

Includes PCjrWORLD

PCWORLD

July 1984

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*The Comprehensive Guide to
IBM Personal Computers and Compatibles*

Symphony! Is it in Tune?

3 Hands-On
Reports!



Laser Disk Storage

Choosing Data
Management Software

High-Speed Modems

Compatibles Update

- **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

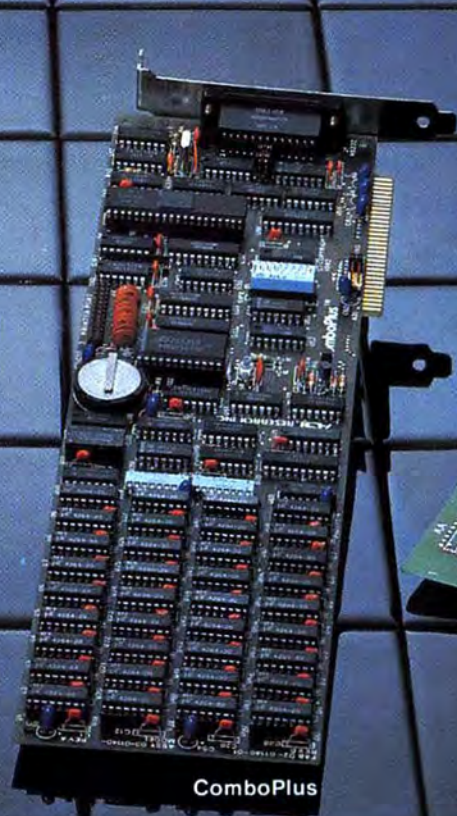
can use the joystick input for other applications by writing your own programs.

- **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.

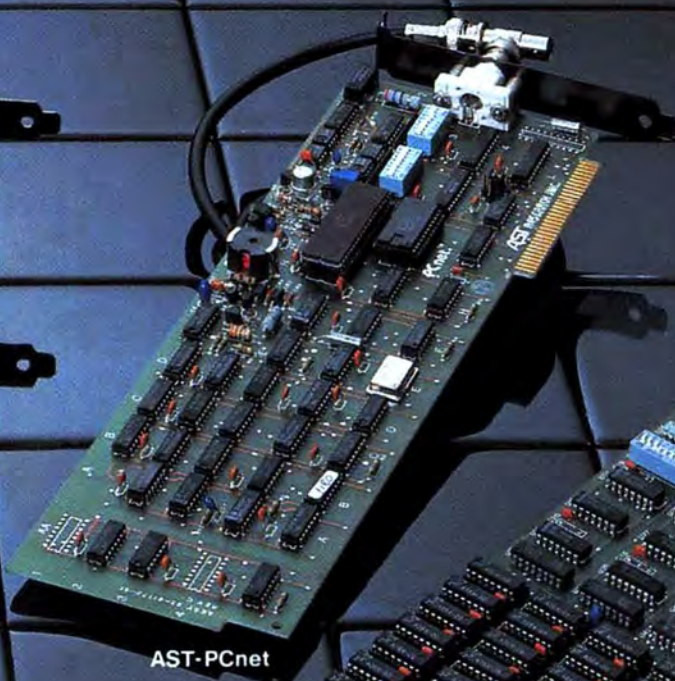
- **Proven Compatibility** — All AST Research hardware and software products are 100% compatible with all versions of the PC and PC-XT as well as the Compaq and other PC look-alikes, and are 100% compatible with PC-DOS 1.1 and 2.0.

- **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, reliability, after-the-sale support, and overall design excellence which give our products the best price/performance ratio in the industry!



ComboPlus



AST-PCnet



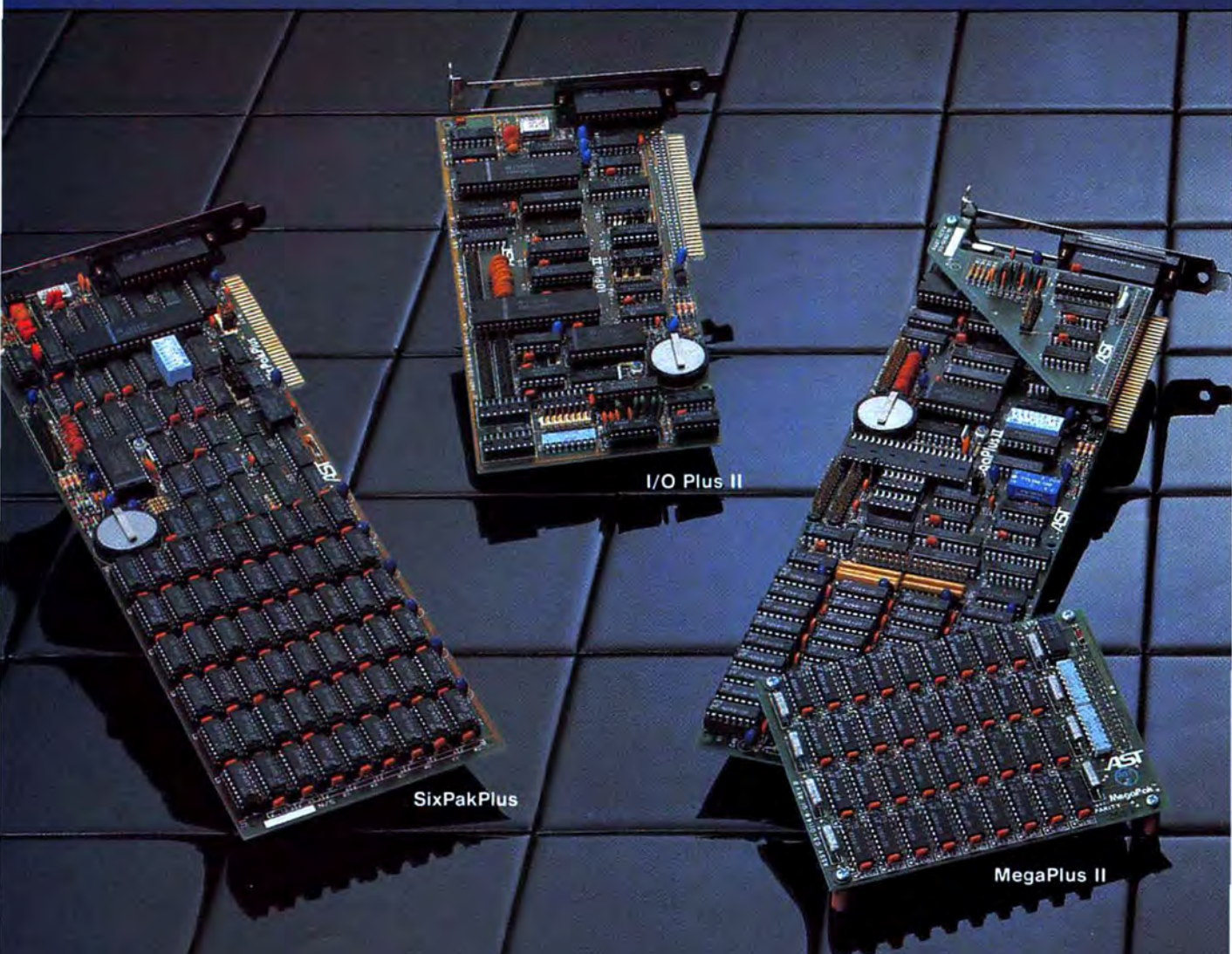
MP Expansion Memory

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

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

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

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



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
SuperPakPlus	X	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.

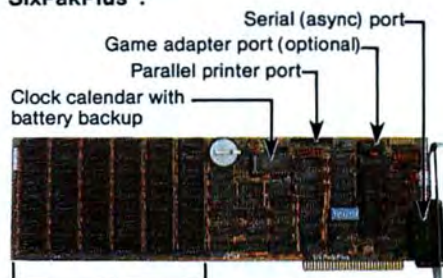
• **AST-3780** — A hardware/software package which allows an IBM PC to communicate with a mainframe in 2780/3780 bisync protocol.

• **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.

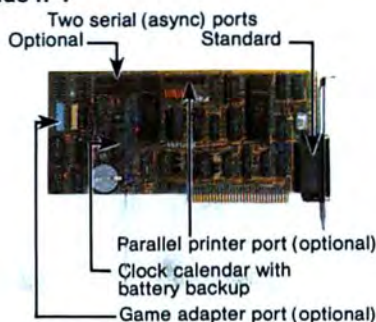


SixPakPlus™:

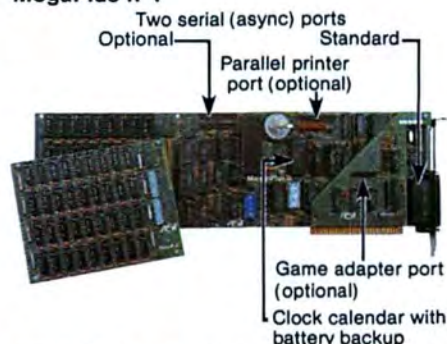


64K-384K of parity checked memory. Added to a PC or XT with a fully populated 256K system board, the SixPakPlus can bring the system memory to 640K, the maximum addressable user memory.

I/O Plus II™:

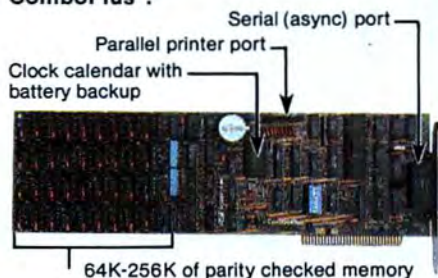


MegaPlus II™:



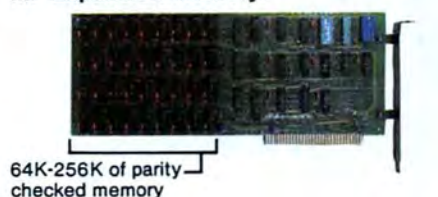
64K-512K of parity checked memory. The basic card expands to 256K, and with the MegaPak extension expands to an additional 128K or 256K of parity checked memory.

ComboPlus™:



64K-256K of parity checked memory

MP Expansion Memory:



AST-PCnet™:



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- Interconnects multiple PC's (57,000 addressable limit)
- All PC-compatible disk drives and printers are shareable
- Networked access to mainframes via shared AST-3780
- Users can execute commands remotely on shared PC
- File lock-out
- DOS 1.1 and DOS 2.0 compatible

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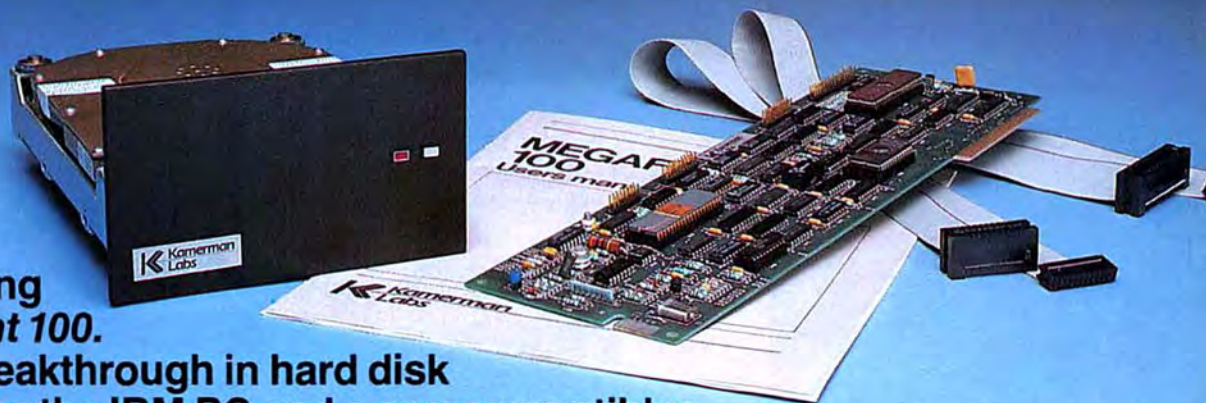
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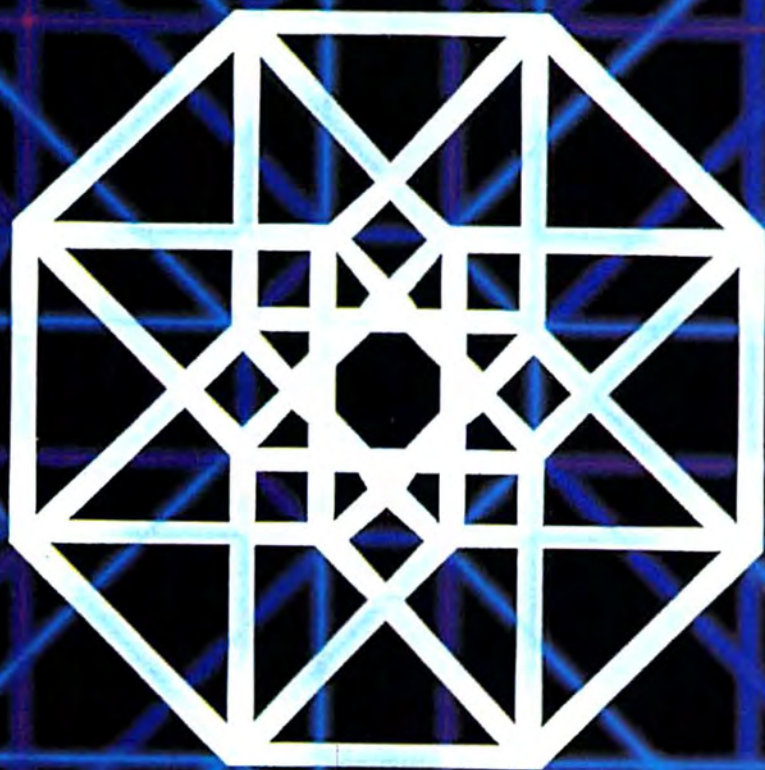
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Get the modems with the name for quality. Quadmodem.™ Fully compatible with Bell 103/212A dial-up modems and the most popular modem brands.

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And now with Quadnet, you don't have to compromise your system to fit our system. Instead, you can easily link as few as two, or as many as 255 IBM PC's together in a hard-wired network. And you can configure them almost any way you want. They can work independently of each other or share resources and peripherals.

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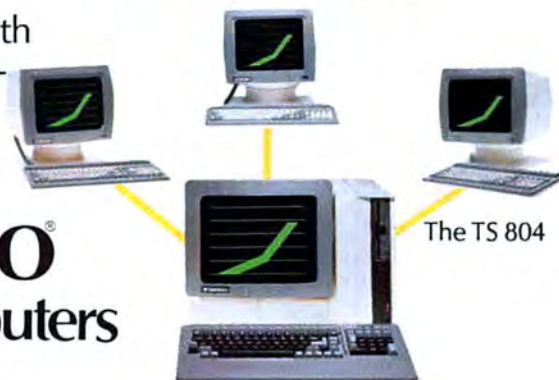
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Computer Software: Today's Shooting Stars

The art of developing computer software has attracted an enormous crowd of practitioners. This hot new field draws some people with promises of overnight fortunes; others are intrigued with the endless possibilities of programming. But like most artistic ventures, software authorship offers no guarantees.

Of course, some software authors become instant millionaires and inspire us all: Tom Frye, a 26-year-old high school dropout and Berkeley panhandler, converted the *Pac-Man* arcade game into an Atari video-cassette and earned a million dollars in royalties; Bill Gates, 28, featured on the April 16 cover of *Time* magazine, developed a \$100 million empire through his software company, Microsoft; and Mitch Kapor, a former radio disk jockey, grossed over \$50 million in one year with Lotus's 1-2-3. Still, the total number of software millionaires is less than twenty out of thousands.

Everyone would like to have a hit program and be a millionaire, but this goal has remained out of reach of most programmers. It's easy to conclude that those who make it big are more intelligent—they have the right concepts and know how to implement them—whereas the others are simply coding up the wrong tree. But even those who catch the big wave usually have only one glory ride.



With the exception of Bill Gates, most of today's software gurus have made it on the basis of one successful program. Dan Bricklin and Bob Frankston transformed the personal computer from a hobbyist's toy to a serious business machine when they unveiled *VisiCalc*, but their subsequent *TK!Solver*, despite its introductory fanfare, failed to capture users' imaginations. Rob Barnaby wrote *WordStar* in 1977 but has not been heard from since.

As reported in *Time* magazine, Bill Gates seldom, if ever, writes any code. Although he is a brilliant programmer, his incredible success as chairman of Microsoft is primarily derived from his astute business sense. Gates built a company of more

than 500 people, including a regiment of brilliant programmers.

So the question is, if the software princes are smarter than the software paupers, why do so many of them hit the jackpot only once? Perhaps the field of personal computer software is still too new to ask that Top Ten artists repeat their genius—even the greatest stars make bad recordings. Certainly the formula for creating a hit program eludes even the finest programmers.

A song does not consist of mere lyrics—the delivery and video enhancements are what make it sell. Similarly, a program's ultimate greatness is not determined by the elegance of its code. The secret to successful software is a delicate balance of creative vision and functional skills. Snappy techniques are important, and software developers have learned to use techniques such as windows, mice, and menu commands to captivate their audience. Harmonizing these factors into one final product is a tough job. Aspiring rock groups have to learn how to tune down the bass; aspiring software authors have to develop an ear for the user's needs and abilities.

The single-success rule may be on the road to being broken. In this issue we are releasing the first in-depth review of one of the most important

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David Bunnell

applications programs ever introduced in the history of personal computing. This program, *Symphony*, is a second attempt from Mitch Kapor and Jonathan Sachs, authors of the number-one spreadsheet program for the IBM Personal Computer, Lotus Development's 1-2-3. *Symphony* incorporates five applications on one piece of software.

Perhaps the window software environment, which allows users to integrate applications from different vendors, will prove a better approach

The search for the
next software star
continues.

than the less versatile all-in-one approach. Even though its current applications are limited, *Visi On* looked impressive at a recent Paris IBM Personal Computer show; maybe computer journalists in the United States have written it off too soon. *Microsoft Windows* also shows promise in this arena, as it will allow you to mix and match any MS-DOS-based applications, including over 90 percent of all IBM PC programs.

Meanwhile, the search for the next software star continues. The great program that will point out the new direction for personal computing probably has yet to be written, and the Grammy awards for computer software aren't given until the programs hit the stores. ●



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If you want to expand the use of Lotus 1-2-3™ on your IBM-PC®, or extend your application of VisiCalc, here are five books to smooth the way for you.

BUSINESS WORKSHEETS FOR 1-2-3, by Jack Grushcow, is a virtual encyclopedia of ready-to-use spreadsheet applications for the business user. Included are: accounting, financial management, forecasting, investments, amortization and financial statements. It's complete with instructions, source listings, and illustrations.

1-2-3 TUTORIAL APPROACH, by Scott Jones, uses plain language, illustrations, and well-documented examples to teach beginners the basics of 1-2-3™. Using four typical worksheets, you'll learn how to set up and print from worksheets, manipulate data and produce graphic presentations of data — painlessly.

1-2-3 REVEALED, by Dan Shaffer, is a complete guide to developing faster, easier and more powerful worksheets, using the power of the 1-2-3™ keyboard macro facility rather than Lotus' 1-2-3™ documentation. Available as a book or as a book/disk package.

1-2-3 AT WORK, by Thomas Cain and Nancy Woodard Cain, is organized from an operational perspective to help the business user explore new and creative applications. Examples and illustrations explain when and why to use 1-2-3's commands and provides alternatives not made evident in the documentation.

VISICALC EXTENSIONS FOR THE IBM-PC™ AND PC-XT™, by Jack Grushcow, is an illustrated, applications-oriented guide for the serious business user. It focuses on customized printing extensions, data transfer between spreadsheets, sorting extensions and more, to extend and adapt IBM-PC™ software to suit the user's needs.

If you've found 1-2-3™ or VisiCalc rough going, visit your local bookstore or computer retailer and pick the title that can help smooth out the bumps.

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A review of the IBM Personal Computer family: Summer 1984



UP AND RUNNING

And Swimming, Building, and Baking. Building and baking? They don't produce gold medal winners, but they do figure in staging the Olympic games. So do 200 IBM Personal Computers (including software) that are part of IBM's sponsorship of the 1984 Olympics in Los Angeles. In fact, IBM PCs are hard at work in both sports and administration.

PCs are involved in a wide range of planning and analytical activities, though they don't provide official results of the various athletic events. Some events, for example, use the IBM PC to determine how competitors are seeded—who competes against whom. In other events, such as archery, the PC simplifies the complex task of recording scores and compiling statistics for each athlete as the competition progresses.

In events like gymnastics that depend on points awarded by judges, statistics can be kept on the PCs to analyze scoring consistency. Also, a whole range of information about individual athletes, past Olympics, and

world and national records, both past and present, can be quickly recalled and compared with the help of the IBM PC.

Last but not least, administration. Spreadsheet programs, such as IBM's Multiplan™, were used on the PC for planning and forecasting by nearly every administrative department, from Construction to Ticketing. The same departments speed up some of their day-to-day accounting tasks with the help of the PC and IBM accounting packages.

Departments with specific software needs developed special packages with the assistance of a programmer whose services are part of IBM's Olympic sponsorship. Specially designed programs include database management applications to help handle transportation requirements and inventory control programs to keep track of sports equipment and personnel records.

In short, there's hardly an area of planning and staging the 1984 Summer Olympics that the IBM Personal Computer doesn't play a part in. Maybe there *should* be medals for administration.

Multiplan is a U.S. trademark of Microsoft Corporation.



ON THE STOREFRONT

A Shorter Distance between PC Points. We're all familiar with the feeling of being lost in the growing maze of new computer products. IBM has opened a path through that maze, straight to the information and answers you need about IBM Personal

Computer Products—information about a specific software package or hardware configuration and answers to technical questions.

The key to entering this new information path is the IBM Customer Support System (CSS) at your authorized IBM Personal Computer retail dealer or IBM Product Center. Dealers in over 300 cities throughout all 50 states use the Customer Support Sys-



tem, which includes a nationwide communications network, to help give you instantaneous computer-age service support that's unmatched by any other computer manufacturer.

Colorful Stops along the Way. More than 1,700 authorized IBM dealers have access to a permanent and continually updated directory of IBM Personal Computer product information in IBM's Customer Support System. For a sharp color display of the type and level of information you want, visit your dealer or IBM Product Center and choose from lists of options displayed on an IBM PC color monitor. There are choices that guide you quickly and easily from product directories to in-depth product demonstrations and configuration information.

Since knowing how to take the first step is often a problem, CSS gives you a variety of possible starting points. By selecting the appropriate category—such as printers or business software—you can move to a list of specific products and then to the



Information from CSS with simple one-key commands

product demonstration you want. If you know a product name to begin with—Word Proof, for example—CSS will make an alphabetic search for it. To keep you up-to-date, there's also a special listing for new product announcements.

You can browse through the CSS displays at your own pace, pausing at a given spot or moving quickly backward or forward by using simple one-key commands that are always displayed at the bottom of the screen. One of these commands enables you to make print-outs of any information you wish to save for future reference.

The IBM PC family's color graphics capabilities make the CSS software demonstrations especially impressive. The Multiplan demonstration, for example, consists of several consecutive screens of information. Each screen is split vertically, with representative sections of the actual program on the left and explanatory text on the right. By the time you've seen the entire demonstration, you'll have a good idea of both *what* the program can do for you and *how* it does it.

Answers at the End of the Line. Over 1,000 authorized IBM retail dealers and IBM Product Centers are linked through their Customer Sup-

port System to the IBM Information Network. This nationwide communications capability helps your dealer give you fast, efficient service. Warranty claims, for instance, can be handled through CSS with a minimum of paperwork and delay. Dealers also use the network to communicate with other dealers and with IBM to keep abreast of the latest product and service information.

In addition, the CSS network is your gateway to technical information about the IBM Personal Computer family of products. IBM maintains a database on a 3033 mainframe in Tampa, Florida, that your dealer can use to answer—within minutes—a wide range of questions. If the solution isn't on hand in the database, your question can be submitted through CSS to a technical support staff in Boca Raton. There, it will be analyzed and an answer returned through CSS to your dealer.

The information used to answer your inquiry is added to the CSS database, where it will be immediately available for anyone else with a similar question. Your technical inquiries therefore contribute to the growth of the Customer Support System. Its on-line product information, color graphics displays, and advanced communications all have a single purpose—to help you get the most out of your investment in IBM Personal Computer hardware and software products.



HARDWARE NEWS

Color. There's color news for the IBM PC, IBM PC XT, and IBM *Portable* PC in the form of the IBM Personal Computer Color Printer. It's a high-performance, dot matrix printer that can print charts, graphics, artwork, and text in up to eight colors. The Color Printer produces color graphics that can enhance the appearance of your reports and presentations and make the information they contain even easier to understand. It can also type directly onto overhead transparencies.

The IBM PC Color Printer's range of performance features make it especially well suited for heavy-use/high-productivity applications. A near letter quality printing mode is standard. Printing speeds of up to 200

characters per second can help save time. So can programmable automatic control of print requirements such as print mode, line spacing, and margin and tab setting. These programmable features act as an extension of many software products—word processing programs, for instance—and can be initiated with just a few keystrokes.

A final feature for those who like a personal touch. You can use the Color Printer to personalize your documents by varying the printing modes, character spacing, and boldness. This allows you to differentiate



The IBM PC Color Printer

among headlines, subheads, and quotations and even to print math and science equations.

The Big Crunch. Not long ago, computing and number crunching were nearly synonymous. Personal computers and software for everything from office management to agriculture changed that, but the need for heavy number crunching has hardly disappeared. If it's still a part of your computer workload, the IBM Personal Computer 8087 Math Co-processor can help speed up your calculations.

The 8087 is a floating point co-processor that multiplies, divides, adds, subtracts, exponentiates, and performs trigonometric and logarithmic functions. It works together with the PC's 8088 processor to improve the execution speed of floating point operations by as much as 10:1. The Math Co-processor increases calculation speeds so greatly because it makes floating point operations a hardware rather than a software function.

In addition to increasing the speed—and often the level of precision—of statistical and analytical math packages, the Math Co-processor can improve the display speed of graphics and video games. It also significantly improves high-level language execution time, and is designed to work with the APL Interpreter and the version 2.0 Pascal and FORTRAN Compilers discussed next in this issue.



WHAT'S THE PROGRAM

We Speak Your Language. IBM Personal Computers are shameless polyglots. They can handle most of the popular programming languages you want to work with. Much of the credit for their versatility goes to the IBM Disk Operating System (DOS) 2.10. This updated version of DOS 2.00 was developed to provide support for the IBM PCjr as well as for the IBM PC, PC XT, and IBM *Portable* PC. So all members of the IBM Personal Computer family are united by a single master program that provides the required support between their hardware and a wide range of application programs.

More to our present linguistic point, the DOS 2.10 diskette contains two programs, Disk BASIC and Advanced BASIC, to help you write your own programs on an IBM PC. (IBM PCjr BASIC—a separate, optional cartridge—provides this support for the PCjr.) Disk BASIC adds DOS file support, date, time of day, and communications capabilities to the BASIC language that comes with every personal computer from IBM. Advanced BASIC adds advanced key trapping and advanced graphics—including viewports, windows, and paint tiling—plus music and other capabilities.

DOS has other features that help simplify advanced program development and design, including a line editor, a linker, background printing, and chaining of commands. For help with writing and editing particularly sophisticated BASIC programs, there's the BASIC Programming Development System, a software package that consists of two programs and four utilities. The first program includes a Text File Editor and a Structured BASIC Pre-processor; the second includes a BASIC Formatter and a BASIC Cross-Reference.

Native Translators Available. The IBM BASIC Compiler compiles or translates the BASIC programs you've written, down to native object code so they'll run on your IBM PC. And BASIC is just the beginning. DOS also provides the support you need to develop and run programs using the IBM Personal Computer Macro Assembler or the FORTRAN, COBOL, and Pascal Compilers.*

*Two of these, the FORTRAN and

Pascal Compilers, are available in recently updated versions. IBM PC Pascal 2.0 is based on the ISO standard, and IBM PC FORTRAN 2.0 conforms to the ANSI-77 standard subset level. Both new versions feature improved arithmetic capabilities, and both support the IBM 8087 Math Co-processor for greatly increased speed in processing floating point calculations. (For more about the Math Co-processor, see "Hardware News" in this issue of *Read Only*.)

In addition, versions 2.0 of the FORTRAN and Pascal Compilers feature a Library Manager for creating user-defined libraries and provide easy access to all files in any subdirectory through DOS path support. FORTRAN 2.0 supports linking of object modules with subroutines written in Pascal 2.0 and vice versa. Both new versions support linking of object modules with subroutines written in IBM PC Macro Assembler.

There's a bargain in store for those who already own the 1.0 versions of these compilers: you have the option of buying an upgrade to the 2.0 version at a substantial savings from the full 2.0 price.

To ensure that your programming reach doesn't exceed your grasp, the IBM PC APL Interpreter enables you to write and edit your own programs in APL. It can also be used to exchange data files and workspace between your IBM PC and many mainframe computers.*

Finally, if you're inclined to make serious use of the IBM PC's array of programming aids, we suggest that you also take a look at the recently announced IBM PC Sort program. It provides support for data types and file organizations used by the IBM DOS-supported languages mentioned

or files, merge multiple input files, selectively include or exclude records, and create an output file containing the records, pointers, or keys from the input files. There are no arbitrary limits in IBM PC Sort for file size, record length, number of keys, or number of input files.

*BASIC Compiler and Macro Assembler will run on the IBM PCjr. APL Interpreter will not. Although the IBM PCjr does not support FORTRAN, COBOL, and Pascal Compilers, most of their output will run on the PCjr if there is sufficient storage.

Now Get Organized. The IBM PC's ability to run a wide variety of commercially available programs and to help you develop your own applications may result in a good news/bad news situation. The good news is that you'll be able to satisfy your application requirements. The bad news is that you'll probably be the one responsible for keeping track of your growing library of programs. If, as we've often found, enthusiasm outstrips organization, you may find yourself falling behind—especially if you're working in an area, such as



Animation Creation software from IBM

small business finance or education, where programs multiply rapidly.

Fortunately, help is in sight, in the form of Fixed Disk Organizer, an IBM software package that does just what its name suggests.

Fixed Disk Organizer has a master menu that lets you sort out your various application programs by category—word processing, spreadsheet, communications, and so on. You can tailor the menu to your specific application needs by adding new menu categories, revising or deleting existing categories, or changing titles. The master menu allows you to review all the programs stored on your fixed disk at a glance and to call them up quickly with just a couple of keystrokes.

Fixed Disk Organizer also helps protect sensitive data by allowing you to create passwords and restrict access. It also enables you to write a



Application development tools from IBM

above and can significantly speed and streamline your programming efforts.

IBM PC Sort can be used as a stand-alone utility, integrated into a batch job stream, or invoked directly from a COBOL program via the Sort verb. It can sort records from a data file

string of complex DOS commands into a batch file and execute them whenever you want simply by selecting that file from the menu. And in case part of your organizational problems stem from not always remembering just how things are organized, you can use Fixed Disk Organizer to establish Help files as a reminder.

So we're all in trouble—no more excuses for not being organized.

Moving Pictures and Mathematical Castles. Let's not forget that there's more to life than programming, compiling, and getting organized. There's also software from IBM for pure enjoyment and for enjoyable education. Two such packages are Animation Creation and Adventures in Math.

Adventures in Math incorporates math drills into an adventure game with vivid color graphics of a castle and its passageways and treasures. To find the way out—and to uncover as many treasures as possible along the way—children (or particularly skillful adults) have to solve basic math problems. The program's difficulty level increases as you solve the problems you're confronted with.

Using Animation Creation, you or your children can draw your own pictures and watch them come to life. To draw pictures, you select from 254 computer characters and position them on your screen. Add color by choosing any of 16 foreground and 8 background colors. Then, by slightly repositioning the images on successive screens, you can create animation.

Next stop, Hollywood.



HARDCOPY

You Can't Enjoy the Game without a Program. Earlier in this issue (see "On the Storefront"), we discussed the Customer Support System for on-line information about IBM Personal Computer products. Much of that information is also available in two publications: *The Guide*, a directory of Personal Computer offerings from IBM, and *The Library*, a directory of IBM Personal Computer software offerings. If you want to enjoy the personal computer game, these are the "programs" you need to do it.

The Guide, published twice a year, is a catalog that contains clear, concise descriptions of IBM PC, IBM PC XT, IBM PCjr, and IBM Portable PC systems. It also reviews printers, video displays, expansion units, and all other IBM PC hardware products. A separate section of *The Guide* contains articles on IBM PC software packages.

Both hardware and software articles are illustrated



with annotated color photographs—of key screens for the software packages—and start with charts that provide quick product overviews. Other noteworthy features include sample configuration tables for all three systems and a closing section on Sales and Service Support.

The Library, updated quarterly, presents an overview in booklet form of the entire IBM PC software product line. It presents the software by category, with sections on Operating Systems and Languages, Personal Productivity, Communications, Business, Education, and Entertainment. Program descriptions are brief and to the point. Each includes a short overview, program highlights, and system requirements. There's also a chart at



the end of the booklet that shows at a glance which programs are compatible with the IBM PCjr.

Or the Hardware without a Manual. If *The Guide* and *The Library* are the general road maps to IBM PC products, the *Technical Reference* and *Hardware Maintenance and Service* manuals—now available in newly updated versions—are the detailed maps of downtown. It's not a trip everyone wants to take, but if you do, these are the right directions.

There's a three-volume *Technical Reference* set for the PC and another for the PC XT and Portable PC. These manuals include the functional specifications for the system units and for the options and adaptors in the IBM PC product line. The *Hardware Maintenance and Service* manual details many aspects of troubleshooting a personal computer from IBM. It includes a parts catalog, a section on preventive maintenance, and instructions for identifying the failure of a replacement unit.

*These manuals are intended for use by technically qualified service personnel.



TIPS AND TECHNIQUES

If you use Personal Editor—IBM's full-screen editor for writing programs and brief documents—but find yourself displaying the Help file whenever you forget a function key assignment, here's a little help from the fellow forgetful.

Function key assignments can easily be displayed on the command line of your Personal Editor screen by assigning F1 to display the unmodified keys and alt+F1 to display the alt+Fx keys. You can then assign the Help function to alt+H, although you probably won't need it nearly as often as before.

The macro for the F1 assignment can be written as follows: def f1 = [cursor command] [begin line] 'F: 2=Save 3=File 4=Quit 5=Erase 6=EraseEOL 7=Print 8=Switch 9=InsL 10=Ins&Indt' [cursor data].

For more information about IBM Personal Computer products, see your authorized IBM Personal Computer dealer or IBM Product Center. To learn where, call 800-447-4700. In Alaska and Hawaii, 800-447-0890.

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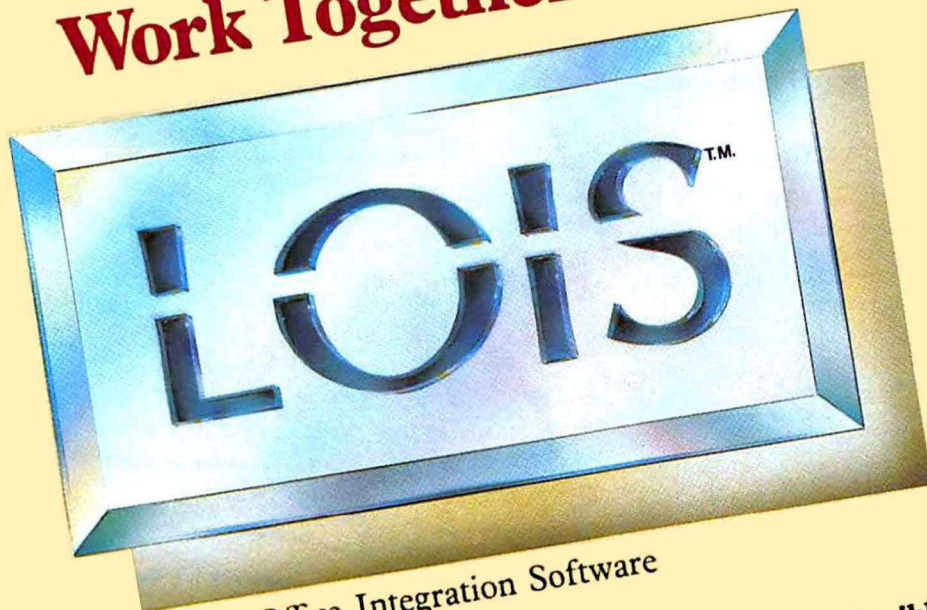
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Circle 409 on reader service card

Electronic Democracy

Imagine a nationwide interactive communications network that connects with every home's personal computer, telephone, and TV set. On this network local, state, and national issues are debated and decided periodically. Each viewpoint is clearly and fairly framed, and unpopular views are defended vigorously by a "public dissenter." Voters, using individual passwords to prevent fraud, cast their ballots at the keyboard. The true voice of the people is regularly and authoritatively expressed. The electronic referendum becomes a part of our lives—as popular as "Monday Night Football," though with much more at stake.

This scenario is both attractive and repulsive—and it is quite possible. The hardware and software are nearly in place; the widespread use of cable TV systems is slowly but surely linking homes into an electronic network that may someday provide this sort of immediate, electronic democracy. The immediacy is attractive; the chance of grave political mistakes, repelling. Yet no system of government, including our present one, can avoid mistakes. Real power tends to promote restraint among honorable people who wield it. But direct, computerized democracy wagers everything on the ability of the masses to



make reasoned judgments. The question is, can they? Should electronic democracy be promoted at all?

Electronic democracy would profoundly change the way we view "government by the people." Today we popularly elect representatives, who then make policy affecting our lives. Electronic democracy promises speed, accuracy, and convenience without representation. Every issue of local, state, or national importance can be put directly to the voter. Problems of fairness, of course, would have to be solved in the design of such a system. Problems like ensuring universal access and guarding against fraud—which have been with us since the beginning of our republic—would have to be solved. But the key

question about electronic democracy is not so much its feasibility as its desirability.

America's founding fathers would have been horrified at the thought of government directly in the hands of the people. Thomas Jefferson, who emphasized the need to inform and educate a self-governing electorate, supposed that the wisdom of the people would be expressed in their choice of a "natural aristocracy" of talent to lead them. James Madison defended a constitutional compromise by which the people retain

REMark

ultimate authority—though only through elected officers. Those representatives were intended to restrain the electorate's passions; the will of the people would be considered at length, refined, and articulated by those skilled in the delicate art of governing. Thus, in this view, representation is not a necessary evil but rather a means of protecting the real interests of the people.

Of course, some contend that people know their own interests better than any set of elected representatives. The suffering we experience due to war, waste, or corruption may be the natural result of too much power being concentrated in too few hands. Ordinary people, given the needed information and preparation, may be better at creating a just and wise society if they have the chance to run it themselves.

The computer revolution enables us to test this hypothesis, but the testing will be risky. Would "one terminal, one vote" democracy improve the quality of decisions made? Would the First Amendment be defeated if put to a vote of the American people? Would the taking of American hostages by a foreign power cause a government instantly responsive to the will of its citizens to retaliate by reflex? The masses have commonly been judged as being intemperate in war, shortsighted in peace, and unable to deal with the refinements of economic policy. Recent national polls on political issues tend to support this view.

But if we cannot trust ourselves, who can we trust? If genuine self-government is dangerous, are we not saying that democracy is dangerous—unless restrained by the aristocrat? Is government by the terminal what we really want? Or should we honestly admit that we feel compe-

tent to choose our leaders but not to guide them? Alexander Hamilton, one of the early American aristocrats, would likely nod his head in assent and repeat his assertion that "the people, sir, is a great beast."

Answers are not easily found. If self-government is chiefly a matter of justice and individual right, then representation should be eliminated whenever possible. In this light the computer is an ally in the battle for true democracy. Of course, a plausible case can be made for the other side. The decisions made by elected delegates are likely to be better, more informed, and, one hopes, wiser than those made by a keyboard electorate.

But this argument has its dangers. A defense of democracy ultimately rests upon confidence in people. I believe that in the long run individual citizens will best understand and protect their own interests. Without this confidence democracy could not sustain itself. But is this conviction a self-deception, ultimately disproved by practical experience? If we reject computerized, direct democracy because we fear the outcome, then the whole concept of democracy is in question. Perhaps it is not computers that present the real problem, but placing the ultimate authority in the hands of the governed. And so the answer is at hand: too much democracy—in any form—is dangerous.

I reject this answer because I am a democrat. I realize that people can and sometimes do make terrible mistakes, but I trust them in the long run—certainly more than any elite body. A computerized system of direct participation in public affairs might bring about a better, more robust democracy. Of course, there are dangers to consider: a record of what we spend, say, join, and support and how we vote could be filed and used by others with less than pure motives. Access to the computers that collect and use such data must be carefully safeguarded. Above

all, we must be certain that any system of citizen participation be equally accessible to rich and poor.

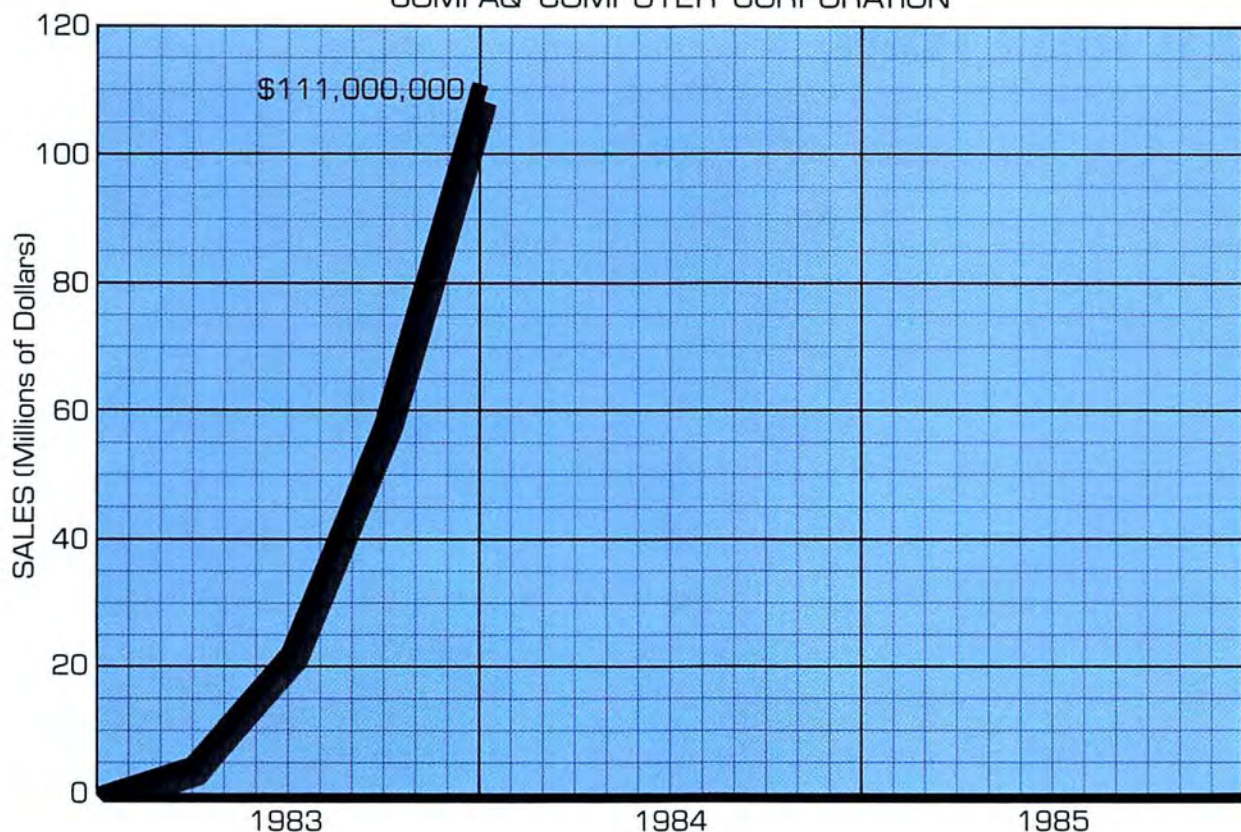
Democracy requires universal access not only to the decision-making process but to the education and information that make intelligent choices possible. I submit that both will likely be enhanced as the computer enters our personal, professional, and political lives. Massive amounts of information, thanks to a growing number of publicly and privately owned data bases, will soon be but a keystroke away. Literacy for all—universally available education—is now within reach for the first time in human history. Perhaps universal democracy will be as well.

Computers cannot produce a spirit of universal participation, but they can support it. If politics becomes more tangible, more countable, and more keenly sensed and effective because of computers, we may yet revive our flagging democracy. The personal computer, tied to a world of computers, can reinforce the spirit of democracy and endear it to us.

Of course, my confidence in people and in their use of the computer ultimately may prove unwise. An irresponsible, networked citizenry may ruin its own system of self-government and much else besides. But the great experiment is surely coming. Like Tocqueville, I await the process of full democratization "full of apprehensions and of hopes." ●

Carl Cohen is professor of philosophy at the Residential College of the University of Michigan in Ann Arbor. His most recent book is Four Systems (Random House, New York, 1982).

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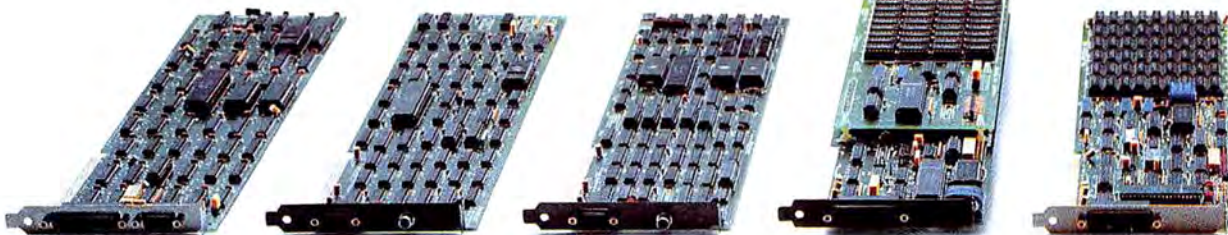
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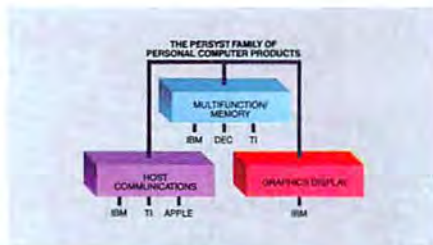
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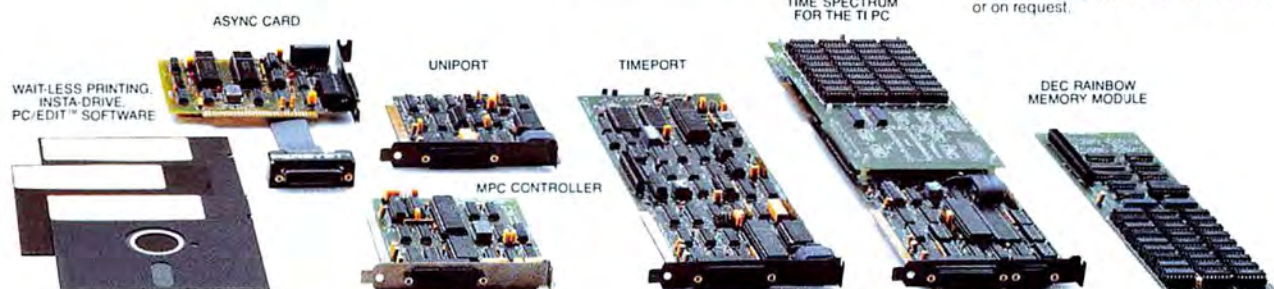
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Circle 77 on reader service card

Letters

Key Tronic Comes Through

I read your recent article on the advancement of computer technology to aid people with physical disabilities in operating computers ["Open Doors," *PCW*, Vol. 2, No. 3]. These people would not otherwise be able to benefit from the vast opportunities made possible by the computer boom. I am one of "these people."

As a result of a spinal cord injury I am paralyzed from the shoulders down. When I became interested in computers, I found performing any of the procedures that require the simultaneous pressing of two or more keys to be impossible (e.g., <Ctrl>-<Alt>- and such symbols as !, #, %, and ^).

With no knowledge whatsoever about computers, I went to purchase an IBM PC. I assumed there would be no problem in manipulating the keyboard, since I can operate a typewriter with no problem. I quickly learned differently. With the Shift-Lock key on a typewriter I am able to use the eraser end of a pencil in a brace strapped to my right arm, of which I have limited use, to print any character. The locking key feature does not exist on a PC keyboard.

The problem seemed simple enough to me to correct by replacing the <Ctrl>, <Shift>, and <Alt> keys with ones that would lock and release as do the <CapsLock> and <NumLock> keys. However, when I brought this to the attention of the ComputerLand store where I was planning to purchase the system, they researched the matter and responded by saying that they could not make

the alterations. Although they made a thorough and sincere investigation, they found no answers.

After contacting every person I could think of, including IBM's top brass in Boca Raton, and receiving no assistance, I made a last-ditch appeal to *PC World* for help. You put me in touch with Key Tronic, where I talked with Robert McConnel, who said that not only could it be done but that he would see that it was done immediately. He did. As a result Key Tronic now offers a keyboard specially built for the disabled.

With a keyboard I could operate, I began looking for a computer. In my search for a PC, I stumbled upon a Columbia MPC, which offered more computer and software for less money (Key Tronic makes the keyboards for Columbia). I bought my MPC without a keyboard and received a discount that equaled the cost of my modified keyboard, hence no extra expense.

I have no hard feelings toward IBM for its lack of help, only appreciation for the help of *PC World* and Key Tronic. The only problem left is that of having to swap disks. It seems as if a hard disk drive would alleviate this problem, but as is the case most often, the cost is more than I can afford.

Doug Maples
Starkville, Mississippi

Persons interested in finding out more about this special keyboard can call Key Tronic at 800/262-6006.—Ed.

Buyer Beware

I read your IBM PC compatible issue [*PCW*, Vol. 2, No. 4] with considerable interest. I own a Columbia MPC 1600-1, my first computer, and have used same since August 1983. I feel your coverage was excellent, but there are some things that need to be addressed to make the story complete.

Why do people buy compatibles? What do they get for their money? What are their expectations and experiences? In talking to other compatible owners, I find my objectives and experiences typical.

My reasons for buying the Columbia over the IBM PC were simple. The price difference was a few hundred dollars, and the MPC comes with a large bundle of software. My goal was to get into data base management, word processing, and eventually spreadsheet-based graphics at a definable cost. I figured that as a first-time computer user, having a single software and hardware source to deal with would get me up and running fast. Having bundled software also spares the novice having to select software. Right?

Columbia (as do several compatible manufacturers) centers its bundled software offering around Perfect Software products. The software bundle was a nightmare. By the admission of both Columbia and Perfect Software, the software was buggy. I waited months for revised editions of *Perfect Writer*, *Perfect Calc*, and *Perfect Filer*. I have never gotten the word processor to run properly. The filer came on a disk with parity errors. It took novice me many hours to discover this. I returned the disk and requested a replacement, which I have never received. Now I'm shopping for an

easier spreadsheet to avoid having to use "sum(f6:f26)+g28*1.07" to get a bottom line.

When I called Perfect Software for help they said to call the manufacturer. Columbia said to ask my dealer. My dealer said, "Yes, we're hearing that a lot, and we can't figure it out either." You'll note there are no Perfect Software products on the top-sellers list, but uniquely there are third-party, disk-based training programs available on how to use those products. The bundled graphics program is OK, but primitive. There are some other packages included, but I have no need for CP/M-86 or a home accounting package right now.

The MPC is said to be hardware compatible. So far mine is, but in order to make it so I have had to go to some lengths. Try to buy a third-party RAM board. A typical purchase inquiry goes like this: "Will it work in a Columbia MPC?" "It should." "But will it?" "Probably." "Will you accept a return if it fails to be MPC compatible?" "Yes, if the package is unopened." The long-distance charges for calling manufacturers and the time invested are costs that will continue indefinitely.

Columbia sells RAM boards at a premium price, and by adding their \$445 128K board you exceed the price of the PC with 256K on the motherboard. The Columbia 256K board is \$645. I paid \$75 for a Columbia parallel printer cable. A Columbia serial cable cost \$50. I had to special order, which means wait weeks for, both. IBM PC plug-compatible cables are widely available off the shelf for half the price I had to pay.

And finally the big one. All compatible owners live with this: by the grace of IBM we compute. Someday

IBM may shut off our water with a proprietary operating system. Our supply of state-of-the-art software will end, or we will bear considerable expense to stay current. This will probably happen about the time IBM's production capacity meets product demand level.

Did I meet my objectives of getting up and running fast and saving a few dollars? Hardly. I now know that I didn't ask the right questions. Yes, the Columbia is compatible, as compatible a machine as can be bought. In fact I'm running PC-DOS 2.00 right now (Columbia's MS-DOS 2.00 has been on back order for months). *Flight Simulator* runs perfectly, and I run several IBM packages without problems. This computer thinks it is an IBM PC. But for how long and for what price? The few hundred dollars saved could be wiped out by one incompatible, nonreturnable purchase.

I would like to stress that as a compatible the Columbia is top shelf, and the hardware has operated flawlessly and met every claim made by its manufacturer. I have a fine computer system. I use it every day with pride and pleasure. We can presume that those who have bought less compatible computers thinking they were fully PC compatible could make my experiences seem insignificant. My point is that compatible buyers assume certain risks and costs that PC buyers do not and they should be aware of these issues as they weigh their decision.

J. Johnson
Minneapolis, Minnesota

Columbia Responds: The Case for Compatibles

Mr. Johnson faced the same problem every new computer owner faces, that of jumping in and getting his feet wet with both the hardware and the software. On-disk tutorials are provided with the Perfect Software, and most users find them very helpful. Not only has Perfect Software Inc. addressed the parity errors in *Perfect Filer*, but the software has enjoyed almost unanimously favorable reviews in industry journals such as *Info-World*, *Creative Computing*, *Popular Computing*, and *PC World*, to name a few.

Columbia has addressed the need to train its dealers even more comprehensively in order to answer questions such as "will a peripheral work in a Columbia MPC?" An authorized Columbia dealer must demonstrate both technical and sales expertise on an ongoing basis in order to be shipped any product. Most authorized dealers will carry compatible peripherals and are able to demonstrate them on the floor.

Mr. Johnson admits that he didn't ask the right questions, although he realizes that he has a wonderful computer system that he loves. One question that he and potential Columbia customers should ask in comparing dollars with IBM is this: What is the actual cost of a comparably equipped IBM—i.e., with seven available expansion slots and 15 software programs? The answer is literally thousands of dollars.

Jan Lange
Director, Corporate
Communications
Columbia Data Products
Columbia, Maryland

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Circle 569 on reader service card

Letters

More Watch Those Compatibles Department

Randall J. Shafer's letter regarding *MultiMate* [PCW, Vol. 2, No. 3] prompts me to write about my own somewhat similar experiences with Corona and SoftWord Systems.

Recently my office bought three Corona PCs by Olivetti. Because we all write for a living, Corona's inclusion of SoftWord Systems's *MultiMate* was a big plus in our thinking. Of course, we assumed we were buying the same *MultiMate* that SoftWord advertises in such magazines as *PC World*. You know, the one with the 80,000-word spelling checker and 180 days of free upgrades.

Imagine our surprise when we unpacked our shining new toys and found no spelling checker. A call to the dealer produced a referral to SoftWord, and they gave us our second surprise—no free upgrades either. Instead we could buy the spelling checker, together with other unspecified upgrades at some unspecified future date, for a package price of \$79.95.

Questioned about the discrepancy between this offer and their advertisements, SoftWord replied that we, like all Corona purchasers, were informed in writing of what we were buying. "That's funny," we thought, "we don't remember any such notification." Much rummaging around in cartons finally produced the notice, on a card inside the *MultiMate* user manual packed inside the carton under pounds of wrapping. In other words, just where you'd expect to find a pig in a poke.

The fact that software doesn't always live up to its manufacturer's claims probably comes as a surprise only to those who still believe in the

Easter Bunny. After having spent over \$11,000 (computers are expensive in Canada), we find SoftWord's attempt to pry another few dollars from us more an insult than an injury. The principle is more troublesome. Neither SoftWord nor Olivetti-Corona is lying, but between them they manage to withhold enough information to mislead the consumer.

Caveat emptor, folks. The micro-computer industry has become the used-car business of the 1980s. It's interesting to reflect that even though the software houses love to moan about unscrupulous users who rip them off by making unauthorized copies, in this game, as the case of *MultiMate* shows, not all the ripping off is done by the users.

*Bert S. Hall
Toronto, Ontario*

MultiMate's Response

The following is MultiMate's policy with regard to the Corona-*MultiMate* end user.

Upon purchasing the necessary additional memory, bringing his or her system up to 256K (minimum), the Corona end user can obtain a free upgrade, Version 3.25C. This upgrade features sheet-feeder support, library printout, required page break, expanded character set, global search and replacement for format lines, bold printing, and shadow printing—to name a few.

There is also available an 80,000-word speller/dictionary approved by Merriam-Webster for \$79.95. This

product is packaged with the upgrade. This is Version 3.26C for the Corona end user.

Again, let me stress the need for 256K (minimum) memory to operate both 3.25C and 3.26C.

*Karen Carlson, Assistant to the
President
MultiMate International Corporation
(formerly SoftWord Systems, Inc.)
East Hartford, Connecticut*

Tip Topped

This letter is in response to the "PC Talk Tip" from Ronald M. Sawey [Letters, PCW, Vol. 2, No. 3].

The loss of carrier when changing communications parameters can be avoided without using duplicate dialing directories as suggested in Mr. Sawey's letter. The real key is to force the modem to stay on line while the communications port is changed. One way to do this is to force DTR (Data Terminal Ready) "on." Most modems have an internal switch to accomplish this.

With DTR forced on, a user could dial up a host or a BBS at 7 data bits, even parity, and change to 8 bits, no parity, without losing the carrier signal. Those using *PC-Talk III* can do this using the <Alt>-P key combination.

*Daniel J. Willis
St. Paul, Minnesota*

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Level III, Partnership/ Corporate \$1000.	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
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(Area code changes to (818), effective January 1984)

Circle 292 on reader service card

Letters

A Better Spreadsheet

I read with interest Andrew T. Williams's "Tracking Your Dividends" [PCW, Vol. 2, No. 2]. By applying 1-2-3's ability he was able to take a practical application and demonstrate its usefulness in a constructive way. I have tried to simulate his worksheet and take his model one step further.

Just below the section on quarterly earnings, an individual table should be constructed to account for number of shares, acquisition price, and current price per share. With this in mind I made the following changes:

I13 (B44*C44)

J13 (B44*D44)

The worksheet can then be conveniently printed with an IBM dot matrix printer on one 8½- by 11-inch piece of paper by using the print setup code \0274\015.

I also offer one correction to Mr. Williams's spreadsheet by showing the @TODAY cell as F7 rather than F4.

Eric B. Davenport
Somerset, Virginia

The print setup code in Mr. Davenport's letter produces italic, compressed print. If you don't want italic, just use the code \015.—Ed.

Foreign Report

I enjoyed Fred D'Ignazio's article on taking a computer to Europe ["Portables Abroad," PCW, Vol. 2, No. 2]. Here are some additional notes from my experience as a graduate student at Cambridge.

Transformers are much easier to obtain in England than in the United States. So are adapters that take two-prong American plugs ("electric

shaver adapters"). Rather than trying to get hold of these things before you go, visit an electronics or stereo store when you arrive. But you might want to bring one or more multiple-socket American extension cords.

As Mr. D'Ignazio mentioned briefly, transformers change voltage but not frequency; the frequency difference between British (50Hz) and American (60Hz) power poses no problem with most computers, though it causes electric clocks and some phonographs to run at the wrong speed. The PC requires a transformer that can handle at least 325 watts (more if you want to power a printer also).

Beware of rectifier-type power converters, whose output is a pulsating, DC voltage suitable only for lights and heating elements; they will damage a computer. These devices are recognizable because although they handle 1000 watts or more, they are small and lightweight. A transformer suitable for powering a computer weighs several pounds.

Some computers and other pieces of equipment have an internal switch to select 120- or 240-volt operation and hence do not require a transformer; check a circuit diagram to be sure.

Finally, note that foreign TV sets are quite different from American ones; you can't feed either direct video or modulated signals from an American computer into a British TV.

Michael Covington
San Gabriel, California

Speaking Up for Seequa

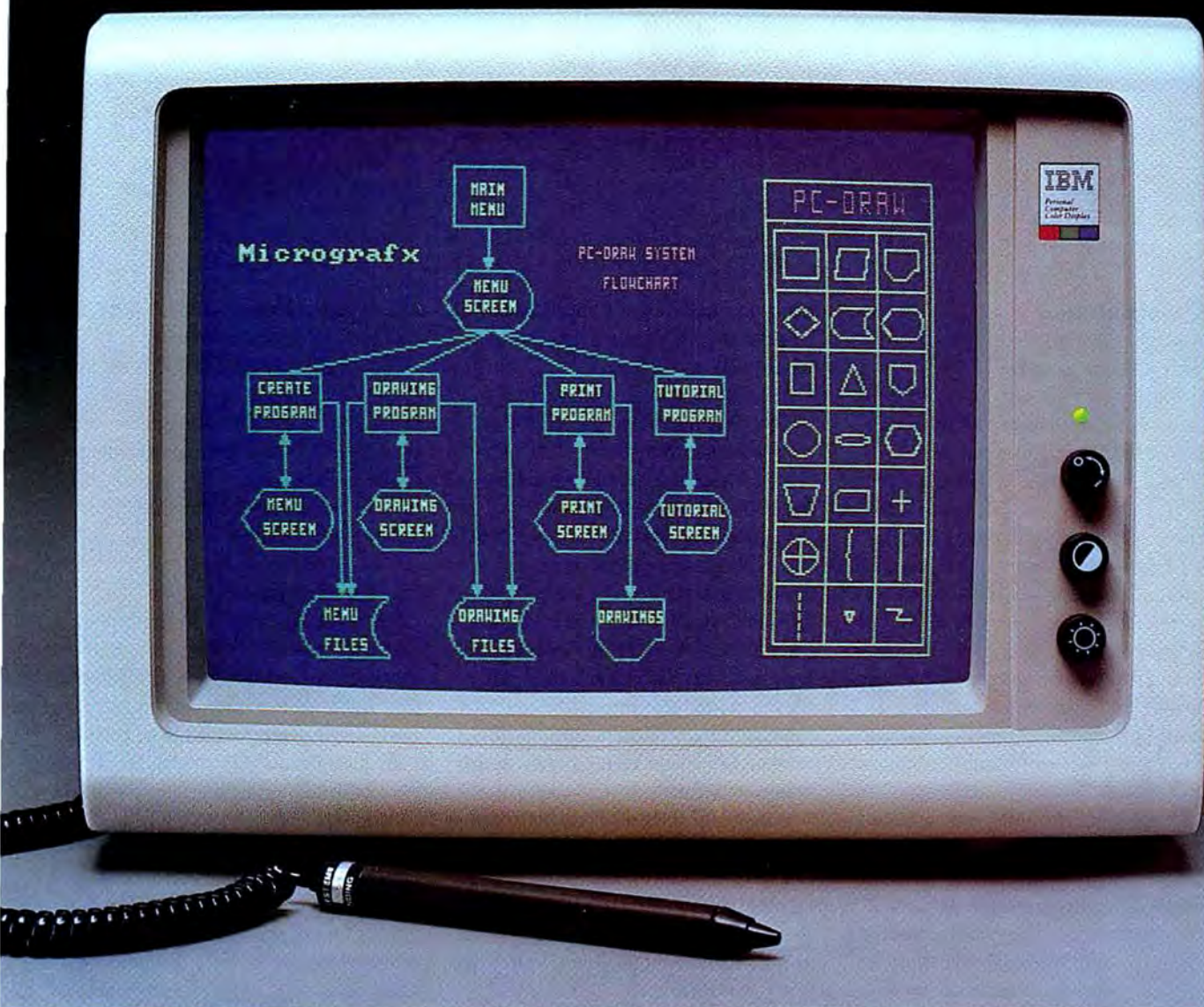
In your latest bit of misinformation on the Chameleon you place it in the "66 percent compatibility" range ["The Compatibles Line Up," PCW, Vol. 2, No. 4]. It might interest you to know that in selling Chameleons for the last several months my most effective sales tool has been to have IBM PC users bring in their software disks to see for themselves that the Chameleon is highly PC compatible.

PC World has consistently printed prejudiced and inaccurate information on Seequa's computers. The first accurate and fair review I've seen is in the latest issue of *Popular Computing* (although that magazine also mistakenly attempted to use Microsoft BASIC-86, rather than GW BASIC, to run IBM BASIC programs).

I consider the Chameleon second to none in compatibility. I have run the IBM PC version of *Xenocopy* (your "acid test") flawlessly on dozens of Chameleons. In fact, one of my customers uses *Xenocopy* daily to transport his legal documents between his Chameleon Plus and his Osborne. Can you say the same about your beloved Compaq?

Jim Gray
Doraville, Georgia

PC World had the Chameleon in-house for a number of weeks, and we were thus able to spend more time with it than with some other computers. GW BASIC, not Microsoft BASIC-86, was used in our tests. Other compatibles were able to run the DOS 2.00 sample programs—the Chameleon was not. PC World stands by its results.—Ed.



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Circle 332 on reader service card

Letters

Congratulations

My congratulations on your new section, "Getting Started." I've been using my IBM PC for almost a year now and have become fairly proficient, thanks in large part to *PC World*. Sometimes we forget, however, that there are still beginners out there. I remember the frustrations that soon overcame my initial excitement on getting my own IBM computer. You took the intricate and obscure explanations from software manuals and computer science textbooks and put them into words I could understand. This was one of my main reasons for subscribing to *PC World*.

It seemed, though, that as your articles became more sophisticated, the beginners were forgotten. "Getting Started" is just right for the new PC owner and continues your proud tradition. It will even help us "old-timers" who don't know as much as we think we do. Bravo.

Maurice White

Papillion, Nebraska

Hard Luck

After having recently wiped out a friend's hard disk, I felt that my experience should be shared with others. Basically the situation was that I took what I believed to be a DOS 2.00 boot disk with me to his machine. The machine, a PC XT, was being used in a doctor's office as a terminal for Blue Cross/Blue Shield data and as a beta test site for a local physician's billing program. Since the billing program was designed so that

the computer-inexperienced doctor could not easily enter DOS and see what was on the hard disk, I used my DOS disk to boot the machine.

The problem was that my DOS disk was one that had a CONFIG.SYS file that was designed for my PC, which has a 23-megabyte Pegasus hard disk. When my CONFIG.SYS automatically came up on the XT, it established a new file allocation table. Once that was done, there was no way to retrieve files of any meaning. Of course, program files to which nothing had been written could be retrieved, but any file that had been written to consistently was worthless.

After calling Peter Norton's office, John Sweeney of Tall Tree Systems, Great Lakes Computer, and the IBM support unit in Boca Raton, it was determined that the only thing to do was to format the disk and start over with backups.

The reason that I bring this to the attention of the readers is that people must be using many different hard disks or soon will be doing so. Inadvertently someone may transport a disk with a CONFIG.SYS file to a friend's XT and have the same experience I had.

Ronald K. Collins

Tulsa, Oklahoma

The Purloined Data

I've often delayed backing up files, playing the odds against a crash or an electrical failure. One of the potential disasters I hadn't even considered until today is burglary. Last night our office was burglarized, and off went the computer and all the files on the hard disk. Fortunately, I have back-

ups of everything, so I don't have much work to do.

The moral is: even if you have protection against power interruption, back up those disks—burglaries are more likely than equipment failures.

Rod Walsh

Sherman Oaks, California

Re: Numbering

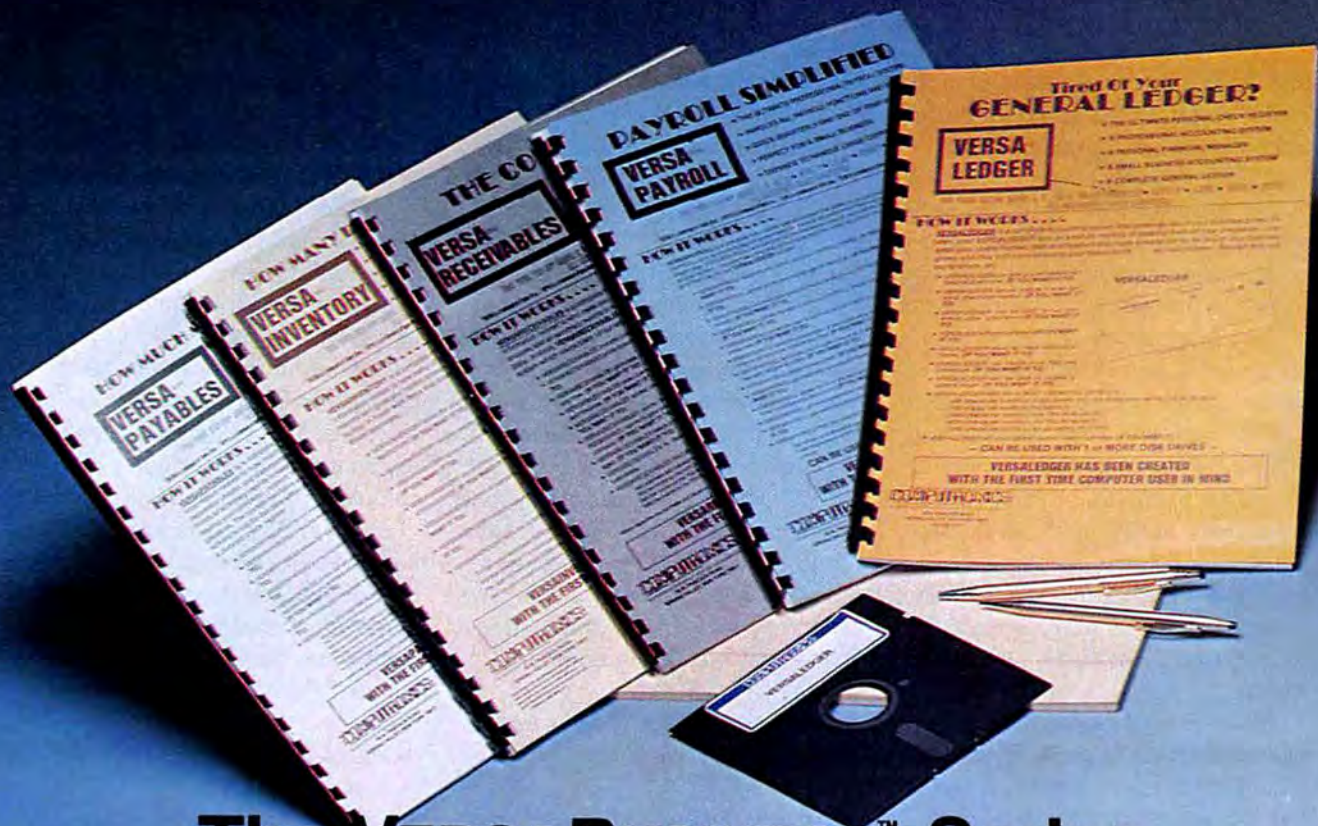
Your reviews are the most complete and objective of any of the magazines. However, nowhere can I find discussion of one of a word processor's most important attributes: Can it automatically renumber chapters, sections, and other subdivisions?

Many people who use word processors are lawyers and technical writers. This kind of writing usually involves dividing works into sections. For example, a contract usually has many sections, and new sections are often added to the beginning parts. If you are using a word processor that does not renumber sections, adding a new section entails finding each subsequent section, subsection, and numbered paragraph to change its number.

It is the program's failure to auto-renumber that caused me to abandon *WordStar* for legal documents and manuals. The word processors that contain this feature are formatters, such as *Scribble*, from Mark of the Unicorn, and its offspring, *FinalWord*

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Letters

and *Perfect Writer*. Autorenumbering is also available in formatters operating under larger computers (e.g., *NROFF* and *Scribe*).

The problem with all of these systems is that you do not know what your final document will look like until you print it out. Nine times out of ten the formatter will put "Very truly yours" on one page and the signature on the next, or something stupid like that. For a contract this usually means revising the last page, where the formatter probably started a new page in the middle of the signatures (not classy). Redoing this page and reformatting is worth the trouble in a 20-section contract. But to have to redo half your letters is too much.

What I would like to have is a word processor that not only shows what I am going to get on the screen but also autorenumbers. I carefully read the reviews of *PIE: Writer* and *Microsoft Word* [PCW, Vol. 2, No. 4], and I cannot tell if they renumber or not.

Ivan Strand
Berkeley, California

Neither Microsoft Word nor PIE: Writer has an autonumber function. We know of no program that combines the features you're looking for; perhaps one of our readers does.—Ed.

Expert Information

I was disappointed to read in your article "Playing by the Rules" [PCW, Vol. 2, No. 1] that you did not expect any expert systems on the IBM PC until late in 1984.

I am proud to tell you and your readers that the first expert system generator derived from artificial intelligence has been available for PCs and PC compatibles since December 1983. This software, called *Expert-Ease*, was designed by Professor Donald Michie, director of machine intelligence at the University of Edinburgh in Scotland. The program itself was programmed by a company called Expert Software International Limited, also based in Edinburgh.

Jeffrey O. Milman
President, Expert Systems Inc.
New York, New York

Our January issue had already gone to press when Expert-Ease was released. A review of the program will appear in an upcoming issue.—Ed.

Good Idea

I am faced with the necessity of replacing the single-sided disk drives in my unit with double-sided ones. In the process of deciding how to do that I made a surprising discovery.

Apparently the major manufacturers of floppy disk drives have never advertised in any of the half-dozen computer magazines I receive, nor have their products ever appeared in new product announcements. I have spent several hours searching for

mailing addresses for Tandon, Teac, and Panasonic without finding any. They also don't appear in my *National Directory of Addresses and Telephone Numbers* or the *Industrial Research and Development Telephone Directory*.

It seems that you could provide a real service to your readers by:

1. Publishing articles devoted to the disk drive replacement problems that must affect thousands of people who purchased the original IBM complement of equipment.
2. Publishing a personal computer industry directory with names, addresses, and telephone numbers of all major suppliers of PC-related equipment so people like me can write for detailed product descriptions and catalogs.

Michael W. Csontos
Lima, New York

Look no further. The PC World Hardware Review, with descriptions of 750 IBM PC and PC-compatible products, will be out later this month and should provide all the information you need about disk drive manufacturers.—Ed.

Letters should be mailed to Letters, PC World, 555 De Haro St., San Francisco, CA 94107, or sent electronically to CompuServe 74055,415 or Source STE908. ●

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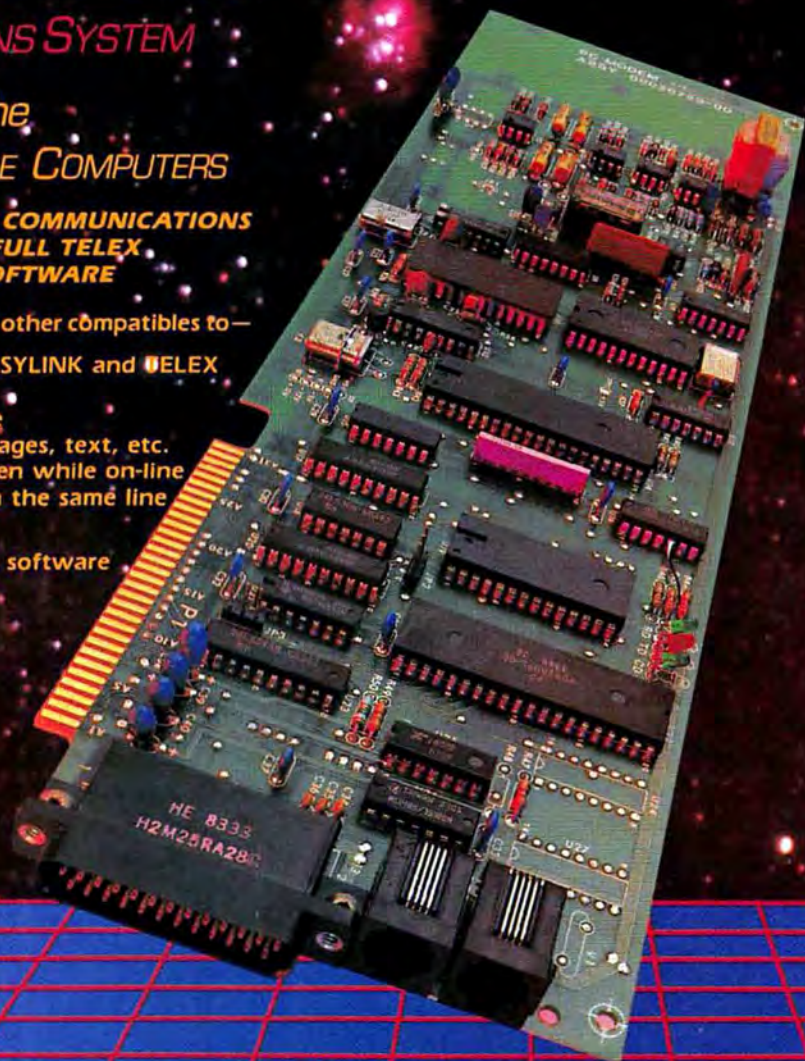
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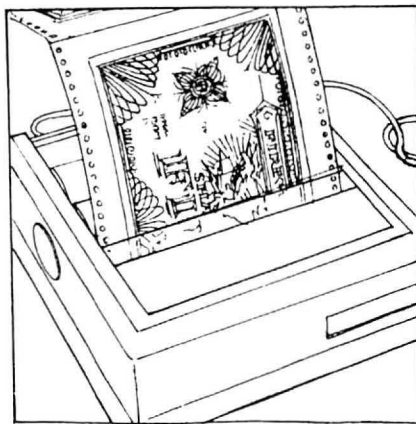
Bulls, Bears, and Modems

On-line investing may soon become the primary computer activity for many PC owners—and the brokers are only too happy to help.

With the proliferation of on-line financial information services and software for investment analysis, it was only a matter of time before brokers began to let customers manage their own accounts by computer. Several large brokerage firms have instituted such invest-by-modem services, which may eventually eliminate all those frantic phone calls to your broker.

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.

—*Miriam Medom*



The most advanced system of financial data transfer is the joint venture recently announced by IBM and Merrill Lynch & Company. This high-class, expensive system uses the 3270 PC and is primarily geared for brokers and commercial financial institutions rather than individual investors. Several relatively low-cost services are geared to individuals, however. In case you're interested in using a computer to buy and sell securities, here's a summary of the on-line brokers' services.

C. D. Anderson & Company, a discount brokerage firm in San Francisco, offers an on-line service called Trade Plus. Customers can place orders 24 hours a day. The service costs \$195 to join plus on-line fees of \$24 per hour during normal business hours and \$6 per hour during evenings and weekends. There is a minimum charge of \$10 per month.

Fidelity Brokerage, based in Boston, also offers the Trade Plus service. By late this year Fidelity will include its large group of mutual funds among the on-line offerings to customers.

Max Ule & Company, a New York discount broker, provides on-line trading to its customers only during evening and weekend hours. In New York and some other locations, Ule customers can dial a local number for access to on-line trading at no cost beyond that of the phone call and the ordinary sales commission. In addition, Ule customers can gain on-line access to their accounts through the CompuServe Executive Information Service.

Unified Management Corporation, of Indianapolis, provides two services to computer owners. Customers can transfer funds from their bank accounts to any of the firm's six mutual funds or from one fund to another. The second option is its UniSave service, which investors can reach through CompuServe. UniSave requires a \$1000 minimum account and provides discount brokerage services, a money market fund, and on-line fund transfers.

View

News and notes for the computing community

Grapevine

Rumors, Speculation, and Predictions

* ————— *

Technology Watch

Each year a group of engineers gathers at the International Solid State Circuits Conference to discuss the newest developments in high-tech research. One report presented at this year's meeting, held recently in San Francisco, may point to some future PC products from IBM. The report described CMOS technology, which is currently used in RAM chips that can be powered by batteries, such as those in the TRS-80 Model 100 notebook-size computer. Because this report was jointly presented by IBM's Boca Raton Systems Products group and the company's General Technology division, industry observers speculate that the PC family of computers may soon be joined by one or more small portables that contain CMOS memory chips.

* ————— *

Quick Printer Coming?

Another addition to the PC product line may be a fast dot matrix printer. Reportedly IBM wants to offer a 400-character-per-second printer as an option with its systems. One potential supplier is Dataproducts Corporation (Milford, New Hampshire), which already produces a printer for another division of IBM.



* ————— *

Portable Destinations

Not only was the introduction of IBM's Portable PC hastily arranged, but the supply of these new machines has also been severely constrained. Authorized PC dealers received only two machines per month for the first few months, reportedly because the majority of the new portables had been promised to IBM's National Accounts Division, which sells bulk quantities of IBM products.

One large group—quantity unknown—of Portable PCs was reportedly sold to the federal government. (Imagine an IRS auditor showing up with a briefcase in one hand and a 32-pound Portable PC in the other, demanding to see all your receipts from last year. . . .)

Another 800 or more of the portables have been sold to the Harvard Business School, where first-year students will be required to use the machine this fall. This may mean that students will have to take a summer weight-lifting class to stagger through the halls of ivy with their books and computers.

Loose Lips

Recently some leaders of the microcomputer industry were asked to comment on the possibility of a shakeout among software companies. Here are interesting perspectives from two of the top people in this arena.

"There are going to be some major nosedives. Some will pull out; others will crash and burn."

—*Mitchell Kapor, president of Lotus Development Corporation.*

"We're used to having a lot of second-tier companies asking us to market their products. Now they're asking us to buy them."—*David C. Cole, president of Ashton-Tate.*

Muffle that Portable

Thanks to David Nagel of Wabash, Indiana, for clarifying a situation that had us up in the air. All those airborne executives contentedly writing memos on their lap-size portable computers at 30,000 feet may be running afoul of the law. David reports that federal rules prohibit the in-flight operation of most electronic equipment. Computers—which emit all types of radiation, particularly radio waves—can play havoc with on-board guidance systems. Part 91, Section 19 of the Federal Air Regulations makes the point with the usual bureaucratic clarity and allows only a small loophole. Exempt is "any . . . portable electronic device that the operator [pilot] . . . has determined will not cause interference with the [plane's] navigation or communication system." But the airline pilots association prefers that its members not have to make those decisions and has delegated "discre-



tion" to the airlines. While American Airlines has banned the in-flight use of portable computers, Eastern recently reversed its prohibition.

The Radio Technical Commission for Aeronautics may settle the matter. The group has convened a committee to assess the hazards of using computers in flight and will soon convey its findings to government and industry. In the meantime you'd better stow that carry-on computer. Just in case.

Computers on Campus

Generous Alumni

Several recent programs have brought students, faculty, and computers into close contact. There's been a lot of talk about Apple selling computers to students at half price, but Georgia Tech, located in Atlanta, has instituted a program to let faculty members and researchers buy IBM PC systems at a 60 percent discount. This price break is not a gift from IBM but was made possible by contributions from local businesspeople and grants from two Georgia Tech foundations.

Three Atlanta-area businesses that have donated products include Hayes Microcomputer Products, Peachtree Software, and Quadram Corporation. The president of each of these companies (in Peachtree's case, of its parent company, MSA) is a graduate of Georgia Tech.

Commuting Computers

Correspondent Karen Dowell reports that the computers come to the students—at least in Pasadena.

"A new concept in computer education recently hit the streets of Pasadena, California. The Computer Commuter, a renovated van equipped with 13 Commodore 64 computers, tours some 30 schools in the area under the sponsorship of the Pasadena Boys Club.



Pasadena Boys Club's Computer Commuter

"Club director Robert Monk founded the program in an effort to give the Boys Club a more positive community image. He was able to round up a van that had once been used by Xerox to display copiers (and so had a built-in generator) and a collection of donated software and components. He expects to add PCs and PCjrs to the fleet of equipment in the near future.

"In addition to its traveling computer center, the program offers classes for interested teachers and supplements the mobile unit with classes in BASIC and Logo at the Boys Club headquarters. Monk believes that the Computer Commuter has been a success, and he hopes to add a second van to the program. He says he senses definite changes in the children he works with: 'They are happier, a little wiser, and better prepared for problem solving.'"

* ————— *

The Word Processing Poll

You know that computers have permeated the culture when the topic of which computer to buy becomes the subject of a graduate student's thesis. Well, it's happened, and a student in the University of Chicago's Graduate School of Business wants help with that very thesis. If you'd like to offer your two cents' worth about how and why you chose a word processing program or text editor, please send a stamped, self-addressed, legal-size envelope to Aarne Elias, P.O. Box 255, Bensenville, IL 60106. You need not own a computer to participate.

* ————— *

Culture Shock

Correspondent Gary Bacon reports a poignant episode that might be called "The Computer That Knew Too Much." Bacon teaches at a high school near San Jose, California, that was given PCs and a collection of software as part of IBM's educational donation program. His students are a mixed group, including a number of recent Vietnamese emigrants who speak little English. Here is Bacon's account.

"One day in the computer lab several students from my class were working with two very bashful young Vietnamese women from another class. My students wanted a program that might help break the ice, so they booted up *Question* (Alpha Software) to get started. *Question* is an interactive guessing game in which the PC users think of an animal, a city, or a famous person, and the computer asks questions that the users must answer yes or no. After a series of questions, the computer makes a guess—usually correct—at the answer.

"The two young women chose 'Cities of the World' for their turn at the game. I guessed that the city they had in mind was Saigon. The other students spent considerable time explaining the meaning of the words in each question the computer asked as the young women progressed through nine questions, answering yes when the computer asked if the city was in Vietnam and then if it was in the southern half of Vietnam.

(continues)

Big Blue's News

New Developments from IBM

New PC Push

IBM is making a PC (or an XT) every 16 seconds, but the company still can't meet the demand for the product. In response to this unprecedented demand, the Entry Systems Division, which makes the PC family of computers, will spend \$500 million this year for new manufacturing facilities and new products. By the end of 1984, IBM will be turning out a PC every 7 seconds.

To accomplish this monumental increase in manufacturing capacity, two production lines have been

added to the original three in the Boca Raton plant. All operate around the clock. In addition, IBM's Greenock, Scotland, plant also manufactures PCs, and a new plant in Wangaratta, Australia, is about to begin building the computers as well. The Portable PC is made at a plant in Austin, Texas.

IBM may also be able to reduce the prices of its PCs as production efficiency increases. The Boca Raton plant has both automatic testing equipment and an experimental automated packaging system, both of which add to the overall production capacity of the operation.

How will IBM find a PC buyer every 7 seconds? That's a challenge there are salespeople enough to meet, apparently. In addition to the sales force of IBM's National Accounts Division, there are some 1400 authorized PC dealers in the United States and Canada and 800 more abroad. Another 1000 dealers sell PCs as "value-added" products; they enhance the systems with customized software or hardware and sell to specialized markets.

Its Own 8088s

To help IBM boost production of PCs, Intel recently allowed IBM to manufacture the 8088 microprocessor for use in the PC, the XT, and the PCjr. (Commodore also was permitted to make 8088s; see *Compatibles Update* in this issue.) Although this move could ease the recent chip crunch somewhat by freeing up Intel's supplies of 8088s

for sale to other manufacturers, IBM will be able to make more PCs and thus will still offer stiff competition to makers of compatible computers.

Cheaper PCs in Europe

Citing its increased manufacturing capability (at the Greenock, Scotland, plant), IBM recently reduced the prices of the PC and the XT in Europe. The new prices are from 7 to 30 percent lower, depending on the configuration of the system and the country where it is purchased. In case you're planning a trip abroad and want to bring back a PC, think twice: the reduced prices in Europe are still higher than those at home.

You're in the Army Now

Chances are you can't run out and buy one, but IBM makes a specially constructed version of the PC that's designed to be impervious to the hazards of war—even nuclear war. Correspondent Shawn Patrick learned of this computer's existence and reports these details about it. Although this special PC isn't exactly bombproof, the computer is enhanced with special shielding, primarily of copper, so that its internal signals and data will not be damaged by radio frequency interference (RFI) or electromagnetic interference (EMI). Equipment that has this form of protection, by the way, is classified by the federal government as a

Culture Shock (continued)

"Then the computer took its guess. The two young women, who had so recently fled their country after a devastating war, watched in horror as the all-knowing computer displayed the words 'Is it Ho Chi Minh City?' Technically, the computer was right, but to these women their home would always be Saigon. We may have made some progress against the language barrier that day, but I'm afraid the computer lost a couple of friends in the process."

[See Gary Bacon's story on computers in the classroom in this issue.]

"TEMPEST" system. (That's one acronym we don't know the meaning of and dare not ask.)

RFI and EMI are two of the atmospheric hazards of war, especially war involving electronically guided weapons and nuclear explosions. In other words, Patrick notes, "There could be a nuclear attack in New Jersey, and if you were in New York, your PC would still be running." (It's the little things that count.)

This war-resistant PC is hard to get, however. IBM has not officially announced it, but they did show the machine at a weapons conference late last year. The machine is sold only to selected federal agencies, and it is not even listed on the General Services Administration's roster of equipment. Even if you qualify, protection against RFI and EMI doesn't come cheap: the TEMPEST PC (with 256K of RAM and two disk drives) costs \$6795.

In the true spirit of Dr. Strange-love, we're rather sorry that this armored PC is such a secret. It probably means that we'll never see an ad with a little man in tattered clothes contentedly doing financial projections as a narrator calmly intones, "Takes a nuku and keeps on computing."

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

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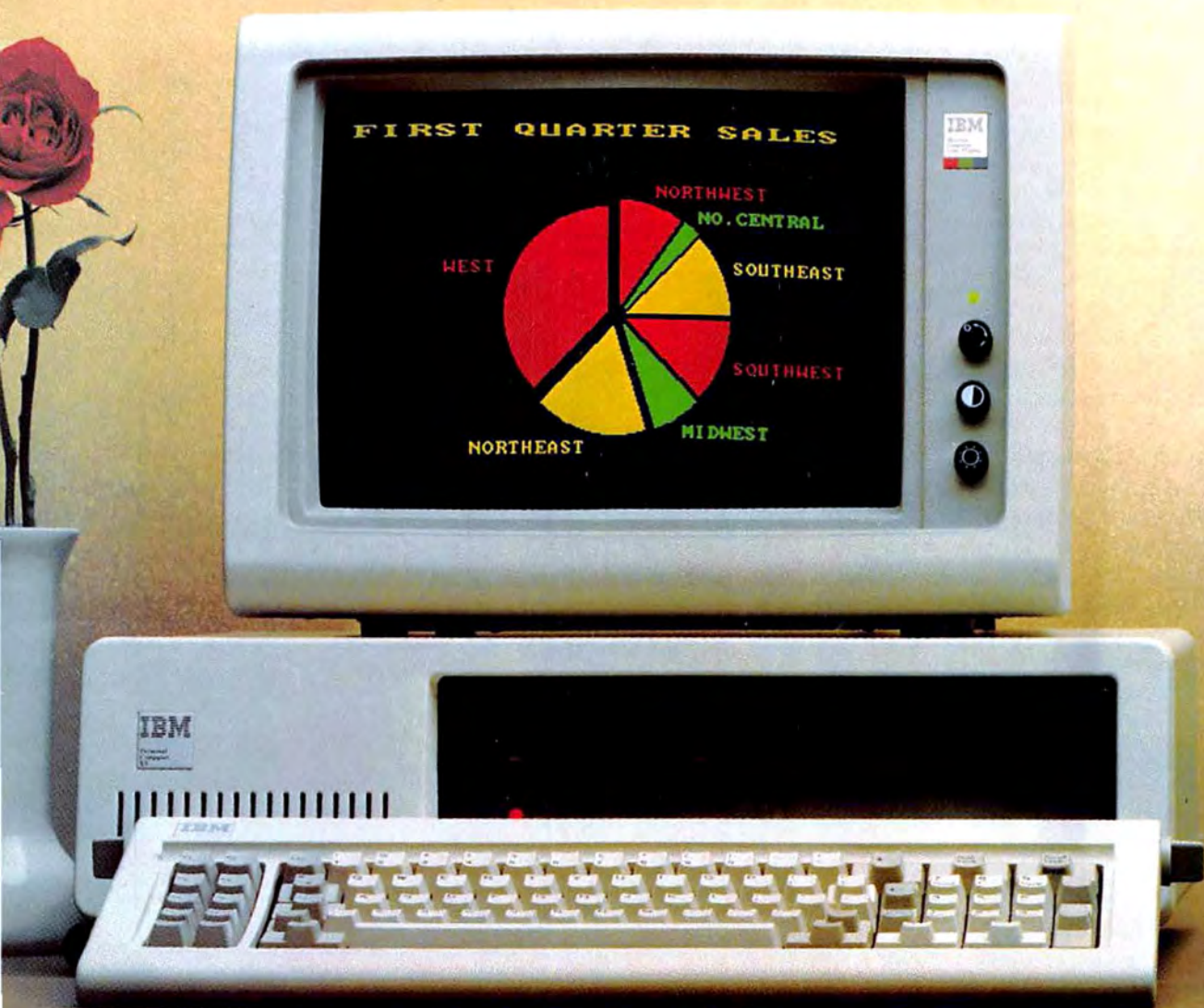
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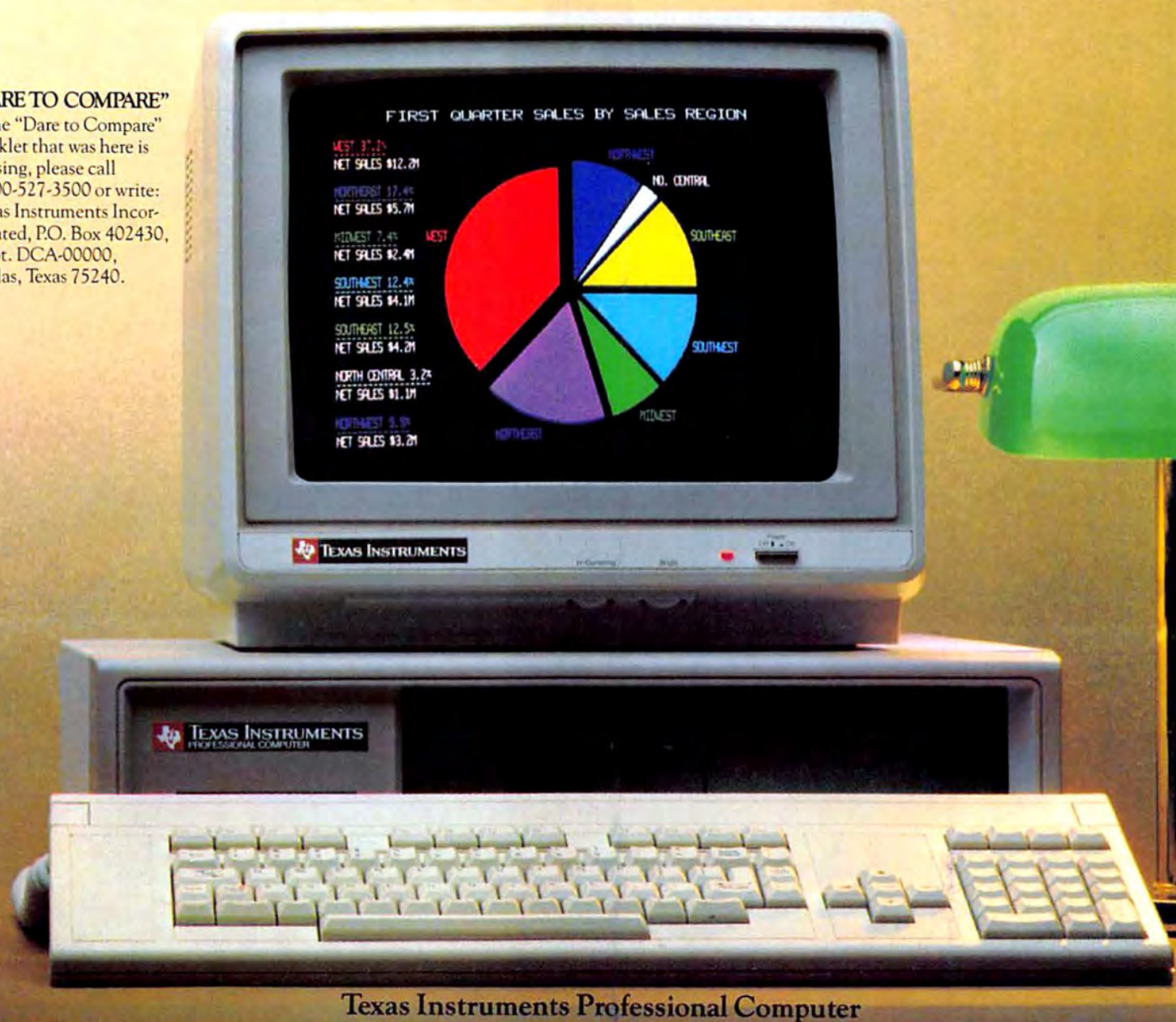


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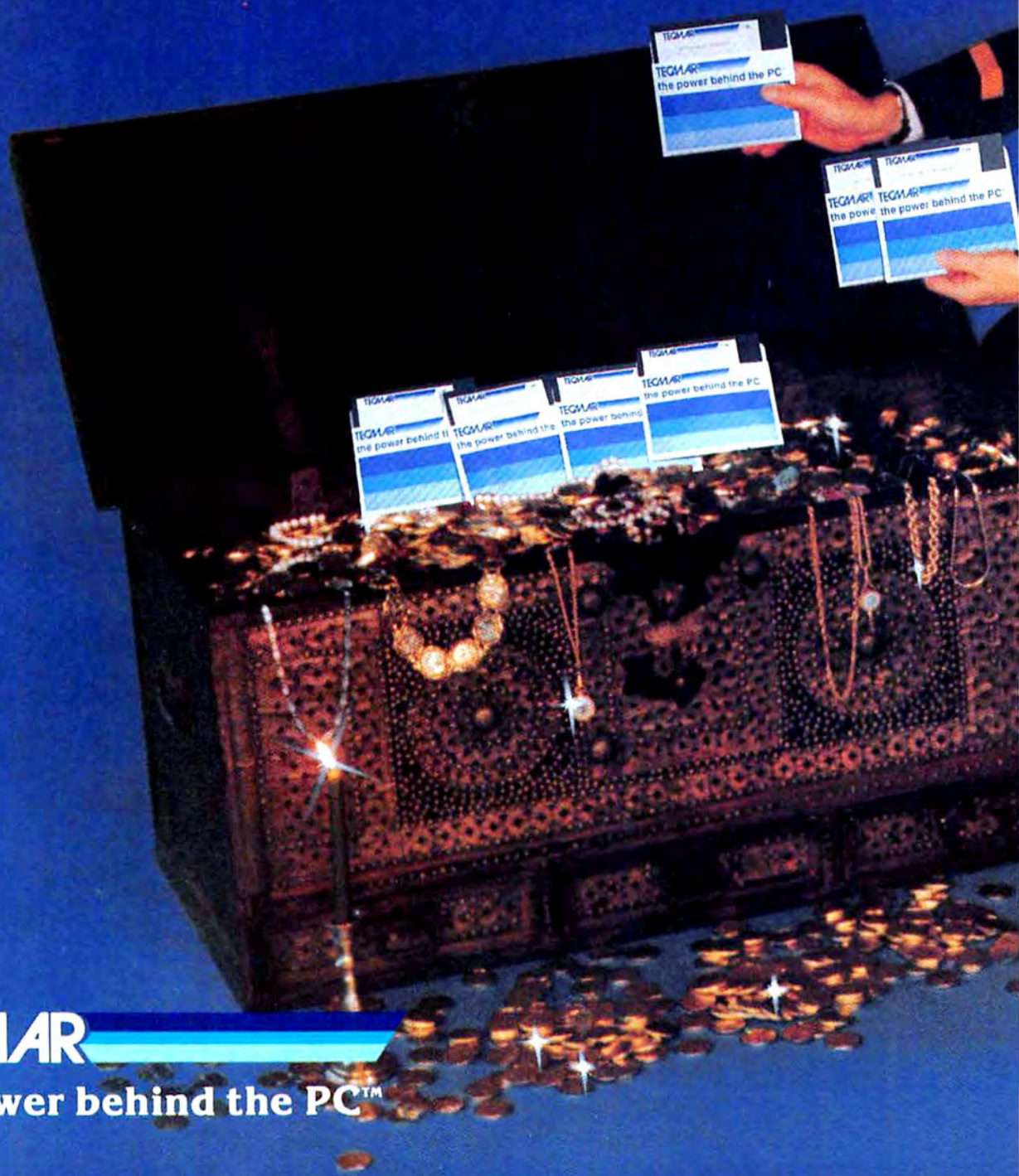
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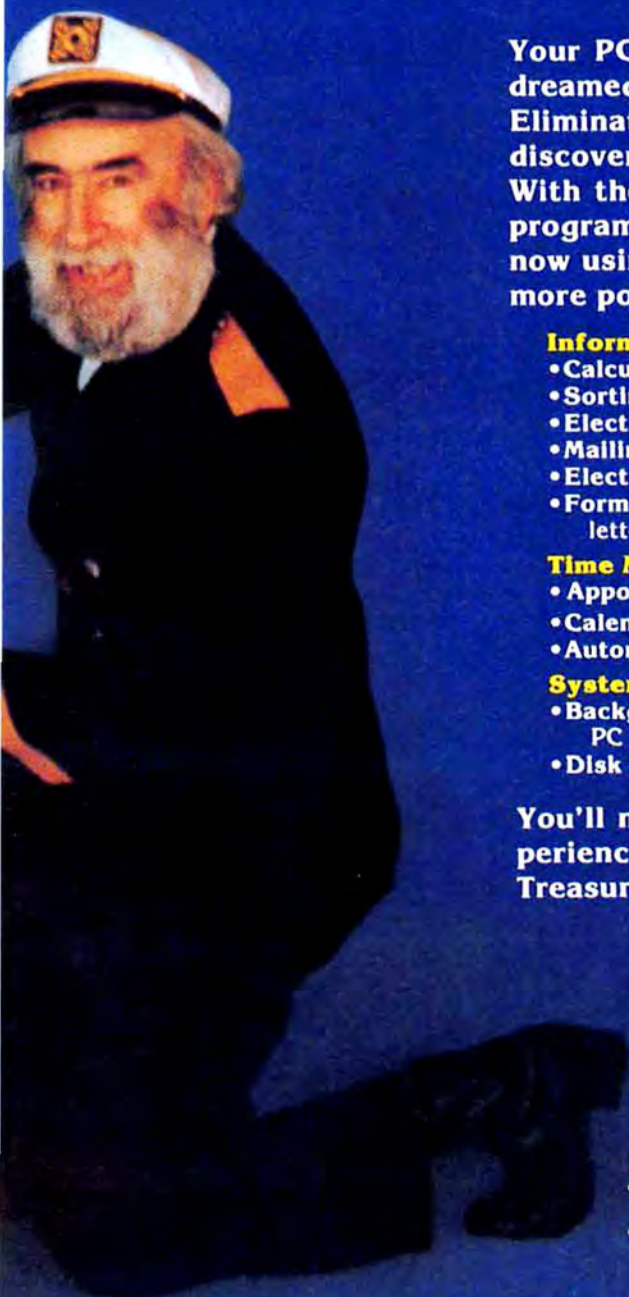
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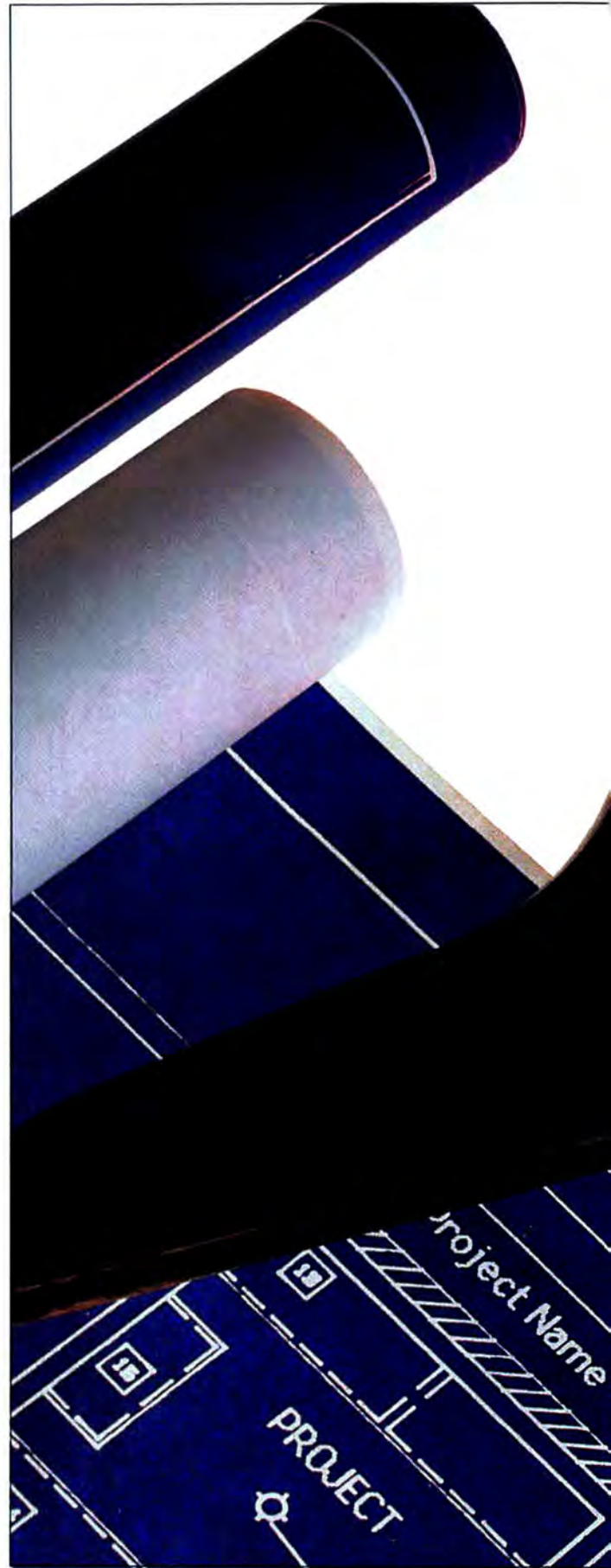
Blueprint Your Data Base

Manuel Sotomayor

Would you build a house without a blueprint? Would you drive up to an empty lot, stack lumber on one side and tools on the other, and begin to hammer nails into boards without any idea of where to put the doors or how high to make the ceiling? In effect that's exactly how many people set up their computer data bases. They go to their local computer store and buy hardware and software (lumber and tools) and then proceed to build a data base without first formulating their ideas in a design (a blueprint) that describes exactly how each piece will fit together. The result can be frustrating and expensive and can lead to a long-term disenchantment with personal computing.

Remember that the structure and capabilities of a data base are dependent on the data base management system (DBMS) software you use to manipulate the data base and generate applications. If you already own a DBMS, keep in mind its limitations and special features when you design a data base. If you haven't yet bought a DBMS, creating a blueprint of a data base will help you choose the DBMS that's right for you. (See also "Choosing a Data Management System" in this issue.)

To design a data base, you first have to decide on a set of design goals. Ask yourself what functions you'd like the data base to have and make a list of them. For example, you may want the data base to schedule appointments, calculate inventory values, and produce shipping labels. Once you feel the list is complete, go back and weed out the functions that are not needed immediately or are not essential. Continue to sort the list until only the most important functions remain. Organ-





● Getting Started

Major Tasks	Subtasks
A. Ring up sale	1. Enter card number 2. Enter amount of purchase 3. Verify card number 4. Produce receipt 5. Update customer's account
B. Bill customer	1. Access customer record 2. Calculate current balance 3. Print statement 4. Mail to customer

Figure 1: Step one—outline of major tasks and subtasks

ize the tasks into groups, putting the functions that are needed immediately into Phase 1 and those that can be added later into Phases 2, 3, and so on. Listing the tasks in order of their importance will help you allocate time and resources more efficiently.

With the design goals determined, you now need to figure out how to implement them. Begin by breaking each application into a series of major tasks. Gradually add layers of detail by reducing each task to its constituent parts or subtasks (see Figure 1). Take your time and pay close attention to detail. It's better to discover that

you've missed a step now when you can correct it on paper than to rebuild your data base after it's installed. The resulting outline is the basis of your blueprint. It should help you view each function as a series of logical steps. The outline will also be needed later, when you write the application routines that will be used by the DBMS.

Data Flow Diagrams

Now that you know what the data base will be used for, it's time to focus on the way information will flow through the DBMS application. To do that you must identify and label each data element and chart its course with a data flow diagram. Such a diagram tracks each data element from the time it arrives as input to your application until it departs transformed into some form of useful output, such as a letter, an invoice, or an inventory report. In the process of creating the diagram, the nature and extent of the data base that is required to support your application will become apparent.

Putting together a data flow diagram is relatively easy. All you need are four common symbols to represent each of the four basic building blocks—process, data base, source/destination, and data flow (see Figure 2). A process is any function or task that acts on data (for example, printing labels). A data base is where data is stored (for example, an inventory file). The source/destination is the location where data originates and is eventually delivered (for example, the customer). Data flow is

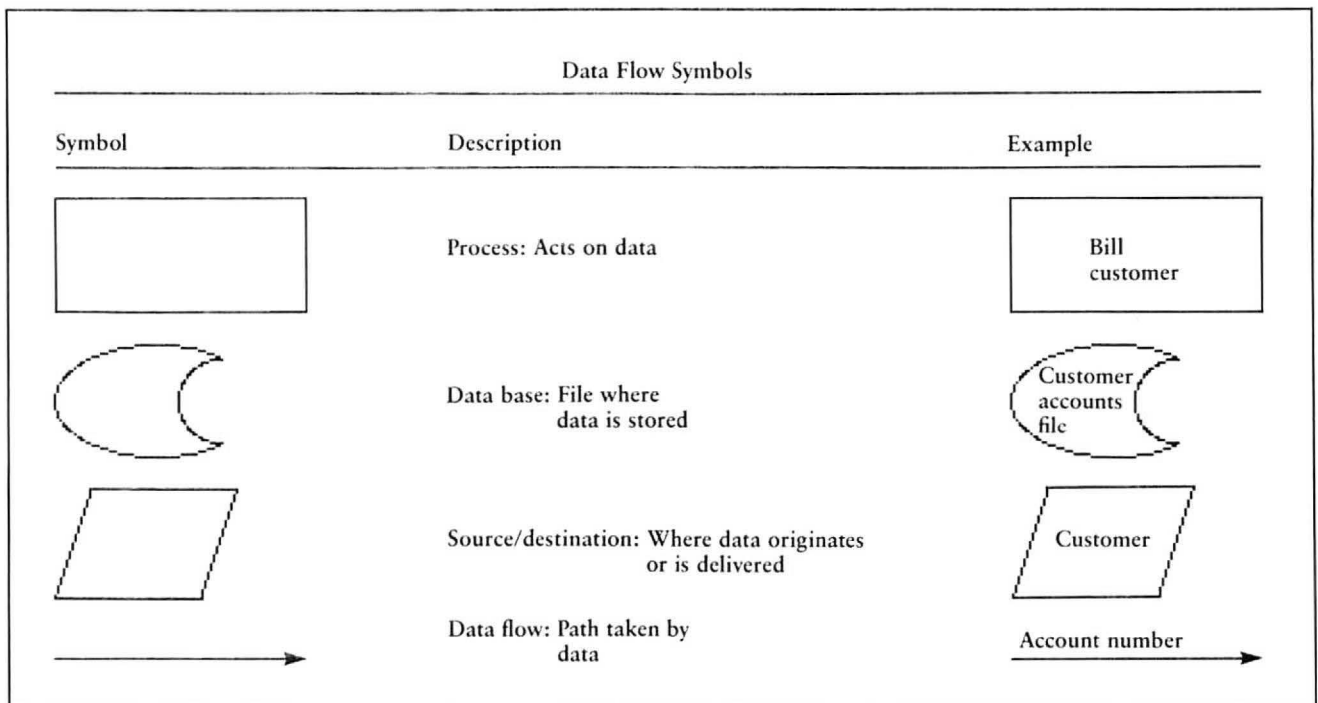


Figure 2: Symbols used to build data flow diagrams

the link between processes, data bases, and sources/destinations. The data flow symbol identifies what data is being passed (for example, the part number being called from the inventory file and sent to the invoice report).

Start by diagramming each major task shown in the outline, connecting each task to other processes or to data bases by using data flows that show what data is being passed. Add the source of the information and the destination of any output, and you have a basic data flow diagram (see Figure 3). Once again, add layers of detail by expanding each major task into its subtasks, adding connecting data flows where necessary.

Review the data flows carefully and make revisions. Now is the best time to make corrections or alterations to the basic design. Stop only when you feel confident that the data flow diagram accurately reflects how each task will be handled. The resulting diagram should provide an overall view of the design and a clear description of how the entire application will function.

The creation of the data flow diagram produces a valuable by-product: a list of all the individual data elements that will be used to complete each task. Once again, it is time to establish priorities. Remember that data base functions are affected by the size of the data base. The larger the data base, the longer it will take you to search for a specific piece of information or to sort the data into a desired order. Fight the temptation to include every conceivable piece of information you might need. Try to limit your choices to those elements that are absolutely necessary to complete the tasks you've defined.

Now take each remaining data element and fill out its definition to include some required essentials. First, a suitable name must be found. Most DBMS programs require that field names be no longer than 8 to 10 characters (*dBASE II*'s limit is 20 characters, and *Condor* accepts no more than 15). Concentrate on short, descriptive names like CUSTNAME, ACCTNUM, or PHONE, and avoid using cryptic acronyms. Next, assign a length attribute to each data element. Keep in mind that space is at a premium.

You might also note if any special formatting is required, such as the hyphens within telephone numbers or the dollar signs, commas, and decimal points within dollar amounts. Since DBMSs vary in their ability to handle formatting, you should know what your requirements will be before you choose a package.

Building a Relational Table

Data bases generally fall into three categories: hierarchical, network, and relational. The first two are usually found on mainframe computers and minicomputers and are designed to handle very large applications. These large data bases often work in real-time environments, such as an airline reservation system, where the response

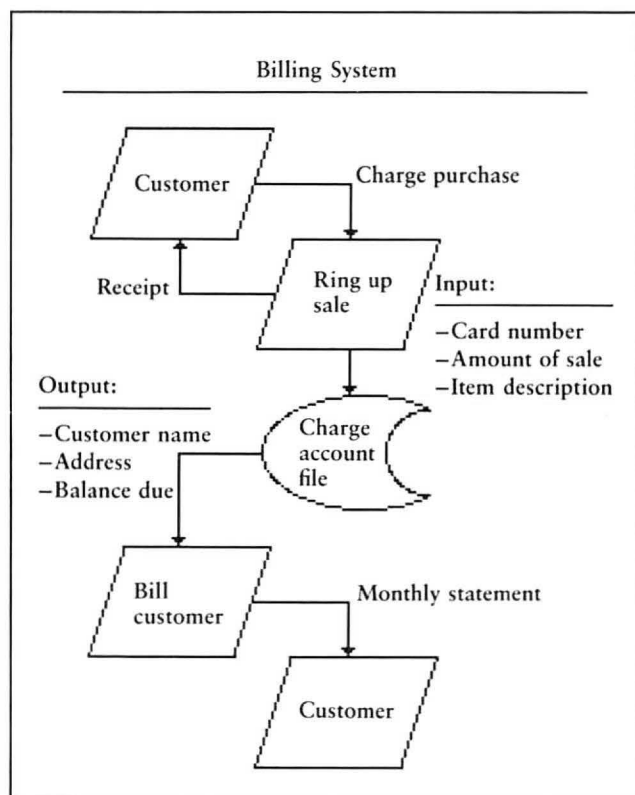


Figure 3: Step two—data flow diagram of a familiar transaction

to an inquiry is available in a matter of seconds. They usually require powerful processors to operate them and a small army of professional programmers to develop and maintain them.

Relational data bases, however, are less complex in design and are easier for most people to grasp conceptually. Most DBMSs available for the PC are relational. As the name implies, a relational data base is constructed by establishing an orderly relation among pieces of information. This relation is best viewed as a two-dimensional table. The columns are called "fields" and contain data of a specific type such as names, account numbers, or amounts. Rows are called "records" and represent a collection of related fields that together describe an individual unit such as a customer, a company, or an inventory item (see Figure 4).

To build your own table, begin by defining the relationships you want to establish. Relationships can be identified by looking closely at the data flows. Can the information be grouped (related) together in a consistent pattern? For example, a pattern may consist of name/address/phone number/customer, part number/price/part name/inventory, or apartment/rent/tenant/property.

● Getting Started

Record Layout Description

Search through the relational table and look for logical relationships. You might find that you'll need more than one data base in order to account for all the data elements a specific application requires. Rearrange the list of data elements, grouping them together to reflect any alternative record/field relationships you've developed. The result is a record layout description for each data base (see Figure 5).

The record layout description allows accurate estimates to be made of the number of records in the data base, the number of fields per record, and the length of each record. These parameters are critical because they will determine what capabilities to look for while shopping for a DBMS.

Once you've completed the record formats, the design is essentially complete, but you will probably go through several design cycles before you're completely satisfied. In the process, your original ideas will no doubt be somewhat altered, but the effort will add polish to your final design.

When at last you are satisfied that the design adequately reflects your stated design goals and that each task will be handled successfully and efficiently—freeze it. That is easier said than done (for many people it is the

most difficult step), but having the major elements of the design firmly defined and recorded before beginning the implementation stage is crucial. If they aren't settled, you can quickly get bogged down in a tangle of unending revisions and be constantly forced to redesign your application while your original goals fall away one by one. Once you've approved a design, stick to it. Limit changes as much as possible and steer a resolute course toward your design goals.

With a completed blueprint in hand, you will be armed with all the information you need to begin serious shopping. You can now evaluate the available hardware and software and arrive at the right combination of features and capabilities that you need to build your data base and bring life to your design. ●

Manuel Sotomayor established Stellar Software in San Francisco as a consulting firm specializing in data base design for business applications.

For more information on data base design, read Structured Systems Analysis: Tools and Techniques by Chris Gane and Trish Sarson, Prentice-Hall, Englewood Cliffs, New Jersey, 1979.

Table of Customer Information			
Record Number	Account Number	Customer Name	Balance Due (field)
1	955 6637 1	Blackburn, John R.	\$ 126.57
2	341 1865 3	Jamesson, Melody	\$ 397.52
3	621 6531 5	Young, Thomas S.	\$ 154.73
4	625 8730 6	Simmons, Gloria T.	\$ 201.42

Figure 4: Step three—relational data base expressed as two-dimensional table (columns = fields; rows = records)

Record Layout			
Customer Name	Address	Account Number	Current Balance
Length = 25 Type = char	Length = 30 Type = char	Length = 8 Type = numeric Format = 999 9999 9	Length = 7 Type = numeric Format = \$99,999.99
Record length = 70			
Maximum records (360K floppy disk) = 5200			

Figure 5: Step four—record description for a customer file

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100% compatible with the IBM Color Graphics—for RGB and composite video monitors, lightpen	YES		YES		YES	YES		
Operate standard IBM Color Graphics software on the IBM Monochrome Display—(Lotus Graphics, etc.)	YES						YES	
Connect two monitors simultaneously and switch either by software or an external switch	YES					YES		
Graphics resolutions on the IBM Monochrome Display of 720 x 700, includes advanced software support	YES			YES				
Graphics resolution on an RGB Monitor of 640 x 400 with 16 colors, includes advanced software support	YES				YES			
Requires device drivers to operate Lotus 1-2-3 Graphics on an IBM Monochrome Display	NO			YES	YES		NO	
Includes a standard IBM Parallel Printer Port	YES	YES		YES		YES	YES	YES
Operate with a standard television set	YES		YES		YES	YES		

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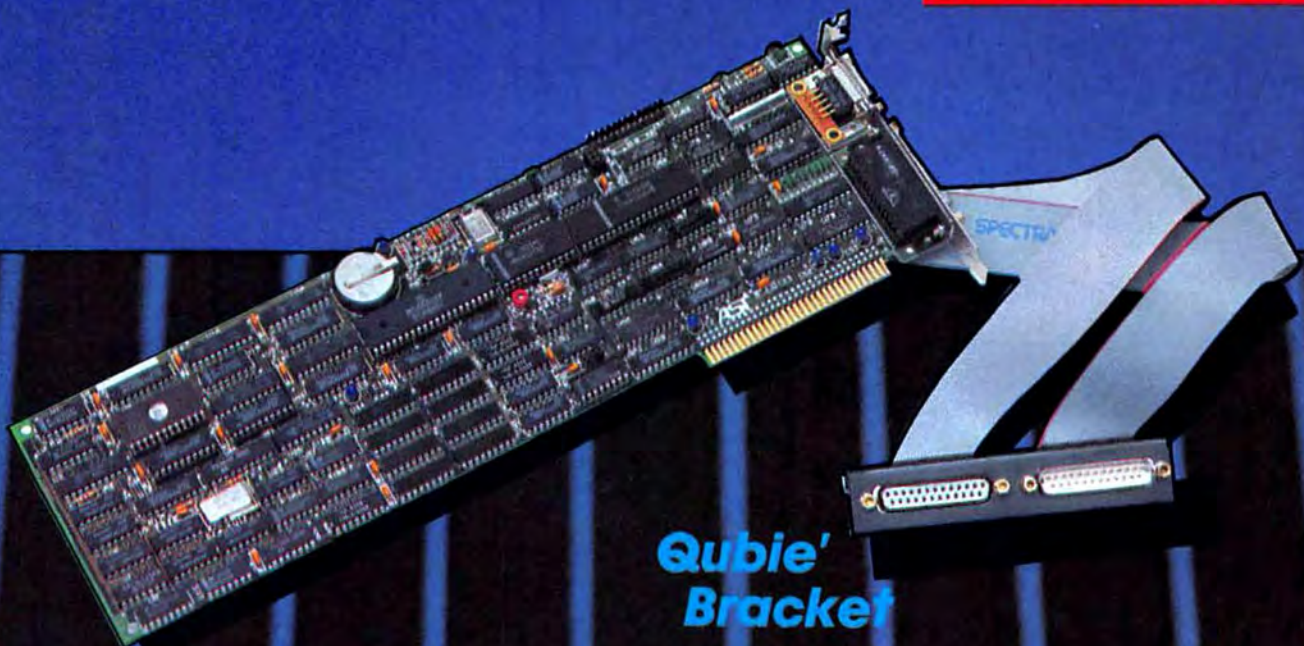
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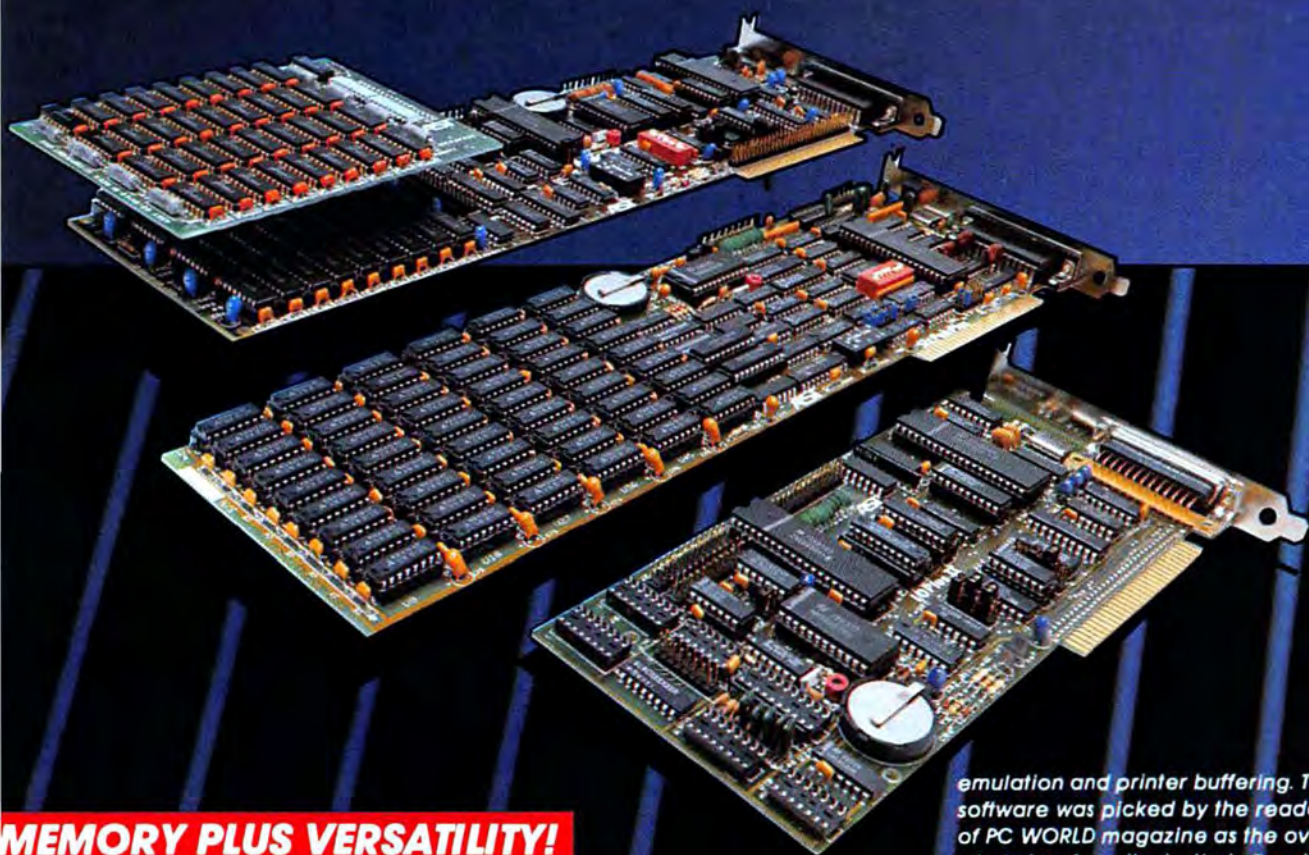
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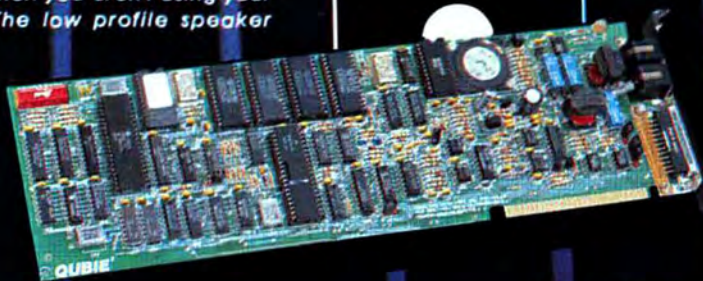
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Local Area Networks

The PC used to be the strong, silent type. With the advent of networks, personal computers are becoming more communicative.

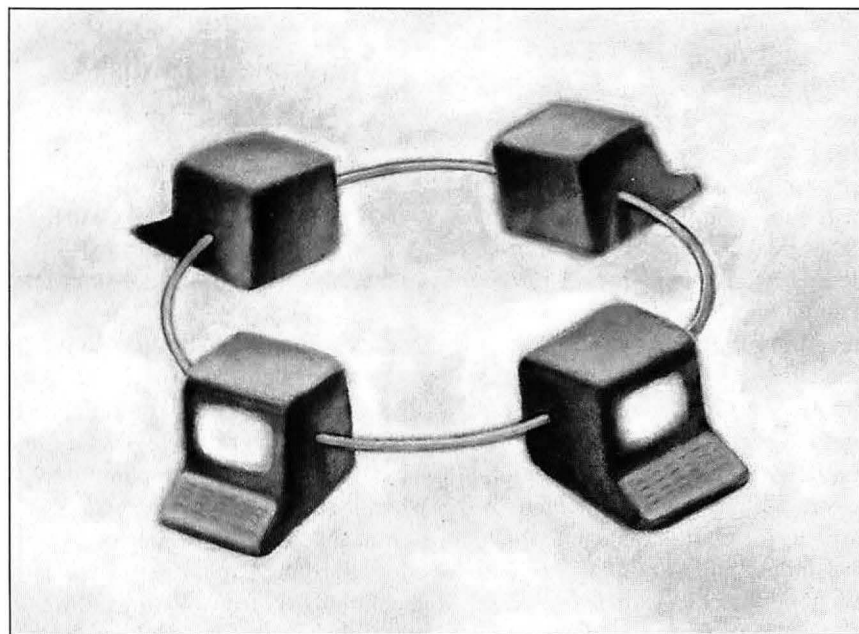
Jonathan Sachs

Any organization that uses several computers can benefit from sharing resources among them. Local area networks (LANs for short) are emerging as the best method of coordinating computers that would otherwise stand alone. A LAN makes it possible to use one computer to work with a file stored on another computer, print a document on another computer's printer, or send a message to an associate who is working on another machine.

A Look at a LAN

A LAN is a medium for sharing hardware, information, or both. For a business, the benefits of linking several IBM PCs with a LAN are manifold. Picture a company, which I'll call Green Equipment, that employs a dozen people who sell and service farm equipment. The firm occupies a two-story building with the "front office" downstairs and the "back office" upstairs.

It's 8 a.m. Monday when service manager George Smith arrives. George tells his PC to print an inventory report that it prepared overnight. A customer calls, reporting that his tractor is broken and must be fixed immediately. George can do it, but he may not return in time for a staff meeting that Bob Anderson, the general manager, has planned. He



calls Bob's office but finds the office empty. Rather than run upstairs to leave a note, George sends a message from his PC. When Bob's secretary comes in, the message will be waiting.

George wants a copy of the broken tractor's service record. It's in his PC, but his printer will be tied up for half an hour. No problem; he prints the service record on his "second

printer," which is attached to a PC in the showroom. The showroom printer has just finished producing the service record as George enters the room. He tears off the report and is out the door.

Salesperson Sue Wright, meanwhile, answers a phone inquiry. Does Green Equipment stock a pump for a milking machine that it sold last year? "One moment, I'll check," Sue says. The service department keeps the parts inventory, but obtaining inventory information is, again, no problem. Sue searches a file on the showroom PC's "third disk drive,"

● Getting Started

which is actually located on the service department's system. She learns that the part isn't in stock but can be delivered in three days. "Is Thursday OK?" she asks. The caller says that it is. Sue has just made the day's first sale.

Linda Tolliver, Bob Anderson's secretary, clocks in. She's been helping the bookkeeper put old sales data into computer files for financial projections. Much of the work has been done since she last looked at the project; the bookkeeper must have worked on it late last week. The files are on Linda's PC, but they have been read by the bookkeeper's PC as though they were on his computer's "third disk drive."

Bob Anderson arrives. "Any messages?" he asks. Linda finds the message from George: "Have an emergency repair call; may not be back for the meeting. Reschedule?" Bob asks Linda to check every employee's calendar. The calendars are scattered throughout Green Equipment's computers, but they're easy to review; a scheduling program collects them automatically. Linda notes that everyone is available Tuesday at 10 a.m., and Bob approves that time. Linda updates all the calendars, which "return" to the computers from which they came. Linda drafts a memo announcing the change and, from her PC, sends everyone a copy.

How a LAN Works

Our hypothetical case demonstrates that LANs can simplify communication among people as well as among computers by performing numerous tasks for numerous users. But how do they work?

A LAN enables each computer on the network to use the resources—that is, the peripherals—of all the computers on the network. For example, one computer on a LAN may use a disk drive attached to another computer as if that drive were its own. To a network user, this is essen-

tially a "third disk drive." Similarly, one computer can use a second computer's printer as though that printer were its own. At the same time, someone else may be using the second computer for an unrelated task—which can even include working with a file in the first computer's disk drive.

The typical LAN consists of a software package and any of several types of hardware. Some LANs, for example, link computers and peripherals via a coaxial cable similar to that which carries radio and television signals. An adapter board added

One computer on a LAN may use a disk drive attached to another computer as if that drive were its own.

to each PC in a network transmits and receives data over the LAN. Usually, the board decodes the "address" attached to each package of LAN information and calls on a computer when it receives a message addressed to that machine. It also performs "housekeeping" operations, such as checking LAN transmissions for data errors. Because of its complex responsibilities, the board usually contains its own microprocessors.

LAN software, which augments each PC's copy of DOS, governs the sharing of physical resources and the simultaneous use of applications software. While a rudimentary LAN includes only the interface board for each PC, a cable, and LAN software, most networks rely on an additional hard disk capable of storing at least 10 megabytes.

Some LANs add a special component called a "server"—a computer that is responsible for managing the LAN. Such a LAN connects all the shared disk drives and printers to the server rather than scattering them throughout the network. The server may be an ordinary computer such as a PC, or it may be a specialized computer that the LAN manufacturer develops.

Local area networks come in three basic configurations: star networks, ring networks, and bus networks. A star network (see Figure 1) is governed by a central server that routes data transmissions through the system. A ring network (see Figure 2) links computers without the intervention of a server; if one computer crashes, the network goes down. A bus network (see Figure 3) assigns a portion of network management to each computer but preserves the system if one component fails. The majority of LANs are bus structured.

You must instruct the LAN software that a specific device name (for example, "disk drive D:") refers to a certain device on the network before the computer can use a device (such as a disk drive or a printer) on another computer. You do this by entering a command that assigns a name to each device on the network. You can change device names at will with LAN software.

LANs support varying numbers of computers, depending on network application and design. Some LAN manufacturers claim that their products can connect hundreds of computers. The practical limit, however, is usually between 3 and 20 computers on the LAN at one time. This limit depends as much on how you use a LAN as on the capabilities of the LAN itself. If you're using word processing, for example, you'll need the LAN only to retrieve, save, or print a file. If you're using a data management program, you may need the LAN every time you enter a command.

The meaning of the word *local* in *local area network* varies with the LAN. Some LANs permit connections among computers several hundred feet apart; others accept links of up to a few miles. Since all LANs require a dedicated cable, the most practical way to define *local* is *intra-building*. Stringing privately owned cable from one building to another is difficult (and expensive) enough to rule out interbuilding LANs for most users.

Data transfer rates also vary from LAN to LAN. Most of today's microcomputer-based LANs can transfer between 1 and 10 megabits (about 120,000 to 1,200,000 characters) per second. These rates may be deceptive, however. Most LANs perform that well only if lightly loaded, so that a computer seeking to use the cable can usually do so immediately. The higher-speed LANs are also likely to be limited by how fast a microcomputer can pump data into them.

LANs generally allow some control over who uses network resources and how they use them. Many LANs require that each user enter an account number and password to use the network or to use particular disks or printers or both. Some LAN software packages offer more sophisticated schemes, which recognize users with different degrees of privilege and allow them to perform different operations.

Before a LAN can be used, the computer's regular operating system must be modified slightly. Whenever an applications program makes a request to the operating system, the added LAN software can intercept the request and reroute it through the LAN if necessary. If you seek to read a record in another computer's disk drive, for example, the LAN software must retrieve that record from the other computer and return it just as the regular operating system would.

LANs vary in the kinds of computers and the number of operating systems they can accommodate. Some are made exclusively for PCs and PC

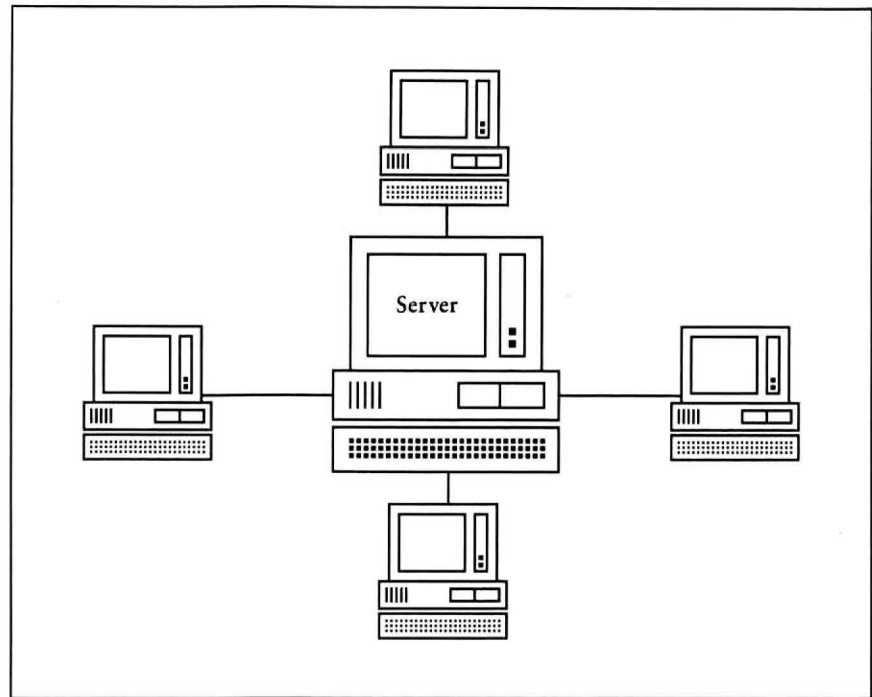


Figure 1: Star network

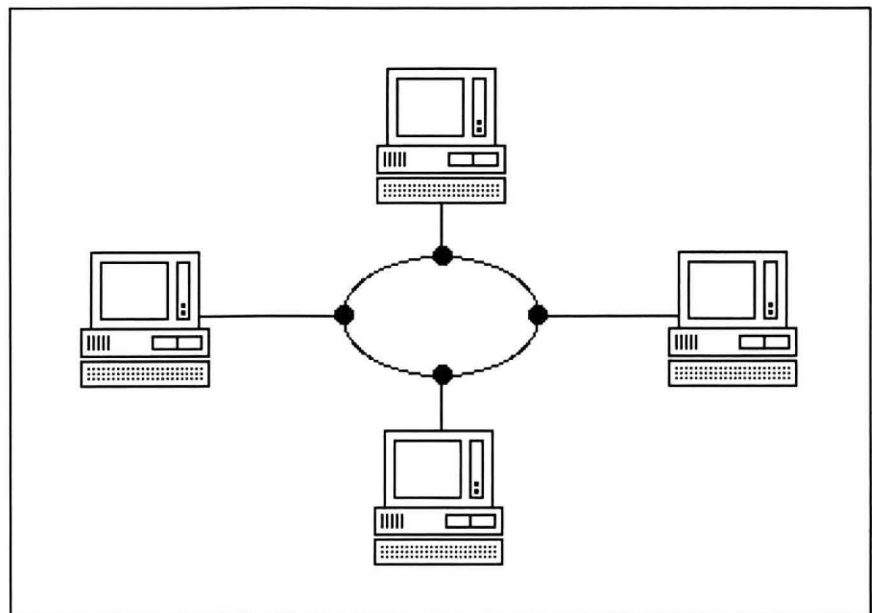


Figure 2: Ring network

compatibles, others for Apples, TRS-80s, and the like. LANs tend to come in two varieties: those that can handle a single operating system and those capable of working with a number of operating systems. Because some LANs can link several

kinds of machines, a network's usefulness is frequently based on its ability to let otherwise incompatible machines communicate with each other. Before dissimilar computers can converse on some LANs, you must format a section of the LAN server's hard disk for each operating system on the network.

● Getting Started

Some LAN makers produce computers devoted exclusively to their networks. Such machines often lack disk drives, but as long as these computers are on a LAN, separate disk drives aren't necessary. These stripped-down machines can be made and sold for less than comparable stand-alone systems. (See "Work Stations—½ Off," *PCW*, Vol. 1, No. 10.)

Do You Need a LAN?

If you want to share data with several other computer users, a LAN isn't the only way to go. You might consider two major alternatives to a LAN: a time-sharing system and a multiprocessor computer.

A time-sharing system serves several users with a single computer containing a single CPU. The only resources that each user receives are a keyboard and a display screen. A multiprocessor computer also serves several users, but dedicates a CPU to each one. The disk controller, printer adapter, and other components are shared.

Either alternative can cost less than several micros clustered as a LAN serving an equal number of users. Both, however, require that each user give up the ability to run independently of the others. When the computer goes down, everyone's work stops. In addition, time-sharing and multiprocessor tend to be physically confining; since everything displayed on any screen must be sent from a central site, everyone must be within a few hundred feet of the computer unless work stations are connected by expensive cables or slow telephone lines.

A large time-sharing computer can serve many users, but each must cope with unpredictable service levels from the CPU. As the computing load increases, the CPU gives each user a smaller share of its time, and everyone's work slows down. A multiprocessor computer offers more de-

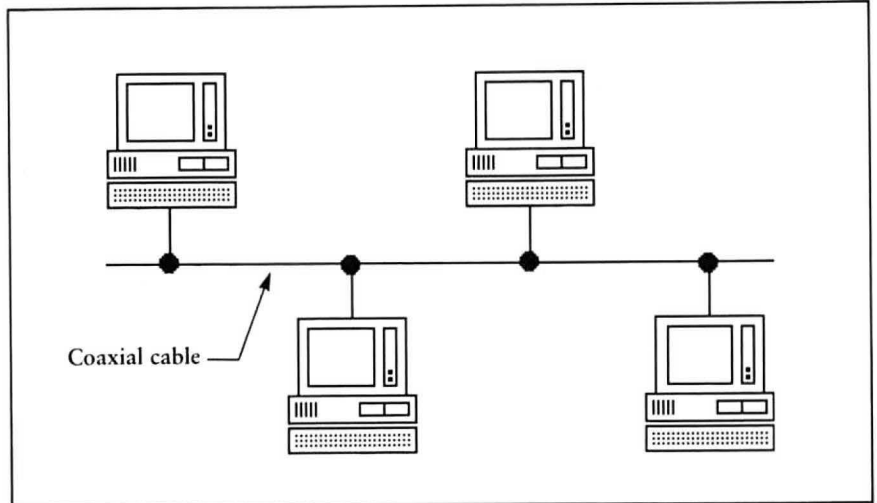


Figure 3: Bus network

pendable service by dedicating one CPU to each user, but the number of users the computer can support is limited—usually four to eight per system.

An Emerging Industry

LANs are not new. They were developed in the mid-1970s, when the falling cost of CPUs suddenly put a premium on disk drives and printers. Sharing one costly hard disk drive or printer among two or more relatively inexpensive computers began to make sense.

Corvus Systems introduced Omninet, the first microcomputer-based LAN, in 1980. That network was designed to let several microcomputers share one of Corvus's hard disk drives. From this beginning, an industry serving microcomputer-based LANs rapidly emerged. Today, scores of LAN hardware and software products are available for microcomputers, including more than a dozen tailored to the IBM PC. Such companies as Corvus, 3Com, Digital Microsystems, Nestar Systems, Orchid Technology, Santa Clara Systems, and Ungermann-Bass are aggressively promoting their LAN products for many small computers, including the PC. In May, Big Blue also entered the market, releasing the *Personal Computer Cluster Program*, a hardware and software "cluster" package that links up to 64 personal computers—PCs, XTs, PCjr's, and Portable PCs.

LANs are useful because they eliminate redundancy in applications software, and they do so "transparently." That is, a network enables you to use a program that is stored on your computer or on someone else's, and you won't know the difference. Word processing programs are a prime example. If you can run them on a stand-alone computer, you can run them on the LAN connected to that computer. The result is more efficient use of both applications programs and peripherals.

Chiefly because the application is so well suited to network usage, word processing has become the most popular activity on most of today's small-computer LANs. Using a LAN for word processing enables everyone on the network to store files on a large, fast hard disk. If a common library of documents or boilerplate paragraphs exists, all may share it, and it can be updated for all users at once. In addition, everyone can share expensive letter quality printers and high-speed dot matrix printers attached to only a few of the LAN's computers.

Wanted: Applications Software

The major impediment to network growth has been the dearth of applications software. While the market abounds in LAN hardware and software, applications software for

LANs Get Work

Wes Nihei

The wait for LAN applications software may be drawing to a close. Companies are beginning to write programs—particularly data management programs—that allow local area networks to perform meaningful tasks. Several notable recent offerings are listed here.

LAN:DATASTORE

Software Connections has introduced *LAN:DATASTORE*, a relational data management system that enables up to 16 networked PCs to share a central data base simultaneously. Software Connections claims that *LAN:DATASTORE* provides the data base integrity and security that a multiuser environment requires. The product features automatic record locking, storage of up to 16MB, and a built-in report writer. *LAN:DATASTORE* supports the following networks: 3Com EtherSeries, Novell ShareNet, Davong Multi-Link, Orchid PCnet, and Corvus Omninet. It runs on the PC, the XT, and compatibles.

Software Connections
1800 Wyatt Dr. #17
Santa Clara, CA 95054
408/988-3704

List price: \$1945, for two to five concurrent users \$945, for single users (upgradable) \$495
Requirements: 192K, one disk drive, DOS 2.00

QuickNet

TCS Software recently released *QuickNet*, an accounting applications package that is combined with a distributed data

base. *QuickNet* accepts four simultaneous users in a 3Com EtherSeries network with a maximum of 100 nodes. A user on any computer in the network can share information stored in any TCS data base with any other work station, and several users can access a TCS *Total Accounting System* file simultaneously. *QuickNet* runs on the PC or compatibles.

TCS Software Inc.
3209 Fondren
Houston, TX 77063
713/977-7505
List price: \$1000 per user (estimated)
Requirements: 256K, one disk drive, DOS 2.00

Liaison

SofTech Microsystems is offering *Liaison*, a network operating system based on the UCSD p-System. *Liaison* includes electronic mail, both multi- and single-user data bases, and a spreadsheet. To use the system, *Liaison* must be installed on each PC in a Corvus Omninet network. It runs on the PC, the XT, the TI Professional, and the Corvus Concept.

SofTech Microsystems, Inc.
16885 W. Bernardo Dr.
San Diego, CA 92127
619/451-1230
List price: 2 to 8 users \$750, 9 to 24 users \$2000, 25 to 64 users \$4000
Requirements: 128K, one disk drive, Omninet Transporter board

Shoebox II

Techland Systems is distributing a version of *Shoebox II*, its time and expense management program, for the IBM PC Cluster Program. *Shoebox II* provides multiuser access to common data in a PC cluster while including a multiuser "mailbox" message center capability. A coordinator keeps track of appointments and reminders for an unlimited number of users. It runs on the PC, the PCjr, and the Eagle portable.

Techland Systems Inc.
25 Waterside Plaza
New York, NY 10010
212/684-7788
List price: multiuser package with coordinator \$125 per user
Requirements: 128K, one disk drive, DOS 1.10 and up

Open Systems Software

Open Systems currently offers eight accounting programs that are tailored to a 3Com Ethernet-based network linking PCs or compatibles. The eight packages include accounts payable, accounts receivable, general ledger, inventory, job costing, payroll, sales order processing, and purchase order processing applications. Open Systems also offers *The Team Manager*, software that enables you to customize reports and plug in data from any of the eight accounting packages. Open Systems claims that

(continues)

LANs Get Work (continued)

its network package, which made its debut in April, permits Open Systems software to run on Novell and Orchid networks also.

Open Systems, Inc.
430 Oak Grove
Minneapolis, MN 55403
612/870-3515

List price: each accounting program \$695; The Team Manager \$695; BASIC interpreter and network package for up to 3 nodes \$895, for 4 to 12 nodes \$1295

Requirements: accounting software or The Team Manager 128K, two disk drives, DOS 2.00; network package 256K, hard disk, DOS 2.00

Multiuser dBASE II

Ashton-Tate recently unveiled *Multiuser dBASE II*, which the company claims is a full-featured version of its popular

data management program, modified for LAN use. Ashton-Tate says that the program responds on demand to any PC in a network.

Ashton-Tate
10150 W. Jefferson Blvd.
Culver City, CA 90230
213/204-5570

List price: up to four simultaneous users \$995, additional users in groups of four \$495
Requirements: 128K, one disk drive, DOS 2.00

ProBase

Data Technology offers *ProBase*, a full relational data management program that works on a 3Com network. The program includes automatic file locking and record locking and converts files from *dBASE II* and *1-2-3* to the *ProBase* format. It runs on the PC and compatibles.

Data Technology
701A Whitney St.
San Leandro, CA 94577
415/638-1206

List price: single user with program, menu, and report generators \$650; single user without generators \$300; unlimited number of users \$900; each additional generator \$350

Requirements: 128K, CP/M-86 or DOS 2.00, one disk drive

10-BASE

Fox Research has developed *10-BASE*, which the company describes as a relational data management program written in IBM's Sequel DBMS language. *10-BASE*, aimed at networks of PCs and compatibles, can handle 16 files at a time. In addition Fox claims that its *10-NET* local area network permits a full sharing of such data management applications programs as *SuperCalc* and *dBASE II*.

Fox Research
7005 Corporate Way
Dayton, OH 45459
513/433-2238

List price: \$695 per node
Requirements: 128K, one disk drive, DOS 2.00

networks has developed more slowly. Most LANs today include electronic mail software similar to that used at the hypothetical Green Equipment Company, but applications such as Green Equipment's datebook program, which collects schedules from several computers, remain scarce.

It's ironic that LAN manufacturers have dressed up the PC in network finery only to find that LANs, lacking the applications programs to actually get jobs done, have had nowhere to go. This turn of events has been more a reflection of uncertain con-

sumer demand than of technological limitations. Things may be changing as applications programs for LANs start to appear on the microcomputer scene (see "LANs Get Work").

Applications software is especially critical because networks create a few problems that only applications programs designed specifically for LANs can solve. Most important is what to do when two computers try to use the same data simultaneously. If both are reading the same data,

everything works well. If the computers are modifying the data, however, they are likely to get in each other's way. This can make valid data appear invalid, causing programs to fail or to give incorrect, seemingly random results.

Today, most LANs solve this file-sharing problem in a very simple way. When one computer is using a file, the LAN locks up the file and won't let other computers access it. Some LANs lock up the entire disk, which is a safer approach, but this can interfere even more with LAN user activity. Some LANs reduce the

disruption of this disk "lockout" by dividing a large hard disk into several smaller "virtual disks," each of which appears to the LAN user as a separate disk drive. Each virtual disk may then be locked separately.

Record locking prevents you from reading or writing to a record when it is in use. As with file locking, you can establish various authorized levels of access.

Even the less restrictive file-locking protection scheme can defeat the purpose of using a data management application on a network. To work well, the data management system must be written to protect data selectively, permitting users to update different parts of the same file at the same time.

File sharing also raises the ticklish situation of unauthorized software duplication. Even programs that are not copy protected usually include statements prohibiting disk duplication. A common hard disk changes all that, making programs available throughout the network.

Electronic Mail

Networks make it possible to write applications, such as electronic mail, which wouldn't make sense on stand-alone computers. Electronic mail software enables you to send a message to another LAN user; the message is delivered whenever your correspondent signs onto the network. Many LANs offer an electronic mail option that includes a variety of extra features, such as distribution lists (for sending letters to a list of users in one operation), "certified mail" (which notifies the sender when the recipient has read the message), automatic filing and retrieval, mail forwarding, and more.

Electronic mail is used extensively in some installations and not at all in others. In part, this depends on the LAN's layout: if the computers are close together, sending electronic mail may be no easier than leaving a note on a co-worker's desk. Of course, the level of use depends on the habits of network users, whatever the application.

Looking Ahead

Shared data management applications, such as Green Equipment's scheduling program, represent the area of greatest potential growth for LANs. The marketplace also continues to await programs for accounting, inventory control, and industrial process control that will run on LANs and take advantage of LAN features. Some of these will resemble single-user applications that now run on microcomputers. Others will perform like multiuser applications that today run only on minicomputers and mainframe systems.

The prospect of getting large numbers of micros and mainframes to converse tantalizes those in the LAN business. Many firms now rely on large computers that access accounting, order entry, and other applications via "dumb" terminals. These companies have begun acquiring microcomputers with sophisticated spreadsheet programs and other software, and they're aching to plug the micros into mainframe terminal networks. When that happens, micro users will be able to access the vast stores of data kept on the host computer.

Today, it's technically feasible to connect a mainframe computer and a microcomputer to the same LAN, enabling the two machines to talk to each other. LAN applications software remains the missing link. Without a sufficient base of that software, making mainframes and micros say useful things is still an elusive goal. ●

Jonathan Sachs is an independent consultant living in the San Francisco Bay Area who specializes in text processing software development.



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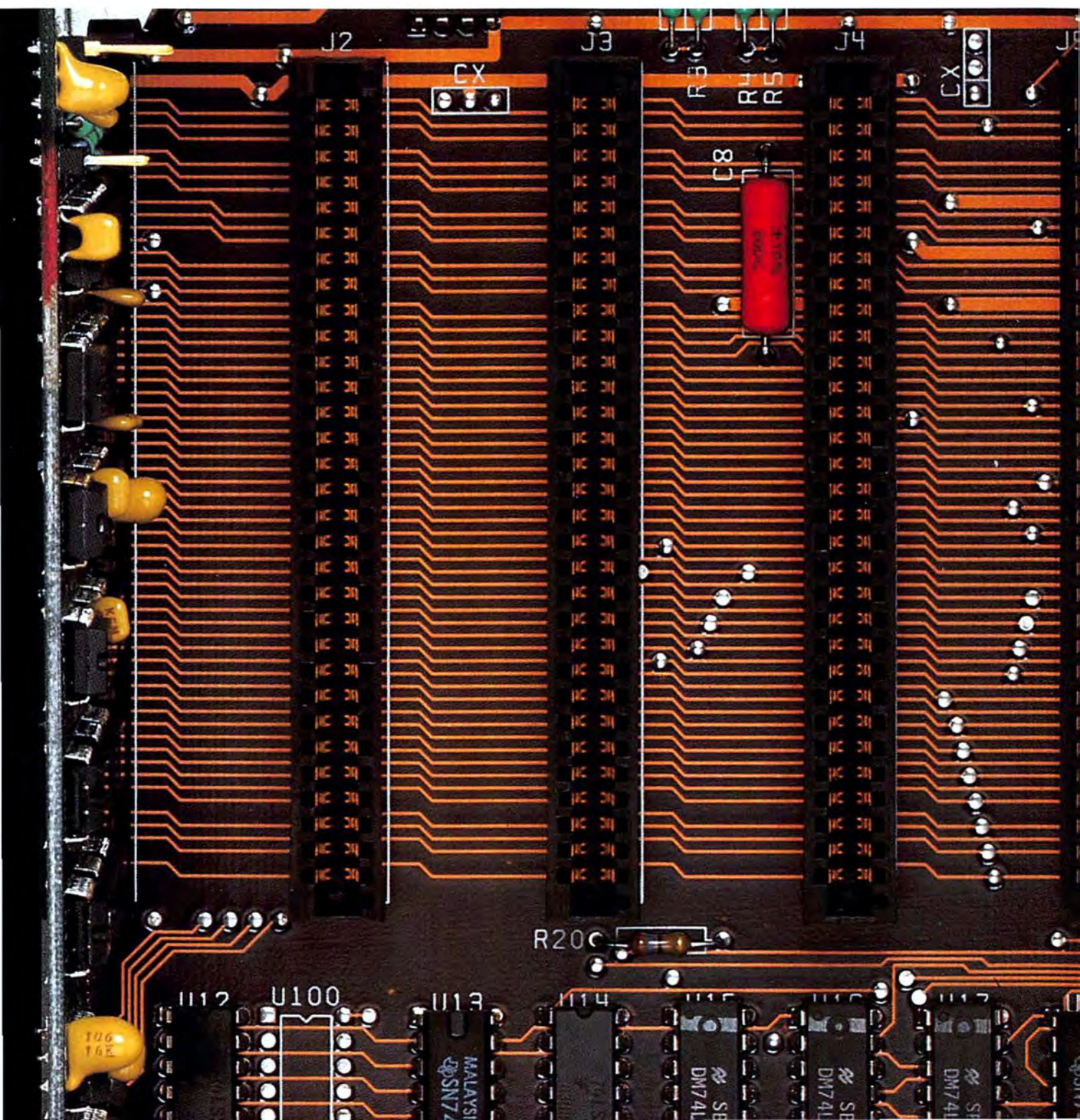
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Karl Koessel

This month we learn to disable <Shift>-<PrtSc> on the Compaq for those times when you're without a printer. It seems that when this key combination is pressed, the Compaq, unlike the PC, keeps looking for a printer and won't do anything else until it finds one. We also have a reader who would like his word processor to print special business symbols on his dot matrix printer. The same reader wants to know why a CHKDSK run on his disk reports three hidden files instead of two as shown in "DOS for Beginners" (PCW, Vol. 2, No. 4). In the last item we learn to use the DOS 2.00 re-direction feature to create a file that contains a list of all the subdirectories and files on a disk. We also learn to use one of the optional parameters of the DOS 2.00 filter command FIND.

Compaq and <Shift>-<PrtSc>

Q. I have a Compaq with two disk drives and 256K RAM. The printer I use is an Epson; my word processor is a PC version of the ever-popular WordStar 3.3.

One night I was working on a story when I happened to hit some combination of keys that froze up my machine. The cursor shot to the top left corner of the screen, sat for about 20 seconds, and then proceeded to move slowly to the right at the rate of one column approximately every 20 seconds. I couldn't scroll, escape, <Ctrl>-<Break>, or save the document. Pushing any key for longer than a few seconds elicited a squeal

from the Compaq. I finally had to <Ctrl>-<Alt>- and lose a night's work.

A few weeks later it happened again when I was writing another story. After rebooting and fooling around a bit, I discovered that hitting <Shift> and <PrtSc> simultaneously produced the problem. I figured that if my printer was hooked up and turned on, it might print—and somehow unfreeze my Compaq. I tried it and it worked. The cursor moved from the command line down each line on the screen as the line was printed on the Epson. When the screen had been printed, I found I could continue word processing.

The question is, should this happen at all? Does this combination of keystrokes produce the same problem on a PC? If not, does this mean that the Compaq is incompatible with the PC version of WordStar 3.3—at least in this case? Or is something wrong with the Compaq? Also, what do I do if this happens again, but I don't have a printer plugged in to dump the screen to and thus unfreeze it?

Bob Miller

Lafayette, California

A. This problem is not related to WordStar—it is present whenever DOS has been loaded. Pressing <Shift>-<PrtSc> causes the keyboard to send codes to the system that DOS interprets as a request for interrupt 5, the print screen routine. On the PC (and the XT) the print screen routine will test 20 times for the "printer ready" signal. If no printer ready signal is found (e.g., if a printer is not attached), you are returned to your current program. Apparently the Compaq's print screen

routine does not stop testing for the printer ready signal, and without a printer you are left in limbo.

Each manufacturer writes its own print screen routine and stores the routine in the computer's ROM (read-only memory). When the computer is turned on, it builds a table of

The Compaq's print screen routine does not stop testing for the printer ready signal, and without a printer you are left in limbo.

the addresses, called interrupt vectors, of the first byte of each interrupt routine. When DOS receives a request for interrupt 5, it looks in this table for the print screen routine's starting address. If instead of pointing to the beginning of the print screen routine the interrupt vector points to an interrupt return code, then <Shift>-<PrtSc> will not execute the print screen routine, and you will be returned to your current program.

There happens to be an IRET (interrupt return code) in the byte preceding the print screen routine. Therefore, by changing the interrupt vector for interrupt 5 so that it points to that byte, the print screen routine (on the Compaq only) can be disabled. To create a program that will change the interrupt vector (we'll

The Help Screen

name it PRTSCOFF.COM, for print screen off), place a disk containing DEBUG.COM into drive A: and type the following sequence:

```
A: <Enter>
DEBUG <Enter>
A 100 <Enter>
XOR AX,AX <Enter>
MOV DS,AX <Enter>
MOV AL,53 <Enter>
MOV [0014],AL <Enter>
INT 20 <Enter>
<Enter>
R CX <Enter>
B <Enter>
N PRTSCOFF.COM <Enter>
W <Enter>
Q <Enter>
```

The screen should appear as shown in Figure 1 (except for the x's, which will be replaced by a hexadecimal segment value dependent on the amount of memory in your Compaq). Now, whenever your Compaq is turned on or reset, place the disk with PRTSCOFF.COM into the default drive, type PRTSCOFF, and press <Enter>, or put the PRTSCOFF command in your AUTOEXEC.BAT file. <Shift>-<PrtSc> will no longer be a problem.

Special Symbols in Word Processing
Q. I need help in two matters. First, in my business correspondence I need to use the trademark symbol, ®, the copyright symbol, ©, and the registered trademark symbol, ®. I use WordStar and have an Epson MX-80 printer with the Grafrax option. Is there any way that I can get WordStar to print these three business characters? If not, is there any other word processor that provides this capability with a dot matrix printer?

Second, Figure 4 on page 48 of your April issue ["DOS for Beginners," PCW, Vol. 2, No. 4] shows the application of CHKDSK to a blank, formatted, double-sided disk; it states that there are 22,528 bytes in two hidden files. As the enclosed printout shows (see Figure 2), DOS 2.00's CHKDSK, when run on some of my disks, says that there are 22,528 bytes in three hidden files. Why is there this difference?

John K. Mickelsen
E. Syracuse, New York

A. To print graphics on the Epson MX-80 with Grafrax, the printer needs to be sent a code sequence that turns on the printer's graphics mode. Then the printer is sent a second code sequence to which the printer responds by printing a particular columnar pattern of dots for each byte of the code sequence (see "Character Construction," PCW, Vol. 2, No. 4).

Because WordStar usually suppresses the high bit of the codes it sends to the printer, the graphics code sequence received by the printer will only print columns seven dots high. This is not much height in which to create the symbols you want. You would also have to dedicate two user patches (e.g., ^PQ to turn on the graphics mode and ^PW to turn it off) as well as two function keys for each symbol.

As shown in "Character Construction," if you had one of the other Epson dot matrix printers, you could send the printer definitions of an alternate character set of your own creation. Then WordStar would have no problem getting your printer to produce the symbols you want.

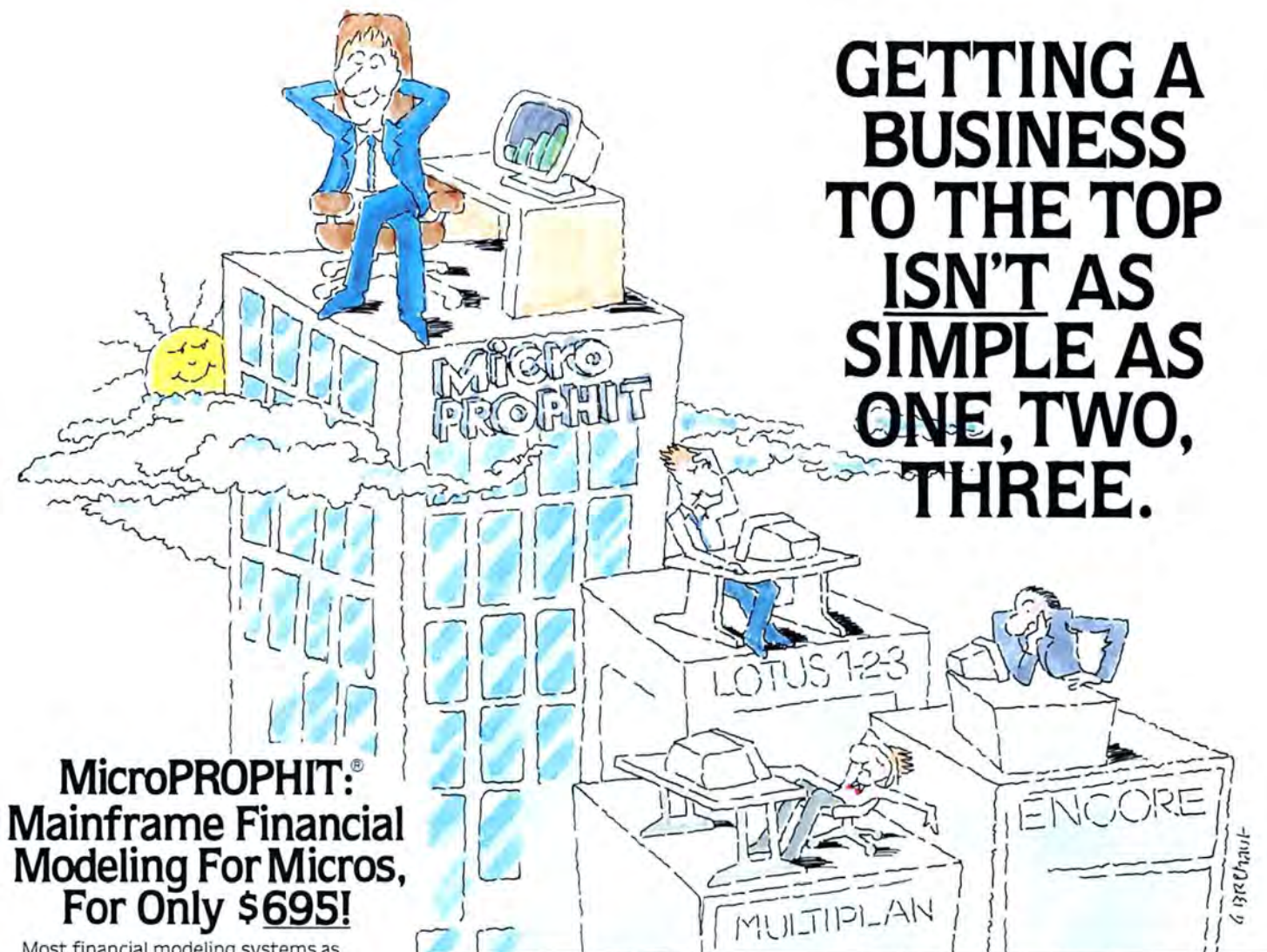
```
A>DEBUG
-A 100
xxxx:0100 XOR AX,AX
xxxx:0102 MOV DS,AX
xxxx:0104 MOV AL,53
xxxx:0106 MOV [0014],AL
xxxx:0109 INT 20
xxxx:010A
-R CX
CX 000B
:B
-N PRTSCOFF.COM
-W
Writing 000B bytes
-Q
```

Figure 1: Screen display after creating PRTSCOFF.COM

An Epson technical representative told me he thought that later model Epson MX-80s (sold with Grafrax included) will print condensed superscript characters. If you happen to have one of these, printing TM, (C), and (R) in condensed superscript mode may be an acceptable alternative. If you decide you want another word processor that will send full 8-bit codes to your printer, take a look at the 1984/85 edition of *The Ratings Book: IBM PC Word Processing Programs*, from Software Digest. This comprehensive review of 30 word processors says 26 of them will solve your problem.

The reason there is a difference between the display of CHKDSK on your disk and the display reproduced in the April issue is that your disk was given a volume label when it was formatted. A disk's volume label (see "Volume Labels," *The Help Screen*, PCW, Vol. 2, No. 3) is stored in the disk's root directory as though it were a file name and is given a file at-

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The Help Screen

tribute (see "Hidden File Attributes," **,**, PCW, Vol. 2, No. 6) identifying it as a volume label. CHKDSK includes a disk's volume label in its count of hidden files.

Trimming the TREE

Q. I've been using my PC with a hard disk for six months under DOS 2.00. Having all my files and programs readily available is an inestimable benefit. It's not just because the hard disk drive accesses its files faster than does a floppy disk drive but also because I no longer have to search for the proper disk, empty the proper drive, put away the exiting disk, and finally insert the disk with (hopefully) the file I want.

I have made several subdirectories and sub-subdirectories and have put the data files, programs, and batch files needed into each. Soon I had many extra copies of programs and files (a copy in each directory that would need it). Recently I learned about the DOS command PATH, which defines an extended search path—the subdirectories that are to be searched for commands or batch files that are not in the current directory. Now I have a subdirectory called \DOS that contains all the DOS 2.00 files, including those from the DOS Supplemental Programs disk. Because C:\DOS is now one of the extended search paths, I no longer need a copy of CHKDSK.COM in each subdirectory where this file is needed.

Having learned the PATH command, I am now anxious to reorganize my directories and rewrite my

batch files. I would like to know if there is a simple way to find out which subdirectories contain copies of a given file.

*Phillip Moore
Washington, D.C.*

A. Try the following set of DOS 2.00 commands with a copy of TREE.COM in the current directory of the default drive or after a path to the file has been set by the PATH command. They create a file containing the names of all the files and subdirectories in the root directory and each subdirectory. (See **,** in this issue for a patch to correct a bug in TREE.COM.)

```
DIR C:\ > C:\FILES.LST  
TREE C: /F >> C:\FILES.LST
```

Note the use of the DOS 2.00 redirection feature. The > causes the output of the command DIR C:\ to be written to the file FILES.LST in the root directory of the hard disk. The >> causes the output of TREE C: /F (which lists each subdirectory along with all its subdirectories and files) to be appended to the file FILES.LST. To create a hard copy of FILES.LST type COPY C:\FILES.LST PRN <Enter>

```
A>CHKDSK B:  
Volume TEMP.SYSTEM created Mar 12, 1984 10:17p  
  
362496 bytes total disk space  
22528 bytes in 3 hidden files  
18432 bytes in 1 user files  
321536 bytes available on disk  
  
327680 bytes total memory  
302544 bytes free
```

Figure 2: CHKDSK on a blank, formatted, volume-labeled, double-sided disk

Now you can use the DOS 2.00 filter command FIND to find each occurrence of a given file name in FILES.LST. (FIND.EXE must be in the current directory of the default drive, or a path to the file must first be set by the PATH command.) Type FIND /N "filename" C:\FILES.LST, replacing filename with, in uppercase, the name of the file that you want to find. The optional parameter /N causes FIND to display the relative line number in front of each line in FILES.LST that matches the string (file name) in quotes. The line numbers will help you locate the file names on the printout of FILES.LST, where the name of the subdirectory containing the file is easily identified.

A word of warning: Take care while you reorganize the hard disk. Files with the same names in different directories do not necessarily contain the same information.

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

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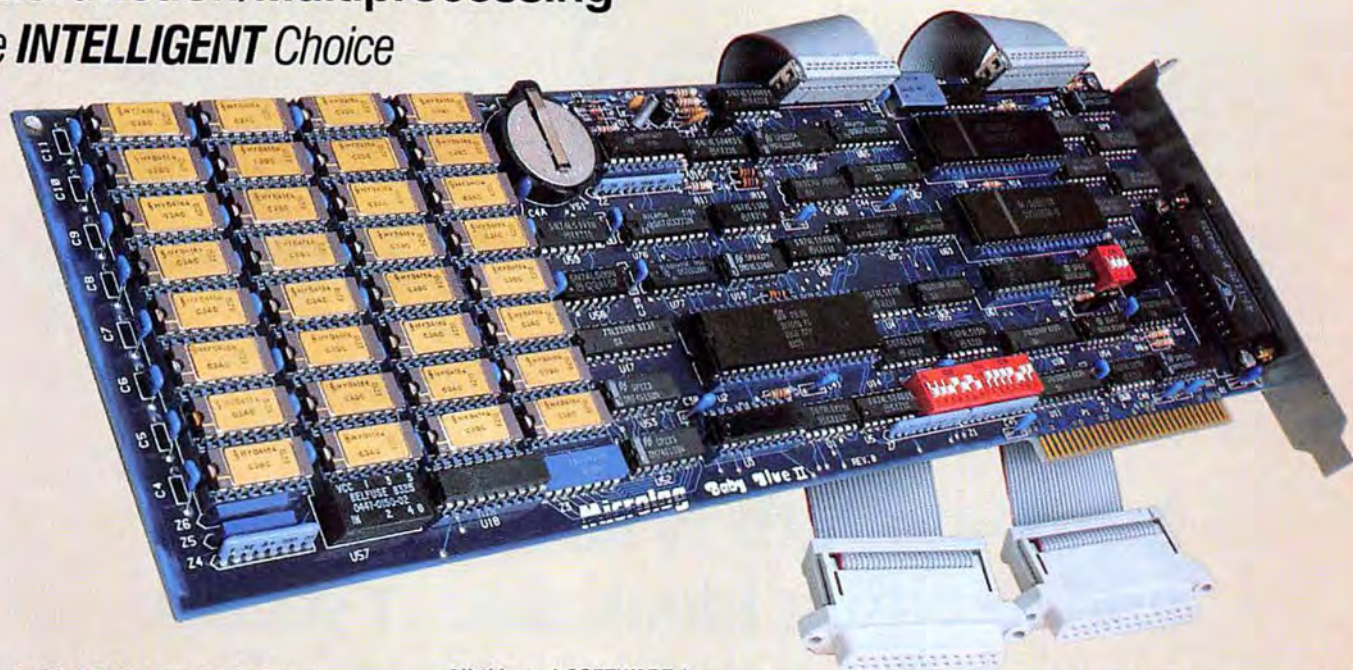


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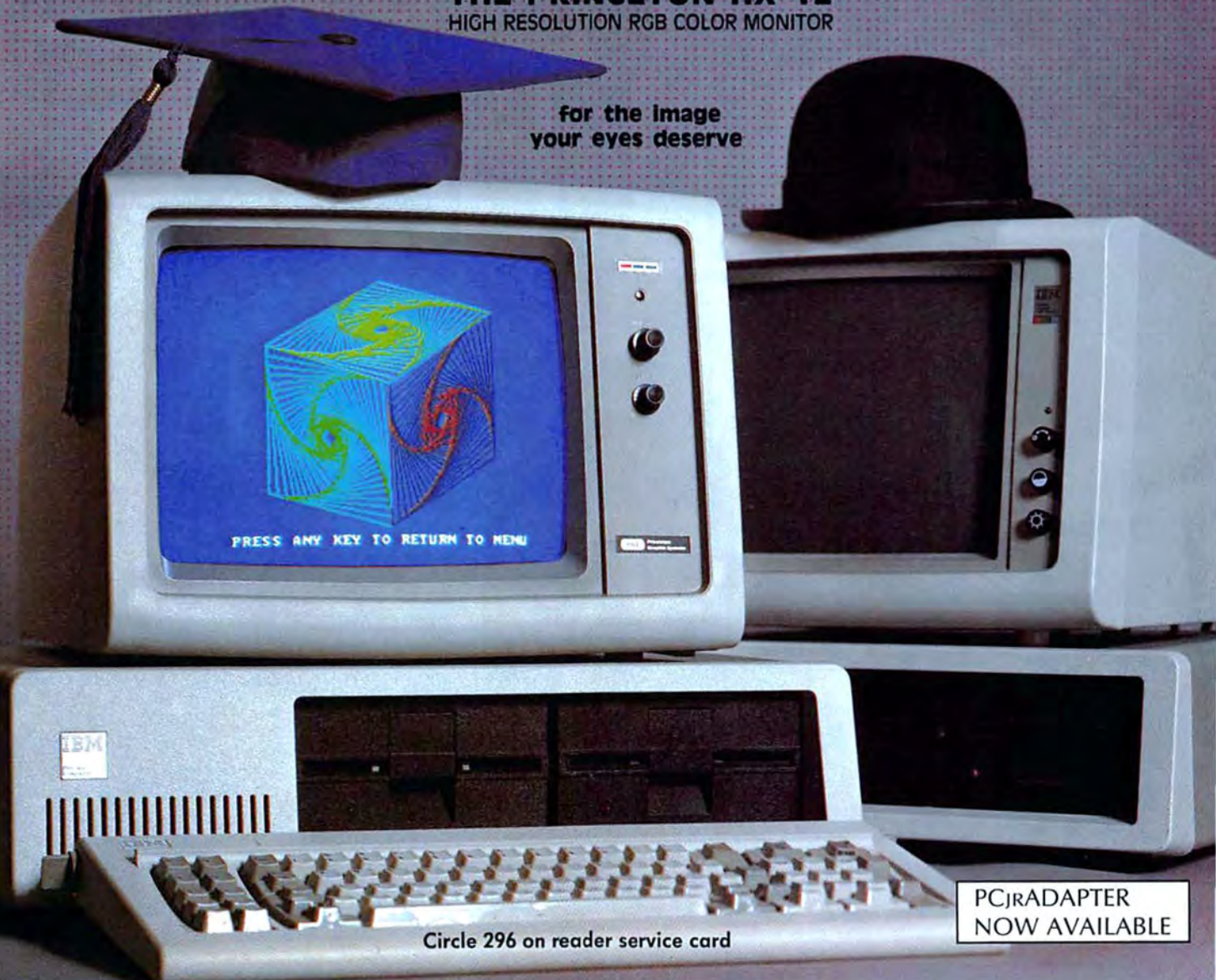
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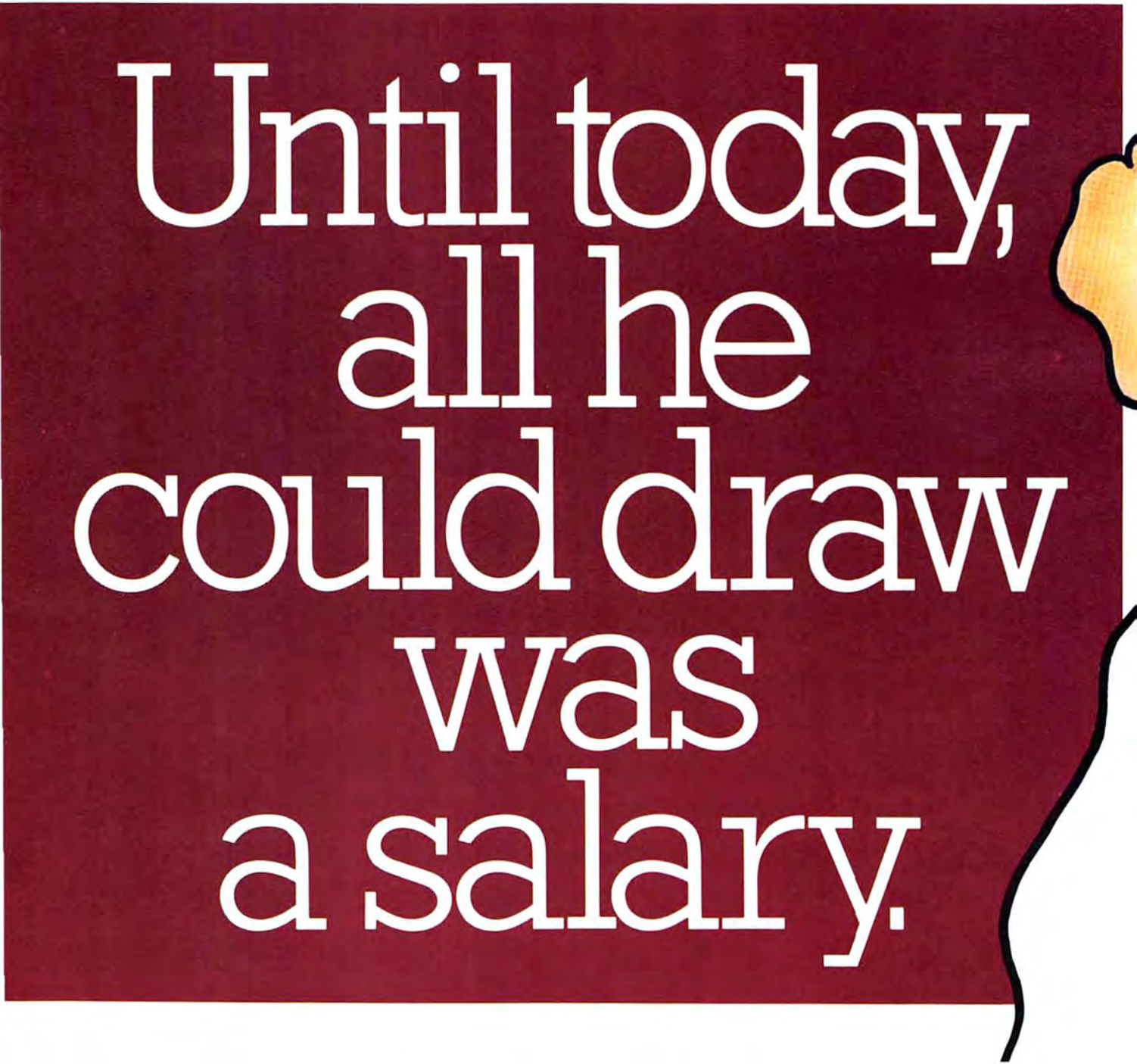
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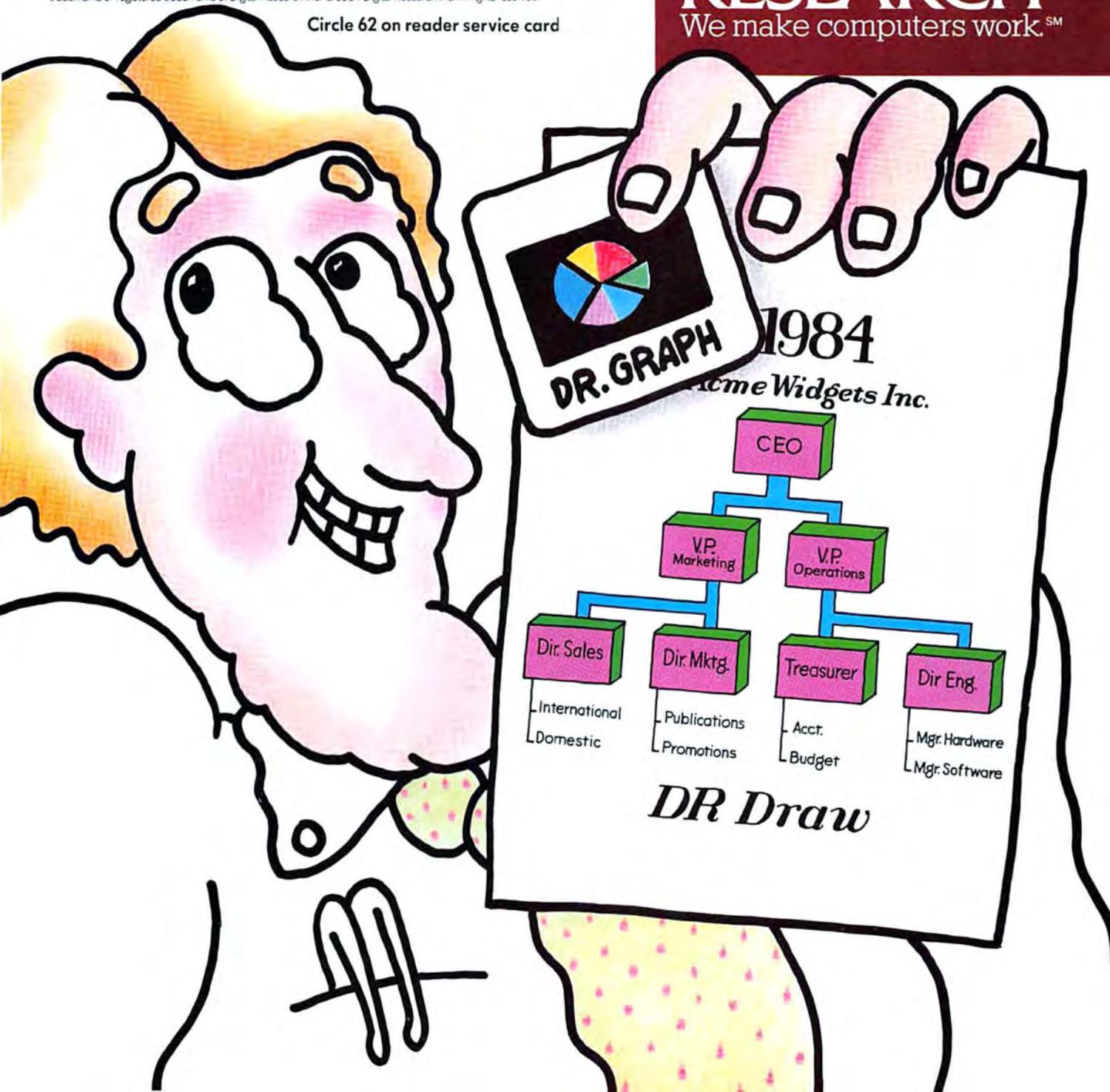
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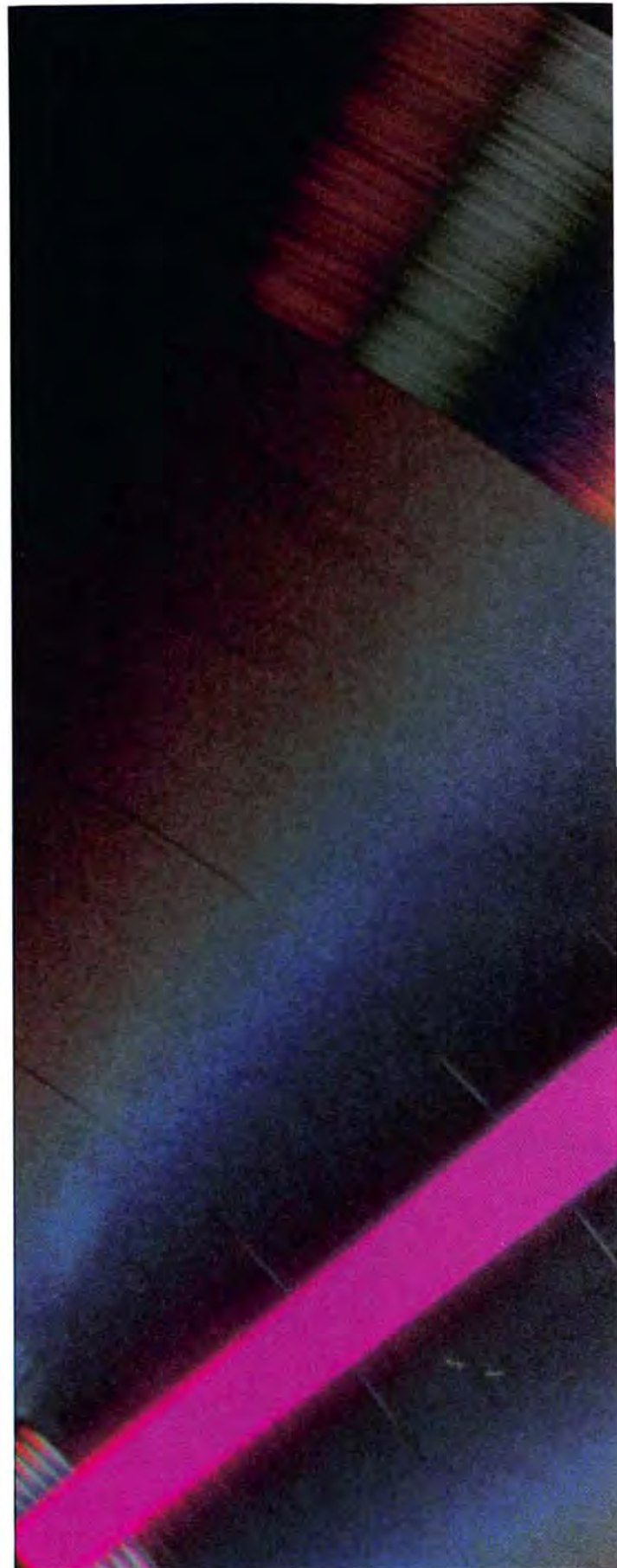
Rick Cook

When you think of lasers and videodiscs, the image of shiny, album-sized platters holding the latest Star Wars movie comes to mind. But the technology that made the laserdisc player possible has brought forth the optical disk, a storage medium that may make the hard disk drive—the computer's traditional mass storage device—a thing of the past.

As every IBM PC owner quickly learns, files inevitably expand to fill the space available—and then some. The obvious solution has been to add more storage; you swap your 180K single-sided floppy disk drives for 360K double-sided drives. Perhaps you add a 5- or 10-mega-byte (MB) hard disk drive. Now you have storage to burn.

But inevitably the day comes when you find that your files have outgrown your storage space once more. Like many hard disk users, you purge your backup files, buy programs that “pack” your data (take out redundant bytes), and start using floppy disks again for some storage. The storage problem goes from annoying to acute if your system is part of a growing business that must store more and more information (and get to it quickly) but may not be able to afford a 50MB hard disk. For the time being, buying another hard disk is the only solution to storage woes. But in the not-too-distant future, answers may be measured not in megabytes but in gigabytes—with optical disk storage.

Optical disk storage, a first cousin to videodisc and audio compact disk (CD) technologies, uses a laser to store digital information, rather than images or sound, on a plastic-coated magnetic platter. Initially tied to mainframe computers because of their cost (\$140,000 and up per drive), optical disks pack data more densely



A close-up of an optical disk



	PC Floppy Disk Drives (Tandon TM-100-2)	XT Hard Disk Drive (Miniscribe 2012)	Shugart Optimem 1000
Cost	\$220	\$800	\$12,500
Storage capacity	360K	10MB	1000MB
Cost per kilobyte stored	61¢	10¢	1¢
Storage density bits per inch	5877	8280	14,500
Storage density tracks per inch	48	345	14,500
Average number of tracks per side	48	306	40,000
Average access time in milliseconds	75ms	90ms	100ms
Data transfer rate	250 kilobits/second	5 megabits/second	5 megabits/second

Table 1: Storage cost and performance comparisons

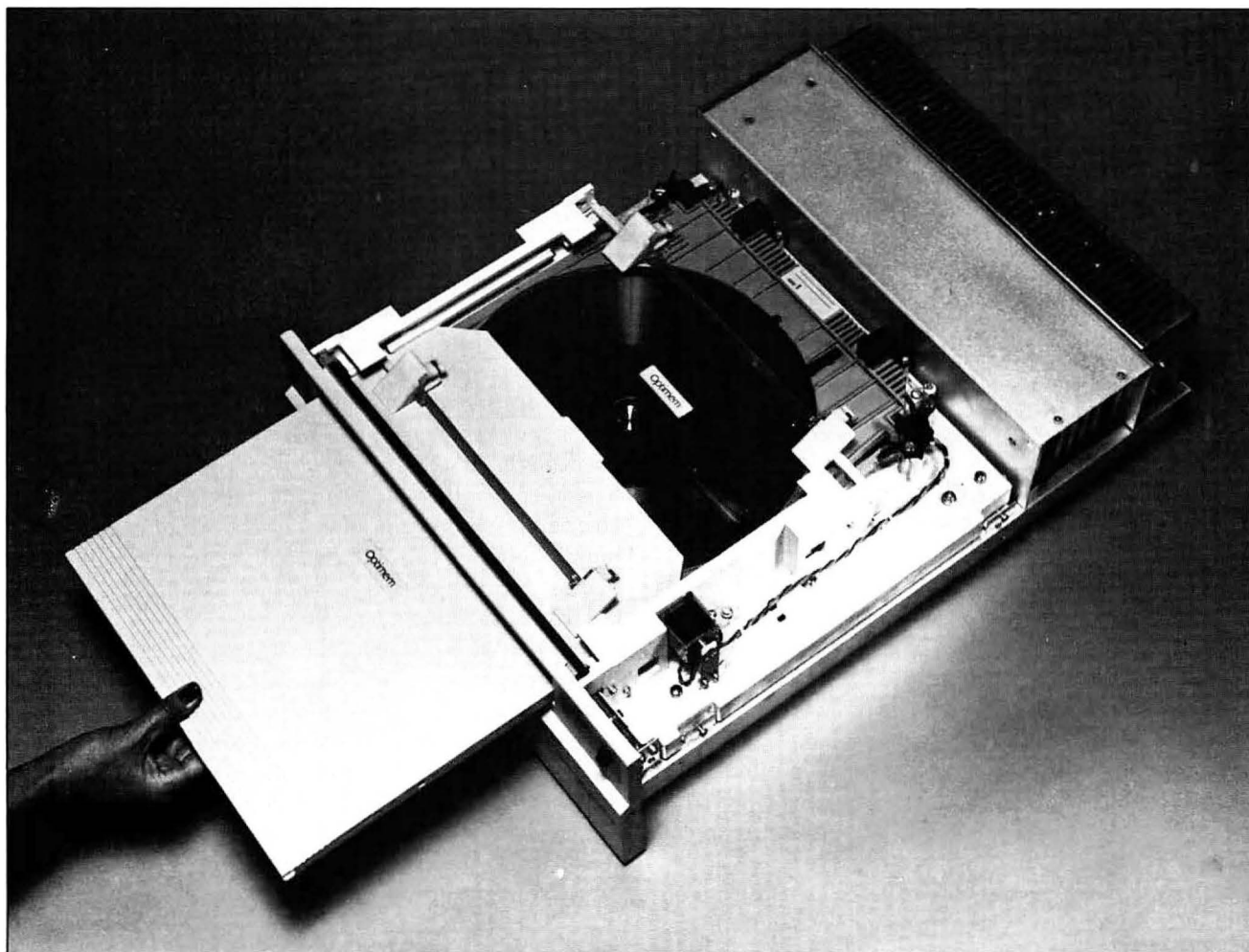
than floppy or hard disks at a price that is rapidly coming within the grasp of PC users. Already, 1 gigabyte (1000MB, which is the equivalent of 500,000 double-spaced pages, or the storage capacity of 100 PC XT's) of storage is available for the PC and other personal computers. Shugart, a company known for its floppy disk drives, is already shipping the Optimem 1000, a 1-gigabyte, write-once optical disk system that uses 12-inch, single-sided, removable disks. The unit, disk, and PC interface may cost the customer as much as \$15,000. This is not cheap, but consider that equivalent on-line storage would require nearly 2800 360K double-sided disk drives—at a cost of over \$600,000 (see Table 1).

The price of optical disk drives is likely to drop quickly as manufacturing techniques are refined, production increases, and more manufacturers enter the field. By late 1986 units should be in the steep-but-affordable \$8000 to \$10,000 price range. Industry analysts expect that before 1990 optical disk systems will go for \$2000, with disks dropping in price from the current \$100 to under \$10.

But don't turn your floppy disks into Frisbees just yet. Aside from the cost, optical disk storage has a few other drawbacks. For one thing, an optical disk drive like the Optimem 1000 is almost as big as the PC's system unit and needs 230 watts to run. Also keep in mind that the first optical disk units available, like the Optimem, can only write to a disk once. Once data is recorded on the disk it cannot be erased. To paraphrase Omar Khayyám, "The moving laser writes and having writ, moves on. . . ." Some units may only function as players, using disks that are already embedded with programs and data. Optical disks that can be written, read, erased, and rewritten in the fashion of a floppy or a hard disk are about five years away.

Making the Light Fantastic

Most optical disks are made by embedding a thin metal layer and a layer of special plastic inside a clear plastic disk. If the disk is only going to be read and never written to (like a phonograph record or the BASIC ROM chip inside a PC), a laser is used to burn microscopic pits in the shiny metal layer. The intermingling dull pits and bright metal spots are easily detected by a laser beam bounced off the disk and are used to represent data.



The Shugart Optimem 1000 optical disk drive exposed

Optical disk systems like the Optimem 1000 that allow the user (instead of the manufacturer) to write once to a disk use a slightly different method. The write laser shines through the plastic layer and is reflected by the metal; enough heat is generated to create tiny gas bubbles in the plastic, which in turn dimple the metal (see Figure 1). The presence or absence of a dimple is detected by a low-power read laser. Both methods leave a permanent record, since there is no way of removing a pit or a bubble.

A third technique, called "optically assisted magnetic recording," is the key to erasable, editable optical disks. Instead of physically altering the disk, a laser is used to change the disk's magnetic field. The process is based on the principle that if you heat a magnet to a certain temperature, it will cease to be a magnet. If you

place the heated magnet in a magnetic field, it will conform to the field as it cools. Geologists and archaeologists have used this principle for years to determine the age of everything from lava flows to shards of ancient pottery.

An optically assisted magnetic disk is initially magnetized horizontally, parallel to its surface. The write head in the drive has both a laser and a magnetic coil; a metal plate designed to intensify the coil's field is often placed underneath the disk. To write one bit of data to the disk, the laser and the coil are both turned on. The coil cannot overcome the disk's magnetic field except at the tiny spot that the laser heats. When the laser strikes, the coil changes the direction of the magnetic field of the affected area and creates a vertical magnetic "bulge."

To read the bits recorded on a disk, the laser is set at a lower power. The beam is polarized; that is, the light waves of the laser are all oriented in a certain direction. As the beam passes through the magnetic field of the

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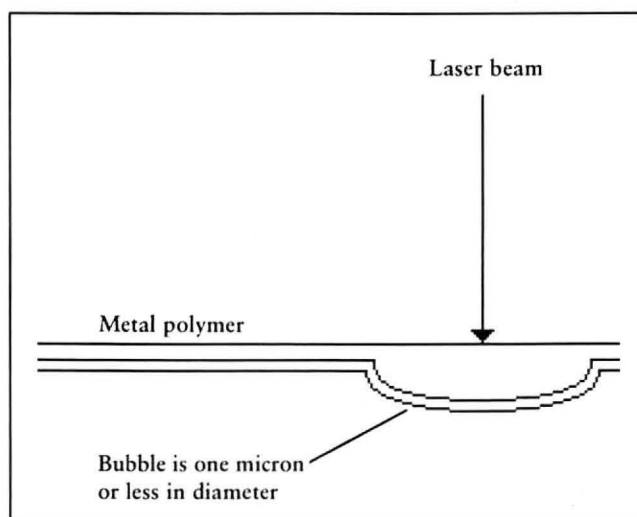


Figure 1: Writing to a write-once disk

disk, the plane of polarization rotates slightly when it encounters a bulge in the magnetic field. By using a complicated series of prisms, beam splitters, and electronic circuitry, these minor twists can be detected and decoded.

To erase data on the disk, the laser simply heats the area the data occupies. At the proper temperature, the surrounding horizontal magnetic field swamps the vertical bulges. Data can be erased one bit or an entire track at a time.

A new system of erasable optical disks that relies on differences in reflectivity to represent data is currently under development in Japan. The metal layer in the disk is made of tellurium, germanium, indium, and lead. When subjected to a laser beam of a certain intensity and wavelength, this naturally shiny alloy becomes dull. Shine a laser beam of a slightly different wavelength on the affected area and it becomes shiny again.

Making Tracks

The recording density of a floppy or hard disk drive is commonly measured by the number of bits per inch recorded in a track and the number of tracks per inch (tpi). Most floppy disks are capable of holding 5000 to 6000

bits per inch, while hard disks are capable of storing in excess of 10,000 bits per inch. The Optimum 1000 records 14,500 bits per inch, which, though a greater number, seems hardly worth the extra investment. The real difference comes in the tpi capacity.

The bits-per-inch density is primarily a function of the read/write head and the magnetic coating on the disk itself. For a number of reasons, the magnetic spot produced by the write head of a floppy or a hard disk drive has to be wider than it is long. An optical disk can store more information per inch because a laser can write and read a much smaller, circular magnetic spot.

But the possible number of tpi is dictated not only by the read/write head and the disk, but by the mechanical components that move the read/write head to a track. Most floppy drive heads cannot sense where they are on a disk; also, the mechanism that moves the head, particularly on a floppy disk drive, is not precise. A track must therefore be rather wide and relatively distant from adjacent tracks. As a result a conventional floppy disk's limit is about 96 tpi, and a hard disk's is about 800 tpi. Because a laser's optical resolution is so fine, an optical disk can have a track density of 14,500 tpi. For the Optimum 1000 this translates into 40,000 tracks per disk.

To read tracks this close together, the Optimum 1000 uses disks that are preformatted with radiating positioning lines that act like the index hole in a floppy disk. The drive's dual-servo head, unlike most floppy drive heads, can sense its location on the disk and thus can quickly find a block of data stored among the thousands of tracks. The head also has an automatic focusing system that keeps the laser beam pinpointed.

Future Lights

The benefits of optical storage may not be immediately available to the PC user. Relatively inexpensive read/write units for personal computers are still several years away. But for many applications a read-only or write-once disk may be an advantage. Banks and insurance companies (and no doubt the agencies that regulate them) will like the idea of having an unalterable audit trail—something that was lost when businesses made the transition from the pen to the computer. For the PC user an uneditable disk is likely to be a minor annoyance at worst, since filling up a gigabyte or more will be difficult indeed. Since optical disks can be changed as easily as floppies, the wait for true read/write units may be bearable.

Read-only optical disks will probably be used like enormous ROM cartridges or microfiche, since they will be a cheap and quick means of distributing large amounts of information. Entire libraries can be stored on a handful of disks; companies wanting to distribute massive parts catalogs to their dealerships will find read-only optical disks ideal. Updating information will involve shipping out a new disk and shelving the old one.

The read-only optical disk may become the backbone of the publishing business as well. The current edition of the *Encyclopaedia Britannica* takes up 6 feet of shelf space and would fit (without illustrations) on a single 1-gigabyte disk. A disk is cheaper than books to produce in quantity, more compact, and easier to carry around. Hooking up an optical disk encyclopedia to a data base management program would increase its usefulness.

Entire libraries can be stored on a handful of disks.

Software publishers too may take to optical disks. A read-only disk can be made virtually uncopyable, providing a pirate-proof method of distributing programs. Since nothing touches the optical disk except a laser beam, the chance of data being damaged or corrupted is minimal. Disastrous head crashes of the sort known to hard disk owners are eliminated. Thus, for the user, backups are for the most part unnecessary; a software firm can sell a copy-protected program without incurring the wrath of consumers who would normally insist on being able to back up their purchase. The idea of optical disks is viable enough to interest IBM, which is reportedly working on a 2-inch, read-only, 40MB optical disk for distributing software.

Of course, you do not have to run out and buy a \$15,000 optical disk system right now. Many new home videodisc players have been designed with the computer in mind and have the necessary circuitry for randomly accessing data on an optical disk. These players can't be used to write information to a disk, but they could be used to play read-only disks containing many megabytes of information. By computer standards the response time is slow, but if you already have a unit, all you need is the proper computer interface.

Future Problems

One gigabyte is only the beginning. Optical disk units for mainframe computers currently offer 4 gigabytes or more of storage. In several years units for personal computers will probably offer an equal amount of storage. As systems improve and prices go down, 10- or even 20-gigabyte units will be common.

The question is, can we use this much storage or, in the case of read-only drives, this much information? The people who run banks, insurance companies, and information services like Dialog, who devote thousands of square feet to expensive and cumbersome disk and tape drives, would say yes. Though any XT owner will tell you how quickly 10MB is used up, the storage and information needs of the average PC owner are relatively modest. A public library might want the complete Library of Congress on a disk, but would a PC user? More to the point, is it affordable? Consider that the traditional royalty on a book is about 10 percent; multiply this by the average cover price of every book printed in the last 50 years and held by the Library of Congress. A company selling such a disk would not only have to make licensing arrangements with thousands of publishers and authors, but pay a hefty premium as well. That price would, of course, be passed on to the consumer.

But people and computers being what they are, it is a sure bet that we will find some use for those gigabytes. After all, five years ago the zenith in personal computing was a 64K Apple with 120K disk drives. ●

Rick Cook is a freelance writer whose work has appeared in Barrons, Microcomputer, and the Buyer's Guide to Small Computers. He is currently writing a book on microcomputers for Sybex.

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Sunnyvale, CA 94086

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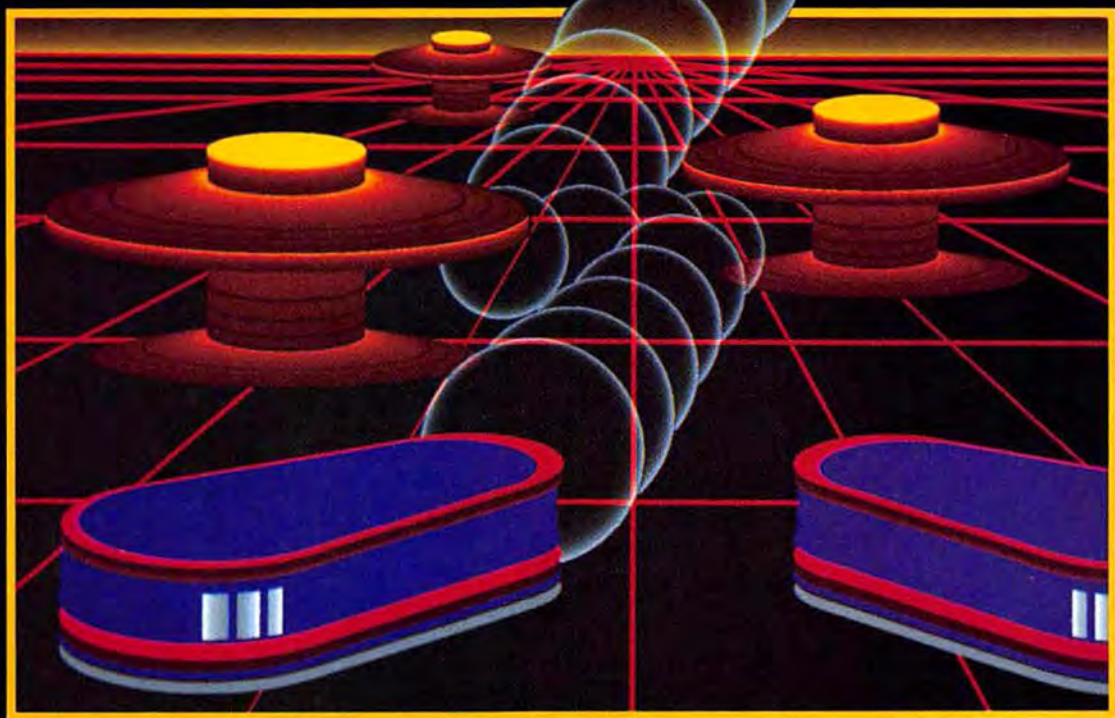
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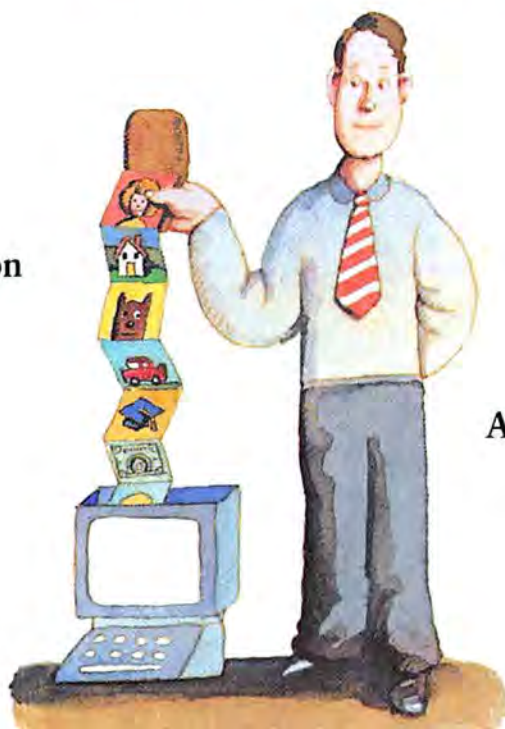
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Modems in the Fast Lane

New standards and new chips are speeding up voice-line communications for the PC. With 2400-bps modems available soon, 9600 bps can't be far away.

Larry Jordan

Last year approximately 75 percent of IBM PC communications were performed at 300 bits per second (bps); the remaining 25 percent were performed at 1200 bps. But early statistics for 1984 show a phenomenal increase in 1200-bps communications by both individuals and businesses. PC users can expect to transfer data at even faster rates: a number of intelligent, 2400-bps modems for the PC will be introduced by the end of this year. By the end of 1985 an estimated 10 percent of all PC communications will be done at 2400 bps, and by 1990 high-speed modem transfers will account for almost half of all PC communications.

The main reason for the trend toward high-speed communications is the increasing occurrence of PC-to-mainframe communications. Despite the sophistication of the PC's hardware and software, many applications still require the power of larger computers. Data communications allows the best of both worlds: most work can still be done on a PC, but applications that require larger data storage capacity or greater processing power can be sent to a minicomputer or mainframe. Text and data can be



prepared locally and then transmitted to the remote host system for further processing. This process increases productivity and reduces the remote computer's work load—the larger computer system can concentrate on tasks that require its greater powers instead of wasting its time on work that can be done with more flexibility on a PC.

The efficiency of PC-to-mainframe communications depends on the speed with which data can be transported. Little productivity is gained if you spend all your time babysitting a PC through communications sessions. Table 1 demonstrates the dramatic time savings that are pos-

● State of the Art



Concord Data Systems's CDS 224 Autodial modem (2400 bps)

Data transfer rate (bps)	300	1200	2400	4800	9600
Time to transfer 1 single-spaced page	2 min	30 sec	15 sec	7.5 sec	3.75 sec
Time to transmit a 20-page, single-spaced report	40 min	10 min	5 min	2.5 min	1.25 min

Table 1: Data transfer rates compared

sible with high-speed modems. The shorter access time required by high-speed modems can also save money, since access to a mainframe data base is often charged by the minute.

Large computers have been communicating with each other for years at speeds of up to 9600 bps, but such high speeds have required the installation of lines that are designed especially for data communications. Communication at rates greater than 1200 bps has been limited by the design of the public telephone system. The switched circuits available for voice communications are not designed for direct digital communications, and the amplifiers, filters, and echo suppressors used to transfer sound-activated analog signals distort the signal waves produced by computers. Modems are used to facilitate the transfer of the digital signals produced by a computer. A modem con-

verts the square-wave digital signals to audio-frequency analog signals that can be transmitted over voice telephone lines.

The Bandwidth Bottleneck

The bandwidth of the telephone system is the most difficult obstacle for data communications. Bandwidth is the difference between the lowest and highest signal frequency that can be properly transmitted. The data throughput a system will support is directly proportional to its bandwidth—the wider the bandwidth the greater the data throughput.

The public telephone system provides a bandwidth that supports normal voice sound frequencies, but the range restricts data transfer. The human speech frequency range is between 20 and 20,000 Hz (cycles per second), but most voice sounds fall between 100 and 3500 Hz. A bandwidth of 300 to 3300 Hz was chosen for the telephone system as a compromise between cost and adequate

voice-range frequency support. This range is fine for voice communications, but it severely limits data communications. High-speed data transfer can create a frequency traffic jam as the data signals try to squeeze themselves through the thin bandwidth of the voice line.

In the past, data transfer over voice-grade telephone lines was achieved at rates greater than 1200 bps by using "half-duplex" modems. Half-duplex modems used the same frequency range for both transmitting and receiving. When operating at data rates greater than 1200 bps, half-duplex modems used the entire bandwidth when in either the transmit or receive mode. They could not transmit and receive data simultaneously. To overcome this limitation it was necessary to install four-wire, leased telephone lines in place of the standard public telephone system. The four-wire lines provide double the bandwidth of the two-wire public telephone system, allowing simultaneous sending and receiving of data, or "full-duplex" operation.

Echo Suppression

Another limitation on data transfer is imposed by the public telephone system's echo suppression devices. These are used on telephone networks to reduce low-power signal reflections produced by signal-switching stations. The echoes are eliminated by allowing signals to transfer in only one direction at a time. When a person is talking on the telephone, the signals that carry the speaker's voice are transmitted to a distant listener, but signals received while the speaker is talking are electronically eliminated through the use of signal filters. When the speaker stops talking and begins to listen, the telephone system senses the change and switches the echo filter direction. For local calls this line turnaround takes approximately 300 milliseconds (ms) and is not noticeable during voice communications. However, longer line turnarounds typical of coast-to-coast calls can be annoying.

Although echo suppression and line turnaround are necessary to keep the phone system from turning into a network of babble, these devices inhibit data communications by prohibiting true full-duplex operation. Echo suppression filters out one direction of signal flow, and line turnaround produces a total signal dead time. When operating at 1200 bps, the 300-ms line turnaround delay is equivalent to the transfer time of 36 text characters.

To eliminate this delay, it is necessary to disable the telephone system's echo suppression. Full-duplex modems do this by transmitting a 2100-Hz tone to the telephone system for 400 microseconds. This process eliminates both echo suppression and line turnaround until the data transmission has stopped for more than 100 microseconds.

Since full-duplex modems eliminate the telephone system's echo suppression, echo filtering must now be done by the modem itself. Echo suppression is easily achieved during 300-bps and 1200-bps operation, but filtering for rates greater than 1200 bps has been a problem until recently. New echo-canceling technology has made it possible to eliminate echoes at high data transfer rates.

Background Noise

Background noise is another hindrance in data transfer over public telephone lines. Modems convert digital signals into voice signals of approximately -10 dBm (dBm is a relative measure of signal strength equivalent to 1 milliwatt into a 600-ohm load.) However, the magnitude of these signals drops to -30 or -40 dBm by the time they reach a remote modem. These signals are superimposed on a background noise of approximately -50 dBm. As the ratio of signal strength to background noise decreases, it becomes more difficult for the modem to separate the received signal from the normal line noise.

This process becomes even more difficult at higher speeds, when the complexity of the data signal increases. The limit was 4800-bps signal detection until this year, when technicians perfected automatic signal equalization hardware capable of separating noise from legitimate data signals between 4800 bps and 9600 bps. This capability has enabled modem manufacturers to produce reasonably priced, high-speed modems that overcome the background noise problems.

Modems are designed to use different digital signal modulation techniques for different data transfer rates. The three methods of signal modulation shown in Figure 1 are used individually and in combination to transfer data over voice-grade telephone lines.

Bell 103 compatible, low-speed modems use a frequency modulation technique called frequency shift keying (FSK) to produce data transfer rates between 0 bps and 300 bps. Bell 212A compatible modems use a phase modulation technique called phase shift keying (PSK) to produce a data transfer rate of 1200 bps. The maximum data transfer rates of FSK and PSK modems are 600 bps and 4800 bps, respectively. (See "What Makes Modems Run?" *PCW*, Vol. 1, No. 8, for a further discussion of signal modulation.)

International Standards

In order to break into the world marketplace and to address the compatibility problems of international communications, United States modem manufacturers are turning away from Bell standards and supporting international standards. The new high-speed modems are expected to conform to standards set by the CCITT (Consultative Committee for International Telephone and Telegraph).

In the fall of 1983 the CCITT approved a draft modem specification, designated V.22 bis, that describes a full-duplex 2400-bps modem that can transmit over voice-grade telephone lines. This specification uses the same frequency-division signaling

Here Come High-Speed Modems

The following high-speed modems are expected to be available for the PC in 1984:

2400 bps

Codex 224 Data Modem
Codex Corp.
20 Cabot Blvd.
Mansfield, MA 02048
617/364-2000
List price: \$1195

CDS 224 Autodial
Concord Data Systems
303 Bear Hill Rd.
Waltham, MA 02154
617/890-1394
List price: \$1195

Rixon R2424
Rixon, Inc.
2120 Industrial Pkwy.
Silver Spring, MD 20904
301/622-2121
List price: \$1395

Rockwell R2424 (modem board
for OEM sales)
Rockwell International Corp.
4311 Jamboree Rd.
Newport Beach, CA 92669
714/833-4700
List price: \$332

9600 bps

FAXT-96 (synchronous modem board)
Gamma Technology Inc.
2452 Embarcadero Way
Palo Alto, CA 94303
415/856-7421
List price: \$1995

● State of the Art

technique called for in CCITT specification V.22, which governs signal modulation for 1200-bps modems. It is also similar to the Bell 212A modem modulation technique.

The V.22 bis specification calls for a variation on phase amplitude modulation (PAM) called quadrature amplitude modulation (QAM). The QAM signal combines 12 phase angles and 4 phases with amplitude modulation and results in a 16-point signal structure, or 16 possible carrier states. The 4 phases that have modulated amplitudes have two possible amplitude levels and are counted as two possible bit patterns per point. The QAM signal is also referred to as a "star" or "constellation" pattern because of its shape (see Figure 2). The V.22 bis specification is based on a 600-baud line-signaling rate. Each phase angle of the QAM star represents four consecutive bits (quad bits). The combination of 600 signal changes with four bit patterns per signal change produces 2400 bps.

Beyond 2400 bps

The CCITT is also working on draft specifications for 4800-bps and 9600-bps voice-grade, telephone-line-compatible modems. Approval of the 4800-bps specification, designated V.bb, is not expected soon. The big money is on 9600 bps. Both AT&T and IBM own patents on the technology that will support the 9600-bps specification, designated V.32. Both companies are lobbying for CCITT acceptance of the draft specifications so they can implement their patents. Because it is backed by two powerful sponsors, approval of the V.32 is expected by late 1984. CCITT acceptance of the standard will ensure international acceptance of 9600-bps modem technology and a larger market for domestically produced V.32 modems.

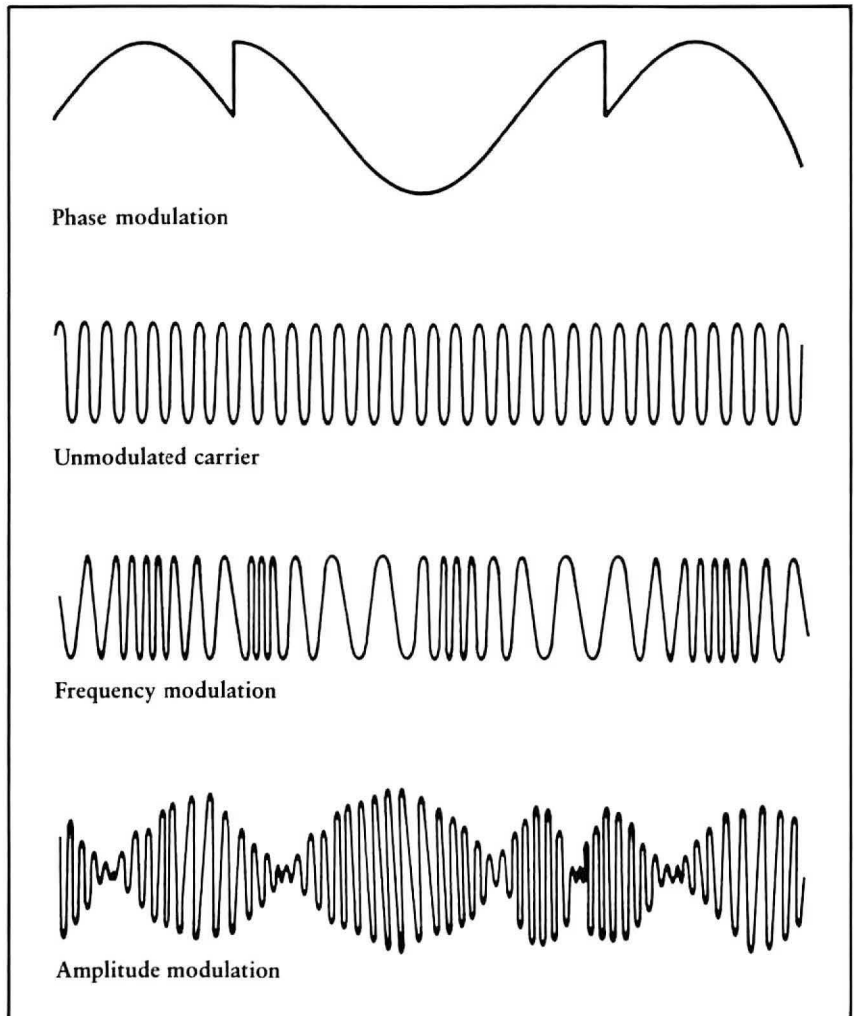


Figure 1: Types of signal modulation

The V.32 specification incorporates an advanced version of the QAM technique defined for V.22 bis. V.32 will require the transmission of five data bits with each baud signal change and a signal rate of 2400 bps. The total bit throughput will be 12,000 bps, but the effective data bit throughput will be only 9600 bps; one out of five of the transferred bits is used for an error-correction technique called Trellis coding.

The Trellis coding protocol, called forward error correction, allows error detection and correction without retransmission of data. The receiving modem automatically detects and corrects data transmission errors before it passes the data to the computer. This scheme effectively separates the data signal from the

increased background noise caused by high-speed communications and the sporadic noise that can be generated by faulty or old telephone equipment.

Another new feature of the V.32 standard is the technique it uses to separate transmitted and received signals. Instead of consuming a wide bandwidth by using separate frequencies for sending and receiving data, a V.32 modem would use a process called echo canceling to calculate the received signal by subtracting the transmitted signal and echoes from the total line signal. Frequency-division signal separation limits full-duplex modem speed to 2400 bps, but echo canceling allows 9600 bps.

Cost will be the major factor that will keep the new 2400-bps full-duplex modems from becoming obsolete as 9600-bps products are introduced. A 9600-bps modem is expected to cost about \$6000. This cost translates to approximately 60 cents per bit at maximum bps compared to 50 cents for 1200-bps and 2400-bps modems. This 20 percent cost premium can be justified only by the reductions in connect-time and machine operator costs that can be achieved by higher speed.

Another reason to stick with 2400 bps is that many current communications programs are unable to support faster speeds. Any program written in BASIC (*PC-Talk*, for example) will not be able to support speeds faster than 2400 bps during normal communications and 4800 bps using the Xmodem error-checking protocol.

Many large businesses with massive amounts of data to communicate will be able to afford the luxury of 9600-bps, dial-up communications, but most small businesses and households will stay with the less expensive 1200-bps and 2400-bps alternatives. The general adoption of data transfer speeds in excess of 1200 bps will be accelerated if information utilities such as The Source and CompuServe make them available for users at reasonable costs.

Breaking the Speed Barrier

The higher-quality, lower-cost signal processing chips that have been introduced during the past year will allow modem vendors to produce hardware that will conform to the CCITT V.22 bis and V.32 specifications. The new chips overcome the data throughput bottlenecks and other limitations of the public telephone system to produce high data transfer rates with acceptable error rates.

Currently, the speed barrier for voice-line data communications stands at 9600 bps, a barrier that will be difficult to break. The modem chips have not yet been designed that can reliably push data through noisy voice lines at speeds higher than

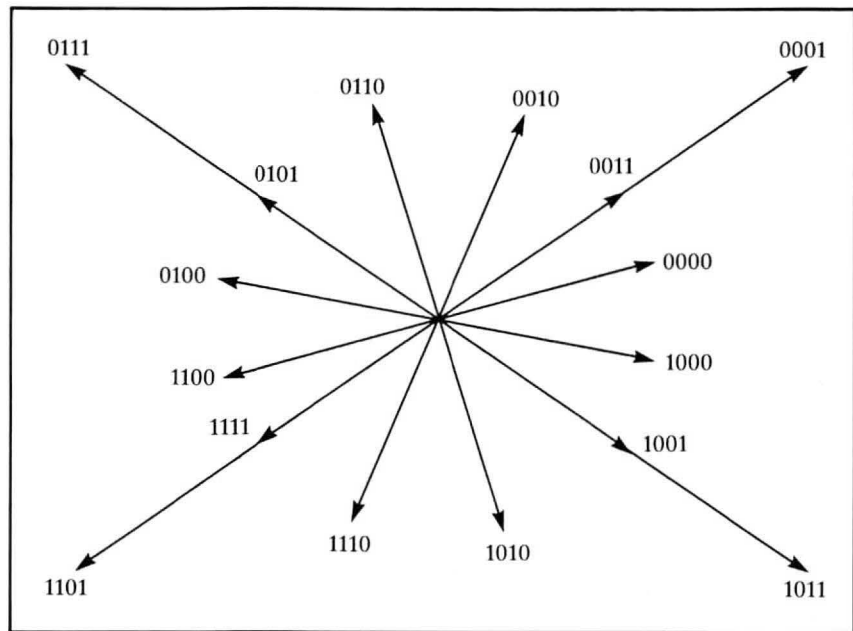


Figure 2: Quadrature amplitude modulation (QAM). Each number represents a quad bit (4 bits).

9600 bps. Eventually, new communications media such as fiber optic networks may put an end to attempts to accelerate data flow through an antiquated phone system. Although only 300,000 meters of fiber optic cable have been installed, initial experiments have shown that fiber optic networks would be a vast improvement over the current phone system. If fiber optic technology can be standardized, and lasers and light emitting diodes (LEDs) drop in price, fiber optic networks will become more common.

In a fiber optic network, lasers or LEDs are used to shoot digital pulses of light down optical fibers made of glass. Repeaters strung along the line keep the signals strong enough to be interpreted at a remote location. Since glass fibers are unaffected by the electromagnetic and radio interference that plagues copper wire conductors, background noise is all but eliminated, and data can be transferred at speeds of up to 90 million

bps. An advanced form of fiber optic technology called Raman light amplification promises to transmit data at between 10 billion and 100 billion bps.

It will be many years before fiber optic lines will be accessible to most corporations (let alone to individuals) and perhaps longer before hardware and software are developed that would allow a PC to accept data at such high speeds. For now we must make the best of our present copper phone lines. As hardware costs continue to decline and telephone costs continue to increase, the move to higher data communications speeds is inevitable. ●

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

EPSON



EPSON LQ-1500

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Alcalyn

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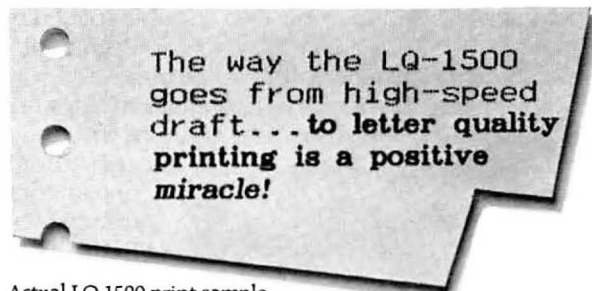
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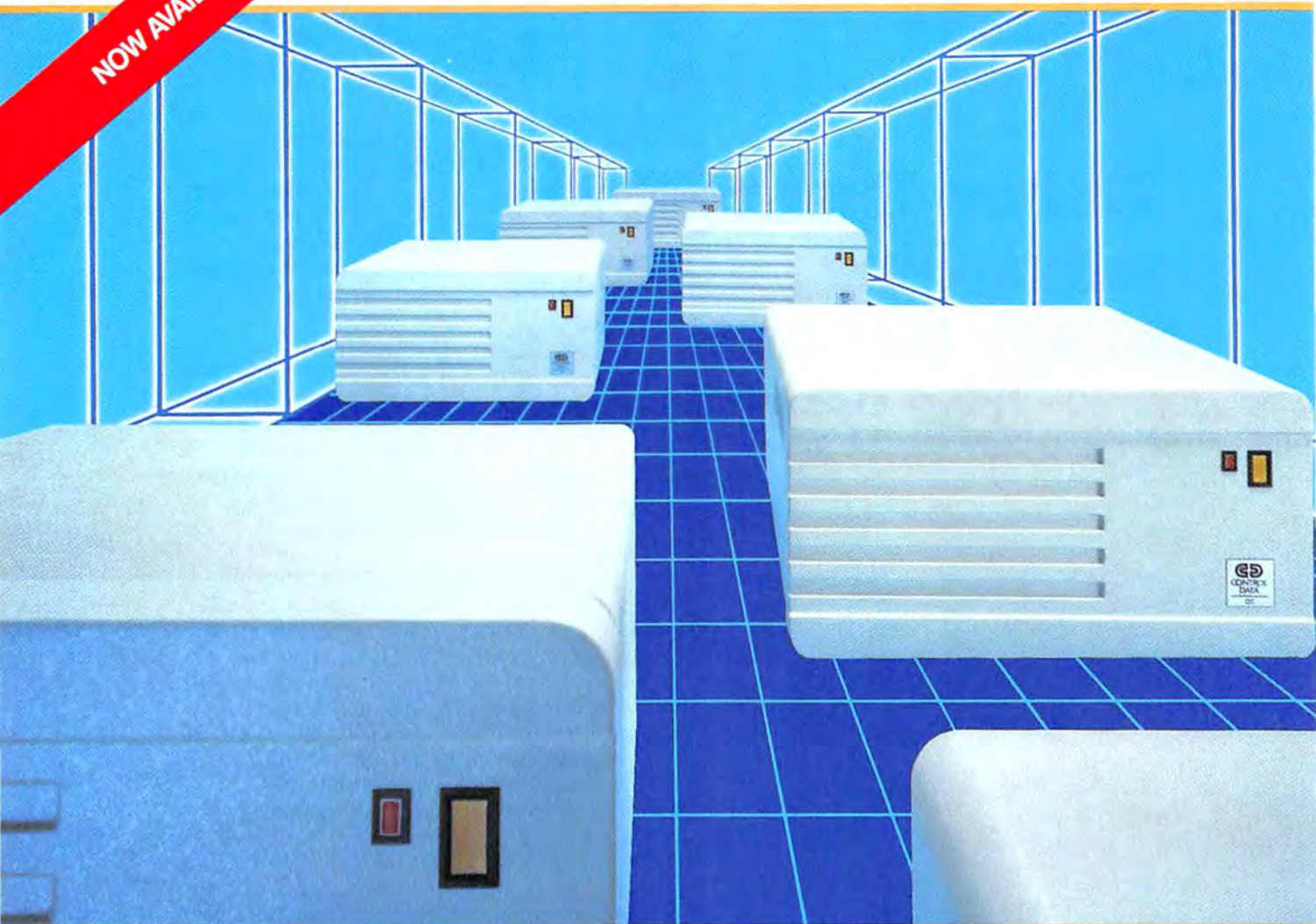
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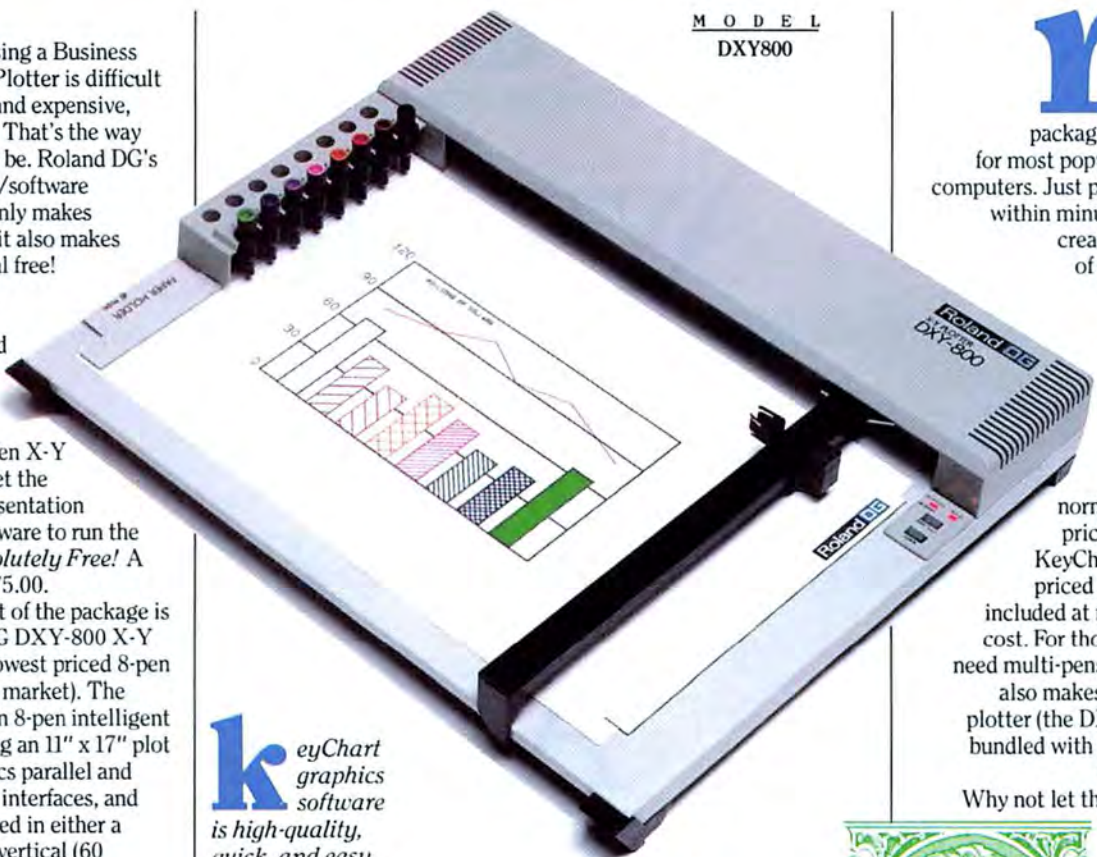
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Roland DG

What?

What is the latest R&D activity in Japan in the field of industrial robots?

Is?

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Which?

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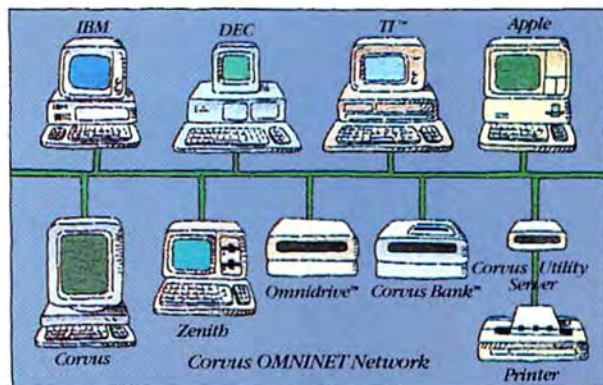


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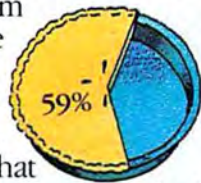
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Lotus's Symphony: Three User Reports

When Lotus Development Corporation introduced *1-2-3* a little more than a year ago, it almost instantly defined the standard of functionality for spreadsheet programs. Any spreadsheet program produced after *1-2-3* has been compared to it in terms of its range and implementation of features. Meanwhile, *1-2-3* has gone on to become a runaway best-seller.

Now, having captured the attention of the microcomputer community, Lotus is introducing a second product, *Symphony*, which includes five of the functions most commonly required by business computer users: spreadsheet, word processing, data management, business graphics, and data communications. Lotus has packed these functions into a single program along with window management and command language features.

In the following pages we present three views of *Symphony*. Editor-in-Chief Andrew Fluegelman analyzes *Symphony*'s structure and method of integration. *PC World* Editor Harry Miller presents a rundown of *Symphony*'s features in each of the five applications areas. Finally, Dick Andersen, a computer applications consultant, offers a hands-on description of an integrated *Symphony* work session.



In presenting these three "first looks" at an ambitious program, we want to make clear that the version of the program we used was in beta-test form, although it was sent to *PC World* by Lotus for purposes of review. The documentation provided was a first-draft typeset version without many figures. We did not have the benefit of the planned on-line tutorial, although we were able to speak by phone with Lotus to obtain answers to our questions regarding the program.

Even as *Symphony* was being demonstrated in its prerelease form, many industry observers were touting it as "the only software you'll

ever need." That determination will have to be made by each user, as you compare *Symphony*'s functionality to the dedicated software you may currently be using. The factors you should consider are the advantages of integration, the range and depth of features, the ease of access and use, and the price.

We hope that the information we provide here will aid in making those judgments.

Five Complex Pieces

Andrew Fluegelman

In fairness, I should disclose a personal bias. I am an unabashed fan of 1-2-3. From the moment Mitch Kapor demonstrated an alpha-test copy of the program that was to put his and Lotus Development Corporation's names on the microcomputer map, I hailed 1-2-3 as a signal accomplishment in combining power and good program design. 1-2-3 has been my program of choice for spreadsheet work, and I have explored, used, and praised its extended features.

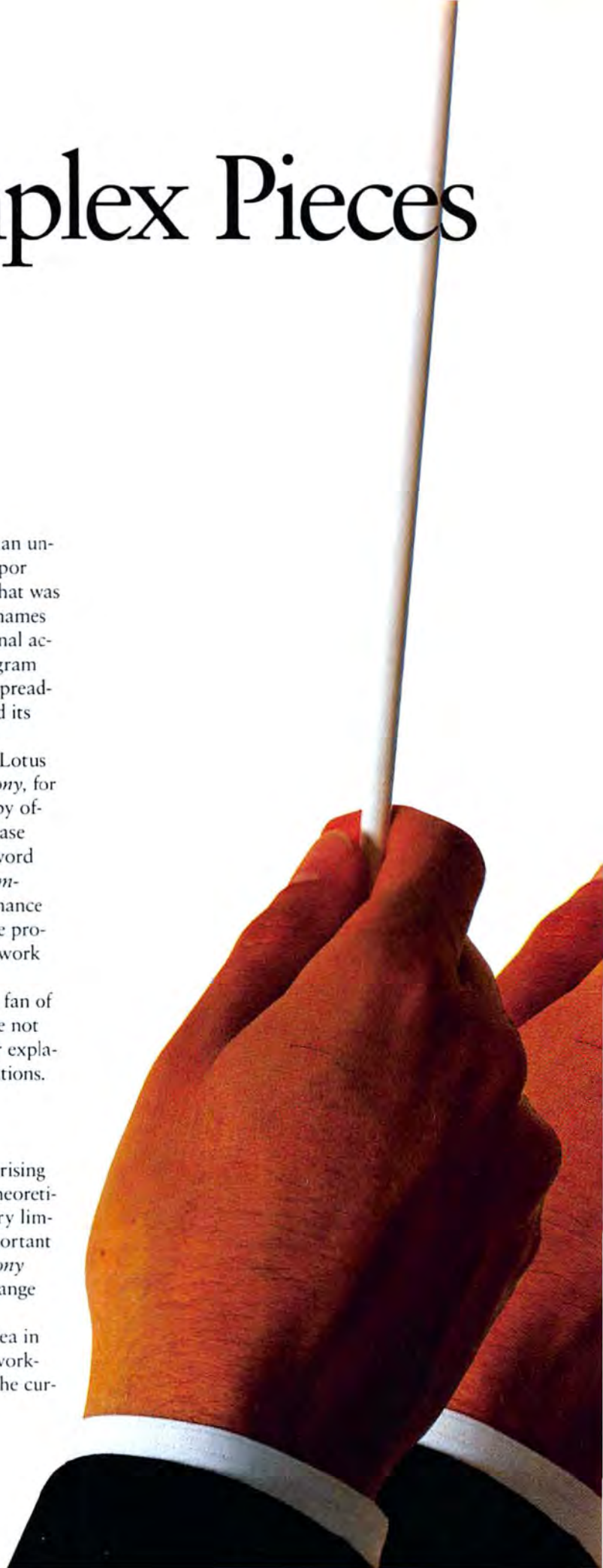
You can imagine, then, my excitement when Lotus sent a beta-test copy of its newest release, *Symphony*, for review. *Symphony* is advertised to build on 1-2-3 by offering enhanced spreadsheet, graphics, and data base functions and, more importantly, by integrating word processing and communications capabilities. If *Symphony* measured up to the quality and the performance of its predecessor, it could become the cornerstone program that would fulfill most of the average user's work needs.

Despite my expectations I have not become a fan of *Symphony*. In the process of explaining why I have not embraced this new program, I hope to give a clear explanation of how *Symphony* combines its five applications.

The Worksheet Landscape

Symphony's foundation is a huge worksheet comprising over 2 million cells. This impressive size is more theoretical than practical because the program has memory limitations. But capacity is not the issue. What is important is understanding that virtually all work in *Symphony* gets recorded in or depends on a cell location or range somewhere on this expansive worksheet grid.

You can move around the *Symphony* work area in the same way that you navigate the smaller 1-2-3 worksheet—progressing one cell at a time by pressing the cur-






```

Copy a range of cells
Copy  Move  Erase  Insert  Delete  Width  Format  Range  Graph  Query  Settings
      M      N      O      P      Q      R
1
2  XYZ Company
3  Operating Budget -- 1984
4
5           Item           Jan      Feb      Mar      Apr      May
6
7  Rent                   700      700      700      700      700
8  Utilities              300      300      300      300      300
9  Payroll               5500     5500     5500     5500     5500
10 Cost of Goods Sold     8400     9240    10164    11180    12298
11 Travel & Entertainment 2000     2000     2000     2000     2000
12 Advertising           1100     1100     1100     1100     1100
13 Sales Tax             1200     1320     1452     1597     1757
14 Professional Services  500      500      500      500      500
15 -----
16 Total Operating Expenses 19700    20660    21716    22878    24155
17 =====
18
19
20
17-Apr-84  03:13 PM
MA IN

```

Figure 1: The SHEET environment

sor keys, one screen at a time by using paging commands, to a blank cell with the <End> key, or directly to a specified cell address or range name. But because *Symphony's* worksheet is much larger than *1-2-3's*, it is not practical to rely on just the cursor movement keys to traverse the work area. Using named ranges is a virtual necessity.

It is also essential to keep track of your physical location on the worksheet, as well as of the contents of the worksheet as a whole. Knowing where you are and where you are going on the worksheet is critical if you hope to integrate the program's five basic applications.

In order to understand how *Symphony's* five applications work, you have to understand how they relate to the underlying worksheet. In the process you'll discover that the applications relate to the worksheet differently.

SHEET

When you start the program, you are put automatically in the spreadsheet, or "SHEET," environment the one that *1-2-3* users will be most familiar with. In the SHEET environment the screen displays a traditional grid of spreadsheet columns and rows (see Figure 1). Except for the indicator 'SHEET' in the upper right corner, the border around the sheet, and the label 'MAIN' in the lower right corner (more on this later), the worksheet looks and operates just like *1-2-3*. You can enter numbers, labels, and formulas on the worksheet according to the same conventions and with virtually the same results.

If you're an experienced *1-2-3* user, the major adjustment you'll have to make for spreadsheet work is learning *Symphony's* function key commands. There are 23 *Symphony* commands accessible from 20 function key combinations (see Figure 2).

The most-used function key is the <F10> "Menu" key, which gives access to the SHEET commands in the same way that the slash key does in *1-2-3*. The spreadsheet commands are similar to their *1-2-3* counterparts, although there are more of them and they have been arranged differently. Some relearning will be necessary if

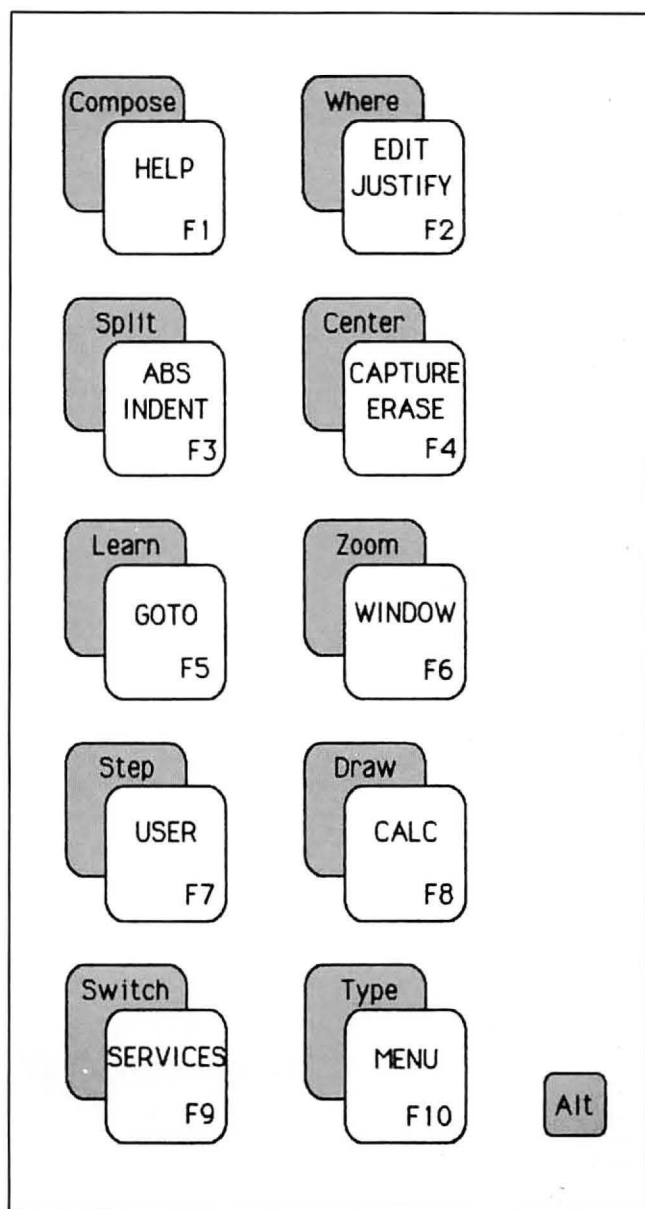


Figure 2: Symphony's function keys

you've memorized routine 1-2-3 key sequences. Commands relating to file operations and configuration settings are accessible from a separate Services menu, invoked by the <F9> key.

Except for the greater variety of functions and commands, the start-up SHEET environment does not present conceptual hurdles if you are already familiar with 1-2-3. Your location on the worksheet is indicated clearly, and you have complete freedom to move anywhere on the worksheet.

DOC

Pressing <Alt>-<F10> presents a command line that offers a choice of five "Types" of environment. The second choice is called DOC, for *document*. Selecting it has a dramatic effect on the worksheet.

Figure 3 illustrates the DOC environment. In place of the SHEET cell grid, the screen presents a blank work area that has a format ruler across the top. DOC is the word processing environment. It looks like the work areas of stand-alone word processing programs and operates according to most of the standard word processing conventions—cursor movement, word wrap, insert/over-type, automatic paragraph reformatting, and page scrolling.

If you press the <F10> "Menu" key while in the DOC environment, you gain access to a separate command structure that provides typical word processing functions. The <F9> key accesses the same Services menu as it does in the SHEET environment.

Mixed Modes

Closer inspection of the DOC screen shows another indicator that contains a cell reference. This is the tip-off that the DOC environment is more than it appears to be. If you give the <Alt>-<F10> "Type" command after you have filled a DOC screen with some text and choose SHEET, you'll find yourself in the SHEET environment, with your text still displayed but now residing in a spreadsheet screen. If you move the cell pointer to the first column of the screen, you'll see that the lines of your text are now represented as long labels in the various rows of column A.

At this point you are squarely in the SHEET environment, and you can enter numbers, labels, and formulas in all cells of the worksheet. If you give the Type command again, you can return to the DOC environment. You'll discover, however, that you can't edit the numbers that you entered while in the SHEET environment. Those numbers appear dimmed, and when you move the cursor to them, an asterisk appears at the top of the screen. If you try to type over the numbers, *Symphony* beeps, and nothing happens.

But those SHEET-created numbers aren't impervious to DOC actions. If you move the cursor to the left margin of a line that contains a SHEET-created number

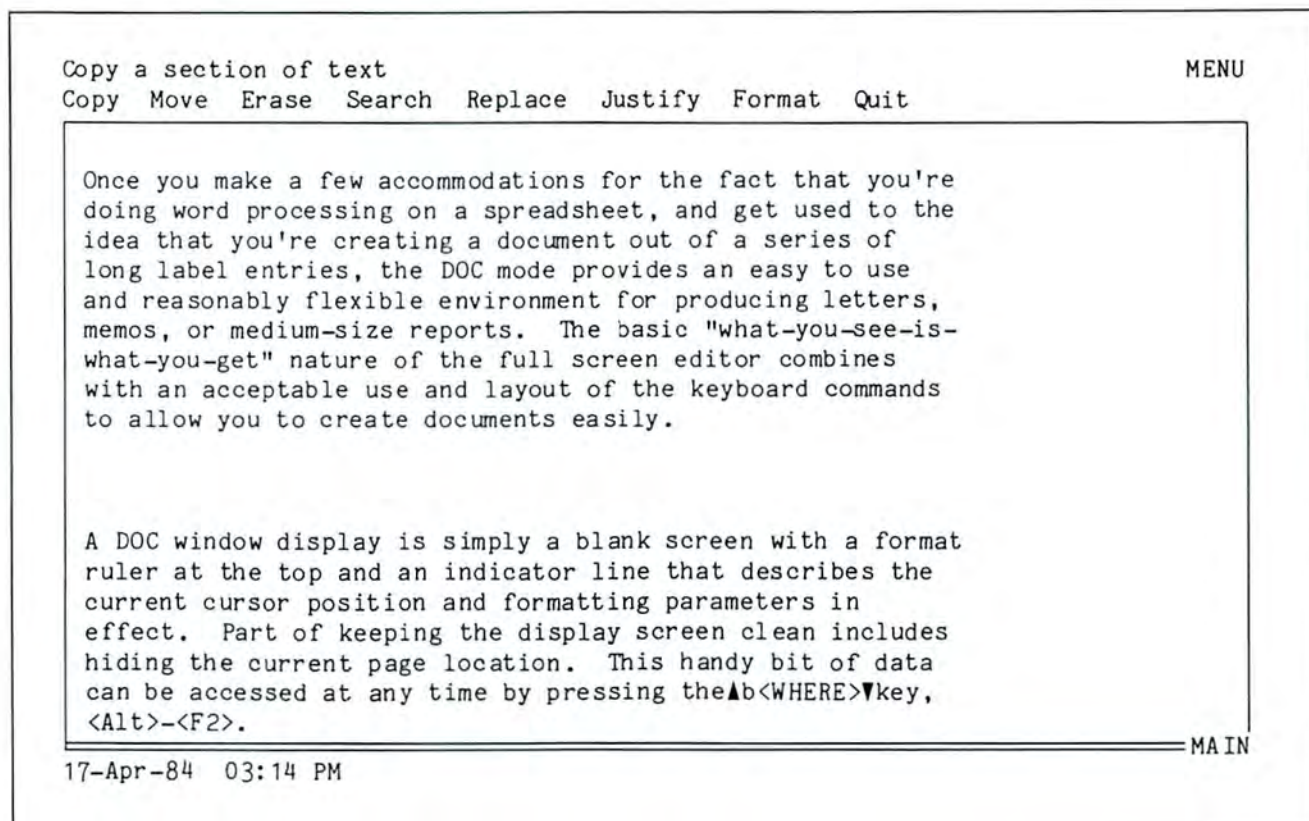


Figure 3: The DOC environment

and start to type, you will push the number down one line each time the text wraps to the next line. Another anomaly: if you enter text labels while in the SHEET environment, you won't be able to edit them when you switch to DOC unless they are left-aligned labels that reside in the first column of the DOC environment.

If you experiment with the two modes, you'll discover that the spreadsheet and word processing information coexist in the same physical space, but without being truly integrated, and that each type of information can displace the other in different ways. The two environments interact in other ways that are not intuitive or obvious; this will be explained when we look at *Symphony's* windowing features.

GRAPH

The third program environment accessible from the **<Alt>-<F10>** "Type" command line is GRAPH. Unlike SHEET and DOC, this environment does not represent physical space on the worksheet; it portrays a range of

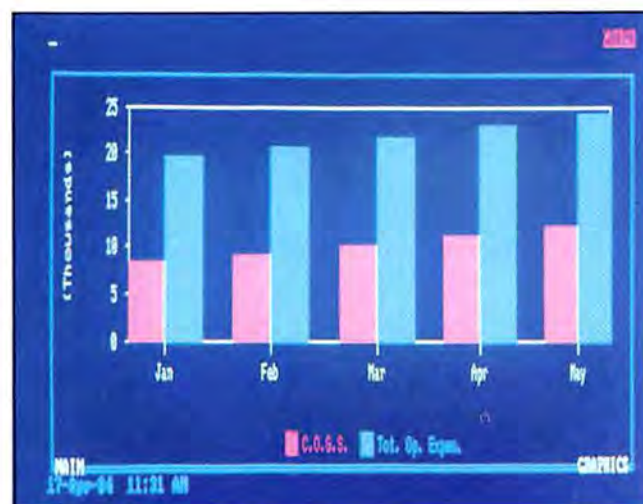


Figure 4: The GRAPH environment

Editing Record 1 of 10
Enter first

FORM

first Alex _____
last Bell _____
company AT&T _____
address 55 Sutter Street _____
city Edison _____
state NJ _____
zip 18099 _____
phone 609-222-1111 _____

==DIRECTORY==

==MAIN

17-Apr-84 03:16 PM

Calc

Figure 5: A sample form

AM32: 'Alex

SHEET

	AM	AN	AO	AP
31	first	last	company	address
32	Alex	Bell	AT&T	55 Sutter Street
33	Karl	Oppenheimer	Lionstone Inc.	160 Green Street
34	Martin	Bayless	Bayless Data	1100 Jacobs Road
35	Cynthia	Atkins	Penrose Research	66 Albion Street
36	Roger	Tawa	Tawa Travel	16 Bancroft
37	Edith	Pollan	RL Systems	20 Stetson Ave,
38	Jordan	Welch	KRB Software	590 Commonwealth Ave
39	Anita	Roth	Datex Services	2345 Broadway
40	Chris	Jackson	Venture Realtors	805 Main Street
41	Dr. Samuel	Hoyt	Magnetic Devices	850 University Ave
42				
43				
44				
45				
46				
47				
48				
49				
50				

==MAIN

17-Apr-84 03:18 PM

Figure 6: The SHEET environment, showing information generated in the FORM environment

Use the telephone (modem)
MENU

Phone Login Transmit-Range File-Transfer Break Settings

Please enter your user name: pcworld
 Password:
 Connection initiated. . . Opened.

Welcome to MCI Mail!

Tuesday's headlines at 5 pm EST

--BBC: British Embassy Surrounded
 In Libya After London Shooting
 --Reagan Says U.S. Security Menaced
 By Central American Situation
 For updated headlines and details at
 News/Retrieval regular rates, type
 DOWJONES, then //NEWS.

Type HELP for on-line assistance.
 Count your points: See HELP GIFTS.

17-Apr-84 04:50 PM
MAIN

Figure 7: The COMM environment

SHEET values in graph form (see Figure 4). Those of you who are familiar with 1-2-3 can think of the GRAPH environment as the equivalent of the 1-2-3 Graph View command.

The GRAPH environment cannot operate without support from the SHEET environment. Some values from within the SHEET environment must be entered on the worksheet before GRAPH will yield any results. This may be a source of confusion for new users who jump directly into GRAPH and try to start working.

Another possible source of confusion is that all GRAPH command options also appear in a subbranch of the SHEET command tree. You can specify graph settings and even "preview" the graph from within the SHEET mode, depending on your system configuration. You can make the identical settings from within the GRAPH environment, but nothing is displayed until the settings are "attached" to a range of SHEET values.

FORM

The fourth environment produces a FORM that is used in conjunction with data management functions. Like GRAPH, the FORM environment does not represent physical worksheet space. It portrays SHEET-created information that exists on the worksheet. FORM is a different sort of hybrid environment, however: you can enter data on the FORM screen. As we'll see, this also automatically enters data to the SHEET environment.

If you enter the FORM environment directly upon starting with a fresh worksheet, you cannot proceed with any work. If you try to enter data or make command choices, you will receive beeps and error messages. To make use of the FORM environment, you must switch to SHEET and enter a list of field names. You can then enter the FORM environment, press <F10>, and give the Generate command from the top FORM command line.

When you have completed the forms generation procedure, *Symphony* automatically writes information to the worksheet. This information includes a table in which default values for the data form are recorded, a

criteria range for defining limited selections from the data base, and a row of labels representing the data base field names.

Once you have attended to this setup operation, the FORM environment functions as a data input form and as a single-record output form for the data base (see Figure 5). The actual data is recorded on the worksheet in the SHEET environment, beginning with the first row below the generated information.

As you perform various operations on the data base, such as changing selection criteria or sorting, you are taken back to the SHEET environment, which is where the "real" data is stored (see Figure 6). You can also modify the data base directly from SHEET.

Because the data base resides on the worksheet, you have to be careful that there is sufficient clear space below the initial field names when you generate a data form. As you add records, they are written to the worksheet in the rows below the field definitions. Any unrelated data in their path will be overwritten.

COMM

The fifth environment, communications, also bears a unique relationship to the worksheet. When you press <Alt>-<F10> and select COMM, you are presented with a blank window that is independent of any part of the worksheet. This screen, illustrated in Figure 7, is the operating environment for the communications functions.

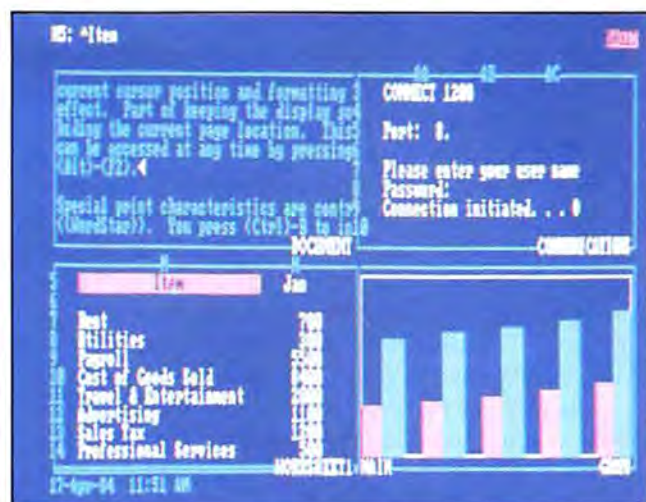


Figure 8: Using Symphony's windows

As in the other modes, the <F10> "Menu" key produces a special menu of command choices while the <F9> "Services" key gives access to *Symphony's* standard file and configuration commands.

The COMM environment connects with the worksheet in one important way. If you want to record on the spreadsheet the information received during a communications session, you must specify a range on the worksheet (in the SHEET environment) as the communications "capture" range. When the capture feature is enabled, the information is written to those specified cells.

The data written to the capture range is written as a series of SHEET cell labels and numbers rather than as lines of text. This makes subsequent use of the data relatively easy if it comprises only numeric information, but rather difficult if the captured data is textual.

The same caution holds for the data base information: the capture range must be specified to cover a blank portion of the worksheet; otherwise captured data can overwrite previous SHEET data. You can also send data from specified SHEET ranges while operating in the COMM environment.

Windows

On top of these five environments, *Symphony* adds another dimension: windows. *Symphony* normally displays the information appropriate for the selected environment on the whole screen, in a window called MAIN. But you can also create multiple windows; in fact, making use of multiple windows is the only practical way to integrate applications from different environments. Figure 8 illustrates a *Symphony* screen with multiple windows displaying different environments.

For each window you create, you are asked to specify a name for the window, which of five environments the window is to assume, the dimensions of the window, and where on the screen it is to appear.

Although all windows are created in the same way, the properties of each window depend on which environment it represents. A SHEET window affords the

● Review

greatest flexibility. It can be scrolled to display any of the cells on the worksheet. A SHEET window can also be “restricted” so that it will scroll only within a specified cell range.

If the window represents the GRAPH, FORM, or COMM environments, scrolling and restricting are not relevant because those environments do not display actual worksheet locations. However, a GRAPH window, to be meaningful, must be attached to a particular range of worksheet cells. Similarly, a FORM window must be attached to worksheet data base cells, and a COMM window will usually reference a defined worksheet capture and/or transmit range.

At first encounter the DOC window seems to act in a very curious manner. Unless you know to restrict the range of the DOC windows to discrete areas of the worksheet, any DOC window will represent the cells starting with A1, continuing to the right as far as the specified format line and continuing down for as many rows as

A SHEET window can also be
“restricted” so that it will scroll
only within a specified cell range.

there are lines of text entered. Even if you try to create a DOC window in another area of the worksheet, you will be returned to column A as soon as you start typing.

This phenomenon is initially confusing—it seems to suggest that there can be only one DOC window, but that is not the case. You can create multiple DOC windows, but you have to restrict them to separate ranges in the underlying worksheet. Note that restricting has a rather different purpose and effect in this environment than it does in the SHEET environment although the procedure for specifying the restricted range is the same. Once again, you must take care not to define these DOC window ranges so that they conflict with portions of the worksheet dedicated to other functions.

Ranges and Macros

The subject of worksheet cell ranges has come up several times. Virtually every function of the program, regardless of the environment, depends on cell ranges and cell addresses on the worksheet. *Symphony* requires you to specify those ranges and addresses frequently.

Symphony lets you give identifying names to individual cells and cell ranges in much the same way as does the range naming facility in 1-2-3. If you plan to use *Symphony* for anything more than simple, single-

environment applications, it is essential that you take advantage of this range naming feature. Although you can get by in 1-2-3 using the cursor keys to define ranges, the *Symphony* worksheet is simply too expansive and too range-dependent for a pointing strategy to work.

Symphony also provides an expanded version of 1-2-3's macro facility, which lets you define sequences of program commands that can be launched by typing a single key. These macros can be intricately structured and can produce powerful results. Although you can work quite effectively in 1-2-3 without ever implementing a macro, if you hope to take advantage of *Symphony*'s integrated features and have your work proceed smoothly and efficiently, using macros is practically a necessity.

A Knot of Modality

Although this discussion has been detailed at times, it is just a surface treatment of *Symphony*'s components. *Symphony* is much more intricate, and its complexity can't be avoided if you hope to use the program for integrated computer applications. While I think that *Symphony* is too complex for the average user, my disaffection with the program runs deeper.

The current wisdom among software designers is that a program should avoid “modality.” What this means is that a program should not put the user in different contexts in which identical actions produce different and unexpected results.

This principle of “non-modality” has several goals. One is that program commands should eventually become reflexive responses by the user—not conscious and conditional ones. Another is that the user should not have to keep track of his or her place in the program. The ultimate goal of the non-modality principle is to foster efficiency and user confidence. *Symphony* does not follow this principle, and I believe it suffers for it.

The five basic *Symphony* environments are given equal stature in the program structure, but in fact they are not equal. Only the SHEET environment is fully functional. The other four depend on and are subservient to the SHEET environment—each in a different way and according to four radically different sets of rules. This makes learning and using the program unnecessarily difficult.

Another fault I find with *Symphony* is that too many of its functions are tied too closely to the geography of the underlying worksheet. Many diverse types of information—numeric data, text, definitions, settings, work

space dimensions, and macro commands—must be placed on the single, large worksheet at the direction of the user. Keeping track of which space is taken and which is free is so critical that you are advised to draw a map allocating space. Knowing the identities of the worksheet elements is so critical that you will have to give them names. A fully configured worksheet is so expansive that visual exploration of it is impractical.

This need not be the case, however. Much of the space planning and range identifying required by *Symphony* could and should be done automatically by the program.

To make the user go through the motions of defining and restricting areas and ranges used for word processing windows, data base defaults, communications capture, and macros serves as nothing more than an impediment. Why couldn't *Symphony* set up and identify these areas by default, when required? The program could still give experienced users the option of disabling the automatic setup and customizing the worksheet to accommodate advanced applications.

A Maze of Commands

The tree-and-branch command structure that works so well in 1-2-3 may have been extended beyond its practical limit. Although 1-2-3's command structure is an aid in learning that program, I feel that *Symphony*'s multitude of commands often gets in the way.

Symphony has such a vast repertoire of command options that traveling down the various branches of the tree can become difficult and rather tedious. Although the designers have done their best to optimize the tree structure by putting the most-used commands at the root levels, many often-used functions remain buried. This is particularly true of the settings commands, which are crucial to starting to work with the program.

To complicate matters, the same command words sometimes appear in different branches of different environments and in different contexts. On several occasions I found myself saying "I know there's a command to do such and such somewhere in the program," and then spent minutes groping through the tree looking for it. There are many opportunities for taking wrong turns and following fruitless branches that terminate in the rude beep of an error message or, worse yet, in no response at all.

One advantage of the tree command structure is that it facilitates the use of macros to drive the program. In view of *Symphony*'s complexity, the macros are a necessity. Maybe there is no better alternative to the tree structure.

In the final analysis I do not think that *Symphony*'s strategy of basing all five applications environments on the spreadsheet model has been successful. Graphics and

data lists represent inherently cellular information. While these types of information work within the spreadsheet model, word processing and, for the most part, communications deal with information that has a stream and page orientation. *Symphony* attempts to shoehorn these environments into the spreadsheet model. The result is not a comfortable fit.

The Macro Solution

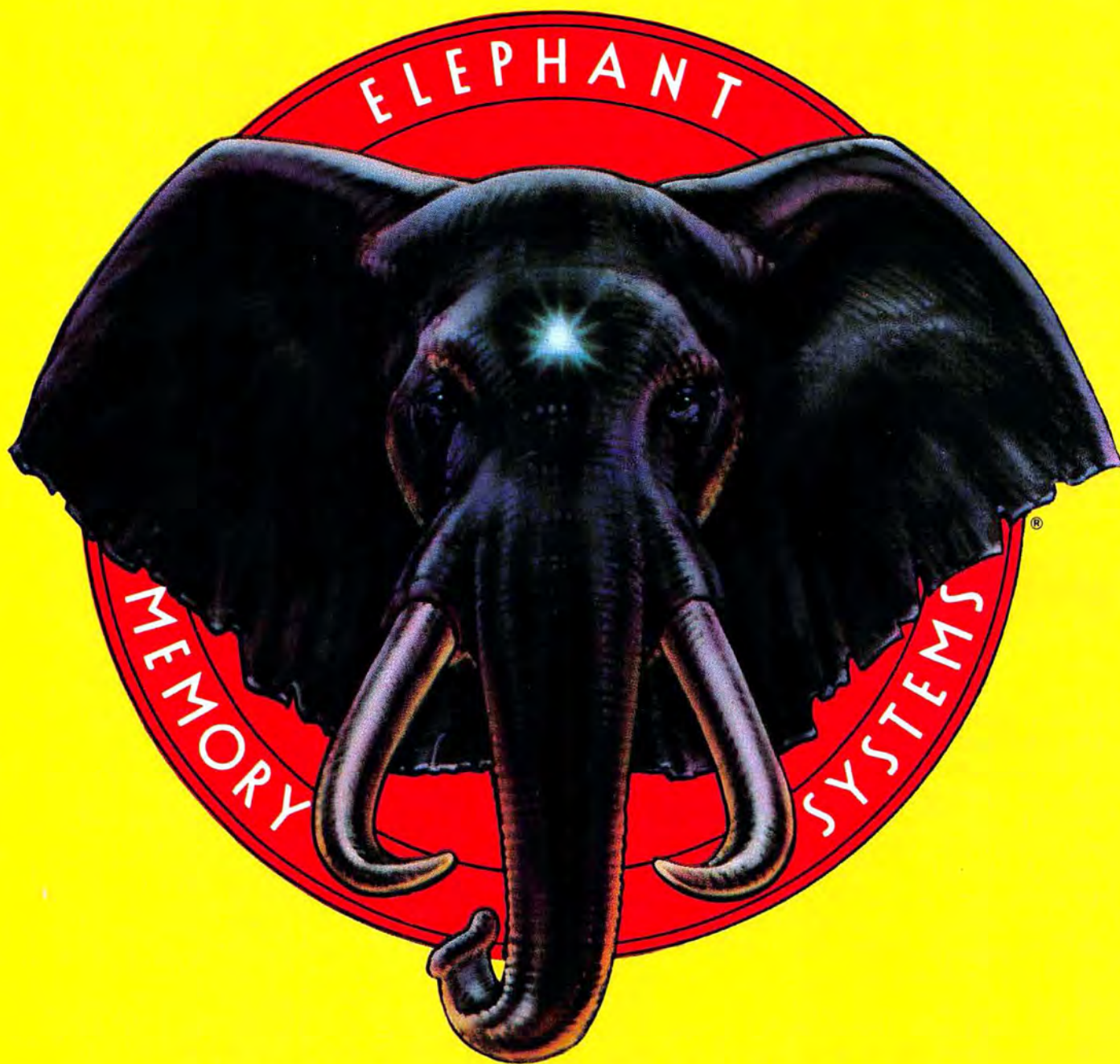
Many computer users will rejoice at the appearance of *Symphony*. They are the people who feel comfortable with computers and love to tinker with them until they come up with creative and elegant solutions to problems. *Symphony* won't disappoint them—it is a treasure chest of functionality. Some people are going to write some very impressive macro-driven applications with this program.

In its "raw" state, however, *Symphony* is a decidedly complex program to learn and not a particularly easy one to use. Integrating the program's features requires dealing with five levels of abstraction: worksheet and settings files, environments, windows, window restrictions, and ranges—not to mention macros. I can't imagine giving this program to the average busy executive or administrative assistant and expecting them to make productive use of its integrated functions. Those who master *Symphony* will do so only by investing a lot of time and mustering a good deal of enthusiasm.

Symphony is an impressive, powerful language for programming a wide variety of business applications. But in its present form it is not smoothly designed or elegantly integrated. Perhaps someone will create an ingenious "front end" for *Symphony* that will insulate users from the program's underlying structure. Until that happens, I can't envision *Symphony* enjoying the popularity of its predecessor. ●

Andrew Fluegelman is the Editor-in-Chief of PC World and Macworld.

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C BASIC Compiler	✓	✓	✓	✓	✓
Pascal/MT+	✓	✓	✓	✓	✓
Level II COBOL	✓	✓	✓	✓	TBA
PL/I	✓	✓	✓	✓	TBA
C		✓	✓	✓	✓
Assembler Plus Tools	✓	✓	✓	✓	TBA
Access Manager	✓	✓	✓	✓	TBA
Display Manager	✓	✓	✓	✓	TBA
micro/SPF		✓	✓	✓	
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A Feast of Features

Harry Miller

Symphony is impressive in its tremendous range of features and functions. It has a great deal of raw power for a single program. But is that power presented in a useful way? Do those features meet the needs of the people who are most likely to use the program? How does *Symphony* compare with stand-alone packages that perform the same functions? This exploration of a beta-test (pre-release) version of *Symphony* points to some answers.

Symphony handles text in a more adept manner than does 1-2-3.

The most difficult part of using *Symphony* is getting it set up. Once you've got all the basics defined, using the program will be relatively easy. However, establishing a working environment for each of the applications is not a trivial task and could easily overwhelm the weak of heart. One important trick is to figure out which ranges of the worksheet have to be defined before you can start each application. In the course of defining those ranges, you'll want to map out the worksheet and restrict each application to a discrete area.

Overture

Symphony's spreadsheet is deceptively large. 1-2-3's worksheet is among the largest available, and *Symphony*'s is four times as long. It is ironic that because the *Symphony* program code takes up about 265K of memory (compared to 1-2-3's 112K), you'll end up with less work space than you had before, unless you can add memory to your computer.





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As a result the real capacity is considerably less than the 256 columns by 8192 rows on the worksheet seem to indicate. For example, on a machine with 512K of random access memory (RAM), we filled all 8192 rows of each column in succession with a number, then with a text string (label), and then with a formula. Using the number (12345), we got to the end of column G when we ran out of memory; using the label (abcdefg), we got as far as the bottom of column B; using the formula

If I had a lot of spreadsheet data to manipulate, I'd rather use 1-2-3 than *Symphony*.

(A1/A1*A1+A1-A1), we could only fill column A. When we set up a very plain sample data base, we found that the real limit was about 2000 records, each containing name, address, city, state, zip code, and phone number fields. These informal tests only reveal part of the problem. *Symphony* hasn't improved on 1-2-3's relatively inefficient method of reserving memory by using blank cells. If you enter some data at a remote cell location (somewhere towards the bottom right corner, for example), 1-2-3 and *Symphony* reserve memory for all of the space between that cell and the upper left corner (cell A1).

This situation has direct implications for your system requirements: if you want to take full advantage of the integrated applications environment (and to do so you'll want to map out the worksheet with discrete areas for each environment and window), you'd better have as much RAM as you can get. Even then, none of the applications you want to integrate can be large. It may seem strange, but if I had a lot of spreadsheet data to manipulate, I'd rather use 1-2-3.

My opinion is that restricting all of the program code and data storage to what can fit into RAM (the computer's central memory) is a mistake. It seems that a judicious use of overlay files or virtual memory swapping would yield a freedom from limitations that would more than outweigh a slight decrease in performance. An optimum design would allow all of the work to be performed in RAM until the limits were reached and then call on some disk storage technique.

Spreadsheet

1-2-3 is among the most powerful spreadsheet programs available. *Symphony* builds on 1-2-3's capabilities and adds some useful features. The most notable additions are password protection and hidden cells that limit access to certain parts of the worksheet, a Range Table command that lists existing range names with their corresponding ranges, and a Range Transpose feature that copies a range of data and swaps row and column entries (to change the orientation of a table of data). The Copy command has been upgraded to copy only the current values of the specified source cells (not the formulas), if that method is desired.

The date arithmetic is improved greatly by the addition of an @DATEVALUE function that finds the date value of a text string or label. Also, the time arithmetic functions should allow timed automation of some operations. For example, at 5 a.m. it could call Dow Jones, get the quotes for the stocks on the list, and send the results in the form of a memo to a distribution list.

Other new additions include logical functions to determine the type of entry in a cell (@ISNUMBER, @ISSTRING, @ISERR, @ISNA) and functions to manipulate text or character strings (@ASCII, @CHR, @FIND, and so on). *Symphony* handles text in a more adept manner than does 1-2-3, and some of the methods of handling long labels that are used in the word processing environment seem to have rubbed off on the rest of the functions.

Word Processing

Once you adjust to doing word processing on a spreadsheet, and once you get used to creating a document out of a series of long label entries, the DOC environment provides an easy-to-use and reasonably flexible foundation for producing letters, memos, or medium-size reports. The combination of the "what-you-see-is-what-you-get" nature of the full-screen editor and an acceptable layout and use of the keyboard commands enables you to create documents easily.

The DOC window is simply a blank screen with a format ruler at the top and an indicator line that describes the cursor position and formatting parameters that are in effect. The display screen is kept clean by a hidden current page location. You can access this handy bit of data at any time by pressing the <Alt>-<F2> "Where" key.

Special print characteristics are controlled in a manner similar to that of *WordStar*. You press <Ctrl>-B (for begin) to indicate the start of an attribute (such as boldface or italics), and the program displays a triangle. You then press another key to specify which attribute, and at the end of the text string to be treated you place a <Ctrl>-E (for end); the program responds by displaying an inverted triangle.

Interval between successive tab stops		MENU
Tab	Justification	Spacing
Left	Right	Blanks-Visible
CRs-Visible	Quit	
3 Tab interval:	5	
3 Justification:	1	
3 Spacing:	1	
3 Left margin:	1	
3 Right margin:		
3 Blanks visible:	NO	
3 CRs visible:	YES	

Document Settings for window MAIN

Figure 1: Document format Setting Sheet

It is tricky at first to put two or more documents in windows at one time. Doing so allows you to view two documents side by side and to cut and paste blocks of text between them. To succeed in this maneuver you must specify appropriate "restrict ranges." If the document you're working on is less than 80 columns wide, you can simply set the column width to 80 and restrict the DOC range to a single column. If you're careful to keep the restrict ranges unique, you can define many windows, each holding a separate document.

If you don't restrict the range of the DOC window, there will be a significant delay in the screen response since the entire spreadsheet is redrawn or recalculated whenever new DOC text is inserted.

The underlying spreadsheet structure provides a high level of interaction between spreadsheet data, data captured over the phone line or from the data base, and a word processing document. Besides the mail merging capability that you would expect from a combined word processing and data management program, you can take advantage of the communications function to tie the word processor to an electronic mail system or to have immediate access to any incoming communications document.

The ability to include spreadsheet data in a word processing document such as a memo or a report is a definite benefit. You can even make the spreadsheet data dependent on data from other parts of the worksheet and thus have it change whenever the worksheet is altered. The problem with this system is the method it requires to move a block of data or text from a SHEET environment window or location into a document. It's reasonably easy to get the data into the document by copying or moving it in, but then it becomes SHEET data and is therefore not easily edited from within the DOC environment. And when you're in the SHEET environment, you can't edit text created in the DOC en-

vironment. Further, the documentation—at least in its early version—doesn't explain how to change the status of a block of text or data to make it accessible from the current mode (i.e., to enable editing of "non-document" text in the document environment). The recommended answer is simple, if inelegant: To import spreadsheet data into a DOC environment window, you "print" it to a range within the document. That's a solution that would be hard to guess—it goes against my intuition about how programs should work.

The formatting features offer a very acceptable level of flexibility and control. The ruler line and format menu permits selective control of margin and tab settings: right (even), left, centering, justification, and line spacing (see Figure 1). A document can have many ruler lines so that the format can be changed for small blocks of text if necessary. Format lines can be named and saved for later use with other documents.

Another notable feature is *Symphony's* ability to name, store, and merge any number of boilerplate paragraphs for use in multiple documents. These blocks of text can be stored as separate files or held in a part of the present document. Commonly used simple phrases can also be stored as keyboard macros.

The justification feature works adequately. It reformats automatically but not annoyingly. Rather than proportional spacing, which assigns a different amount of space to each character, adjusting space to create an even right margin, *Symphony's* justification feature uses the coarse method of inserting spaces between words.

The centering function is controlled by the justification feature, and therein lies its weakness. To center a line of text, you have to create a new format ruler with justification set to "centered." That means a lot of keystrokes for a simple task—another good candidate for a keyboard macro.

The line-marker feature works well. It enables you to assign a name to a specific line in the text, so that the name can be used with the "GOTO" key to jump back and forth to a specified location. Since the line-marker names are stored with the worksheet file, you can easily

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create two macros to take advantage of this feature: one would assign a standard name to where you left off before you saved the file and quit the program (`{MENU}FLAleftoff~R`), and the other would “goto” that standard-named line-marker to pick up where you’d left off (`{GOTO}leftoff~`).

A nicely implemented speed-highlight feature allows you to specify the end of a range to be highlighted by simply typing the last character in the block. When you type a character, the highlighting is extended to the next occurrence of that character.

Communications

The COMM environment includes a full-function communications program. For the most part, *Symphony*’s COMM environment will perform asynchronous communications as well as do most stand-alone packages. Data can be captured directly onto the worksheet or into a DOC window. To capture communications data in a DOC window in usable form, you have to define the capture range as a single column large enough to accommodate the longest line sent from a remote computer. Just as easily, data can be sent directly from a worksheet range to a remote computer.

The software also provides auto-dial and auto-logon capabilities as well as auto-answer. A full range of transmission parameters, the phone number, and, optionally, the full logon sequence (user name, password, and the remote host’s responses) for each commonly used remote computer site can be stored in a Setting Sheet that can be specified, activated, and executed with a few keystrokes. *Symphony* supports the XON/XOFF handshaking protocol, which you can enable or disable with a selection on the Setting Sheet. The sheet can also include any specifications for terminal emulation that are necessary for the remote host you are using. Most standard ANSI-type terminals are supported, including the DEC VT-100. The program even lets you store the amount of time you want it to spend trying to connect to any given host before it gives up.

In addition, the Setting Sheet (see Figure 2) stores the location of the “capture range” on the worksheet. The process starts with establishing and naming a Setting Sheet (a .CCF file) for each remote site. Some of those parameters (the capture range, for example) can be altered in the middle of a communications session. A session can also be temporarily suspended to allow spreadsheet analysis of the incoming data.

Once you select a capture range, subsequent communications sessions are appended to the bottom of the range, as you’d hope, rather than starting at the top of the range each time and overwriting the previous session.

The complex configuration of the telecommunications environment in part makes possible its innate power and potential. When combined with some keyboard macros to form a menu system, the communications features can be made extremely easy to use in day-to-day operations; when combined with the time arithmetic and command language programming features, this program holds the potential to be among the most automated communications systems available for the PC. But although the complexity makes this possible, it will also certainly keep successful communications just out of reach for many average users. That same laudable automation requires that you learn to program in *Symphony*’s command language.

The great weakness of the COMM environment is that it greatly favors communication between the worksheet and the remote site. Disk file transfer in either direction requires the Xmodem error-checking protocol. While that protocol is reasonably popular among micro-

This program holds the potential to be among the most automated communications systems available for the PC.

computer users, it is not at all common on larger host computers. Thus, to transfer a file from the disk to a remote host that doesn’t support Xmodem, you have to import the disk file into the worksheet and then send it out—an inelegant solution at best.

Data Management

The data management function probably best displays the advantages and disadvantages of performing all functions in a spreadsheet format. While the spreadsheet format provides a good visual comprehension of the table format that is the conceptual foundation of most data bases, it also limits the number of records and the number of characters per field (255 is the limit of characters per cell).

Although it’s a perplexing business, moving back and forth between the FORM environment to create the data base layout and enter the data, and the SHEET environment to do all the manipulations (searching, sorting, extracting, editing, and so on) turns out to be an effective means of managing data in small to medium-size

Speed and type of transmission										MENU
Interface	Phone	Terminal	Send	Break	Handshaking	Capture	Login	Name	Quit	
Interface		Terminal		Send						
Baud:	1200	Screen:	WINDOW	Response: \j						
Parity:	Even	Echo:	NO	EOL: \m						
Length:	7	Linefeed:	NO	Delay: 0						
Stop bits:	1	Backspace:	BACKSPACE	Break: 60						
Phone		Wrap:		YES	Handshaking					
Type:	TONE	Delay:	0	Inbound: YES						
Dial:	60	Translation:	Outbound: YES							
Answer:	15	(none)	Capture:							
Number:				Range: NO						
			Printer: NO							
Communications Settings:										

Set send/receive string for B										MENU			
Maximum-Time	Repeat-Time	A	B	C	D	E	F	G	H	I	J	Zap	Quit
Count	Send (maximum time 0)										Receive (repeat time 0)		
A 1	{RETURN}										Please enter your user name:		
B 1	pcworld										Password:		
C 1													
D 1													
E 1													
F 1													
G 1													
H 1													
I 1													
J 1													
Login Settings:													

Figure 2: Communications Setting Sheet and logon sequence

chunks. In addition, the data management function is more than adequate for simple day-to-day file management tasks. Its features include edit check (for validity—i.e., that the data entry falls between a prespecified range of values), automatic establishment of a simple input form, and a sophisticated but simple query-by-example system.

The FORM environment is very usable for data entry and retrieval. Once you've created a list of fields in the SHEET environment, *Symphony* creates a data entry form with the fields listed down the left side of the screen with underscore characters indicating the length of the field. That form could easily be edited in either the SHEET or DOC environment to make data entry as convenient as possible. The only limitations are that the whole entry form must fit on one screen and that each field must be contained on a single line; that is, several fields can share one line, but no field can spill over to the next line. As you move through the fields to edit the data

base and add new records, user-definable data entry prompts are displayed on the command line at the top of the screen. Those prompts, along with other attributes connected to each field, are stored on the worksheet in a "definition range" and can easily be altered in the SHEET environment.

Symphony also automatically creates an input and criteria range just below the definition range. In theory, this would enable you to proceed immediately to use the data base application. In practice, you'll have to go through several iterations of misunderstanding before useful reports come flying off the printer. For example, you'll first have to specify sort keys, output ranges, and report forms. For every choice *Symphony* automates, you can rest assured that there will be two more choices you'll have to decipher and make.

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In some categories *Symphony*'s data management facility is limited in comparison to stand-alone packages, and in other areas it compares favorably. For example, searches in *Symphony* allow wild-card parameters (such as * to mean all of a type, ? to mean any character in that position, and ~ to mean "all but" the specified type) and compound search criteria (up to 32 fields). And the query-by-example criteria are easy to specify: you just use the criteria range to enter the items you want matched. As in 1-2-3, searches and sorts are performed very quickly. In addition, *Symphony*'s calculation capabilities would be hard to match in a stand-alone data base management program.

Symphony uses a reasonably powerful report generator that allows sophisticated field computations and calculations (including data base statistical functions such as average, maximum, minimum, standard deviation, and variance of records that match a certain set of criteria) in the data management reports. The report forms can include form letters, mailing labels, invoices, and lists, among others. You can design report forms by creating and editing them in a DOC or SHEET window.

Symphony allows multiple data bases in a single worksheet and an unlimited number of entry, query, and report forms per data base. Of course, as with the DOC environment, great importance is placed on restricting ranges to keep separate data bases in separate areas of the worksheet.

Graphics

The GRAPH environment is a sophisticated analysis graphics facility. Its features and functions are essentially the same as those contained in 1-2-3 with the addition of an extra graph type (high-low-close-open). The other major difference between the two is the windowing feature: with *Symphony* you can display two or more graphs simultaneously on the same screen, or you can display a graph next to the data it represents or with a text explanation in an adjacent window.

One of 1-2-3's greatest inconveniences is that it requires a program on a separate disk to create printed graphs. *Symphony* carries on that unfortunate tradition. You create the graph on the screen and then save the image in a .PIC file to be printed later. The PrintGraph program offers excellent control of the final printed appearance. While it wasn't an issue with 1-2-3, it is disappointing that *Symphony* doesn't provide a way to create a hard copy that mixes text or spreadsheet data with a graph on the same page.

The process of creating a graph is in some ways made more complicated by the use of setting sheets and by the fact that you can specify the graph settings in either the GRAPH environment or the SHEET environment. If you specify the settings from a SHEET window, you can preview the graph, but you must ultimately "attach" the graph to a window. If you work from a GRAPH window, the "attachment" is automatic.

Window Management

I was ready for windows, and I hoped that *Symphony*'s windows would be easy to use and would provide a good logical introduction to working in several environments simultaneously. It didn't take long before I was hooked. This article was created using several windows: the text of the article was in a DOC window called MAIN that more or less remained on the left side of the screen while I kept a running set of random notes in a SHEET window called NOTES; a MACROS window held the macros that I made up as I went along to reduce the drudgery and to work around some rough spots in the program's design; the data base was in a window called DATA; and a window called TEST held the temporary results of my experimentation.

The spreadsheet framework provides an expansive canvas representing the memory (RAM) work space upon which all these applications can be overlaid, each in its own window. At the same time, determining how to make the best use of all that space can be a slightly overwhelming challenge, especially for a novice.

My recommendation for new users is that you refrain from using windows until you understand the operation of each of the applications individually as well as the method of movement around the worksheet. Once you have a better idea of the worksheet's geography, you can start to take advantage of the windowing capability to display several sections of the worksheet simultaneously and to move from place to place, and application to application, more easily.

Macros and Programming

1-2-3 introduced keyboard macros to spreadsheet software, and they have become a standard feature of spreadsheet or integrated programs. *Symphony* extends this feature with a Learn mode, an extended number of macro names to assign, and a command language that includes some of the features you'd expect from any programming language.

The Learn mode operates in a manner similar to that of *ProKey*. When you start the Learn mode, any keystroke you perform until you turn the mode off will be recorded in a "learn range" that you've previously defined. *Symphony* stores learned keystrokes in the format

required for keystroke macros, with special keys surrounded by brackets (e.g., {HOME}). That learn range can then be assigned a range name and executed as a macro. For a complex operation this method is a sweeping improvement over furiously keeping track of keystrokes with pencil and paper in preparation for writing a macro.

The <F7> "User" key broadens the base of possible range names that can be used for macros. By pressing <F7> and typing a range name, you can execute the macro stored in that range. As you do, a 'USER' indicator displayed in the lower right corner of the screen is replaced by the range name you type.

When reading the documentation on the command language, you almost get the feeling that programming is what *Symphony* is about—that all of the applications are really just resources for the programming language.

A macro program written in the command language consists of a series of statements, each beginning with a command key word. Keystroke sequences that have been "learned" or typed in manually can also be included in the programs. The key words access the computer's resources (for example, {BEEP} sounds the computer's

Conceptually the *Symphony* command language provides many of the same resources and possibilities as BASIC.

bell), access the data in the spreadsheet (as in the {LET} command, which stores a label or a number in a specified cell), and access *Symphony*'s operations (for example, {PANELOFF} suppresses the redrawing or flickering of the control panel while a macro is being executed, and {INDICATE} lets you specify a short text string to be highlighted and displayed in the upper left corner of the screen). The language provides facilities for subroutines, branching, IF logic, assignment of values to variables, and loops.

The potential for automation of the applications is almost mind-boggling. Programmers will have to learn a new syntax and grammar, but conceptually the *Symphony* command language provides many of the same resources and possibilities as BASIC.

Integration

A major objective of *Symphony* is the creation of an integrated applications environment where data can be easily transferred between applications. To a great extent this data integration is the reward for using the spreadsheet as the common structure to which other applications are forced to comply. On the other hand, as data is passed to and from the DOC environment, the ease of integration that you'd expect falls away. It seems as if the degree of effort that is required is not much less than the effort required to import a file from an unrelated application. In some instances I found that it was not the level of effort that was the barrier but rather the counter-intuitiveness of the design. There are some data interchange procedures you'll just have to learn by rote, because you probably won't be able to follow the program's logic.

For example, when you set a column width, the new width is in effect only for the window and environment under which it was defined. If you have a DOC window in column A, and you switch to the SHEET environment to define that column to be 80 characters wide and then change (with the <F6> "Window" key) to a COMM window to transmit the document in that range, you'll be surprised to find that only the first 9 characters are transmitted. That's because in the COMM window (or in any other window except that single DOC window) column A still has its default column width of 9 characters (see Figure 3).

Another form of integration involves the degree to which the commands and basic functions are similar in each of the five environments. *Symphony* does as well at this as can be expected for a program that switches modes. The Services menu (accessed by pressing the <F9> key) is constant regardless of the mode, and the changing menu of application-specific commands is accessible from the <F10> "Menu" key.

Documentation

It really wouldn't be fair to evaluate *Symphony*'s documentation based on the early version we had to work with. However, there are a few indications that the final manuals won't be the tools you'll need to gain comprehension and control of the program. The manuals suffer from their unusually large size. In part the size is due to the ambitious scope of the program, but whatever the cause, it's a lot of reading. The documentation comes in two parts, a how-to manual and a reference manual. Neither one stands very well on its own, and I found myself flipping back and forth between the two large volumes. I was dismayed at the number of times the how-to manual referred to the reference manual for a complete discussion; when I turned to the reference manual, it was hard to tell whether the lack of that complete discussion was due to the early draft nature of the document or not.

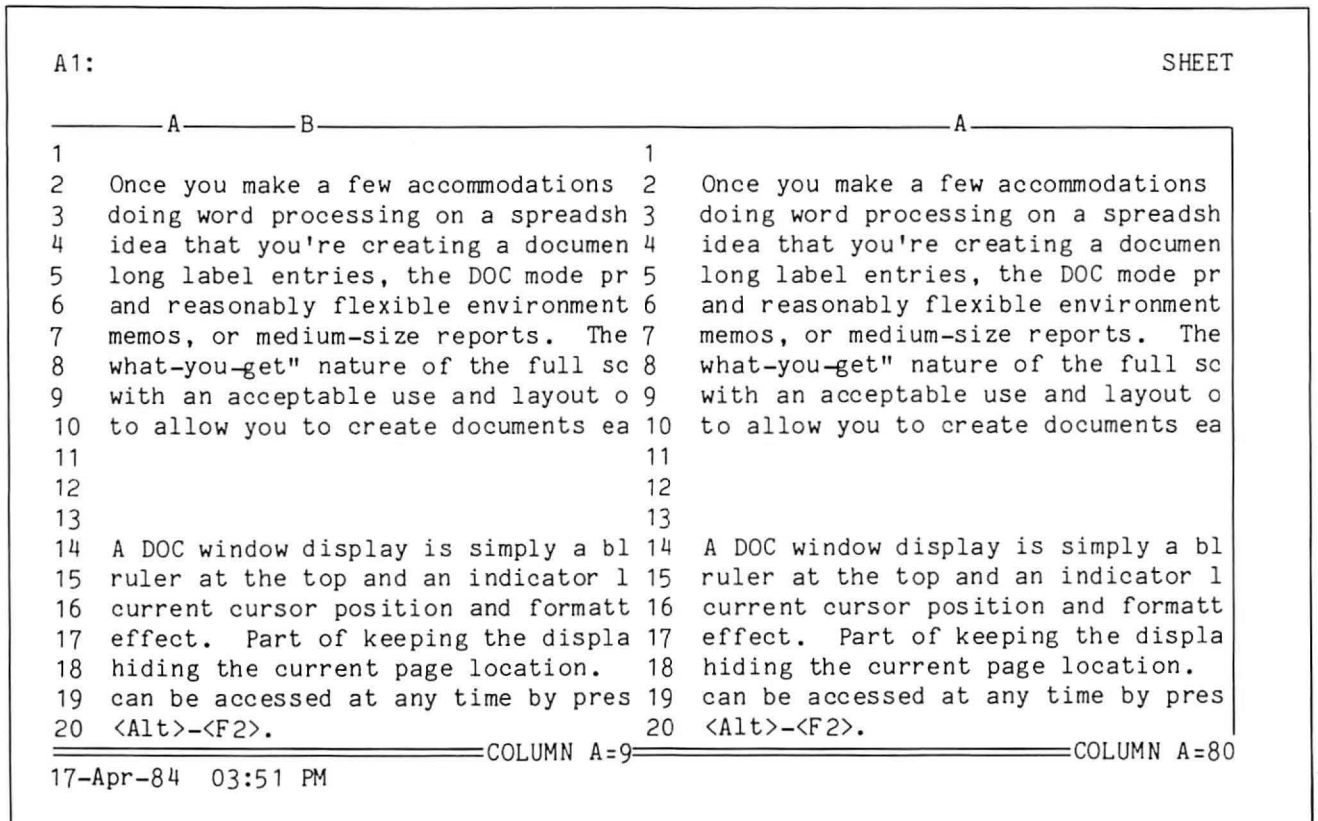


Figure 3: Any area of the worksheet may be formatted differently in separate windows.

The early release of the manual also exhibits one of my pet peeves: it goes on for about 30 pages without telling you that you can exit the program gracefully by using the Services menu (pressing <F9>).

Finale

What has Lotus created with *Symphony*? Is it "the only software you'll ever need"? Or is it a monster of complexity that will keep you further from your goal of just getting the computer to produce some useful work?

Clearly, *Symphony* has a fantastic array of features and capabilities. We could fill an entire issue with descriptions of each and every feature and our opinions about them. The problem is in gaining access to those features. If the riches are hard to get to, only the hardest souls will stick around long enough to discover them. While most products seek to be more intuitive and to free you from worrying about the workings of the machine or the software, *Symphony* forces you to do a lot of preparation before any results are possible. The implementation of *Symphony*'s vast range of features feels like a major step backward in computing history.

Another frustration with the product stems from the fact that, given the flexible command language and Setting Sheet design, making *Symphony* as easy to use as it is powerful wouldn't have been too difficult. It would

have been immensely helpful if Lotus had delivered the product with a "beginner's mode" group of Setting Sheets, predefined windows with restrict ranges, and some sample GRAPH and COMM settings. It's clear that to make the product handy, you'll want to set up macros and probably a menu system. It would have been a great help if some of those technical amenities were provided with the product. Once you'd mastered the program, you'd have the knowledge to go in and alter the Setting Sheets and window definitions to better suit your own applications or working style.

As with any piece of software, how good it is depends on how you want to use it. Don't expect *Symphony* to be the one program that will fulfill all of your dreams. It isn't. If you're a manager or if you run a small company, *Symphony* may eventually prove to be a useful tool for a large portion of your work. People whose work lives are dominated by a single type of task (writers, data entry personnel, and so on) will still require the fuller and deeper functionality of dedicated software. ●

Harry Miller is the Editor of PC World.



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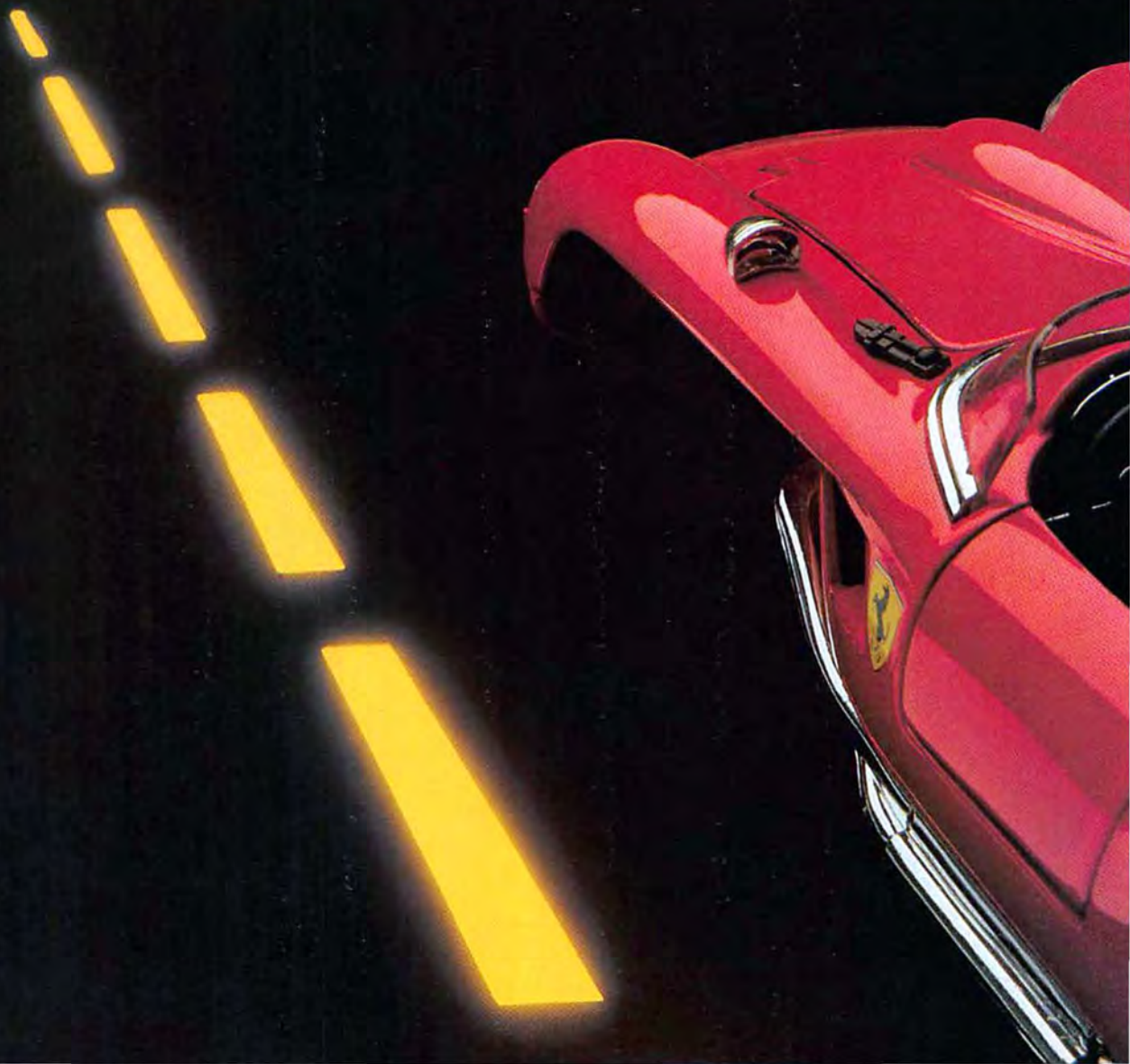
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A Symphonic Performance

Dick Andersen

The best way to discover how *Symphony* works is to use its functions, singly and together, on a typical, real-world application. Suppose that I work for the chairman of ABC Development Corporation and I have been asked to write a memo to the other board members discussing the performance of ABC's stock. This is a task that calls into play all of *Symphony*'s major functions.

Using *Symphony*'s communications function, I can call up the Dow Jones News/Retrieval service to get current quotes on ABC stock and capture the data in an area of my *Symphony* spreadsheet. The numbers I receive will automatically be shuttled into the memo, will update a quotes data base, and will be added to and analyzed in the spreadsheet. The quotes in the memo will be used as the basis for a graph.

Getting Ready

As in the case of 1-2-3, all *Symphony* functions use the spreadsheet as a common holding area for data. Before I start any work, I need to allocate different areas of the spreadsheet for each task. A good way to keep track of which area does what is to draw a map of the spreadsheet, illustrating which rows and columns are reserved for which functions. For



● Review

this test I set the memo area at columns A through I. Area 2, columns J through P, will hold the data captured in the communications session. The data base (Area 3, columns Q through X) will hold the quotes data base and other information required for forms processing.

When I first load *Symphony*, it automatically starts in the SHEET environment, with a full-screen window called MAIN. The window represents a range of the spreadsheet that can be logically isolated from other ranges. (The word 'MAIN' is displayed in the lower right-hand corner of the screen. In the upper right-hand corner the Environment Indicator displays the word 'SHEET'.) All

You can convert the formulas in the memo into values and move these values directly into the data base.

five possible environments—spreadsheet, word processor, graph, communications, and data base—can be active in this window. I could partition the screen into five windows to monitor all these functions simultaneously. For simplicity's sake, however, I will display each environment in turn in the MAIN window.

To enter the word processing mode, I press <Alt>-<F10>, which produces the Environment Type menu, and select the DOC option. *Symphony's* word processor comes complete with features such as word wrap, toggling between insert and overwrite modes, paragraph refor-

Use, Create, Delete, or Execute a named file of communications settings				MENU
Interface	Phone	Terminal	Send	Break
Baud:	1200	Screen:	WINDOW	Response:
Parity:	Even	Echo:	NO	EOL:
Length:	7	Linefeed:	NO	Delay:
Stop bits:	1	Backspace:	BACKSPACE	Break:
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Answer:	15			Capture:
Number:	9,267 3764			Range:
				Printer:

Communications Settings: A:\DJNS.CCF

Figure 1: COMM environment Setting Sheet

matting, and copy, move, and erase block operations. If I press the "Services" key, <F10>, a high-level menu of DOC environment commands is displayed.

After I write the first part of the memo, I must turn to the COMM environment to get current ABC stock quotes from Dow Jones. I give the <Alt>-<F10> "Type" command again and select the COMM function. *Symphony* displays a blank COMM screen. The lower right-hand corner of the screen shows that I am still working in the MAIN window, though I have changed environments. (The memo remains in memory; I can retrieve it quickly by choosing DOC from the Environment Type menu.)

I next set the capture range in the communications Setting Sheet; to establish communications with Dow Jones, I then specify the appropriate parameters (see Figure 1). Considering the large number of public and private data bases and the number of different personal computers, it is likely that Lotus Development Corporation and other vendors will eventually provide configuration files containing communications settings for all the popular services and computers.

When *Symphony* captures lines of text into the spreadsheet, it breaks up each line into strings of characters and places each string in a different column. The number of characters

that occupy a column is determined by the width of the column. If you know the format of the data that will be received and set the column width accordingly, your data is more likely to make sense at first glance. Since I know that Dow Jones transmits quotes fields 10 characters long, I set the column width in the capture area of the spreadsheet to 10 before I start the session.

Once the Setting Sheet is complete, calling Dow Jones is a matter of flipping on the modem and selecting the Phone option from the Communications menu and the Call option from the next menu. For this test I used a Hayes Smartmodem, though any Bell 103 or 212A modem will do. Once logged on to Dow Jones, I request the most recent week's quotes for the ABC Development Corporation and capture the information in columns J through P of the spreadsheet. (ABC is a fictitious name, but the quotes used in this test are from a real company and were captured using *Symphony*.) You can toggle in and out of the capture with <F4>—a handy feature if you do not want to save everything from a communications session. In this case I only capture the actual request for stock quotes ("abc pl") and the quotes themselves to avoid cluttering the worksheet with logon and logoff sequences.

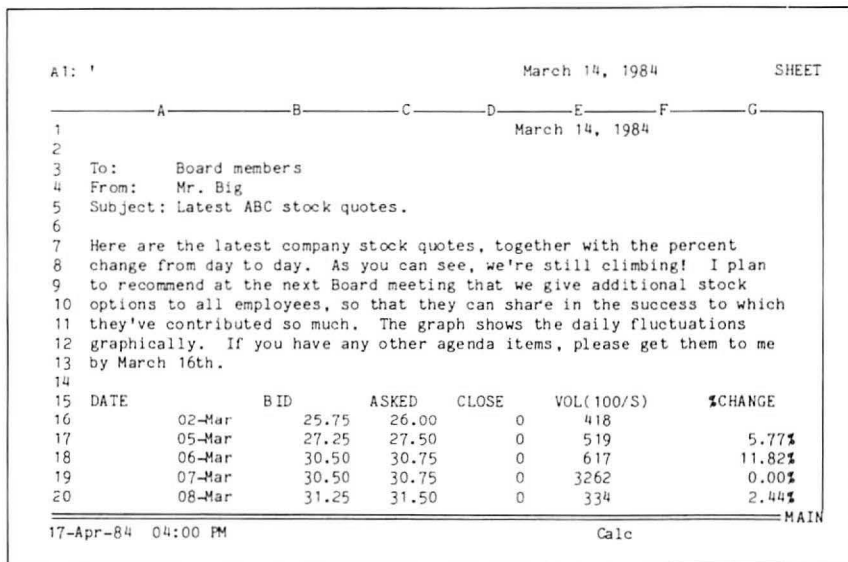


Figure 2: Memo and embedded stock quotes

Moving Data

There are several ways of moving captured data into the memo. I could simply copy the data and implant it, but an easier and more efficient way is to display the memo, enter the SHEET environment, and insert into the memo formulas that refer to the proper cells in the communications capture area. These formulas automatically transfer the data into the memo; the next time quotes are captured, the memo will automatically be updated.

Note that column G in the memo contains formulas that calculate the percent change in the asking price of the stock for each day (see Figure 2). This aptly illustrates that in the SHEET mode a document can be treated and worked on like a spreadsheet. This raises the issue of what is a document and what is not. Remember that *Symphony* is a gigantic spreadsheet that can function in four other modes. When you enter text in the DOC environment, each line is essentially a label that starts in a column of the spreadsheet. You can enter the SHEET environment, enter

additional data or formulas, and return to the DOC environment. The data you have just entered is "non-document" text; it can be printed, but it cannot be edited in the DOC mode. This is not a flaw in *Symphony* but rather a safety measure that prevents a user from inadvertently destroying valuable formulas or macros while editing a document.

To transfer the updated quotes into the data base, I use the Range Values command in the SHEET environment. This allows me to convert the formulas in the memo into values and to move these values directly into the data base. This useful feature has long been present in some first generation spreadsheet programs such as *VisiCalc* and *SuperCalc*—although it is absent in 1-2-3.

Symphony's graphics are quite similar to 1-2-3's, with the exception of a few new features such as High-Low-Close-Open graphs. Graphs are not allocated a space in the spreadsheet; they exist in RAM. Once you have created a graph, you must save it with the Graph Save command (which puts it in a .PIC file), exit *Symphony*, and use the Print Graph utility. To generate a graph from the stock quotes in the memo, I enter the

GRAPH environment, and with the Range command, I specify the location of the numbers to be graphed. I could also label the axes of the graph with the date of the session by likewise specifying the cell address of the memo's date.

Separate Windows

Up to this point I have used five environments in only one window. But there are good reasons for performing distinct functions in separate windows. One advantage is that you can monitor several functions at once. Beyond this, separate windows offer protection, since operations in one window cannot usually interfere with those in another.

It is particularly important for a document to be in a separate window. For the memo I use the Window Create command to create a window called "Memo"; I make the window hug the text by restricting it to columns A through H with the Window Create Restrict Range command. Once the memo is enclosed, I can perform block insertions and deletions within the window and not worry about affecting other areas of the spreadsheet; without the protection of a window, changes in the memo might cause data or formulas elsewhere in the spreadsheet to shift.

Moving text is simple. Suppose I want to place the last two sentences in the first paragraph of the memo below the stock quotes. I move the cursor to the first character of the text block and press <F10> to get the Services menu for the document environment. I choose the Move option and highlight the block with the cursor. I stop highlighting with <Enter> and move the cursor to the block's destination; pressing <Enter> again performs the move.

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Review

The Integration Perplexity

A question still remains: is having five programs in one integrated package all that useful? The tasks performed in this article could have been accomplished with *1-2-3*, *MultiMate*, *dBASE II*, and *PC-Talk III*. But with those programs it would have involved repeated disk swapping, program reloading, and the laborious transfer of data from one program to another—things most people would not bother to do. *Symphony's* integration of these functions means not only quicker program execution and one working style but a subtle expansion of control over information. When using five functions becomes as easy as using one or two, gathering and manipulating data is not nearly as imposing or indecipherable.

A word of caution: if you choose to use *Symphony*, you will have the power to improve your productivity in many ways. But do not come to this banquet prepared to sample all of its delicacies at once. Master each environment separately before you attempt to integrate them. ●

Dick Andersen is the director of Advanced Micro/Mainframe Solutions, a consulting firm specializing in the integration of personal computers into small and large businesses. His first book is 1-2-3 Tips, Tricks, and Traps, from Que Corporation.

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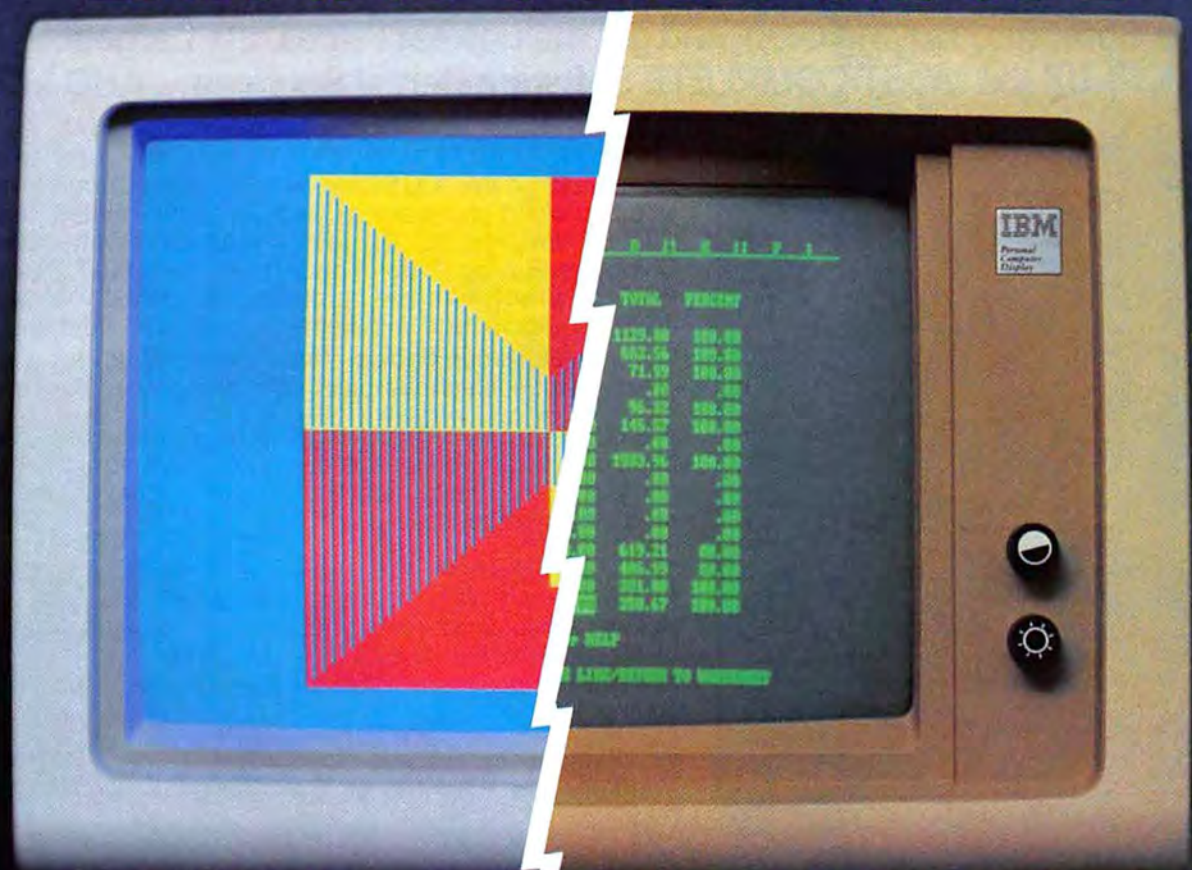
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OZ offers managers the ability to have complete control over their financials. OZ is the first and only software that can actually be used to

These ads for OZ have appeared in major computer magazines including InfoWorld, Byte, PC Magazine, PC Week, Computer Retail News, Computer Merchandising, and Micro Market World.

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A Champion among Middleweights

R:base 4000 is a well-engineered and easy-to-use DBMS, but it can't compete with the heavyweights.

Burton L. Alperson

R:base 4000 is the middle member of a family of data base management programs from Microrim. *R:base 2000* is a stripped-down, low-cost version of *R:base 4000*, and *R:base 6000* is the 4000-level program modified for a multiuser environment. Except for the multiuser capability, the 4000- and 6000-level programs have similar capacities and features. The criteria for evaluation for this review have been described in "Choosing Data Management Software," in this issue.

R:base is a fully relational DBMS (data base management system) with the ability to sort and select records conditionally and unconditionally. Like many other DBMSs, it can perform intersection, union, subtraction, projection, and joining operations in the creation of new relations.

The program requires 256K of memory, and performance does not improve with more memory. However, optional modules sold at extra cost may be able to take advantage of more memory. Microrim currently sells the *Extended Report Writer*, and two other modules—a FORTRAN/Pascal programming interface and a natural-language user interface called CLIO—are promised in the near future. None of the modules was tested for this review.



R:base supports any printer capable of reproducing uppercase and lowercase ASCII text. It provides no special control of printers that use setup codes for fonts, sizes, and other printing characteristics. Although a color monitor may be used with *R:base*, no special provision is made for controlling color in the program.

The program is compatible with all levels of PC-DOS from 1.10 up and MS-DOS, CTOS, and BTOS. Microrim reports that the Compaq, the Columbia, the Corona, the Eagle Spirit, the Hyperion, and the Tandy 2000 can run the program. Full sup-

● Review

Microrim provides hot-line support on regular telephone lines during normal business hours. This service is free for the first 30 days, after which it may be purchased for \$150 per year. However, the documentation and tutorial are so good and the program so well designed that it seems unlikely that many users will need help even during the first 30 days. The documentation should serve as a model for other software companies.

The User Interface

R:base's user interface is flexible enough to suit both experts and novices. If you are an experienced user, you can type in commands in

R:base's documentation should serve as a model for other software companies.

the correct syntax, then sit back and watch the program run through its paces. If you are still unfamiliar with the syntax, you can type PROMPT to send the program into a fully prompted mode. An appropriate help screen appears, and the program prompts you for information. All you do is fill in the blanks. Thus, *R:base* gives you the best of both worlds: command and menu operation in a single program.

On the other hand, one of the most important features of the heavyweight DBMSs, programmability, is almost absent in *R:base*.

Only a crude provision to sequence noninteractive commands in "command files" is provided. It is impossible to develop turnkey systems and other customized applications because *R:base* contains neither a programming language nor a macro capability. The future addition of a FORTRAN/Pascal programming interface should allow some programmability for professional programmers, but the lack of a BASIC interface or an internal language capability leaves most of us out in the cold.

This is a puzzling omission. Most of Microrim's advertising invites users to compare *R:base* with programs like *dBASE II* and *Knowledge-man*, which leads you to believe that it is similar in scope and capacity to these programs. It is not. Lack of programmability places *R:base* in a weaker class.

Communications

R:base's ability to send and receive files to and from other programs is weak but comparable to most other data management software. ASCII input and output is available for both serial string and two-dimensional formats. Automatic routines are available for *Multiplan* SYLK files and for other Microrim products. Although communication is claimed for DIF files, it involves a manual procedure that requires you to understand the jargon of DIF files before you can convert data.

R:base's searching and sorting capabilities mix power and flexibility, but there are disappointing omissions. The program is unusually rich in available data types. Appropriate data handling is provided for date, dollar, integer, real (floating-point), text (string), and time variables. However, only ten search or sort criteria may be used simultaneously, and the only available operators are

AND and OR. (With the addition of the *Extended Report Writer* you can also use IF... THEN... ELSE.) To provide a point of reference, *Knowledge-man* provides AND, OR, XOR, NOT, IF... THEN, IF... THEN... ELSE, and CASE. In addition, the number of simultaneous search and sort criteria in *Knowledge-man* is unlimited.

Indexing (called "keying" in *R:base* terminology) is powerful and easy to invoke. While some other data management programs restrict the use of keyed variables to one or two commands, *R:base's* keying can be used to improve performance in a broad range of inquiry functions, including INTERSECT, SUBTRACT, UNION, and WHERE.

Ad hoc query functions are beautifully implemented in *R:base*. The inquiry command structure is similar to IBM's SQL/DS (Structured Query Language/Data System). The major inquiry command is SELECT. Like most of *R:base's* command set, it is easy to use, intuitively appealing, and moderately powerful. The syntax for SELECT operates as follows: SELECT *attnames* FROM *relation* {SORTED BY *attnames* {=A or =D} WHERE *conditions*}

SELECT *attnames* FROM *relation* is the only required part of the syntax. It describes the list of fields you want to see and the name of the table that contains the data. SORTED BY *attnames* {=A or =D} defines the sorting order and whether it should be ascending or descending for each sorting variable. WHERE *conditions* defines the conditions for inclusion or exclusion of records in the report.

R:base's report capacities are disappointing. Although field placement is flexible, report width is limited to 132 columns, and control breaks are impossible. Most importantly, no

more than ten variables can be created for a report. These limitations severely constrain applications programmers. Adding the *Extended Report Writer* reduces some of these limitations. The extra module reduces the restriction on the number

Ad hoc query functions are beautifully implemented on *R:base*.

of variables, increases the page width of reports, allows the insertion of control breaks, and provides expanded formatting capabilities.

The maximum record length for *R:base* is 1530 characters. The maximum number of fields per record is 400, and the maximum field length is 1500 characters. Microrim's claim of a 1-billion-record capacity for *R:base* is amusing. Using their estimation formula on a small 33-field data base, a mere million records would require a 768-megabyte (MB) hard disk for data storage alone. A billion records would require a 768,000MB hard disk. It would be nice to believe that this capacity will be available before *R:base* is obsolete.

Performance Testing

In order to test some of *R:base*'s features, I imported a small hospital information system that I had originally developed as a 1-2-3 template system. The process illustrates some of the problems involved when a program does not provide a direct transfer capability.

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ADDAY	INTEGER	1 value(s)	MAIN		Admissions day
ADMCODE	INTEGER	1 value(s)	MAIN		Program code
ADMTH	INTEGER	1 value(s)	MAIN		Admissions month
ADYEAR	INTEGER	1 value(s)	MAIN		Admissions year
ATTADD1	TEXT	30 characters	MAIN		Attorney's address
ATTADD2	TEXT	30 characters	MAIN		Attorney's address
ATTADD3	TEXT	30 characters	MAIN		Attorney's address
ATTADD4	TEXT	30 characters	MAIN		Attorney's address
ATTPHONE	TEXT	19 characters	MAIN		Attorney's phone
DIDAY	INTEGER	1 value(s)	MAIN		Day of discharge
DIMTH	INTEGER	1 value(s)	MAIN		Month of discharge
DIYEAR	INTEGER	1 value(s)	MAIN		Year of discharge
LNSTAT	INTEGER	1 value(s)	MAIN		Payment lien status
MDADD1	TEXT	30 characters	MAIN		Physician's address
MDADD2	TEXT	30 characters	MAIN		Physician's address
MDADD3	TEXT	30 characters	MAIN		Physician's address
MDADD4	TEXT	30 characters	MAIN		Physician's address
MDPHONE	TEXT	19 characters	MAIN		Physician's phone
PAYSRC	INTEGER	1 value(s)	MAIN		Payment source code
PTID	TEXT	9 characters	MAIN		Patient ID number
REFATT	TEXT	30 characters	MAIN		Referring attorney name
REFCODE	INTEGER	1 value(s)	MAIN		Source of referral
REFDAY	INTEGER	1 value(s)	MAIN		Day of referral
REFMD	TEXT	30 characters	MAIN		Referring physician name
REFMTH	INTEGER	1 value(s)	MAIN		Month of referral
REFSRC	INTEGER	1 value(s)	MAIN		Referral source code
REFYEAR	INTEGER	1 value(s)	MAIN		Year of referral
SLFINS	TEXT	1 characters	MAIN		Self insured?
WCAUTH	TEXT	1 characters	MAIN		Work comp authorized?
WCCO	TEXT	30 characters	MAIN		Work comp company
WCCOOF	TEXT	30 characters	MAIN		Work comp office
WCPHONE	TEXT	19 characters	MAIN		Work comp phone
WCREP	TEXT	30 characters	MAIN		Work comp rep name

Figure 1: R:base LISTATT description of a hospital information system

It was necessary to reformat the spreadsheet by inserting new columns containing quotes and commas (“;”) between each of the original columns. This step was required because some of the original fields contained embedded commas that could disrupt the transfer process. After reformatting, the spreadsheet was “printed” to an ASCII .PRN file by 1-2-3.

Although *R:base* is supposed to read two-dimensional ASCII files, incoming records can be no longer than 80 characters. Consequently I

had to write a BASIC program that could read the PRN file and reformat it into the serial string format expected by *R:base*.

After running the BASIC program, the data were imported into *R:base* with a LOAD command. The process was tedious; a considerable amount of time could have been saved if *R:base* contained a direct importing routine for 1-2-3 .WKS files. In fairness it should be pointed out that few other data management programs have this capacity.

Microrim deserves high praise for providing formulas for estimating file size. Few microcomputer DBMSs contain this critical information. The estimated file size for this data base turned out to be quite close to the actual size. The estimated file size for data storage was 322,560 bytes, while actual file size was 325,632 bytes.

The sample data base I used is a 33-field, 420-record information system. Figure 1 shows *R:base*'s description of the data base produced by the LISTATT (list attributes) command. Except for the column labeled “Com-

ment," which I added, Figure 1 is the actual file output from *R:base*. It was necessary only to type OUTPUT "ATTR.DOC" to instruct *R:base* to produce a file rather than screen output. The file was then easily imported to a word processing program.

I confined speed testing to the ad hoc inquiry functions and tried to restrict the scope of testing to tasks similar to those that were actually required of this data base. An additional consideration was sorting performance. I wanted to see how much performance was degraded by increasing the number of sort criteria and making the conditions imposed on the search requests more complex. All tests were performed on a 640K IBM PC with an expansion chassis and a hard disk.

The first test involved using the SELECT command to produce a report consisting of referring physicians, referring attorneys, workers' compensation representatives, payment sources, referral sources, and program admissions codes, all ordered alphabetically by referring physician. The required syntax was: SELECT REFMD REFATT WCREP PAYSRC REFSRC ADMCODE FROM MAIN SORTED BY REFMD = A.

This command took 48 seconds to process (the time between pressing <Enter> and the appearance of the first line of the report on the screen). When an additional sorting criterion was imposed (sorting by REFATT), processing time increased to 71 seconds. Adding a third sorting condition (WCREP) increased the time to 95 seconds.

All of the previous tasks involved string sorting criteria. A second series of tests involved the same report as above, this time sorted by the numerical variables of PAYSRC, REFSRC, and ADMCODE. The report was produced with one sorting criterion in 15 seconds. Two criteria

required 20 seconds, and three criteria required 22 seconds. *R:base* is apparently more efficient at sorting integers than strings. When possible you should use numerical sorting fields to increase speed with *R:base*.

Performance was substantially improved when conditional statements were included.

Performance was substantially improved when conditional statements were included with a WHERE statement. This was surprising since the use of conditionals degrades the performance of some other data management software.

When the clause WHERE ADYEAR EQ 82 was added to the syntax just used (restricting the report to 1982 admissions), processing time dropped from 48 seconds to 16 seconds for the one-string criterion task. For the two- and three-string criteria tasks, processing times changed from 71 seconds to 32 seconds and from 95 seconds to 40 seconds. Processing times for all the numerical sorting tasks were constant at about 13 to 14 seconds.

Increasing the complexity of the conditional clause to WHERE ADDAY GE 1 AND ADMTH GE 1 AND ADYEAR GE 82 AND ADYEAR LT 83 had little impact on performance. The times were all within a second or two of the simpler conditional statement. In all cases the program performed flawlessly and exactly as specified in the manual.

R:base is fast for a microcomputer DBMS. While it is considerably slower than 1-2-3, it is faster than most other data management programs.

R:base is an outstanding choice for a small business that doesn't need to develop turnkey systems or complex reports. Its superb engineering and documentation put it head and shoulders above much of its competition.

However, *R:base* doesn't come close to being the replacement for powerful data management software such as *dBASE II* and *Knowledge-man*. Applications programmers will find themselves severely limited by the absence of programming capability and macros, by limited communications capability, by an impoverished selection of logical operators, by the limitations of ten variables per report and 132 columns per page, and by the inability to group data with control breaks.

Although some of these limitations may be overcome by adding modules at extra cost, many of the functions found in the modules deserve to be included in the original product. Microrim says that it is working on programming enhancements for the product. If the company can produce these enhancements with the same elegance that exists in its current product, *R:base* may become a formidable heavyweight contender. As it stands, the program is a champion among middleweights. ●

Burton L. Alperson, Ph.D., is a Contributing Editor for PC World.

R:base 4000

Microrim, Inc.

1750 112th NE

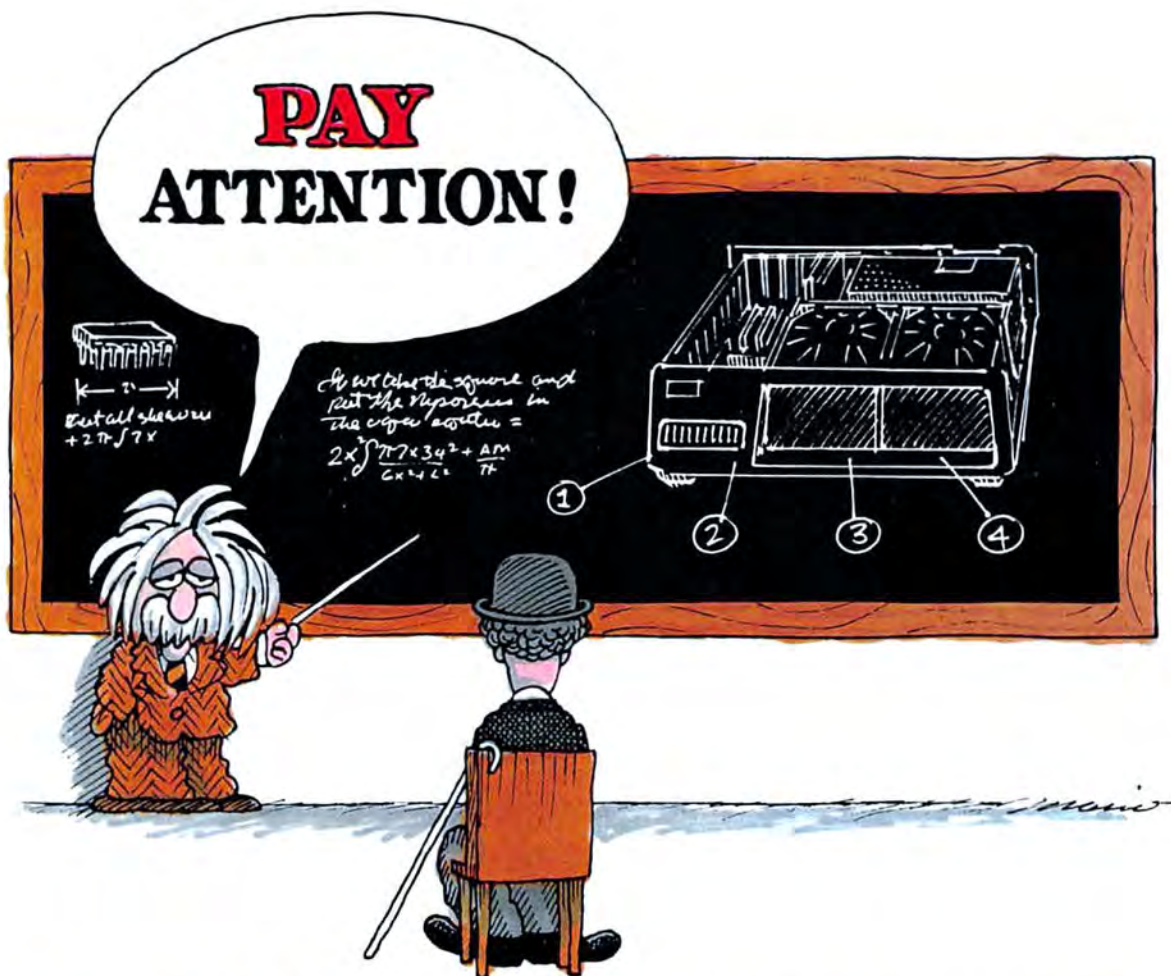
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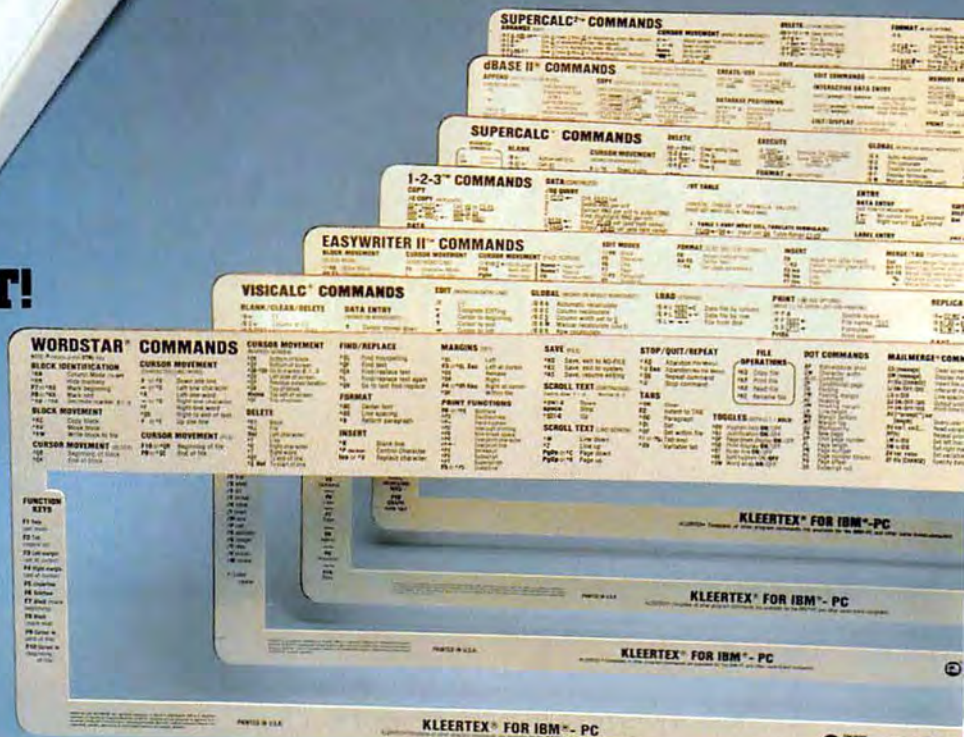
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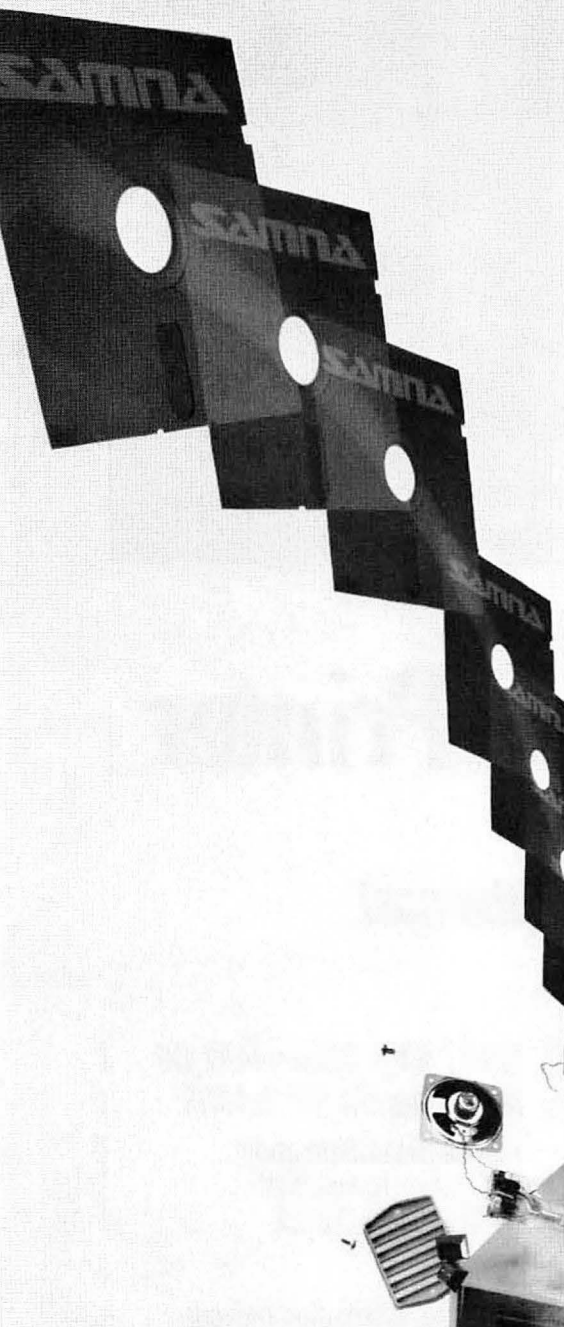
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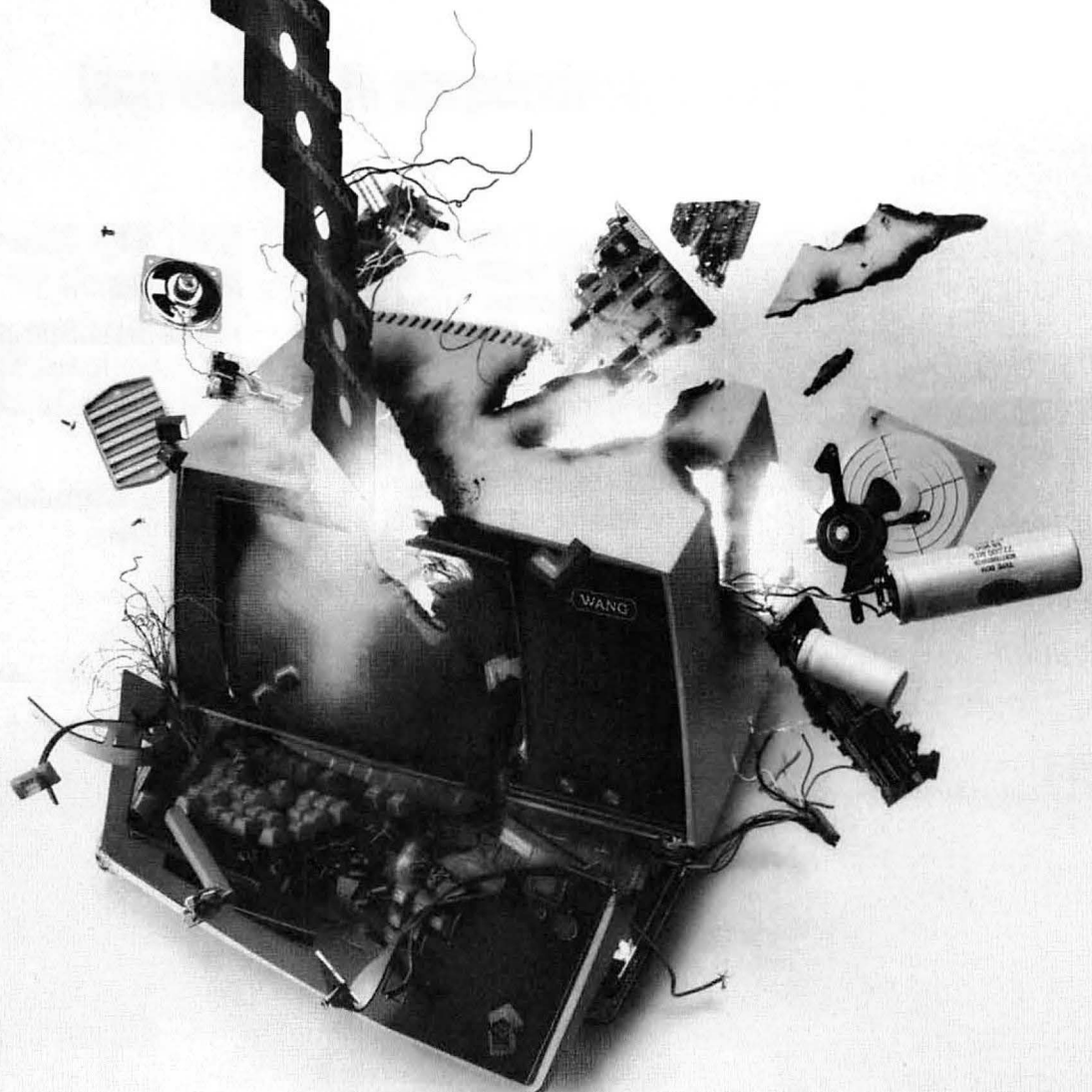
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The Generators

dBASE II application generators let you leave data base programming to your PC.

Warren Sirota

Many computer buffs have neither the time nor the inclination to write programs for their machines. But using many software products, particularly *dBASE II*, requires programming skills. *dBASE II* programs permit efficient data entry, report definition, and printing. If you know some BASIC and have a couple of weeks available to study *dBASE II*, you can probably learn to write a *dBASE II* program in BASIC. Even then your programs may not be so sophisticated enough for your business needs. Fortunately, there is an easier way: you can use an application generator.

An application generator is a program that builds other programs. You tell the application generator what application you want, and it will create a set of programs for you. Several application generators are available that are designed to create programs especially for *dBASE II*.

Most application generators are menu-driven programs that create other menu-driven programs. The program you create will typically allow anyone operating the system to modify the data in one or more files and to create reports from those files.

The virtue of menu-driven systems is that you don't have to know any commands or data base file names. If a novice is entering the data, the system must be menu-driven—a data base management system (DBMS) that was not menu-driven would be worthless. Given a well-designed system, anyone can be trained in less than half an hour to operate the system for a particular data entry or report generation task.

You tell the application generator what application you want, and it will create a set of programs for you.

Similarities and Differences

Not all applications are alike, and the same is true of application generators. All the report generators reviewed here create reliable menu-driven systems that include procedures for file maintenance and printing. How, then, can you select an application generator that best meets your needs? The main differences among the systems can be summarized as follows:

Flexibility. Can you customize screen formats and report formats, or must you use a standard format? Can you design reports and data entry screens that include data from more than one data base or that have more than two levels of subtotalling? What other special features are available?

Ease of use. Does the application generator guide you in creating an application? Is the resulting application easy to use?

Adaptability. If you need to custom-program some enhancements for the application, how easy is it to code these procedures and incorporate them into the application structure?

Compatibility. Can you use the product with existing *dBASE II* data bases and code?

Speed. Do the applications run so slowly that they tie up the computer and the operator for long periods of time?

Cosmetics. Do the screens and reports that the generated application produces appear professional?

Product Survey

I tested three application generators for this review: *The dBASE Window*, by Tylog Systems; *dProgrammer*, by Sensible Solutions; and *Autocode*, by

Axel Johnson. *The dBASE Door*, also by Tylog Systems, is a report generator that enhances *dBASE II*'s report generator.

These products fall into two categories. *Autocode* and *The dBASE Door* are small factories that produce *dBASE II* application code. Once you've created an application with one of these products, you don't use the generator again until you need to create a new application. *dProgrammer* and *The dBASE Window*, on the other hand, create their own "environment" within *dBASE II*, and the application is executed from within the generator. You're guilty of copyright infringement if you create an application with one of these two products and sell it without the permission of the company that owns the application generator copyright. The applications that you create with *dProgrammer* and *The dBASE Window* run more slowly than applications created by the other two generators reviewed here.

The dBASE Window and The dBASE Door

The dBASE Window has the makings of a good product, but it operates so slowly that few people are apt to have the patience to wait for it. Its operation could be hastened considerably if the product were placed on a disk emulator and a hard disk were used for storing data. But without these enhancements it is frustrating to use.

Although *The dBASE Window* is slow, its ability to handle multiple files exceeds that of the other products here, and handling more than one file at a time is often necessary in data base management. For example, you may have a customer master file and a separate transaction file that contains information relating to, but not duplicating, data found in the customer file. None of the application generators reviewed here handles these related data base situations adequately, but *The dBASE Window* does a better job than any of the others.

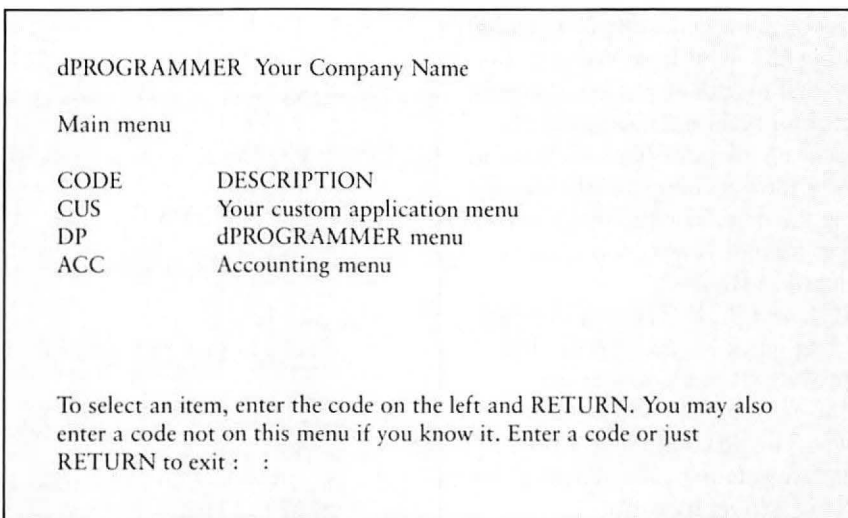
The dBASE Door is simply the report generation portion of *The dBASE Window* sold as a separate product. *The dBASE Door* is slow-running, but the programs it creates run as quickly as the others and can be called from any *dBASE II* program or from the *dBASE II* operating environment.

The dBASE Door is the only product that allows you to design reports that use data from two data bases at once. You can also use it to include more levels of subtotaling than the standard *dBASE II* report generator provides. You have to study a bit in order to use *The dBASE Door* properly, but the time involved is minor when compared to coding this type of report by yourself.

more difficult than preparing a report using the *dBASE II* report generator, but the *dBASE II* report generator can't produce many of the reports that *The dBASE Door* can handle. Compared to writing the custom code to produce these complex reports, *The dBASE Door* is a breeze to use. But if your reporting needs are not complex, *The dBASE Door* may not be necessary.

dProgrammer

dProgrammer lacks advanced features, and some of its functions are sluggish, but the total package is integrated quite well. In less than an hour I was able to create a simple system for maintaining a mail-order customer file.



dPROGRAMMER Your Company Name	
Main menu	
CODE	DESCRIPTION
CUS	Your custom application menu
DP	dPROGRAMMER menu
ACC	Accounting menu
To select an item, enter the code on the left and RETURN. You may also enter a code not on this menu if you know it. Enter a code or just RETURN to exit :	

Figure 1: dProgrammer main menu

To use *The dBASE Door*, you must use either its built-in text editor or a separate word processing program to create a layout file for the report. You then use the layout file to specify which data comes from which data base, where data is placed in the report, and how you want the accumulators used (for totaling and subtotaling purposes). This process is

In addition, Sensible Solutions has included an accounting package as part of *dProgrammer*. I didn't use this portion of the product, but the application generator alone makes *dProgrammer* worthwhile.

To start up *dProgrammer*, you type *DBASE DPROG* at the DOS prompt. This displays the *dProgrammer* main menu (see Figure 1). Sensible Solutions has provided two examples of custom applications with *dProgrammer*. The manual guides you through the membership file maintenance program. (The other application is the accounting system.)

● Review

All program generation functions are available through the dProgrammer menu (see Figure 2), which can be accessed from almost any other menu by typing DP. *dProgrammer* allows you to specify where you want to go. You don't need to traverse the menu tree branch by branch; you can jump from one branch to another. This can save the experienced user a considerable amount of time, and it doesn't inconvenience the novice. It's easy to modify an application, test it, and return to the DP menu for more modifications.

The dProgrammer menu shows the options for application development. The most important functions are listed here.

FM. The file maintenance option helps you set up new files or maintain existing files. This is an extensive facility that includes features especially helpful for novices. It automatically keeps track of index files and lets you modify the structure of a file without losing the data. The functions available in the File Maintenance menu are listed in Figure 3.

BQL and BQR. These options for building quick list and report libraries provide an easier way to use *dBASE II*'s Report and List commands. The lists and reports you create are automatically added to the List and Report menus.

CMD. The option for changing menu descriptions or menu placement allows you to customize the *dProgrammer* menus by shifting a choice from one menu to another or eliminating the choice entirely. You can even eliminate the DP choice from the main menu, creating a turn-key system in which the operator will not have access to the full range of *dProgrammer* facilities. If you know how, you can still access all these facilities, however, by typing DP.

dPROGRAMMER Your Company Name	
dPROGRAMMER menu	
CODE	DESCRIPTION
FM	File maintenance menu (add new files)
UM	Utility menu (make global changes)
PDS	Program a display screen (or change one)
ADP	Add/modify dBASE II programs
BQL	Build a library of quick lists
BQR	Build a library of quick reports
CMD	Change menu descriptions or placement
MNU	Add a new menu (or delete one)
PW	Add a new password (or delete one)
To select an item, enter the code on the left and RETURN. You may also enter a code not on this menu if you know it. Enter a code or just RETURN to exit : :	

Figure 2: dProgrammer menu

dPROGRAMMER Your Company Name	
File Maintenance menu	
You have selected Tape Customers	
Your choices are:	
PACK	- Pack and reindex the file
DFLD	- Display fields in indexes
(Above for version 2.4 or greater only)	
DSTR	- Display structure to screen
PSTR	- Print structure to printer
MNDX	- Modify indexes and reindex
MSAV	- Modify structure and save data
MDEL	- Modify structure and delete data
LIST	- Modify list of fields on displays
RENA	- Rename file or file description
DELE	- Delete file and all its indexes
Enter your choice or just a RETURN to quit : :	

Figure 3: dProgrammer file maintenance menu

What's missing from *dProgrammer*? A screen generator, for one thing. Also, the built-in file maintenance procedures do not allow the use of two linked files simultaneously. If you need this capability, you will have to write your own *dBASE II* program to handle it. (You

can access the custom program from a dProgrammer menu if you wish.) Finally, although the report generator allows you access to the *dBASE II* report generator, it doesn't improve on the report generator (as *The dBASE Door* does).

	Flexibility	Ease of use	Adaptability	Compatibility	Speed	Cosmetics
The dBASE Window	Excellent	Fair	Excellent	Good	Poor	Fair
dProgrammer	Good	Excellent	Excellent	Excellent	Good	Good
Autocode	Good	Good	Good	Poor	Excellent	Good

The dBASE Door has not been rated with the other products because it is a report generator rather than an application generator. Its capabilities are excellent, and its ease of use is good.

Table 1: Product ratings

Autocode

The programs devised by *Autocode* can do roughly the same things as those created by *dProgrammer*, but *Autocode*'s programs run faster than *dProgrammer*'s. In addition, *Autocode* includes an excellent screen generator that enables you to easily design data input screens. On the other hand, putting together an *Autocode* application is more difficult than fashioning a *dProgrammer* application. The fields in the data bases *Autocode* creates have such names as FLD1, FLD2, and so on, rather than more descriptive English names like NAME and ADDRESS. This makes it difficult to access the data base outside of the *Autocode* context.

Generating an *Autocode* application involves four processes. First you set up screen formats using a word processor or text editor. Next you set up file maintenance procedures and create a data base using *Autocode*. You then create the reports for the application using either *Autocode* or *dBASE II*. Finally, you tie together all the pieces of the application using the *Autocode* menu generator.

Overall, *Autocode* is a well-built product that is convenient to use for single-file applications. As with *dProgrammer*, there are no provisions for the simultaneous handling of several files.

Findings

My ratings of each of these products are summarized in Table 1. My personal preference for systems involving only one file leads me to choose *dProgrammer* as an application generator system. Once I learned to use it, *dProgrammer* enabled me to take a data base of sales leads and turn it into an actual application in less than an hour. No other generator offered application creation that was as easy. For systems involving two or more files, there is no adequate file maintenance system on the market. Custom programming is still the only realistic choice. ●

Warren Sirota is a partner in Midway Software, a consulting firm based in Berkeley, California. He has programmed several dBASE II applications for PC World.

The dBASE Window
Tylog Systems
9805 S.W. 152 Terrace
Miami, FL 33157
305/253-5942
List price: \$249
Requirements: 400K, one disk drive

The dBASE Door
Tylog Systems
9805 S.W. 152 Terrace
Miami, FL 33157
305/253-5942
List price: \$149
Requirements: 128K, one disk drive

dProgrammer
Sensible Solutions
5244 Edgepark Way
San Diego, CA 92124
619/560-4583
List price: \$295
Requirements: peripheral storage
170K, installation 20K, two disk
drives or a hard disk

Autocode
Axel-Johnson Corporation
666 Howard St.
P.O. Box 7067
San Francisco, CA 94120
415/777-3800
List price: \$195
Requirements: 64K, with dBASE II
2.3B or later version 130K, one
disk drive

Autocode
Axel-Johnson Corporation
666 Howard St.
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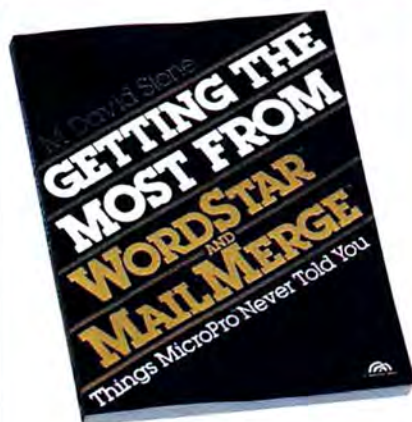
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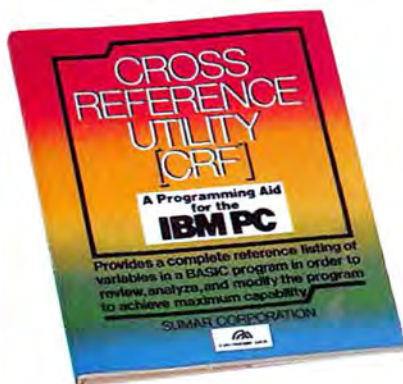
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Keith Richard Cook

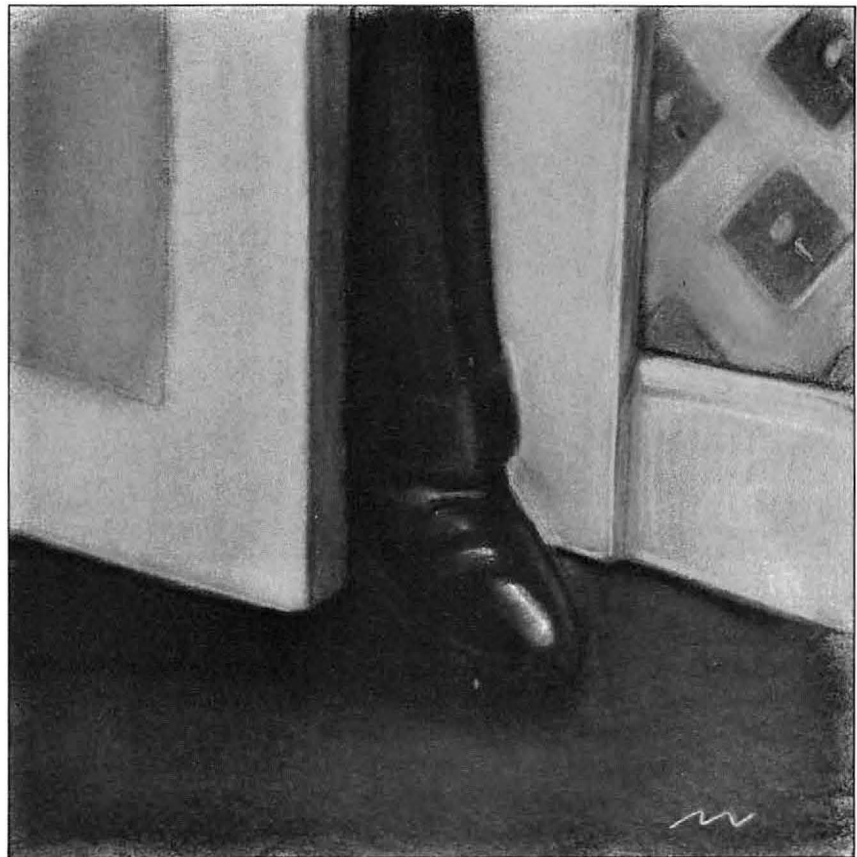
Can this program really analyze a potential customer's personality and explain how to sell a product? I pondered that question as I read the introduction to a new software package aimed at America's legion of salespeople. The package is called *The Sales Edge*, and it promises, among other things, to help you understand how a customer thinks and to help you devise a winning sales pitch for that customer.

The Sales Edge is one element of the *Human Edge* software series, which also includes *The Management Edge* and *The Negotiation Edge*. The goal of the *Human Edge* programs, according to a brochure supplied by Human Edge Software, is to "increase your personal power." In other words, these packages help you twist people's arms more effectively.

That was enough to make me wonder what would happen if, for example, a salesperson armed with *The Sales Edge* were to match wits with a customer who owned *The Negotiation Edge*. Which Edge would have the edge? Could the salesperson and the customer simply connect their PCs and let the programs come to a meeting of the "minds"?

Taking Stock of Yourself

The Sales Edge begins by asking you to agree or disagree with 86 statements about yourself, such as, "I like to take charge of situations," "A



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The program then asks you to agree or disagree with 50 adjectives about your customer, such as "friend-

ly," "deferential," "aggressive," and "talkative." Some of the characterizations, such as "exhibitionistic," are difficult to define and almost impossible to apply.

After you've completed both the self-assessment and customer-assessment sections, the program processes the information and pro-

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Exxon	St. Regis Paper
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Fireman's Fund	The Nestle Co.
General Electric	The Rouse Co.
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● Review

duces a Sales Strategy Report. The report is divided into six sections: what to expect from your customer, how to succeed with that customer, and strategies to help you prepare, open, present, and close your pitch.

How much of an edge can *The Sales Edge* provide? To find out, I used the Assessing Yourself section to create a salesman persona, which I named Bill Hardsell. Bill was an aggressive, ambitious, dominant, take-charge guy who believed that the end justified almost any means.

Using the Assessing the Customer section, I created two customers for Bill. The first customer, E. Z. Mark, was a shy, quiet, sensitive, introspective, detail-oriented person—a tulip in the path of the Bill Hardsell steamroller. The second customer, Sue Standpat, was a tough, independent, controlling person similar to Bill himself.

After completing the assessments of Bill, E. Z., and Sue, I ran the Sales Strategy Reports for both customers. The five- to six-page printouts recommended considerably different strategies for the two customers.

The report on E. Z. Mark reassured Bill that "you can control this meeting" and that "Ms. E. M. will defer to your authority and expertise." The program viewed E. Z. Mark as a social and friendly person who responds well to praise and approval. "On occasion," the report continued, "little more than a few positive personal comments and some basic product information will compel her to purchase." What a pushover.

But further along the report said, "She is not likely to overlook many details and can be expected to request much information in order to understand all aspects of the product and the purchase." The report added that "a superficial, social presentation will not do" and that "Ms. E. M. can

be insensitive to the social 'tone' of a situation."

The Sales Strategy Report on Sue Standpat indicated that Bill should "expect Ms. S. S. to want to dominate." It advised that he "defer to her; respect her opinion; expect her to drive a hard bargain; and temper [his] persuasiveness."

"At all costs," the report admonished, "do not argue or get pushy with Ms. S. S., or your relationship

The five- to six-page printouts recommended considerably different strategies for the two customers.

may quickly evaporate. She considers you an opponent who must be bested, and you tend to view the sales situation as a confrontation where the buyer will resist purchasing unless she is coerced. With Ms. S. S. it is to your advantage to avoid pressure tactics, or she is likely to respond in a hostile manner."

So far, so good. I was then ready to test the accuracy of the program's personality evaluations by trying *The Sales Edge* on a real person. I enlisted the aid of a *PC World* staffer, whom I'll call Mr. X, by asking him to assess himself and then evaluate the results of the Sales Strategy Report.

"Mr. X is a nervous person," the report began, "who seeks stimulation and excitement, even though he responds to this stimulation with anxiety and agitation. He works best in

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● Review

a structured setting but may develop resentment if he feels things are being imposed on him."

As Mr. X and I read the report, I glanced at him. Sure enough, he did look excited, anxious, and agitated. I would have asked why, but I didn't want to impose.

"Avoid confrontations or arguments with Mr. X," the report urged. "He has a hot and unpredictable temper. Be especially careful not to make sarcastic or disparaging remarks, even as a joke." I wisely bit my tongue in time to avoid commenting on his Day-Glo necktie.

The report noted that Mr. X "is analytical, pragmatic, and places great value on valid and reliable information." The report also concluded that Bill could expect Mr. X to bargain and that he is "a difficult person who will test your patience and your temper."

I asked Mr. X how accurate he felt *The Sales Edge* had been in evaluating him as a person and as a potential customer. "Remarkably accurate," he replied. "But don't use my name in this article," he warned, waving a ballpoint pen in my face, "or you'll be sorry." He clicked the pen several times to emphasize the point or maybe just to test my patience and my temper.

The three reports were generally full of potentially useful advice and insights, but there were flaws. One interesting item appeared in the Closing Strategies section. The report advised Bill that "Mr. X seeks a high level of arousal." I'm not sure that this is appropriate information for a salesperson to know.

I was bothered by descriptions of E. Z. Mark in one paragraph as a social butterfly eager to buy at any en-

couraging word, and later as an anti-social stickler for details. Is *The Sales Edge* written to present every possible facet of a customer's personality—and thus not be wrong? If so, the name should be changed from

I was bothered by descriptions of E. Z. Mark in one paragraph as a social butterfly and later as an anti-social stickler for details.

The Sales Edge to *The Sales Hedge*. Possibly, however, the problem was due to inconsistencies in my characterization of E. Z.

This points up the weakest part of *The Sales Edge*: its judgments are only as accurate as the user's opinions of his or her customers. If you are not an observant salesperson, then you'd better be good at either dazzling customers with your brilliance or blinding them with your baloney.

If, on the other hand, your decisions about your customers' personalities are sensitive and accurate, *The Sales Edge* will provide you with surprisingly perceptive information. ●

Keith Richard Cook is a Contributing Editor to PC World.

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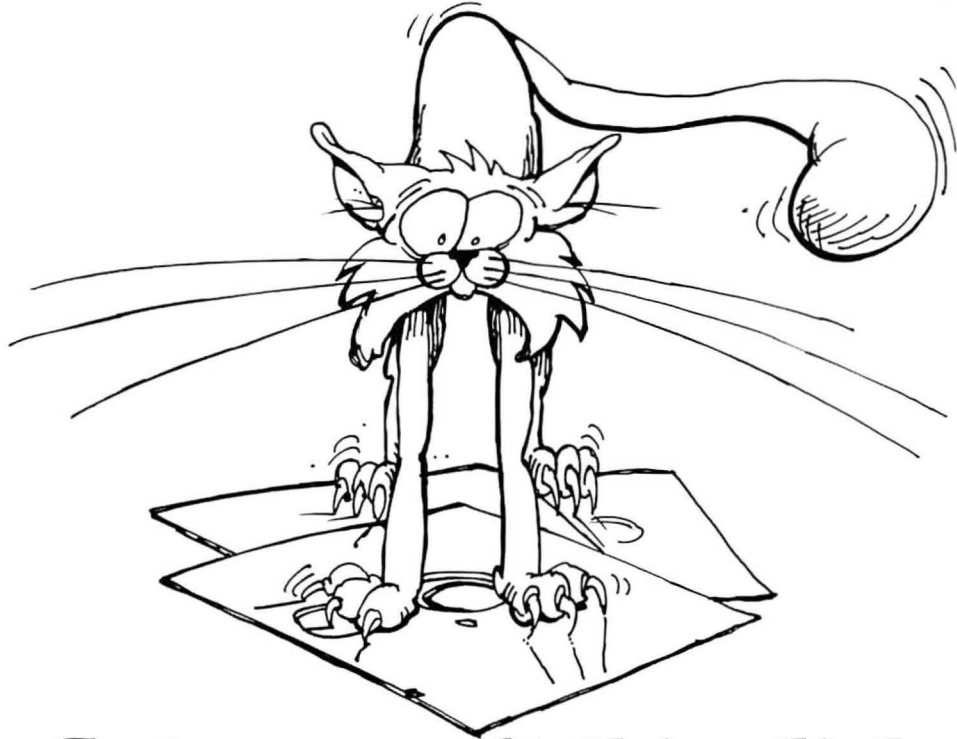
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IBM Rides the Turtle

IBM Logo offers powerful graphics, data file features, and assembly language access.

Greg Stone

Logo is a sophisticated programming language, designed for education but capable of a variety of applications. It stands with one foot in the educational philosophy of psychologist Jean Piaget and the other in LISP, the programming language favored by artificial intelligence researchers. In education circles it is best known for its "turtle graphics," a simple drawing routine that provides a good introduction to programming and geometry simultaneously. But Logo also shares many of the list processing features of LISP and therefore has a wide range of capabilities, especially for manipulating text.

Logo encourages exploration. Plain English error messages and an interactive structure that allows you to see results a line at a time make it possible to investigate the thinking process while you are programming.

These features have helped make Logo a hit in the schools, where it is used by students from kindergarten through college. Logo, however, has not yet caught on as a programming language for more complex applications. One reason is that the turtle graphics are not designed to execute quickly, nor are they as sophisticated as other graphics packages. Second, Logo is a memory hog. While there are truncated implementations of Logo on machines that have as little



as 16K of memory, those versions of the language are limited. More useful implementations awaited the introduction of 64K microcomputers such as the Apple II. Apple Logo, a popular version of the language, provides a good standard by which the others may be judged. However, with the added memory and speed of the IBM PC, Logo has become even more exciting and useful.

At least four versions of Logo are now available for the PC: PC Logo, Dr. Logo, Waterloo Logo, and IBM Logo. (The first three products were reviewed in "The Turtle Grows Up," PCW, Vol. 2, No. 4.)

IBM Logo requires only 128K of memory but will take full advantage of 256K. The program includes al-

● Review

most all the Apple Logo features, except for the editing routines. If you have 256K of memory, about 162K will still be free for user programming after IBM Logo is loaded. That's about 16 times as much space as is available when using Apple Logo on a 64K machine. The extra memory can be useful to anyone trying to develop complex applications.

Dribbling to Disk

Like PC Logo, IBM Logo allows you to create data files on disk. With other Logo versions you can keep small amounts of data in program files that are saved when the entire program is saved, but that isn't as useful as being able to write data separately to a disk or to a printer. Along with letting you send results to disk, IBM Logo enables you to send commands to disk with the DRIBBLE command. DRIBBLE immediately sends nearly every character that appears on the screen to either a printer or a disk. However, it cannot send data from the Logo editor.

When you develop a Logo drawing, you frequently work at the command level to give immediate instructions to the Logo turtle. As the instruction list grows, it scrolls off the screen and is not retrievable. Standard practice has been for the user to keep track of the instructions by writing them on a separate sheet of paper, but with IBM Logo's DRIBBLE function you can print them out immediately or save them to disk for later review.

Turtle Graphics

The turtle graphics of IBM Logo are similar to those of the other Logo versions for the PC. There are a few special features, however, the most unusual being the ability to change the shape of the turtle. Using the SETSHAPE primitive, you can choose from 255 standard ASCII

```
TO RANDOM.SYMBOLS
  SETSHAPE RANDOM 255;(selects a shape randomly from
    the ASCII code)
  PENUP FORWARD RANDOM 50;(moves forward a random
    distance without drawing)
  STAMP;(places an image of current turtle shape at
    this location)
  RIGHT RANDOM 360;(chooses a new direction from 0
    to 360 degrees)
  RANDOM.SYMBOLS
END
```

Listing 1: IBM Logo program to change turtle shape. Note that in IBM Logo the semicolon indicates that the rest of the line is a remark.

shapes. Another command, SNAP, allows you to design a turtle shape and link it to an ASCII number accessible with SETSHAPE. Finally, the STAMP command puts the image of the turtle wherever you want it on the screen. To get a feel for how SETSHAPE and STAMP work, try the procedure in Listing 1.

The second to last line in Listing 1 uses "tail recursion" to start the program all over again, like a dog chasing its tail. The result is a series of symbols appearing randomly on the screen. When you tire of this, press <Ctrl>-<Break> to stop the program.

The only problem with changing the turtle's shape is that you can no longer see where it is heading. Any new shape always points up. Although the heading can be changed and the turtle will move in any direction specified, you cannot tell by looking at it what this direction will be. But that's a small price to pay for the ability to change shapes.

Integrating Graphics and Text

MIXEDSCREEN is another command unique to IBM Logo that allows graphics and text to appear simultaneously in the same area of the screen. Other Logo versions reserve a portion of the graphics screen for text (commonly the bottom four to six lines) with the option to switch the screen entirely to graphics. Some versions enable you to vary the size of the text window, and Dr. Logo's TURTLETEXT command allows you to place text on the graphics screen. IBM Logo provides all of these options as well as allowing graphics and text to overlap one another, which makes some labeling of graphics possible. However, I found it more cumbersome to use than the TURTLETEXT command in Dr. Logo, which allows the placement of text starting at the turtle's location.

SAVEPIC is a screen dump that saves the graphics or text screen to a disk or sends it to a printer (assuming the printer is capable of producing graphics). This lets you save a picture without saving the procedure. LOADPIC returns a picture from the file to the screen.

Color and Math

When you use turtle graphics, the usual 16 colors are available for the background, and the turtle can use any of 6 pen colors. When you display text on the graphics screen, your color choices are limited to the turtle's pen colors. In text mode there are 16 choices for pen color and 8 choices for background color. Text can be made to blink in any of the colors. You can use the FILL command to fill any area outlined by the turtle with the current pen color.

IBM Logo provides the same arithmetic operations as Apple Logo (ARCTANGENT, COSINE, RANDOM, PRODUCT, and QUOTIENT) as well as several additional operations. These include commands that output a number in scientific notation, output a specified number raised to a given power, and output a number in a specified form (with the desired number of digits before and after the decimal point). You can also output the logarithm of a number to a given base and set the precision of a rounding operation. There are no major differences in the arithmetic functions of IBM Logo, PC Logo, and Dr. Logo, but the programs' minor variations may be important considerations for particular applications.

Words and Lists

The handling of words and lists in IBM Logo is standard, and there are no radical departures in the program's handling of control commands or logic operations.

A "word" in Logo is a sequence of characters (numbers, letters, symbols, or a mixture) preceded by a quotation mark and followed by a space. A "list" is made up of several Logo words. Commands such as FIRST, LAST, BUTFIRST, BUTLAST, and ITEM permit the programmer to manipulate lists. IBM Logo also supplies conditionals such as IF and TEST.

Loops can be used in IBM Logo with the GO and LABEL commands, but tail recursion is a more useful

feature. Simple tail recursion allows a procedure to repeat itself continuously or until a specified condition is met. For example, the following procedure, called "Countup," uses tail recursion as a device to print a list of consecutive numbers:

```
TO COUNTUP :NUMBER
PRINT :NUMBER
COUNTUP :NUMBER + 1
END
```

The trick is to have a variable, in this case NUMBER, as input. Each time COUNTUP is called, the input variable is increased by one. Tail recursion can be used for far more powerful and complex applications than the preceding example.

Programming Environment

IBM Logo provides no special debugging aids, and its editor departs from Apple Logo conventions. Dr. Logo and PC Logo provide two sets of editing commands, one that takes advantage of the PC keys and another that duplicates the Apple Logo control key codes, but IBM Logo doesn't supply the Apple commands. Although IBM Logo's editor provides no learning bridge for Apple Logo users, its editor is easy to use and makes good use of the PC cursor and function keys.

Advanced programmers will be interested in IBM Logo's ability to access assembly language routines. Five commands enable you to access and use assembly language files or call machine language routines. Several helpful programs are included on the IBM Logo disk as "tools," such as procedures that draw circles and arcs. Some versions of Logo make these procedures part of the language, but having them as accessories gives a teacher or user the option of either including them in a STARTUP file that boots with the language or leaving them out so students can write their own procedures to draw circles and arcs.

A thick, well-written reference manual devotes a page or more to every command, in alphabetical order, and includes an overview of

the language. In addition, the package includes a liberally illustrated tutorial on programming with turtle graphics. Finally, there is a quick reference guide to the Logo vocabulary.

I Find Myself Wishing ...

IBM Logo is clearly better than Waterloo Logo, but when you start comparing it with PC Logo and Dr. Logo, you have to decide what features are most important to you. PC Logo has an extensive math vocabulary and lets you create data files on disk. The program is also blessed with good documentation. Dr. Logo's strengths are its additional list processing commands, sophisticated debugging environment, and superb documentation. IBM Logo, however, provides additional graphics features and has the ability to make use of a full 256K of memory, create data files on disk, and access assembly language routines.

I find myself wishing I had one program that included the debugging aids and list processing commands of Dr. Logo and the data file capabilities and assembly language access of IBM Logo. If Logo is new to you and you can't decide between these three packages, then simply go for the least expensive. You won't be disappointed. ●

Greg Stone is director of community relations at Southeastern Massachusetts University. He has taught Logo to children and adults.

IBM Logo

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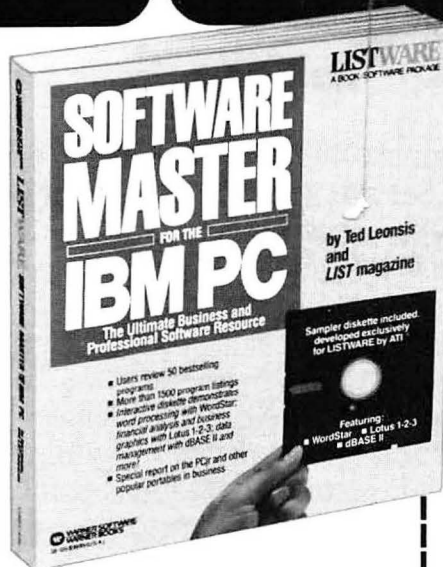
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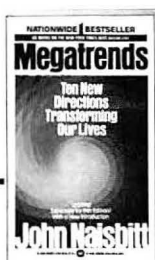


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Compatibles Update

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

Ken Greenberg

A PC by Any Other Name

The latest trend in the IBM PC compatibles market may well be the deluge of magazine articles about it. It's like thunder and lightning: last November's COMDEX was the flash in the sky, everybody counted and waited, and a few months later, we had reverberations galore. Beginning with this issue, *PC World* intends to filter the static from the music about compatibles. This column will provide monthly news about PC work-alikes and the companies that produce them.

Mimicking the IBM standard has become one of the major activities in the personal computer business. At last count, nearly 60 manufacturers claimed that their machines do what the PC does, using more or less the same software—and many machines are doing it faster, with greater flair, at a lower cost, and with more sophisticated technology. Keeping tabs on this facet of the personal computer world is what *Compatibles Update* is all about.

The scope and potential of this burgeoning field is stunning—and typical of the microcomputer business. It's fraught with unknowns: the perils of competing with IBM, the possibility that some other proprietary operating system will supplant MS-DOS, and the capacity of the market to accept formidable new entrants, including AT&T.

As IBM attempts to boost PC production to meet demand, compatibles manufacturers have entered the field with zeal. The sincerest form of flattery is rapidly becoming the sincerest form of competition. Future Computing, a Texas-based market research firm, has concluded that PC work-alikes will be taking an ever-heftier bite out of the IBM architecture pie. By 1988, Future Computing claims, PC compatibles will own 54 percent of that market, compared to IBM's 46-percent share. In 1983, 58 percent wore the IBM logo. Future Computing puts sales of PCs and PC compatibles at \$9.4 billion for 1984 and predicts that the market will balloon to \$20.3 billion by 1989.

If you own a Compaq, a Corona, a Columbia, an Eagle, or some other PC look-alike, this corner of *PC World* is written especially for you. Look here for information on new and notable hardware, from computers to expansion boards to peripherals; for PC software modified expressly for a given machine; for who's up and who's down in business and in technology; for legal developments that affect and define the issue of compatibility; for insight into questions of service and product availability; and for information on how compatible OEMs (original equipment manufacturers) are reacting to the slippery and crowded market that IBM dominates. We'll also be watching the industry's major teams—DEC, NCR, Hewlett-Packard, and Texas Instruments, among others—for signs of how they're playing the compatibility game. Finally, our product descriptions will often pave the way for reviews in future issues.

Compatibility doesn't live by MS-DOS alone. The guts—if not the souls—of most new machines pay homage to the PC. True compatibility is the ability to use any product designed for the PC. Generally, to define compatibility we rely on our own model (explained in detail in "The Compatibles Line Up," *PCW*, Vol. 2, No. 4). The issue of compatibility is apt to remain in flux for some time to come. As Robert Harp, chairman of Corona Data Systems, observed, "Software vendors write software hoping that the machines will not change. Hardware manufacturers come out with advanced designs hoping that the software will change."

Stay with us as we follow the action.

Computers

Cloning Clones

No question about it: PC clones by Corona, if not the Corona name itself, are getting around.

Docutel/Olivetti has entered the compatibles market with several new machines, all manufactured by Corona Data Systems, a leading PC compatible manufacturer. Wordplex, one of Corona's San Fernando Valley neighbors, is also marketing a line of Corona-made PC work-alikes. And Philips Information Systems, a Montreal-based subsidiary of the

Compatibles Update

huge N. V. Philips concern, is pushing Coronas under its own established name.

Is Corona competing with itself? Not at all, according to Corona marketing vice president Larry Lotito, who described the moves as part of a company strategy to build a base of business "underneath our retail distributors."

"This is like having twice as many dealers," Lotito said. "There's some overlap in markets, but it's not heavy. Retail distribution is volatile, and we need more stability."

There appears to be no formal marketing arrangement, although the market niches are well defined. Wordplex sells computers as enhanced word processing systems and has no retail distribution network. Olivetti, a major investor in Corona, maintains its own network but, with its Fortune 1000 base, is expected to help insert Corona's foot in corporate America's door. N. V. Philips, which recently signed a five-year pact reputed to be worth \$20 million to Corona, is in the government market.

These developments are all the more heartening for Corona in the wake of IBM's allegations that Corona illegally duplicated copyrighted routines in the PC's BIOS ROM. Corona settled with IBM out of court and agreed to destroy its existing stock of ROM chips and develop a new BIOS routine. With the new ROM in place—"at no loss in compatibility," Lotito claimed—Corona has been shipping its computers to a growing list of OEMs. For its part, Corona keeps moving. The company has added the PPCXT, a 10-megabyte (MB) hard disk portable, to its line of PC compatibles.

Docutel/Olivetti is marketing its three desktop and two portable machines internationally as "strictly IBM compatible." Like the Corona lineup, the Olivetti machines use the 8088 microprocessor and MS-DOS. Olivetti claims they run "all the more popular business applications software packages written for the IBM PC." The Olivettis will accept an 8087 coprocessor and run CP/M-86 and the UCSD p-System. Software included in the purchase price includes GW BASIC, *PC Tutor*, MS-DOS 2.00, and MicroPro's *WordStar*, *InfoStar*, and *CalcStar*.

The Olivetti desktops and portables come equipped with 128K RAM (expandable to 512K using 128K expansion modules) and a single 5¼-inch, 320K floppy disk drive; all five computers can take a second drive, and the desktops accept a 10MB hard disk in the system unit. The Olivetti desktops have a 12-inch screen, the portables a 9-inch. Company vice president George Christian said Olivetti will produce its own PC compatible and plans to unveil the machine first in Europe. Christian described Docutel-Olivetti's relationship with Corona as "not much different than that of a distributor."

Wordplex is marketing its Corona clones as the Wordplex Desktop PC and the Wordplex Portable PC. Both are 16-bit, 8088-based micros that include 128K RAM (expandable to 512K), one serial and one parallel port, four expansion slots, and disk emulation software.

Both computers are equipped with one 320K, 5¼-inch, double-sided floppy disk drive, with a second floppy disk drive or a 10MB hard disk drive optional. Monitors on both computers feature high-resolution characters and graphics (640 by 325 pixels) and can display and overlay text and graphics simultaneously. Both machines feature detachable keyboards. The portable weighs 28 pounds and has a 9-inch screen.

Wordplex spokesperson Brad Tallent said his firm detected no loss in compatibility with the revision of the Corona BIOS and added that the IBM suit may have actually helped sales. "A lot of customers wanted to buy instantly to clear out the warehouse," he quipped. "The publicity over the suit wasn't favorable, but the system really hasn't been affected."

For more information, contact Wordplex Corporation, 141 Triunfo Canyon Rd., Westlake Village, CA 91361-5014, 213/889-4455.

Welcome to MS-DOS

Franklin Computer, a major manufacturer of 8-bit Apple clones, has taken the wraps off its first MS-DOS machine. Kaypro Computer, another stalwart of the 8-bit world, is also about to get into the MS-DOS act.

The Franklin CX-2M transportable relies on dual microprocessors—the 16-bit 8086 and the 8-bit 6502—and runs under the Apple II+ operating system as well as MS-DOS. Franklin's new machine comes with 128K RAM, expandable to 512K; two half-height double-sided disk

drives; a universal disk controller; an 86-key detachable keyboard (with *WordStar*-compatible control keys); a high-resolution, 80-column, 7-inch, green monochrome display; color capability; and RS-232C serial and Centronics parallel ports.

Weighing in at 27 pounds, the CX-2M accepts such options as a 110/300-bits-per-second (bps) modem, an MS-DOS memory upgrade, and a Z80 CP/M expansion board. Franklin is bundling its computer with MS-DOS 2.00, GW BASIC, and an integrated package called *Franklin Office Manager*.

For more information, contact Franklin Computer, 2128 Rt. 38, Cherry Hill, NJ 08002, 609/482-5900.

Kaypro, meanwhile, has joined forces with Mitsui, the Japanese trading group, to market a lap-size MS-DOS machine it claims is capable of running *Flight Simulator* and *1-2-3*. The machine features a modular design and can be connected to a base station that includes a video unit plus two configurations of hard and 5¼-inch floppy disk drives. Freed of its base, the portable relies on nickel-cadmium batteries and nonvolatile memory but loses PC compatibility because of the mapping of its 6- by 9-inch liquid crystal display.

The notebook-size machine was conceived by Mitsui and Kay Nishi, designer of the Radio Shack Model 100 lap computer. Kaypro's pact with Mitsui provides for initial delivery of 5000 machines, with shipments expected to begin by October. The Kaypro-Mitsui pact is the United States firm's first chance to make



HP110 Portable Computer

good on its pledge to become the first American distributor for, in the company's words, "the best new Japanese computer products."

For more information, contact Kaypro Computer, 533 Stevens Ave., Solana Beach, CA 92075, 619/259-4430.

ROM and Ready

The Portable, a new 9-pound offering from Hewlett-Packard (HP), has joined the list of truly mobile PC compatibles, but The Portable's real innovation is what's written in its 384K of CMOS (complementary metal oxide semiconductor) ROM. Built-in programs include MS-DOS 2.11, *1-2-3*, HP's *MemoMaker* word processor, the HP 150 *Personal Ap-*

plications Manager interface, a help facility, and a terminal emulation package.

The HP 110 is also equipped with a low-power CMOS 8086 micro-processor, 272K of CMOS RAM, a 16-line by 80-character liquid crystal display, 128- by 480-pixel bit-mapped graphics, a 75-character keyboard, a real-time clock, an HP interface loop, an RS-232C serial port, and a 300-bps modem. The interface loop permits data file transfers between The Portable and the PC.

Powering the HP 110 are three permanently installed lead/acid D-cell batteries, which offer 16 hours of continuous use on a full charge.

Compatibles Update

Memory is retained for one year when the machine is off.

For further information, contact Hewlett-Packard, 3000 Hanover St., Palo Alto, CA 94304, 415/857-1501.

Business

Osborne's Comeback

Osborne Computer Corporation (OCC), getting its house in order under the guidance of a federal bankruptcy judge, plans to market a portable PC compatible before the end of the third quarter of this year.

OCC president Ronald Brown said his company will develop the product, license or subcontract for its manufacture, and then market the machine under the Osborne logo. OCC's newest entry—its first computer since the firm filed for Chapter 11 protection last September—will be 8088-based, roughly the size of the Osborne Executive, and in Brown's words, "as compatible as you can get and still be legal." Brown says that OCC will target the university and Fortune 1000 markets.

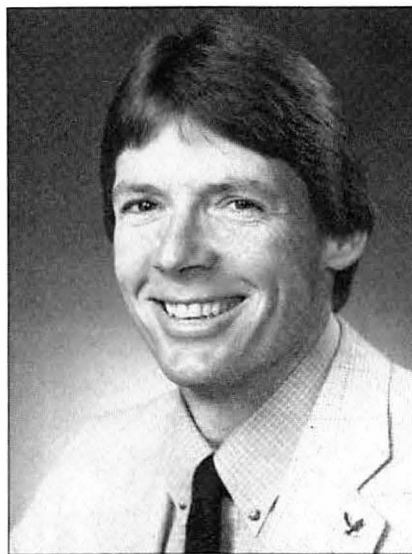
A prerelease version of the machine reportedly includes 256K RAM (expandable to 512K), two double-sided disk drives, one parallel and two serial ports, a 7-inch amber screen, and an 8087 socket.

Osborne has spent most of the year since the Chapter 11 filing as a marketing shadow of its former self. The reorganization plan approved last spring required the firm to relinquish its manufacturing arm. OCC has spent much of the past several months seeking venture capital and R

and D funding, as well as settling matters with its creditors. A company spokesperson has predicted solvency before the summer is out.

Eagle UnBIOSed

Corona Data Systems is not the only prominent compatibles manufacturer fishing itself out of the IBM BIOS ROM soup. Eagle Computer Corporation also signed a consent decree, without admitting copyright in-



Ron Petersen

fringement. The company then destroyed its existing stockpile of ROM and halted production for two weeks. That hiatus led to a third-quarter loss of more than \$7 million.

Eagle vice president Ron Petersen said the agreement came during an "ongoing" period of BIOS testing. Petersen explained that the firm held up shipment of its 16-bit machines for two weeks while it "exhaustively" tested applications packages.

Petersen claimed that the revised BIOS will provide a level of PC compatibility identical to that of the earlier chips and that Eagle's continuing BIOS updates could even increase that level. "There have been a number of modifications, but I can't say how significant they are," he said. "We've had very little response from dealers. Not even a hiccup, actually."

Why Eagle and Corona? "Perhaps IBM is on a West Coast swing," he joked. "They seem to be on a program of enforcing copyright. We're visible, but I can't believe we're the only two they would single out."

Software

Xeno-Copy for Clones

Vertex Systems's *Xeno-Copy*, a utility that lets you copy data onto an IBM-formatted disk from a disk with a different format, is available for more than a dozen PC compatibles. *Xeno-Copy* permits quick one-way file transfers without a modem. Running under MS-DOS, the program reads, copies, and writes files on what Vertex claims are "dozens" of different 5¼-inch disk formats. *Xeno-Copy* is said to run on the Columbia MPC, the Tava PC, the Sperry PC, the Compaq and the Compaq-Plus, the Corona PC, the Seequa Chameleon and the Chameleon Plus, and the Eagle PC, among others.

Xeno-Copy is menu-driven and you can select the host computer, specify source and destination disk drives, display text file contents on

the screen, and rename a file as it is copied. The disk format menu lets you choose your source and destination disk formats. The program does not require technical knowledge of disk formats.

Vertex claims *Xeno-Copy* is fully compatible with a number of disk drive configurations, hard disk systems, and DOS releases. *Xeno-Copy Plus* permits two-way file transfer. The *Advanced Option* is available for 80-track formats, and the *Xeno-Disk Production System* will read, write, format, and duplicate foreign disk formats. The program requires 128K, two floppy disk drives, and MS-DOS 1.10, 2.00, or 2.10.

For more information, contact Vertex Systems, 7950 W. Fourth St., Los Angeles, CA 90048, 213/938-0857.

Compaq Communications

IE Systems has released its Micro-TAM family of data communications products for the Compaq. The four new products operate within any asynchronous or bisynchronous environment. IE Systems is touting the product line's talent for error-free file transfers to a host of micros, minis, and mainframes.

New are Acculink, an asynchronous product featuring menu prompting, phone support, and terminal emulation, and Accucomp, a compiler designed to build command macros for communications tasks. The Acculink-Host group supports a variety of DEC operating systems.

Also available are BIS-3780, which is a full-function 3780/2780/3741/2770 emulator, and a full-function bisynchronous 3270 emulator.

For additional information, contact IE Systems, Inc., Box 359, Newmarket, NH 03857, 603/659-5891.

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Compatibles Update

Peripherals

Apple Ripens into PC Compatible

MS-DOS 2.00 on an Apple II? Rana Systems is offering the 16-bit operating system—complete with *Microsoft Windows*—as part of its Rana 8086/2 disk drive system for Apple machines.

The 8086/2 consists of an 8086 microprocessor and two half-height double-sided disk drives that provide 360K of storage per drive. The 8086 coprocessor includes 256K RAM, expandable to 512K, and a socket for an 8087 chip. The system's cathode ray tube (CRT) controller chip supports a variety of graphics and text modes and uses hardware addresses identical to the XT's. Rana claims that its drives can read and write both MS-DOS and Apple formats. The company has also added GW BASIC to the 8086/2 package.

For more information, contact Rana Systems, 21300 Superior St., Chatsworth, CA 91311, 818/709-5484.

Seeing the Big Picture

Tired of scrolling? If you've got a Stearns desktop micro, you now have the option of adding a full-page, 54-line CRT. The 15-inch, full-page monitor has a black-and-white display. Stearns also manufactures 12-inch amber, green, and eggshell monitors for its 8086-based machine.

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Expansion Boards

Wider View for Columbia

California Computer Systems (CCS) has released its SuperVision board for the Columbia Data Products family of PC compatibles. CCS claims that SuperVision enables Columbia users to stretch the display of applications such as spreadsheets to 132 columns. The board expands monitor display to formats of 80 characters by 44 lines and 132 by 44. Its high-resolution graphics adapter permits use of the IBM Monochrome Display for graphics displays. SuperVision can also run terminal emulation programs for IBM and DEC mainframes.

For additional information, contact California Computer Systems, 250 Carribbean Dr., Sunnyvale, CA 94806, 408/734-5811.

For information on products cited in this column for which addresses and phone numbers are not given, please consult "The Compatibles Line Up," PCW, Vol. 2, No. 4.

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

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```
10 A=.99
20 PRINT A
30 END
Output: .9899999
```

With SuperSoft BASIC with BCD math

```
10 A=.99
20 PRINT A
30 END
Output: .99
```

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*SuperSoft BASIC is compatible with Microsoft BASIC interpreter and IBM PC BASIC. Due to version differences and inherent differences in compilers and interpreters some minor variations may be found. Machine dependent commands may not be supported. The vast majority of programs will run with no changes.

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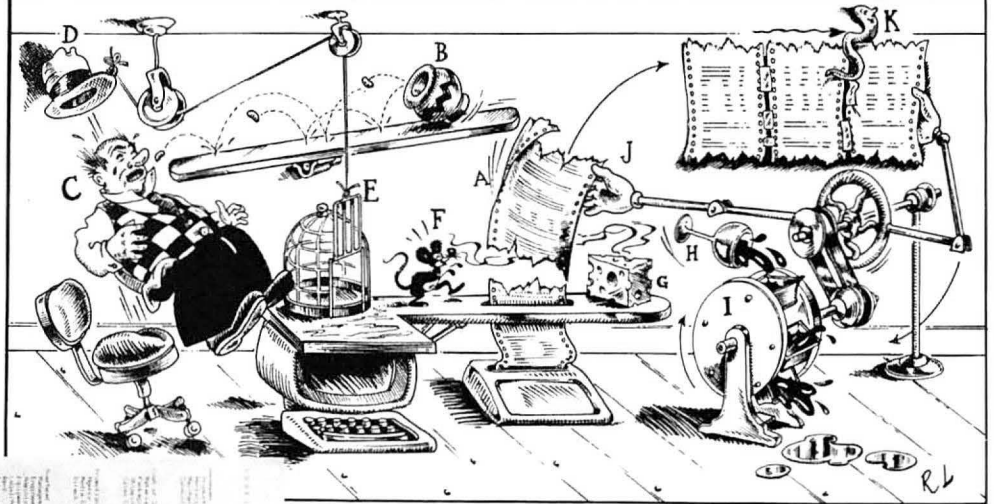
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PCjr WORLD

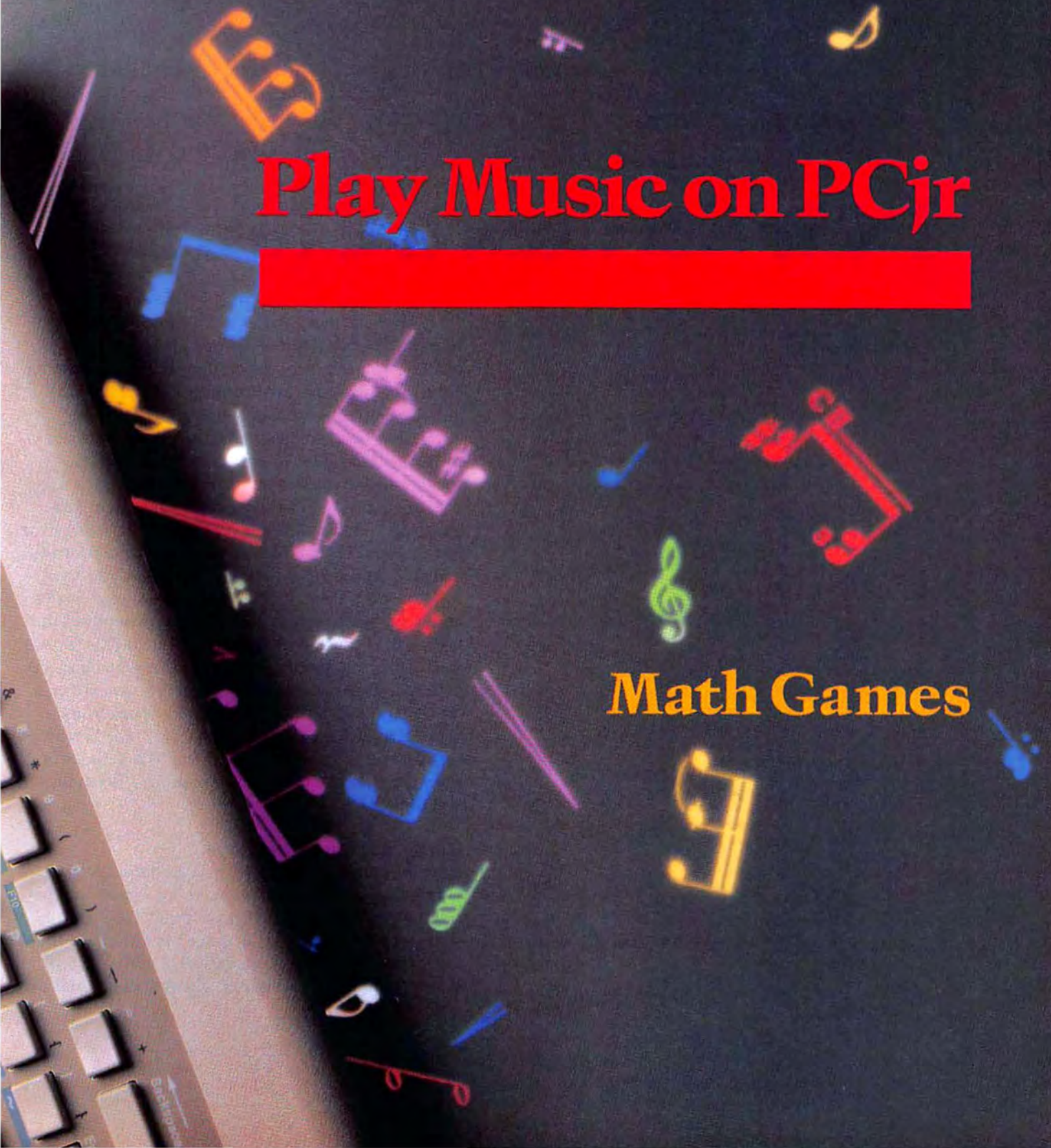
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*The Home Computer Magazine
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Play Music on PCjr



Math Games



Learn about PCjr's exceptional music capabilities.

PCjr Strikes a Chord

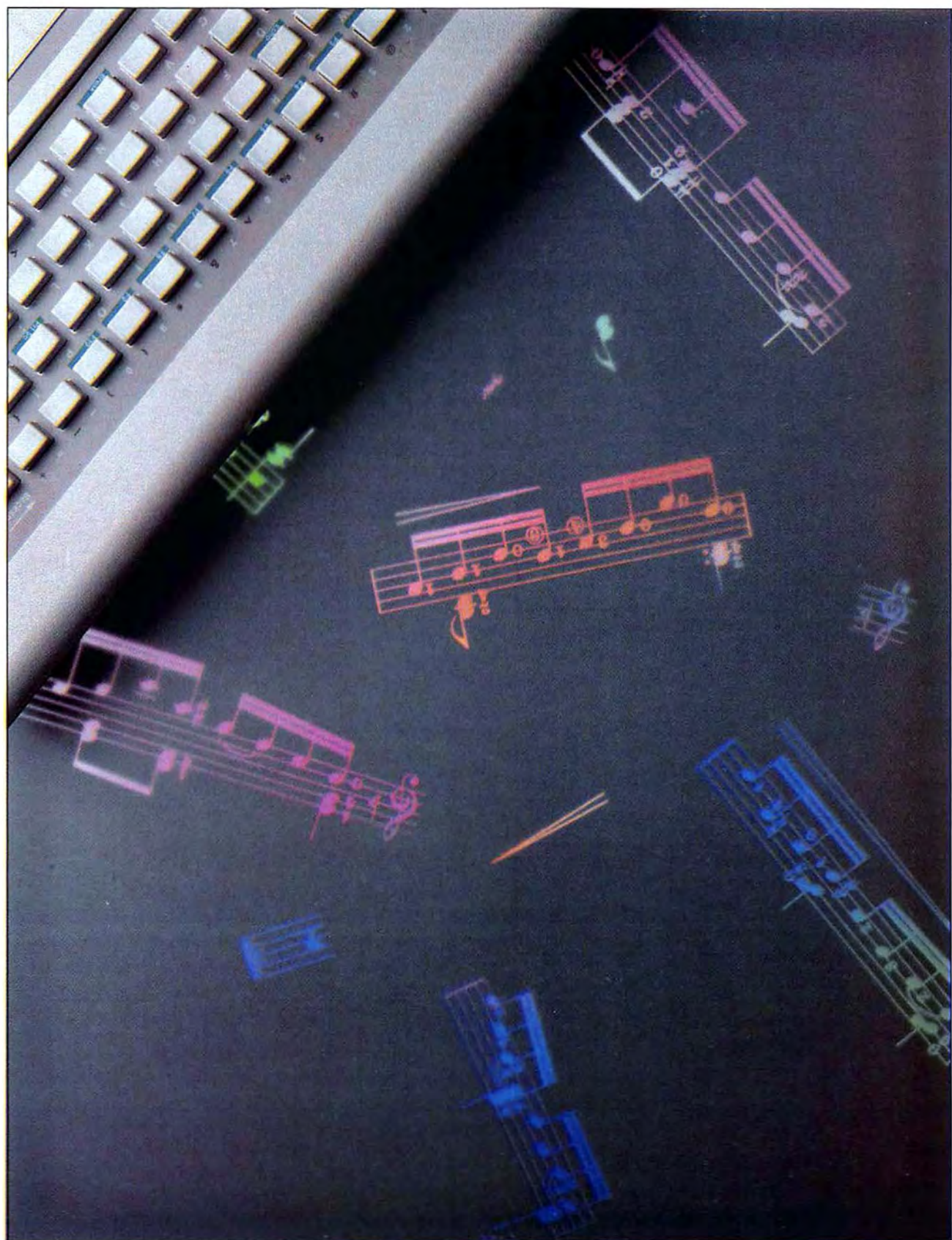
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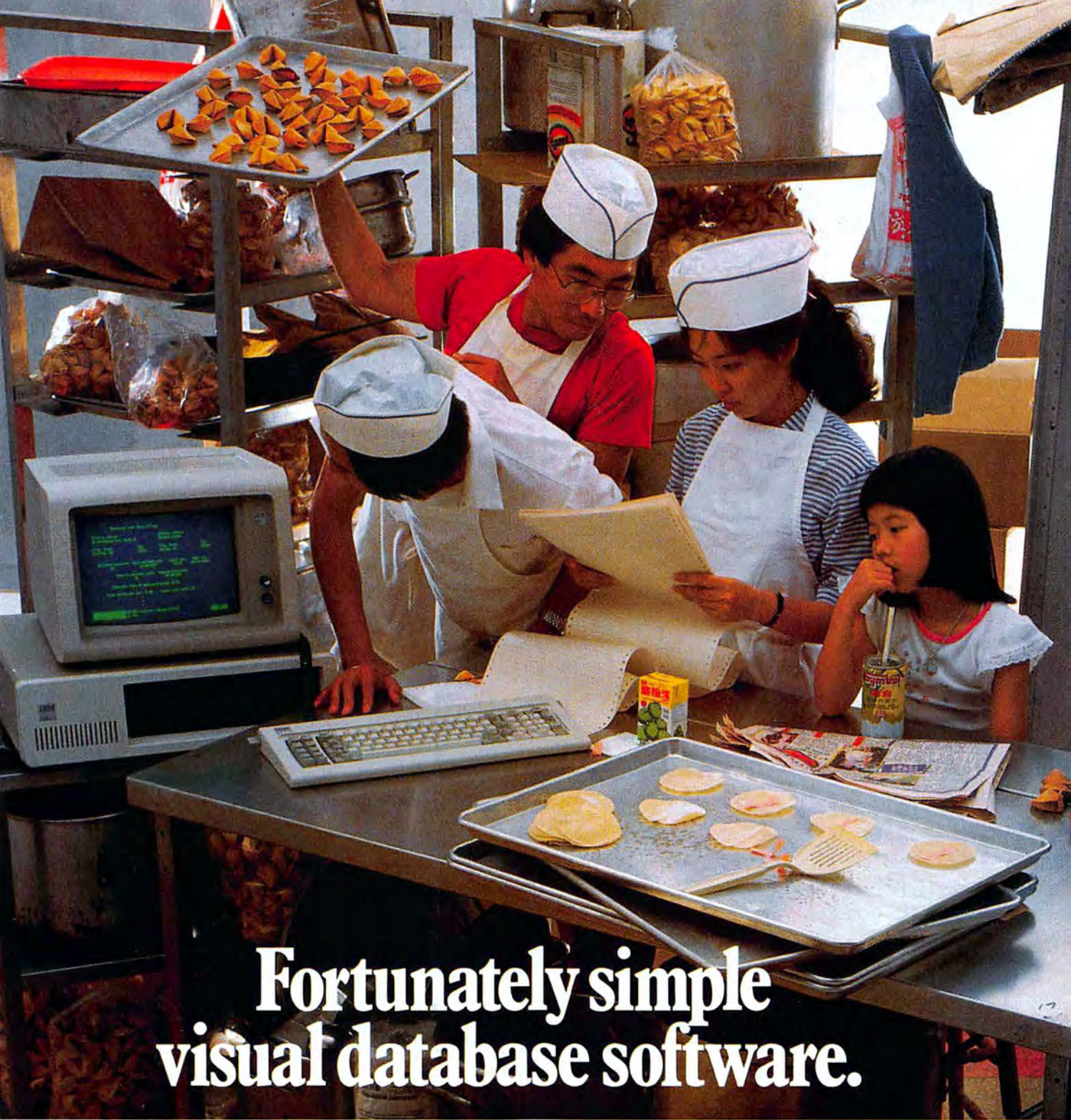
In many respects PCjr must look up enviously at its older and more expensive siblings, the PC and the XT. Yet the youngest child in the family has a musical gift that outshines that of the rest of the family.

All of the IBM personal computers have some musical ability. The PC and the XT each have a speaker inside the system unit that can be programmed in BASIC to play simple tunes (see "Programming Sound in BASIC," *PCW*, Vol. 1, No. 4). PCjr has the same internal speaker and software controlling it as do the PC and the XT. But when you hook up PCjr to a TV set or another external speaker such as a home stereo system or a musical instrument amplifier, PCjr can play three notes at once. This feature is called "three-voice capability." When you connect PCjr to a stereo, you generally get better sound quality than is possible through your TV speaker. (See "Hook Up PCjr to Your Stereo System.") For listening through the TV speaker, no hookup is necessary besides the standard hookup between the system unit and the TV.

Computer Music Systems

How do you make music with a computer? A computer is not a musical instrument but a machine that sends out electrical signals to a speaker, as does a stereo system. Figure 1 illustrates the differences between producing music acoustically, with a stereo system, and with a computer. The first diagram illus-





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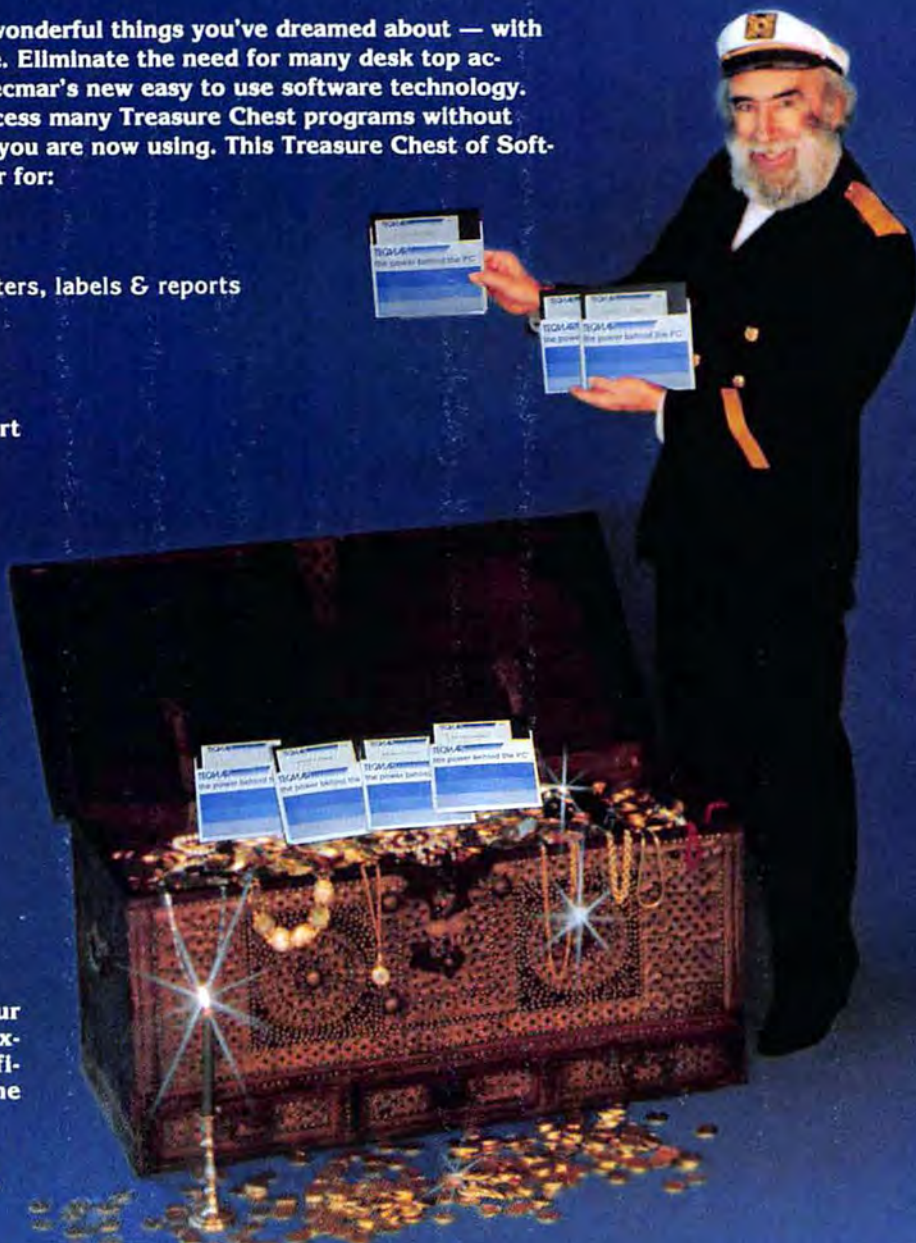
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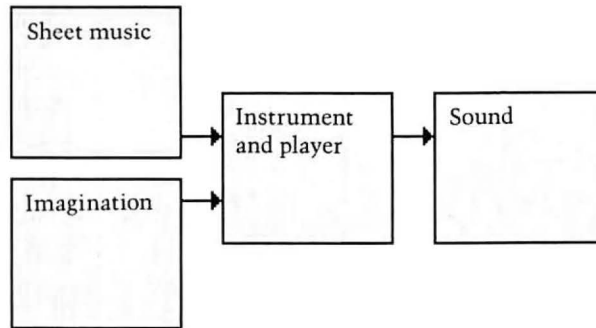
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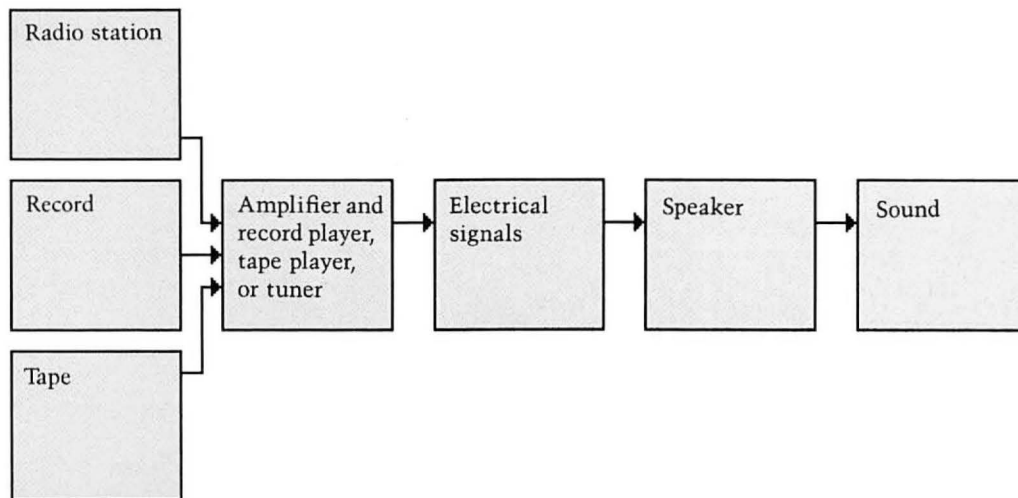
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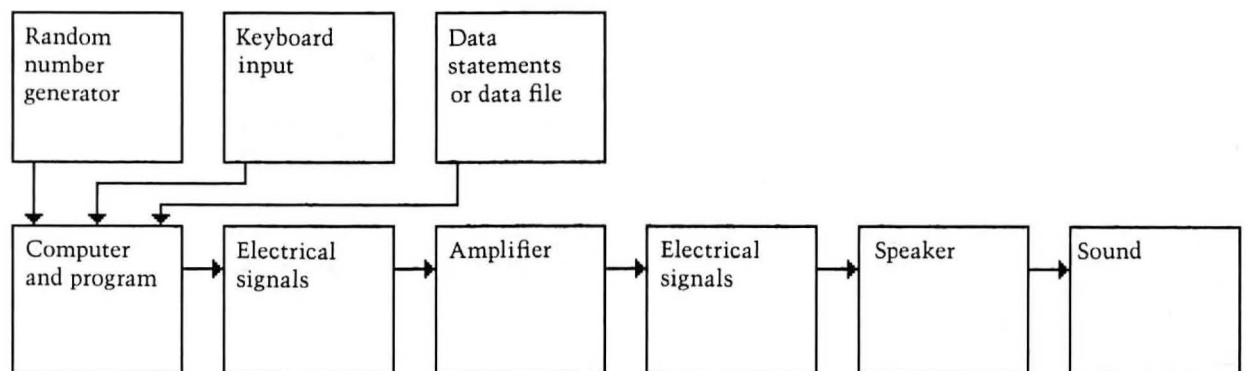


Figure 1: Three methods of music production


```

10 REM RANDOM MUSIC GENERATOR
20 REM SEED THE RANDOM NUMBER GENERATOR
30 RANDOMIZE
40 REM GIVE A RANDOM NUMBER BETWEEN 130 AND 10,130 TO FREQUENCY
50 FREQUENCY=RND*10000 + 130
60 REM GIVE A RANDOM NUMBER BETWEEN 0 AND 15 TO DURATION
70 DURATION=RND*15
80 REM PLAY THE NOTE
90 SOUND FREQUENCY, DURATION
100 REM DO IT AGAIN
110 GOTO 40

```

Listing 1: Random music program. To stop the program press <Fn> and <Break>.

```

10 REM WORLD'S SIMPLEST KEYBOARD PLAYER
20 A$=INPUT$(1)
30 IF INSTR(1,"abcdefghijklmnopqrstuvwxyz",A$)<>0 THEN PLAY A$
40 GOTO 20

```

Listing 2: Keyboard player

trates what happens when a musician plays an instrument. The instructions for which notes to play and how to play them come from printed or written sheet music or from the player's imagination. The instrument and the player each follow instructions to make sounds.

In the second diagram you see the most common example of electronic sound production—a home stereo system. In this case the instructions for the music come from a record, a tape, or a radio station. The instructions are carried out not by a musician and an instrument but by an amplifier and a tape player, a record player, or a tuner. Like an instrument without a person to play it, an amplifier without a record player, tape deck, or tuner is inert and useless.

A stereo system presents a more complicated situation than does a musician with an instrument. The amplifier does not directly produce sound; it produces electrical signals that are sent over wires to speakers. The signals cause magnets in the speakers to make the speaker cones vibrate, and voilà, you hear sound.

A computer music system is similar to a stereo in many ways. The third diagram in Figure 1 shows how a computer produces music. A computer behaves in different ways depending on the instructions the program gives it. To play notes, the computer needs a

way of determining which notes to play. Programs that produce music generally fall into three categories.

The first type of program tells the computer directly which notes to play. The closest thing a computer has to imagination is its random number generator, the only computer process that is not completely predetermined. The program in Listing 1 uses random numbers to create music.

The second type of program allows you to play the computer keyboard as if it were a piano keyboard. A BASIC program can instruct PCjr to play different notes depending on the key that is pressed. The program in Listing 2 is such a program. A program like this corresponds to the "keyboard input" box in the computer music system diagram in Figure 1.

The third type of music program reads and plays "sheet music" written in the form of data statements or data files. One program can be used to play many tunes, depending on the data it is given. The "sheet music" must be communicated to the computer in a form the computer understands. The machine accepts the names of notes (A, B, C, D, E, F, G) and other descriptors, such as how long to play a note and which octave the note is in.

After a music signal leaves the computer, the signal must be amplified before it can be heard through a speaker. The only exception to the amplification requirement is for music played on PCjr's internal speaker, since the speaker carries out a small amount of amplification on its own. If you use an external speaker in a TV set, the amplifier in the TV strengthens the signal. If you use a stereo system, the stereo amplifier strengthens the signal.

What Can PCjr Play?

Will the computer ever succeed as a concert musician? Or is it capable only of blooping and bleeping in accompaniment to the video games it runs? PCjr is able to play pitches and rhythms (in other words, melodies) with precision. In fact it plays tunes more precisely than any human being. It also plays with dazzling speed and can play while it's talking or thinking about other things (such as running video games). The computer has excellent dynamic control; it can play three notes at precisely controlled and different volumes so that the melody stands out. The computer can also play a crescendo or a diminuendo. (A crescendo is a gradual increase of loudness of the music, and a diminuendo is the opposite.)

PCjr has some problems, though. Its ability to sound three notes at once is good for a computer but limited compared to what you can play on most instruments. Although it plays with technical excellence, all the notes sound more or less the same. The computer can play notes sharply (staccato) or smoothly (legato), but it cannot control nuance or tone variety. Still, the music PCjr plays is fine as an accompaniment to games and other programs and is complex enough to enjoy for its own sake.

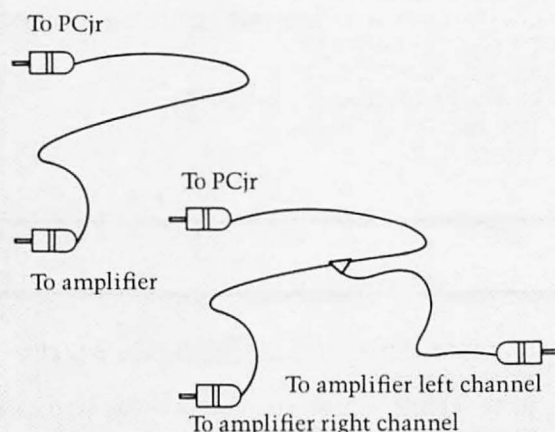
PCjr is perfectly suited to teaching music skills such as reading music, sight singing, and ear training. You will have to wait for the programs that do this, but you can rest assured that they are forthcoming.

Making Music—The PLAY Statement

Before PCjr can play anything, it needs music lessons. This means programs. There will doubtless soon be many commercially available programs to help you make music. You can also write your own.

You need Cartridge BASIC to produce music with PCjr. If you know enough about PCjr to be able to type in a BASIC program, you can be making music in no time. If you want to learn about typing in programs, read the PCjr BASIC manual or refer to "Free and Simple BASIC" (*PCjr World*, Vol. 2, No. 4).

Hook Up PCjr to Your Stereo System



It's simple to hook up a PCjr to a stereo system. Just go to your local electronic supply shop or stereo store and buy a connecting cord long enough to reach from your computer to your amplifier or receiver. The cord should have RCA-type "male" phono plugs on each end.

If you want to hook up your PCjr to just one channel of your stereo, you should get a cord like the one on the left. If your amplifier or receiver does not have a stereo/mono switch, however, you will probably want to hook up PCjr to both the left and the right channels, so get a cord that looks like the cord on the right, as shown.

Once you have the cord, plug one end into the connector marked "A" (for audio) on the back of PCjr. The other end goes to the auxiliary input of your amplifier. Turn the selector switch on your amplifier to the auxiliary setting, turn the amplifier on, turn PCjr on, and you're ready to play music.

You might want to sit down at your computer and try the examples that follow. Plug in the BASIC cartridge and turn on the machine. Once the 'Ok' message appears on the screen, you're ready to go. Just type in the commands. After typing each command, press the <Enter> key.

The PLAY statement is a Cartridge BASIC command that gives you control over PCjr's music. In the simplest case all you do is type the word PLAY fol-

Octaves

```
0 -----0 1-----1 . . . 7-----7
C C# D D# E F F# G G# A A# B C C# D D# E F F# G G# A A# B . . . C C# D D# E F F# G G# A A# B
```

Figure 2: PCjr's octave structure

lowed by the letter name in quotation marks of the note that you want to play. For example, typing in the command `PLAY "A"` tells PCjr to play the note A.

Playing more than one note is easy, too. Try typing `PLAY "AB"`. You should hear the note A, followed by the slightly higher note B.

Now here comes a slight curve. Continue the pattern and type in `PLAY "ABC"`. Did you notice that the C was a lower tone than the B? That's because PCjr assumes that you want to keep the notes in the same octave. (An octave is the series of 8 notes, or 13 notes if you count what would be the black keys on the piano, extending from one note to the next note with the same name. Since PCjr is programmed in the key of C, each octave begins with the note C and ends with the note B above it; each C on PCjr is included only with the octave above it to avoid repetition.) The notes PCjr can play are grouped into seven octaves, as shown in Figure 2.

When you type in `PLAY "ABC"`, all three notes are played in octave 4, which is the default octave. The C in octave 4 is lower than the A and B in octave 4.

If you want to play the C that is the next note higher than the B, type `PLAY "AB>C"`. The `>` tells PCjr that you want to move to the next higher octave. The symbol `>` means "greater than" in mathematical terms. Here the symbol is used as a command to tell PCjr to make the new octave "greater than," or higher than, the old one.

If you type `PLAY "AB>CAB"`, the second AB will be higher than the first, because these notes are in the new, higher octave. To lower the octave, use the symbol `<`, as in `PLAY "AB>C<AB"`.

This procedure is a convenient way to change octaves, because it frees you from having to keep track of which octave your notes are in at any given time. You can set the octave once, at the beginning of a piece, and then just use `<` and `>` to switch octaves.

Try typing `PLAY "O5 AB>C<AB"`. (Make sure that you type the letter O, for octave, rather than a zero.) The O5 at the beginning sets the starting octave at octave 5, so all the following notes are higher than the notes you played before.

Interlude—The World's Simplest Keyboard Program

Believe it or not, you now know enough to turn PCjr into a musical instrument. Enter the program in Listing 2 and type `RUN <Enter>`. Now start pressing keys on the computer. When you type a letter that is the name of a note (any letter from A through G), the note will sound. No other keys on the keyboard will operate. To stop the program (or any BASIC program), press the `<Fn>` key and then the `<Break>` key.

How does the program work? Let's go through it line by line.

Line 10. This line contains the title of the program.

Line 20. This line waits for you to press a key on the keyboard and keeps the letter that you press in a variable called A\$. If you press C, for example, the variable A\$ will be given the value C.

Line 30. This line checks to see that the key you pressed is a musical note (see the PCjr BASIC manual for information on the INSTR command). If you have pressed any of the keys A through G, PCjr is instructed to play that note. If A\$ has the value C (from line 20), then `PLAY A$` is the same as `PLAY "C"`.

Line 40. This line repeats the program.

Unfinished Symphony

You can do a lot more with the PLAY statement, including controlling the length of notes and playing several notes at once. (This will be covered in more detail in an upcoming issue.) You might want to examine the description of the PLAY statement in the PCjr BASIC manual. For now, you can use what you've learned to have fun playing melodies with PCjr.

Warren Sirota is a member of the consulting firm Midway Software, of Berkeley, California. He is also a member of the Electric Guitar Quartet, a classical music group.

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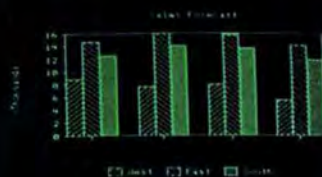
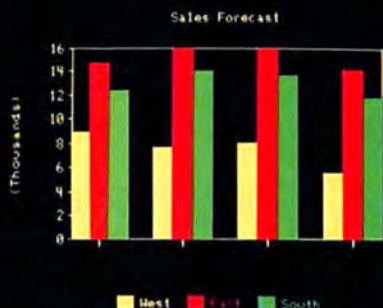
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Math games can entice youngsters into doing their arithmetic and liking it.

Battling the Deadly Mathphobia

Linda Williams

Here is an all-too-common adventure drama for parents. The villain is a nasty creature that devours innocent maidens and beardless youths. It transforms smiling children into howling beasts and reduces strong men and brave women to tears. Its name—mathphobia.

If you are the parent of a mathphobe, help is at hand in the form of your PC or PCjr. Software developers are hard at work forging an arsenal of weapons for an assault on mathphobia.

There's nothing like 10-year-olds who still count on their fingers or 9-year-olds who won't learn their multiplication tables to convince parents of the wisdom of spending money for educational software. The parents' problem is finding programs that meet the children's educational needs as well as hold their interest.

When children say they hate mathematics, they usually mean that they dislike computation—adding, subtracting, multiplying, and dividing. The reason they don't like computation is that they haven't learned their math facts: $5 + 7 = 12$, $9 \times 8 = 72$, $16 \div 4 = 4$, and so on.

Learning math facts and becoming good at computation take lots of repetitive practice. Until recently that practice has meant boring drills that most children don't like. The appeal of computer math games is that drill is incorporated into activities that are enjoyable enough to keep youngsters wanting to play and, thus, to practice. The task for parents is to find games that combine the kind of math practice their children need



with a game format the children enjoy. If you have a PC or an enhanced PCjr, the three games discussed here—*Monster Math*, *Adventures in Math*, and *Math Blaster*—may fit the bill.

Monsters, Castles, and Circuses

Monster Math presents players with a monster and challenges them to get rid of the creature before 60 seconds elapse. A clock ticks off the seconds as the screen displays math problems that the players must answer. With each correct answer, part of the mon-

ster disappears. If the players are fast enough, the monster is erased before the minute is up. The game computes the players' scores based on the number of correct answers and errors and the level of difficulty of the problems; if the monster is erased before the time is up, the players win bonus points.

Adventures in Math uses the format of a fantasy-adventure game to capture imagination and interest. The games take place in castles, which come in small, medium, and large sizes. Players must find their way through

many rooms, pick up treasures, and reach the door that leads out of the building. To open doors or pick up treasures, children must solve math problems. An incorrect answer unleashes a spider who snatches away the booty.

Math Blaster includes four activities: flash cards that display problems and, after a pause, their correct answers, drills that present math problems for children to solve, problems in inverse operation form (such as $3 + _ = 6$), and an arcade-style game in which the players shoot a man out of a cannon to hit the correct answer.

In the arcade game, four cannons lined up along the bottom of the screen are aimed at four answer squares at the top of the screen. A man stands on a walkway above the cannons. The screen displays a math problem, and the players move the man to the spot beneath the correct answer and push a key to shoot the man from the cannon. To add to the game's excitement, a balloon on one side of the screen descends slowly towards a pin. Every four or five problems, the players must move the man to the side to push the balloon back up, because if the balloon reaches the pin, it pops and the round is over.

Keep Them Coming Back for More

In deciding which of these games is best for your children, two factors must be considered—educational value and entertainment potential. Educational value is primarily a question of whether the types of problems and the levels of difficulty in each game are appropriate for your child.



Monster Math game selections

Entertainment value must be considered because children won't play a game that isn't fun. The best program is the one children play most often and for the longest time. When you select a game, an important consideration is whether the software can hold your children's interest.

Each of the formats of *Monster Math*, *Adventures in Math*, and *Math Blaster* has appeal and sources of frustration. You should evaluate the games according to what you know about how your children learn.

Monster Math's beat-the-clock approach challenges some children and alienates others. If your child likes to race the clock and to compete against his or her own best score, *Monster Math* is great. However, many of the youngsters who most need to drill math facts are intimidated by timed tests. The pressure of working against the clock causes them to become tense and perform poorly. If you're buying a math game for children who have problems with the subject or have developed negative attitudes toward math at school, the last thing you want is a game that makes them feel inadequate.

Adventures in Math moves at a slow pace, which appeals to some children and irritates others. The program is unlikely to intimidate youngsters who have difficulty in math. The fantasy quality of the game may also draw in many children who would otherwise balk at doing math problems.

One aspect of *Adventures in Math* that may frustrate some youngsters is that players can easily get lost in the castle and end

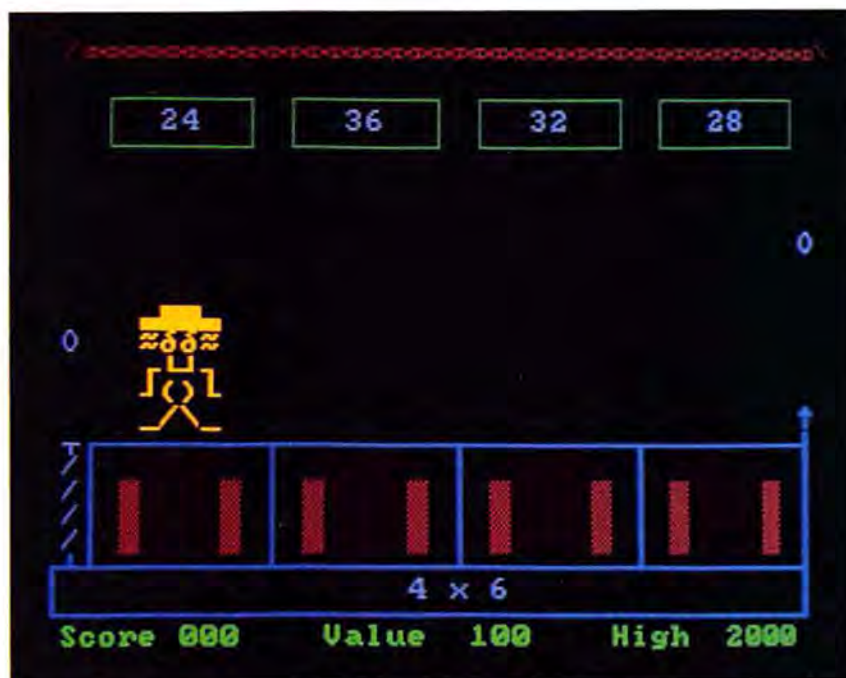
up going through rooms they have visited before. It's irritating to wander around in circles, and finding the exit door is often more trouble than doing the math.

A math game is not an electronic babysitter.

Of the three games, *Math Blaster* has the greatest potential to hold children's interest over time. The arcade game may be frustrating to some children at first, but

its complexity keeps children from becoming bored after a few weeks' play.

The arcade game in *Math Blaster* places players under time pressure; however, since time pressure is often a part of arcade games, encountering it in the math game is probably less stressful to most children than a timed math test in a classroom. Two of the game's activities do not include time pressure and can be played by children too young to master the arcade game.



Math Blaster players move the figure of a man to beneath the correct answer.

Math Blaster has another feature parents will appreciate. It includes an editor that allows you to create problem files tailored exactly to what your children need to practice. For example, if your children are struggling with multiplying by 3, you can set up a file so that all the equations involve multiplying by 3.

The Game that Fits

Shopping for software is like shopping for clothes—it's important to find an item that fits. The program that's perfect for one family may not be right for another, and the program that's best for your eldest child may not fit the needs and interests of your youngest.

The ideal way to choose educational software is to involve your children. Find a computer store that stocks educational games and let your children play all of them. It won't take long to discover which game you can't drag your kids away from. The time you spend selecting a program will pay off. If you choose the right one, you won't have to waste time nagging your children to practice their math.

Getting your children to enjoy playing math games involves more than selecting the right software. Your attitude and participation play an important role in the way your children respond to an educational game. Be enthusias-

tic. There's nothing more deadly than a this-will-help-you-with-your-math approach. Even *Pac-Man* couldn't survive that.

You can't fool children into believing that *Math Blaster* is an arcade game, but you can capture their interest by emphasizing the challenge of the game. "Why don't we see how many points we can rack up?" is more likely to elicit enthusiasm than "it's time to do your math program." Remember, educational games are like carrots; you'll have a lot more luck getting kids to enjoy them if you don't place too much emphasis on how good they are for them.

Games are more fun when there's someone to play them with, and at least in the beginning, that someone should be the children's parents. Join forces with your kids against the computer. Instead of competing with each other, have your children supply the answers while you type them in.

Keep in mind that a math game is not an electronic babysitter. Children with no anxiety about math may enjoy the challenge of playing alone to better their scores, but children who feel insecure about their abilities need support and encouragement. Having a parent nearby to coach them on difficult problems and to give praise for success can make all the difference in children's attitudes toward educational games, math problems, and their own abilities.

Mathphobia is a formidable foe. It haunts a surprisingly large portion of the adult population. Fortunately, children are able to slay the enemy far more easily than grown-ups. If you find it lurking around your house, boot up your PC or PCjr and give battle.

Linda Williams is an educational consultant and the author of Teaching for the Two-Sided Mind (Prentice-Hall, Englewood Cliffs, New Jersey, 1983), a book that explores the implications for education of brain research. She is currently writing a book about EasyWriter II.

Monster Math

IBM

Systems Products Division

P.O. Box 1328

Boca Raton, FL 33432

800/447-4700, 800/447-0890

Alaska and Hawaii,

800/322-4400 Illinois

List price: \$30

Requirements: PC 64K, one disk drive, color graphics board; PCjr 128K, one disk drive, Cartridge BASIC

Adventures in Math

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Math Blaster

Davidson & Associates

6069 Groveoak Pl. #12

Rancho Palos Verdes, CA 90274

213/378-7826

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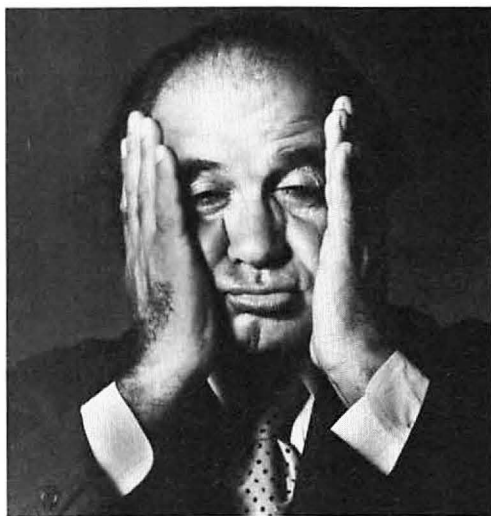
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Megabytes

News and notes for the PCjr community

Katie Seger

Megabytes reports about people, products, and developments in the computer world. We give you up-to-date information on events and trends, and occasionally we speculate about the rapidly expanding world of PCjr.

Toll-Free Help

IBM has opened a PCjr Information Center that answers questions and provides assistance for new PCjr owners. You can call the center at 800/222-7257 and ask questions on topics such as setting up the system and making backup copies of program disks. The PCjr Information Center operates weekdays from 10 a.m. to 7 p.m. eastern standard time.

Order Increases and Layoffs

Qume, an International Telephone and Telegraph subsidiary based in San Jose, California, supplies disk drives for PCjr. The 11-year-old company's initial 1983 contract with IBM reportedly called for Qume to supply 400,000 half-height disk drives for an estimated \$30 million. Qume's total 1983 sales were \$250 million.



Sounds like a Silicon Valley success story. Well, yes and no. Qume is making money, but earlier this year the company laid off 600 California assembly line workers and transferred all manufacturing operations to plants in Puerto Rico and Taiwan.

Qume president Roger Gower says that layoffs resulted from increased foreign competition and falling prices. The only way Qume could compete, he says, was to stop manufacturing in the

United States. According to Qume, its California assembly line workers averaged \$10.50 an hour with benefits, while workers in Puerto Rico and Taiwan are paid \$5 an hour and \$1.50 an hour, respectively.

Qume employees had an easier time than other laid-off workers because the company spent \$200,000 on an outplacement program. Qume hired professional

job counselors and arranged to have hiring personnel from other Silicon Valley firms come into the plant to interview Qume workers. Employees were allowed to use company telephones, typewriters, and copiers to set up interviews and prepare resumes. And as a final severance benefit, Qume promised that laid-off workers will receive the same amount of profit-sharing money in 1984 that they received in 1983.

Qume's lay-off procedure was nicer than most firms', but the action still means unemployment. Will Silicon Valley go the way of Detroit, Allentown, and Pittsburgh?

Big Brother Time?

Yes, it is 1984, but isn't another computer magazine going too far by having a column titled "New-speak"? The January column even covered "technocops," and while these officers aren't the Thought Police, the title and subhead gave our staff an Orwellian shudder.

The technocops referred to are actually deputies of the Los Angeles Sheriff's Department who wear laser-sensitive vests and shoot laser-equipped revolvers and shotguns while training at the department's new facility. This new

equipment, which shows the deputies precisely where real bullets would hit, is designed to be used in simulated confrontations.

Software Success

Want to meet a millionaire? Find the person who writes a best-selling applications or game program for PCjr. According to the market research firm Future Computing, a hit applications program for PCjr will bring in \$24 million in retail sales this year. The program will sell for \$120, and Future Computing estimates that 200,000 copies will be purchased this year. The same program will have retail sales figures of \$36 million in 1985 and \$42 million in 1986. The firm estimates that the best-selling game, which will cost \$35, will garner \$9 million, \$14 million, and \$25 million in the next three years.

Prison Robots

The Massachusetts firm of Denning Mobile Robotics will sell 200 robots a year for five years beginning in 1985 to the Southern Steel Company of San Antonio, Texas.

Southern Steel, which claims to be the largest manufacturer of detention equipment in the United States, will sell the robots to prisons, where the mechanical people will supplement the security guard staff.

A Denning Mobile Robotics spokesperson says that the robots, which cost between \$30,000 and \$60,000 each, travel at about 3 miles per hour. Each robot is equipped with microwave radar, infrared sensors, and a sonar range finder that allows it to survey areas and detect humans and inanimate objects. The robots will not be armed.

Sam Youngblood, Southern Steel's president, says that the robots can be programmed to speak up to ten sentences, such as "you have been detected," when confronting an escaped prisoner. Youngblood said that the robots could perform some of the "humdrum and high-risk tasks" that human guards now do, such as checking if doors are locked and patrolling corridors at night.

Southern Steel plans to conduct a test with robots at a prison in December of this year. The prison facility has not yet been chosen.

A Bellwether Comment?

Education Secretary T. H. Bell said in an Associated Press interview that computer buying was "almost a fad" among schools. He criticized computer learning programs, saying that "most computer software is electronic page turning. It hasn't been designed to do a good job of interacting with the mind of the student."

Not surprisingly, spokespersons for firms that produce educational software were quick to disagree. Peter Rosenthal, vice president of marketing for DesignWare, called Bell's comments "a broadbrush, unwarranted condemnation of educational software." Rosenthal guessed that Bell was referring to older, computer-aided instruction programs (often referred to as CAI programs). "The current genre of educational software is highly interactive and an effective teaching tool," he said.

Edu-Ware sales manager Mike Lieberman said, "Secretary Bell apparently hasn't examined available products. The marketplace is filled with interactive programs designed by people with experience in instructional design and educational technology."

Marcia Klein, president of The Learning Company, agreed that some of the early CAI programs were "like textbooks on the screen. But that's why The Learning Company and other firms created software that was different [from earlier CAI programs] and used the computer to its fullest." Newer programs are more interactive and take better advantage of computers' color, sound, and graphics capabilities, she claimed. Klein added that if computers and



educational programs were "simply a fad, we wouldn't be getting the favorable response that we have received from teachers and educators."

In the same interview Secretary Bell said school computers are only good for doing monotonous correction work. Bell believes that the work of checking for grammar, spelling, punctuation, and structure "could be done by the computer as a slave mechanism," and leave teachers free for other work.

What a pity Secretary Bell is so shortsighted. Although educational software is still in its infancy, you can hardly call Logo an electronic page turner. Microcomputers have been with us less than a decade and have already transformed the way we work. In another five years educational software will probably be more sophisticated than even its greatest proponents imagine. It will be a shame if our schools, because of budget cutting and fiscal planning, can't take advantage of this educational tool.

Digital Detection

When you think of wiretapping, you probably think of someone listening in on your telephone conversations. But the computerized data that you send over telephone lines is just as susceptible to electronic bugging.

The House of Representatives' Judiciary Subcommittee on Courts, Civil Liberties, and the Administration of Justice held a series of oversight hearings earlier this year titled "1984: Civil Liberties and the National Security State." Subcommittee members

looked at legislation that might need to be changed or updated because of technological advances. A 1968 statute covering wiretapping received particular attention.

A statute in the Omnibus Crime Control and Safe Streets Act of 1968 (referred to as the "Safe Streets Act") makes it a federal felony to tap into telephone conversations. (Law enforcement officers with warrants are excepted.)

Many subcommittee members are concerned that the statute, which covers only oral communication, does not protect the privacy of telecommunicated, digital data sent over telephone lines. According to the counsel for the Judiciary Committee, legislation to close this loophole will probably be proposed, but it isn't likely that the legislation will be introduced this year.

Electronic Magazine

Epson America makes computers and dot matrix printers that many people connect with their PCs and PCjr's. Epson is now producing a weekly magazine, *EpsONLine*, on CompuServe. *EpsONLine* is found under CompuServe's Special Interest Group (SIG) listings. In addition to articles on the Epson's QX-10 personal computer and HX-20 Notebook Computer, the magazine answers questions about new and old Epson products. CompuServe subscribers can submit questions and comments to the magazine's staff while connected to the service.

Silicon Goes Commercial

Will Jan remain true to the brilliant but naive chip designer, Robert, or fall prey to the desires of Robert's manipulative older brother, J.D., who runs the chip

manufacturing firm with a ruthless hand? Will the power struggle to control the Alvacado Computer Company—the first firm to put computers in salad bars—destroy the friendship of the two Sunnyvale kids who started with a dream, a garage, and a lettuce patch? Will best-selling software author Suzanne overcome alcoholism and find happiness with Edward, the computer-illiterate but user-friendly 18-year-old mail-room clerk?

Will California's Silicon Valley be the setting of television's next hit series? According to one TV critic, Warner Bros Television has a property tentatively called "Midas Valley" on the drawing board. The drama, which revolves around movers and shakers in the computer industry, is apparently patterned after successful "soap-dramas" like "Dallas," "Dynasty," and "Falcon Crest."

A spokesperson for Warner Bros wouldn't talk about "Midas Valley." The film company has a "policy of not discussing any project that is in development," the spokesperson said. Will Suzanne discover that she is allergic to guacamole? Stay tuned for further details.

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

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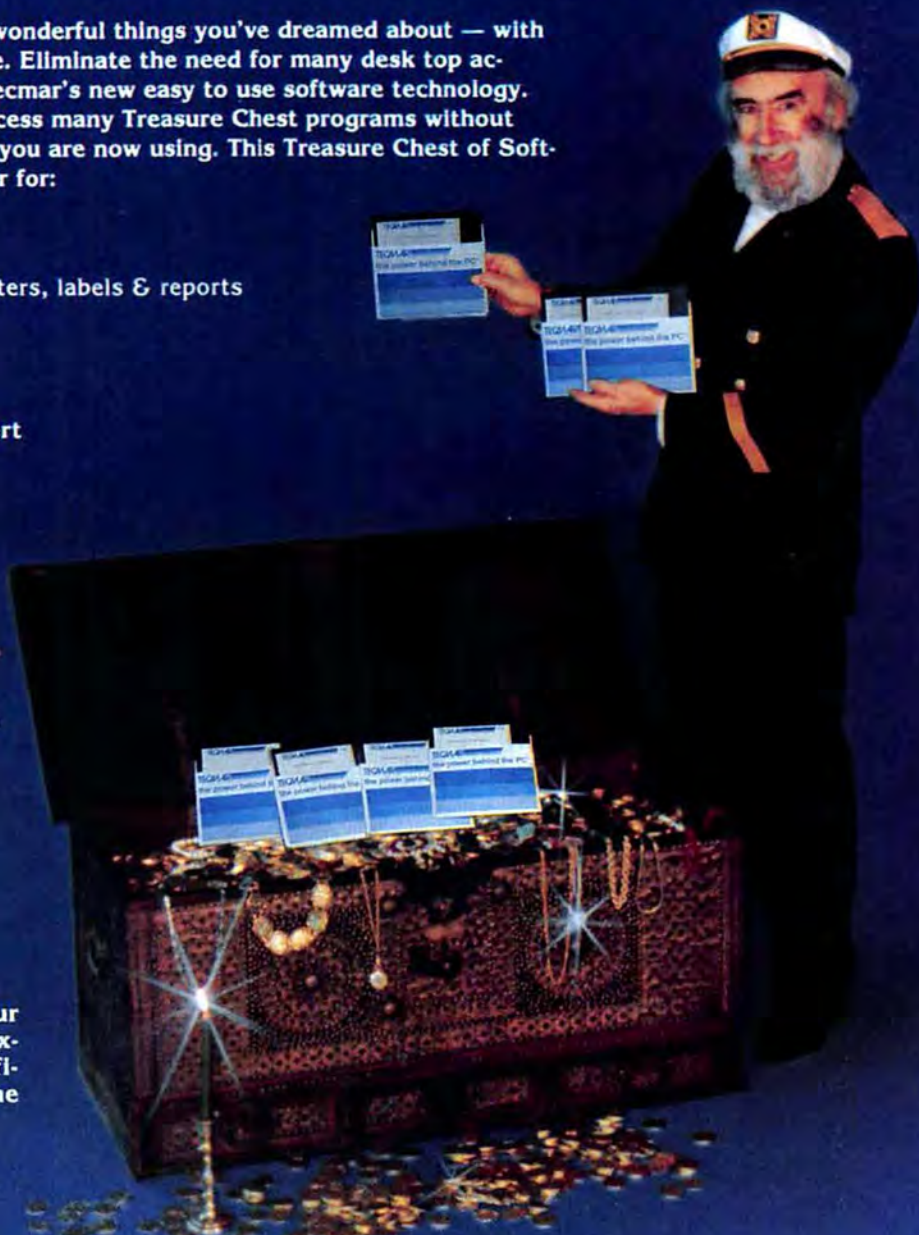
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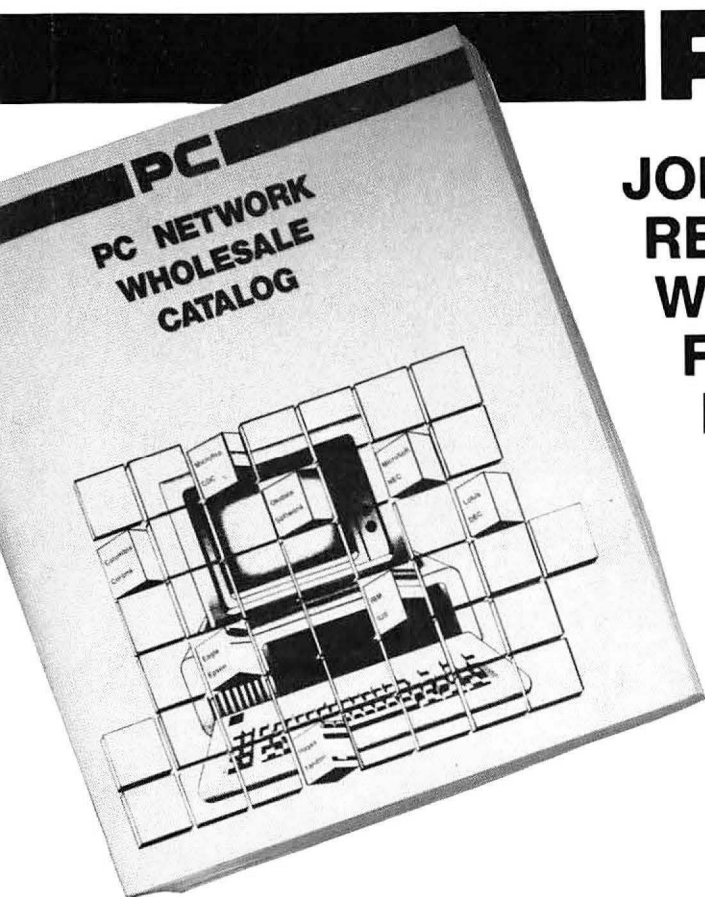
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Choosing Data Management Software

Burton L. Alpersen



Anyone contemplating the purchase of a data base management system (DBMS) faces a bewildering overload of information. Over 200 companies market DBMS software for the IBM PC alone, and DBMS programs are among the most complex available for microcomputers. Whether you are browsing through your computer dealer's software library, calling toll-free numbers, or reading a product review, the systematic approach presented here will help you sort out the confusing variety of packages calling themselves data base management systems.

A data base may be defined simply as any organized collection of information. Data base management usually rests on two concepts: records and fields. A telephone book is an example of a data base. All of the information about one person would constitute a record; the person's name, address, and phone number would each be a field within that record. In the language of various applications, a record might be called a case, a person, a subject, a company, an account, or a transaction. The fields might be called variables, descriptors, items, particulars, characteristics, data, elements, or attributes. The advantage of a computerized DBMS is the ease with which fields can be manipulated.

The way records and fields relate to one another defines the data base type. Imagine a list of customers for a business. The list would have information about each customer, including the customer's name, street address, city, state, zip, phone number, and whether that person made a purchase within the last six months. If the information were organized alphabetically by name, the list would be a "hierarchical" data base. Each name "owns" a street address, city, and other information. Hierarchical data bases, sometimes called "one-to-many" systems, are typical of most noncomputerized office filing systems.

Suppose that any customers who made at least one purchase in the last six months had additional information in their records about the kinds and number of purchases they made. This information might lead to new classifications consisting of the names of people who made only one high-profit purchase, more than one high-

profit purchase, only one low-profit purchase, and more than one low-profit purchase. If you needed a list of your high-frequency, high-profit customers, you could go to the more-than-one-purchase, high-profit list. If you wanted to develop a mailing list of those people, you could look up their addresses in the alphabetical records. This kind of data base organization is called a “network” (many-to-many) system.

Both these organizational schemes are useful and easy to use—as long as your needs don’t change. But suppose you developed a sudden need to mail information to all of your Rhode Island customers who had made more than one high-profit purchase. There is no easy route to this subset in the two systems just described, because the need for a listing by state wasn’t anticipated when the data base organization was developed. However, a third organizational scheme is available on the PC—the “relational” approach.

The relational approach can relate almost any set of fields to almost any other set of fields in the data base. It accomplishes this by treating the data as though they were organized in a rectangular matrix with records as rows and fields as columns (as on a spreadsheet). Any rectangular subset of data may be formed and sorted. The subset may also be merged with, joined with, and projected onto any other rectangular subset. These subsets are called “relations,” or “tables.” Sorting rearranges the table by some criterion (such as alphabetically, numerically, or by date). Merging adds a new set of records to a table. Projecting creates a new table (a subset) from an existing table. Joining creates a new table from two existing ones based on criteria contained in both original tables.

It might seem that the relational system is the best alternative, but there is a trade-off. Although relational systems are far more flexible than hierarchical or network systems, they are generally more expensive and much slower.

Now that you have a general understanding of the basic functions and types of DBMSs, you can get down to comparing particular features. Figure 1 is a sample checklist for DBMS selection. Each section of the checklist is expanded upon in the text.

User Support

Data management software is complicated. A company that produces a DBMS and doesn’t provide user support is irresponsible. Beware of companies that supply only a post office box or refuse to deal personally with users. Likewise, companies that claim to support users by having them rely on dealers for information are not supplying adequate support; few dealers have the staff, expertise, or time to act as information brokers for a single program.

Requirements and Compatibility

Most program documentation is clear about minimum hardware requirements, but information about maximums is harder to obtain. It does little good, for example, to purchase a computer with 640K of random access memory (RAM or central memory) to be used specifically with a DBMS that can only take advantage of 256K. All other things being equal, programs that can use more memory will usually handle larger problems or run faster than others.

● Hands On

It is generally not a good idea to mix operating systems. If you do most of your work in PC-DOS 2.00, you should think very carefully before purchasing a program that runs only under UCSD p-System or CP/M-86. Unless the program has a very good communications capability, you may have difficulty using its output with a word processor, a spreadsheet, or any other program in your library that runs under a different operating system.

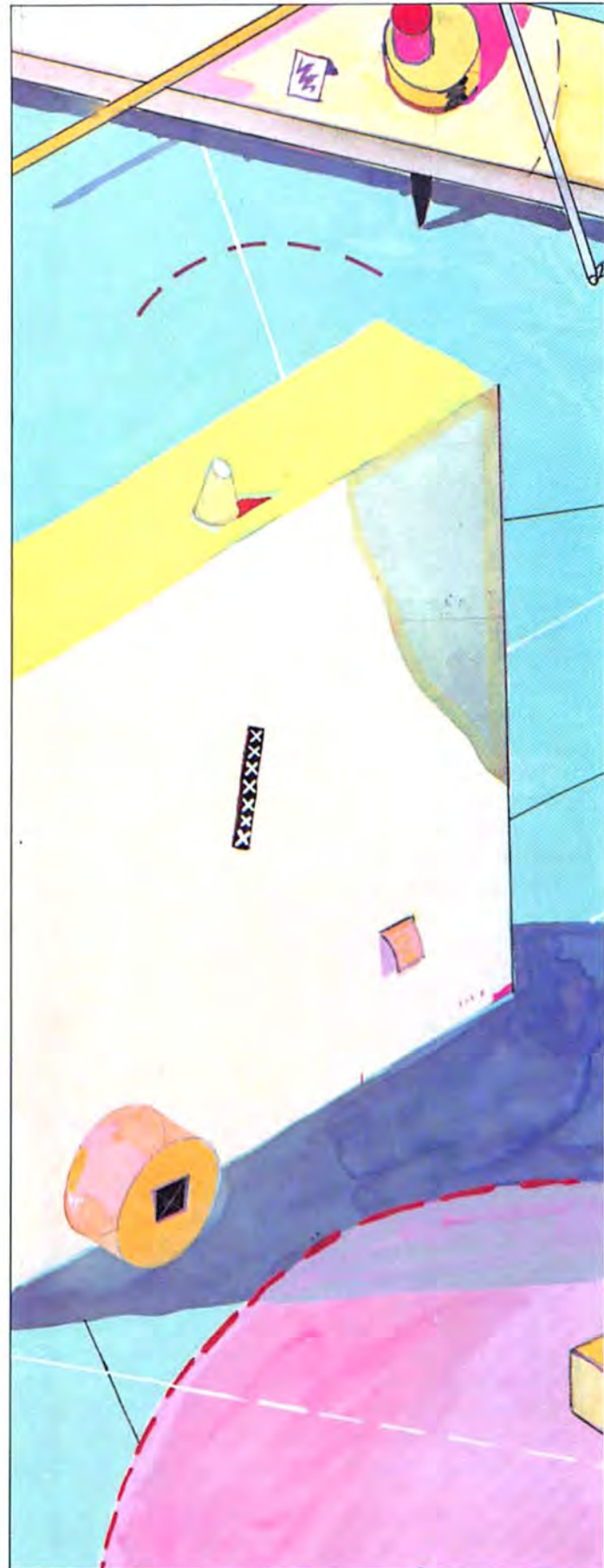
Take nothing for granted. Even when published hardware requirements have been met, a program may not run on your machine. When several programs were recently revised and upgraded to run on the PC XT, for example, it was discovered that they would not run on a PC with an expansion chassis and a hard disk (a configuration supposedly identical to that of the XT). Make sure that the software producer guarantees that the program will run on your system configuration.

Copy protection is an inconvenience to all concerned, but some companies feel it is necessary. If you are considering a copy-protected program, be sure the protection strategy is acceptable to you. Some schemes can prevent effective use of the program by making it unavailable to a hard disk or a disk emulator. Others eliminate the possibility of using separate keyboard macro programs like *Keynote* or *ProKey*. Additionally, since many copy-protected programs are supplied on single-sided disks, you may be forced to shuffle through several disks while using the program and have little space to put other programs or data on the program disk.

Data management programs are generally disk-intensive. Since a large data base will rarely fit completely into a microcomputer's RAM, programs usually require a great deal of data-swapping between disk and central memory. Program designers usually choose to trade speed for volume. Therefore you need all the extra speed you can get. Constant data-swapping makes hard disks and disk emulators important adjuncts to a large DBMS implementation. Programs vary in the degree to which they will support such operations.

User Interface

There have been many debates over the virtues of command-driven programs versus those of menu-driven programs. Make sure that the program you're looking at has an interface that suits your needs. Some of the newer DBMSs are capable of both types of operation. With these products you can opt for a "prompted" mode and use menu operation, or you can choose to type your commands directly.





● Hands On

Some DBMS packages provide their own programming language, while others provide a rich set of interactive commands within the program itself. This distinction is less important than it used to be because of the recent innovation of program macros for microcomputers. Macros allow several commands to be strung together and assigned to a single key or abbreviation. These macros can be saved for future use. Given a sufficient set of commands, macro capacity can fully substitute for a programming language.

Regardless of whether programming is implemented through a formal language or through macros, it is helpful if the programming capability is sufficiently powerful to allow the development of "turnkey" systems. With a turnkey system all the user has to do is start the machine and follow the preprogrammed prompts. Instructions are given in the language of the application rather than in the computerese of the DBMS.

Many DBMS applications require that access to information be restricted. Restricted access is most frequently implemented through the use of password schemes. The simplest schemes prevent access unless you have a password. More sophisticated strategies require different passwords for reading information and for writing it. Some schemes even allow you to target certain fields for different levels and types of protection.

Communication with Other Programs

The ability to write and read data to and from other programs is a critical and frequently overlooked aspect of DBMS performance. If the DBMS you buy doesn't have this capacity, and you change to a different DBMS, you will have to recreate your entire data base manually. If you need the data from the DBMS for a spreadsheet or word processing task, you will have to print a report and reenter the data for the other program. Similarly, importing spreadsheet data to the DBMS will require reentry, and you won't be able to share information with main-frame computers.

At the very least, a DBMS should be able to communicate data in simple ASCII format. The weakest form of ASCII communication allows only serial-string format. For example, you could not transfer data in its original form if you were importing data from a spreadsheet into a DBMS that allowed only serial-string communication. While this is better than no communication at all, it forces you to take an inelegant and time-consuming intermediate step, such as writing and running a BASIC program, to read and reformat the representation of the

data base. It is much more convenient to use a DBMS that allows transfer of the data in its original form. Another useful feature is the ability to transfer data to other popular programs in their native formats. Some DBMSs provide modules to communicate with specific programs in this way.

Many DBMS programs require a modem to transfer data. This is becoming too common a strategy in programs written for operating systems other than PC-DOS. If you are considering such a program, you will need two computers, two modems, and possibly two communications programs just to transfer data between your DBMS and other programs in the same computer.

Searching and Sorting

Searching and sorting data are two of the major activities of a DBMS. There are many important subtleties of these activities to consider in addition to the number of simultaneous search and sort criteria. The availability of ad hoc operations is one of the most exciting of the recent DBMS innovations for the PC. With ad hoc capability, you can obtain a complex report by asking a

One program uses artificial intelligence techniques to allow you to state your questions in natural language.

question in an interactive mode instead of programming a report format in advance.

For example, suppose you needed to know the names and addresses of all referring physicians whose patients had successful outcomes and were admitted to a hospital rehabilitation program before January 1, 1982. Suppose, further, that you had to see that data arranged by physician name in alphabetical order, with patient information for each physician ordered by date. If the DBMS for the hospital data base worked with IBM's SQL/DS (Structured Query Language/Data System), you would simply type in a statement like `SELECT PHYSICIAN, ADDRESS, PTNAME, ADMDATE FOR ADMDATE < 1-JAN-82 AND OUTCOME = GOOD GROUP BY PHYSICIAN ORDER BY ASCENDING PHYSICIAN, ADMDATE`. This command sequence would generate the full report, even though you had not created any special report format in advance. One program is even advertising a module that uses artificial intelligence techniques to allow you to state your questions in natural language.

A. General Information

Program name: _____
 Data base type: _____

B. User Support

- ☐ None: Company shows only P.O. box or refuses to talk to users.
☐ Weak: Company will respond to problems if submitted in writing.
☐ Moderate: Company will respond to calls during business hours.
☐ Strong: Company maintains a 24-hour telephone hot line.

C. Requirements and Compatibility

Minimum central memory: _____K
 Maximum usable central memory: _____K
 Printers supported: _____
 Operating system(s) supported: _____

Hard disk compatibility:

- ☐ None ☐ IBM PC XT
☐ IBM PC with expansion chassis

Hard disk support:

- ☐ Complete program and data may reside on hard disk.
☐ Program and data may reside on hard disk, but floppy must be in machine.
☐ Only data may exist on hard disk.
☐ Neither program nor data may reside on hard disk.

Electronic disk support:

- ☐ Complete program and data may reside on electronic disk.
☐ Program and data may reside on electronic disk, but floppy must be in machine.
☐ Only data may exist on electronic disk.
☐ Neither program nor data may reside on electronic disk.
☐ Program creates and uses its own electronic disk.

D. User Interface

- ☐ Menu driven
☐ Command driven
☐ Choice between menu and command operation
☐ Driven by a programming language
☐ Macro definition capability
☐ Password protection
☐ "Turnkey" systems

E. Communication with Other Programs

- | | |
|---|---|
| Reading: | Writing: |
| <input type="checkbox"/> ASCII (serial string format) | <input type="checkbox"/> ASCII (serial string format) |
| <input type="checkbox"/> ASCII (two-dimensional format) | <input type="checkbox"/> ASCII (two-dimensional format) |
| <input type="checkbox"/> 1-2-3 .WKS | <input type="checkbox"/> 1-2-3 .WKS |
| <input type="checkbox"/> VisiCalc .VC | <input type="checkbox"/> VisiCalc .VC |
| <input type="checkbox"/> VisiCalc .DIF | <input type="checkbox"/> VisiCalc .DIF |
| <input type="checkbox"/> Multiplan SYLK | <input type="checkbox"/> Multiplan SYLK |
| <input type="checkbox"/> dBASE II | <input type="checkbox"/> dBASE II |
- ☐ Modem transfer required for communication with other programs

F. Searching and Sorting

Maximum simultaneous search criteria: _____
 Maximum simultaneous sort criteria: _____
☐ Ad hoc queries possible.

Available search logic:

	Date	Dollar	Floating point	Integer	String	Yes/No
AND	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NOT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IF ... THEN	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
IF ... THEN ... ELSE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Search types:

- ☐ Wild card
☐ Soundex (phonetic)
☐ Search & replace

Case independence:

- ☐ Searches are case independent.
☐ Sorts are case independent.
☐ Case independent searching is a user option.

Indexing:

- ☐ Indexing is possible.
 (Number of keys allowed: _____)
☐ Index keys must be defined when the data base is created.
☐ Any field (indexed or not) may be defined as a key when search or sort is initiated.
☐ Any relevant command can be used with indexed variables.

G. Reports

- Maximum report width: _____ characters.
☐ Page breaks are supported.
☐ Control breaks are supported.
☐ Titles on each page are supported.
☐ All fields for a record must be printed on a single line.
☐ Any field may be placed anywhere on a page.

H. Forms

- ☐ Program has forms design capacity.
 (Up to _____ separate screens may be defined.)
☐ Data checking is permitted.
☐ For data type ☐ For data range
☐ Color is permitted.
☐ Sound is permitted.
☐ Program has its own input routine that cannot be easily altered.

I. Program Capacities

- Maximum number of records: _____
 Maximum record length: _____
 Maximum number of fields per record: _____
 Maximum field length: _____
 Maximum file size: _____
 Maximum number of variables: _____
☐ A data base can span more than one floppy disk.
☐ Guidelines are supplied for estimating storage requirements.

Figure 1: DBMS criteria checklist

● Hands On

The search logic described in section F of the checklist combines two sets of criteria. The first is the available operators (AND, OR, etc.), and the second is the unique data types available. Some data management programs allow special handling of data types such as dates. For example, you can subtract one date from another to obtain the number of days in-between. Other programs automatically format dollar amounts with two-decimal accuracy.

Several enhancements to searching are available in some programs. Wild-card search capability enables you

The word processing capabilities of most data management programs are still primitive.

to specify `???WORLD` or `PC*` to obtain all *PC WORLD* entries in a data base. A “soundex” (phonetic) search would allow you to specify `WOR` to achieve the same end. A search and replace capability would allow you to change all instances of *PC WORLD* to *PC World*.

The searches and sorts of many programs are sensitive to whether data are in uppercase or lowercase. With these DBMSs, a data base containing *able*, *BAKER*, and *CHARLIE* would yield only *able* in a search for *able*, *baker*, and *charlie*. Obviously, the ideal is to allow the user to control the way case is handled.

The ability to index information is a desirable feature in a relational data base. Although you may not realize it, you are probably already familiar with most of the concepts involved in indexing. Finding all the references to an author or a subject in a textbook is analogous to indexing in a data base. You could go through the book painstakingly from beginning to end and make note of every instance of the desired author or subject. This, in fact, is the strategy employed in a nonindexed data base. However, if your textbook has an author and subject index, you need only look up the information you need in the alphabetical index, and you are immediately referred to the appropriate pages. In data management terminology, the page numbers are pointers to the desired data. Notice that indices do not change the ordering of information; they simply provide different mappings of it.

Indexing a file provides two advantages: you can print or display information in different orders, and you can find a record quickly by organizing the information in the most efficient order for each use. Programs vary in the degree to which they implement this feature. Some

programs limit the number of possible indices; others force you to create all indices when you create the data base format and do not allow any change thereafter. Others restrict the use of indexed variables to only a few of the commands in the program.

Reports

The word processing capabilities of most data management software are still primitive. Only a few programs allow control over subscripting, superscripting, type font, and the like. Consequently, most of the report criteria in section G of the checklist focus on other kinds of flexibility.

Some data management programs allow you to control where pages should break. Even the most primitive of programs should skip the perforations in standard-size paper. The ability to insert “control breaks” means that there will be an indication in the report each time the value of a field changes. For example, in the hospital report described earlier that was ordered by the names of the referring physicians, blank lines might be left each time the name of the physician changes. Control breaks also allow easy mathematical calculations on subsets of data.

Forms

The more powerful DBMSs have the ability to create forms on the screen for data input. With forms capability you can design an application that helps people with low-level computer skills to enter data easily. For example, you can design the format on the screen to resemble the format of the data being read.

One of the most important enhancements of forms design is the provision for “data-type checking.” With data-type checking, only an expected response type is permissible. If a name is expected for an entry field, for example, a number will not be accepted. If a number is expected, an alphabetic character will not be accepted. “Range checking” controls the permissible values within a data type. For example, if data are being entered by date, entries after the current date might be prevented. You might also want to prevent entries not on a pre-established list or dollar amounts over a certain amount.

Other aspects of forms design may be desirable, but they are usually unnecessary. Although they may be nice to have, color and sound are rarely essential features of forms design.

Program Capacities

Information on the number of records permitted, the maximum record length, the number of fields per record permitted, the maximum field length, and the number of variables allowed for a program are usually available and make easily digested advertising copy. However, these figures may be less important than other considerations.

One company is advertising a million-record capacity. Another is advertising a billion-record capacity. However, the difference between these programs is trivial: you will run out of disk space long before you reach a million records. A more important consideration is the efficiency with which the programs store data. Without some means of estimating your own file-storage requirements, capacities like a million or a billion records serve as distractions from the essential questions. Actual file storage capacity depends on many interacting factors, but reasonable estimates can be made. Comparative evaluation is impossible because only a few companies publish estimation guidelines.

Whither Performance?

It may seem a curious omission that the checklist contains no reference to performance criteria; parameters like sorting speed and selection speed are not addressed. This is intentional. Because the range of data management software is so diverse and the needs of users vary

almost as widely, a simple set of performance criteria for such software could not be fair to all the programs. In addition, it is usually very difficult for a prospective buyer to perform meaningful benchmarks in the field (i.e., in a computer store or a dealer's showroom). However, before committing substantial resources to a particular system, you should consider several performance factors. If possible, test these with a sample data base of approximately the size you need to work with.

Most of the time you will spend using data management software will entail either entering data or searching for records. Alternative programs should be tested for meaningful speed differences when searching for a record (with and without an index file), adding new records, adding data to every record, and restructuring the data base file to add fields to each record. You should also try to sort the file by a non-key field.

DBMS developers are introducing useful innovations at a rapid rate. Many data base management operations once thought to be possible only on large mainframes are now easily accomplished on microcomputers. Tracking these developments should be fascinating. ●

Burton L. Alpers is a Contributing Editor for PC World and a psychology professor at California State University at Los Angeles.

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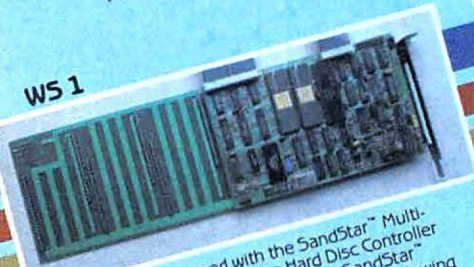
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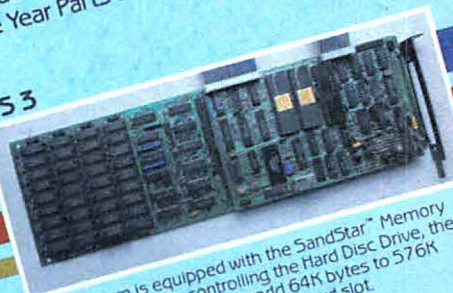
This System is equipped with the SandStar™ Multi-function card. In addition to the Hard Disc Controller Module, you can add up to three other SandStar™ Modules while using only one card slot. The following modules are available: Serial Port, Parallel Port, Clock Calendar, Game Adaptor, and Prototyping Module.

WS 2

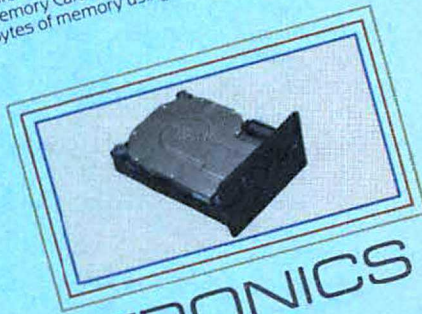


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WS 3



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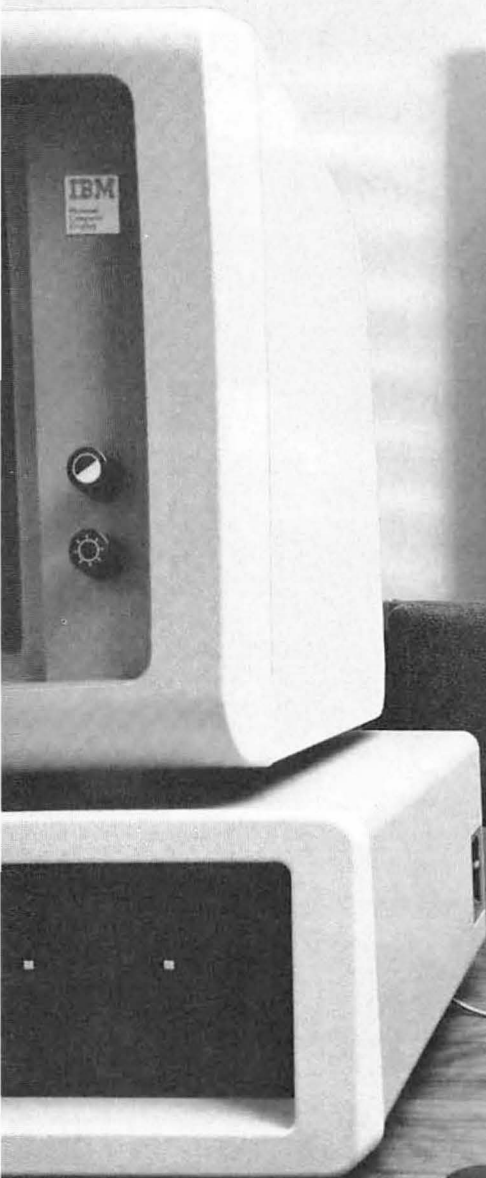
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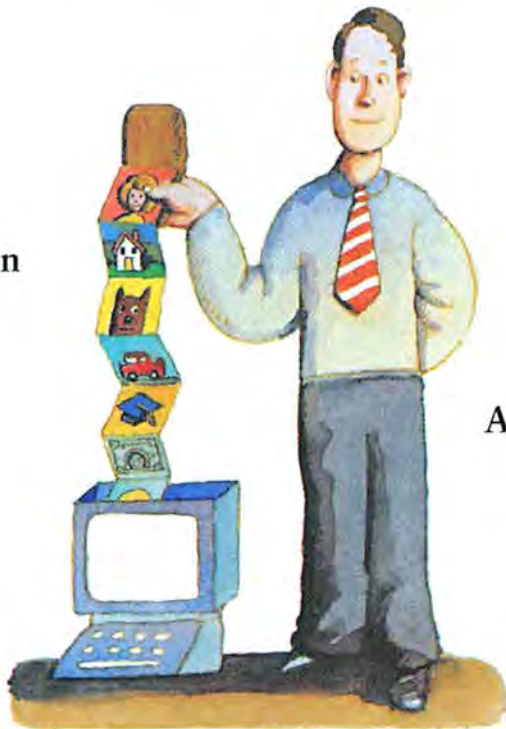
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The Little Black Book II

More ways to organize your personal life with 1-2-3

Paul McDermott

The Little Black Book is a name and address file template to be used with version 1A only of Lotus Development Corporation's 1-2-3. The template enables you to quickly store and retrieve names, addresses, phone numbers, and birthdays of friends, employees, and relatives. In the last issue (see "The Little Black Book," PCW, Vol. 2, No. 6) I described how to set up the Data Input and Data Query areas of the template. In this article you will learn how to expand the template to incorporate features that print mailing labels from the name and address file and how to create your own menu to simplify the operation of the template.

This article builds on the template created in last issue's article ("The Little Black Book," PCW, Vol. 2, No. 6), and the best way to construct that template is to follow that article's step-by-step instructions. If you don't have access to that article but are familiar with 1-2-3, you can build the template by following the directions in "Setting Up The Little Black Book."

Label Printing

Begin by recalling the file that contains The Little Black Book (blackbk). Erase any entries in the criterion line and go to cell V37. Type PA and press <Alt>-X. When the ex-



tract procedure is finished, you will have a list of names, addresses, and other data on all Pennsylvania residents. If you needed this information for mailing correspondence, you could make a hard copy with the /Print command and then type the names and addresses on envelopes. But this seems like a waste of time since the information is already typed. Ideally you would want 1-2-3 to print the data on mailing labels that could be affixed to the envelopes. The problem is that the ad-

dress information in the output section is shown in a horizontal format, while the name, street address, and city, state, and zip code on a mailing label must be printed on separate lines.

To print one label using the /Print command, you would have to specify three print ranges: one for the first and last names, one for the address, and one for the city, state, and zip code. You would have to use about 30 keystrokes to print just one mailing label. That on top of trying to remember the proper spacing and other print options makes this method impractical. But you can create a macro program to do all that typing for you.

Before you start to create the label printing macro you should note a few assumptions. The labels used in this tutorial are assumed to be standard 3½- by 15/16-inch, single width (1-up Avery). We will be using only three out of the five lines available on each label; after seeing how the macros are set up, you can add a fourth or fifth line of text. Finally, the tutorial assumes that you are using an Epson printer. Other printers may or may not execute the correct spacing between labels.

The label printing macros consist of several parts. The first part moves the cursor to an instruction screen and gives the user the option of stop-

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ping there or continuing. If you choose to continue, a "counter" will be created, and the standard print options will be set. The next part prints a set of two labels. The last part causes the program to loop back to see if all records in the output section have been printed.

The Instruction Screen

To begin creating the macros, go to cell C92 and enter MACROS FOR PRINTING LABELS. Move to C93 and enter a line of 26 hyphens there. (Remember to start the hyphens with a single quotation mark (') to indicate a label.) Go to cell B95 and enter {GOTO}label info~. Move the cursor down to cell A130 and give the command /Range Name Create LABEL INFO <Enter> <Enter>. The screen you now see is where the macro will pause before label printing starts. You will place a few instructions on this screen so that other users can understand the printing procedures.

Go to cell B132 and enter INSTRUCTIONS FOR PRINTING LABELS. Release the <CapsLock> key and enter the following instructions in cells B135 through B144:

B135: Load labels in the printer.
B137: If labels are found to be misaligned after printing
B138: <Space> <Space> has begun, press <Ctrl>-<Break> and adjust.
B140: Press <Alt>-L to start printing again.
B142: Enter number for desired choice:
B144: BEGIN PRINTING = 1 DO NOT PRINT = 0

Return the cursor to cell B96 and enter /XNEnter desired choice: ~CHOICE~. Go to cell B113 and give the command /Range Name Create CHOICE <Enter> <Enter>. Move to B97 and enter /Xlchoice=0~{HOME}/XQ~.

The macro in cell B95 will move the cursor to a screen with instructions. The macro in cell B96 will prompt for input from the user and

place that input into a cell called CHOICE (cell B113). The macro in cell B97 will evaluate the "choice" to determine whether to stop or continue executing the macro.

In cell B98 you will set up a "counter" that will keep track of the number of labels printed. With the cursor at B98 enter {GOTO}counter~ + counter + 1~. Move to cell C98 and give the command /Range Name Create

You can create a macro program to do the typing for you.

COUNTER <Enter> <Enter>. The formula in cell B98 will increase the value of cell C98 by 1 each time the worksheet is recalculated.

As long as you are giving out range names, you might as well create one more. Give the command /Range Name Create COUNT <Enter> V38 <Enter>. Cell V38, as you may remember from last month, is the cell that contains the formula to keep count of the records in the output section.

The macro in cell B98 causes the cursor to move away from the Data Query section, so you will want to return it to view the printing process. In cell B99 enter {GOTO}criterion~. From there you want the cursor to move down to the first line of data to be printed. Go to cell B100 and type {GOTO}output~{DOWN}{CALC}. The print options will be set in cell B101. Move to B101 and enter /PPOMLO~S{ESC} \018~000Q. This macro sets the left margin to zero, ensures the normal-size print mode, and suppresses page breaks.

Cell B102 will contain an IF... THEN... ELSE statement. Move to cell B102 and enter /Xlcounter> = count~/REcounter~{CALC}{GOTO}criterion~/XQ~.

Simply stated, if the counter (which keeps track of the number of labels printed) is greater than or

Setting Up The Little Black Book

These instructions summarize the steps laid out in "The Little Black Book" (PCW, Vol. 2, No. 5) and set up the name and address file template. The instructions assume familiarity with the overall 1-2-3 command structure and with basic movement around a 1-2-3 worksheet. The terms printed in *italics> are 1-2-3 commands. They can be entered either by typing the first letter of*

Column	Width
A	3
B	10
C	15
D	20
E	13
F	4
G	7
H	14
I	11
J	5
K	8
L	5
M	9
N	5
O	4
P	5
Q	9
R	10
S	15
T	30
U	13
V	4
W	8
X	14
Y	11
Z	5
AA	5
AB	7

Table A: Column widths for The Little Black Book

1	B	C	D	E	F	G	H	I	J	K	L	N	N	O	P
2	*****	*****													
3	THE LITTLE BLACK BOOK														
4	*****														
5				File Size:										Cur't Yr: 84	
6														Date of Birth	
7	First	Last	Address	City	St	Zip	Phone	D.O.B.	Age	B.D.	Code		Yr	Mn	Dy
8															

Figure A: Labels for the Data Query section of The Little Black Book

each command word or by using the cursor control keys to select the appropriate command. Text and values to be entered into cells or in response to prompts are listed in monofont type.

Start with a blank worksheet. Set the global format to fixed with no decimal places with the command */Worksheet Global Format Fixed 0* <Enter>. Using the */Worksheet Column Set* command, set the column widths according to Table A.

Next type in the labels in rows 2 to 8 as shown in Figure A. Make sure you enter the value 84 separately in cell P4. In cell F5 type the formula @COUNT(B9..B11). To speed up cursor movement, set the recalculation mode to manual with the command */Worksheet Global Recalculation Manual*. Go to cell B9 and enter JOHN; in cell C9 enter BROWN. In cell D9 type 123 ANYWHERE ST. In cell E9 enter ANYTOWN; in cell F9, PA. In cell G9 type 19040 and in cell H9; 215-555-8923. Then go to cell L9 and type E, go to cell N9 and type 58, go to cell O9 and type 12, and type 10 in cell P9. In cell I9 type in the formula @DATE(N9,O9,P9), then give the command */Range Format Date* <Enter> <Enter>. In cell J9 type

```

63      B          C          D          E          F          G
64
65      MACRO FOR DATA INPUT
66      -----
67
68 /XNWant to enter data ? (Yes=1, No=0) "ANSWER"
69 /Xanswer=0~{HOME}/XQ~
70 {GOTO}A10~/WIR~{HOME}
71 /XLFirst name ? "B10"
72 /XLlast name ? "C10"
73 /XLAddress ? (# Street) "D1Q"
74 /XLcity ? "E10"
75 /XLState ? (XX) "F10"
76 /XLZip code ? (XXXXX) "G10"
77 /XLPhone number ? (XXX-XXX-XXXX) "H10"
78 /XLCode ? (E=employee,R=relative,F=friend) "L10"
79 /XNMonth born ? (XX) "O10"
80 /XNDay born ? (XX) "P10"
81 /XNYear born ? (XX) "N10"
82 {GOTO}I9~
83 /C(RIGHT)(RIGHT)~{DOWN}~
84 {HOME}
85 {CALC}
86 /XGLOOP1~
87
88
89      0
90 /DQEQ{CALC}

```

Figure B: The data entry macro

in the formula @INT((@TODAY I9)/365), and in cell K9 enter the formula @DATE(\$P\$4,O9,P9).

Next, referring to Figure B, type in MACRO FOR DATA ENTRY at cell C46 and then type the macros listed below that label starting at cell B49. Remember to start each entry with a single quotation mark to designate the entry as a label.

After all the macros are entered, use the following commands to name four ranges:

/Range Name Create ANSWER
<Enter> C70 <Enter>

/Range Name Create INPUT
<Enter> B7..P36 <Enter>

/Range Name Create LOOP1
<Enter> B49 <Enter>

/Range Name Create \D <Enter>
B49 <Enter>

Move the cursor to cell B7 and issue the command */Range*

(continues)

● Hands On

equal to the count (the total number of labels to be printed), the macro will erase the counter, move the cursor to the top of the Data Query section (the criterion area), and stop executing. If the counter is less than the count, the macro will continue. The next part of the macro is for printing the data.

JOHN	BROWN
123 ANYWHERE ST.	
ANYTOWN	PA 19040
ELAINE	HOUSTON
2083 PARKDALE AVE.	
HORSHAM	PA 19154
JOHN	SWELTZ
527 SHERWOOD LA.	
UPPER DARBY	PA 19835
BRIAN	WYNNE
111 CATBRIER WAY	
ROSEMENT	PA 18078
TIM	BOYLE
4237 PASSMORE ST.	
PHILADELPHIA	PA 19135
LORI	LIVEZEY
215 SANDY KNOLL DR.	
HATBORO	PA 19901
JOAN	MOYER
118 MEREDITH AVE.	
DOYLESTOWN	PA 19010
DAN	HERBERT
179 MADISON AVE.	
NORRISTOWN	PA 19457

Figure 1: Printed mailing labels

The Printing Macros

The second part of the label printing macro will begin by printing two sets of labels and then moving the cursor down two lines. Next it will increase the counter before looping to the IF... THEN... ELSE statement. To have 1-2-3 perform this procedure, type the following macros in cells B103 through B109:

```
B103: /PPR{BS};{RIGHT}~LG
B104: 'R{BS}{RIGHT}{RIGHT}~G
B105: 'R{BS}{RIGHT}{RIGHT}{RIGHT}.
      {RIGHT}{RIGHT}~GLL
B106: 'R{BS}{DOWN}{RIGHT}~LG
B107: 'R{BS}{DOWN}{RIGHT}{RIGHT}
      {RIGHT}~G
B108: 'R{BS}{DOWN}{RIGHT}{RIGHT}
      {RIGHT}{RIGHT}{RIGHT}~GLLQ
B109: '{DOWN}{DOWN}{CALC}{CALC}
```

Cells B103 through B105 print the first mailing label. Cells B106 through B109 print the second label, move the cursor to the next group, and increase the counter twice.

Adding a loop will complete the macro program. Go to cell B110 and enter '/XGloop2~. Next give the command /Range Name Create LOOP2 <ENTER> B102 <ENTER>. This macro causes 1-2-3 to loop back to the IF... THEN... ELSE statement in cell B102 to verify that all records have been printed. Finally, give the macro its name with the command /Range Name Create \L <Enter> B95 <Enter>.

A list of Pennsylvania residents should be in the output section from the last Data Query Extract operation. Before you start executing the label printing macro, save the worksheet with the command /File Save <Enter> Replace.

To test this macro it is not necessary to load labels in the printer. You can execute the macro by pressing <Alt>-L. Your output should look like

Figure 1. While the macros are running, watch the control panel; notice how fast 1-2-3 executes the keystrokes and think how long it would have taken you to type the same commands.

If errors occur during execution of the macro, first check the text of the macro for completeness. A common mistake is to omit the tilde (~) character. Also check the spelling of the range names. If problems persist, execute the macro in the "step" mode. In the step mode the macros are read one at a time with a pause between each keystroke. To enter the step mode, press the <Alt> and <F1> keys before executing the macro. Type any key to continue to "step" through the macro until an error message appears. Note where the problem occurs and press <Alt>-<F1> again to exit the step mode. You can abort a macro anytime by pressing <Ctrl>-<Break>.

Create Your Own Menu

The last step in this tutorial is to organize the various sections in the worksheet to make the system easier to use. This can be accomplished by creating your own 1-2-3 menu with macros and the /XMlocation command.

With the /XMlocation command you can define your own menu, up to eight fields wide and two rows deep, similar to 1-2-3's menu. The first row contains the menu options. The second row may contain explanations for each of those options. The macros are stored below the second row.

When the menu macro is executed the menu will appear in the control panel. As with other 1-2-3 menus, you can select an option by typing the first letter of that option or by pointing with the cursor. When an option is selected 1-2-3 looks at the cell directly below the one containing that option for its first macro command.

The Little Black Book's menu will include options to execute the data entry macro, move the cursor to the

Setting Up the Little Black Book (continued)

JENNY	OSBORNE	21 MAPLE AVE.	HARRISBURG	PA	19045	215-555-4978	E	04/10/67
RICH	CARBO	221 WELLINGTON DR.	CINNAMINSON	NJ	08077	609-555-8253	R	09/03/56
DONNY	SMITH	259 TENBY RD.	DELRAN	NJ	08077	609-555-8211	F	12/02/58
DAN	HERBERT	179 MADISON AVE.	NORRISTOWN	PA	19457	215-555-1018	R	10/05/59
MEL	GRIES	351 TANNER AVE.	WARMINSTER	MD	21974	301-555-8187	R	05/21/57
JOAN	MOYER	118 MEREDITH AVE.	DOYLESTOWN	PA	19010	215-555-1697	E	05/29/59
JOHN	LANG	256 CLEARFIELD CT.	NEW BRITAIN	MD	21456	301-555-3096	F	06/12/57
FRAN	MC GLYNN	206 MOHEGAN ST.	BRISTOL	NJ	08901	609-555-9128	E	09/22/54
LORI	LIVEZEY	215 SANDY KNOLL DR.	HATBORO	PA	19901	215-555-6904	R	06/19/59
ROBERT	HITCHNER	206 MOHEGAN ST.	WARMINSTER	MD	21974	301-555-8947	F	02/14/60
PATTY	WALK	235 COTTMAN AVE.	MT. LAUREL	NJ	08054	609-555-0103	F	07/02/60
TIM	BOYLE	4237 PASSMORE ST.	PHILADELPHIA	PA	19135	215-555-1982	E	03/16/57
ED	SOTTALANA	295 BUCKMAN DR.	WILDWOOD	NJ	08054	609-555-0791	R	05/01/53
BRIAN	WYNNE	111 CATBRIER WAY	ROSEMENT	PA	18078	215-555-1331	F	12/31/58
VINCENT	RIITTS	1105 PRIMROSE CT.	ANNAPOLIS	MD	21403	301-555-4131	R	04/15/52
MARY	TROUT	197 CHEW AVE.	PENNSAUKEN	NJ	08110	609-555-8190	R	02/05/54
JOHN	SWELTZ	527 SHERWOOD LA.	UPPER DARBY	PA	19835	215-555-1940	E	08/22/53
PAUL	BUNYAN	3109 WOODHAVEN DR.	PENNSAUKEN	NJ	08110	215-555-8253	F	09/18/56
ELAINE	HOUSTON	2083 PARKDALE AVE.	HORSHAM	PA	19154	215-555-8534	E	05/02/50

Figure C: Sample entries in The Little Black Book

```

30      R          S          T          U          V          W          X          Y          Z  AA  AB
31 =====
32
33
34 CRITERION Press <Alt>-X to Extract
35 -----
36 First      Last      Address      City      St      Zip      Phone      D.O.B.      Age Code  B.D.
37
38                               Output Size: 0
39 ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
40 OUTPUT
41 -----
42
43 First      Last      Address      City      St      Zip      Phone      D.O.B.      Age Code  B.D.
44
45

```

Figure D: Labels for the Data Input section of The Little Black Book

Name Label Down B7..L7 to assign range names to the column headings.

If you typed in the macro correctly, you can now use it to enter the sample data shown in Figure C. To use the macro as is, press <Alt>-D and answer the prompts displayed in the control panel, pressing <Enter> after each answer. Don't worry about the order of the columns or the fact that you won't be prompted for the age or birthday columns.

Those two columns are calculated from the responses to the 'Month born?', 'Day born?', and 'Year born?' prompts. Note that the section containing the data input macro moves down as you enter the data. When you've entered all of the sample data, the macro should start at cell B68.

Go cell R30 and type in the labels shown in Figure D in rows 30 to 43. In cell V38, enter the

formula `@COUNT(R44..R84)`. In cell B90, type in the macro `'/DQEQ{CALC}` and give the command `/Range Name Create \X` <Enter> B90 <Enter>.

To complete the foundation, issue the following commands: `/Range Name Create CRITERION` <Enter> R36..AB37 <Enter>, `/Range Name Create OUTPUT` <Enter> R43..AB84 <Enter>, and `/Data Query Input INPUT` <Enter> `Criterion CRITERION` <Enter> `Output OUTPUT` <Enter> `Quit`.

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Data Query section, execute the label-printing program, print the Data Query output section, and save the worksheet.

The /XMlocation Command

To begin go to cell C116 and enter **MACROS FOR THE MENU**. Place a line of 19 hyphens in C117 (starting the cell entry with a single quotation mark). Move to cell B119 and type **/XM** menu~. Create the two necessary range names with the following commands: **/Range Name Create \M** <Enter> B119 <Enter> and **/Range Name Create** menu <Enter> B121 <Enter>.

The first command assigns the macro its name, and the second names the location at which the menu can be found. The macro will therefore look for the first menu option at cell B121. Move the cursor to B121 and type **Input**. Go to cell B122 and type **Start** to enter data. In cell B123 type **{HOME}** and in B124 enter **/XG\ d~**. These two macro cells will move the cursor to the home position (cell A1) and then begin executing the data entry macros. The range name **\d** used in cell B124 refers to the cells in which the data entry macros are located.

For the second menu option go to cell C121 and type **Data Query**. In cell C122 enter the description **Go to the Data Query section**. Move to C123 and enter **{GOTO}data query~**. Create the necessary range name with the command **/Range Name Create DATA QUERY** <Enter> R30..AB84 <Enter>. When you select **Data Query** from the menu, the cursor will quickly move to that section, allowing you to perform the extract function.

Go to cell D121 and enter **Print Queries**. In D122 enter the description **Print the Data Query section**. Move to cell

D123 and enter **/PPRdata query~**. Enter the remaining print commands in the following cells:

D124: **OML11~MR132~**
D125: **S{ESC}\015~0FQ**
D126: **AGPQ**

Whenever you use this menu item you should verify that the data in the output section does not extend beyond row 84. If it does, the range named **DATA QUERY** should be expanded accordingly.

The next column in the menu will contain the option for label printing. Go to cell E121 and enter **Labels**. Move down to E122 and enter **Print mailing labels from output section**. In cell E123 enter **/XG\L~**. This macro cell, which is similar to the macro in cell B124, tells 1-2-3 where to read its next macro. In this case it will go to the label printing macros and begin executing them.

Move to cell F121 and enter **Save**. Type the description **Save the worksheet in F122**. Go to cell F123 and enter **{HOME}/FS~R**.

Finally, go to cell G121 and enter **Quit**. Move to G122 and enter the label **Leave the menu and return cursor to Home position**. In cell G123 enter **{HOME}/XQ~**. This last option provides an easy way to exit the menu. The other way would be to press the <Esc> or <Ctrl>-<Break> keys.

Once the macros for each of the menu options work properly, you should go back and make a few changes so that the menu will reappear after each menu option is executed. For the **Input** option go to cell B69 and change the contents from **/XI ANSWER = 0~{HOME}/XQ~** to **/XI ANSWER = 0~{HOME}/XG\M~**.

For the **Data Query** option go to cell S34, press <F2> (the Edit key), and add ... Press <Alt>-M to stop. To alter the **Print Queries** option, go to cell D126 and change 'AGPQ' to **AGPQ/XG\M~**. For the **Labels** option go to cell B97 and change **/XI choice = 0~{HOME}/XQ~** to **/XI choice< = 0~{HOME}/XG\M~**. And fi-

nally, to change the Save option, move the cursor to cell F123 and change '{HOME}/FS~R' to {HOME}/FS~R/XG\M~.

Auto-Start

You can put the finishing touch on The Little Black Book by using a macro feature called automatic macro execution. This technique causes a macro to execute automatically when the worksheet is loaded. Assign a special macro range name, \0, to the macro that you want to execute automatically as soon as the file containing The Little Black Book (blackbk) is retrieved. Give the command /Range Name Create \0 <Enter> \M <Enter>. Then give the command /File Save <Enter> Replace.

When the worksheet is loaded the control panel should look like the first example in Figure 2. The other examples in the figure show what the control panel would look like with other options selected. With this menu, the prompts in the data entry macros, and the other on-screen instructions you have embedded in the spreadsheet, The Little Black Book can be used by a 1-2-3 novice.

Other Program Hints

Before you print labels with the macros, make sure a Setup code has already been entered. This can be done (if you are using an Epson printer) by typing the command /Print Printer Option Setup \018 or \015 Quit Quit. If the Setup is blank and the macro executes {ESC}, 1-2-3 will leave the Setup option before it can enter the code.

Also, the macros can be documented while you create them or after they are created. The best way to document them is to enter a brief description of each macro in a col-

A1:	Input	Data Query	Print Queries	Labels	Save	Quit
	Start to enter data					
A1:	Input	Data Query	Print Queries	Labels	Save	Quit
	Go to the Data Query section					
A1:	Input	Data Query	Print Queries	Labels	Save	Quit
	Print the Data Query section					
A1:	Input	Data Query	Print Queries	Labels	Save	Quit
	Print mailing labels from Output section					
A1:	Input	Data Query	Print Queries	Labels	Save	Quit
	Save the worksheet					
A1:	Input	Data Query	Print Queries	Labels	Save	Quit
	Leave the menu and return the cursor to the home position					

Figure 2: Menus for The Little Black Book with different options selected

umn to the right of the macro. Since column C also contains some important macro data (the counter for example), you should use column D for the documentation in this case.

Once you have set up The Little Black Book, you will find many more possibilities for using the 1-2-3 features that you've learned. The Data Sort command is an excellent means of grouping or rearranging the data in the Output section. Columns can be sorted in either ascending or descending order with primary and secondary keys available. Refer to the 1-2-3 manual for more details.

The system for entering dates that is used in The Little Black Book is probably the easiest way to get around the limitations of 1-2-3's date arithmetic system. It allows you to enter the dates in a familiar format and still perform date calculations.

The label printing macro can be adapted to produce printed reports in almost any format. It selects and

changes the range to be printed as it is executed and uses the printer controls on 1-2-3's print menu to adjust the paper in the printer as required.

The menu macro automates the procedures required to use the system on a day-to-day basis and allows a sophisticated system to be operated by a novice. ☺

Paul McDermott is a financial consultant with Mediq Management Services in Pennsauken, New Jersey.

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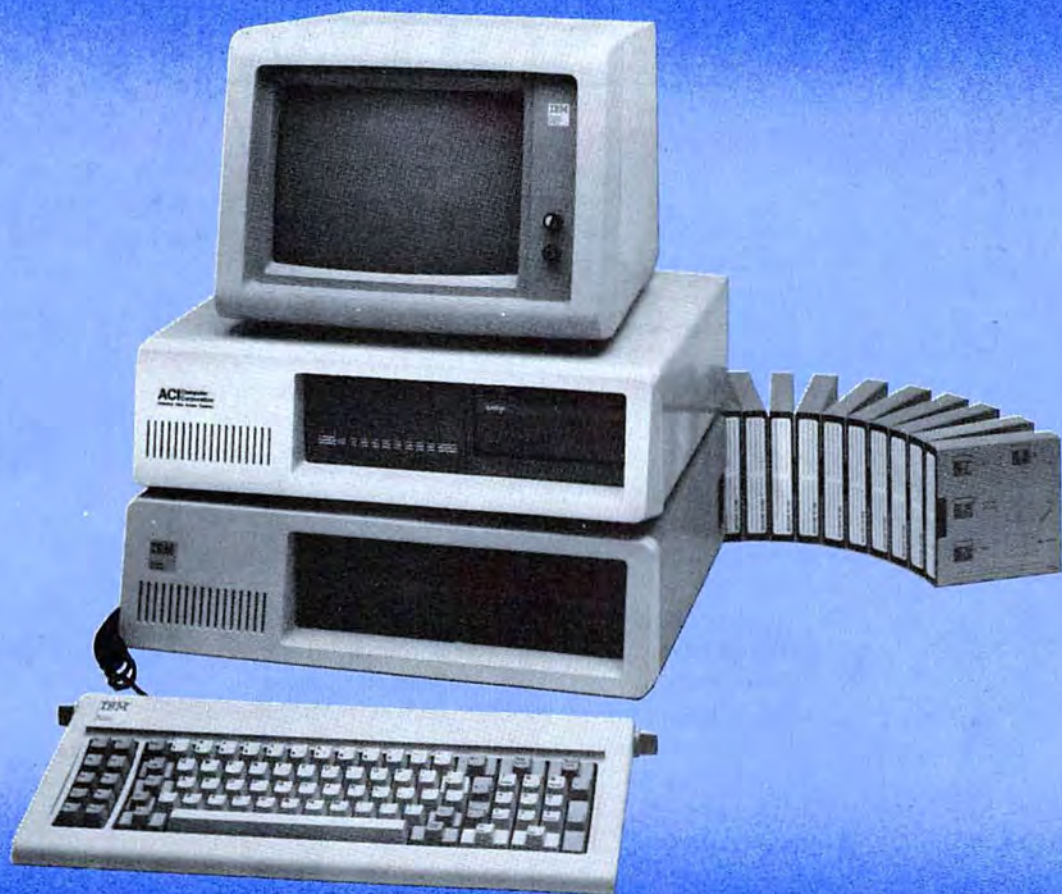
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Tuning Up dBASE

Make your dBASE II applications work faster.

David Jenkins

There comes a time when a *dBASE II* application's reach exceeds its grasp. A mailing label program or a modest order entry system that you created six months ago is now handling thousands of records; index files have grown to 300K, and command files have swelled as more and more functions have been added to the beleaguered program. And while everything still works, processing speed has plummeted.

This slowdown confronts any *dBASE II* user who expands an existing application as a project or company grows or who writes a *dBASE II* program that performs a myriad of tasks. Fortunately, there are a number of ways to increase the speed of a *dBASE II* application without substantially changing the command files that are already in place. The methods range from the use of disk emulators and buffers to the less esoteric reshuffling of files on a disk. One or several of these approaches may be best for your application.

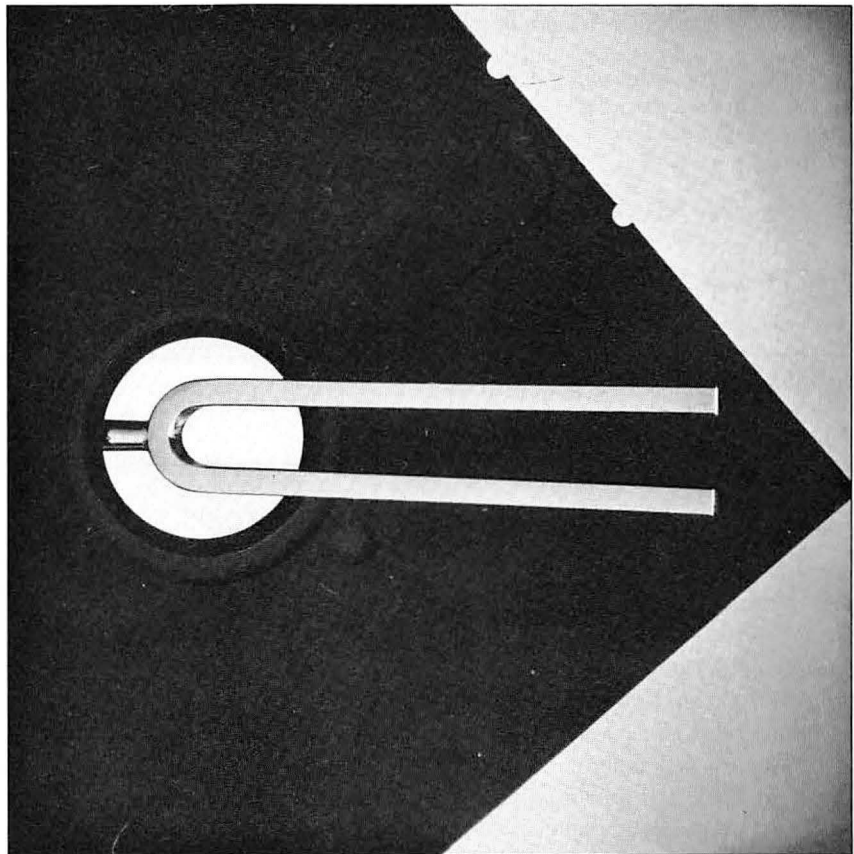
Boosting Buffers

If you use DOS 2.00 or 2.10, you can speed up almost any *dBASE II* application by specifying the number of buffers, i.e., the amount of RAM that DOS uses for input and output between RAM and the disk drives. Each buffer is 512 bytes and is used

as a temporary holding place for data that is either about to be read to a disk or waiting to be used again by a program. DOS normally allocates two buffers for any program. For many applications, such as word processing and spreadsheet programs,

there is no benefit in increasing the number of buffers. But for data management applications, the difference in processing speed can be spectacular.

When *dBASE II* needs to access a file that is stored on disk, it sends a request to DOS. Before DOS reads the disk, it checks its buffers to see if




```

*                               GETTIME.PRG
*                               get the time from DOS and display as time
*                               and as seconds
store ' ' to dummy
poke 61440, 180,44,205,33,137,22,13,240,137,14,15,240,195
set call to 61440
call dummy
store peek(61456) to hour
store peek(61455) to min
store peek(61454) to sec

store str(hour,2)+":"+str(min,2)+":"+str(sec,2) to time
? "Time ",time,hour*3600+min*60+sec," (# secs)"

*                               INDEX / BUFFER TEST

? "BUFFERS TIMING TEST"
?
input "How many times do you want to repeat the test? " to repeat
?
accept "Do you want a printout? " to printout
if !(printout)="Y"
    set print on
endif
?
? "Buffer timing test."                               Repeat Factor = ",repeat

(continues)

```

Listing 1

the requested data is already present from a previous operation. If it is, it is quickly passed to *dBASE II*; if not, it must be read from disk—a slow process compared to fetching information from a buffer. Reading information from hard disk drives is faster than reading from floppy disk drives, but considerable time is saved when any disk access is avoided.

In many *dBASE II* operations the number of buffers used makes no difference. For example, buffers will not help you list a nonindexed file more quickly. There are other trade-offs to consider as well. The more buffers you add, the more RAM DOS needs. If you use disk emulation software, which turns a section of RAM into an electronic disk drive, you will have less memory to devote to buffers.

```

.create TESTINDX
ENTER RECORD STRUCTURE AS FOLLOWS:
FIELD  NAME,TYPE,WIDTH,DECIMAL PLACES
001    test1,c,10
002    test2,c,10
003    test3,c,43
004
INPUT DATA NOW? N

```

Figure 1: Creating the test file TESTINDX

Keep in mind too that DOS is obligated to search every buffer for the presence of data. The more buffers you have (99 is the limit with DOS), the longer the search takes.

Changing Buffers

When the PC is initially turned on or is reset, DOS looks for a file called CONFIG.SYS, which tells it how many buffers to allocate. If no buff-

ers command is present, DOS allocates two buffers. To change the number of buffers allocated, first type in TYPE CONFIG.SYS at the A> prompt. If a CONFIG.SYS file is in place, you must use a word processor or a text editor to change the setting. If there is no CONFIG.SYS file, DOS will return a 'file not found' message.


```

*                               now perform the test
DO  GETTIME
store 4 to N
use testindx
copy stru to test
use test

*                               make the first N records
store 1 to count
do while count<=N
    append blank
    store count+1 to count
enddo

*                               make test1 different in each record
replace all test1 with str( #,10)
index on test1 to ndxtest1
set index to ndxtest1

*                               now make a copy of the N records in TEMP
copy to temp

*                               copy in TEMP repeat times
store 1 to count
do while count<=repeat
    append from temp
    store count+1 to count
enddo

*                               you now have repeat copies of 1 .. N
*                               get the time again
DO  GETTIME
?
set print off

```

Listing 1 (continued)

You can then create the file with a word processor or from the console (but not with the *dBASE II* Modify Command function) by typing
 COPY CON: CONFIG.SYS <Enter>
 BUFFERS =5 <Enter>
 <F6> <Enter>

This changes the number of buffers from two to five. You can verify this entry by typing in TYPE CONFIG.SYS <Enter>; the response should be 'buffers=5'. The buffer setting does not take effect until the system is either turned off or reset with the <Ctrl>-<Alt>- command.

Testing Buffers

To see how extra buffers will speed up an application, you can use the test data file in Figure 1 and the timing test in Listing 1. Create TEST-INDX.DBF as shown in Figure 1. Next use a word processor or the *dBASE II* Modify Command function to enter the two .PRG files, GETTIME and BUFFTME, in Listing 1. To run this buffers timing test, set the buffers to 5 in CONFIG.SYS, reboot, and enter *dBASE II*. At the *dBASE* prompt, set the default to the drive that contains GETTIME.PRG, BUFFTME.PRG, and TEST-INDX.DBF. For example, if these programs are in drive B:, you would type set default to b. Then type in DO BUFFTME. After BUFFTME runs, the

screen displays the time that execution began and ceased. The difference between the two is the execution time of the program with this buffer setting. By varying the number of buffers you can discover what setting works fastest.

GETTIME is a program that reads the time from DOS. It is reprinted here from the July 1983 issue of Ashton-Tate's newsletter, *dNEWS*, with the company's permission. Two lines have been added; these print the time in hours, minutes, and seconds and

● Hands On

in the total number of seconds. A stopwatch is in effect created by calling GETTIME at the beginning and the end of BUFFTME.

BUFFTME is a complicated command file that uses indexing heavily. BUFFTME copies TESTINDX's structure into a second file called TEST and makes an index of TEST, in a file named NDXTEST1, on the field variable TEST1. Next the program appends N records into TEST. (N is a memory variable that is set at the beginning of BUFFTME.)

Changing the value stored in N changes the timing results; you may discover that at a certain point the number of buffers makes little difference in improving execution time. The program goes through these records, replacing TEST1 in record 1 with 1, TEST1 in record 2 with 2, and so on until N is reached. A copy of TEST1 is then placed in a file called TEMP. TEMP is copied back into TEST the number of times specified in the memory variable "repeat." Thus NDXTEST1 is repeatedly moving back and forth as it adjusts its index. It is like someone rearranging several decks of cards so that all the aces are on top, followed by all the twos, and so on.

To Buffer or Not to Buffer

Once you get a feel for how the time test works, experiment with your own applications to see what buffer size works best for each. Make copies of your programs and data. Insert a call to GETTIME (type DO GETTIME) at the beginning and the end of each application to determine whether the number of buffers has any effect. Make sure your application runs long enough to generate accurate results. GETTIME is accurate only to the

No. of Buffers	Time to run TIMEBUFF.PRG
2	105
5	98
7	97
10	92
12	93
15	92
20	91

Table 1: Buffer timing test results

whole second. Any tested application should run at least 100 seconds so that measurement errors are on the order of 1 or 2 percent.

If you are testing with two floppy disk drives, you should get times consistent with the results in Table 1. For different hardware configurations or different dBASE II applications, the time saved and optimum number of buffers may vary, but you will always gain over DOS's standard setting.

In the test, using 10 buffers instead of 2 results in a speed increase of nearly 12 percent. After I tested some of my own dBASE II applications, it was clear that speed improves little beyond 15 buffers. Two-file systems (in which, for instance, you process a transaction record, look up customer information, and process the next transaction), programs that list an indexed file, or programs that switch between command files show no extra gain beyond 5 buffers. If you have a disk emulator and are short on memory, 5 buffers should be appropriate. Otherwise, set the number of buffers at 15.

Disk Bottleneck

Because floppy and hard disk drives are mechanical devices, they are almost always the major factor affecting the speed of a data management system. When dBASE II issues an instruction through DOS, the disk drive positions its read/write head at

the appropriate track on the disk and then waits while the disk drive spins the right part of the track underneath the head. All of this time could be better spent running a program.

As files get larger, more reading and writing to the disk is required. But some of this reading and writing can be eliminated. When disks get crowded or files are written alternately (such as the customer and transaction files mentioned above), the files are broken up into blocks that are scattered across a disk. This condition, called fragmentation, increases the time a read/write head spends looking for the data in a file.

You can determine which files are fragmented by using the DOS 2.00 CHKDSK command and a wild card, such as *.*. The command CHKDSK *.* examines all the files on a disk and notes which are noncontiguous and how many blocks each is divided into. If important or frequently used files are fragmented, you can speed up dBASE II processing time by copying those files to a new disk in order of importance, using the DOS COPY utility. That way if any files are fragmented, they will probably be the less important ones, which were copied last.

Hard disk users will have to use BACKUP and RESTORE to consolidate files—processes that are trickier

	Creating an Index	Listing an Indexed File
Floppy disk drive	227	409
Disk emulator	84	407

Table 2: Comparison of indexing times on a floppy disk and on a disk emulator

	Multiple Command Files	Nested Command File
Floppy disk drive	122	127
Disk emulator	33	115

Table 3: Timing command files

and slower than copying a floppy. If you have little experience with either of these commands, do not risk your data for the sake of saving execution time.

Disk Emulators

A disk emulator, also known as a RAM drive, eliminates disk read/write delays because all operations are performed in RAM. Because of its random access to data, a disk emulator can store data anywhere in memory and retrieve it quickly. A number of companies sell disk emulation software, and many memory expansion boards come with these programs. (See "Faster than a Spinning Floppy," *PCW*, Vol. 1, No. 4.) Since *dBASE II* requires 128K, and most PCs accept up to 256K of RAM on the motherboard, you may be able to avoid buying a memory expansion board for many *dBASE II* applications that use a disk emulator.

Now that you have a disk emulator, what should you use it for? Since RAM is volatile (i.e., information is

lost when the machine is turned off or rebooted), it's not advisable to put data files in a disk emulator. The choice comes down to putting command files or index files in RAM.

Creating an index on a disk emulator is nearly three times faster than doing the same task on a floppy disk drive, though the disk emulator is at best only 10 percent faster when listing an indexed file (see Table 2). Listing involves moving sequentially through an index file, much like turning face up each card in a sorted deck of playing cards. Creating an index is more demanding, since the index file must be updated as new records are entered; the process is like sorting a deck of cards.

Your applications will run considerably faster if you place command files in RAM before you enter *dBASE II*. To do so requires some reprogramming, since every command file's drive reference must be changed. This can be a relatively simple job if you have a few command files; otherwise it can take a long time.

Three command files and one nested command file (command files within a command file) with equivalent functions were tested. As Table 3 illustrates, a disk emulator is signifi-

cantly faster than a floppy disk drive when dealing with multiple command files. The nested command file executed 10 percent faster from the disk emulator.

Tuning Up

Before you start looking for other *dBASE II* tricks, tune up your PC. Test your applications with different numbers of buffers until you find the right setting; reorganize the files on your disks, and if finances permit, buy a disk emulator. *dBASE II* is a fast development tool, but its structure is relatively fixed. If you want to speed up your *dBASE II* applications without spending long nights in front of a screen, remember this rule: first alter your environment—not your code. ●

David Jenkins is the president of Midway Software, Inc., a consulting and programming company based in Berkeley, California, that specializes in dBASE II applications. He currently directs several programming projects for PC World.

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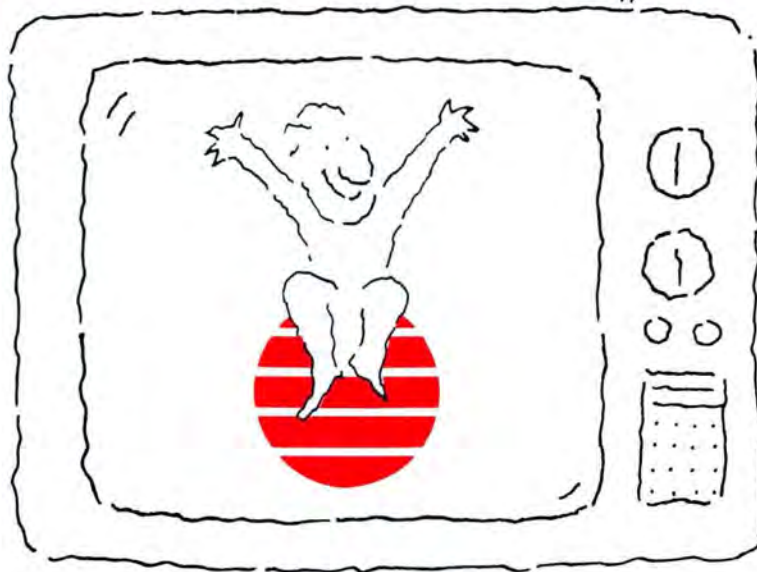
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A global exchange of computer discoveries

*Edited by Karl Koessel
and Art Wilcox*

One of the benefits of this column is that it gives our readers a chance to reveal bugs they have discovered in PC software. It's even more beneficial when a reader who has spent hours combing through computer code shares the solution (which is often just a couple of keystrokes). This month we lead with such an item from a reader who discovered a bug in TREE.COM, the DOS 2.00 utility that is supposed to display a list of all subdirectories on the specified drive. (For more about TREE.COM see *The Help Screen* in this issue.) Following the TREE.COM fix we have a few comments and suggestions regarding the use of paths, subdirectories, and batch files to organize your hard disk.

We also have a small BASIC program demonstrating how the BASIC command INSTR() can be used to check whether a single character input is a valid response (e.g., when you want to test for a Y or an N), a patch to *PC-Talk III* for those communicating with slow-responding mainframes, a fix that allows TIMER.BAS (see *.* , PCW, Vol. 2, No. 1) to work correctly when compiled, a correction of an oversight in DOWNLOAD.ASM (from "Character Construction," PCW, Vol. 2, No. 4), and an assembly program that you can construct with DOS 2.00's DEBUG to disable the automatic line-feed feature of Radio Shack printers.

TREE Root Bug

Having a Tallgrass 20-megabyte hard disk with over 50 subdirectories, I have come to depend on the DOS utility TREE.COM to help me control the subdirectories.

One day, to my surprise, I could no longer list any subdirectories past the first root subdirectory, DATABASE.DIR. "Oh no! My hard disk has problems," I said. After some swearing and sweating and several long nights and days, I had isolated the problem to the TREE.COM utility program.

The problem is: if in the root directory you have a subdirectory name that is 11 characters long, and you have another subdirectory within the same directory, TREE.COM stops looking for any other directories after reporting the subdirectories of the 11-character subdirectory.

The problem is easily fixed using DEBUG to patch TREE.COM:

```
A>DEBUG TREE.COM
-E 3D4 D
-W
Writing 05E9 bytes
-Q
```

No more root bugs, so now we have a healthy TREE.COM again. TREE.COM for DOS 2.10 is the same as for DOS 2.00. I have reported the bug and the fix to IBM. As an added bonus there is an undocumented DOS function call (37) used in TREE.COM. This function call determines the defined system path separator character. This separator may be defined at boot time by including the following undocumented statement in the CONFIG.SYS file:

```
SWITCHAR = x
```

where x is any character. For example, SWITCHAR = - will yield the path separator familiar to UNIX users.

You may ask, "How can an applications program determine what separator character was defined at boot time?" Now the bonus. Using partial assembler code as an example:

```
XOR DX,DX      ;Clear DX
MOV AX,3700    ;Put 37h in AH
INT 21         ;Call function
MOV AL,DL      ;Put DL in AL
```

Guess what's in register AL? Right, the defined separator character.

Good luck, and I would like to hear from other users who have found more undocumented function calls.

*James Morgan
Orlando, Florida*

More PATH and PeachText

In *PC World*, Volume 2, Number 3, you published a *.* item by Larry Axsom that described a method for circumventing *PeachText*'s inability to recognize path names. Because of the number of steps involved in this procedure, I suspect it would be faster to simply copy the file(s) you want to work with into the directory containing *PeachText*, edit them, and then copy them back to their original subdirectory.

For users of the IBM version of *PeachText*, there is a much simpler way to access files in other directories. If you use the IBM version (not the Peachtree version, *PeachText 5000*), you can rename EDIT.PSI as EDIT.EXE and rename PRINT.PSI as PRINT.EXE. If you're really lazy like me, you can use the names E.EXE and P.EXE and save a few more keystrokes. This allows you to bypass the *PeachText* main menu entirely. If you want to edit a file called FILE-NAME.DOC, simply type EDIT FILE-NAME. To print the file, type PRINT



FILENAME (you can omit the extension because *PeachText* assumes the extension .DOC unless you type something else).

Assuming that you have EDIT.EXE in a subdirectory called WORDPROC, and you would like to edit documents in other subdirectories, you can simply use the command PATH \WORDPROC to establish a path to the WORDPROC subdirectory. Then, get into the subdirectory containing your file and type EDIT FILENAME. The PATH command will show DOS where to find the EDIT program.

I pass this along not only because it is a neat solution to the path name problem, but because I think that many *PeachText* users will appreciate the ability to bypass the menu for other reasons. Experienced users who no longer need to be prompted for commands and who don't use the on-screen help facility (including us old-timers who loved *Magic Wand*, from which *PeachText* was derived, for its speed and simplicity) will appreciate being able to invoke EDIT and PRINT directly.

If you use *PeachText* as a program editor as well as a word processor, you only need EDIT.EXE on your disk and can save the space otherwise occupied by the menu and PRINT.EXE. The only sacrifice you make is that the REPRINT command, which allows you to reprint a

file from the beginning, will not work unless you have called PRINT through the menu.

By the way, if anyone knows how to modify the PeachTree version of the *PeachText 5000* system so that EDIT and PRINT can be used without the menu, I would be eternally grateful for the information.

Miriam Liskin
Berkeley, California

Hard Disk Organization

Over the last two years I've helped numerous friends and business acquaintances install software on hard disks and networks. In doing so I developed a simple method of creating menus using batch files so that these people could access numerous pieces of software without having to remember the startup commands for each one. Because I used standard PC-DOS batch commands, these people are able to modify their own menus with EDLIN or a standard word processor, eliminating the need for any maintenance on my part.

As an example, let's assume that we have an IBM XT (with the hard disk as drive C:), *WordStar*, 1-2-3, *dBASE II*, and DOS. We also have an AST Combo-Plus board with clock software. First, using the Change Directory command we make sure the current directory is the root directory:

```
C>CD \
```

Using the Make Directory command, we make subdirectories for each of the packages:

```
C>MD WS
C>MD LOTUS
C>MD DBASE
C>MD DOS
```

We copy all the files from the disks of each package to the appropriate subdirectory on the IBM XT:

```
C>COPY A:* C:\WS
C>COPY A:* C:\LOTUS
C>COPY A:* C:\DBASE
C>COPY A:* C:\DOS
```

We also need, in the root directory, the utility to set the system date and time:

```
C>COPY A:ASTCLOCK.COM C:\
```

Now we create the following AUTOEXEC batch file. It will set the system date and time and put us in the DOS subdirectory, which I consider "home base."

```
C>COPY CON: AUTOEXEC.BAT
ECHO OFF
CLS
ASTCLOCK
CD \DOS
MENU
<F6>
```

Note that the line with the command MENU calls a batch file that displays the menu. This batch file resides in the DOS subdirectory, as do all of our menu choices. Now we create MENU.BAT:

```
C>CD \DOS
C>COPY CON: MENU.BAT
ECHO OFF
CLS
TYPE MENU.TXT
<F6>
```

MENU.TXT is a text file containing a list of the software available on the system. By creating a separate file for the actual display of choices, we don't need to use messy REM state-

ments and we never have to modify MENU.BAT. The text file can also contain Christmas messages, shut-down notices, and so on. The text file should look like this:

```
C>COPY CON: MENU.TXT
```

```
XYZ SYSTEM
```

```
TYPE 1 For WordStar
```

```
2 For 1-2-3
```

```
3 For dBASE II
```

```
4 For DOS CHKDSK
```

```
<F6>
```

If we boot the XT now, the screen will clear and the text file above will be printed on the screen. We still must create the actual batch files to do the work:

```
C>COPY CON: 1.BAT
```

```
ECHO OFF
```

```
CD \WS
```

```
WS
```

```
CD \DOS
```

```
MENU
```

```
<F6>
```

```
C>COPY CON: 2.BAT
```

```
ECHO OFF
```

```
CD \LOTUS
```

```
LOTUS
```

```
CD \DOS
```

```
MENU
```

```
<F6>
```

```
C>COPY CON: 3.BAT
```

```
ECHO OFF
```

```
CD \DBASE
```

```
DBASE
```

```
CD \DOS
```

```
MENU
```

```
<F6>
```

```
C>COPY CON: 4.BAT
```

```
ECHO OFF
```

```
CHKDSK
```

```
MENU
```

```
<F6>
```

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Those batch files complete the task. Whenever you turn on the XT, the system displays the menu. When you type 1, the system changes directories to WS and loads *WordStar*. After you exit *WordStar*, the batch is still active and you are taken back to the DOS subdirectory, where the menu is displayed again. To add another item to the menu, just edit MENU.TXT and add a file called 5.BAT.

Mike Falkner
Orangevale, California

Editors' note: Further organization may be achieved by placing the batch files and MENU.TXT in another subdirectory (e.g., \BATCH) instead of keeping these files in the \DOS subdirectory. If this is done, two other changes to Mr. Falkner's routines are needed. The AUTOEXEC.BAT file needs to contain the command PATH \DOS; \BATCH after the CLS, so that DOS will search these subdirectories as well as the current directory for subsequent commands. The command TYPE MENU.TXT in the file MENU.BAT must be changed to TYPE \BATCH\MENU.TXT.

In addition, as suggested in the previous item from Ms. Liskin, if the PATH command also included the path \WS; the menu choices and their associated batch files could be arranged to change to some subdirectory (e.g., \MEMOS or \LETTERS) and then call WordStar without needing to change to the WS subdirectory. This practice not only keeps your documents in a directory other than

```
100 PRINT"      MAIN MENU":PRINT
110 PRINT" <1> Transaction Entry"
120 PRINT" <2> End Program"
130 PRINT" <R> Report Menu"
140 PRINT" <F> File Maintenance"

200 GOSUB 900
210 ON INSTR("12",A$) GOTO 1000,2000
220 CLOSE
230 ON INSTR("RrFf",A$)/2 GOTO 8000,9000
240 BEEP
250 GOTO 200
899 '**Get 1 character
900 A$=INPUT$(1)
910 RETURN

1000 PRINT "Line 1000":END
2000 PRINT "Line 2000":END
8000 PRINT "Line 8000":END
9000 PRINT "Line 9000":END
```

INSTR.BAS demonstrates the BASIC command INSTR().

the one holding your word processor, it also allows different kinds of documents to be kept in different directories.

Using INSTR to Check INPUT

Most people who write programs would like to have a fast, clean way to verify that a one-character entry in fact conforms to the choices that are offered. This is often helpful in menu choices.

The INSTR function is perfect for this use. INSTR.BAS is an example that demonstrates the versatility that INSTR allows. Lines 100 to 140 print the menu of choices. Let's suppose that the first two choices each branch directly to some line and the next two choices require a preliminary

step (such as closing all files) before branching. Line 200 calls the subroutine to get a character from the keyboard. INSTR is used in lines 210 and 230 to verify that the user has entered a valid choice and to branch to the correct line in the program. (Note that, as shown in line 230, INSTR is easily employed to find a match for either uppercase or lowercase letters.) Any other character causes the program to beep and return for another entry (lines 240 and 250).

Donald Ramsey
Houston, Texas


```

522 XXMACXX=0
560 IF EOF (1) THEN XXMACXX=XXMACXX$PL1:GOTO 515 ELSE 605
607 IF XXMACXX>1000 THEN BEEP
608 SSMACSS=0

```

PCBEEP, a patch for using PC-Talk III with a slow-responding mainframe

PC-Beep III

If you use *PC-Talk III* to communicate with a mainframe that gives a relatively slow response, try adding the four lines shown in PCBEEP. They cause the PC to beep when a character is received if the user or the mainframe has not transmitted anything for at least 15 seconds. The beep summons you back if you have walked away from the PC or if your thoughts have wandered while you were waiting for a response.

This is for the interpreted version of *PC-Talk*; for the compiled version, the number 1000 in line 607 should be much larger.

*Michael A. Covington
San Gabriel, California*

Compiling TIMER

I read with great interest in your January *. * (PCW, Vol. 2, No. 1) about the TIMER function for BASIC 1.1. I was writing a simulation package and needed the resolution that TIMER provides but that the BASIC Compiler does not support. Jehangir Gazdar and R. R. Shroff gave me a good start, but I encountered one mysterious problem. My compiled programs appeared to stop after about 30 minutes. I finally discovered that the culprit was the compiler's calculation of the variable TICK!. Because the compiler assumes that nu-

merical values are to be stored, if possible, in integer format (2 bytes), when PEEK(109) is 128 through 255, the resulting TICK! becomes negative. To solve this problem, just multiply PEEK(108) by 1.0 and PEEK(109) by 256.0—the .0 in each multiplier forces the resultant values to be stored in single-precision format (4 bytes). The resulting TICK! value will be correct for the entire day.

*Thomas Bode
Toledo, Ohio*

DOWNLOAD.ASM Bug

After entering J. G. Vaughan's program DOWNLOAD.ASM in your April issue (*., PCW, Vol. 2, No. 4), I noticed an error. In order to get the program to run correctly, one must insert a .RADIX 10 directive in the code segment (after the ORG 100H directive is as good a place as any). Otherwise, the instructions MOV CX,96 and MOV CX,12 will be treated as MOV CX,96H and MOV CX,12H, respectively, and garbage will be printed out by the Epson FX printer.

Another way to correct the above error is to replace the 96 with 60H and the 12 with 0CH.

*Allan Horwitz
Bloomfield, Michigan*

Radio Shack Printer Fix

Printers, despite all their electronic wizardry, are still basically mechanical devices—and mechanical devices eventually tend to break down.

Availability of service, then, is an important consideration when buying a printer. I've had good experiences with the service available from Radio Shack for my venerable TRS-80 Model I and Line Printer IV—and they are certainly widely available. So when it came time to buy a letter quality printer to use with an IBM PC, I took a close look at the Radio Shack line of daisy wheels (DWP-210 and DW II) and bought the DWP-210.

But there was a problem: Radio Shack computers all end a line with a single character, a carriage return (ASCII 13). The required linefeed (ASCII 10) is provided not by the computer but by the printer. All Radio Shack printers are configured to supply this linefeed automatically with each carriage return received.

The IBM PC, by contrast, provides both a carriage return and a linefeed. What this means is that if an IBM PC is connected to a Radio Shack daisy wheel printer, the print comes out double-spaced when single-spaced output is desired.

There is a simple solution to this problem—just go into BASIC with the printer "on line" and issue the command LPRINT CHR\$(27); CHR\$(21). This tells the microprocessor in the printer to stop supplying the automatic linefeed. (To re-enable automatic linefeed, use LPRINT CHR\$(27); CHR\$(22).)



However, this method is a bit awkward, since it requires BASIC to be available on the disk in the default drive. I decided it would be preferable to have a small machine language routine that would do the same thing—I could include it in the AUTOEXEC.BAT file to be invoked automatically when the computer is booted up.

The DEBUG utility of PC-DOS 2.00 allows assembly of 8088 mnemonics into a .COM file which can be run directly from DOS. To create the .COM file, follow the steps shown in PRNTREDI.COM, pressing <Enter> after each line. The first line invokes DEBUG, which prompts with a hyphen on line 2. The instruction for assembly, beginning at an offset of 100 hexadecimal, is A 100. DEBUG responds with a string of numbers representing the segment and offset (the segment numbers—the first four before the colon—differ for variously sized PCs and are shown in the listing as x's). After you have entered the assembly language instructions, the hyphen prompt will reappear. The N command allows the file to be named. (If the file is to be written to the default drive, the drive specifier may be excluded.) The R CX command displays the current value in the CX register and prompts with a colon, allowing a new value to be entered. This value is the number of bytes that will be written by the subsequent W command. The Q command returns you to DOS.

Now you should have a 14-byte file, PRNTREDI.COM, which you can include in your AUTO-EXEC.BAT file. PRNTREDI.COM simply loads the appropriate values into the DL register (MOV DL,1B and MOV DL,15—1B hexadecimal is 27 decimal and 15 hexadecimal is 21

```
A>DEBUG
-A 100
xxxx:0100 MOV DL,1B
xxxx:0102 MOV AH,05
xxxx:0104 INT 21
xxxx:0106 MOV DL,15
xxxx:0108 MOV AH,05
xxxx:010A INT 21
xxxx:010C INT 20
xxxx:010E
-N A:PRNTREDI.COM
-R CX
CX 0000
:OE
-W
Writing 000E bytes
-Q
```

PRNTREDI.COM turns off Radio Shack printers' automatic linefeed.

decimal) and then uses the DOS function call 5 (MOV AH,05 and INT 21) to send the values to the printer. Finally another interrupt (INT 20) returns you gracefully to DOS. You might also include a pause with a message to remind you to make sure the printer is turned on before running PRNTREDI.

Ronald Hands
Hamilton, Ontario

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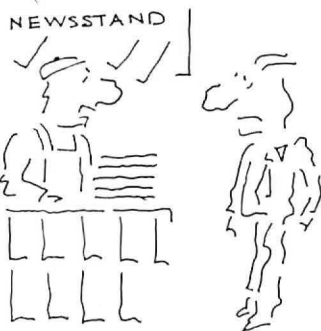
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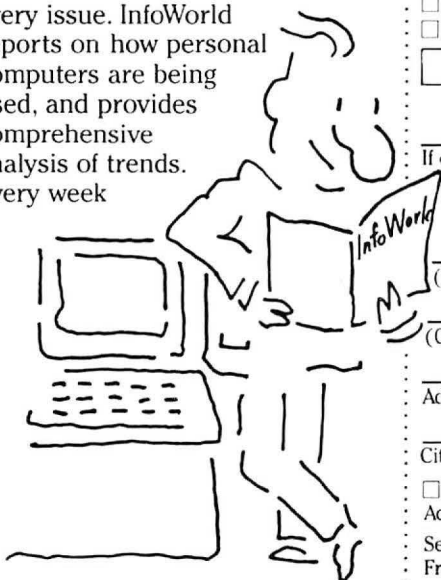
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Window Talk

Lawrence J. Magid

While the Apple Macintosh comes with indigenous windows and a mouse, such panes and rodents are hybrids on the IBM PC. As far as Big Blue is concerned there is just one window—the PC's screen. Many people think that one is not enough, so the race is on to see who can come up with the best and most popular system for bringing windows to the PC. The following is a discussion of windows and mice with the people who are bringing them to the PC: Bill Gates, chairman of Microsoft (Microsoft Windows), Terry Opdendyk, president of VisiCorp (Visi On), and Gary Pope, executive vice president and cofounder of Quarterdeck Office Systems (DesQ).

Windowing software allows you to view two or more screens of data simultaneously. Some systems even allow you to display information from more than one program at a time and to transfer that information among the screens and among separate programs.

Just as the PC provides only one display at a time, it offers only one input device—the keyboard. But plenty of companies offer other ways to input and manipulate data, such as touch screens, optical character recognition devices, graphic tablets, and light pens. The most popular method seems to be a hand-held device called a mouse. Its "tail" is a cord attached to the PC via a special mouse interface board or through a serial port. The mouse enables you to move text, select commands, manipulate the cursor, and if the software allows it, transfer data between windows, all without touching the keyboard.

Windowing software and mice complement each other. With advanced windowing software you tend to spend more time moving the cursor and manipulating text than you do typing on the keyboard. Software that uses windows often uses commands that can more easily be activated by the clicking action of a mouse than by typing the command on the keyboard. Instead of typing commands, you select them from displayed menus. The mouse is perfectly suited for all the clicking and selecting, marking and moving, opening and closing of windows, and dashing about the screen that goes on when you use windows. Mice make windows manageable and windows make mice usable.

Whether windows and mice will go down in computing history as confusing gimmicks with limited application or as revolutionary devices that improve productivity will depend on two factors: how well software supports these new capabilities and how many levels of information a user can comfortably use at one time. With its Macintosh, Apple has developed a totally integrated window/mouse system. One of the reasons it works is that it was created from the ground up as an integrated system. Since windows and mice for the PC are currently offered only by third parties, integration is more difficult. Nevertheless, there are some heavy hitters in the industry who are counting on grand slams with their window/mouse products.



"It's amazing how much unanimity there is about the importance of mice and windows."
Bill Gates of Microsoft

● Community

The first major software company to introduce an integrated window/mouse system for the PC was VisiCorp. VisiCorp made its fortune on the enormous success of *VisiCalc*, the computer industry's first electronic spreadsheet. Until last year, *VisiCalc* was the best-selling business program, but now Lotus Development Corporation's *1-2-3* is outselling it by a huge margin. VisiCorp is now betting on *Visi On* to help it recapture its position as an industry leader.

Microsoft is another giant in the window/mouse market. The corporation is known as the leading developer of languages and operating systems. If there was ever any doubt of Microsoft's eminence, it was resolved in 1981 when IBM anointed MS-DOS (which IBM calls PC-DOS) as the standard operating system for the IBM PC. As their only hope for compatibility, virtually every other manufacturer of 16-bit computers has adopted MS-DOS as its standard. Microsoft also dominates the market with its version of the BASIC language and with applications programs such as *Microsoft Word*, *Multiplan*, and *Flight Simulator*.

Now Microsoft has something new—*Microsoft Windows* (see "Microsoft Does Windows," PCW, Vol. 2, No. 1). It's neither an applications program nor an operating system. *Microsoft Windows* is an "extension" of the MS-DOS operating system that increases the power of applications software that runs under it.

Quarterdeck Office Systems is new to the micro-computer software game, but its founders have plenty of experience in integrated office systems. Company president Therese Myers and cofounder Gary Pope started designing integrated systems in 1976 when they worked for a subsidiary of Citicorp. That experience, according to Myers, formed the basis for the company's windowing software, *DesQ*.

With large stakes riding on the success of their products, it is no surprise that all three companies are launching major marketing campaigns. At a recent trade show, I organized a "window summit," pulling together the leaders of the three companies that had announced windowing software packages for 1984 in an impromptu meeting amid the confusion of a crowded conference aisle.

The following is an edited transcript of this unexpected meeting between Bill Gates, chairman of Microsoft; Terry Opdendyk, president of VisiCorp; and Gary Pope, executive vice president of Quarterdeck Office Systems.

People equate mice and windows with ease of use and convenience, but that's not always true."
Terry Opdendyk of
VisiCorp

PCW (to Bill Gates of Microsoft): What are the main advantages of windowing software?

Gates: The main thing is that it makes provision for you to run two applications at the same time and to see what's going on in various sections of the screen.

PCW: Wait, are you talking about multitasking or windows?

Gates: No, windows. That's a good point, because the terminology is kind of confusing. [With windows] the two applications are not actually running simultaneously. Only one is active, but you can still see what's going on with the other. You can pull up a tiny little



window and do some calculating and then take the results of that and use it back in your main window. It lets you work with little software pieces instead trying to throw every feature into a single software package.

PCW: Why is it important to go out and get a system with Microsoft Windows?

Gates: Partly because a lot of the good applications software will be done under *Windows* and take advantage of *Windows*. It's the same as with MS-DOS. The only good reason for an end user to buy MS-DOS is be-

cause most of the good applications are available, or are becoming available, under MS-DOS. It will be the same for *Windows*. I don't expect every user to understand windowing software, but when they walk in a store and they look at these packages, it will say right on them "Requires Microsoft *Windows*."

PCW: Do you think windows and mice are going to be dominant in 1984?

Gates: Absolutely. It's amazing how much unanimity there is about the importance of mice and windows. Apple agrees, VisiCorp agrees, Microsoft agrees.

PCW: Does IBM agree?



"We felt that the first thing we ought to do is get a system out there that enhances what people already have."
Gary Pope of Quarter-deck Office Systems

Gates: IBM hasn't taken a formal position.

PCW: Didn't IBM say that they will sell VisiCorp's Visi On?

Gates: They'll make it available. That's probably because Visi On is available now and Microsoft Windows isn't.

PCW: So how does Microsoft Windows compare with Apple's Lisa technology, which is used in the Macintosh?

Gates: We obviously agree on a lot of things. An MS-DOS machine running Windows gives you a lot of the same capabilities that a Lisa or a Macintosh has.

PCW: Does Microsoft Windows have any added functions?

Gates: Oh, yes. There are things that we've decided to put in that they didn't. Like this tiling thing. Both Lisa and Visi On use the overlapped approach.

PCW: What's the thinking behind Microsoft Windows' tiling approach?

Gates: Tiling automatically resizes the display. If you want to get rid of a window, then the other windows grow to fill in that space. If you create a new window, then the other windows will shrink appropriately. So rather than having to say, "I want to see three things," it will take the current two windows, give a command to shrink this one, give a command to shrink that one, and let you put the third where you want to. Whoosh. We tile, we lay the thing out for you. With tiling you can do all the things you can do with overlaps. You can say, "Oh, I want this window to be this big, and I want that one to be here." Tiling gives you full control. But you would rarely use it [directly]. It's an automatic thing, but other companies force it to be done on a manual basis.

PCW (to Terry Opdendyk of VisiCorp): Is your system compatible with programs that are not specifically adapted for Visi On?

Opdendyk: There's a standard operating system environment in which any program can run, and you can transfer to and from the tailored Visi On environments. So you can tailor products to take advantage of the Visi On environment, or you can run standard, off-the-shelf programs.

PCW (to Gary Pope of Quarterdeck Office Systems): How does that differ from the way DesQ works?

Pope: We're different. With DesQ, if you run through DOS or use the ROM calls, then you can window. Or if you're using one of the programs that we recognize specially, such as 1-2-3 or WordStar 3.3 or one of our own products, then you can run them through two windows at the same time. So you get some of the benefits of windowing without having special applications.

PCW: How does DesQ differ from Microsoft Windows?

Pope: Microsoft does the windows a little differently. They use the paned approach rather than the overlapping approach.

Gates: Yes, we run the screen in graphics mode. Do you ever run it in graphics mode?

Pope: In this version of DesQ, when you do graphics, we give that window the full screen, and then when you deselect that window, it switches back into the text window.

'Eventually all systems will have bit-mapped displays.'

Gates: We always run in graphics mode.

PCW: And Visi On? How do you solve the graphics problem, Terry?

Opdendyk: Visi On works totally in graphics mode. That allows us to give full overlapping windows. . . . When the application is tailored to the window manager, then you can do new things. You can exploit the window manager if you're willing to do a lot more with graphics. Adapted applications like a nice mouse cursor or bold or italic text can only be done in graphics.

PCW (to Gary Pope): Why doesn't DesQ get into that kind of graphics mode?

Pope: The first version doesn't because the existing applications don't support it. We want to be able to run 1-2-3 and dBASE II and Condor and WordStar and all the existing popular packages, none of which use graphics. If you ran in bit-mapped graphics, you'd actually degrade those applications. They wouldn't be able to run in color, and they would slow down. We felt that the first thing we ought to do is get a system out there that enhances what people already have and what people are used to using. We thought it was important to be able to run in color and on the monochrome display.

Opdendyk: Eventually all systems will have bit-mapped displays. I don't mean that as monochrome versus color. It's just an anomaly of the current IBM board

● Community

that you can't use the color circuitry and the bit-mapped circuitry simultaneously. There are a number of other systems that run color and high resolution. Bit-mapped graphics are absolutely the way in which the whole market is going. Non-bit-mapped systems are going to be a thing of the past.

PCW: *Terry, can you tell us what's unique about Visi On?*

Opdendyk: *Visi On* has a dramatic set of functionalities and capabilities like true overlapping windows and true automatic data exchange. One really points from one section of a product to a section of another to interchange data. . . . *Visi On* has total virtual memory so one can have very large documents and 20 or 30 applications running simultaneously even with a very small amount of memory in the system. Not only have we provided the *Visi On* environment, but we also offer a whole new generation of applications that have been designed to take advantage of the windows and the ability to integrate data from different programs. They include *Visi On Calc*, *Visi On Graph*, *Visi On Word*, and *Visi On Query*, a relational data base.

PCW: *Is Visi On Calc a totally different product from VisiCalc?*

Opdendyk: Totally different product—an entire generation beyond.

PCW: *Let's say for some reason you wanted to run VisiCalc in the Visi On environment. Could you do it?*

Opdendyk: You can transfer your *VisiCalc* models with our built-in transfer program and move them up to the *Visi On* environment, or you can run your existing applications the way they've always run. We have the ability inside of *Visi On* to run existing applications within the native operating system environment.

PCW: *You're still in MS-DOS while you're in Visi On, right?*

Opdendyk: Actually, we fit on top of the operating system independently, so we can run with PC-DOS on the IBM PC, and we can run on other operating systems. For instance, *Visi On* works on an IBM 3270-PC, which has a non-MS-DOS proprietary layer. So at all times the system can take advantage of any of the system files.

PCW: *Let's say I'm using Visi On, and I want to run WordStar. How long will it take me to get into a mode where I can do that?*

Opdendyk: On *WordStar*, 2 to 3 seconds at most.

PCW: *You don't have to exit Visi On?*

Opdendyk: There's a command that takes you right to the MS-DOS environment. You select that command with the mouse, and you're in.

PCW: *Are other software manufacturers writing Visi On applications?*

Opdendyk: Absolutely. We have already trained over 500 developers from 450 independent software companies over the past five months.

PCW: *Will Microsoft products run under Visi On?*

Opdendyk: They have actually sent people to our training sessions. It will be interesting to see what they'll announce and how they'll announce the products on *Visi On*.

PCW: *These three programs we're talking about—Visi On, DesQ, and Microsoft Windows—are they competitive products? Do they serve different niches? Would it be feasible to own all three or two of the three?*

Opdendyk: They are dramatically different products with different capabilities.

PCW: *It's curious, but it seems to me that you helped create a market for these other products.*

Opdendyk: Without a doubt. We're working with so many hardware manufacturers—for example, IBM's customers—that preannouncing our product was necessary to enable various hardware people to talk openly about it and to enable their positioning. We needed time to get those 450 software companies actively involved, writing programs, doing toolwork for the product.

PCW: *Would you agree with Bill Gates and others that mice and windows may be the most exciting computer developments of 1984?*

Opdendyk: One of the confusions is that people equate mice and windows with ease of use and convenience, but that's not always true. But with carefully designed applications designed for a specific environment, these interfaces open up tremendous amounts of power. ●

Lawrence J. Magid is executive vice president of San Francisco-based Know How Computer Learning Centers and a syndicated computer columnist for the Los Angeles Times.

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A PC for the Teacher

IBM's Personal Computer was considered an infant in the fall of 1981, but Big Blue's prodigy is already being sent to high school.

Gary Bacon

What the IBM mainframe was for colleges during the 1960s the PC may become for high schools in the 1980s. During the 1983 academic season, 88 schools in three states received generous gifts from IBM—for each, 15 brand-new PCs complete with peripherals and software.

This gesture, which surely marks only the beginning of IBM's entry into secondary education, heralds a fresh attitude by that company. IBM is now encouraging new applications of personal computers in high schools. And it has enlisted educators at the grass roots level to help plug some of the current gaps in PC-based educational software. Given that push, all indications are that school-owned computers will no longer be the exclusive province of programming wizards. IBM is doing its part to expand the use of personal computers to the humanities, the social sciences, and the arts.

What will schools make of this gift? More to the point, how will tomorrow's leaders begin to fashion a better world by using today's technological marvel? At Los Altos High School in Los Altos, California—one of the lucky 88—such concerns were hardly academic. What follows is an

account of how one Silicon Valley high school class, which I taught, transformed a sophisticated business tool into a dynamic participant in the educational process.

First, a bit more about the national experiment of which Los Altos High was a part. IBM selected the Educa-

School-owned computers will no longer be the exclusive province of programming wizards.

tional Testing Service (ETS), the New Jersey-based administrator of the Scholastic Aptitude Test and an array of other standardized tests, to implement its \$8 million program in a demographic cross section of schools in California, New York, and Florida. ETS worked with university and regional educational service centers to choose recipient schools, to help the centers train staff, and to oversee the project. The crux of the program was local initiative: teachers were free to adapt the PC in ways appropriate to their classrooms.





Tiffeny Mullaly and Kim Chi Nguyen work together on a program for students whose second language is English.



A student tests the PC's color monitor as instructor Gary Bacon looks on

IBM's largess included a generous complement of software, including PC-DOS, BASIC, *BASIC Primer*, *Word Proof*, *EasyWriter*, *The Instructor*, *Typing Tutor*, *pfs:File* and *pfs:Report*, *Question*, *VisiCalc*, and *Delta Drawing*. The PCs were equipped with 128K and two single-sided disk drives. Peripherals included 15 high-resolution graphics boards and color monitors and 3 graphics printers. Hayes Microcomputer Products also got into the act by contributing a Smartmodem, an asynchronous com-

munications board, and a \$500 credit for The Source for the first year. Other than limiting the equipment to instructional applications on school premises, IBM's contracts with the recipient schools were free of restrictions.

Close Encounters

It's probably fitting that an interdisciplinary class called "The Learning Community" was the first group at Los Altos High to give the versatile tool a test. The Learning Community is a nontraditional educational experience for its 22 student members. The class, which meets for 4 hours daily, examines various physical, en-

vironmental, and psychological aspects of life. Its members represent a microcosm of the student population: high achievers, underachievers, and a handful of those in between. Few class members had operated a computer before, and many admitted to the anxieties commonly known as "computerphobia."

One year's experience as a PC owner helped me determine objectives for the group. Although I knew what worked well for me and had a fairly good idea of what was on the market, I realized that high school students have different needs.

Fortunately, the IBM/ETS program had been structured to give instructors maximum latitude in creating lesson plans that used and extended existing software. With that in mind, I supplemented the IBM-supplied programs with products from other manufacturers, including Cdex's *DOS Tutorial*, Advanced Software Interface's *Keynote*, Artificial Intelligence Research Group's version of *Eliza* (which is also available on CompuServe), and Lifetree Software's *Volkswriter*.

Six straightforward criteria were applied in choosing the additional programs: each package had to be simple, easy to use, applicable to the task at hand, adaptable to our needs, interactive, and instructional.

The First Time

On the first morning of Los Altos High's PC experiment, the computer lab suggested cold, mechanical efficiency. The room's bare walls framed more than a dozen drab metal casings, the tops of which sported what appeared to be small television monitors. Tethered to the boxes were gray keyboards teeming with letter and figure keys.

As the students stationed themselves in front of the machines, some were eager to flip the red switch at the back and begin to explore this new universe. Others conveyed trepidation in the face of all this electronic gadgetry.

Each class session allowed students to explore a vast range of PC applications. Our first priority was learning how to gain access to this potent medium. What better way to begin than with *Instructor*, a simple, attention-getting, nonthreatening introduction to the PC's keyboard. The program is so direct that first-timers can't get lost, and it offers appealing audio and display features.

While youth is touted as having a greater aptitude for computer literacy than older folk, even kids have to start somewhere. Students gingerly lifted the drive A: gate on their machines, as though opening a crypt. That task completed without incident, they pulled the floppy disks out of their *Instructor* packets, slid them into the drive slots, and closed the drive doors. The power switches clicked in chorus, and the room came to life amid start-up beeps and the whir of spinning floppies.

While youth is touted
as having a greater
aptitude for computer
literacy than older folk,
even kids have to start
somewhere.

In the next hour the students received a taste of what the PC can do, sampling sound, color, graphics displays, a *Pac-Man* look-alike, and the idiosyncrasies of the computer's keyboard. After that playful welcome, the group was ready to dig into something more substantial.

Much of the joy in working with young people comes unexpectedly. Running through even such simple software as *Instructor* was enhanced when a group of students used the program as a springboard to a discussion of its subliminal qualities. They transcended the task at hand and offered observations on the programmer's personality, belief system, and world view.

Shaking Hands with the Operating System

Initially, I worried about exposing students to a tutorial that might be pedantic. While not surprised that *Instructor* caught and held the class's attention, I was delighted to find students so receptive to a program as comprehensive as the 4-hour Cdex DOS tutorial, *How to Use Your IBM PC with PC-DOS*. With the Cdex tutorial, students learn from one another. One student took the test, then administered it to four others. Those four in turn gave it to another group. In five steps, every student had taken a turn. We found the Cdex software a detailed, effective primer on the PC's disk operating system: it was thorough, interactive, and full of opportunities for hands-on instruction.

Not only was the Cdex program user-friendly—the firm was downright neighborly; its plant is just a mile or so from Los Altos High. Although Cdex designed the program for executives, the company liked the fact that it was a hit with students. What had been a software loan to the class eventually became a donation.

Troubleshooting

The class had the school's PC lab virtually to itself during the first few weeks of the semester, before the rest of Los Altos High got word of the new arrivals. The students became pioneers in using the lab resources. Some students also became lab technicians.

The computers arrived without the proper DIP switch settings on the system boards, a fact we discovered the hard way. Some applications programs were garbled by the 40-column display switch setting. In addition, drive B: on two machines did not read or write. And while we were told that the machines had 128K on the motherboard, CHKDSK reported only 64K.

One student dug into the technical manual and discovered that all these glitches were due to the DIP switch settings. Soon two students had removed the cover of a PC to test that theory. To no one's surprise, the switch settings were wrong. A few clicks later the machine was functioning with 80-column display, two disk drives, and 128K. The enterprising young technicians then proceeded to bring all the machines up to speed.

Internal Dialogues

If there's a common thread in the class's interdisciplinary studies, it's the premium placed on communication. Students probed their communication patterns via Steve Grumette's version of *Eliza* for the PC, one that is functionally identical to MIT Professor Weizenbaum's 1965 creation.

Eliza is an interactive program that poses personal questions, stores some of the responses, and seeks to elicit further responses. Weizenbaum, so the story goes, intended *Eliza* to be a parody on Carl Rogers's nondirective therapy and was chagrined to find that people took it seriously.

Although familiar with other semi-intelligent software, I found none as well suited to the classroom. *Eliza* is highly interactive and sophisticated; it shapes the dialogue by identifying key words and phrases.

Students led *Eliza* along, exploiting its potential for probing feelings and thoughts. To help students gain empathy for their parents, I encouraged some class members to engage the program in the kind of encounter they might have at home. An example of such a dialogue follows:

Student: Well, I've been considering leaving home for a long time.

Eliza: YOU SEEM QUITE POSITIVE.

Student: No, not really. I'm more confused than anything.

Eliza: WHY NOT?

Student: I don't know why.

Teacher's Choice

Educational software for the PC has evolved from drills and rote exercises to interactive encounters with vivid graphics. For his Los Altos High School class, educator Gary Bacon supplemented donated software with several programs of his own choosing. Bacon found that the packages listed here succeeded in enlightening and edifying his students.

Instructor
Individual Software, Inc.
24 Spinnaker Pl.
Redwood City, CA 94065
415/591-4166
List price: \$44.95
Requirements: 64K, one disk drive

How to Use Your IBM PC with PC-DOS
Cdex Corporation
5050 El Camino Real
Los Altos, CA 94022
415/964-7600
List price: \$69.95
Requirements: 64K, one disk drive

Eliza
Artificial Intelligence Research Group
921 N. La Jolla Ave.
Los Angeles, CA 90046
213/656-7368, 213/654-2214
List price: protected version \$25, unprotected version \$45
Requirements: 64K, one disk drive

Volkswriter
Lifetree Software, Inc.
411 Pacific St. #315
Monterey, CA 93940
408/373-4718
List price: \$195, International Edition \$225
Requirements: 64K, one disk drive

SuperCalc 2
Sorcim Corporation
2310 Lundy Ave.
San Jose, CA 95131
408/942-1727
List price: \$295
Requirements: 64K, one disk drive

Eliza: DON'T YOU REALLY KNOW WHY?

Student: I suppose I do. It's because of my parents mainly and how they react.

Eliza: WHY DO YOU SAY YOUR PARENTS MAINLY AND HOW THEY REACT?

Student: Because of the things that they think I should do.

While *Eliza* has limitations, the program is adaptable—the manufacturer even encourages changes. For instance, the program's original

opener was a defensive "What's your problem?" so I altered the greeting before the students used it.

Initially, class members found talking to a computer an unsettling experience, but *Eliza* is both a great motivator for discussions on artificial intelligence and a mirror of how each of us directs or is directed by those with whom we deal. It's also a way to test a student's ability to stay on target in a subject area.

One student reported having to "fight the computer to get deeply into real feelings. Sometimes the questions it asked took me away from my

topic." He said he learned how to bring the point of conversation back to his topic, "and that's not easy, even in conversations with most people."

An excerpt of his encounter follows:

Eliza: WHAT WOULD YOU LIKE TO TALK ABOUT TODAY?

Student: My feelings.

Eliza: YOUR FEELINGS—THAT'S INTERESTING.

Student: They really are!

Eliza: DID YOU THINK THEY MIGHT NOT BE?

Student: Sometimes I feel really depressed and alone.

Eliza: TELL ME MORE ABOUT SUCH FEELINGS.

Student: I ask myself if life is worth living. I always say "yes."

Eliza: DO YOU THINK THAT IT'S LIKELY THAT LIFE IS WORTH LIVING?

Student: Indubitably!

Tailoring Responses

During a session with *Eliza* on the PC lab's second day, I caught a glimpse of color on one of the monitors. Since *Eliza* is not programmed to run in color, my interest was piqued.

We had purchased the unprotected version of *Eliza*, which permits modifications of the source code. One student discovered this potential immediately and developed a short procedure to allow him to choose two colors for the responses, one for *Eliza* and one for himself, plus a third color for background. Before the hour was up, every student in the lab was working in color. One student had retrieved the BASIC manual to figure out what colors could be used. Some students chose faint colors to ensure the privacy of their responses, and one even found out how to get her responses to blink on and off.

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Community

Then the enhancements began to multiply. One boy got *Eliza* to enlarge the size of its response buffer so class members could input longer responses, turning the program into a virtual electronic journal. Another student enhanced the program menu to allow easy exit to DOS. But the most significant insights occurred when students discovered ways to actually alter *Eliza's* responses. In short order they gained mastery over this beguiling computer program.

Eliza's malleability gave the class new confidence. In a manner reminiscent of the *Wizard of Oz*, they had looked at the code on the screen—in effect walking behind the mask—and obtained an understanding of how the program works. This removed some of the mystique, but it heightened their interest.

A Tool for Social Action

Gaining proficiency in the use of a word processing program was next on the class agenda. *Volkswriter* was selected because of its user-friendliness, effectiveness, and versatility. *Volkswriter* is easy to learn and features a fine menu system. Files are well protected, which is essential in a classroom situation.

The students took to *Volkswriter* immediately. In no time they were producing clean copies of contracts that spelled out their study goals, objectives, and specific assignments for the current term. Class members rapidly moved to hone their new skills in the social action arena. A series of student-initiated letter-writing projects to elected officials demonstrated *Volkswriter's* real power: the students discovered how easy multiple-letter writing can be when a merge utility is used. Each student compiled a list of his or her local, regional, state, and federal representatives.

Practical Living Skills

Preparing for life after high school is fundamental to adolescents. Clarifying and organizing the often mundane details of self-sufficiency can be achieved via *SuperCalc 2*, an electronic spreadsheet.

I asked each student to concoct a budget for a hypothetical living situation. Based on current skill level, what kind of job would he or she

Computer education breeds a 'share the wealth' attitude.

get? What jobs were appealing? How much would a possible job pay? What form of transportation would be required to get to work? How much would the transportation cost? How would that cost affect financial status over the long term? What about an apartment? Where would it be and how much would rent be? What would food cost? What might the other costs of independent living be?

This project, a practical introduction to spreadsheets and a further application of the PC, assisted students with a bit of real-life economics. Through the research it required, the exercise may have prodded a few into really thinking about ways and means. And as one student told me, just because the spreadsheet program was practical didn't mean that it couldn't be fun.

Bridging the Communication Gap

Class explorations in communication didn't end with *Eliza*. Using the Hayes Smartmodem, students meandered through The Source and the information bank of United Press International. They were also able to develop links with other IBM/ETS recipient schools, sharing accomplishments, applications, and frustrations.

Computer education breeds a "share the wealth" attitude, as the class observed when members were asked to tutor other Los Altos High students in PC fundamentals.

Through a special arrangement with the coordinator of the school's English as a Second Language program, students shared their computer skills with peers from El Salvador, Mexico, Viet Nam, Iran, and the Philippines.

The class's work with the computer embodied what for me are two crucial components of learning. One is the spirit of cooperation in which learning takes place: no matter how fast someone assimilates new things, those quickest to catch on must be willing to help those who have not. The other is the encouragement and permission students and teachers must give one another in exploring and creating beyond what is obvious or accepted as known.

Taking Time to Discover

There is a balance between working on a specific task (such as learning how to use a program) and allowing sufficient time to make discoveries. Sometimes the latter entails coming up with creative applications for existing software, devising DOS menus, or writing programs from scratch.

A few students vented their creativity by composing music for the PC, both by ear and by sight. One student even programmed the keyboard so that it could be played like a musical instrument. We tooted our own horn about these inventions, sending them by modem to other schools in the network.

The computer can be a catalyst in the classroom. The students generally viewed as class leaders didn't necessarily hold the limelight when the PCs arrived. Conversely, the three or four quiet kids really rose to the opportunity, working well indepen-

dently—a trait the computer tacitly endorses. Those who had to struggle a bit initially proved to be the best tutors later on.

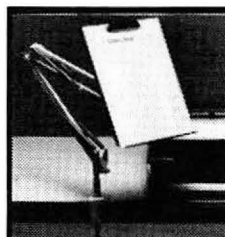
Questions without Answers

The bulk of this article concerns how IBM's generosity has been a boon to education. I often wonder, however, if there's another side. For all the current clamor about computer literacy, is it wise to occupy young, developing minds with computer applications? Not all students were enamored of the prospect of spending 25 percent of class time isolated in front of a PC monitor. More than once, it became an issue that threatened to divide the group into two factions.

What of the concern that computers, along with other technological developments, have further alienated minorities and that computers have widened the gap between the sexes? What about an excess of reliance on technology that can create a social or political imbalance or that can deepen the rift between developed and developing nations? What of the computer's seductive nature, its uncanny ability to chain its user to compulsive use, the sedentary lifestyle of some users, the neglect of social relationships, and the stress this fabulous tool places on the material world, perhaps at the expense of the spiritual?

The challenge may be to temper our enthusiasm slightly and to integrate computer and technological training into a curriculum that nurtures the whole person. Doing so may be essential in order to prevent IBM's gift horse from becoming a Trojan horse. ●

In addition to teaching at Los Altos High School, Gary Bacon is part of the management team at Tall Tree Systems. He is also the author of Essential Education: Drawing Forth the Golden Child published by Rainbow Bridge.

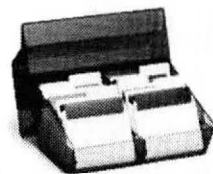


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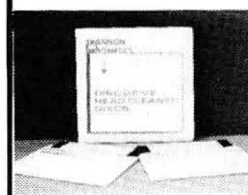
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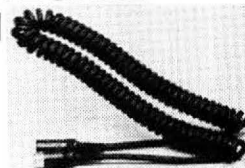
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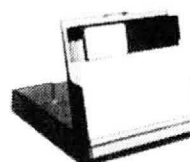
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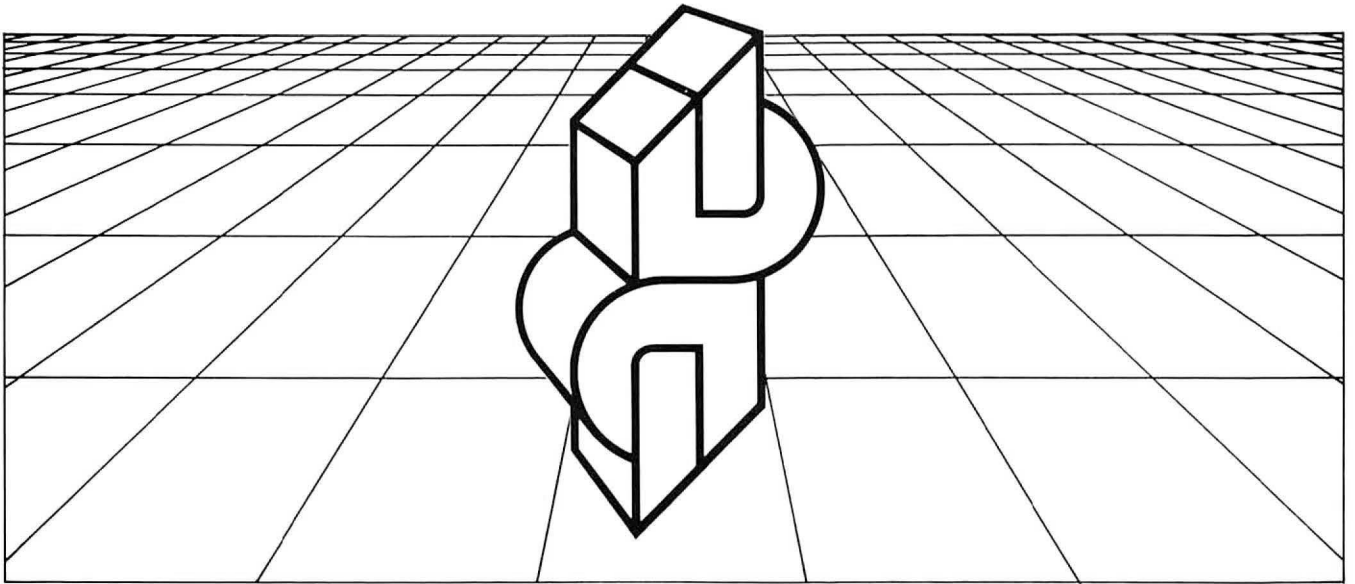


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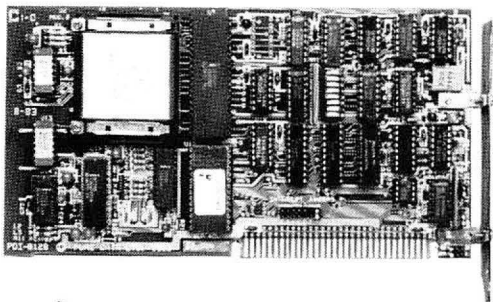
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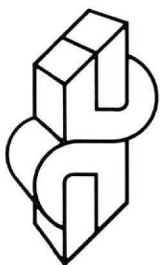
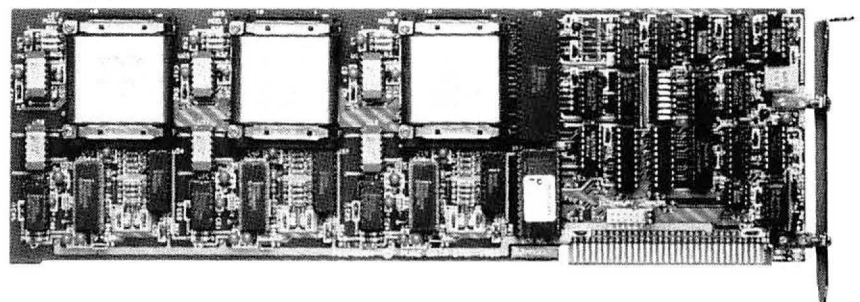
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Circle 147 on reader service card

World Events

A calendar of regional, national, and international computer events

Edited by Eric Brown

June 13-15

PC World Exposition
McCormick Place West
Chicago
An exposition and conferences on
IBM PC hardware, software, and
compatibles.
Mitch Hall Associates
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June 14-17

International Computer Show
Cologne, West Germany
A computer show featuring personal
computers for business, home, and
leisure use.
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June 15-16

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Hyatt Regency
San Francisco
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June 21-23

Great Southern Computer Show/
Jacksonville
Veterans Memorial Coliseum
Jacksonville, Florida
An exhibition, workshops, and semi-
nars pertaining to computer hard-
ware, software, and peripherals.
Great Southern Computer Show
P.O. Box 655
Jacksonville, FL 32201
904/356-1044

June 23-25

MEDCOM, the National Conference
on Computers in Medical Practice
California Masonic Memorial
Temple
San Francisco
A conference on computers in medi-
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sions and hardware and software
exhibits.
TEC/Helix
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California

June 26-28

PCEXpo
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New York
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PCEXpo
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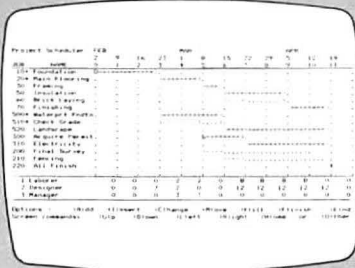
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Minneapolis

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111 E. Wacker Dr.
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August 1-3

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Summer Conference Office
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University of Oregon
Eugene, OR 97403
503/686-3460

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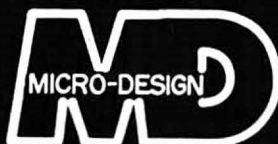
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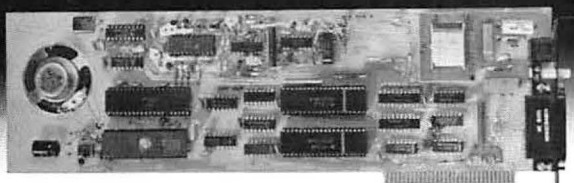
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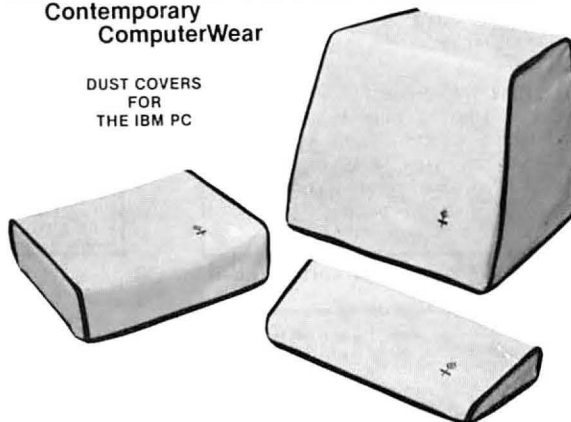
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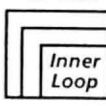
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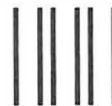
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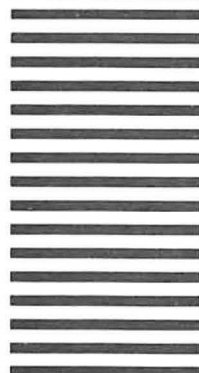
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Circle 242 on reader service card

Just Announced

The wide world of PC products

Edited by J. Schaffner

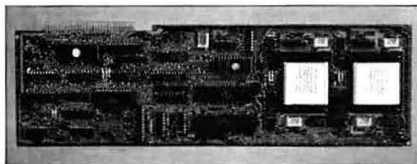
In the fast-paced personal computer marketplace *Just Announced* keeps you apprised of the latest developments in IBM PC and compatible technology. Information for this department is provided by manufacturers; these write-ups are not reviews. Many of these descriptions will be followed up by reviews in future issues.

Hardware

Boards

Bubble Drive

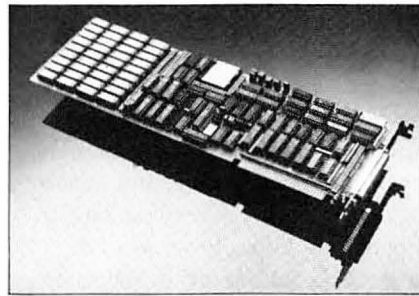
A bubble memory board with 256K or 512K that functions as a disk drive. Its nonvolatile memory is especially suitable for programs that require speed and reliability and data that must survive a power failure. A switch on the board lets the PC start up the operating system from a copy stored in bubble memory. Another switch provides write protection, preventing accidental erasure of files. Bubble Drive automatically installs itself when the computer is turned on. The board can include an optional serial port. List price: 256K \$995, 512K \$1495, serial port \$50. Hicom Computer Corp., 5016 148th Ave. NE, Redmond, WA 206/881-6030.



Bubble Drive, Hicom

Omega Diskless Memory Board

A memory board with 256K that emulates disk drives at processor speeds. When 256K chips become available, the Omega will provide a total of 1 megabyte of RAM. You can use up to 640K as directly addressable memory, leaving 360K or more for disk emulation. Software packaged with the board includes disk emulation and print spooling for DOS 2.00. Optional piggyback boards provide error checking and correction, serial and parallel ports with a clock/calendar, and an 80186 coprocessor. List price: \$995, price for optional boards not available. Mega-Omega Systems Inc., 5477 Glen Lakes Dr. #108, Dallas, TX 75231, 214/987-1340.



Omega Diskless Memory Board, Mega-Omega Systems

Computers

Execuport XL +

A portable computer with both Z80 and 80186 coprocessors that supports the MS-DOS and CP/M-86 operating systems. The Execuport XL + has 128K, a 9- by 5-inch green monitor, two floppy disk drives, two serial ports, a video jack, and a parallel port. The keyboard has a typewriter layout and 22 function keys that provide 44 programmable functions.



Execuport XL +, Computer Transceiver Systems

The monitor displays 24 lines with up to 132 characters per line. The XL + measures 18½ by 15½ by 6½ inches, weighs between 26 and 34 pounds, and has a leather-like exterior resembling a briefcase. It comes with CP/M and MS-DOS utilities, *Perfect Calc*, *Perfect Speller*, *Perfect Writer*, and *Perfect Filer*. List price: \$3945. Computer Transceiver Systems Inc., P.O. Box 15, E. 66 Midland Ave., Paramus, NJ 07652, 800/526-9068, 201/261-6800.

Network Devices

AC Soft/Net

A network for IBM and compatible microcomputers that operates under Digital Research's Concurrent CP/M 3.1. It requires 128K and one disk drive. The network is a base-band, distributed-bus system that connects as many as 255 computers with coaxial cable. With AC Soft/Net a dedicated file server is unnecessary. The network's operating system runs applications designed for CP/M-86, MP/M-86, and MS-DOS. The network software supports multitasking, windows, graphics, print spool-

Just Announced

ing, and three security levels. List price: board \$250, software \$695. Autocontrol, Inc., 11400 Dorsett Rd., St. Louis, MO 63043, 314/739-0055.

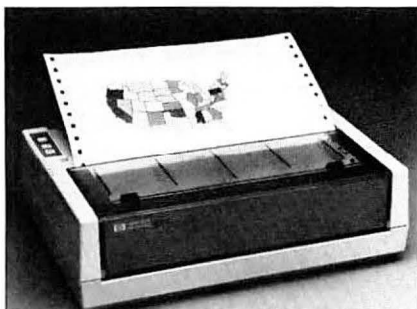
EtherStart

A chip that lets PCs without disk drives operate on an EtherSeries network. The EtherStart chip fits into a socket on the EtherLink networking board. When the computer is turned on, it loads the operating system directly from the file server. A PC without a controller board or drives can use applications within the network but cannot copy data to disk. List price: \$100. 3Com Corp., P.O. Box 7390, 1390 Shorebird Way, Mountain View, CA 94039, 415/961-9602.

Printers

ThinkJet

An ink jet, dot matrix printer that operates bidirectionally at 150 characters per second with a noise level less than 50 dBA. It requires a parallel port. ThinkJet prints 11- by 12-dot characters and has a graphics resolution of 96 by 96 or 192 by 96 dots per inch. Character sets for 12 languages can be printed in pitches from 71 to 142 characters per line. The printer handles single-sheet or fanfold paper in 8½- by 11-inch or 21- by 29.7-cm sizes. The ink jet mechanism uses inexpensive disposable cartridges. ThinkJet measures 11.5 by 8.1 by 3.5 inches and weighs 6.8 pounds. List price: \$495. Inquiries Manager, Hewlett-Packard, 1820 Embarcadero Rd., Palo Alto, CA 94303, 800/367-4772.



ThinkJet, Hewlett-Packard

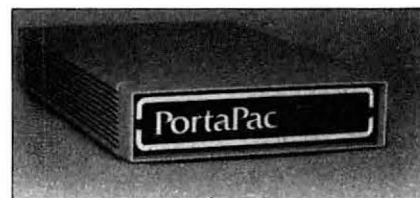
Storage Devices

Zeke

A ¼-inch tape drive that provides random access to 28 formatted megabytes of data. The external drive comes with a board that replaces the floppy disk controller in the PC and controls two floppy disk drives, an external 8-inch disk drive, and Zeke. Removable DC-600 tape cartridges can be used to back up hard disks, to move data between systems that are otherwise incompatible, and to store regular randomly accessible data. When used with a local area network, Zeke automatically backs up files as they are closed. Zeke transfers data at up to 500 kilobits per second with automatic error checking. It is plug-compatible with standard 8- and 5¼-inch floppy disk interfaces. List price: \$1995. Zetrtec Corp., 1625 Olympic Blvd., Santa Monica, CA 90404, 213/450-3934.

PortaPac 100

An external memory expansion unit that saves files written with a lap-size computer until they can be transferred to a personal computer. It requires a serial port. Designed for PC users who travel with an NEC PC-8200 or a Radio Shack 100, the PortaPac 100 measures 1.75 by 5.8 by 9.9 inches and weighs 3.75 pounds. Operating as a RAM disk, the unit stores up to 32 files in 60K (expandable to 252K). The PortaPac can store data for two days before the battery must be recharged. List price: \$395. Cryptronics, Inc., 11711 Coley River Circle #7, Fountain Valley, CA 92708, 714/540-1174.



PortaPac 100, Cryptronics

Sundown

A 5¼-inch hard disk with 10 megabytes that comes with the Venix/86 operating system already loaded. The disk fits in the extra bay of a PC and uses the existing power supply. Venix/86 provides BASIC, a C compiler, electronic mail, and a hard disk partition for both Venix/86 and MS-DOS files and programs. The operating system is available for one or several users. List price: single-user version \$2095, multiuser version \$2295. Unisource Software Corp., 71 Bent St., Cambridge, MA 02141, 617/491-1264.



Sundown, Unisource Software

System Software

Operating Systems

microSHARE

An operating system that lets three users run MS-DOS and CP/M-86 programs at the same time. micro-SHARE replaces MS-DOS in a small, shared-logic network of an XT (or a PC with a hard disk) with 640K and two dumb terminals connected through serial ports. The system includes a print spooler. Security features protect files and can prevent access to the system by modem. List price: \$499. Digitrol Computers, Inc., 440 Phillip St., Waterloo, Ontario, N2L 5R9 Canada, 519/884-4541.

Utilities

Mouse Menu

A program for use with the Microsoft Mouse that supplies menus for *Multiplan*, *1-2-3*, *WordStar*, and *Visi-Calc*. It requires one disk drive. With this utility, the mouse governs all program commands, reserving the keyboard for text and data entry. The package includes source code to permit creation of menus for programs without mouse support or alteration of the standard menus. The

Mouse Menu will be included with the Microsoft Mouse or provided separately. List price: \$25, with mouse \$195. Microsoft Corp., 10700 Northup Way, Bellevue, WA 98004, 206/828-8080.

dB>MENU!

A program that provides menus for *dBASE II* to structure data base tasks for those with little knowledge of the *dBASE II* language. It uses 20K and one disk drive. The menus provide access to commands such as EDIT, FIND, SORT, BROWSE, APPEND, INDEX, and LOCATE. An information menu includes the currently used file name, the contents of the key field, the date, the total records, and the current record number. Features include multiple key sorting and access to *dBASE II*'s "dot prompt." *dB>MENU!* keeps seven indexes and can be used to select a master index. The program can expand to support custom applications. List price: \$34.95. JNZ, Inc., 729 Windward Dr., Rodeo, CA 94572, 415/799-1446.

Multi-RAM

An integrating utility that lets the PC exchange information between nine different programs. It requires 128K and one disk drive. *Multi-RAM* works with spreadsheet, word processing, accounting, and data base programs. Users can load programs and then transfer data between them with two keystrokes. You can keep one program on a color monitor and

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run another program on a monochrome monitor. On-line help and status messages track the programs in use. List price: \$99. Softsmith Corp., 2935 Whipple Rd., Union City, CA 94587, 415/487-5900.

Applications Software

Business Management

PROTRACS

A project scheduling program that tracks 100 separate projects, each containing up to 100 tasks, by either responsibility or priority. It requires 128K and one disk drive. The program can organize tasks necessary to complete a project in order of importance and assign them to workers. For reports, tasks may be sorted and grouped in any sequence. *PROTRACS* highlights overdue items with one keystroke. The program includes six text reports, four Gantt charts, and a calendar. *PROTRACSjr*, for the PCjr, tracks up to 75 tasks per project. List price: \$59.95. Applied MicroSystems, Inc., P.O. Box 832, Roswell, GA 30077, 404/475-0832.

Communications

In-Search

An information retrieval package that provides an intelligent interface to Dialog Information Services's on-line data bases. It requires 192K, two disk drives, and a modem (any Hayes modem, Novation's Smartcat, or an acoustic coupler). Using graphics, screen prompts, and on-line help, *In-*



In-Search, Menlo Corporation

Search guides the user through research strategy and then automatically dials the network. A screen editor permits on-line modification of requests until the desired information appears. Dialog is a collection of over 200 data bases that cover recent literature and information in the fields of engineering, science, medicine, business, government, and law. List price: \$399. Menlo Corp., 4633 Old Ironsides Dr. #400, Santa Clara, CA 95050, 408/986-0200.

Construction and Engineering

FLASHCALC 1.00

A chemical engineering program that solves ten types of equilibrium flash problems and accommodates as many as 900 petroleum fractions. The program contains information on 87 hydrocarbons and inorganics. It requires 128K and one disk drive. *FLASHCALC* offers fast calculations and precision close to that of a main-

frame to designers of chemical plants and to on-site troubleshooters. Given a feed stream of up to 20 components, the program supplies all properties of feed, liquid, and vapor at temperature and pressure. *FLASHCALC* allows all input and output to be saved on disk and permits multiple calculations without requiring data to be reentered. The program has warning messages and default values to screen out faulty data. List price: \$700. Process Systems International, RD #3, Foxchase-Friendship Rd., Vincentown, NJ 08088, 609/268-0571.

Data Management

A.I.M.

A simplified data base manager designed for quick response to English-language queries. It requires 128K and one disk drive. *A.I.M.* (Attribute Inquiry Method) accepts records of 15 fields each and fields of 30 characters. A separate table holds 300 definable attributes (such as month, year, area, color, model, and type) that are coded into each record. *A.I.M.* searches for 10 attributes simultaneously and displays records as soon as they are found. Depending on disk capacity, a file holds 2000 to 4000 records. List price: \$250. CompuSoftware, 6350 LBJ Frwy. #271, Dallas, TX 75240, 214/392-0051.

dBASE II Multi-User

A network version of *dBASE II* that adds record, index, and file locking to its namesake's features. It requires 128K and runs from the network's file server. *dBASE II Multi-User* operates with TurboDOS and MP/M-86. The program works on 3Com's EtherSeries network and will eventually work with Omninet, Netware, and PCnet as well. Password security can be programmed by the user. The package comes in a four-user version that can be augmented four stations at a time. List price: four users \$1000, four additional users \$500. Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90230, 213/204-5570.

Nutshell Information Manager

A data base manager that automatically cross-indexes files, including every word in a record. It requires 256K and one disk drive. *Nutshell* allows 60,000 fields per record, 60,000 records per file, and unlimited characters per field, per key, and per record. A feature called "embedded prefix matching" lets users find a record using two or more characters. When a figure or formula in a record is changed, the program automatically corrects all the calculated fields. *Nutshell* also features deletion and addition of fields, reformatting word wrap, headers, footers, and custom reports. The program can exchange data with applications that read and write ASCII files. List price: \$395. Leading Edge Products, Inc., 55 Providence Hwy., Norwood, MA 02062, 800/423-0300, 617/769-8770.

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A score-keeping program for golfing league secretaries that helps compute handicaps. It requires 128K and one disk drive. Handicaps can be calculated according to USGA rules or modified to apply a variation of the rules. *G.O.L.F.* keeps each player's name, phone number, handicap, and 20 scores over a span of two years. The program generates ranking reports, individual score sheets, and a league roster. Leagues can have 400 players, and *G.O.L.F.* accommodates any number of leagues. List price: \$90. Taylor Consulting, 51590 Bridgewater Ct., South Bend, IN 46637.

Graphics

Microsoft Chart

A business graphics program that generates charts from a gallery of examples. It requires 128K, one disk drive, and an IBM Color/Graphics Adapter. The program offers 45 chart forms that can be modified as needed and saved for use with different sets of data. Text may be included and moved anywhere on the screen. Sixteen charts can be displayed simultaneously or overlaid. *Chart* reads data from 1-2-3, *VisiCalc*, *dBASE II*, and DIF or ASCII files. With *Multiplan*, the program can automatically incorporate changes made in the spreadsheet.

Data entered from the keyboard can be analyzed with statistical functions including linear regression and exponential curve fitting. List price: \$250. Microsoft Corp., 10700 Northup Way, Bellevue, WA 98004, 206/828-8080.

Integrated Applications

Cullinet PC Software (CPCS)

An integrated program, designed for networks, that transfers information among its data base, spreadsheet, color graphics, financial, and electronic mail components. It requires 256K, a 5-megabyte hard disk drive, a floppy disk drive, and a color graphics board. The menu-driven program has on-line help for all components. The relational data base limits a data table to 65,530 records. Most other parameters are limited only by the storage available. Users can query the data base using menu selections or commands of minimum keystrokes.

The spreadsheet component can fit different sets of data into the same model and can change a model at any time. The graphics component provides bar and pie charts and line and symbol graphs, which will change to reflect revised spreadsheets. The word processor is a complete text editor that can incorporate graphs, tables, and spreadsheets into documents. With support for the IRMA board and the IBM Asynchronous Adapter, documents can be mailed electronically to stations in a network. *CPCS* also provides 3270 terminal emulation. List price: \$995. Cullinet Software, Inc., 400 Blue Hill Dr., Westwood, MA 02090-2198, 617/329-7700.

Job and Industry Specific

Market Link

A communications program that fetches quotes from the Dow Jones News/Retrieval service while unattended. It requires 128K, one disk drive, and a Hayes Smartmodem or compatible. Using function keys, investors build a list of stock symbols for which quotes can be acquired at six preset times. Quotes are stored on disk for review at a later time. The program automatically turns off the screen when it detects an absence of activity. Both Dow Jones and The Source can be dialed with one key-stroke. List price: \$59.95. Smith Micro Software, P.O. Box 604, Sunset Beach, CA 90742, 213/592-1032.

STATMAP

A statistical and demographic mapping program that displays information in a color-coded map. It requires 128K, two disk drives, and a graphics board. The menu offers maps of states, counties, congressional districts, zip code areas, and census tracts. Statistical information can be entered manually or transferred from dBASE II or other ASCII files. STATMAP automatically creates a color-coded map, which can be enlarged to custom specifications. Maps can be sequenced for slide show presentations. List price: \$995. GANESA Group, 1495 Chain Bridge Rd. #300, McLean, VA 22101, 800/638-2225, 703/442-0442.



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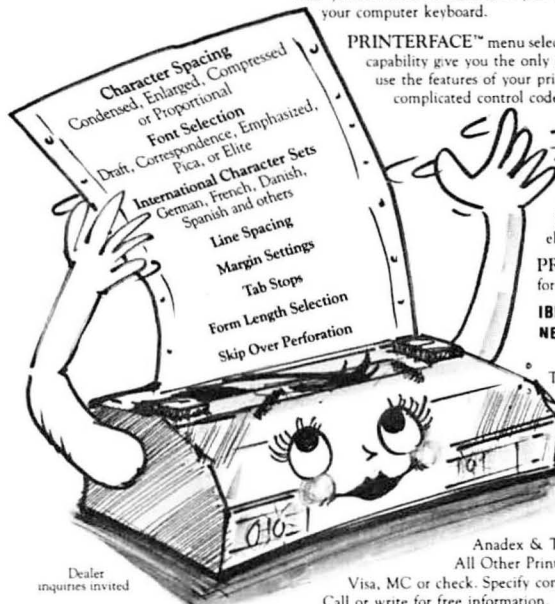
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RATS

An agricultural program that calculates nutrition ratios for domestic and wild ruminants such as dairy and beef cattle, sheep, and deer. It requires 128K and two disk drives. Answers to prompts and selections from menus effect control over amounts and ratios of roughages. The program selects protein and mineral supplements when the roughage proves inadequate. *RATS* comes with sample data files that can be modified according to seasonal variations and supplies at hand. List price: \$425. Westra-Danen Associates Inc., 12910 50 St. #204, Edmonton, Alberta, T5A 4L2 Canada, 403/478-2985.

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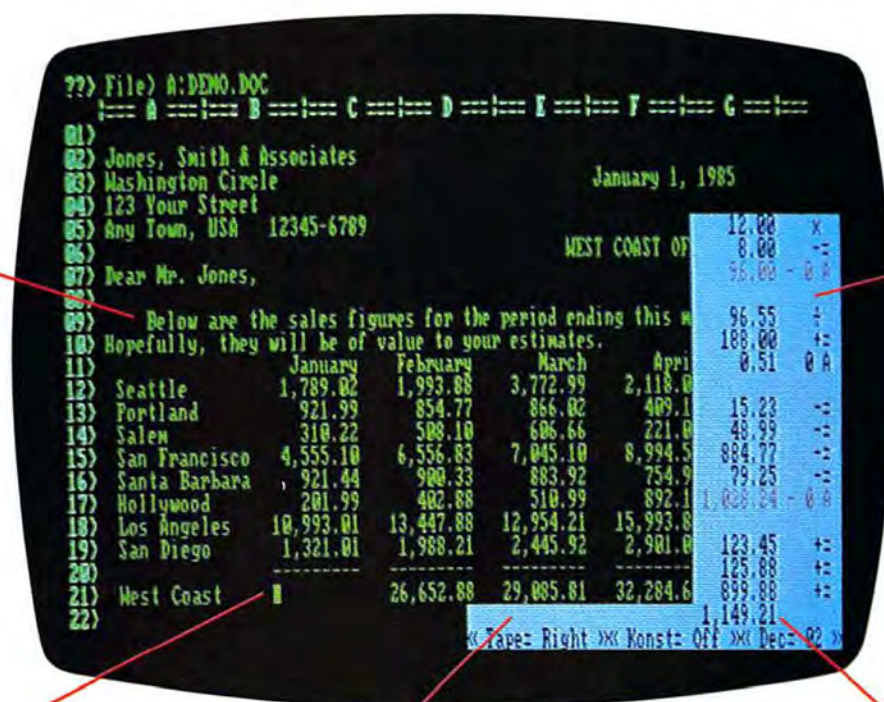
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