

# PC WORLD

Volume 1, Number 3  
\$3.00

*The Personal Computer Magazine for IBM PCs  
and PC Compatibles*

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## *How Self-Training Cures Computerphobia*

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## Special Report: IBM's XT

*The New Extended Personal Computer*

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# DOS 2.0

## *Exclusive Hands-On Look at the PC's Upgraded Operating System*

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*A PC Vision from the Prophet of Xanadu*

*The Apple-IBM Connection*

*The Elves of 'Wall Street Week'*

*A New PC (Professional Computer)*

*from Texas Instruments*



# THE PROWRITER COMETH.

*(And It Cometh On Like Gangbusters.)*

Evolution.

It's inevitable. An eternal verity.

Just when you think you've got it knocked, and you're resting on your laurels, somebody comes along and makes a dinosaur out of you.

Witness what happened to the Centronics printer when the Epson MX-80 came along in 1981.

And now, witness what's happening to the MX-80 as the ProWriter cometh to be the foremost printer of the decade.

## **SPEED**

**MX-80:** 80 cps, for 46 full lines per minute throughput.

**PROWRITER:** 120 cps, for 63 full lines per minute throughput.

## **GRAPHICS**

**MX-80:** Block graphics standard; fine for things like bar graphs.

**PROWRITER:** High-resolution graphics features, fine for bar graphs, smooth curves, thin lines, intricate details, etc.

## **PRINTING**

**MX-80:** Dot matrix business quality.

**PROWRITER:** Dot matrix correspondence quality, with incremental printing capability standard.

## **FEED**

**MX-80:** Tractor feed standard; optional friction-feed kit for about \$75 extra.

**PROWRITER:** Both tractor and friction feed standard.

## **INTERFACE**

**MX-80:** Parallel interface standard; optional serial interface for about \$75 extra.

**PROWRITER:** Available standard—either parallel interface or parallel/serial interface.

## **WARRANTY**

**MX-80:** 90 days, from Epson.

**PROWRITER:** One full year, from Leading Edge.

## **PRICE**

Heh, heh.

*Marketed Exclusively by Leading Edge Products, Inc., 225 Turnpike Street, Canton, Massachusetts 02021. Call: toll-free 1-800-343-6833; or in Massachusetts call collect (617) 828-8150. Telex 951-624.*

## **LEADING EDGE.**

*For a free poster of "Ace" (Prowriter's pilot) doing his thing, please write us.*

See Us At **BOOTH #1146**  
**COMDEX/SPRING '83**  
April 28-29, 1983  
Georgia World Congress Center and  
The Atlanta Apparel Mart  
Atlanta, Georgia

# THE LEADING EDGE IN PRINTERS

## ONE GREAT LINE. ONE GREAT WARRANTY.

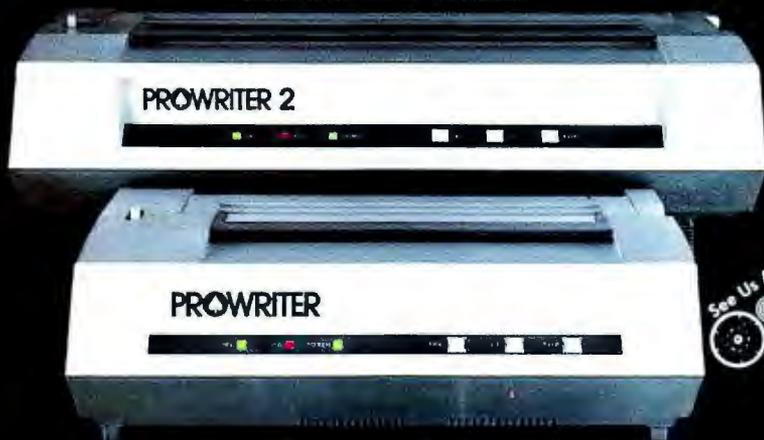
Finally, there's one full family of printers that covers every business or word processing application—all from C. Itoh, a company known for packing more product into less price; and all distributed exclusively by Leading Edge, a company known for searching out and providing that very thing. Which means that one call to one source can get you any printer, any time you need it, for any purpose. All backed by a full years' warranty from Leading Edge. (Try *that* on any other line of printers.)

### THE PRO'S.

**The Prowriters: business printers—and more.** The "more" is a dot-matrix process with more dots. It gives you denser, correspondence quality copy (as opposed to business quality copy, which looks like a bad job of spray-painting).

**Prowriter:** 120 cps. 80 columns dot matrix compressable to 136. 10" carriage. Parallel or serial interface.

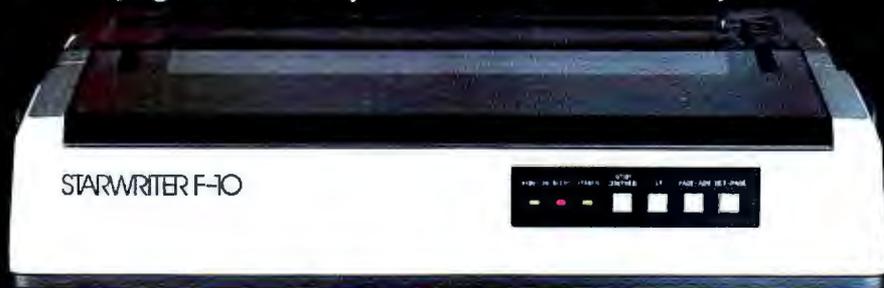
**Prowriter 2:** Same as Prowriter, except 15" carriage allows full 136 columns in normal print mode. Parallel or serial interface.



See Us At BOOTH #1146  
**COMDEX/SRING '83**  
April 25-29, 1983  
Georgia World Congress Center and  
The Atlanta Apparel Mart  
Atlanta, Georgia

### THE STAR.

**The Starwriter F-10.** In short (or more precisely, in a sleek 6" high, 30-pound unit), it gives you more of just about everything—except bulk and noise—than any other printer in its price range. It's a 40 cps letter-quality daisy-wheel with a bunch of built-in functions to simplify and speed up word processing. It plugs into almost any micro on the market, serial or parallel.



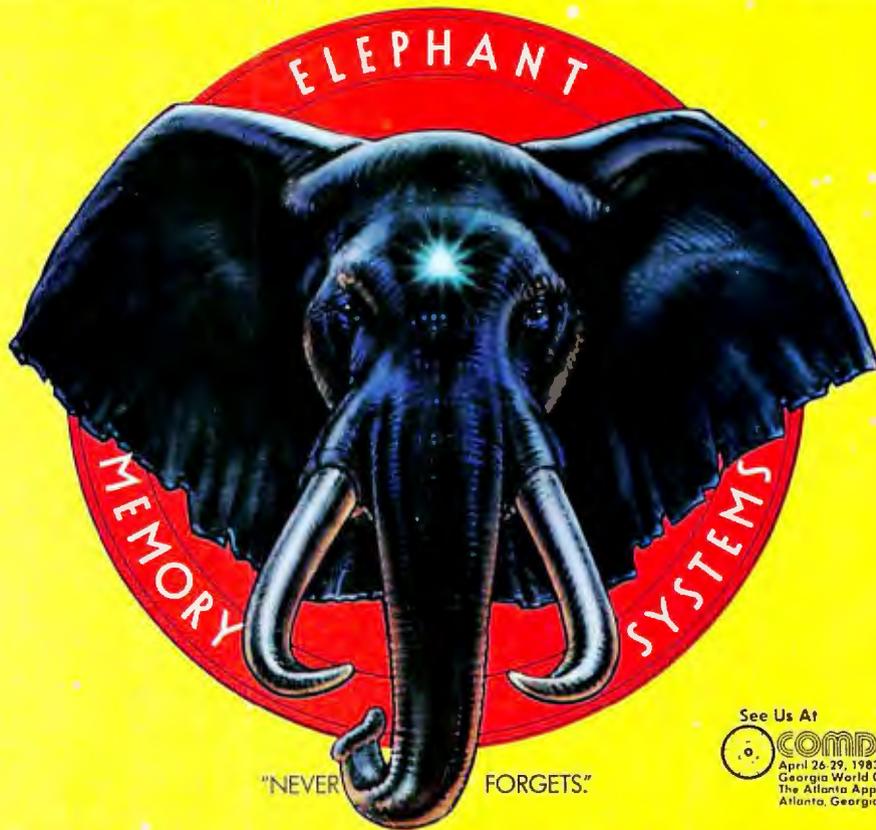
### THE MASTER.

**The Printmaster F-10.** Does all the same good stuff as the Starwriter except, at 55 cps, the Master does it faster.



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# REMEMBER:



See Us At  
**COMDEX/SPRING '83**  
April 26-29, 1983  
Georgia World Congress Center and  
The Atlanta Apparel Mart  
Atlanta, Georgia

## MORE THAN JUST ANOTHER PRETTY FACE.

Says who? Says ANSI.

Specifically, subcommittee X3B8 of the American National Standards Institute (ANSI) says so. The fact is all Elephant™ floppies meet or exceed the specs required to meet or exceed all their standards.

But just who is "subcommittee X3B8" to issue such pronouncements?

They're a group of people representing a large, well-balanced cross section of disciplines—from academia, government agencies, and the computer industry. People from places like IBM, Hewlett-Packard, 3M, Lawrence Livermore Labs, The U.S. Department of Defense, Honeywell and The Association of Computer Programmers and Analysts. In short, it's a bunch of high-caliber nitpickers whose mission, it seems, in order to make better disks for consumers, is also to

make life miserable for everyone in the disk-making business.

How? By gathering together periodically (often, one suspects, under the full moon) to concoct more and more rules to increase the quality of flexible disks. Their most recent rule book runs over 20 single-spaced pages—listing, and insisting upon—hundreds upon hundreds of standards a disk must meet in order to be blessed by ANSI. (And thereby be taken seriously by people who take disks seriously.)

In fact, if you'd like a copy of this formidable document, for free, just let us know and we'll send you one. Because once you know what it takes to make an Elephant for ANSI...

We think you'll want us to make some Elephants for you.

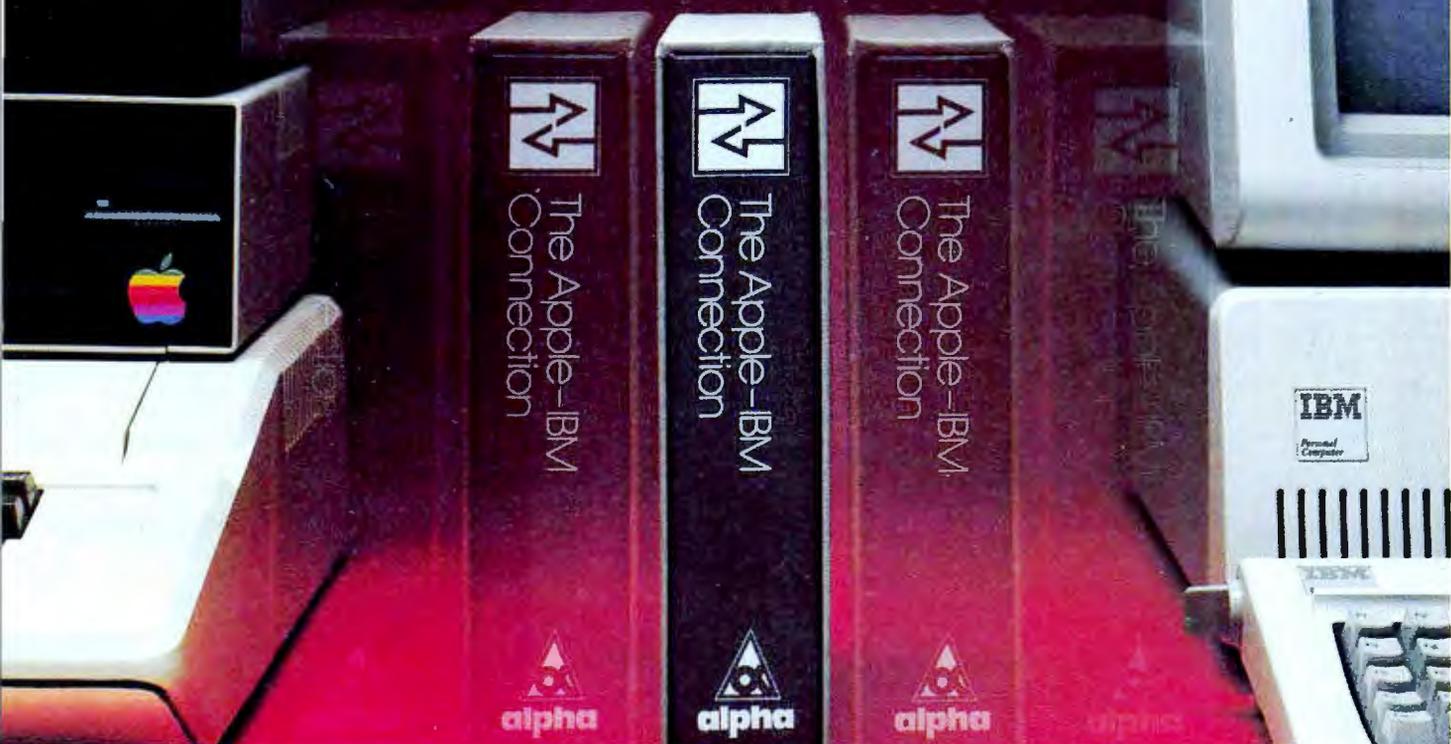
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# the Apple-IBM connection



## Transfers any file back and forth!

Increase **VisiCalc** and **Wordstar** power by transferring files from the Apple II to the IBM Personal Computer—with no retyping and no errors!

**CONNECT** Apples to IBMs, Apples to Apples, or IBMs to IBMs. Transfer information from **any** file thousands of miles—in minutes.

**UPGRADE** your 64K Apple VisiCalc to 256K IBM VisiCalc power. Your worksheets can be larger.

**INCREASE** your Apple Wordstar 130K floppy capacity to IBM DOS Wordstar 320K floppy capacity. Over twice the space on disk.

**CONTROL** communication from either side in either direction with **Master/Slave** operation.

**COMMUNICATE** with people using the **Electronic Mail** mode. The Apple-IBM Connection can be used to send messages to Apples or IBMs.

**Designed for the non-technical user**, the Apple-IBM Connection comes with a disk for the Apple and a disk for the IBM. Connect the two computers with a cable or a telephone modem and insert the disks.

Turn on the computers and the software does all the work, asking you for the name of the file being transferred, the transfer speed, and the type of connection you are using.

Less than one minute after powering up, the transfer starts. The software checks to make sure that no errors occur during transmission.

### Alpha Products for the IBM Personal Computer

All Alpha products come with **spoken instructions**.

Alpha Software—professional, innovative, and easy to use.

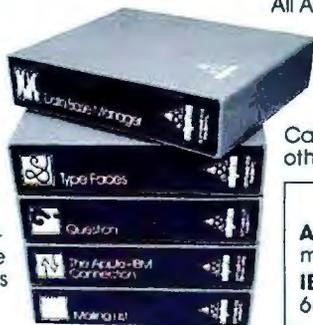
**Data Base Manager**    **Type Faces**  
**Question**    **Mailing List**

Call us for participating Computerlands and other dealers at (617) 229-2924.

### REQUIREMENTS

**Apple II**—1 Disk, 64K Memory, D.C. Hayes Micro-modem II or Mountain Hardware CPS Card.

**IBM P.C.**—1 Disk, 96K (Compiled Version) or 64K (BASIC Version). Any RS-232 Card.



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## VISICALC\*



INTERACTIVE ELECTRONIC WORKSHEET

**YES**



ON-LINE REFERENCE GUIDE

**NO**



"NAMING" OF CELLS OR AREAS

**NO**



PLAIN ENGLISH PROMPTS

**NO**



INDIVIDUAL COLUMN WIDTHS

**NO**



EXTENSIVE FORMATTING CAPABILITIES

**NO**



PROTECTED CELLS

**NO**



MULTIPLE, LINKED WORKSHEETS

**NO**



SORTING CAPABILITY

**NO**

# VisiCalc<sup>®</sup> was a swell idea for then.

**The next generation.** First generation electronic worksheets were a good idea. They were early software management tools that could eliminate a lot of hours with a spreadsheet, calculator, pencil and eraser. Enter Multiplan, the next generation electronic worksheet that's as easy to use as it is useful.

**Make comparisons.** Compare Multiplan to any of the earlier electronic worksheets. We've given you some "prompts" above.

**Compare learning time.** Multiplan's tutorial book brings you up to speed. Fast. But Multiplan doesn't stop there. Multiplan's On-line Reference Guide gives you instant help if you have questions. It knows where you are in Multiplan and offers information related to your problem, right on the screen.

**Compare ease of use.** All Multiplan prompts are full length words or phrases. And Multiplan provides "naming," the ability to assign a plain English name to any

cell or area. "Gross Profit = Sales—Cost" rather than "AA44 = AZ23—BK154." Which means you can work more intuitively. And faster.

**Compare utility.** Multiplan lets you link related worksheets so that information is transferred between them automatically. For instance, you can keep regional sales forecasts on separate sheets but link them with your overall company forecast. Then, just change the forecast for any region, and the company forecast sheet is updated automatically. Something you can't do with first generation worksheets.

**Compare reports.** Not just the work you can do, but the way you can present it. Multiplan's flexible formatting options allow you to produce presentation-quality reports. And its sorting capability lets you sort by either alphabetic or numeric order. So a sales manager who normally lists sales regions alphabetically could sort by amount sold and conveniently rank by sales performance. The

\*Based on features in releases VC-202B0-AP2 and VC-156Y0 IBM of VisiCalc on the Apple II and IBM-PC respectively

# MULTIPLAN

**NOW AVAILABLE FOR THE IBM PERSONAL COMPUTER**



INTERACTIVE ELECTRONIC WORKSHEET

**YES**



ON-LINE REFERENCE GUIDE

**YES**

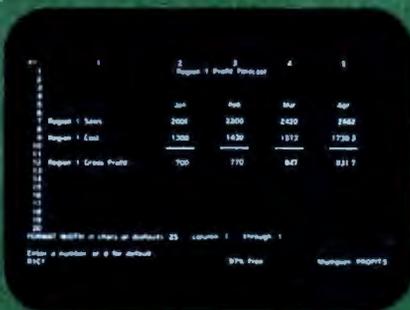


"NAMING" OF CELLS OR AREAS



PLAIN ENGLISH PROMPTS

**YES**



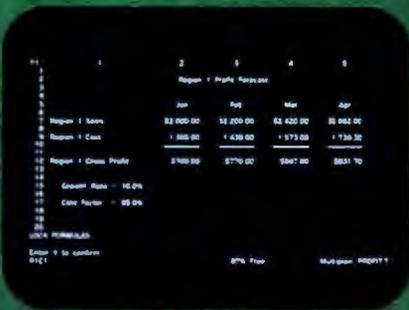
INDIVIDUAL COLUMN WIDTHS

**YES**



EXTENSIVE FORMATTING CAPABILITIES

**YES**



PROTECTED CELLS

**YES**



MULTIPLE, LINKED WORKSHEETS

**YES**



SORTING CAPABILITY

**YES**

# Multiplan™ is a great idea for now.

result is a more meaningful and precise presentation of data. **Compare availability.** With Multiplan, you're not limited to a single range of computers. Multiplan is available for Apple™ and for microcomputers that run MS™-DOS, XENIX™, or CP/M-80™ operating systems. Multiplan supports both 40- and 80- columns on the Apple II.

**Compare the source.** Microsoft was the world's first microcomputer software company. Today, Microsoft software is running in well over a million installations, worldwide. Languages. Utilities. Business programs. All, maintained at the state-of-the-art.

**Compare for yourself.** Drop into your computer store. Compare Multiplan's powerful, user-oriented features to any electronic worksheet on the market. If you've been using VisiCalc, Multiplan's ability to directly utilize your VisiCalc files lets you easily upgrade to Multiplan. And that's just another of the many features designed

to make Multiplan the electronic worksheet for now. And years from now.

**BETTER TOOLS FOR MICROCOMPUTERS**

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## Expand your possibilities with Concurrent CP/M.™

If you have to wait impatiently for your personal computer to finish a job before moving on to another task, you need Concurrent CP/M. This new software technology from Digital Research increases the productivity of your IBM PC by allowing you to do more with it.

Using Concurrent CP/M, you can run several programs simultaneously, switching instantly from one program to another. For the first time you can write a letter while you do your financial planning. For the first time you can write text while printing other documents. For

the first time you can edit programs while your program compiles. Concurrent CP/M is the best investment you can make in microcomputing because it multiplies the value of your hardware and lets you use all the CP/M compatible programs. And if you're developing software, it ensures that you're on the crest of the hottest new wave in the business.

So quadruple the effectiveness of your IBM Personal Computer with Concurrent CP/M. Now available through the CP/M Library.™ See your local microcomputer dealer or contact Digital Research, 160 Central Avenue, Pacific Grove, CA 93950 (408) 649-3896.

# Now your IBM PC can do more than one thing at a time.

The image shows a person from an overhead perspective, sitting at a desk with four computer monitors. Each monitor displays a different application:

- Top Left Monitor:** An email message.
 

TO: Frank Bullfinch  
FROM: Steve Smith  
RE: Staff Meeting

Frank,  
This memo is to remind you of our staff meeting, which will be held this Friday at 10:00 a.m. in the boardroom. The major objectives of this meeting will be to review the sales figures for the past fiscal year, and to project what level of business we can realistically expect to achieve next year.

I think we all recognize how important this meeting will be. The marketing manager will be in attendance to help us develop key accounts for our sales team. Hopefully, by the end of the meeting we will have a well defined strategy to help us meet our objectives.

Regards,  
Steve

Computer-3 Spreads Printer-3 IBM 16:27:35 Stop
- Top Right Monitor:** A calendar for Friday.
 

Friday

9:00 - 9:30 Weekly project status

10:00 - 12:00 Staff Meeting  
Note: Marketing Manager will attend

12:00 - 1:00 Lunch with Jimmy

2:00 - 3:00 Interview J.E. For Marketing Rep Position

4:30 - 5:00 Review Daily Mail

7:00 - Bill and Jimmy meeting for Marketing Rep Dinner

Computer-3 Spreads Printer-3 CALNDAR 14:28:00 Stop
- Bottom Left Monitor:** A financial statement titled "January Annual for World Shipping".
 

Number	Amount	Date	Amount	Description
1000	100	10/1/82	15.00	Gas bill
1001	250	10/2/82	20.00	Cash
1002	100	10/4/82	12.25	Florida Bill
1003	200	10/5/82	121.40	Gas repair
1004	400	10/9/82	51.50	Paul
1005	300	10/11/82	9.25	Tips
1006	100	10/12/82	71.42	Phone bill
1007	100	10/15/82	45.21	Dinner
1008	100	10/18/82	200.00	Dinner repair
1009	400	10/21/82	32.50	Dinner
1010	100	10/22/82	25.20	Cable TV
1011	200	10/24/82	0.00	CD
1012	200	10/25/82	263.25	Stephen's ticket
1013	100	10/27/82	42.50	Rm charge
1014	200	10/28/82	42.50	Thomas's ticket

Computer-3 Spreads Printer-3 BILL 16:32:00 Stop
- Bottom Right Monitor:** A bar chart titled "Projected units shipped in 1983".
 

Projected units shipped in 1983

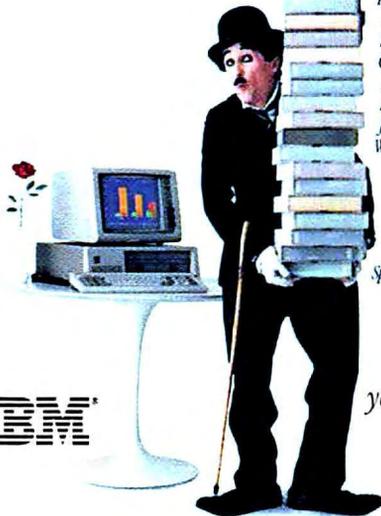
The chart shows a steady increase in units shipped from January to December, with a significant jump in the final quarter.

Computer-3 Spreads Printer-3 BAR 17:04:00 Stop

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 Athletic statistics  
 Structural engineering  
 Medical office system  
 Medical diagnostic analysis  
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 Personal tax planning  
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 Address file updating  
 Spelling checker  
 Name directory  
 Order entry  
 Utility billing  
 Retail management  
 Project costing  
 Mail list management  
 Money market management  
 Investment analysis  
 Playing blackjack  
 Electronic mail  
 Activity organizer  
 Survey analysis  
 Electronic spreadsheet  
 Statistical study/cross tabulation  
 Project tracking  
 Business marketing  
 Hypothesis testing  
 Quantitative decision making  
 Time billing  
 Filing system  
 Inventory control  
 Scheduling/organizing  
 Cash flow analysis  
 Database sort/index  
 General ledger  
 Tax planner  
 Household inventory  
 Learning Pascal  
 Fantasy games  
 Payroll  
 Project planning  
 General accounting  
 Accounts payable  
 Accounts receivable  
 Job costing  
 Word processing  
 Business graphics  
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 Touch typing lesson  
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 Financial analysis  
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# INTRODUCING 1-2-3™ IT'LL HAVE YOUR IBM/PC JUMPING THROUGH HOOPS.



Meet 1-2-3 – the remarkable new software package that puts more raw power at your finger tips than anything yet created for the IBM PC. 1-2-3 actually combines information management, spreadsheet, and graphing in one program that can perform all three functions interchangeably and instantly at the touch of a key. That's power.

To explain: since 1-2-3's information management, spreadsheet and graphing functions reside in memory simultaneously, you can go from retrieval to spreadsheet calculation to graphing instantly, just by pressing a few keys. So now you can experiment and recalculate and look at data in an endless variety of ways. As fast as your mind can think up new possibilities. There's no lag between you and the computer. And that's a new kind of power – power that's greater than the sum of its programs.

## The spreadsheet function.

If 1-2-3 were just a spreadsheet, you'd want it because it has the largest workspace on the market (2048 rows by 256 columns). To give you a quick idea of 1-2-3's spreadsheet capabilities: VisiCalc's spreadsheet for the IBM PC offers 15 arithmetic, logical and relational operators, 28 functions and 32 spreadsheet-related commands. 1-2-3 has 15 operators,

41 functions and 66 commands. And if you include data base and graphing commands, it actually has 110!

In addition, 1-2-3 is up to 50 times as fast as established spreadsheets. With all the features you've ever seen on spreadsheets. 1-2-3 also gives you the capability to develop customized applications (with 26 macro keys) and lets you perform repetitive tasks automatically with one keystroke. If 1-2-3 were just a spreadsheet, it would be a very powerful tool. But it's much, much more.

## The information management function.

Add to 1-2-3's spreadsheet a selective information management function, and the power curve rises at an awesome rate. Particularly since 1-2-3's information management capability reads files from other programs such as Word-

Star, VisiCalc and dBase II. So you can accumulate information on a limitless variety of topics and extract all or pieces of it for instant spreadsheet analysis. Unheard of before. Specific 1-2-3 information management features include sorting with primary and secondary keys. Retrieval using up to 32 criteria. 1-2-3 performs statistical functions such as mean, count, standard deviation and variance. It can produce histograms on part or all of the data base. 1-2-3 also

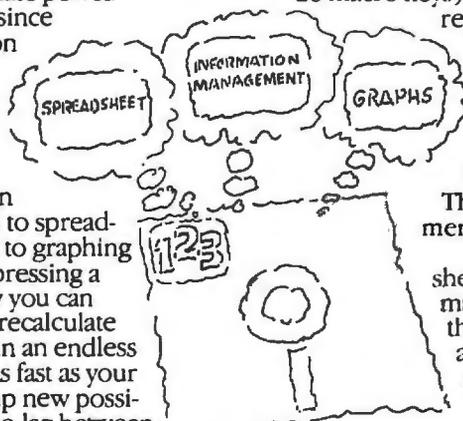
allows for the maintenance of multiple data bases and multiple criteria.

## The graphing function.

1-2-3 enables you to create graphs of up to six variables using information already on the spreadsheet. And have it on screen in less than two seconds! Once you've made a graph, three keystrokes will display it in a different form. If data on the spreadsheet changes, you can display a revised graph with one keystroke. This instant relationship of one format to another opens up a whole new application area. For the first time graphics can be used as a "what if" thinking tool!

For a full demonstration of 1-2-3's remarkable power, visit your nearby 1-2-3 dealer. For his name and address, call 1-800-343-5414 (in Mass. call 617-492-7171).

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Spreadsheet, graphing,  
information management all in one



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# PC WORLD

*The Personal Computer Magazine for IBM PCs  
and PC Compatibles*

## ☉ State of the Art

- 42 **2.00: The Path to UNIX**, *Harry Miller*  
*Microsoft's new DOS points the way to the  
operating systems of the future.*
- 54 **An Overview of the XT**, *Steven Cook*  
*The new kid on the block looks strangely familiar.*
- 66 **Extending the XT**, *Kearney Rietmann*  
*Manufacturers revise their game plans.*
- 71 **The 68000 Sleeper**, *Adrian Mello*  
*The neglected IBM 9000: out of the lab and onto  
the desktop?*
- 75 **Ma Bell's Favorite DOS**, *Jean L. Yates and  
Eileen Skrabutenas*  
*The past, present, and future of UNIX.*

## Departments

- 13 **David Bunnell**
- 15 **REMark**, *Charles Kelly*
- 19 **Letters**
- 40 **Andrew Fluegelman**
- 87 **PC World View**, *Miriam Medom*
- 319 **\*.\***, *Edited by Andrew Fluegelman*
- 322 **BBS Watch**, *Gene Plantz*
- 330 **User Group Dispatch**, *Anna Bunker*
- 348 **World Events**
- 390 **Just Announced**, *Edited by Adrian Mello*

## ☉ Review

- 100 **In This Corner...the TI Professional**,  
*Danny Goodman*  
*The contender from the Lone Star State challenges  
Big Blue.*
- 113 **Data Management without Programming**,  
*Robert Levering*  
*A novice reviews dBASE II.*
- 124 **Torture Testing dBASE II**, *Richard Colman*  
*Take your data base to the limit.*
- 140 **Self-Training on the PC**, *Christine Whyte*  
*Grading the teachers: reviews of six popular PC  
tutorials.*
- 148 **Two Rooms, Ocean View**, *Ellen Rony Wilson*  
*Enter The Landlord.*
- 158 **Apartment for Rent—See Manager**,  
*Thomas R. Phillipi*  
*The Apartment House Manager: some are  
friendlier than others.*
- 161 **Brown Is Brown!** *Karl Koessel*  
*The IBM Color Display—true Blue quality.*

## Volume 1, Number 3

### ● Hands On

- 170 **MS-DOS 2.00: A Hands-On Tutorial**, *Tom Sheldon*  
*Find your way through the forest of tree-structured files.*
- 186 **The Elves of "Wall Street Week,"** *Andrew T. Williams*  
*Know what Louis Rukeyser will say before he says it.*
- 196 **The Apple-IBM Connection**, *Richard Steck*  
*Graft your PC onto the Apple tree.*
- 208 **Building a BASIC Program**, *Donald B. Trivette*  
*Learn by doing—a little tinkering is all it takes.*
- 220 **How the PC Thinks**, *Peter Norton*  
*Passing data between Pascal and assembly language subroutines.*
- 227 **Around in Circles**, *Dan Illowsky and Michael Abrash*  
*A tutorial that makes graphics as easy as pi.*
- 260 **Shuffles**, *Karl Koessel*  
*An explanation of card-shuffling techniques.*
- 273 **BASIC 2.0**, *Karl Koessel*  
*A better BASIC.*
- 280 **Extended Disk Directory Program**, *Kevin Scoot*  
*Utility of the month.*
- 285 **WordStar Patches—P.S.**, *Steven Cook*  
*A few more tips to have it your way.*

### ● Community

- 292 **The Prophet from Xanadu**, *Clifford Barney*  
*Project Xanadu, the new brainchild of computer visionary Ted Nelson.*
- 296 **The Corporate Computer**, *Lisa B. Stahr*  
*The impact of the personal computer in the corporate world.*
- 309 **Feuding to Do Business**, *Katie Seger*  
*Savings or support? The pros and cons of mail order versus retail stores.*
- 315 **X.T. Phone Home**, *Jeremy Joan Hewes*  
*IBM expands its customer and dealer support services.*

### PC World Directory

- 370 *A convenient guide to products and services.*

### Indexes

- 398 **Products**  
402 **Advertisers**

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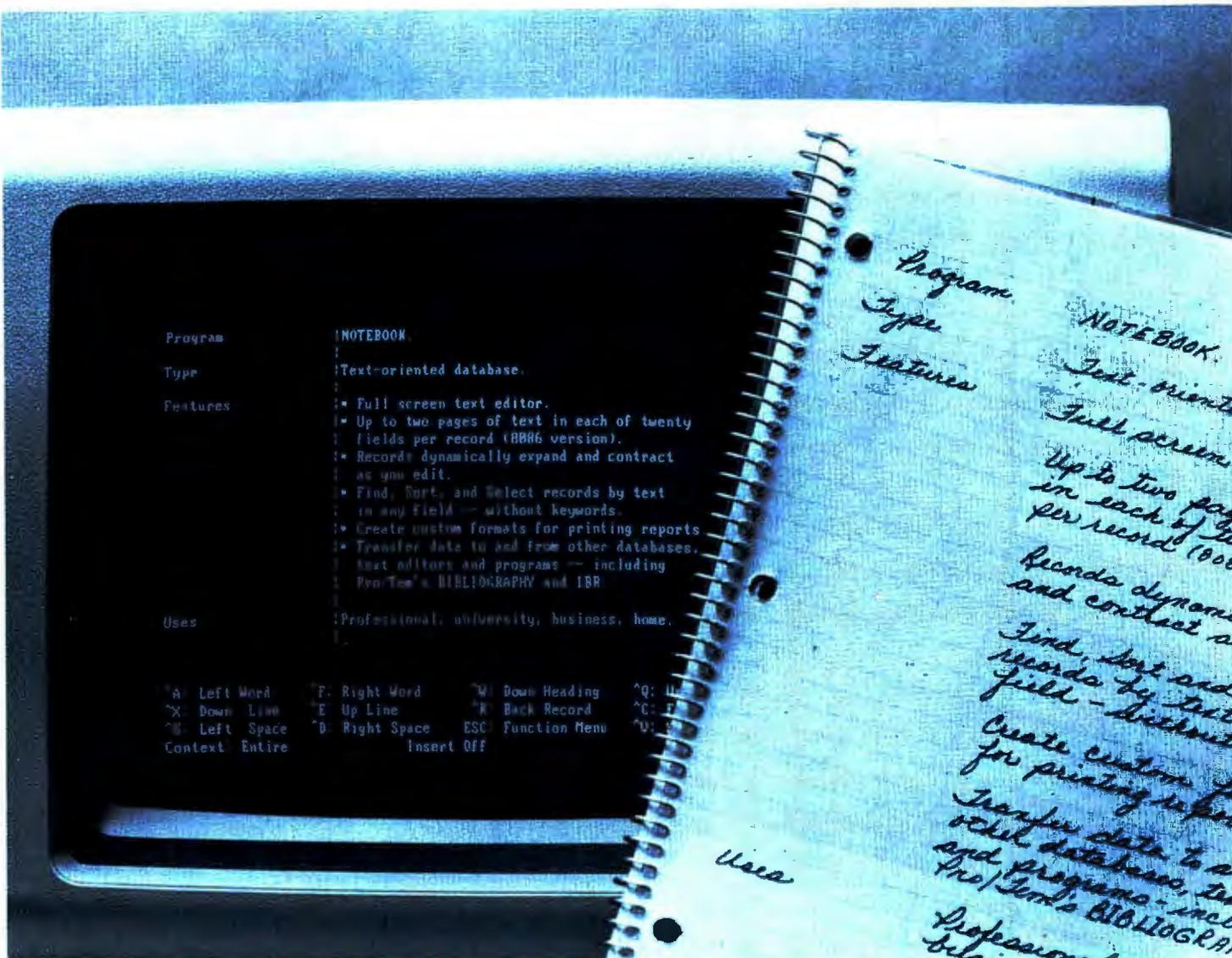
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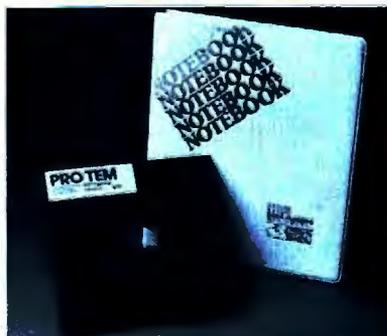
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# The Gigantic PC World to Come

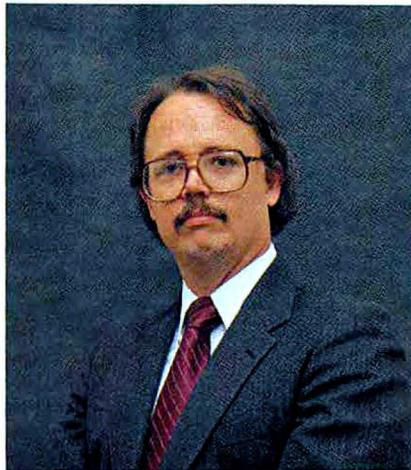
Eight years ago, in 1975, the first personal computer arrived on the scene. Within four years there were 100,000 PCs up and running and over 100 companies in the market, and the industry had reached a plateau. We were tiny.

In 1982 the delivery of some 200,000 IBM Personal Computers gave personal computing a tremendous boost. As PC pioneer Paul Conover likes to muse, the PC market passed the potato chip industry in gross revenue. This year IBM will sell about 500,000 PCs while the sales of PC lookalikes will add another 100,000 units, if not more. And the sum total of all this is only about 30 percent of the market. When you throw in Radio Shack, Apple, Hewlett-Packard, Cromemco, and the many dozens of smaller computer manufacturers, you have an overall hardware market for 1983 of \$10 billion plus.

But here's the clincher. In 1984 the PC market will triple and in 1985 it will triple again. You figure out the arithmetic. The graffiti is on the wall: personal computing will soon cease to be big—it will be gigantic.

## Software As Rocket Fuel

While there will always be refinements, the hardware for this revolution already exists. When we need super high-resolution graphics



and animation, true 32-bit microprocessor chips will replace the PC's 16-bit brain to become the new hardware standard. However, this is eons away—in computer terms, three to seven years.

Meanwhile, hard-disk-based 16-bit systems such as the IBM Personal Computer XT have two new tremendous frontiers to explore. One is multitasking, the PC's ability to run more than one program at a time, and the other is office networking, connecting PCs, big computers, and peripherals to enable them to communicate and share files and functions. These frontiers are the key to the personal computer moving in on its next huge market—the big corporations.

Corporate managers need PCs with the capacity to integrate desktop applications such as spreadsheets,

data bases, and word processing, while at the same time monitoring the message channels from surrounding and distant environments. Personal computers in this environment need a variety of output devices such as letter quality printers, graphic printers, and modems, but cramming offices with computer peripherals wastes both money and space.

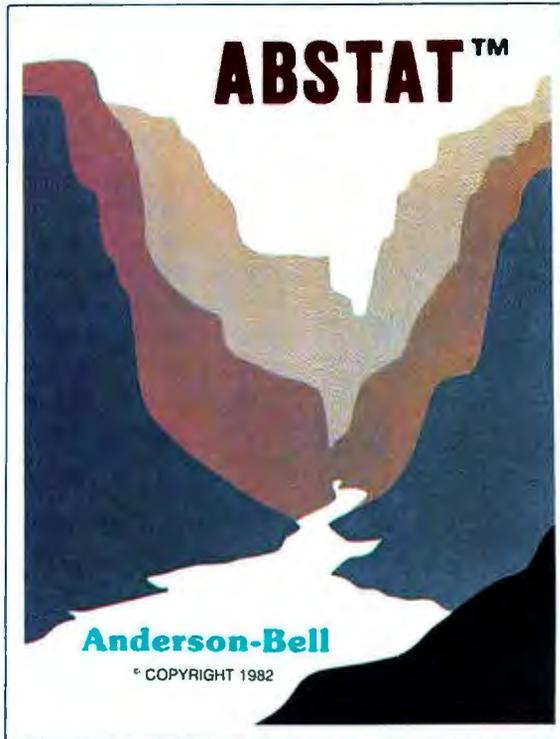
Aside from the individual manager's needs is an overall corporate need to maintain standard methods of operation and control of information.

According to research done by Future Computing Incorporated, the Richmond, Texas, based market research firm, by the end of 1983, 1 million personal computers will be installed in Fortune 1000 companies. By 1988 this number will grow to 5 million, representing a market penetration of 50 percent.

After the corporate world, the next big area of growth for PCs will probably be the educational market. At the same time a different animal, the home computer, will make a massive invasion of middle-class America.

The driving force for all this will be software. During the music boom of the '60s, people bought record players in order to hear the records. Janis Joplin sold more hardware than Bill Cosby ever will.

**Statistical analysis on the IBM-PC is not only easier and faster with ABSTAT but you can even use it with your dBase II files.**



If you are using dBase II for accounting, inventory control, marketing or scientific applications, ABSTAT provides you with the ability to perform statistical data analysis with ease!

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ABSTAT facilities include full data manipulation and editing, on line help and comprehensive statistical procedures, including analysis of variance, cross tabulation, multiple regression, Z scores and much more.

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David Bunnell

The desktop metaphors of *Visi/ON* and *Lisa* are the beginning of a new creative vision whereby software will emulate the working patterns of people; machines will become people-literate. This trend will sell lots of hardware.

Meanwhile, network software has to break the bonds of big-computer thinking. Personal computers with their so-called native intelligence

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The graffiti is on the wall: personal computing will soon cease to be big—it will be gigantic.

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need more versatility and better interfacing—and how about tying PCs together using the best telephone technology? Here's a new battle cry for the '80s: One Desktop, One Machine!

So What Does It Mean Anyway?

OK, it's 1990 and we've all got computers. What then? I think we should start thinking very seriously about the meaning of all this. Personal computers are tremendous productivity tools. Does this mean that people will be working less, or does it mean that we will simply be doing more?

All this intelligence at one's fingertips...I've heard a lot about the advantages of PCs, and I'm tempted to believe it, but I've heard little of the down side, and with all technology there seems to be two sides. Automobiles are certainly a good example.

In the future we will be looking for answers about the impact of PCs that we will want to publish. I hope the readers of *PC World* will understand if we occasionally skip from the world of bits and bytes to the human sector.

---

# The Copy Protection Nuisance Tax

Personal computer business software is advertised as convenient and time-saving. Usually this claim is fulfilled. One glaring exception, however, is copy-protected software.

Many personal computer owners now take advantage of the benefits of hard disks. By adding a hard disk to their systems, they gain quick access to programs, data, and read and write operations; they increase the number of files available; and free themselves from the process of switching from one floppy disk to another. But these benefits are denied when software is copy protected.

A simplistic analysis might indicate that copy-protected software protects authors and publishers from software piracy. But programs from companies such as Central Point Software, Nagy Systems, and Norell Data Systems can easily duplicate protected software onto another floppy disk. What these programs cannot do, however, is transfer the software to hard disks. The result is that any person or group that intends to pirate software can do so easily, while people who wish to use their software with a hard disk cannot.

## Business Software Protection

Powerful protection for business software authors exists. This protection resides in laws enacted by federal and state legislators, who have recognized the effects of software piracy. The



users of business software (corporations, small businesses, hospitals, universities, and government agencies) cannot afford to abuse the copyright laws, and they cannot keep secrets where piracy is concerned. Even inside a business it is impractical to use software illegally because employees (especially disgruntled ones) make very effective watchdogs.

What is the cost of copy protection? Besides wasting time, the risk of losing programs to damaged or destroyed floppy disks puts users in the position of playing Russian roulette with their software. Copy pro-

tection also forces users to pay a cash tax to the authors of transfer programs. Publishers of copy-protected software have created a new software industry that produces programs to defeat copy protection protocols. The original publishers derive no profit from this new market, and users are required to pay a tax ranging from \$25 to \$50 to copy software for legitimate reasons.

## Alternatives

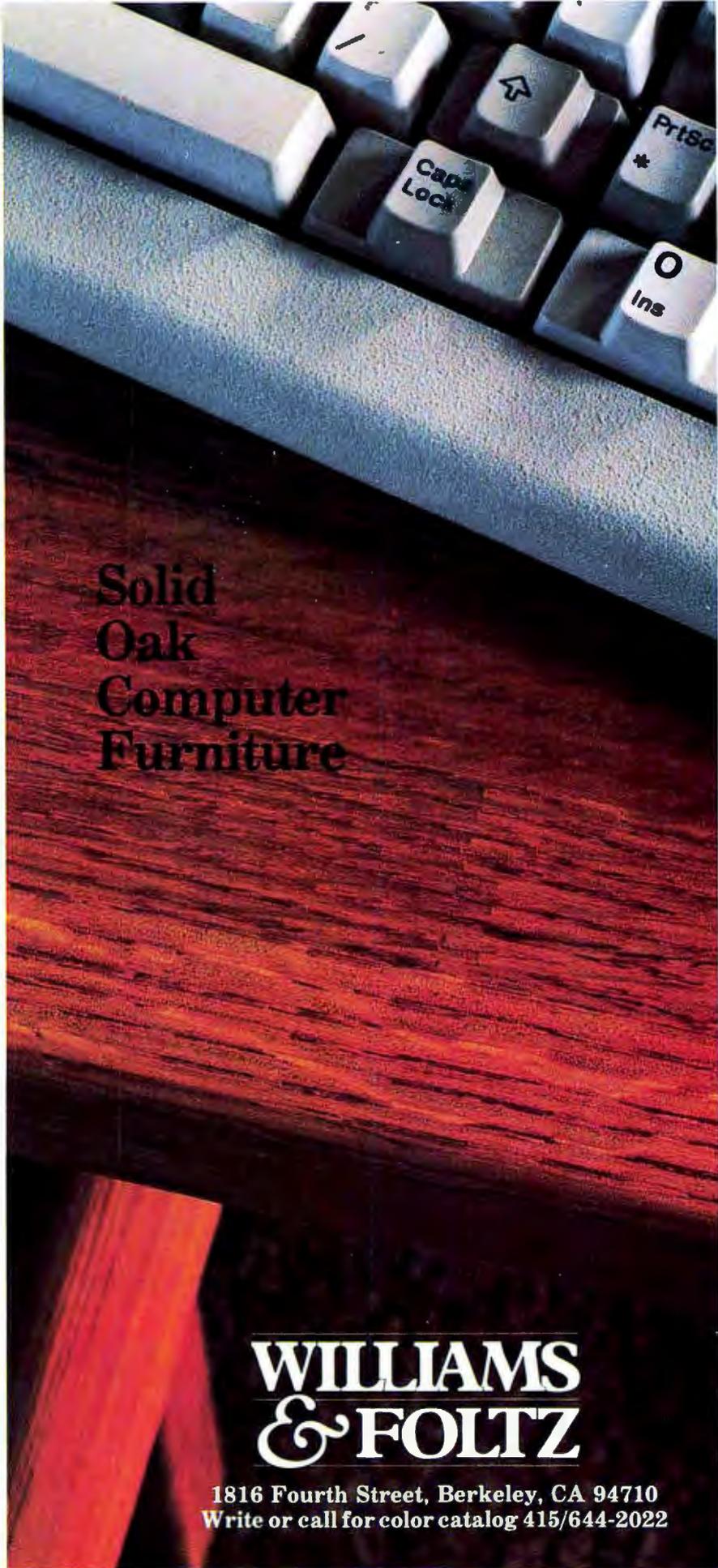
There are alternatives to copy protection. Business users cannot afford to be exposed to the civil and criminal penalties resulting from abuse of existing copyright laws. Collective legal actions, such as those used in the video industry, can deal with risk-taking companies that attempt to evade the law. Besides legal remedies,

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There are alternatives to copy protection.

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there are other ways to deal with software problems. Emerging Technology Consultants, creator of *EDIX* + *WORDIX*, uses a simple appeal to honesty and morality. I believe that this is very effective. Micro Data Base Systems, creator of *MDBS-III*, encrypts a serial number into its



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code. The serial number does not affect the transferability of its programs; however, the company issues a strong warning that all copies are traceable to the original owners and that it will take legal action to protect its rights.

Both of these companies, along with all responsible software publishers, suggest that users make copies of their original distribution disks and further suggest that they never work with the distribution disks.

---

Copy protection forces users to pay a cash tax to the authors of transfer programs.

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## High Hopes

One hopes that software publishers will act reasonably and responsibly. Perhaps those that use copy protection will give up the practice once they realize that the small increase in revenues gained from copy-protected software is more than offset by the inconvenience, time loss, and nuisance taxes paid by users.

Alternatively, market forces might lead progressive publishers to advertise that their products are hard disk compatible, forcing other publishers to follow this practice. Consumers should realize that few unique software products exist on the market and refuse to purchase any software product designed with a software protection scheme.

---

*Charles Kelly is a professor in the School of Business at the University of San Diego, where he teaches courses in data processing, computer science, and finance.*

# HOW TO GET MORE DONE BY TYING UP YOUR PERSONAL COMPUTERS.

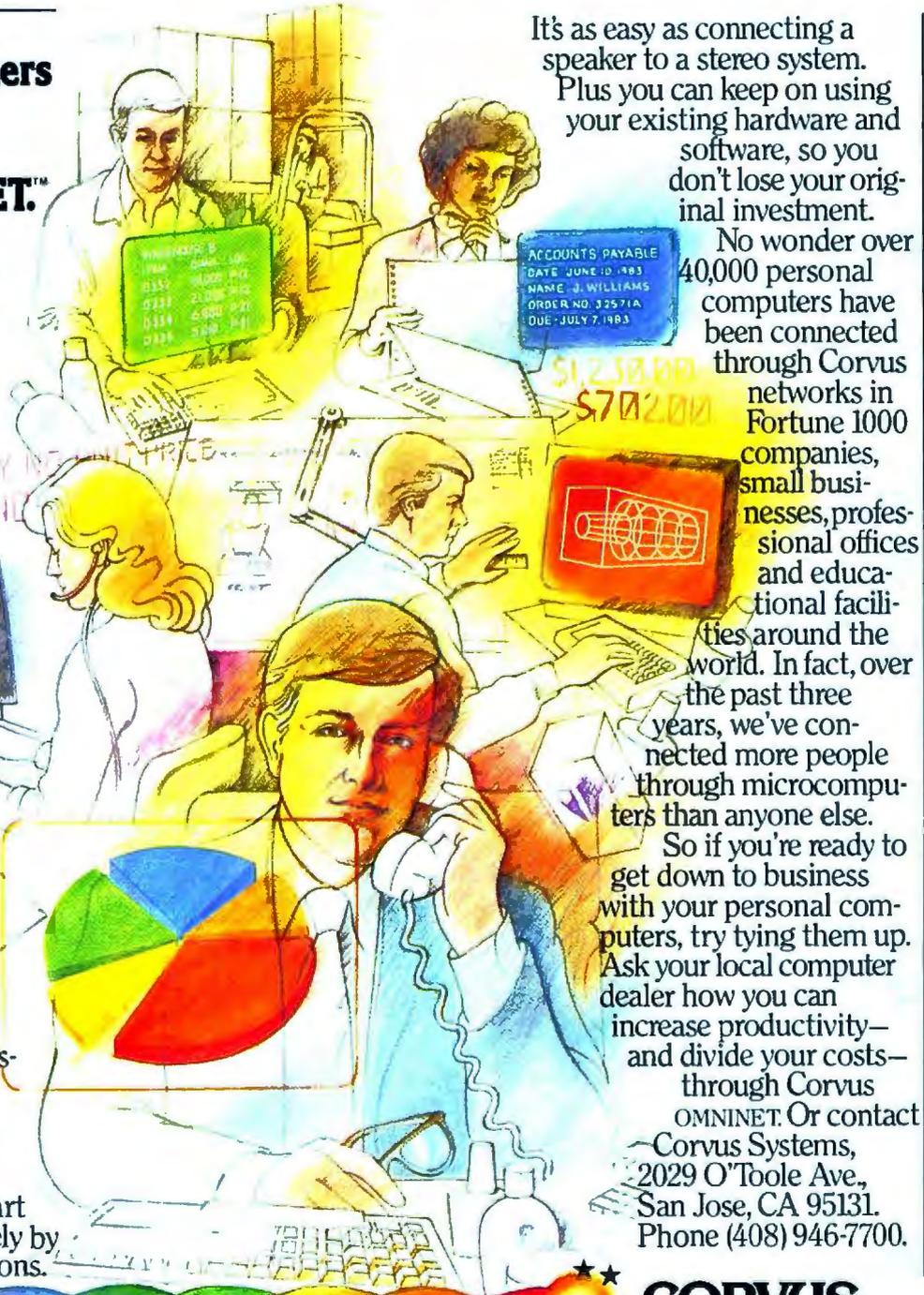
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## Now you can tie your personal computers together—and be more productive—with Corvus OMNINET.™

An OMNINET local area network connects over 60 personal computers, so you can share common equipment—even different computer brands.\* More importantly, you can share the costs of high-performance peripherals, such as printers and Corvus hard disks storing up to 80 million characters.

OMNINET also improves productivity by letting you share common programs and data. That makes it cost effective to turn your stand-alone personal computers into multi-purpose workstations. So now they can realize their full potential for both word processing and number crunching. And things as diverse as electronic spreadsheets, business graphics and electronic mail.

With OMNINET you can start small, and expand inexpensively by simply adding more workstations.



It's as easy as connecting a speaker to a stereo system. Plus you can keep on using your existing hardware and software, so you don't lose your original investment.

No wonder over 40,000 personal computers have been connected through Corvus networks in Fortune 1000 companies, small businesses, professional offices and educational facilities around the world. In fact, over the past three years, we've connected more people through microcomputers than anyone else.

So if you're ready to get down to business with your personal computers, try tying them up. Ask your local computer dealer how you can increase productivity—and divide your costs—through Corvus OMNINET. Or contact Corvus Systems, 2029 O'Toole Ave., San Jose, CA 95131. Phone (408) 946-7700.

\*OMNINET currently ties together Apple II, Apple II CP/M, Apple III, IBM PC, and the Corvus Concept™ and soon the NEC PC8001, DEC VT180, Zenith 289/90 and 2100, S-100 bus computers, and TI Professional Computer.

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# Letters

## ProKey Chimes Back

There were several errors in "ProKey Chimes In" (*PC World*, Vol. 1, No. 1). *ProKey* version 2.11 definitely supports redefining the Backspace key. Moreover, it allows you to redefine any Control key, including Ctrl-Backspace, ENTER, Ctrl-ENTER, and Esc. We've been delivering version 2.11 since mid-December 1982.

Several of the most important features that differentiate *ProKey* from its competitors were trivialized as "interesting features." That is an enormous understatement. Variable and fixed fields are essential for convenient and powerful keyboard macros. Nested definitions allow one to completely hide all system details (including *ProKey* itself) so that unskilled users—e.g., temporary help—can effectively use the IBM PC with almost no training.

It is true that *ProKey* issues no written prompts during normal operation, but that does not mean that there are no prompts. *ProKey* informs the user of what's going on by changing the cursor in a logical and pleasing way. There are, after all, only three modes. *ProKey* does issue written messages if the user makes an error.

*ProKey* allows you to record from your actual work without exiting to a special "compose mode." Again, this is not merely interesting—it is important. Without this feature the end user is forced to define strings purely from memory, without interactive feedback from the computer.

The paragraph on editing macros is misleading. Most end users already own a word processor or text editor—the very best macro editors. Why should users pay for and learn a limited, special-purpose macro editor when they already own the best? *ProKey* is the only keyboard mac-

roprocessor that has fully editable files—an extremely important feature.

David Rose  
President, RoseSoft  
Seattle, Washington

## What Does DOS 2.00 Do?

Please help me. Rumor has it that DOS 2.00 will have multitasking and enhanced file handling abilities. (Lord knows version 1 needs them.) I called Microsoft to inquire and was told that they knew nothing about a new DOS in the works. If they don't wish to answer questions, they shouldn't publish their number. I was referred to my "local dealer," who will have the answers when Microsoft is ready to divulge them. My experience with local dealers is that I tell them what I find out so they will know.

When I received your magazine, I was surprised to find that it included an article on MS-DOS 2.00. I quickly opened the brown paper wrapper to find the answer. Your article, "The View From MS-DOS 2.00," was aimed at the operating system theory to be solved by 2.00, but to my disappointment, nothing was said about what it was really going to do for us users. Could you tell me what DOS 2.00 does that makes it worth purchasing?

Also, what are the operational and functional differences between PC-DOS and CP/M-86? User-friendliness is hardly a concern; I have been living with IBM operating systems for quite some time. I just want to be able to make a wise decision for an operating system based on criteria that will give the decision some weight.

Ric Lloyd  
Henderson, North Carolina

*The answers to your questions were revealed by IBM on March 8. No multitasking (yet), but see "The Path to UNIX" in this issue for an overview of the improved file handling. As for PC-DOS vs. CP/M-86, we've already scheduled a rebuttal interview with the folks at Digital Research.—Ed.*

## What I Like About You

A tip from a friend led me to purchase a copy of the premier issue of *PC World*. I read it from front to back and found it user-friendly and informative. My favorite articles were "Memory Madness" by Jeremy Joan Hewes and "How the PC Thinks" by Peter Norton.

In the future I would like to see articles about color graphics, the IBM PC Assembler (with listings), and reviews of the numerous IBM PC-related books.

Finally, a Reader Inquiry Card would make it much easier to send for detailed literature from your advertisers.

Mark Goldfeld  
Chicago, Illinois

*You've got some great ideas, if we do say so ourselves. For a color graphics tutorial, see "Getting Acquainted with Graphics," (Vol. 1, No. 1) and "Around in Circles" (Vol. 1, No. 2). See issue 2 for reviews of three PC books, and starting this issue we will be running a Reader Service Card for your convenience.—Ed.*

*The Redisplay Delay address in Table 1 of "Wordstar Made to Order" (Vol. 1, No. 2) was incorrectly listed. The correct address is 2D3.*

# IBM compatible . . .



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**The Elusive High Bit**

Do you know how to get the special characters on the IBM monochrome monitor to display in *WordStar*?

With the monochrome adapter and monitor, ASCII decimal codes 001 to 027, and especially 128 to 255, are used for special characters and symbols, including vowels with diacritical marks (used in foreign languages), mathematical, and other symbols (see the IBM BASIC manual Appendix G). From the keyboard these characters can normally be entered and displayed on the monitor by holding down the Alt key and entering the decimal ASCII code on the numeric keypad. In a BASIC program they can be obtained using PRINT CHR\$(n), where n is the ASCII code.

From *WordStar*, however, I cannot display these characters, which I need for foreign language word processing. If you hold the Alt key and enter the codes on the numeric keypad from within *WordStar*, you get either control characters or regular ASCII characters (normally coded decimal 032 to 126, but from *WordStar* given duplicate assignments under numbers 128 to 255).

MicroPro says they do not have a patch for this; they only point to the user patch locations UCONI and UCONO, which they suggest one can JMP to PBGEM (see *WordStar* appendix C 07/15/82, pages 10 & 19). OK, but I don't know assembly language, and two dealers I've consulted can't/won't help.

Anyone who does mathematical or foreign language word processing or likes weird symbols should find it useful to display these characters. What's the use of the PC having these characters "available" if you

can't use them from the most popular existing applications program?

Can the special characters be displayed from *FinalWord* or *Benchmark*? I will appreciate any help you can give me on this one, as will many other readers.

*Alan Page Fiske  
Chicago, Illinois*

*Those weird characters you've been trying to use are the PC's special "high-order" bit ASCII characters in which the eighth bit has a value of 1. WordStar uses these to denote the ends of words in its document mode, and so they're not available to be used as text characters. There might be a patch to allow these characters to be displayed in WordStar's non-document mode, but we don't know of one.*

*The high-bit characters are not accessible in the production versions of FinalWord or Benchmark either. Peachtree claims that its new PeachText word processing program can display the high-bit characters. We can confirm that Volkswriter will handle them. Of course, once you've entered those elusive symbols into your file, you've got to be sure that your printer can print them (most can't).—Ed.*

**PC Typesetting**

I just read the first issue of *PC World*. It has been a real education! We are interested in a word processor that can assist us in publishing our own business catalog. In reading Mr. Bunnell's letter he indicates that all of your own copy is edited on your PCs and then communicated to the typesetters. Could you send me some specific hardware/software recommendations?

*George J. Koliber  
Philadelphia, Pennsylvania*

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- Very quick and easy to set up, powerful English-like retrieval commands
- Immediate response, since CARDBOX keeps its own index to all words, rather than searching slowly through the file like other data base management systems.
- Can be used for mailing labels, can write records to disk as input to other programs.
- Max. no. of cards: 65,000
- Max. 1400 characters per card (This ad has about 1100 characters)
- Easy-to-follow tutorial booklet & comprehensive reference manual
- Four 'Excellents' in Infoworld review (9/13/82)

**\$245**

plus \$5 shipping, from

**Micro Technical Products Inc.**  
123 N. Sirrine, Suite 106D, Mesa, AZ 85201

**(602) 834-0283**

Visa, Mastercard, welcome. AZ add 5% tax.  
Write for details of our other PC products.  
CARDBOX is a trademark of Caxton Software Ltd.

# The new COMPAQ Portable Computer. IBM compatibility to go.

**S**imple, isn't it? The COMPAQ™ Portable Computer can do what the IBM® Personal Computer does. To go.

It runs all the popular programs written for the IBM. It works with the same printers and other peripherals. It even accepts the same optional expansion electronics that give it additional capabilities and functionality.

There's really only one big difference. The COMPAQ Computer is designed to travel.

Carry the COMPAQ Computer from office to office. Carry it home on the weekend. Or take it on business trips.

If you're a consultant, take it to your client's office.

If you use a portable typewriter, you can use the COMPAQ Computer as a portable word processor instead.

If your company already uses the IBM Personal Computer, add the COMPAQ

you'd probably need to buy an additional display screen because the built-in screen is too small for certain tasks, like word processing. The COMPAQ Computer's display screen is nine inches diagonally, big enough for any job, and it shows a full 80 characters across. And the built-in display offers high-resolution graphics and text characters on the same screen.

The bottom line is this. The COMPAQ Computer is the first uncompromising portable computer. It delivers all the advantages of portability

In the standard configuration, the COMPAQ Computer has three open slots for functional expansion electronics as your needs and applications grow. It accepts standard network and communications interfaces including ETHERNET™ and OMNINET™.

If you're considering a personal computer, there's a new question you need to ask yourself. Why buy a com-

puter that isn't portable?

For more information on the COMPAQ Portable Computer and the location of the Authorized Dealer nearest you, write us. COMPAQ Computer Corporation, 20333 FM149, Houston, Texas 77070. Or call 1-800-231-9966.

without trading off any computing power capability.

And what do those advantages cost?

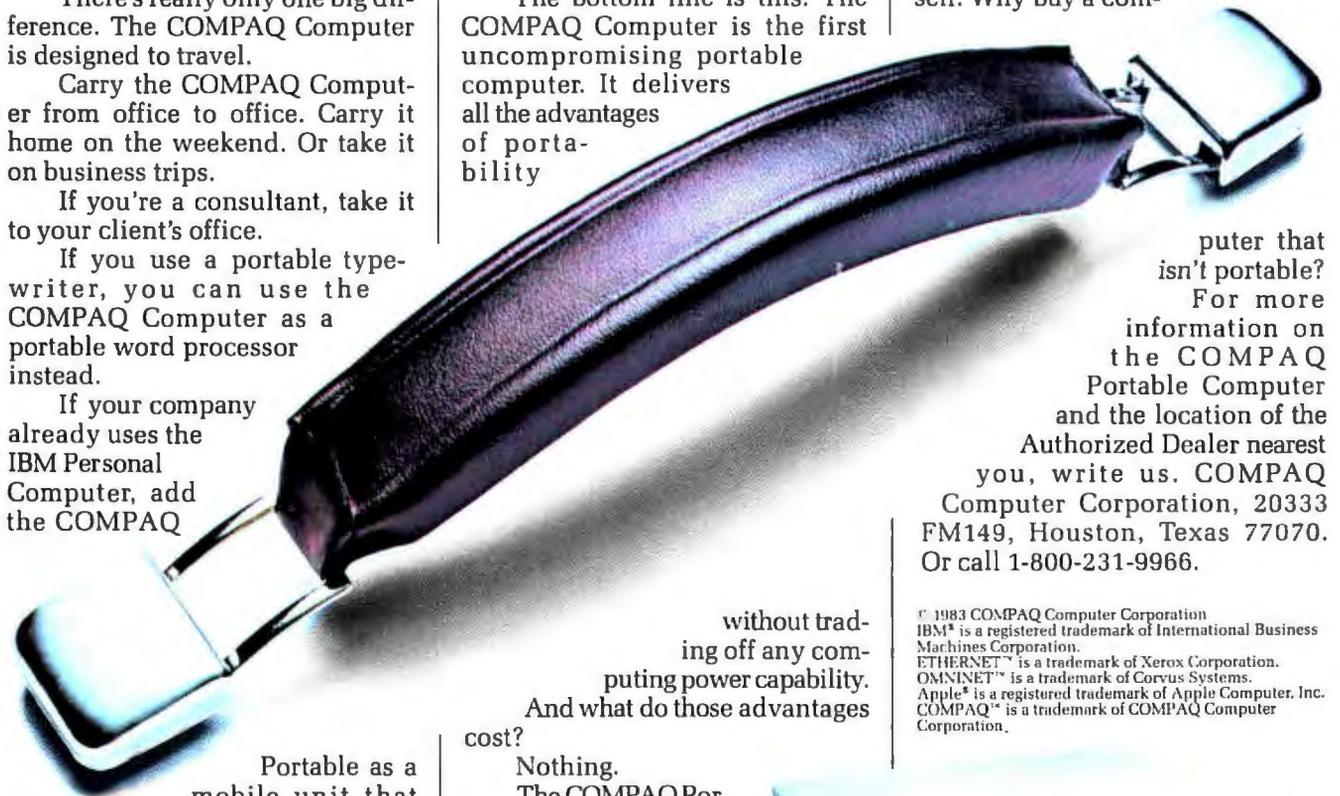
Nothing.

The COMPAQ Portable sells for hundreds less than a comparably equipped IBM or APPLE® III. Standard features include 128K bytes of internal memory and a 320K-byte disk drive, both of which are extra-cost options on the IBM. Memory and additional disk drive upgrades are available options to double those capacities.

Portable as a mobile unit that can use the same programs, the same data disks, and even the same user manuals.

There are more programs available for the COMPAQ Computer than for any other portable. More, in fact, than for most non-portables. You can buy them in hundreds of computer stores nationwide, and they run as is, right off the shelf.

With most other portables



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## COMPAQ™

PORTABLE COMPUTER

The most computer you can carry

## Letters

*Yes, we are an all-PC office. We receive most of our stories from the authors by modem or disks sent in the mail. After editing on the PCs, we insert typesetting codes and telecommunicate the copy to the typesetters. We use a Hayes Smartmodem 1200, a PC with the standard IBM asynchronous board, WordStar data files, and the PC-Talk III communications program. The full story of how we telecommunicate to the typesetters will be appearing in a future issue.—Ed.*

### Computer Consumers

In future issues it would be very useful if you could include a listing of consumer advocacy groups to help harried computer buyers find avenues for recourse when they encounter unresponsive vendors or manufacturers. It is becoming common knowledge that the computer industry is in a free-for-all state of flux; too often the end user is lost in the melee for profits and the general confusion over new technology. It seems likely that true support and accountability in the industry will only be achieved through consumer activist tactics.

You would do a great service to the industry and end users by occasionally printing a list of computer consumer protection agencies (if they exist) or suggestions about how to start such a group. If the industry knows that consumer "watchdogs" are monitoring its performance, perhaps when we call for help we'll no longer hear that obnoxious question, "Are you a dealer or an end user?" (with its inevitable follow-up, "If you're an end user, call your dealer"—as if we haven't already tried!). Consumers should be entitled

to an honest effort on the part of dealers and manufacturers to resolve problems with computer products.

*Helen Harvey  
Oakland, California*

### A Beaut' From Butte

Congratulations! It's great to see that the brouhaha over *PC World's* emergence hasn't compromised the quality or breadth of coverage. I especially like the article on videotex ("Networking in Color," Vol. 1, No. 1).

Besides keeping us up to date on the evolution of the actual apparatus, I trust that *PC World* will also explore such topics as networking and freeware. It is in this synergistic potential that individual computer users may well find the most exciting and expansive applications of their new art.

Keep up the good work.  
*Suzanne Stefanac  
Butte, Montana*

### Stick to Business

I sincerely hope your new magazine will emphasize useful information rather than cute graphics. Our PC is a tool we use in our business; we want to use it efficiently and completely. Four-color graphics and human interest stories do little to help us.

*Michael Truffer  
Deltona, Florida*

### Knack for Feedback

I just finished reading the first issue of your magazine and would like to give you some feedback. First let me tell you I was very impressed. The "State of the Art" and "Hands On" sections were fantastic, and Peter Norton's piece ("How the PC Thinks") was sublime. You have the knack for

choosing the right sort of technical material; it is immediately useful and does not insult anyone's intelligence. I think you should provide as much technical information as possible.

Please avoid the commercial hype we see so much of at other magazines, and things like the Frankston interview are definitely out. No one wants to hear his opinion on the impact of AI research.

The review/comparison of 1-2-3 versus *MBA* was good; on the other hand, the *Flight Simulator* piece was not worth five pages. I am very sensitive to someone saying that a program is "easy to use" or that it "explains itself" when the person is an admitted expert in that type of software.

Give people good technical material and reviews free of hype and you will become a must for any PC owner (there should be enough out there to pay the rent). I am desperate for practical information and communication with other PC owners.

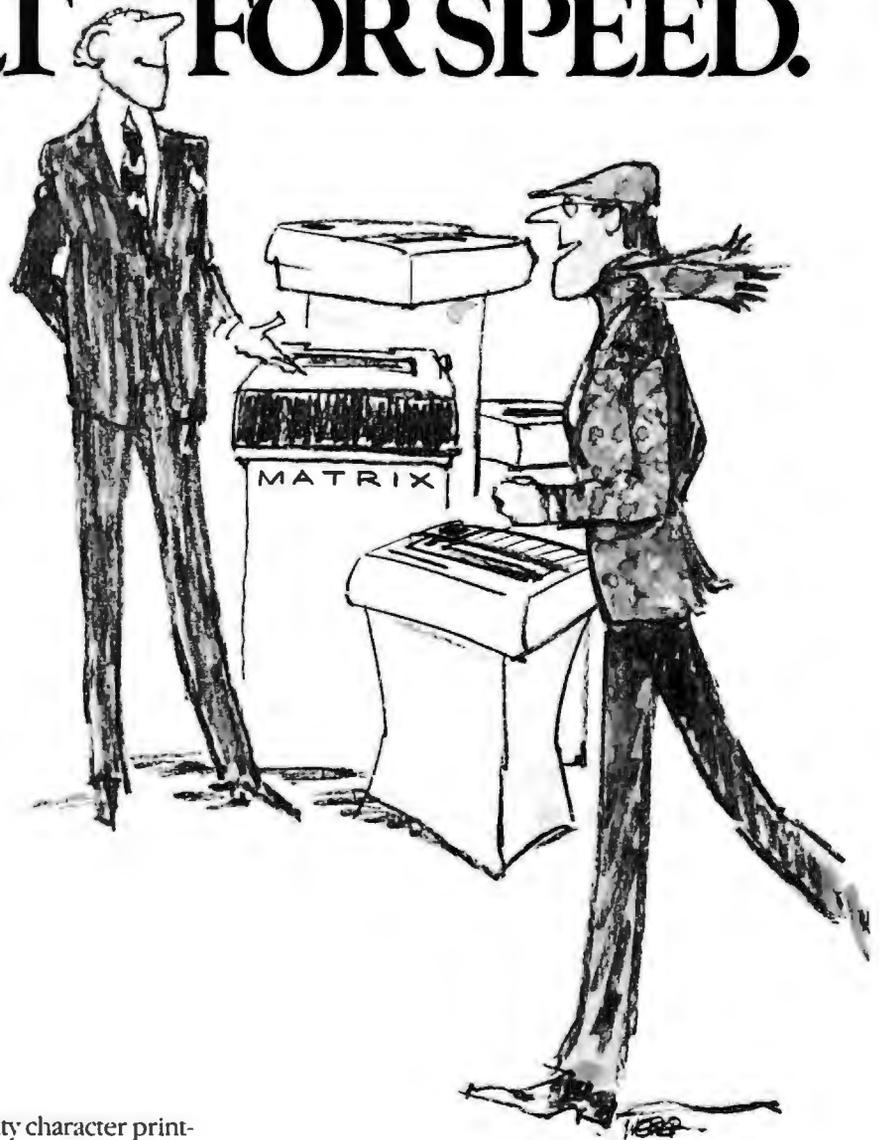
*Blaise Pabon  
New Haven, Connecticut*

### Suggestions

"How the PC Thinks" by Peter Norton in the premier issue was great. It offered insight and understanding I have not seen in other computer magazines. The level of sophistication was appropriate for me. I suspect that many other readers might wish that the PC would be simply an extension of their minds and hands, but come to realize that it demands more than an intuitive understanding.

A monthly duplication of this type of voyage would be unique to a non-programming journal. Only *BYTE* is similar, and its audience is filled with a much higher percentage of computer scientists, I suspect.

# DIABLO HAS FOUR-ON-THE-FLOOR BUILT FOR SPEED.



Diablo, the first name in quality character printers for business, is introducing something new—and fast.

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Matrix printing never looked so good. For a test run today, call your local authorized Diablo distributor.

**Diablo, when every word counts.**

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For the authorized Diablo distributor or dealer nearest you, call operator 606 at (800) 824-7888, in CA (800) 852-7777.

May I suggest a few topics still veiled in mystery: How do various color monitors differ in resolution and ability to display colors, and how is this a function of the PC structure? How do assembly language programs work compared to BASIC or FORTRAN—why are they faster? How does mass storage work on tapes, floppies, and hard disks. Why do hard disks hold more and cost ten times as much? What causes incompatibilities between two machines' methods of storage?

Wes Danskin  
Portola Valley, California

We have yet to see the emergence of a national computer watchdog organization for starters. You might join your local user group; we feature a directory of such groups in each User Group Dispatch.—Ed.

**PC Spirit**

Thanks for an excellent and informative premier issue. It has convinced me that the PC World staff is both creative and dedicated to excellence. This spirit on the part of individuals is perhaps the single most important factor contributing to the success of the personal computer industry today.

John H. Graybill  
Boca Raton, Florida

**Large Files Indeed**

Before our mailbox overflows, we will acknowledge a goof in "Travels with COMPAQ" (Vol. 1, No. 2). COMPAQ's BASIC.COM and BASICA.COM files are each 500 bytes, not 500K as we erroneously printed. And BASICA.EXE is only 53,760 bytes, not 53,760K. You won't see files that large until the XT features a 55-megabyte hard disk.—Ed.

**Change of Address**

The Redisplay Delay address in Table 1 of "Wordstar Made to Order" (Vol. 1, No. 2) was incorrectly listed. The correct address is 2D3.

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.

# Take Your Computer's Commands And Put Them Where They Belong. On Your Keyboard.

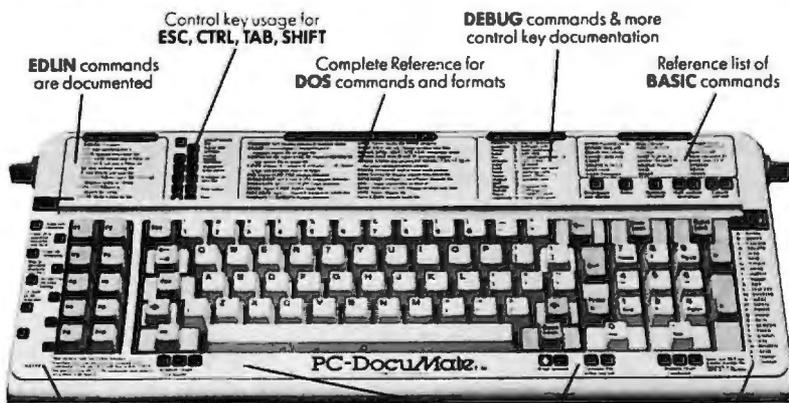
PC-DocuMate™ is a documentation template that fits the keyboard of your IBM PC. So the information you want is where you need it. PC-DocuMate templates are professionally designed, logically organized and comprehensive. Each template is printed on both sides on durable, non-glare polystyrene and is color-matched to your PC keyboard.

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# ANNOUNCING THE END OF WORD PROCESSOR CONFUSION



It's one confusing business, choosing a word processor. All those companies assuring you theirs is the most fantastic one of all. And leaving you to cut through all the smoke and hopefully whittle them down to the best one for you.

Well, we can help. If you'll just invest the next three minutes reading this, we'll tell you about a word processor that makes picking the right one a real breeze.

**FIRST, A WARNING.** There are two things you must do when evaluating any word processor. First, be careful. It's no secret that many of today's claims about being easy to learn and use just don't stand up to careful comparison. Watch carefully for complicated codes and programs that require "training sessions." Secondly, be selective. Buy a word processor you can use on a daily basis, not one that requires another "training session" when someone goes on vacation. In other words, be very careful to select

the word processor that's absolutely the best and easiest to use. Which is what we'll now introduce you to.

**WHY ONE WORD PROCESSOR MAKES THE MOST SENSE OF THEM ALL.** Meet WordPlus-PC. It's the advanced, "user-oriented" software package that turns your IBM-PC computer into a word processor equipped with the sophisticated capabilities of far larger, more expensive systems.

**THE REMARKABLE WORDPLUS-PC STORY.** In a nutshell, it's this. WordPlus-PC was designed from the ground up to be the very latest in word processing technology. It has all the important features you

could ask for. And the program is so easy to learn and use it defies comparison with other software.

**HOW WE CAN BE SO SURE OF OURSELVES.** We're Professional Software, a leader in word processing software with over 30,000 customers contentedly churning out letters and documents around the world on personal and business computer systems. We know precisely what a top quality word processor must do. And we've studied all the shortcomings of our competitors. That's how WordPlus-PC came to be the easiest-to-use word processor ever.

## ALL THE FEATURES YOU'D EXPECT.

WordPlus-PC is both powerful and versatile. Its long list of major functions includes movement of paragraphs, global search-and-replace, and creation of multiple "boilerplate" and personal letters with the touch of a few buttons. There are 3-line headers and footers and automatic page numbering. When you underline or boldface words as you type, WordPlus-PC displays them in that form on the screen. You can merge information created by popular spread sheet programs. You'll create personal letters quickly and easily, or merge name and address information from other programs. You can easily create standard layouts for preprinted forms and use WordPlus-PC to prepare



answers to questions. That's how WordPlus-PC helps you learn. In addition to the help you'll get from your dealer, we're ready to assist you when you call our special toll-free number and talk to one of our carefully trained advisors. This service is available at no charge during the 90 days following receipt of your user registration card. It's all part of Professional Software's total commitment to customer service and support.

## A BREEZE TO LEARN AND USE.

With WordPlus-PC's easy-to-use documentation, you'll be using your word processor right from the first minute. After an hour, you'll feel at home with all the basic functions and ready to explore the more sophisticated ones. After a few hours you'll put the manual away. There are

**SEE WORDPLUS-PC FOR YOURSELF AT YOUR COMPUTER DEALER.** Call us today. We'll answer all your questions. And we'll give you the name of the Professional Software dealership nearest you. Then go witness WordPlus-PC in action. Because once

**GUARANTEE**

Professional Software Inc. guarantees its WordPlus-PC customers:

- 1 Free telephone assistance for 90 days after receipt of customer registration card.
- 2 Free updated program diskette if any software improvements are made within 90 days of purchase.

invoices or quotations. For large corporate customers, WordPlus-PC has the capability to merge information from files created by the firm's mini or mainframe computer. You can even type new documents while the system is printing other ones. And you'll find WordPlus fully compatible with virtually all popular ASCII letter-quality and dot matrix printers.

never any complicated or confusing codes to memorize or look up. Rather, the screen's "message area" reminds you how to do what you want. WordPlus-PC's unique keyboard color coding makes things even easier. And whenever there's a question, simply press the HELP function to get back on track.

**ALL THE HELP YOU NEED VIA TOLL-FREE PHONE.** Learning something new goes best when you have encouragement, reassurance and

you're sitting in front of WordPlus-PC you'll quickly see where all our confidence and enthusiasm come from. After all, you already own the best personal computer. The best word processor is only \$395. So call us today.

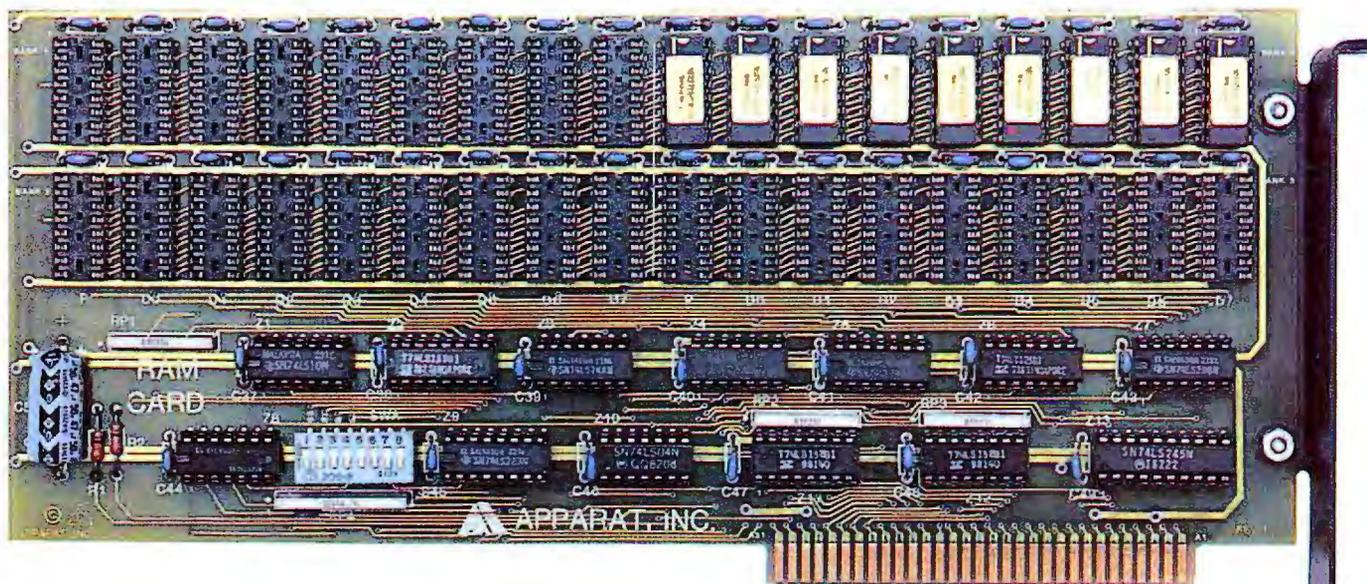
**CALL US TOLL FREE:  
1-800-343-4074**

# Professional Software Inc.

51 Fremont Street, Needham, MA 02194 Telephone (617) 444-5224

Dealer, distributor, OEM manufacturer, and corporate inquiries are invited. Call us at (617) 444-5224.  
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Specifications are subject to change without notice.  
WordPlus-PC was designed and written by Andres Escallon.

# THE BEST PRICED 256K RAM CARD ONLY HAS 64K.



Compatible with the new XT

**BUT YOU CAN GET  
ANOTHER 192K  
ANY TIME.**

Apparat's RAM Card, priced at \$149, is the most economical way to add memory to your IBM/PC today. And have the ability to add-on tomorrow.

The RAM Card, with sockets for up to 256K bytes of RAM with parity, gives you an additional 64K of RAM for your IBM. As the price of RAM chips comes down further or your needs go up, you can add to it easily. Additional RAM is available today at \$64 per



64K increments if you need it now. If not, wait and buy it in the future. Apparat's 64K RAM Card gives you memory and economy. The RAM Card also comes with SDRIVE, enabling RAM memory to be directly accessed as if it were disk memory. And if you

use Apparat's COMBO Card you can have three additional functions; parallel printer, RS232 async communications and clock calendar. The COMBO Card is now priced at just \$169. The RAM Card and COMBO Card are compatible with IBM/PC DOS 2.0 to let you use the newest IBM operating system and both carry a one year warranty.

For the dealer nearest you call 800/525-7674 or write Apparat Inc., 4401 S. Tamarac Parkway, Denver, Colorado 80237, 303/741-1778.

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 Apparat, Inc.

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# QUADBOARD™

## 256K Memory Expansion

Expandable in 64K increments, Quadboard™ is socketed for 256K bytes of memory. Full parity and checking standard.

## Qspool™

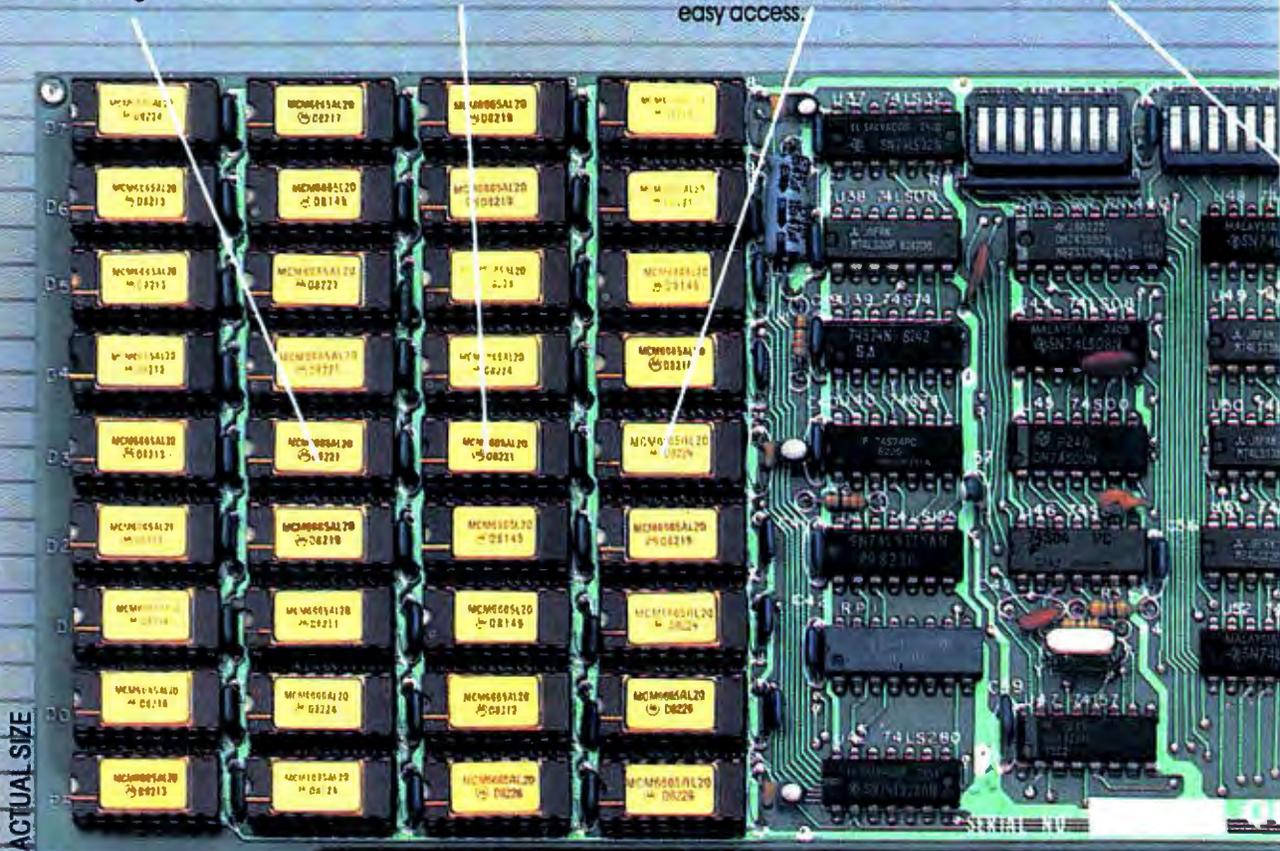
With Qspool, you can also use part of system memory as a software print buffer. Choose from 8K to 56K of memory and stop waiting for your printer.

## QuadRAM Drive™

This software program lets you use part of your total system memory as multiple disk drives. Super-fast drives that let you store important information for easy access.

## Chronograph

Quadboard features a real time chronograph to always keep your system's clock/calendar up-to-date. Even when your system's been off for months.



ACTUAL SIZE

## THE FIRST AND ONLY BOARD YOUR IBM PC MAY EVER NEED.

Your IBM Personal Computer is very versatile. New functions and applications are being developed for it everyday. And now with Quadram's Quadboard, you can keep your PC options open for tomorrow's technology. In the tradition of Quadram Quality, six of the most needed PC functions have been com-

bined into one package, using only one expansion slot. Your remaining IBM slots are left free for future expansion needs.

## All-On-One-Board and Software, too.

Every board you may ever need for your IBM PC is in the Quadboard package. From serial port to print buffer. Plus, there's Quad-Master software, too. Included on this disk are utilities for ac-

curately setting the Quadboard's chronograph for time and date, and for performing diagnostics on all Quadboard functions. There's



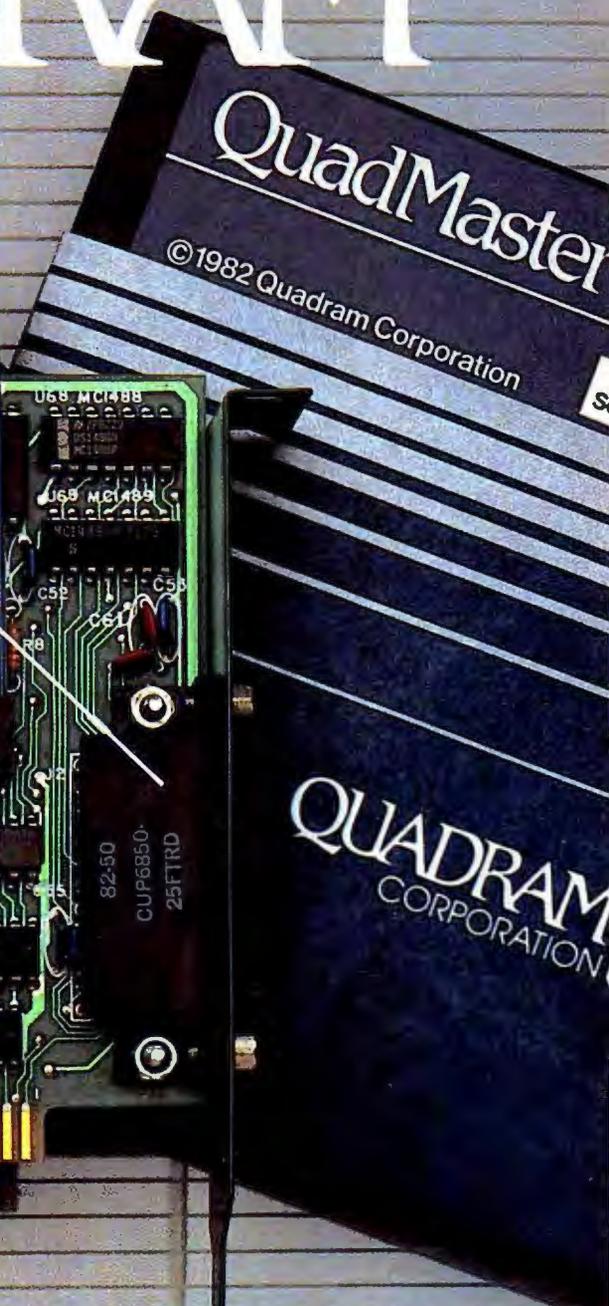
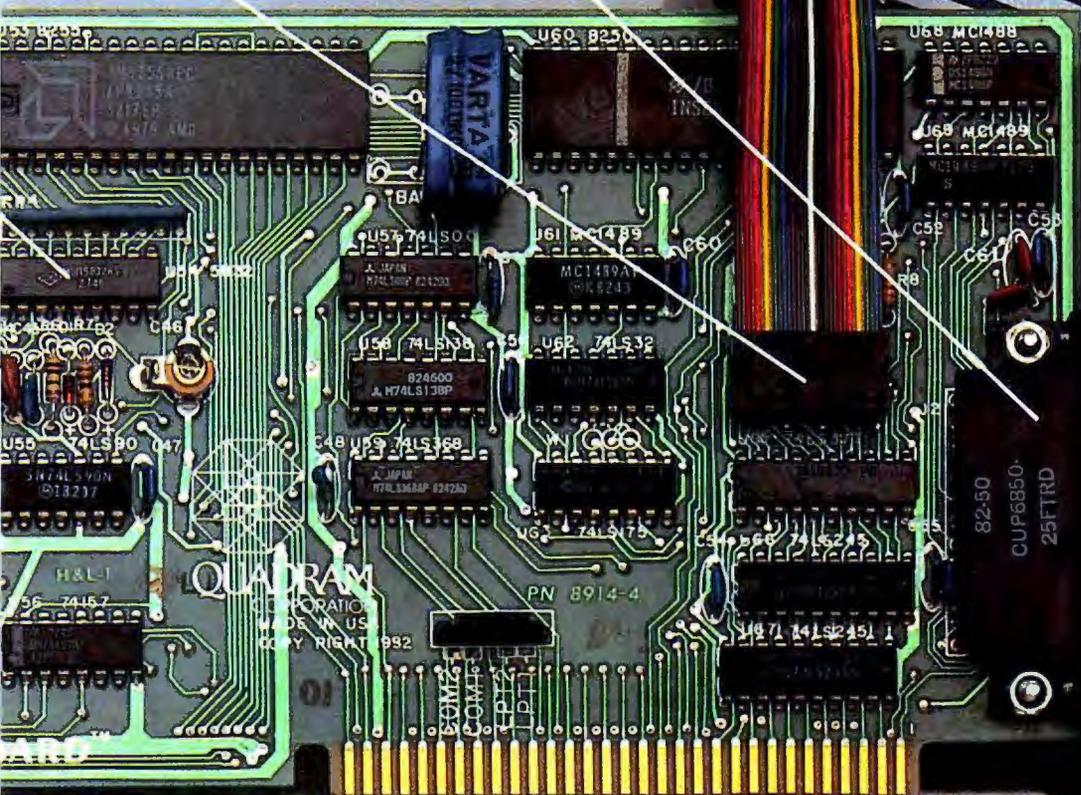
# BY QUADRAM™

## Parallel Port

There's a parallel I/O designed to operate most printers and parallel devices.

## Serial Port

Used for connecting modems, printers, and other serial devices, Quadboard's serial adapter can be configured as COM1 or COM2 and fully supports IBM PC communications software.



also Qswap™, the feature that lets you switch line printers one and two, back and forth, as your printing needs change.

## Proven Design

Quadboard is the number one IBM PC option board on the market today. Nothing even comes close, because Quadboard is designed with performance in mind. Engineered for dependability and built with only the finest components available. Each board has been thoroughly tested and "burned-in" for years of reliable service.

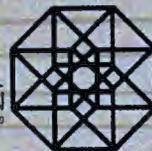
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## TALLGRASS AND YOUR IBM® PC

Tallgrass Technologies is the industry leader in Winchester HardFile™ and streaming tape subsystems for the IBM® PC. Fortune 500 corporations, banks, governmental agencies, and small businesses throughout the world depend on Tallgrass HardFile subsystems for their mass storage and backup requirements.

Tallgrass offers formatted capacities from 6.25 Mb to 70 Mb with integral streaming tape back-up. Our proprietary disk/tape controller with integral 10K track buffer optimizes read/write activity and, coupled with our DMA host interface, offers high performance previously unavailable with 5¼" disk systems.

### WHAT ABOUT DATA INTEGRITY?

Tallgrass offers backup on ANSI standard 5¼" tape cartridges, instead of the usual floppies, video cassettes, or low-capacity removable Winchester devices. The Tallgrass 12.5 Mb formatted Hardfile can back itself up on a \$39.95 data cartridge in less than 10 minutes!

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We've done our homework in engineering and building a reliable HardFile subsystem with remarkable performance and convenient backup for the most stringent on-line mass storage and off-line archival requirements.

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It's no secret. This is certainly "The Year of the Mouse."

And the uproar is justified.

This "see and point" interface is the most natural, powerful and efficient way to interact with your computer.

And Mouse Systems' optical PC Mouse, now available with software support for the IBM PC, is easily the best of its breed; easily the best at making your computer user-friendly.

## Grasp The Future of PC Technology

Slide our PC Mouse across its deskpad. It's optical. There are no moving parts. Your cursor instantly moves across your CRT in response.

No other device gives you such total, accurate control over cursor positioning.

The ergonomically designed PC Mouse is so smooth and natural in its movements, you'll soon be using it almost subconsciously.

Your attention can thus remain on the screen and not on the keyboard, and your concentration will be increased dramatically.

PC Mouse lets you use this new freedom to take full advantage of today's "visual" software products.

(For a truly enlightening experience, ask your dealer to demo PC Mouse with IBM's Personal Editor.)

## PC Mouse vs. The Keyboard

Named Mini/Micro's most significant new product of 1982, PC Mouse lets you bypass your keyboard

for instant menu selection and function activation.

And PC Mouse requires no changes in your existing software. All cursor-related functions in Wordstar, VisiCalc, and other popular programs are replaced by the mouse.

In one darting stroke, you eliminate the pondering and second-guessing of typing complicated command codes.

For systems designers and OEM's PC Mouse's potential is staggering.

## Simplicity, Itself

Just attach the PC Mouse to your PC's RS-232 port. Each of the three buttons is user-programmable, giving you nine different functions at your fingertips.

And our software compatibility assures instant system integration and simple start up.

## Get It Now

PC Mouse is immediately available for \$332.00 including control software and all necessary hardware for your IBM PC.

For ambitious software developers, the optional \$40.00 MouseWindow™ software package includes routines to do high resolution graphics and "pop-up" windows.

An OEM version of PC Mouse can also be supplied in quantity now, configured to your custom specifications.

For more details see your dealer, or contact Mouse Systems at 2336H Walsh Avenue, Santa Clara, CA 95051. Telephone (408) 988-0211 or Telex 467848.

# Mouse Systems

Making Computers User Friendly.



*Slim, compact size allows brisk moves in any direction.*



*PC Mouse keeps your attention on your data, not on your keyboard.*



# Add-On Products

## Multifunction Cards

All Multifunction Products include:

- SuperDrive™ – a Disk Emulator Utility Program
- SuperSpool™ – a Printer Buffer Utility Program

Optional: New ConnectALL™ Connector Mounting Bracket

**I/O Plus™**  
 Maximum 6 Functions (no memory) • Clock Calendar (std.)  
 • IBM Compatible Async Port #1 (std.)  
 • IBM Compatible Async Port #1 (opt.)  
 • IBM Printer Port (opt.) • SuperDrive (disk emulator prog.) • SuperSpool (print spooler prog.)

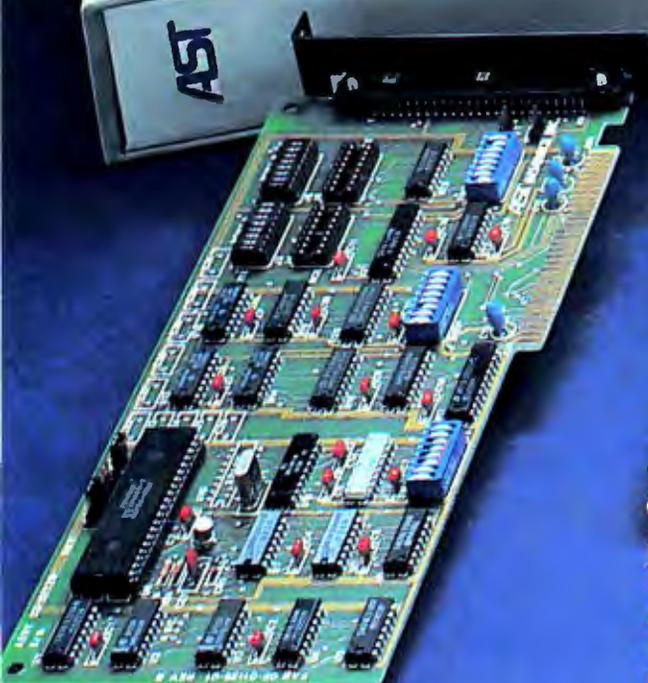
**MegaPlus™**  
 • 64K-512K (with MegaPak) • Two IBM Compatible Async Ports (1 std., 1 opt.)  
 • One IBM Parallel Printer Port (opt.)  
 • One Battery Backed-up Clock Calendar (std.) • Ideal for Concurrent CP/M, MBA, VSI Series software packages.

**ConnectALL™**  
**NEW!** AST Proprietary Connector Mounting Bracket (does not include cables shown in illustration)

256K Memory Calendar (std.)  
 IBM Compatible Async  
 IBM Compatible Printer (opt.) • One  
 up Clock

# Number One

## Communications



### Advanced Comm. Card (CC-232)

- Programmable to communicate in Bisync, SDLC, HDLC, and Async protocols.
- Two Ports of RS 232



### CC-332 For use with AST-3780

- An IBM 2780/3780 RJE Emulator • Supports Bisync point-to-point communications protocol • Allows file transfer between Host & IBM PC • Ideal for IBM System 34, 38, 4300

### AST-SNA

- Emulates IBM 3274 Model 51C Control Unit
- Emulates 3278 Display Station
- Emulates 3287 Type Printer
- Optional 3770 Emulation
- Cluster Controller Operation
- Protocol Converter Support



### ComboPlus

- Features 64K
- One Clock C
- One IBM Co
- Port (opt.) • On
- ble Parallel Prin
- Battery Backed
- Calendar (opt.)

## AST Research Inc. Retail Dealer List (Partial)

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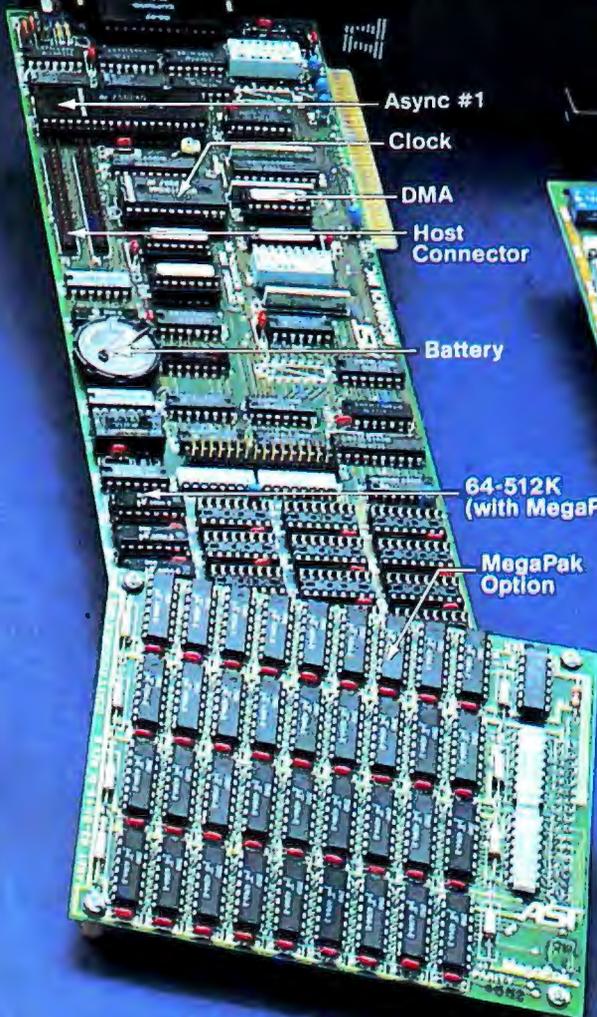
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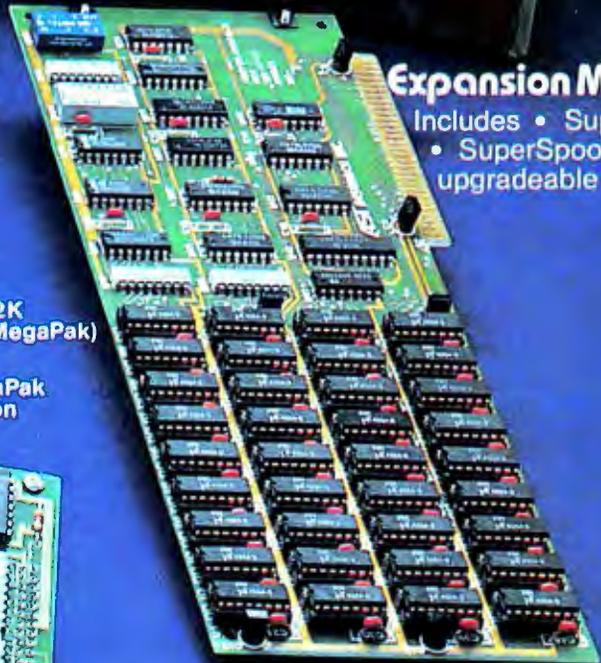
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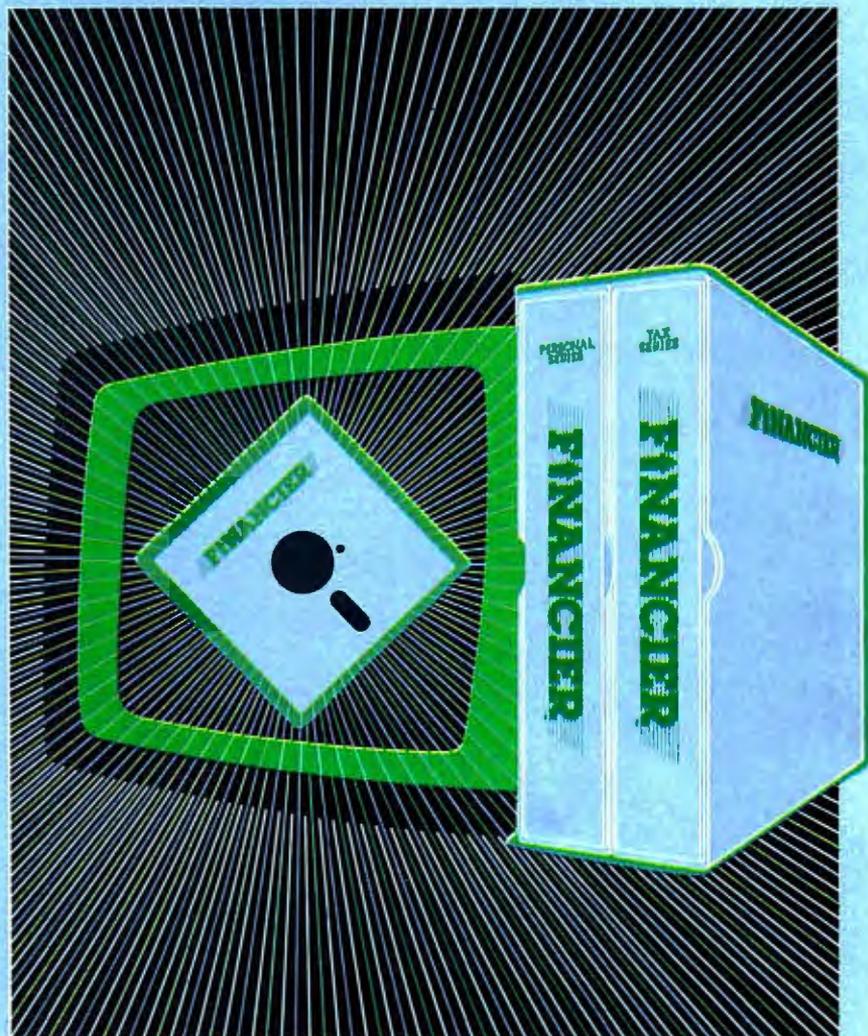
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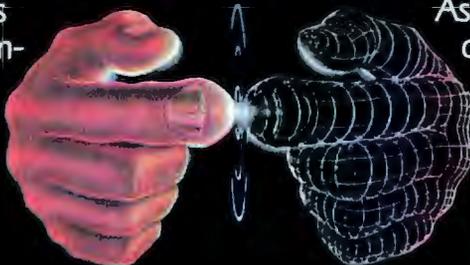
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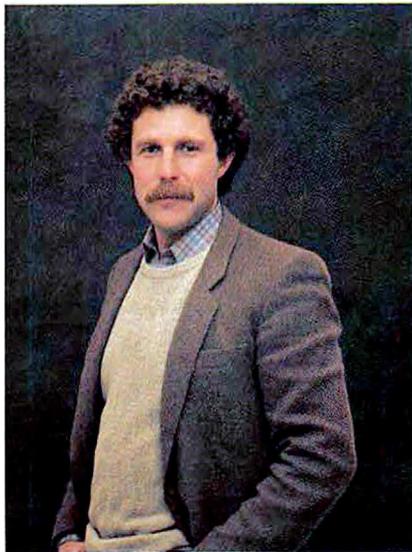
# More of a Good Thing

Last month IBM made its first major addition to the Personal Computer line by announcing the extended PC, the XT, and a new version of the PC's operating system, DOS 2.00. While neither announcement was earth-shaking, they did send a few tremors through the industry. IBM has begun to show its colors as it develops and expands an already substantial share of the personal computer market, and the rest of the computing community can't help but take notice. The announcements reverberate through this issue of *PC World* as well.

## The Hard Stuff

On the hardware front, Steven Cook takes a look inside the XT system unit while Katie Seger gives the background on IBM's chosen hard disk manufacturers. Kearney Rietmann polls some independent manufacturers of PC peripherals for reactions.

IBM's hardware roster has had some other additions. Karl Koessel checks out the recently announced IBM Color Monitor and rates it the best. Meanwhile, Adrian Mello reminds us that IBM has a sleeper 68000 processor-based computer that's also making its way in the world.



None of these products represent technological bombshells. They all seem to be manufactured according to the high-quality standards on which IBM likes to base its reputation, but comparable products have been available from independent manufacturers for months. That fact gives the best clue to IBM's strategy.

IBM has been content to let the industry—and the users—experiment with how and where the personal computer market will grow. They have even made it easy for the independents by giving them access to the technical specifications. They have watched closely, and then with a

giant stride they have stepped conservatively and firmly into the mainstream. They have also shown the rest of the PC world that they're capable of being price-competitive.

IBM will not drive the independents out of business. They won't even try, because it's to their advantage to let more experimentation take place. Meanwhile, they have given us eight new slots to fill and have legitimized the market for hard disks. (It's questionable whether their tongue-twisting term *fixed disk* will catch on though.)

## A New DOS Too

The introduction of a revised operating system will have more immediate impact on the entire PC community. In our lead "State of the Art" story, Harry Miller describes the shape of DOS 2.00 and shows us the path being paved towards a UNIX-like operating system. (Jean L. Yates' and Eileen Skrabutenas' article on UNIX in this issue was planned before IBM's announcement.) In the "Hands On" section Tom Sheldon provides an introductory tutorial to the DOS 2.00 file structure and Karl Koessel describes the new features of BASIC 2.0.

# Numbers got you down?

It's clear that DOS 2.00 is not the ultimate offering from Microsoft, but the first in a series of operating system extensions. With device drivers now outside the system and accessible for customization, a great deal of flexibility has been provided for hardware and software development.

The key question is how quickly the user community will convert to DOS 2.00, so that manufacturers and programmers can rely on a 2.00-oriented software base. The attitude of the industry is naturally, the sooner the better. The benefits of belonging to the DOS 2.00 Club will probably be worth the \$60 admission fee.

Meanwhile, we do keep watching for another operating system to make a serious challenge for the PC market. We haven't seen that happen yet.

## The User's View

Neither the hardware nor software announcements threatened to make existing PC systems obsolete. The original PCs can easily be upgraded to XT capability with the announced expansion units, and most of the DOS 1.10 software is supposed to be fully operable under 2.00. IBM has also shown some consumer consciousness by introducing its network-based customer support program, described by Jeremy Joan Hewes in the "Community" section.

The smart money is betting that we haven't yet seen everything emerge from IBM's PC drawing boards this year. If we can rely on their blue-suited savvy, perhaps we can anticipate IBM's next move by looking at what the market wants most.

The PC is already the biggest phenomenon in the personal computer world. It got that way based on a combination of customer confidence in IBM and customer enthusiasm for competition and experimentation among the independents. IBM is onto a good thing, and so far they seem to be promising us more of the same.



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# 2.00: The Path to UNIX

*Harry Miller*

*The sophisticated UNIX-like features and functions included in Microsoft's DOS 2.00 provide some clues to the future direction of operating system software for the IBM PC and compatible computers.*

MS-DOS 2.00 represents a major advance in functionality and capability for single-user operating systems. Many of DOS 2.00's enhancements reveal an increasing similarity between MS-DOS 2.00 and Microsoft's other operating system product, XENIX. XENIX is a version of the multiuser, multitasking UNIX operating system developed by Bell Labs. Microsoft licensed UNIX from Bell Labs and enhanced it before marketing it as XENIX.

UNIX and XENIX are typified by a hierarchical file structure, a great deal of flexibility for the user in controlling peripheral devices, and internal utilities such as searching and sorting. DOS 2.00 brings those features to the single user environment along with a range of new enhancements and commands. Some of these improvements are designed to support and encourage the use of hard disks.

## **File Management**

DOS 2.00 adopts a form of file management that is logically consistent with XENIX. The filing system is hierarchical, so that groups of related files can be connected. This system is especially helpful for keeping track of files on a hard disk, where a simple directory command (as in MS-DOS 1.10) would yield an unmanageably long, random list of available files.

Each group of related files is called a directory. Each directory may contain program or data files and may also contain the names of subdirectories. The subdirectories may be divided into more subdirectories until disk space runs out (each time a directory is created it takes up about 1K).

DOS 2.00 includes commands to create (MKDIR) or delete (RMDIR) directories as well as a command to change which directory is "current" (CHDIR). Only the files in the current directory are displayed when the DIR command is typed, and only programs in the current directory are available for use.

Files and programs in directories other than the current one can be accessed by specifying the "path" to them. The path is essentially an abbreviated road map describing the route from the current directory through

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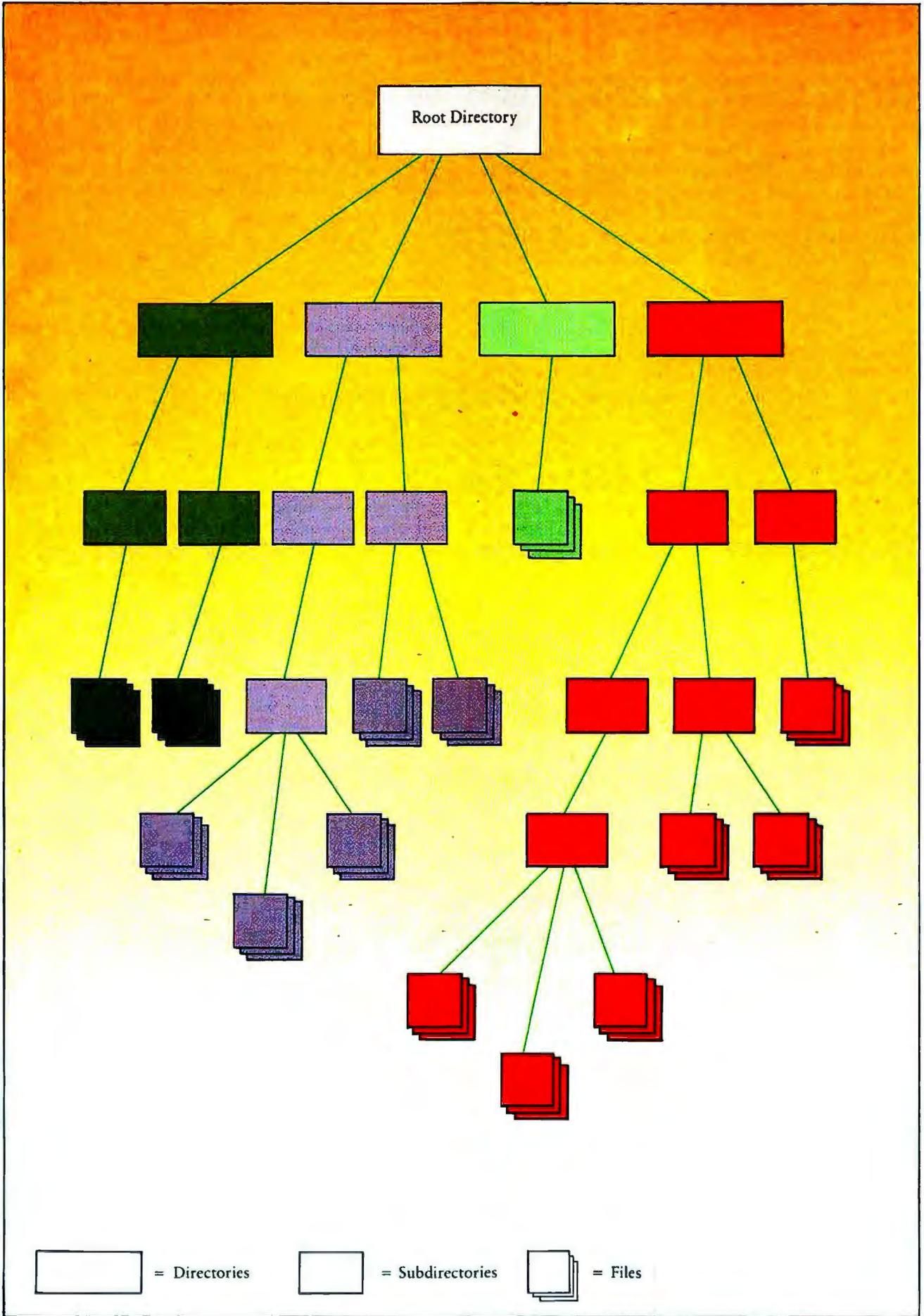
DOS 2.00 is a logical superset of  
DOS 1.10.

---

parent directories and subdirectories to the desired file. A path specification must be no longer than 63 characters, including the backslash characters used to separate the directory names.

The PATH command may be used to specify the directories to be searched for a command or batch file not on the current directory. Typically, the PATH statement will be part of a batch file. If a PATH statement is invoked at system start-up and a separate directory contains all the program files, then whenever a command file is specified, the system knows where to search for it. This is far preferable to keeping multiple copies of a program file, one in each directory.

The TREE command displays all parent and subdirectories and, optionally, all the files residing in the subdirectories on a specified drive. The use of the tree-structured directory system is covered in Tom Sheldon's "MS-DOS 2.00: A Hands-On Tutorial" in this issue.



## ☉ State of the Art

DOS 2.00 still uses the same file name format as earlier versions (8-character names with optional 3-character extensions). DOS 2.00 simplifies the process of copying or deleting groups of related files. Instead of using a complicated structure of wild card (?) and global (\*) characters as required in version 1.10, a group of files can be deleted or copied with a single command if the files are segregated into a separate directory. Under previous versions of DOS, files could only be grouped by assigning identical 3-character file name extensions to each file in the group.

### Hard Disk Support

In addition to the extended file structure, DOS 2.00 includes a number of features that encourage the use of hard disks with PCs or compatible computers. Up to now, manufacturers of hard disks for the IBM PC market have had to modify the BIOS (basic input output system) part of the operating system to accommodate their products. The BIOS is the part of the operating system that actually controls the hardware. Provision for controlling a hard disk was omitted from the BIOS in DOS 1.0 and 1.10.

In the past, independently produced BIOS modifications have been accomplished in one of two ways: the manufacturers either totally rewrote the BIOS to include the code that runs their hard disk, or they created a utility program to read the end user's existing BIOS, modify it to include their hard disk code, and then reinstall the BIOS in the DOS.

In DOS 2.00, hard disks from other manufacturers can be accommodated as part of a feature known as installable device drivers. A file containing the device driver code's can be loaded into memory at system start-up as an extension of the DOS. This is accomplished with a simple DEVICE command (DEVICE = filename) that can be contained in the CONFIG.SYS file described later in this article. Whenever the system calls that device (in this case a hard disk), the system transfers control to the device driver. All a manufacturer of a hard disk must do is supply a file containing the device driver for its drive, and DOS will take care of the rest.

### Backup and Restore

Now that hard disks are supported in the operating system, making backup copies of files on the hard disk has become very important. Many people underestimate the time required to copy the contents of a large-capacity hard disk onto floppy disks. DOS 2.00 includes a BACKUP command that makes this process more manageable. The /S option specifies that all files in all sub-directories will be included in the backup. The /M option backs up only those files that have been modified

since the last time the hard disk was backed up. The /D option backs up only those files that have been written to after a specified date.

Once files have been placed on a floppy disk by the BACKUP command, they can be returned to the hard disk whenever required by the RESTORE command. RESTORE includes options for copying all subdirectory files (/S) or for sending a prompt to the screen before restoring files that have been changed since they were last backed up (/P).

### Redirection Feature

Most of the time input to a program comes from the keyboard and output from a program goes to the screen. The keyboard is considered the standard input device and the screen is the standard output device. DOS 2.00 includes a facility for supplying the input to a program from a data file on the disk or from another device, such as a modem, and for sending the output of a program to a file or another device. This facility uses the special character < to denote the source of input and > to specify the object of output. For example, DIR>DIRLIST will send the output of the DIR command to the file called DIRLIST, while DIR>PRN will send the same output to the printer.

Aside from the convenience of having input supplied from a disk file and output sent directly to the printer, the redirection feature provides another interesting capability.

Redirection allows the computer to be controlled by an external terminal. While this may be only mildly useful now, it points the way to a multiuser environment. It will be no surprise if a future release of MS-DOS provides a facility for multiple users and concurrent processing.

The commands described above redirect input and output for the duration of one command. DOS 2.00 also provides a way (the CTTY command) to change the default standard input and output devices from the keyboard and screen to any other devices. Redirecting the standard input and output control to the modem (the COM1: device) allows remote control of the PC from a computer located across town or across the world.

### Piping Input and Output

DOS 2.00 allows programs to be chained together. In other words, the output from one program (which would normally be sent to the screen) can serve as the input to another program (the input of which would usually come from the keyboard). The vertical bar character (|) is used to separate the names of the programs being chained, as in DIR|SORT. In this example, the output of DIR would become the input of SORT. The output of the SORT command would then be sent to the screen, since no other output was specified. The output of the pipe can also be sent to a disk file, as in DIR|SORT>FILENAME

## Filters

The SORT command is one of the utility programs included as part of the operating system. It is known as a "filter" because it reads data from an input (either the keyboard or a redirected input device), modifies the data, and writes the results to an output device (again, either the screen or a redirected output device).

The FIND command is a filter that searches a specified file for a given string of characters. A third filter is the MORE command, which displays a file one screen at a time and then pauses, displaying the word '—MORE—' at the bottom of the screen.

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## Installable Device Drivers

*Steven Cook*

Hailed as a major enhancement to the Disk Operating System, installable device drivers are a simple cure for the incompatibility blues.

If you add a peripheral to your PC that is not supported by the DOS supplied by IBM, the manufacturer of that device will also supply (or should supply) the software needed to let the DOS use the new hardware. The software to run the device is called the *device driver*, and the process of adding the device driver to the DOS is called *patching*.

In computer jargon, patch means fix, and an old adage says, if it works, don't fix it. Nevertheless, the practice of patching DOS forged on, and with it incompatibility, because a patched DOS is different from the DOS used by everyone else.

If you are using a patched version of DOS, there is little chance that you can add another nonstandard peripheral to your PC, especially if the peripherals are made by different manufacturers. This is because the patches for the second device must be made to an already patched DOS, a process that at best would remove the patches for the first device and more likely would create such a mess that the result would be unusable.

DOS 2.00 solves the problem by using installable device drivers. Instead of patches applied in an arbitrary manner, installable device drivers provide a standard way for all devices to be recognized by the DOS.

Device drivers are machine language programs that connect the DOS to a device. The program is stored in a file on a disk and is preceded by 13 bytes of *header* information describing the device to the DOS.

Two types of devices are supported: character and block. Like printers and screens, character devices accept data one character at a time. Disk drives are block devices; data is transferred to them in groups, usually 512 bytes at a time.

Each driver is stored in a file on the disk, and when the DOS is first started, the drivers are copied from

the disk into memory. The names of the device driver files to be loaded into memory must be stored in a file called CONFIG.SYS, which works in much the same way as AUTOEXEC.BAT. A DEVICE command and a device driver file name must be included for each device you wish to install. Unlike AUTOEXEC.BAT, the commands within CONFIG.SYS do not appear on the screen.

The device drivers listed in the CONFIG.SYS file are loaded into memory before the normal (default) device assignments are made. This means that you can define a different device in place of any default device.

The keyboard and screen have default device drivers that may be replaced by a file called ANSI.SYS, which is supplied with DOS 2.00. Using ANSI.SYS in place of the default drivers implements extended screen and keyboard functions and allows the PC to conform to standards set by the American National Standards Institute. These features are very useful for programmers because programs can be written without regard to the machine they will run on. Any differences between the programmer's machine and the target machine can be masked by the ANSI.SYS file.

Another feature of the extended screen and keyboard functions is the ability to redefine the keys on the keyboard. This means that you can write a simple program to change the character that is generated when you press a key, for example changing the Z key to produce the letter P. That may not seem like a good idea, but you can use the same technique to define a function key to produce the character sequence COPY A:\*. \* B:/V or any other characters you find useful.

Installable device drivers represent IBM's offering of a technological olive branch to other manufacturers, providing an economical bridge to their products. If you plan to add any new device to your PC, you will find that DOS 2.00 is well worth the price.

## ● State of the Art

### Extended Batch Files

The batch file feature of MS-DOS allows a series of operating system-level commands contained in a file to be executed in sequential order. Version 2.00 extends the capabilities of the batch file mode by adding seven subcommands that control batch processing.

With the ECHO command, users can suppress the screen display of commands being executed from a batch file. This is primarily an aesthetic improvement over version 1.10, under which each command is displayed as it is executed.

The FOR statement provides a means for repetitive execution of commands. Just as in a BASIC program, with a FOR statement commands will be executed until the condition specified in the statement becomes false. FOR statements cannot be “nested” in the batch facility—only one FOR statement may be specified per command line.

The GOTO statement transfers control of the batch process to another command in the batch file. Since batch files do not have line numbers like BASIC programs, a label must be inserted on the line preceding the target of the GOTO. A label is created by starting a word with a colon.

The IF subcommand makes conditional execution of batch commands possible. This statement allows a command to be skipped unless a specified condition is met.

With the SHIFT subcommand, more than ten replaceable parameters may be used in a batch file command line. The replaceable parameters are usually numbered %0 to %9 and may be used to specify certain parameters (such as a file name or a disk drive) at execution time.

As with DOS 1.10, batch processing can be suspended temporarily with the PAUSE subcommand. When the batch file reaches the PAUSE statement, it displays ‘Strike any key when ready...’. When a batch file comes to a REM (remark) subcommand, it causes a remark or a specified message to be displayed on the screen.

### Background Tasking

While DOS 2.00 is still a single-tasking system, it now offers the ability to run a background process on “interrupt time.” Interrupt time is available when the CPU, the computer’s processor chip, is not busy with a foreground process. The most prominent use for this feature is in print spooling—printing one file while editing another. DOS 2.00 includes a print spooling utility program.

The PRINT command allows up to ten files to be specified as a queue to be printed. Global file name characters (wild cards \* and ?) can be included in the file names. Once the specification is complete, the system is ready to start another process while the queue is being printed. The PRINT command can be used with a /C (cancel selected files) or a /T (terminate print mode) option to stop the print process.

With most print spoolers currently available for the PC, data sent to the printer from any source (i.e., *WordStar* or a BASIC program) can be held in a special memory area until the printer is ready to receive it. To use the 2.00 print spooler from within a BASIC program requires a routine that includes the file to be printed in a DOS PRINT statement.

### System Configuration

DOS 2.00 brings new flexibility and simplicity to the process of configuring a computer system. The CONFIG.SYS file can contain specifications for system operation. When the system is booted, DOS 2.00 searches for the CONFIG.SYS file. If the file is found, DOS executes it and establishes the specified conditions.

The BREAK = ON command allows Ctrl-Break to cancel a running program no matter what it is doing. The default BREAK = OFF condition will stop a program only if it is performing an operation that involves the screen, keyboard, printer, or asynchronous communications adapter.

The BUFFERS = nn command provides a means for specifying the number of disk buffers allocated in memory at system start-up. A disk buffer is a block of the computer’s main memory (RAM) that holds data being written to or read from a disk. The more disk buffers set aside, the more data from the disk that will be held in memory, and thus, the faster the disk access. The system default is 2 disk buffers; legal values are from 1 to 99.

The DEVICE = statement is the mechanism by which files containing device drivers are specified for use by DOS 2.00. Generally, device drivers will be used for hard disks, different printers or modems, or special terminals (keyboards and screens).

The FILES = nn command specifies the maximum number of files that can be open at one time. The system default is 8 and the maximum legitimate value is 99.

Systems programmers can specify their own top-level command processor by using the SHELL = command. This command causes the new command processor to be loaded in place of COMMAND.COM at system start-up.

### More Features

The ASSIGN statement can be used to fool the operating system into believing that drive A is really drive B. Some applications programs insist on looking for data files on drive B or for program files on drive A. The ASSIGN statement essentially provides the A or B drives with a temporary change of identity.

The PROMPT command lets the user change the system prompt from the default A> to any specified text or some special characters, such as the current directory path, the time or date, or the operating system version number.

For example, the statement PROMPT \$T results in the prompt being changed to something like 16:19:28.35. PROMPT \$P changes the prompt to describe the current path, such as A:\level1\level2. The PROMPT \$P command can be very helpful in keeping track of a complex directory structure. Any text can be used as the prompt. PROMPT Ok could fool someone into thinking they were actually in BASIC; PROMPT % could be used to really make DOS 2.00 look like UNIX.

The CLS command clears the screen. This will be especially useful in batch files or for use with programs that leave the screen cluttered with text.

The RECOVER command is a utility program that recovers files from a disk that has a bad sector. Options allow the recovery of either a specified file (except for the data in the bad sector), or if the directory has been damaged, from all the files on the disk.

DOS 2.00 allows direct access to the table that controls the codes transmitted by each of the keys. Thus, with a little programming any key on the keyboard can be redefined. The operating system also allows DOS commands to be executed from within applications programs.

### Compatibility with 1.10

DOS 2.00 is a logical superset of DOS 1.10; all the features of DOS 1.10 are included in version 2.00, and all the new features are simply additions to the version 1.10 capabilities. If a system contains at least 128K of RAM, the vast majority of programs designed to run under DOS 1.10 will run without a hitch under version 2.00. In fact, if they wanted, programmers could act as if they were still using 1.10 and not use any of the new features until they were ready to learn them.

Since the operating system now includes more features and commands, it takes up more memory space. Because of this, some of the memory locations used by applications programs may be shifted. If a program depends on those exact locations for a crucial function, that program might not run under DOS 2.00 without some reconfiguration.

DOS 2.00 provides a new floppy disk format that uses nine sectors per track instead of eight, resulting in single-sided floppy disks that can contain up to 180K, and double-sided disks that hold 360K. Even though the new format results in a 10 percent increase in disk capacity, disks formatted under version 1.10 are still fully compatible with DOS 2.00 and do not have to be reformatted.

### International Compatibility

Even while DOS 2.00 is making news, Microsoft is already shipping DOS 2.01. The only difference in the newer version is that international system calls are implemented. The CONFIG.SYS file can contain information about the country in which the system is being used. Once the system is started, the operating system will take care of converting to the proper currency symbols and

format, decimal notation, and date format. There is even a facility for displaying and printing in one country's style while the error messages are in another country's language and format. That facility is designed for applications developers who may want to market their application in a different country.

### The Future

The features and capabilities outlined on these pages add up to a significant advance from what we are used to seeing in a single user system. But where will DOS go from here? UNIX and Microsoft's other products provide some clues.

It seems very likely that we can expect a release in the near future to include support for multiple users and concurrent processing. Just as hard disk support is the underlying theme of DOS 2.00, we can expect that multi-user support will be the theme of the next major release. The new features provided at that time will have to include some file locking, record locking, and password protection schemes, as well as the ability to address and utilize very large amounts of memory.

The way in which the user interacts with the computer will be vastly improved. The command processor will very probably be menu-driven and controlled by pointing the cursor. This is the type of "visual shell" interaction that users of Microsoft's *Multiplan* and Lotus' 1-2-3 have adapted to well. It would certainly be appropriate for Microsoft to package an internal on-line tutorial with the newer and more complex DOS.

The next operating system will undoubtedly include many more internal utility programs. Multiuser systems will require electronic mail. An extended on-line help facility would be an obvious area for improvement. The print spooling feature may be extended to give the user greater control, including viewing the print queue. The communications facilities built into the operating system are likely to be significantly enhanced to include many features that currently require a separate program.

In short, we can look forward to an operating system with the power and functionality previously found only on minicomputers or mainframes, combined with the ease of use and accessibility we have come to expect from personal computers.

---

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# An Overview of the XT

*XT stands for extended, and the new machine is just that—an extension of the PC, with only a few changes from the standard PC.*

Steven Cook

The IBM press conference announcing the XT was impressively organized and did a good job of covering all the bases. Representatives from several IBM divisions were present, ready to field questions no matter which way the conversation turned.

After the press conference was over and the crowds had left, I approached the man who had seemed to have all the answers whenever the questions had gotten technical. He was an engineer on the XT project, and he appeared to be very pleased by our enthusiastic reaction to the results of his group's efforts. We talked briefly about the changes that made the PC an XT, and then I popped the big question: "Can we open it up?" "Sure," he said, "let's take the cover off."

## Inside the XT

One look inside the XT confirmed my suspicions that it would look as much like a PC inside as it does outside. I quickly inspected the option adapter slots because the XT was announced to have eight slots while the PC has only five. Two of the eight slots are short, designed for cards that are no more than about 5 inches long. The two short slots, located next to the power supply and behind

the floppy disk drive, were added at the expense of the cassette port, which is no longer present.

The third new slot is the usual length, but to make room for it the other five slots have been moved closer together. The old adapter boards for the PC must be retrofitted with a new, narrower mounting bracket before they can be installed in an XT. Adapter boards from IBM

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One look inside the XT confirmed my suspicions that it would look as much like a PC inside as it does outside.

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are now shipped with the new bracket, and the earlier boards can be updated easily, but this is not necessarily true for boards made by other manufacturers. Closer spacing reduces room for piggyback attachments, especially when the chips on the board and piggyback are mounted in sockets.

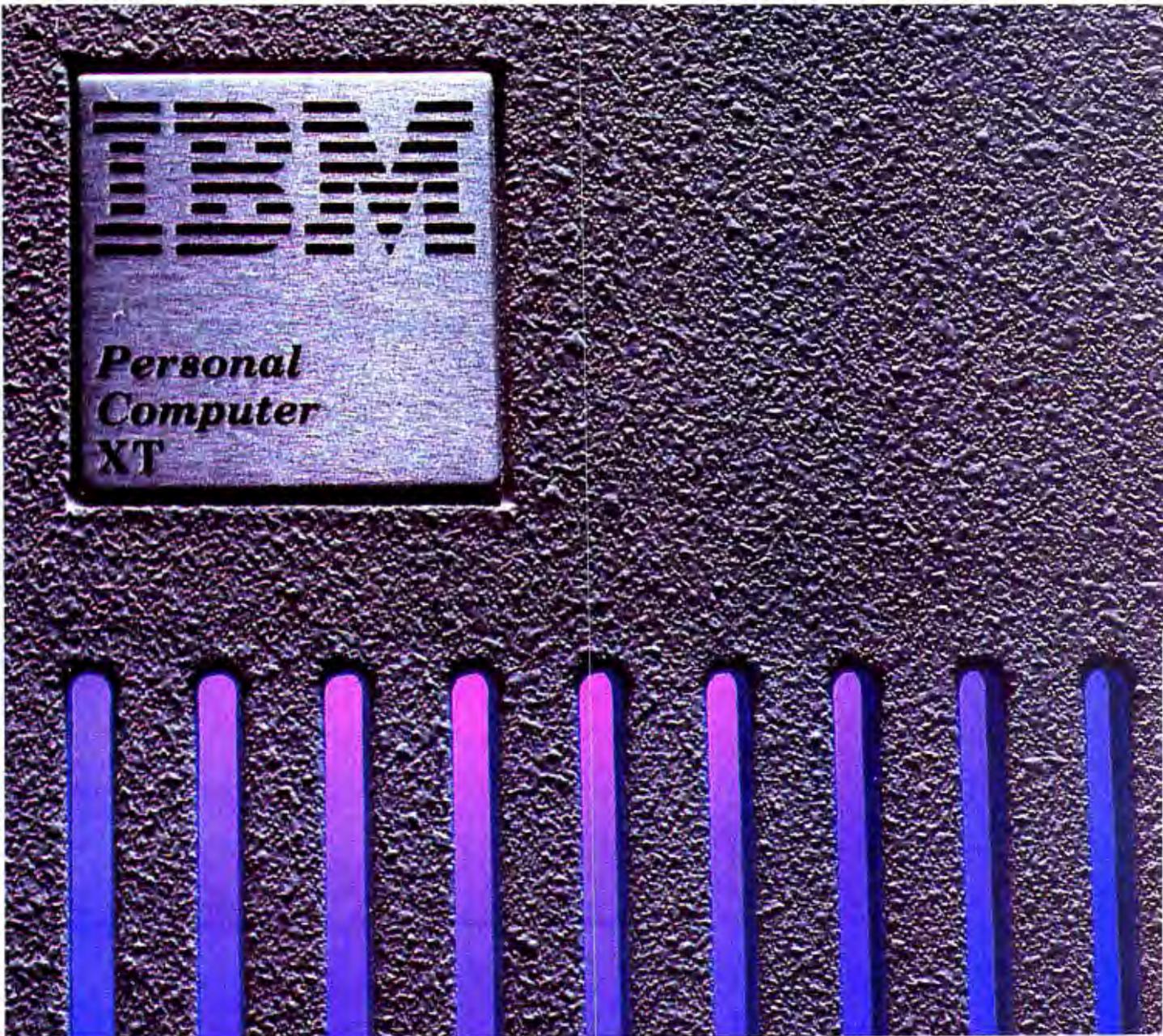
One of the short slots comes filled by an asynchronous communications adapter (serial interface), and two of the long slots are also filled, one by the floppy disk adapter and the other

by the fixed disk drive adapter. By the time you add a video adapter only four slots remain unused, and one of these is short.

Fortunately, the XT can support 256K of memory on the system board, whereas the PC can hold only 64K. IBM accomplished this feat by using 64K RAM chips in place of the 16K chips used in the PC. The 64K RAM chips fail more often than their 16K cousins, so all four memory chip banks on the XT system board are socketed to allow easy chip replacement. On a PC the first bank of chips is soldered to the board and cannot be replaced without a lot of effort.

## Missing Switches

Further inspection of the system board revealed another minor change: the S2 switches are gone. These switches, which indicate how much memory is installed, have been replaced by a software algorithm that uses a binary search to find the upper limit of installed memory (see "The Binary Search Algorithm"). Some PC owners shorten the time required for power-on self-diagnostics by setting the switches to indicate less memory than is actually installed, then using the memory above the switch-set address for disk emulation. That trick will be impossible on the XT.



## ☉ State of the Art

### Power for 10 Megabytes

Perhaps the most important XT extension is the 10-megabyte fixed disk drive, a 5¼-inch Winchester drive mounted internally, in the space a floppy disk drive would be mounted in the PC.



A rear view of the IBM XT

The fixed disk drive requires more power than a floppy disk drive, so the XT has a power supply that provides 130 watts, more than twice the capacity of the PC's power supply. The extra power also helps to support the additional adapter boards that can be put in the eight expansion slots.

Many of the features of the XT are also present in the expansion chassis announced at the press conference. The expansion chassis looks the same as the PC or XT system unit and is compatible with both machines. It includes the 10-megabyte fixed disk drive and the 130 watt power supply that will enable PC owners to use the fixed disk drive without modifying the PC.

The expansion chassis comes in two models, one for the PC and the other for the XT. The only difference is that the fixed disk adapter card is not included with the XT expansion chassis. The card, which can support two drives, is already present in the XT.

Hardware System	IBM PC XT	IBM PC
Memory	128K	64K
Hard Disk Storage	10M fixed disk	N/A
Expansion Slots	8 expansion slots	5 expansion slots
Floppy Disk Drive	360K disk drive	360K disk drive (with DOS 2.00)
Adapter Cards	Asynchronous communications, disk, fixed disk adapters	N/A
Total Cost	\$4995	\$2104

Price Comparison of IBM PC and XT with Similar Configurations

## Designer Disk Drives

### *Miriam Medom*

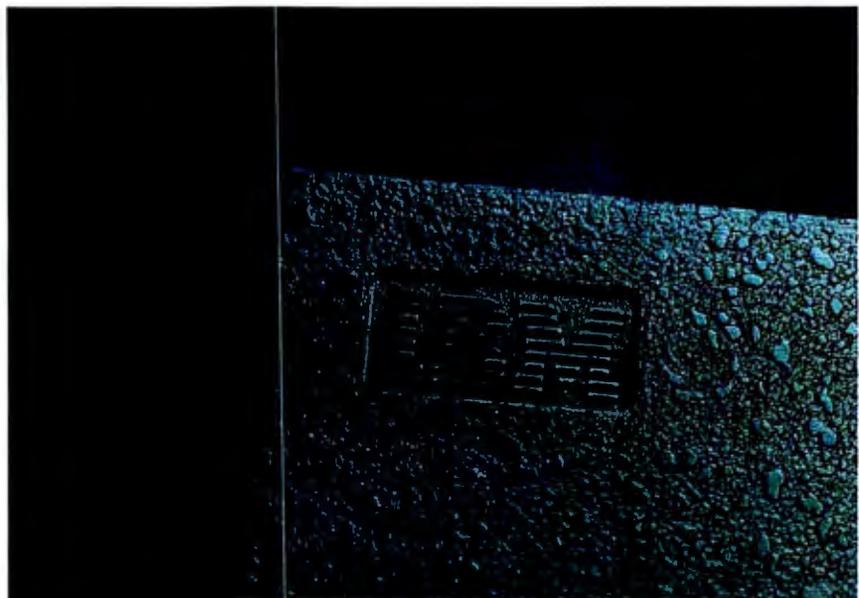
Because of its sheer size and weight in the computer industry, IBM has always moved rather slowly and cautiously. But when the blue giant does move, there's usually a good reason and a profit motive behind that action. A small but significant alteration in the XT is a perfect example of this corporate finesse: now the IBM monogram is embossed on the front of both the floppy disk drives and the hard disk.

This may seem mere trendy corporate egotism, but in fact those three little letters translate to approximately \$300 for floppy drives and much more for hard disks. Before the monogram distinguished IBM-supplied disk drives from other suppliers' drives, many PC owners (and reportedly some dealers as well) bought the minimum available configuration of the PC and installed their own drives to complete the system.

PC Add-ons for Comparison with XT	Price	IBM Expansion Unit—XT Model	IBM Expansion Unit—PC Model
IBM 64K memory .....	\$350	N/A	N/A
Expansion card plus 64K.....	\$165		
Total 128K.....	\$515		
10M hard disk with card:		10M fixed disk	10M fixed disk
Corvus.....	\$4795		
Tecmar.....	\$3995		
Tallgrass.....	\$3044		
Davong.....	\$2495		
N/A		8 expansion slots	8 expansion slots
N/A		N/A	N/A
IBM Asynchronous Communications Adapter.....	\$120	N/A	Fixed disk adapter
IBM PC with 64K .....	\$2104	<b>\$2695</b>	<b>\$3390</b>
Additional 128K (total 192K) .....	\$ 515		
Davong 10M hard disk .....	\$2495		
Asynchronous communications adapter .....	\$ 120		
	<b>\$5234</b>		

Note that on March 8, 1983 IBM announced price reductions ranging from 12 to 66 percent on ten PC products.

Mail-order distributors offer double-sided floppy drives for \$350 or less, a \$300 savings over the IBM price of \$650 (just lowered to \$529, incidentally). Hard disk prices vary, but the competitively priced, certified IBM disk will force the competition to make its prices more attractive.



There are eight more slots and room for an additional disk drive inside the expansion chassis. Both the floppy and fixed disk drive adapters can control two drives, which means that 20 megabytes of fixed storage plus two floppy disk drives can be connected to the PC and XT computers. The intended configuration is to place both fixed disk drives in the expansion chassis and the two floppy disk drives in the system unit, because the adapters must be closest to the drives they control.

### Different Outside Too

Even before the cover was off it was obvious that the XT is different: the cover is held in place by five screws, three more than are used on the PC. The extra screws are necessary to better restrict radio frequency emissions to the levels allowed by the Class B limits of FCC Part 15 rules. This is the stricter of two levels all computers must meet (Class A limits apply to computers not intended for home use). The PC is also certified to meet Class B limits, but some of the XT enhancements increase the amount of RF radiation that must be contained. Those three additional screws do the job.

The XT is almost identical to the PC—so much so that PC owners can obtain the capabilities of the XT simply by adding some RAM and a 10-megabyte disk drive. Many of us were holding our breath in anticipation of a major new product from IBM. It looks like we still have a while longer to wait.

---

*The IBM Personal Computer XT  
8088 microprocessor  
128K RAM expandable to 256K on  
the system board, up to 640K total  
Double-sided floppy disk drive  
10-megabyte fixed disk drive  
Asynchronous Communications  
Adapter  
Eight expansion slots  
Dimensions: 20 inches wide,  
16 inches deep, 6 inches high  
Weight: 32 pounds  
Price: \$4995*

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## The Driving Force Behind the XT

*Katie Seger*

With the inclusion of a hard disk drive in its new XT computer and expansion unit, IBM offers users increased speed and storage capacity.

At its simplest, a microcomputer hard disk is a device for storing large amounts of data. The hard disk drive is made up of a motor that rotates an aluminum platter coated with iron oxide that comprises a magnetic medium. Read and write heads are positioned above and below each surface of the platter and can be moved to any location on the platter by another motor called a stepper motor.

The stepper motor operates on command from an analog interface, a circuit board that translates commands from the controller into signals that direct the parts of the drive to perform their tasks. The controller is an interface board installed in the computer.

The hard disk's components, especially the heads and platter, can easily be damaged by dust and dirt. To guard the delicate components from outside contaminants, the hard disk drive is sealed. A pressure-equalizing air filter is used to maintain an ultra-clean environment within the disk.

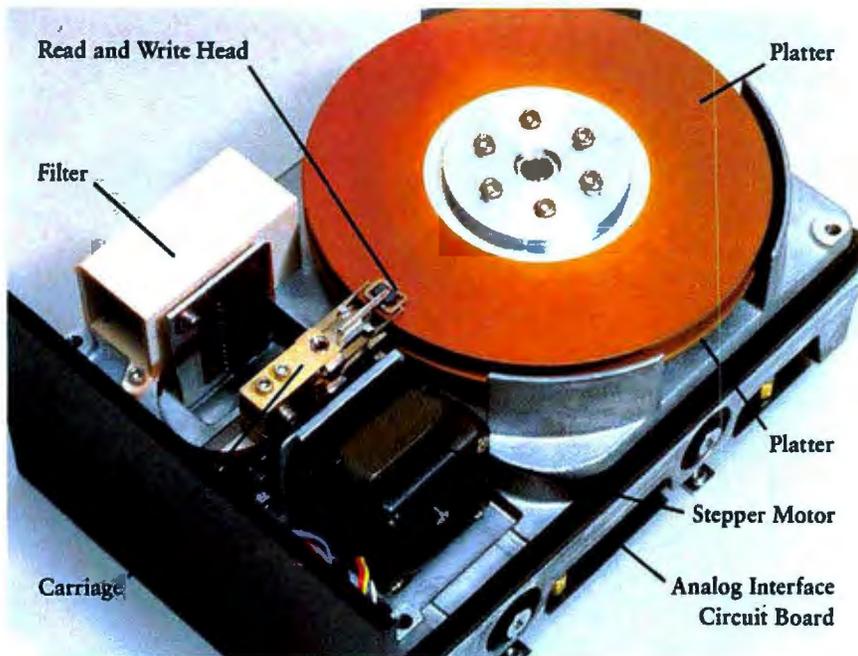
The hard disk's seal and the platter's fast turning speed (3600 rpm) create an air cushion on the

platter's top and bottom surfaces, allowing the read and write heads to move across the platter without actually touching it. The heads travel 1.5 microns above or below the platter's surface while recording and reading data. If this gap is not maintained, the heads touch the platter surface and destroy some of the magnetic media. The heads will also be damaged. Although hard disks are equipped with shock mounts and head locks, a shake or jostle outside the unit may damage components.

According to IBM, the hard disk for the XT has the same physical dimensions as a floppy disk drive and a storage capacity of 10M. Each drive has two platters, giving a total of four data surfaces. Each surface contains 306 tracks. Each track is made up of 17 sectors, each of 512 bytes. The drive has a 90 milliseconds average access, or seek, time and a maximum transfer rate of 5M bits per second.

In comparison, the 5¼-inch floppy disk used with the PC has 40 tracks on a single surface. Each track contains eight 512-byte sectors. The floppy disk turns at 360 rpm. The access time for the floppy disk drive can take from two to ten times longer than the hard disk.

IBM did not name the manufacturer(s) of its hard disk for the new units. However, industry sources have identified two companies: Seagate Technology of Scotts Valley, California, and MiniScribe Corporation of Long-



A look at the components of a MiniScribe hard disk. The drive is shown without its metal cover.

mont, Colorado, as suppliers of the drives. Sources also said that IBM is currently looking for a third hard disk supplier.

While neither Seagate nor MiniScribe spokesmen acknowledged contracts or agreements with IBM, each spokesman did describe its hard disks for *PC World*.

Each company manufactures a 5¼-inch (platter diameter) hard disk drive with an unformatted storage capacity of slightly more than 12M. A hard disk of that size has a formatted capacity of 10M. Hard disks, like their floppy counterparts, must be formatted before

they are used for data storage. IBM includes a format program with DOS 2.00.

MiniScribe uses the Motorola 6803 chip in its analog interface and Seagate employs Rockwell chips from the 6500 series. Both companies claim 85 milliseconds average access time, slightly faster than the access time IBM lists.

The two drives differ in the way read and write heads are moved. Seagate (and most other hard disk manufacturers) uses a split-band actuator, or positioner, method to move the drive heads. With this technique a small, split metal band connects the stepper motor shaft to the carriage on which the heads are mounted.

When a seek signal is given, the stepper motor turns the band, which moves the carriage and hence the heads to the specified track.

The MiniScribe drive uses a rack-and-pinion positioning technique, an older access technique that has been used by mainframe computers. The stepper motor turns a pinion (a gear with teeth) that meshes with a rack (a bar with teeth on one face). Read and write heads are mounted on the carriage attached to the rack.

According to MiniScribe, the rack will not move unless it is driven by the pinion, so inherent in the design is a self-locking feature. This feature offers greater protection for heads and platters during shipping, the company claims. Unlike many hard disk manufacturers, MiniScribe also positions the heads in a nondata area of the disk when transporting the devices. Nondata areas are not included on most hard disks, and some manufacturers question the value of this shipping precaution.

IBM's inclusion of a hard disk means that the personal computer now meets the storage demands made by the business world. The floppy disk drive is by no means an antique. The floppy drive is a venerable workhorse, but compared to a hard disk, it's a 747 airplane racing a Concorde jet. We all know which aircraft will land in Paris first.



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# The Spelling Bee Is Over

Listen. We're going to let you in on an industry secret: It's not hard to make a good spelling checker.

You see, although spelling checking is new for microcomputers, it's been around on big computers for *years*. And when you get past all the talk, most spelling checkers work the same way. They compare what you've written with a dictionary—and report the errors.

So is there *any* difference? You bet: the dictionary, and the price.

## Who Checks The Checker?

The hardest part of a spelling checker to make is the dictionary. It's hard to pick the right words—and spell every one of them perfectly. That's why some popular spelling checkers don't even contain real dictionaries. They use formulas called "hash tables." Which make a hash out of your spelling some of the time.

Other spelling checkers "borrow" their words from printed dictionaries—or copy them from old word lists. Or give a programmer who can't spell "programmer" a chance to write his first dictionary. And as though all this wasn't bad enough, a lot of these

companies want to charge you \$100, or \$200 or even \$300!

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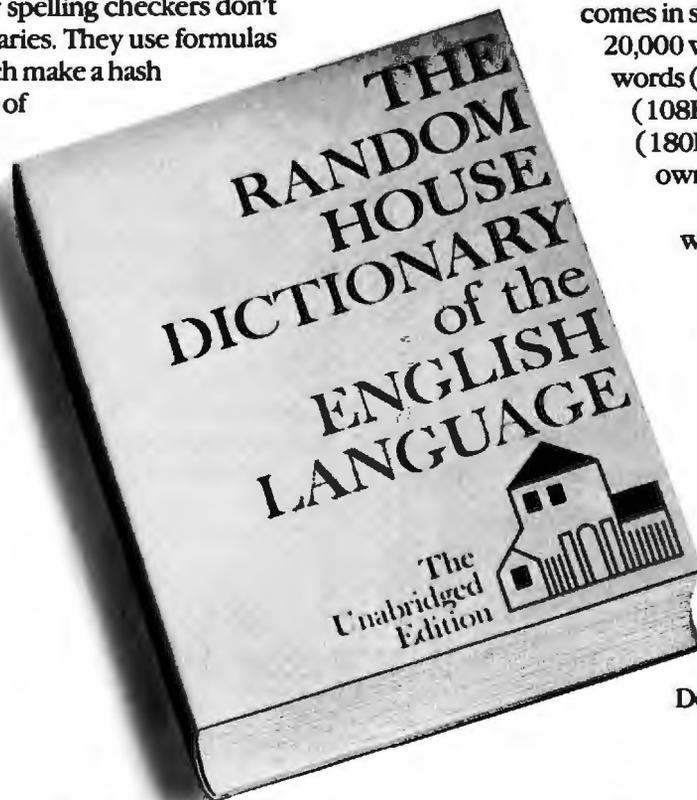
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# Extending the XT

*The announcement of the XT spurs a new wave of non-IBM products offering alternative features and lower prices.*

**Kearney Rietmann**

Taking advantage of the opportunity to select products from manufacturers throughout the computer industry, IBM PC owners have purchased utilities, electronic disks, and keyboard enhancers. They have upgraded their systems with color graphics boards and color monitors, relied on the storage and processing capabilities of memory boards and hard disks, and communicated to other PCs with software, serial interfaces, and modems. The question now is, will product mixing and matching continue for the IBM Personal Computer XT?

If non-IBM manufacturers of PC products have their way, PC owners will continue putting together systems consisting of diverse components. According to Alan Adkins of Advanced Software Interface, the company's *Keynote* keyboard enhancer utilities will continue to be an important product for PC owners. Because of changes in DOS 2.00, the company plans to revise its product so that *Keynote* will continue to provide the routines necessary for assigning character and function strings to single keys or combinations of keys. Hard disk owners will find the product useful in reducing the number of keystrokes required to access the large amount of data and the many programs stored on a hard disk.

Peter Norton, author of the *Norton Utilities* for the IBM PC, found that DOS 2.00 executes the file recovery operation previously carried out by his File Fix utility. Norton stated, however, that DOS 1.10, called by

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If non-IBM manufacturers of PC products have their way, PC owners will continue putting together systems consisting of diverse components.

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IBM a "subset" of DOS 2.00, will still be run on many PCs. For XT owners, he is revising the utility package to support the IBM hard disk.

At Tall Tree Systems, manufacturer of the *JFORMAT* electronic disk and the JRAM 512K memory board, Marketing Manager Martine Boot reported that XT owners will be able to install the JRAM board in up to three of the XT expansion slots. Boot sees the introduction of the XT as a "great opportunity," and the company is developing *JETDRIVE*, a product designed specifically for

DOS 2.00. *JETDRIVE* will create an electronic disk under DOS 2.00 and will provide a print spooler to direct data to both serial and parallel printers. The product's JET routine will provide high-speed file transfer and disk copying between floppy disks and between floppy disks and electronic disks. A new release of *JFORMAT* (scheduled for June 1) will provide file transfer and disk copying routines for 8-inch disk drives, hard disks, and quadruple-density disk drives.

## Graphics

On hearing the XT announcement, Kevin Jenkins, president of Hercules Computer Technology, went to ComputerLand to test the company's Hercules Graphics Card on the new system. IBM's increase in the number of expansion slots from five to eight (without increasing the overall space given to slots) created concern as to whether some manufacturers' boards would fit into the allotted space. The Hercules board fits in the XT expansion slots, although the product's mounting brackets will have to be redesigned to match the changed brackets on the XT system unit.

Luke Ward and Tom Lawson, marketing spokesmen for PC + Products, makers of the Plantronics Colorplus

high-resolution color/graphics adapter, reported that when it is attached to the system unit with a redesigned mounting bracket, the company's product performs well with IBM's new color monitor. Because the Colorplus is a double board, adding it to the XT makes a tight fit in the slot area; the company recommends that users not put another board in an adjacent slot. Ward and Lawson also said that because the company expects IBM's hard disk to appeal to professionals, they plan to develop graphics programs for business applications.

In the area of color monitors, Amdek Corporation spokesman Dan Rimes noted that of the company's six monitors compatible with the IBM PC, the Color II model is the one in direct competition with IBM's color monitor. Rimes said that the Color II will soon feature higher resolution and will be sold at a price reduced from the current \$799 (IBM's color monitor costs \$680). Amdek also plans to bundle a graphics board with the Color II for a total price of \$1350, bringing the price of the monitor to \$599.

### Storage

According to Charles DePew, vice-president of sales and marketing at Davong Systems, the company's hard disk is now running under both DOS 1.10 and 2.00. By April 1 DePew expects to release the company's Multiple-OS system software that will enable Davong and IBM hard disks to serve multiple operating systems (DOS 1.10 and 2.00, CPM-86, and the UCSD p-System) at one time. Davong is also developing a Multi-OS networking system to run on both Davong and IBM hard disks.

In competition with the IBM PC expansion unit, Davong is offering a similarly featured expansion unit at a price 30 percent below IBM's price. DePew further described two new hard disk products from Davong, one a 21-megabyte formatted hard disk and the other a 32-megabyte format-

ted hard disk. Both systems feature a 5¼-inch floppy drive and can serve as an internal or external hard disk for either the PC or the XT. A final Davong product is the new cartridge tape system (for both Davong and IBM hard disks) that allows backup of up to 18 megabytes of data. DePew also reported that company tests show that Davong's hard disk system software operates the IBM hard disk 50 percent faster than DOS 2.00 hard disk routines.

IBM's hard disk will create a greater awareness of hard disks in general, said Tecmar President Martin Alpert, and the system will create greater need for tape and removable hard disk cartridge backup systems. Tecmar offers a lower priced alternative to IBM's hard disk with its 5-megabyte removable hard disk cartridge drive. Priced at \$1795, the product offers the advantages of both removable media and hard disk capacity. The cartridge drive controller board is included in the \$1795 cost, while IBM charges \$695 for the hard disk controller in addition to the \$1695 cost of the IBM hard disk.

MicroDisk, a hard disk manufacturer, is making an interesting offer to XT dealers. According to company President Sandy Schupper, MicroDisk will supply dealers with 20-, 27-, or 54-megabyte hard disks. After removing the XT 10-megabyte hard disk, dealers install one of the MicroDisk systems in the XT and copy the company's BIOS routines to DOS 2.00. The removed hard disk is then shipped to MicroDisk. Retail prices for the hard disks are \$933 for 20 megabytes, \$1200 for 27 megabytes, and \$2267 for 54 megabytes.

According to Tom Yuen, vice-president of marketing at AST Research, the company's MegaPak piggyback memory board fits the redesigned XT expansion slots. Yuen also pointed out that AST has already produced a new mounting bracket for the MegaPak to match the bracket on the XT.

At Quadram Corporation Charles Henderson, manager of marketing and communications, reported that the company tested its Quadboard and found that it fits the expansion slots and works well. Henderson also said that the company is developing a new line of products for the XT.

### Networking

Larry Birenbaum, vice-president of engineering at 3Com, said that the company is testing its EtherLink networking board with the XT. Like

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IBM's hard disk will create a greater awareness of hard disks in general.

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other board manufacturers, 3Com is changing its product's mounting bracket to match the XT expansion slots and plans to rewrite the networking software to run under DOS 2.00.

To Mike Eaton, president of BizComp, maker of the 300 and 1200 baud Intelligent Modems, IBM's decision to install the asynchronous communications adapter as a standard feature on the XT system unit signals that the computer is targeted for communications applications. He said that modems will be an important peripheral for the XT since he sees the system used more and more as a terminal connected to networks that integrate all IBM computers, large and small.

Clearly the non-IBM manufacturers of PC products are striving to maintain their share in the PC market. Companies are revising strategies and redesigning their wares to provide alternatives to IBM features and prices. Undoubtedly, in a few months a look inside a the XT will show as many non-IBM components as the PC of today.

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# THE CASE OF THE MISSING WINGTIP WIDGET



## Solved...with the simple genius of the RL-1 Relational Database.

The night clerk's digital watch showed 2:35 a.m. when the red desk phone interrupted his inventory updates at the IBM PC. It was a double ring. An outside call. Williams sensed trouble as he punched line 3.

"Worldwide Widgets, Williams here."

"Walla Walla Widget Works" came the reply. "One of our widgets went."

"What type?"

"Wingtip."

Williams winced. Worldwide hadn't made a wingtip widget since way back when.

"We wouldn't have a wingtip widget at Worldwide, Sir. They're obsolete."

"If we don't get one by Wednesday," the voice wailed, "we're wiped out!"

There was one chance. The RL-1 Database Management System. If he could track down the last time a Washington dealer had ordered a wingtip widget...

Williams was no programmer, but that didn't matter. Turning to the computer, he put the question to RL-1 in simple English:

```
Select DEALER, QUANTITY, DATE
from INVOICES
where PART EQ "WINGTIP WIDGET"
and STATE EQ "WASHINGTON"
```

Within seconds, Williams had his answer. A dozen wingtips went to Wally's Widgets 6 years ago. But would Wally have any left?

Yes! Waking Wally was well worth it. The last wingtip widget

in Wally's warehouse was on its way to Walla Walla.

### Who? What? Where? When? Why? RL-1 knows.

Give your micro the power of RL-1, and you'll be able to handle data like a master detective. Without mastering BASIC or COBOL or FORTRAN or any other mysterious language.

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The secret of RL-1's genius is *data independence*. Instead of locking data into programs, you create *independent* databases. So different programs can use the *same* data. And you can get at day-to-day information without expensive reprogramming. Or wading through reams of redundant data.

Case in point: standard programming packages. Like accounting, for instance, or inventory control. Most are fine for what they're programmed to do. Beyond that, even the simplest questions can leave them without a clue. Whether it's searching through invoices for missing widgets. Or looking for customers with too much debt. Or finding the address of your aunt in Vermont. Conventional programs just aren't smart enough.

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So easy, the butler could do it.

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want your information stored. Dollar signs that "float." Dates that look like "July 17, 1983," not "071783." Numbers that are decimal, integer, or real.

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The sooner you get started with RL-1, the sooner you'll be cracking your own tough cases. So here's a little "nudge." Order RL-1 from your dealer or ABW by June 30, 1983. And you'll receive a coupon good for a free Report Generator Application Pack. \$75 worth of extra genius that'll make short work of your lengthiest reports.

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Both programs create a dialog between you and your PC. Set your own pace while you learn easily, quickly . . . and inexpensively.

Both programs require 64KB, a double-sided diskette drive, an 80-character display and PC-DOS.

Available at your PC dealer for only \$39.95 (PC Pal) plus \$2.80 California sales tax.

Or \$79.95 (PC Tutor) plus \$5.20 California sales tax.

Dealer inquiries welcome.

\*These products are in no way associated with this publication



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# The 68000 Sleeper

*IBM has another computer that may be a dragon dozing in public view.*

*Adrian Mello*

You know about the IBM PC, and you've heard about the XT. But did you know that IBM sells another microcomputer based on the Motorola 68000 that costs only \$760 more than the XT? Like the XT, this computer is equipped with 128K but has a higher resolution monochrome display and internal memory that can be expanded to 5 megabytes.

The IBM Instruments Computer System has been sleeping quietly even though it was announced in May 1982. Also known as the IBM 9000, the computer is the product of IBM Instruments Inc., a wholly owned subsidiary of IBM located in Danbury, Connecticut. The 9000 is designed for use with laboratory instruments as a data acquisition and processing tool. IBM chose the Motorola 68000 instead of the Intel 8088 used in the PC, based on the need of modern laboratories for a more powerful computer to process the complex calculations associated with procedures such as gas chromatography, which require very large amounts of memory. The 9000 uses the 32-bit Versabus with an optional expansion feature that allows the attachment of up to five Versabus cards.

The basic system has two modules: a main processor unit and a monitor. The main unit holds the processor board, power supply, and a 57-user-definable-key keypad set on an angled surface on the front of the unit.



The IBM Instruments Computer System with the optional printer/plotter, 5¼-inch floppy disk drive mounted in the monitor, and detachable keyboard

The seven-layer processor board has three RS-232C serial ports, one parallel port, and an IEEE-488 interface. On-board adapters are provided for the keypad, monitor, four optional floppy disk drives, optional printer/plotter, and an additional 83-key key-

board option. Any combination of 5 ¼-inch disk drives with 327K of storage or 8-inch drives with 985K of storage can be attached but is available at additional cost. Software in

## ● State of the Art

ROM includes an IBM custom operating system and self-test diagnostics.

The 12-inch green-on-black monitor can be tilted or swiveled with a lever that attaches to a mounting joint that separates the monitor from a plate on top of the main processor unit. The bit-mapped display has 768 by 480 resolution and shows 80 columns by 30 rows of characters.

A row of ten definable keys are located beneath the lower border of the screen. To the right of the screen is the only place to mount an internal drive for the four possible floppy disk drives. In this spot an optional, single

5¼-inch drive can be positioned vertically within the monitor cabinet.

A variety of hardware options is available to take advantage of the potential ability of the powerful basic system. The system bus expansion feature provides only five expansion slots, which means that if the full 5 megabytes of RAM is desired, no other boards can be used. The reason for this limitation is that each additional megabyte of memory uses an entire card that in turn uses one of the expansion slots.

One example of an optional board that would use a slot, and therefore reduce maximum memory expansion, is the hard disk controller card

that permits attachment of up to four 5¼-inch hard disk drives. Another example is the analog/sensor card, available in five versions, that is used to interpret instruments to which the 9000 would conceivably be attached.

If the desired use of these two optional boards doesn't reduce maximum memory expansion, the price of extra memory might. Each additional megabyte of RAM costs \$4080, which should begin to make IBM PC owners feel that memory expansion on their machines is a bargain.

Options other than expansion boards include floppy disk drives, 5- or 10-megabyte hard disk drives, a printer/plotter, and software. The dot matrix printer/plotter can be placed on top of the processor unit between the processor unit and the monitor. The printer/plotter has a print speed of up to 200 cps in draft mode with a resolution of 220 by 336 dots per inch. Optional software includes BASIC, an extension of the operating system, and a chromatography applications program.

One option provides the only recognizable similarity between the 9000 and the IBM PC. That option is a detachable keyboard identical to the PC's, which is better suited for text entry than the standard keypad.

Although the IBM 9000 is presently marketed as a laboratory computer, one can't help but notice that with a little repackaging and software development the 9000 could become a contender in the professional business computer arena. If the Apple Lisa sales record indicates a strong market for this kind of computer, the Lisa might wake up to find that the 68000 sleeper is awake and wants to share breakfast.

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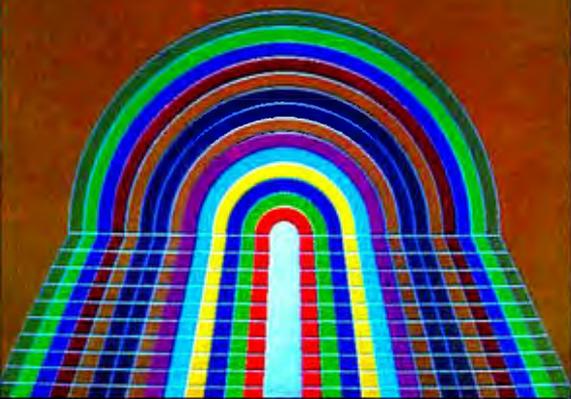
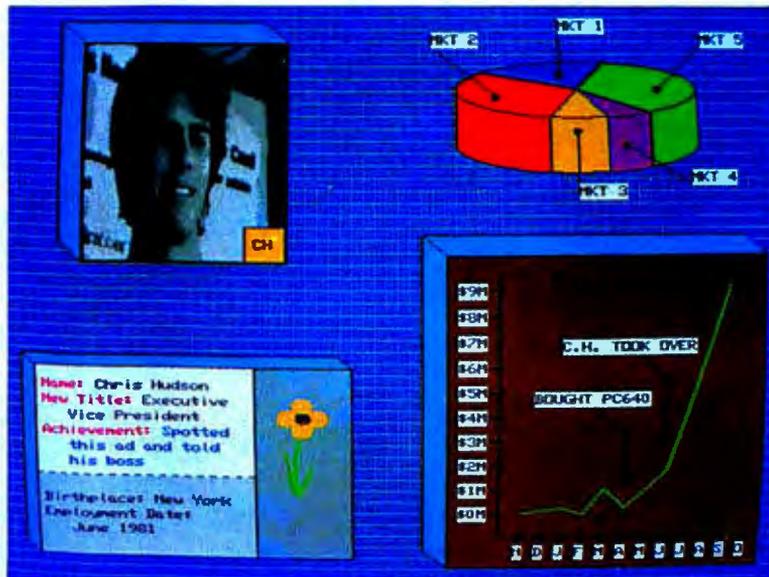
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( 1983 )



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# Ma Bell's Favorite DOS

*With its multiuser and multitasking capabilities, the UNIX operating system brings a new range of flexibility and usefulness to the PC.*

*Jean L. Yates and Eileen Skrabutenas*

UNIX is a powerful and flexible operating system that has provided a hospitable program development environment and is increasingly being used for business applications. Its extensive file directory system, over 200 built-in utilities, and communications capabilities make it attractive to programmers. Enhancements now available with microcomputer versions overcome the complex and awkward command structure that in the past has made UNIX less than optimal for inexperienced users.

## History

UNIX was created at Bell Laboratories for use by the Bell System in developing communications software. Bell Labs offered UNIX to universities at an extremely low cost in 1976, and today Purdue, MIT, the University of California at Berkeley, and several other institutions have large UNIX facilities. As graduates from those universities have been assimilated into the business world, the demand for UNIX in the commercial environment has grown. However, enhancements were necessary before UNIX could be considered a salable product.

In 1979 a company in the Los Angeles area, Interactive Systems, made those enhancements and began selling UNIX to businesses, but for use on large minicomputers only. UNIX

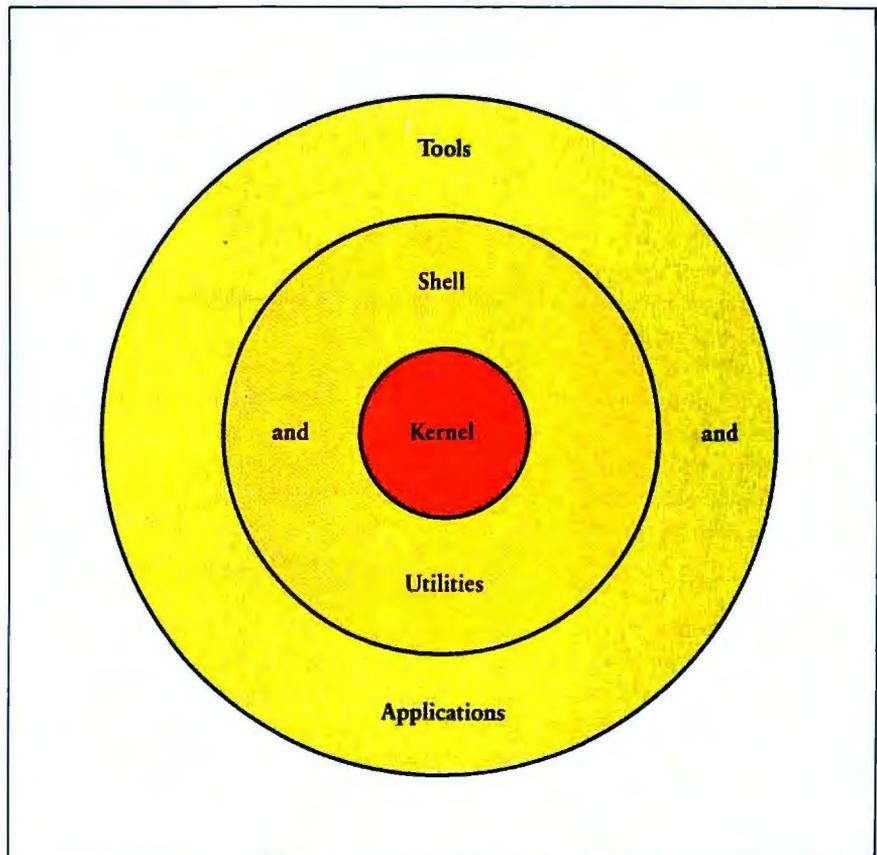


Figure 1: Structure of an Operating System

has since migrated to 16-bit microcomputers, and between now and 1986 the vast majority of licensed UNIX systems sold will be used on microcomputers.

UNIX will predominantly appear on microcomputers that operate in multiuser environments. This means that more than one person accesses the same computer (CPU, disk drive,

and peripherals) at one time. By contrast, almost all IBM PCs are single-user computers.

A few companies, such as Sritek, offer alternative processor boards that convert the PC into a multiuser system. The Sritek boards are essentially extra memory boards with interchangeable processors. A

## ● State of the Art

Motorola 68000 version is currently available and other upgrades are planned.

Although UNIX was initially designed for minicomputers, the way it was implemented made it independent of any specific computer architecture—this is called machine independence. Kenneth Thompson and Dennis M. Ritchie, the developers of UNIX, wrote the operating system almost entirely in the C programming language, a high-level language developed by Ritchie.

Only about 5 percent of the code in the UNIX operating system must be redone when the system is transported to different computers. This compares to almost 100 percent of the code for operating systems like CP/M and MS-DOS 1.10, which is written in the assembly language of the processor for which it was originally intended.

Because UNIX can be easily transported to different computers, it has quickly spread to a wide range of systems. UNIX was originally developed on the DEC PDP-11 minicomputer; it then moved to microcomputers using 8086, Z8000, 68000, and 8088 microprocessors, and is now found in a limited number of sites on IBM mainframes such as the IBM 370.

### Operating Systems

An operating system is a collection of programs that controls the operation of and manages data flow between the computer's processor and peripheral devices (keyboard, screen, printer, disk drives, etc.). For 8-bit computers, the operating system is a small and relatively simple program. The increased capabilities of 16-bit microprocessors allow the operating system to take on a number of more complex functions.

Figure 1 shows the basic structure of UNIX, which is similar to the

structure of many other operating systems. An operating system such as UNIX has three levels: the kernel, the shell (integral utilities), and tools and applications. All operating systems offer various degrees of implementation of these three elements.

The kernel is the part of the operating system that controls the hardware, actually turning on and off parts of the computer system. Any time the operating system is called upon to allocate or control some of the system's resources, the kernel takes charge. The kernel is usually written in the assembly language of the microprocessor and contains the

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UNIX tools include calendar, typesetting, text editing, electronic mail, and communications programs.

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commands to control the peripheral devices. When the light on your disk drive is lit, the kernel has directed the disk drive to operate.

The kernel also controls the file management aspects of UNIX, including a feature known as a "fork." Whenever UNIX starts a process, it makes a duplicate copy of the file to be processed and works on that; if anything unexpected happens during the process, the original cannot be ruined.

The next level of the operating system, the shell, is the actual interface that appears on the screen. It provides an easy connection between the user and the kernel. Commands typed while you are working with the operating system are interpreted by the shell program and translated into those that the kernel understands. For example, in MS-DOS 1.10 the shell could be described as the A> prompt that you see when you use the system. The MS-DOS 1.10 commands DIR, COPY, and ERASE

could also be considered part of the MS-DOS 1.10 equivalent to the UNIX shell.

In CP/M or MS-DOS 1.10, you can type DIR and get a listing of the files on your floppy disk. In UNIX, typing ls displays the same kind of information, but because UNIX is so much more flexible, there are about 15 options to the ls command. Typing ls -l, for example, produces a file directory listing that contains more information, such as the user, time, and date.

UNIX includes a facility for chaining, or "pipelining," commands; a single command can cause a data file to be processed by several programs sequentially, the output of one program serving as the input to the next program. With this facility a single command line could unite several files, pass the whole file through a spelling check program, send the output to the printer, and distribute electronic copies.

The integral utilities of the shell usually include languages (such as C for UNIX) and device drivers. Device drivers are special programs that allow the operating system to talk to specific kinds of peripheral equipment such as printers, external or add-on disk drives, and special graphics devices. UNIX contains a large number of device drivers, but many of them are for devices associated with minicomputers rather than micros (very large capacity hard disks or tape drives, for example). Most micro versions of UNIX will probably have device drivers for the common peripherals you will want to use.

Tools and applications form the outer layer of an operating system. In UNIX these tools include calendar, typesetting, text editing, electronic mail, and communications programs. Such flexibility is rare in an operating system; these packages must usually be purchased as add-ons. Most companies selling UNIX for the PC will remove some of these tools because they take up so much disk space. However, tools of particular interest will probably be available from vendors as options. With other common

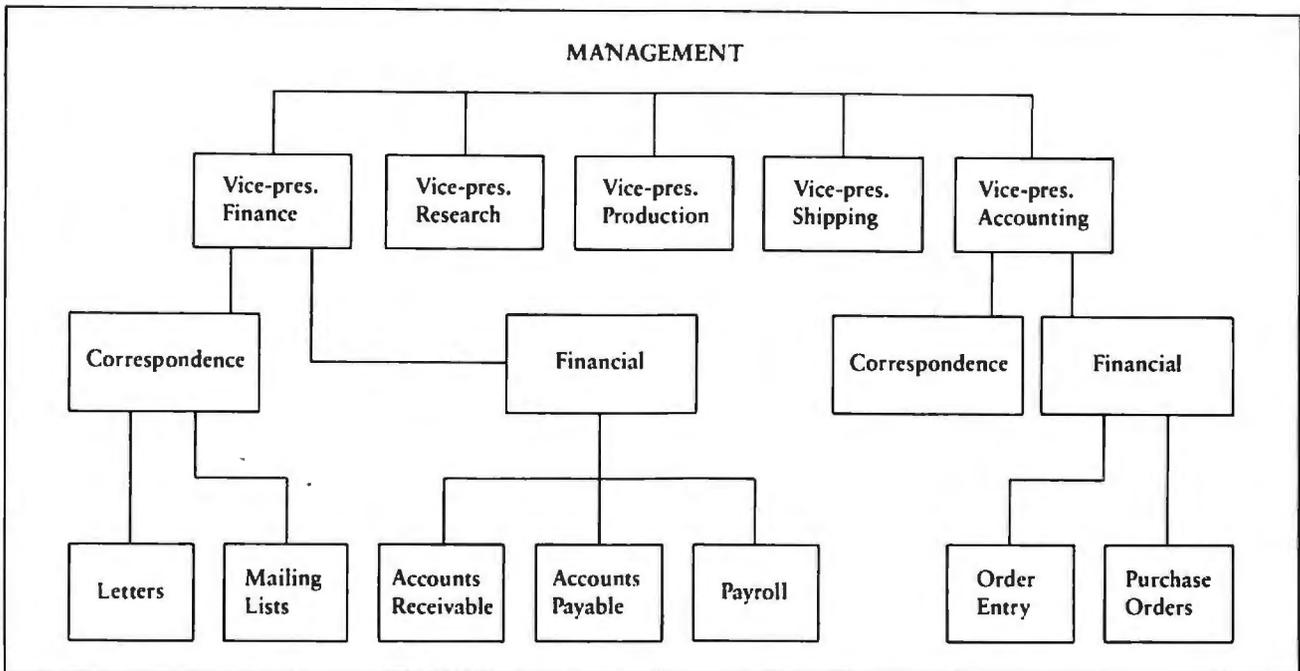


Figure 2: Typical UNIX File Structure for a Business

microcomputer operating systems, the tools and applications level is usually limited to primitive line editors.

The applications included in UNIX were never intended for beginners; they are generally programmer oriented and are poorly documented. The typesetting, calendar, and electronic mail functions are useful for office workers but require a relatively sophisticated knowledge of UNIX.

### Text Entry and Editing

The text editing programs that are part of the operating system are the primary means of creating text and program files in UNIX, whether documents are edited line by line or a screen at a time. Other UNIX commands may be entered and executed concurrently with text editing—UNIX can be running other programs while the user is editing a file.

Documents may be rearranged by marking blocks of text to be moved, copied, or deleted, or those blocks may be referenced by line numbers. Also, a document currently being edited may be combined with other files

as desired. That is, a section of text from the current file may be appended to another file from within the editing program. Under MS-DOS 1.10, the *FinalWord* word processing

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The applications included in UNIX were never intended for beginners.

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program includes this feature, but many popular packages that run on the PC, including *Wordstar*, do not.

The “cut-and-paste” features and the ability to interact with other UNIX operating system modules make the UNIX text editors powerful and efficient tools for experienced users.

Once a document has been entered and modified with an editing program, it may be checked for typographical errors and spelling mistakes using the default, on-line dictionary or a user-defined custom dictionary. The document may then be corrected using an editing program.

### File Management

UNIX’s built-in filing system is so useful that in the minds of fervent UNIX devotees its characteristics are synonymous with UNIX. Unlike the “flat” filing systems of CPM and MS-DOS 1.10, UNIX enables the user to build electronic filing cabinets in which related files are grouped together under one name.

A flat filing system can be likened to a filing cabinet with only one drawer; access to all available files is simultaneous, but getting to files on another disk area requires some fancy footwork. A hierarchical filing system, such as UNIX’s, can be considered a multiple-drawer filing cabinet, where related file folders are grouped together. Particular files within these groupings can be linked to those in other groupings.

Figure 2 describes a typical UNIX file structure for a business. In this example the user has allocated separate directory areas for each of the company’s vice-presidents. Each VP then has separate directory areas for correspondence files and for accounting or production data files. Except for password-protected files, any VP can access the files in another VP’s

## ● State of the Art

directory area. For example, the VP of finance could link the Accounts Receivable and Accounts Payable files to the Order Entry and Purchase Order files kept in the accounting department's directory. All the files are accessible through the "parent" directory, "Management."

This complex electronic filing cabinet approach to file management is useful for putting a lot of data into a computer that has a hard disk. For an IBM PC with floppies, files can be divided up by floppy disk; however, the problem of trying to find the right version of the file that has a specific piece of information is all too common.

UNIX makes this task much simpler and is an extremely sophisticated tool that can provide more efficient file management than any floppy-disk-based system. Files can be linked

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As microprocessors have become more powerful, the placement of UNIX on them has become easier.

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to each other in a variety of ways when directories and file systems are set. A flag or message in the system can connect a file in one directory to another directory system. This linking of files allows a logical connection, for example, of a cover memo to documentation in another directory. Although somewhat complicated to learn, this feature provides a great deal of flexibility in managing large amounts of different kinds of text and data.

Although the above functions represent only a small percentage of the utilities and applications programs

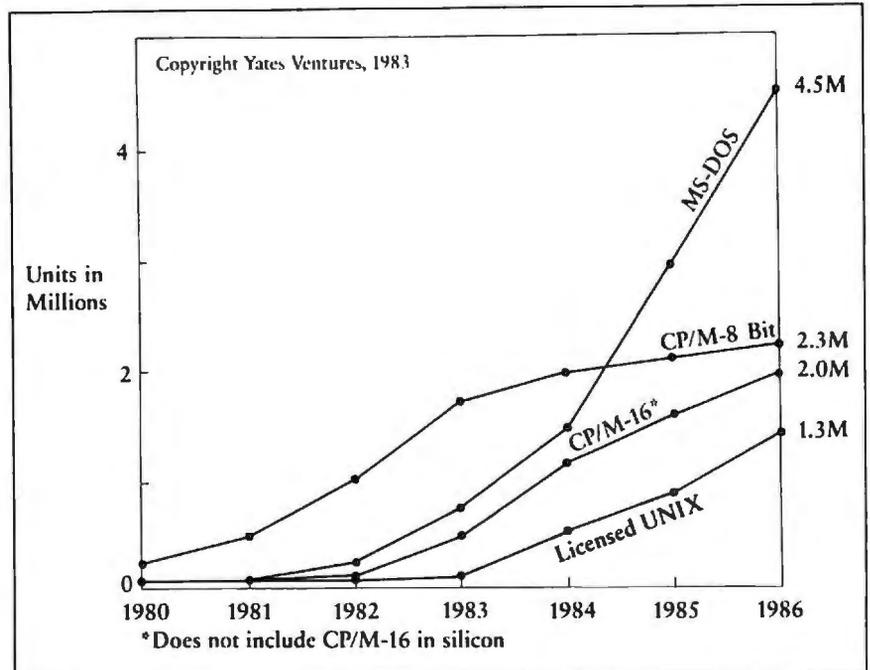


Figure 3: Major Nonproprietary Microcomputer Operating Systems (cumulative installed base from 1980 to 1986)

provided with the UNIX operating system, they are among its most important capabilities and are indicative of the flexibility afforded users.

### UNIX On Micros

The first microprocessors to achieve great popularity in small computers used 8-bit architectures (Zilog's Z80 or Intel's 8080). UNIX is a relatively large software program that requires a more powerful processor than any of the 8-bit chips. As microprocessors have become more powerful, the placement of UNIX on them has become easier.

Between 1979 and 1980, Intel, Motorola, and Zilog released 16-bit microprocessors (the Intel 8088, Motorola's 68000, and the Zilog Z8000). However, these semiconductor manufacturers were used to building hardware and did not develop software to run their chips. Consequently, these powerful chips came to the market with no available software.

Computer manufacturers who wanted to offer personal computers built with these chips as quickly as possible looked around the market to find a software product that would

take advantage of the greater functionality of 16-bit chips. Several products, including the UCSD p-System, CP/M-86, PICK, and UNIX, were considered. In the case of IBM, a compromise was made and a special operating system, PC-DOS, was implemented by Microsoft for the IBM PC's Intel 8088 microprocessor. The 8088 is something of a hybrid between the 8-bit 8080 and a true 16-bit microprocessor. PC-DOS is known as MS-DOS 1.10 when it runs on computers other than the IBM PC.

MS-DOS 1.10 and CP/M-86 both have a major limitation: they are for single-user systems only, and consequently do not allow full utilization of the power of the more advanced 16-bit processors, specifically the 68000. The 68000 is almost a 32-bit chip and is most frequently used for multiuser applications.

As the industry began to see UNIX as a possible alternative to other operating systems, a number of companies directed efforts toward implementing microprocessor versions of UNIX. The largest distributor of UNIX on microcomputers is

Microsoft, whose XENIX operating system runs on 8086- and 68000-based computers such as the Tandy System 16, Fortune 32:16, and Apple Lisa.

Several companies have offered UNIX specifically for the IBM PC, and other versions are on the horizon. VenturCom Corporation has released VENIX for the PC, and a single-user version of XENIX from Microsoft should be available in the near future. Both these products are licensed from the Bell System and are implementations of the UNIX Version 7, or System III, sold by Bell.

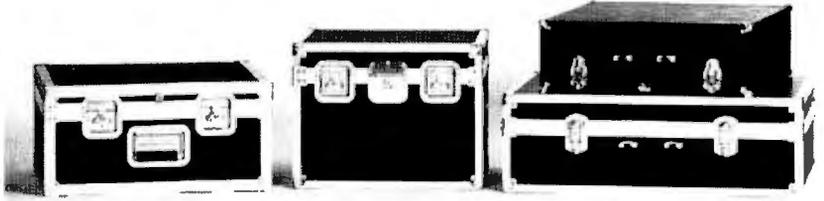
Besides official implementations, a number of UNIX-like operating systems exist that are based on the philosophies of UNIX but are not versions of the actual licensed Bell product. Systems with UNIX-like capabilities include QUNIX from Quantum Software Systems in San Jose, Coherent from Mark Williams in Chicago, IDRIS from Whitesmith's Corporation in New York City, and REGULUS from Alycon Corporation of San Diego.

XENIX and VENIX will be among the first of the enhanced versions of UNIX available on the PC. A hardware modification in the form of a 68000-based add-on processor (such as the Sritek board mentioned earlier) allows the PC to run XENIX, while Venturcom claims that it has actually transported VENIX to the 8088-based PC. QUNIX is the only one of the UNIX lookalike operating systems currently available for the PC. The relative advantages and disadvantages of choosing one over the other will be discussed in a future article.

#### Market Penetration

Figure 3 illustrates a projection to 1986 of the cumulative installed base for the major nonproprietary micro-computer operating systems. The predominance of the 8-bit CP/M and 16-bit MS-DOS 1.10 operating systems over UNIX is partially a reflection of the large installed base of single-user systems such as the PC.

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The market requires that system software be able to access the largest possible software base. All indications are that future versions of MS-DOS will be written in C and will eventually include most or all of the functionality usually associated with UNIX. Thus, although it will not actually contain Bell Labs' UNIX code, MS-DOS will at some point in the future run both UNIX and MS-DOS programs. That translates as access to a very large base of applications software.

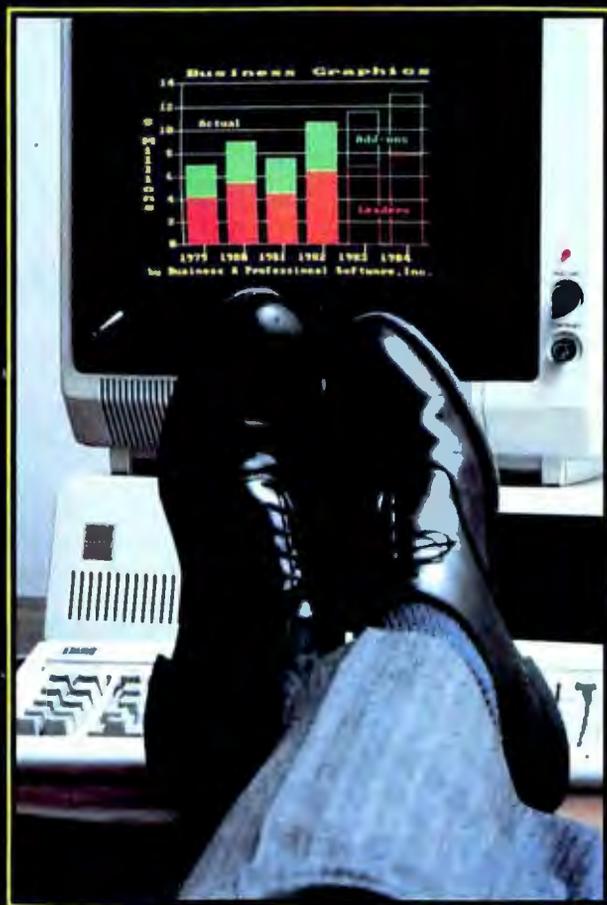
UNIX, on the other hand, will not be able to tie into the MS-DOS software base to any appreciable extent.

But until MS-DOS evolves to encompass UNIX functionality, UNIX and its lookalikes will provide a powerful and flexible operating environment for program development and business applications.

*Jean L. Yates is cofounder and president of Yates Ventures, a Los Altos, California, consulting company specializing in market research and documentation on standard software.*

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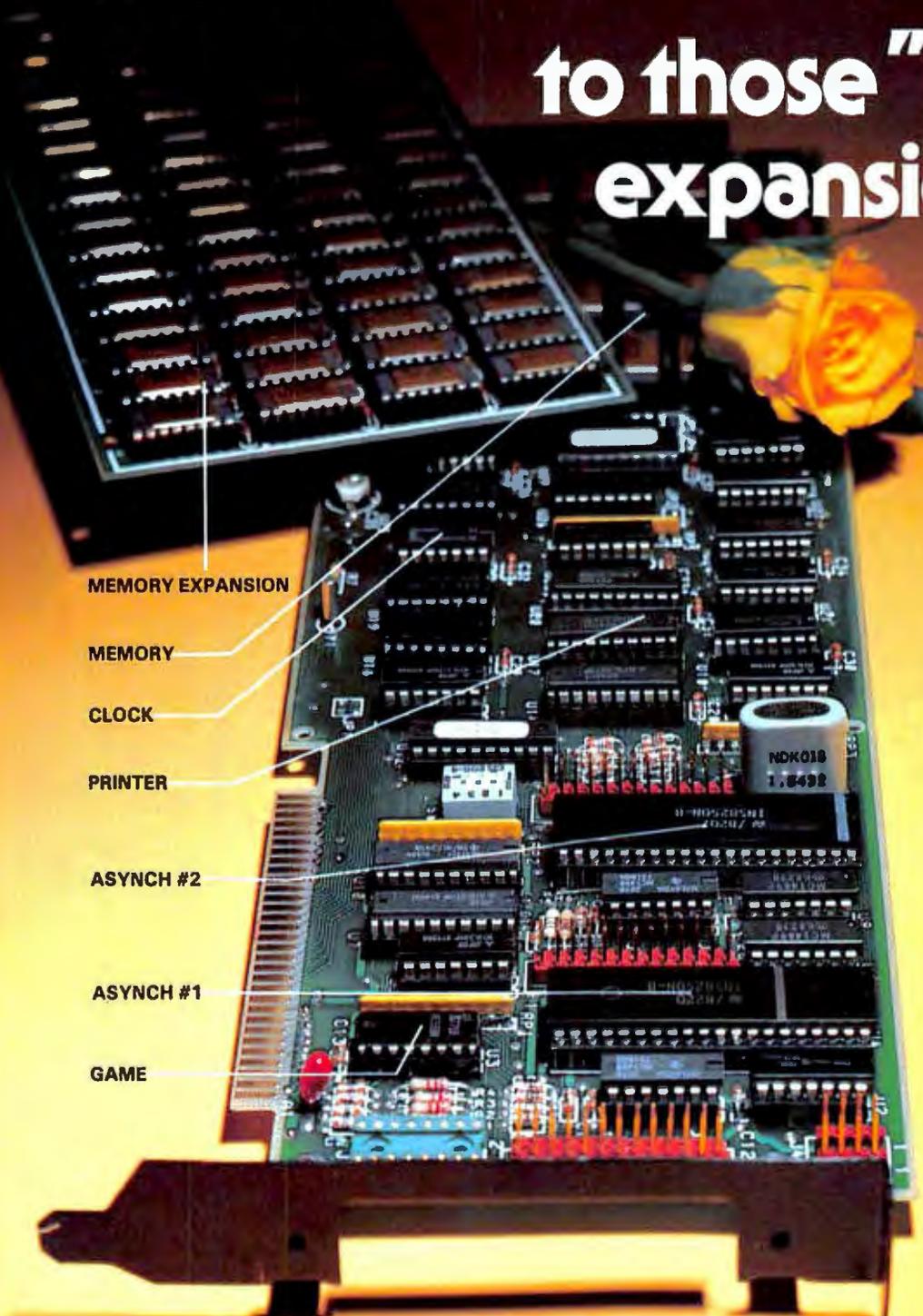
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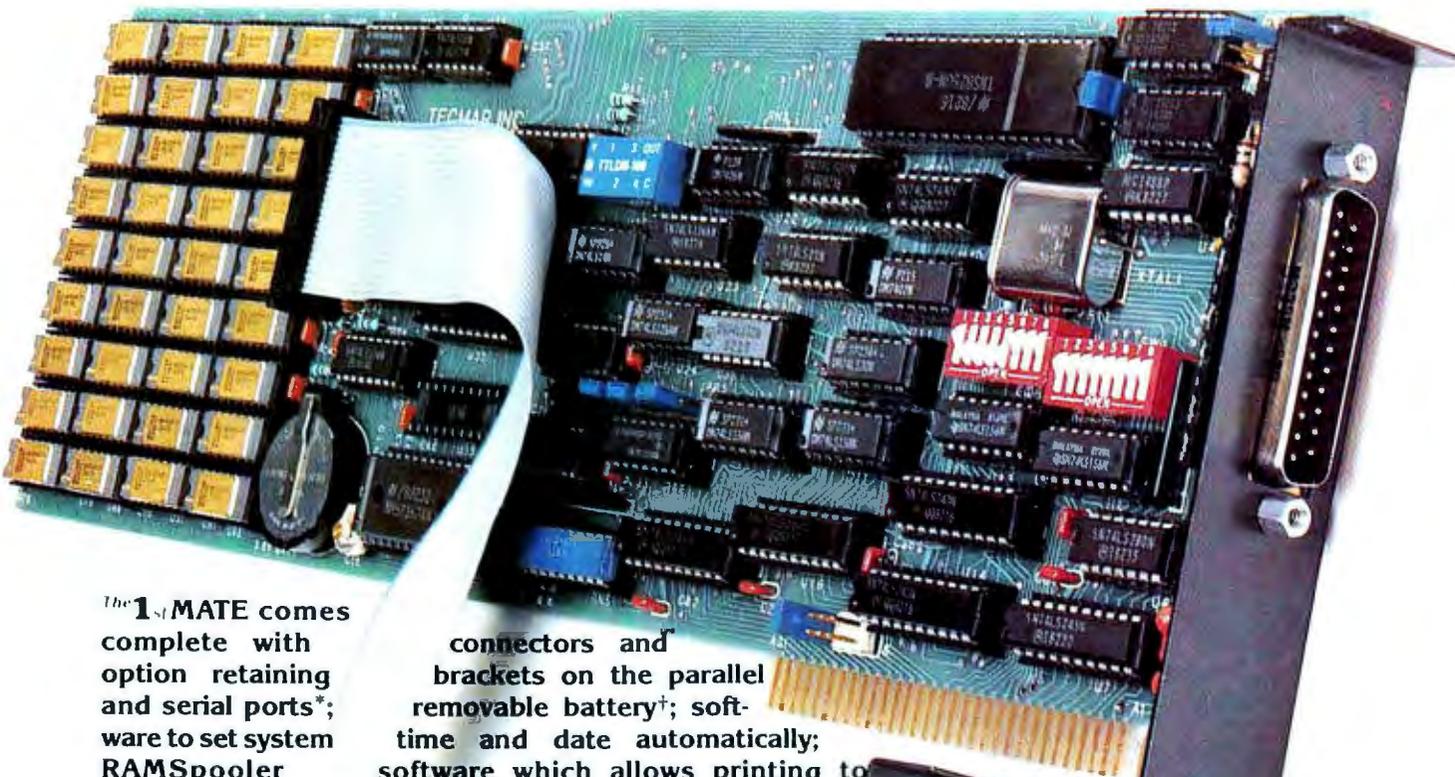
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\*The parallel port can be addressed as LPT1/LPT2, the serial port can be addressed as COM1/COM2. Both can be jumper disabled. They fully support IBM software.

†The removable battery has an estimated 1-year life. No soldering needed for replacement.

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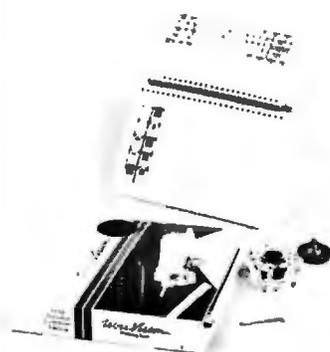
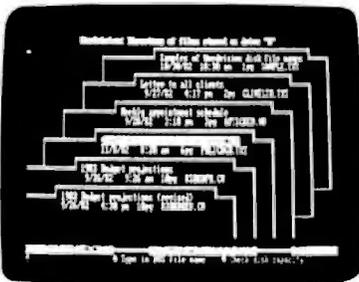
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Licenses include rights to use Bruce & James' copyrighted screen designs and keyboard modifications, and assembly-language code modules which



are incorporated into the licensee's program to implement The Vision Interface. Consultation on adapting the interface to the licensee's application is also available, as is licensing for Bruce & James self-easel package design. Licences will be granted only for programs meeting criteria for acceptance established at the sole discretion of Bruce & James.

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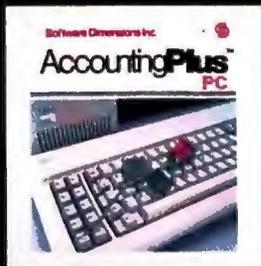
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# PC WORLD View

News and Notes for the Computing Community

Miriam Medom

The *PC World View* staff is avidly attuned to developments in computer technology, and we hear lots of rumors, speculation, and advance news that interests us. We want to share the most promising and unusual of these developments, and we'll do that here. We've reserved the "Grapevine" section of this column for industry reports, speculation, and rumors that we find especially enticing.

## Grapevine

### Bug Off

According to one industry insider, a major data base program for the PC has more bugs than a can of Raid could stop. Apparently this program was being used for a large project when a dozen or so significant problems were discovered in its operation. Repeated calls to the program's distributor yielded little help.

Finally the frustrated folks who had uncovered the bugs sent a memo to their 100-plus offices directing that employees cease using the program until further notice. They also sent a copy of that memo to the program's distributor, which got the attention their earlier pleas for help had not.

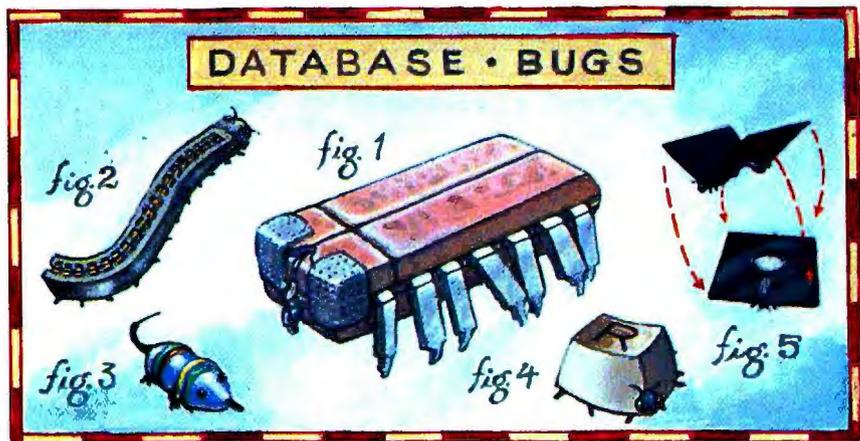
The unusual upshot of this development is that the company that discovered the bugs has loaned its ace programmer to the distributor to help debug the program. The result of this customer-distributor collaboration will be a new version of the program for the PC.

## Tandon Forever

Industry sources report that IBM has agreed to buy another 400,000 single-sided 5¼-inch floppy disk drives from Tandon Corporation. Tandon has supplied disk drives for the PC since the computer was introduced, although IBM has added other drive

compatible with its in-house PCs. The machines they've considered so far are the COMPAQ, Hyperion, and a new Osborne portable.

The second-generation Osborne has a 7-inch screen, double-density disk drives, and an add-in board that features a 16-bit processor to make it PC compatible. (In its regular config-



suppliers, including Control Data Corporation. To date, Tandon has provided mostly single-sided drives to IBM, but the drive manufacturer will also increase its deliveries of double-sided drives. Tandon claims to be the largest manufacturer of floppy disk drives, and its stock prospectus recently reported that sales to IBM accounted for 20 percent of the firm's 1982 sales, which totaled \$150 million.

## Osborne in the Running

Osborne Computer Corporation, the company that broke ground with its portable computer, bundled software, and low price has joined the race for the PC-compatible market.

Our sources report that one division of a large international corporation has made preliminary studies of at least three portables that would be

duration this machine utilizes an 8-bit processor.) With the add-in board, the new Osborne would reportedly be able to use MS-DOS and possibly CP/M-86.

## High-Tech Highrises

It had to happen. The boom in personal computers is creating a building boom. Entrepreneurs in at least five major cities are launching showplaces where high-tech companies can cluster. The idea is that customers will flock to these one-stop computer shopping centers, and that all tenants will benefit from sharing a common address. Chicago was the first city to acquire a high-tech high-rise, the Business Products Center in that city's Merchandise Mart. (De-

spite the highrise label, this computer trade mart is actually on the first floor.) The New York Computer Center takes a somewhat different tack; it offers a permanent exhibit space where potential buyers can look and touch, but not buy.

Four other, more traditional shopping centers are slated to open next year: the Boston Computer and Communications Mart (BOSCOM), the International Information Processing Market Center (Infomart) in Dallas, and, in San Francisco two competing centers, the California DataMart and the Pacific High Technology Trade Center. No doubt these new shopping centers will have the obligatory acres of parking; the only question is, how soon will they build a McDonald's across the street?

### Big Blue's News

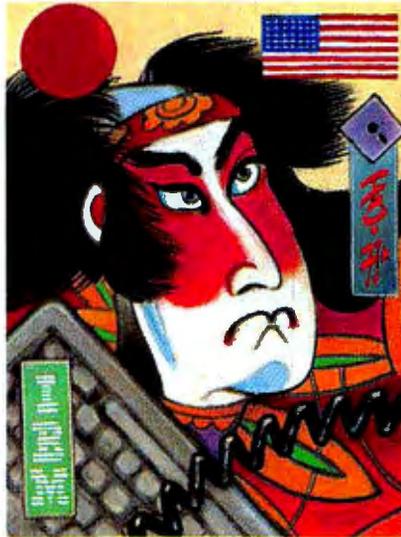
#### *East-West Negotiations*

First it was General Motors and Toyota, now IBM and Matsushita. The two electronics giants are holding detailed discussions with the intention of working together to produce and sell computer products. Japanese reports state that any products developed jointly by the two firms would initially be marketed in Japan.

#### *Caught in the Middle*

The Information Products Division of IBM, located in Boulder, Colorado, has introduced a 4-inch floppy disk drive. IBM expects to market the new drive to original equipment

manufacturers (OEMs), the industry jargon for other computer makers. This 4-inch drive seems to be neither fish nor fowl; it's an odd-sized entry into the microflop market that is already confused by three competing offerings: a 3½-inch drive that features disks in a hard plastic cassette, a 3-inch drive that also features disks with a hard-shell case, and a 3¼-inch drive that uses a conventional floppy disk. With a few dozen incompatible



data formats among the 5¼-inch disk drives presently used in most small computers, the last thing this fast-growing industry may need is another disk size to toss around.

#### *Disgruntled Dealers*

The PC has been sold officially in Europe for only three months, but some 30 authorized dealers in Germany are quite unhappy with IBM's marketing moves in that country. In addition to authorizing those established dealers to sell and service the PC, IBM has allowed Germany's largest discount marketing firm, Metro SB, to peddle

the PC. Traditional dealers say they can't compete with the 25 percent discounts offered by Metro, and they predict that overall PC sales will suffer because customers will quickly become dissatisfied with the lack of service and support from discount sellers.

#### *Moves at the Top*

After 10 years as IBM's Chairman, Frank Cary has stepped aside. Cary will be replaced by John R. Opel, who moves up from president of the corporation. The new president will be 48-year-old John F. Akers, a marketing specialist who has led the PC's parent division of IBM, the Information Systems and Communications Group, since 1981.

### The Cyberbowl

Football has its Superbowl, Hollywood its Academy Awards, and Broadway its Tonies. In her continuing effort to assure that the computer industry is not overlooked in all this giving, correspondent Ellen R. Wilson has proposed the Cyberbowl, an award whose purpose, she notes, is "to applaud distinctions both dubious and deserved."

Following is a selection of the Cyberbowl award categories and winners for 1982:

- The Promises, Promises Rosette—to Apple Computer, whose long-rumored new products didn't get to market in 1982.

- The No-Free-Lunches Bumperticker—to Steve Wozniak for spending \$12.5 million for the US Festival.

○ The Nancy Reagan Award for Distinction in Class—to the Beverly Hills Computer Store, which features chauffeur-driven limousines and software displayed on black velvet in glass cases.

○ The Talk-to-Me-Dirty Statuette—to the term “end user,” which sounds as if it belongs in a dirty book.

## Barbie, Ken, and CP/M

Mattel, the company that brought the Barbie Doll into the world, has a new baby named Aquarius. This new offspring is a low-cost home computer that features a 49-character keyboard, built-in BASIC, the capability to display 16 colors, and optional memory expansion cartridges. The \$500 Aquarius system can be further expanded to utilize the CP/M operating system, which may make it the least expensive computer to join the million or so machines that run CP/M.

## Take Your Pick

The Pick Operating System, a widely respected system originally developed for Honeywell minicomputers, is being implemented on the PC. The firm that will offer Pick for the PC is Computer Distributors of Bellevue, Washington; this company already markets the IBM Series/1 mini with Pick. The PC's Pick will be available in two versions: a single-user format for machines with floppy disk drives, and a multiuser format for use with a hard-disk-based PC.



## Mystery of the Month

This month's mystery has a solution and a good detective, and it may prove instructive for witnesses to similar unexplained events.

In a two-person business we've heard about, the boss bought a computer and immediately began using it for all his reports, correspondence, and calculations. His enthusiasm for the system did not rub off on his assistant, who was comfortable with her typewriter and rather apprehensive about computers in general. Nonetheless, the boss convinced the assistant to use the computer, and she agreed reluctantly.

As often happens, however, the assistant's experience with the computer was precisely as frustrating as she feared, and she soon began to avoid working with the machine whenever possible. On one occasion, though, the boss had made changes in a report that was stored on disk, and he needed a revised copy immediately. So she swallowed hard,

slipped the program and data disks into their drives, and sat down to do the work.

But every time she tried to use the data file, she got an error message stating that something was wrong with the disk. She called the boss, who told her to take out the disk, put it back in, and try again, but she got the same error message. She tried putting another data disk in the computer, and the same thing happened. By now her frustration was approaching fury.

The boss came in and tried the in-and-out test with the second disk, and it worked fine. Then he switched to the original data disk, and it also worked perfectly. He stood by as the assistant once again tried both data disks and got error messages both times.

Now he was a bit mad but even more puzzled. Clearly this was not a matter of his assistant's reluctant attitude, unless computers have ESP. For the next half hour, boss and assistant went through a systematic inspection of everything they did while they were using the computer: turning the machine on and off, handling disks, and working at the keyboard. They could find no difference in their behavior toward the machine and no reason for the repeated disk errors.

Just as they were about to give up and accept the apparent verdict that the computer just wouldn't behave for the assistant, the boss noticed that she was wearing a charm bracelet. He looked closely at the charms. Sure enough, one of them contained a tiny magnet, which had just enough force to interfere with reading disks some of the time. The assistant stowed her bracelet in a drawer, and she's had the computer purring ever since.

## Tech Street Journal

In a move that qualifies for a Best-New-Name-of-the-Year award (if someone doesn't sue, that is), Publisher and Editor Michael Salter has launched the *Tech Street Journal*. This monthly newsletter reports news of the financial performance of high-tech companies and offers tips to investors interested in the hot and not-so-hot companies in the high-tech arena. The publication's premier issue included a pick of the month and a listing of hot buttons—presumably companies to watch. A full page of the newsletter is devoted to performance summaries for the high-tech stocks that have been both the biggest gainers and the biggest losers. *Tech Street Journal* is a registered in-

vestment advisor with the SEC, and its contents are costly: \$125 for three months and \$299 for one year. Investors routinely pay dearly for their advice, however, and more can be obtained from *Tech Street Journal* at Technology Financial Services, 3 Courthouse Ln., Chelmsford, MA 01824, 617/458-3974.

## Computer Names

*PC World View* has yet to establish its own annual awards, but we've noticed some striking connections between the names of people who work in the computer industry and the jargon we all babble in. Here are the first few examples we've encountered without looking far; we'd like

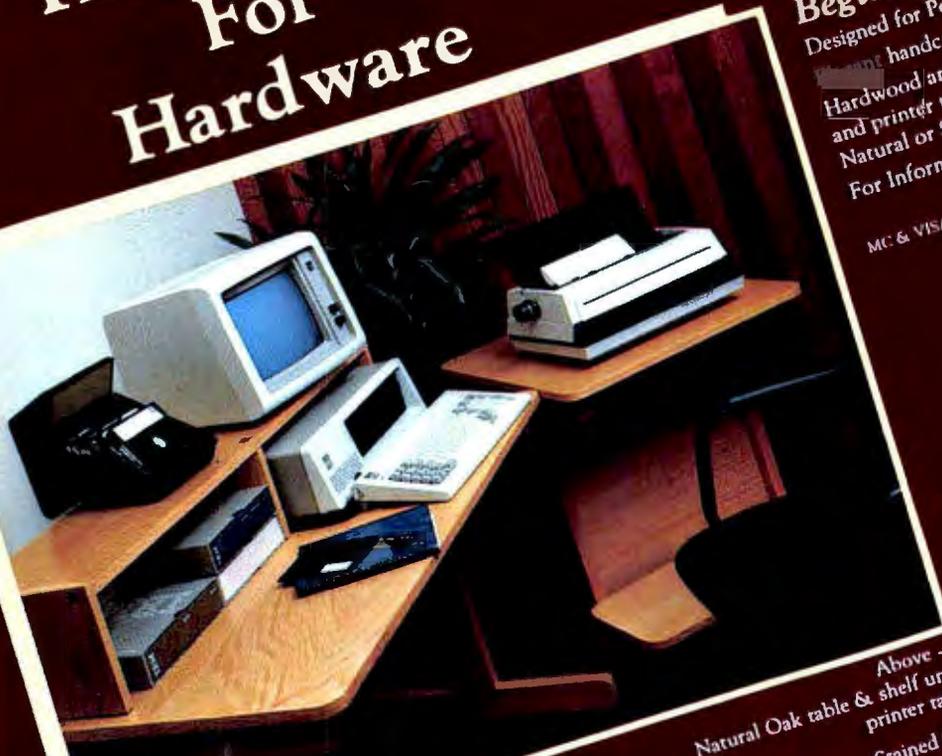
to keep our list growing by hearing about others.

*PC World's* own Lisa B. Stahr, who deserves a prize for her patience while researching and writing a story about the mouse and its use with computers; she happened to be working on that story at the time Apple's Lisa was announced, just as everyone was commenting on that machine's similarity to the Xerox Star work station.

*PC World* also boasts an advertising account manager named J. Mark Doss; we've tried in vain to encourage him to drop the second *s*.

Another well-known journalist and program publisher in our midst, Jim Edlin, has the coincidental distinction of sharing his name with that of the PC's BASIC editor.

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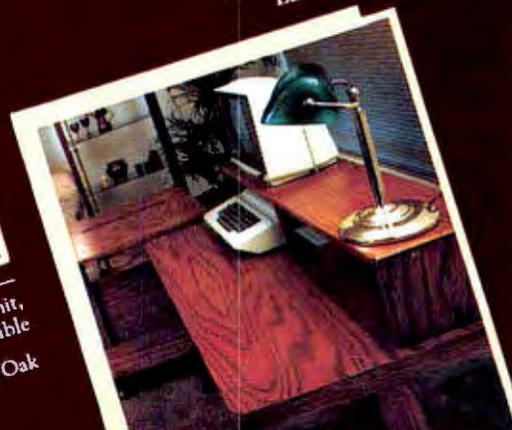
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# Teach yourself software in minutes. Not hours.

The woman in charge of sales and marketing at Tall Trees Systems (see "Memory Madness" *PC World*, Vol. 1, No. 1 for more about this company) is named Martine Boot.

We applaud the forbearance of all these fine folks, knowing that they get at least one chuckle or poke in the ribs every day, and we know we've probably just made it worse.

## Trade Secrets Tiff

A year ago three former employees of Texas Instruments founded the COMPAQ Computer Corporation, producer of the portable, IBM PC-compatible COMPAQ. Officials of Texas Instruments apparently believe that COMPAQ's principals have not played entirely fair, because TI has filed state and federal lawsuits claiming that COMPAQ employees have misappropriated TI trade secrets and lured away key employees.

This action is shaping up as a good old Texan fued, with Dallas-based TI at one end of Main Street and Houston-based COMPAQ at the other. The lawyers are even now strapping on their forensic Colts and Winchesters. The verbal salvos have already begun to fly: a spokesperson for COMPAQ denies TI's charges and promises that "substantial counterclaims" will be filed against Texas Instruments. Whether the shootout ever gets to court remains to be seen.

*PC World View welcomes contributions from readers, and we'll pay up to \$50 for each item published. 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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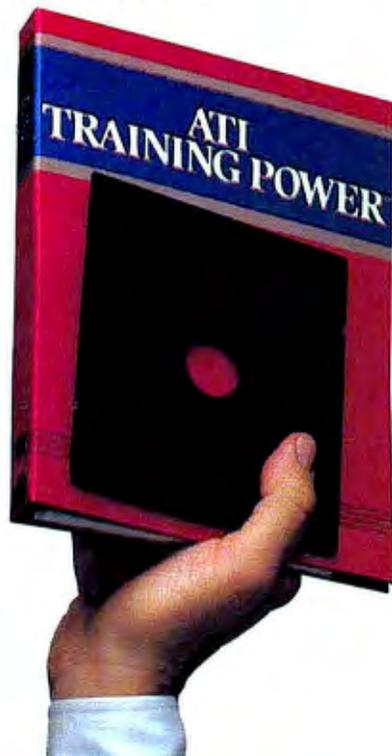
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- Microplan**
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- Programming
- BASIC**
- Database Management
- dBASE II**
- EasyFiler**

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# Before you buy a multi-function RAM board for your IBM™ PC — here's what you need to know about ANATRON's "answerRAM" ...



## it gives your PC professional system expandability

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Now, there's a high quality expansion board for your IBM PC that combines:

- up to 256K of additional RAM
- 3 complete I/O ports, fully compatible with your IBM
- the best communications interface you can buy

... "answerRAM" from ANATRON.

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Most PC owners buy a multi-function RAM board for two reasons: for additional main memory, and to get additional Input/Output (I/O) ports without using up precious expansion slots on the IBM PC's motherboard.

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## “answerRAM” lets your system grow

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So why buy a board that will limit future expansion, when “answerRAM” costs the same as less functional boards?

With “answerRAM” you get the most out of one expansion slot — saving others for future enhancements — so your system can grow as your needs grow.

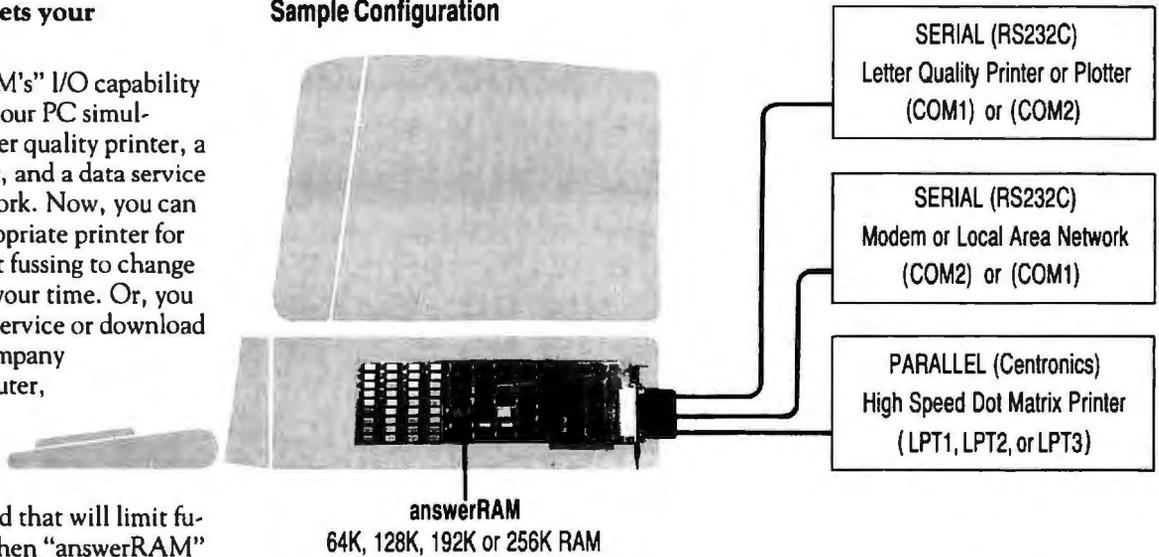
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**Absolutely no clock — here’s why**  
Unlike other boards, “answerRAM”

## Sample Configuration



does not include a board-mounted clock — by design. Your PC has an internal clock/calendar. True, it needs to be initialized each time the system is started, but board-mounted clocks that try to save you that trouble create new problems instead:

- they use address space that may conflict with future enhancements
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- you must carry the clock software on all your system disks

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“answerRAM” comes complete with software to make your additional

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Comparison Chart

	2 Serial ports Standard	1 Parallel Port Standard	1 I/O ports "ready-to-go"	Electronic Disk	Default Printer Toggle	Print Spooler	Check Calendar	Cable connectors*	Is all communications Mfg. supported	Uses only 1 slot
ANATRON "answerRAM"™	●	●	●	●	●	●	●	●	●	●
AST ComboPlus™		●		●	●			●		
QUADRAM Quadboard™		●		●				●		
SEATTLE RAM+™				●						NA
TECMAR ALLinONE™		●		●	●			●		

\*all I/O ports factory-wired to all necessary connectors — no user modification required

\*\*manufacturer's own cable available for interface to peripherals

## Specifications:

**Memory:** 64K, 128K, 192K, or 256K with parity, just as IBM installed

**I/O:** 2 Asynchronous Serial ports Configured as COM1 and COM2 Programmable, for 50-9600 baud; 1, 1.5, or 2 stop bit generation; even, odd or no bit parity, 5, 6, 7, or 8 bit character communication

1 Parallel Printer port Configured as LPT1, LPT2, or LPT3 All ports can be disabled

**Cable/Connectors:** 37-pin commercial grade connector and support bracket mounts in chassis "3-into-1" heavy duty cable with 37-pin connector 2 each DB25 (RS232C) connectors 1 each "Centronics" connector Cable is jacketed and shielded

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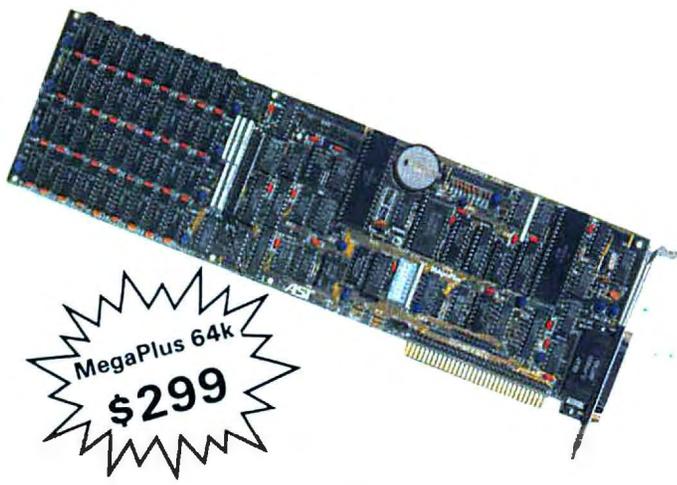
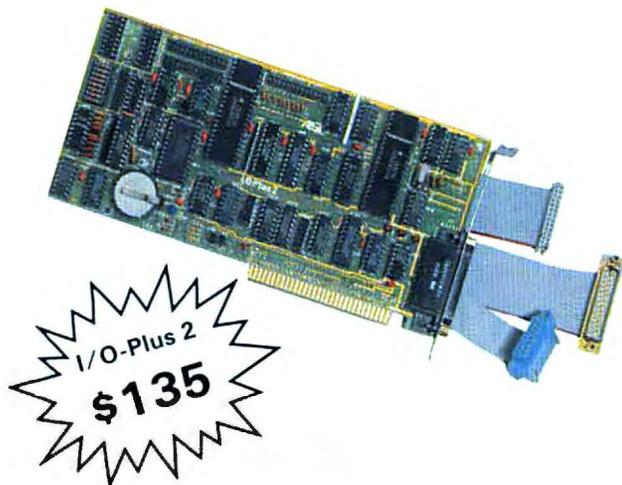
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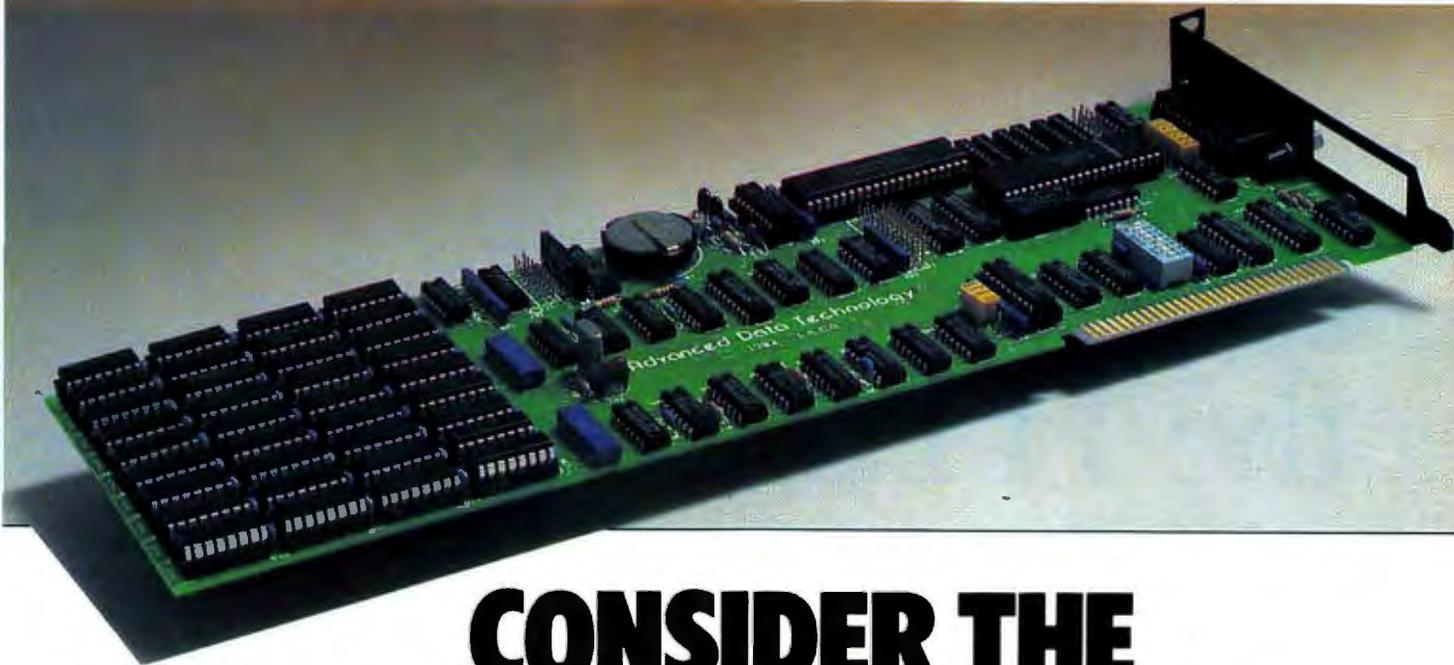
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# In This Corner... the TI Professional

Danny Goodman

*Pitting Texas Instruments' newest computer against Big Blue's PC shows that the Lone Star giant picked up where IBM left off. If the world needs another 8088-based desktop computer, TI has just the system.*

TI, temporarily skipping over its own, vast in-house semiconductor capabilities, is aggressively pursuing the professional computer market with its own PC—the Texas Instruments Professional Computer. Code-named Pegasus during its development at TI's Data Systems Group (a different division from the Consumer Products Group, which has responsibility for the TI 99/4A and Compact Computer CC-40), the TI Professional Computer is in some respects an improvement on the IBM

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The TI Professional Computer is in some respects an improvement on the IBM.

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PC. The new TI's price alone, roughly 10 percent less than a comparably configured PC, is inducement enough to take a look at the Professional Computer.

Just to make sure that those who wanted to take a look could do so, TI shrewdly shipped the Professional Computer to dealers a few weeks before the product was officially announced. System enhancements such as hard disk drives, color monitors, and over 100 software packages were immediately available. First-day buyers could get almost every popular word processing, financial, accounting, graphics, and data base management program that TI offers, with a few languages and alternate operating systems to boot (see Table 1).

## Construction

Such a smooth debut befits a system with an equally smooth design. The Professional Computer sports the familiar IBM exterior design; it has room for two internal disk drives with a possible combination of either two 320K floppy disk drives or one floppy and one 5- or 10-megabyte hard disk. The detachable keyboard is connected to the rear of the system via a coiled cord about the same length as the IBM's.

Removing the Professional Computer's unit cover (which can be done without moving the chassis) reveals an internal layout similar to the IBM PC's. Five rear slots are available for expansion boards, with six connectors inside. A sixth slot, located near the front, accommodates a memory expansion board that can expand the minimum 64K RAM to 256K. That leaves room for one smaller board, such as an RS-232C, and four full-length boards. Guides for the front end of the longer boards are preinstalled, as is a large plastic guide that supports the bottom edges of the boards, keeping them away from integrated circuits on the motherboard.

With a spatial frugality uncharacteristic of most Texans, TI made an obvious effort to preserve expansion slots in the new computer. A parallel printer port is standard, and video display controllers—one for monochrome graphics, one for color graphics—can be piggybacked to allow multiple options in a single slot. The Professional Computer's floppy disk drive controller is built into the motherboard, whereas the controller board for the IBM PC floppy disk drives must use one of the five expansion slots. Both computers need a separate controller board for hard disk drives.

## Monitors and Keyboard

TI's graphics video controllers for both monochrome and color monitors provide 720 by 300 pixels of resolution in 8 color or shade levels, while IBM's recently announced 12 1/2-inch diagonal Color Display has a resolution of 640 by 200 pixels with 16 foreground and



## Review

8 background colors. The PC's monochrome monitor also has 640 by 200 pixels. The Professional Computer's graphics are outstanding, especially on the monochrome monitor.

The 12-inch TI monochrome monitor, officially called the Display Unit, displays the computer's 25-line by 80-column output in text mode. Text characters are defined on the green phosphor screen as 7-by-9-inch elements within a 9-by-12-inch cell. The TI Display Unit doesn't measure up to the easy-on-the-eyes IBM monochrome monitor in text display; individual pixels are clearly visible in the characters, causing eye fatigue over long periods. Text, however, can be displayed at any of eight intensity levels, or in inverse video, underlined, or blinking.

The text display of the Professional Computer may be disappointing, but the TI keyboard answers the prayers of users who had to retrain themselves for the IBM PC layout. Shift keys on the Professional Computer are where they should be, the Return key is large and adequately marked, and the CapsLock toggle key has a red LED on indicator. Twelve function keys (two more than the PC has) run horizontally across the top of the

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### The Texas Instruments' price is inducement enough to take a look.

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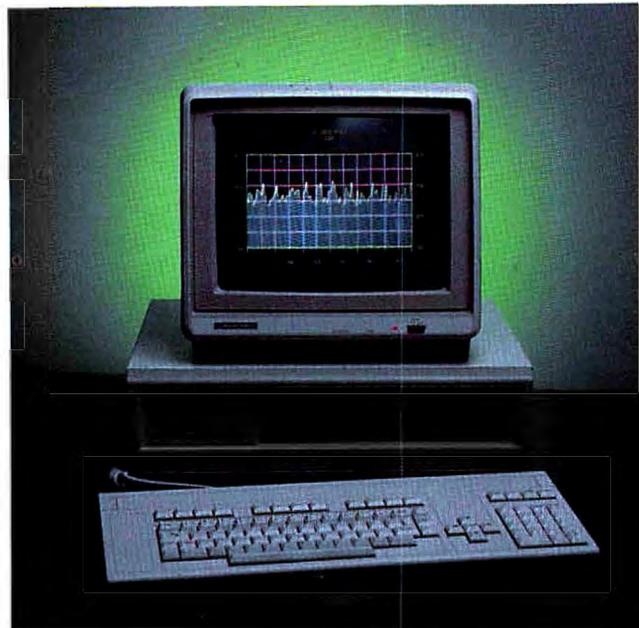
TI keyboard, as on most advanced terminals. Cursor controls and the numeric keypad are separate from the other keys, and the keypad includes a large zero key for the thumb and an extra ENTER key for rapid data entry (see Figure 1).

While the keyboard cabinet is large, it weighs a little less than the PC's. A built-in bail is adjustable from 5 to 15 degrees above horizontal for angled keyboard use on a desk.

The soft, molded form of the keys and the spongy feel of the action are the only problems with the Professional Computer keyboard. A fast touch-typist will make many entry errors caused by fingers slipping over to nearby keys, and may find the Ins and Del keys too far away from the data entry keys.

#### Getting Started

Just like the IBM PC, the TI Professional Computer can be cold started with a toggle switch at the rear right of the system; a warm start reset requires pressing the Ctrl, Alt, and Del keys simultaneously.



The Texas Instruments Professional Computer displaying the Dow Jones Industrial Average.

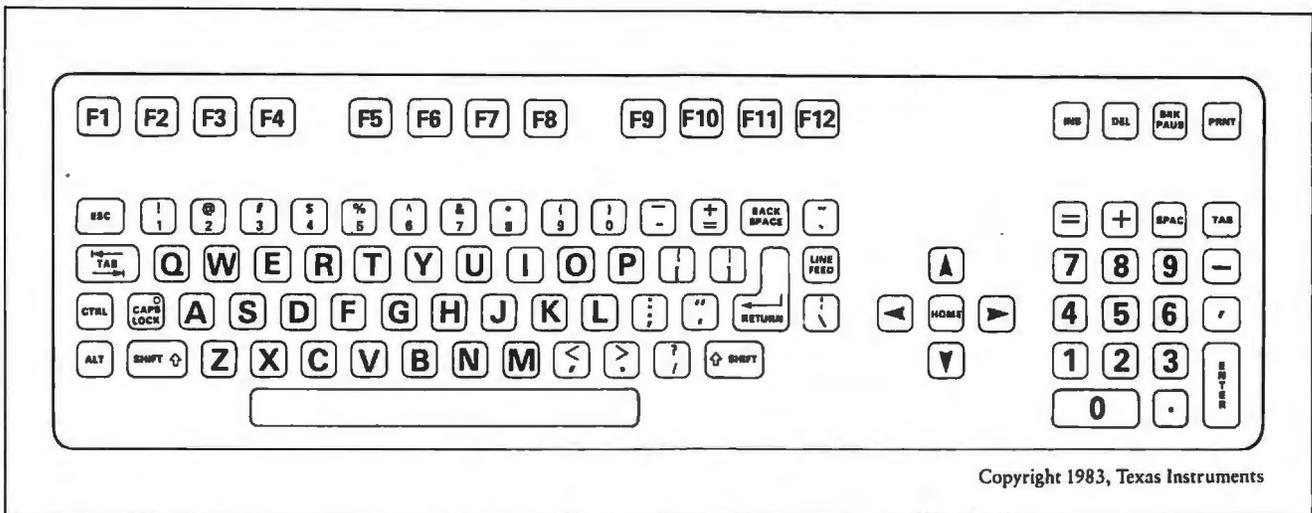
Unlike the PC, the TI computer requires an operating system disk to get going. The TI's ROM is only 8K (expandable to 16K) and does not contain a built-in BASIC interpreter. TI has reasonably assumed that all applications for this business-oriented machine will be disk based, so there is no cassette tape interface.

#### MS-DOS Compatibility

Vying for position as the most popular operating system for the TI Professional Computer are Digital Research's CP/M-86 and CCP/M-86 and Microsoft's MS-DOS, the generic DOS. CP/M availability was announced the same day as the Professional Computer. For the TI implementation, MS-DOS version 1.25 is essentially the same as PC-DOS 1.10. There are a few differences, however. All text applications, for example, even those displayed on the high-resolution color monitor, are in 80-column format, so the part of the MODE command that chooses 40 or 80 columns is not needed. Also, setting RS-232C parameters and printer output direction is accomplished in TI's MS-DOS with a CONFIG command.

Surprisingly, TI's MS-DOS does not let an operator create an AUTOEXEC.BAT file while in DOS; to create a batch file the line editor EDLIN must be invoked, as with a regular text file. This is a waste of one of MS-DOS's most useful features.

Similar operating systems don't necessarily make computers compatible, and that's one reason why TI makes no claims about PC compatibility. Even so, the TI computer reads IBM formatted disks, although at a slower rate than it reads its own. From the TI MS-DOS disk you can read an IBM disk directory, perform a



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Figure 1: The Texas Instruments Professional Computer Keyboard

CHKDSK, type ASCII files, or move files around. While this level of compatibility is two-way, attempting to load IBM .COM or .EXE program files into the TI machine results in error indications. Trying to read a similar TI program on the IBM PC may hang up the system, requiring a complete cold start.

#### MBASIC Compatibility

With no BASIC interpreter in ROM the TI Professional Computer gets its BASIC language from Microsoft's MBASIC disk. A single 54,272-byte program loads into the computer's RAM. An interpreter of this size is too

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TI made an obvious effort to preserve expansion slots in the new computer.

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large for a 64K system to handle—DOS tells you so before you try to load it. So if you plan on running MBASIC, you'll need a minimum of 128K.

There's a high degree of compatibility in running IBM BASIC programs on the TI machine, provided the programs don't use color graphics commands, cursor control keys, or Ctrl- and Alt- key commands. While most of the color graphics statements are identical on the two computers, the range of parameters in color choices and the coordinates on the screens are different.

As for the cursor control keys, you'll need to change the BASIC statements connected with them for use with the Professional Computer. In IBM BASIC, for example, the four direction keys are referred to internally as func-

tion keys F11 through F14. On the TI keyboard, however, regular function keys occupy F1 through F12; so in TI BASIC the cursor keys are denoted as F13 through F16.

There may also be some unexpected differences if your program uses underlined text. The COLOR statement that underlines text on the IBM monitor displays a low-intensity text character on the TI display.

Running a few BASIC programs on the TI Professional Computer from IBM formatted disks was not a complete success. While most loaded into MBASIC and ran without any problems or errors, some were not completely operable. *PC-Talk* version 2, a communications program, was unusable because of its reliance on Alt-key commands. A PacMan-like game that makes extensive use of ASCII graphics symbols looked fine on the screen, but the cursor control keys for moving the man were incorrect.

One program that ran like a champ was a benchmark program that tests the relative computational speed of the IBM and TI BASIC interpreters. The program puts a stopwatch on 1000 repetitive loops of 19 math problems involving integer, single- and double-precision variables, and the square roots of each. The program runs without modification on both machines. In all but two cases the TI ran from 7 to 54 percent slower. See Table 2 for the test results.

#### Disk Input/Output

The benchmark program also tests the relative speed of reading files from a disk. After a small test file is written to the disk, a delay follows that lets the disk drive motor stop before making 100 successive file reads and screen prints.

Applications Software including publisher or author	Operating Systems		
	MS-DOS	CP/M-86 CCP/M-86	UCSD p-system
<b>Accounting</b>			
Accounts Payable, IUS	●		
Accounts Payable, Peachtree	●	●	
Accounts Receivable, BPI	●		
Accounts Receivable, IUS	●		
Accounts Receivable, Peachtree	●	●	
General Ledger, BPI	●		
General Ledger, Peachtree	●	●	
General Ledger and Financial Reporter, IUS	●		
Inventory Control, BPI	●		
Inventory Control, Peachtree	●	●	
Inventory Control & Analysis, IUS	●		
Order Entry, IUS	●		
Payroll, IUS	●		
PeachPay, Peachtree	●	●	
Sales Invoicing, Peachtree	●	●	
<b>Communications</b>			
ASCOM86, Lifeboat	●	●	
TTY Communications Texas Instruments	●		
3780 Communications Texas Instruments	●		
<b>Data-Base/File Management</b>			
Access Manager, Digital Research		●	
DataStar, MicroPro	●	●	
dBase II, Ashton-Tate	●	●	
Display Manager, Digital Research		●	
EasyFiler, IUS	●		
Formula, Lifeboat	●		
InfoStar, MicroPro	●	●	
PFS:File, Software Publishing	●		
PFS:Report, Software Publishing	●		
SuperData, Sorcim	●	●	
SuperSort, MicroPro	●	●	
<b>Financial Modeling and Planning</b>			
Bottom Line Strategist, Ashton-Tate	●	●	
CalcStar, MicroPro	●	●	
EasyPlanner, IUS	●		
Multiplan, Microsoft	●		
PeachCalc, Peachtree	●	●	
SuperCalc, Sorcim	●	●	
SuperCalc <sup>2</sup> , Sorcim	●	●	
The Financial Planner, Ashton-Tate	●	●	
<b>Graphics</b>			
Business Graphics System, Peachtree	●	●	

Applications Software including publisher or author	Operating Systems		
	MS-DOS	CP/M-86 CCP/M-86	UCSD p-system
MS-BASIC Extensions, Microsoft		●	
Peachtree Graphics Language, Peachtree	●	●	
PFS:Graph, Software Publishing	●		
SuperChart, Sorcim	●	●	
<b>Word Processing</b>			
EasySpeller 1.1, IUS	●		
EasySpeller II, IUS	●		
EasySpeller Legal 1.1, IUS	●		
EasySpeller Legal II, IUS	●		
EasySpeller Medical 1.1, IUS	●		
EasySpeller Medical II, IUS	●		
EasyWriter 1.1, IUS	●		
EasyWriter II, IUS	●		
MailMerge, MicroPro	●	●	
MicroSpell, Lifeboat	●	●	
PMATE-86, Lifeboat	●	●	
SpellStar, MicroPro	●	●	
Super SpellGuard, Sorcim	●	●	
SuperWriter, Sorcim	●	●	
WordStar, MicroPro	●	●	
<b>Programming Languages</b>			
Assembler (Microsoft MACRO Assembler), Microsoft	●		
BASIC (CBASIC-86), Digital Research		●	
BASIC (MS-BASIC), Microsoft	●		
C Compiler (Lattice C Compiler), Lifeboat	●		
COBOL (CIS COBOL), Digital Research		●	
COBOL (Level II COBOL), Digital Research		●	
COBOL (MS-COBOL), Microsoft	●		
COBOL (RM/COBOL), Ryan-McFarland	●		
FORTRAN (MS-FORTRAN), Microsoft	●		
Pascal/MT + 86, Digital Research		●	
Pascal (MS-Pascal), Microsoft	●		
UCSD p-System Run-Time including TURTLEGRAPHICS, SofTech			●
UCSD p-System Development including Pascal, SofTech			●
<b>Other Useful Software</b>			
Emulator/86, Lifeboat	●		
EM80/86, Lifeboat	●		
FABS, Lifeboat	●		
PANEL-86, Lifeboat	●		
UT86, Lifeboat	●		
<b>Software Related Hardware Options</b>			
Baby Tex (Z80 board), Xedex	●		

**Table 1. Software Available for the Texas Instruments Professional Computer (as of 2/1/83)**

Adapted version courtesy of Texas Instruments

## ● Review

The delay was not long enough for the TI disk drive motor. As part of the disk controller design, TI engineers built in an instruction that keeps the drive motor spinning for about 10 seconds after the disk I/O is made and the red light goes out. Even though the motor is going, the hub is not in contact with the disk, so you can remove or insert disks. Any deflection of the cardboard disk sleeve, however, brings the disk in contact with the hub.

Bill Skelton, engineering manager of the TI Professional Computer project, says that the sensitive disk media inside the sleeve was not damaged in testing. Skelton maintains that any contact the spinning hub has with a

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### The Professional Computer's graphics are outstanding.

---

disk being inserted or removed will be limited to the sleeve. The motor is kept on to help speed reading/writing in multiple disk accesses, since motor speed need not be stabilized before bringing the head in contact with the medium.

In a comment on the findings of the file access test, which showed a whopping 150 percent slower performance on the TI machine, Skelton pointed out that such a test on an IBM formatted disk will always be two to three times slower on the TI machine. But although re-running the identical test on a TI formatted disk was an improvement, the TI was still 50 percent slower than the IBM.

#### Software

When it comes to prepackaged software compatibility, *EasyWriter II*, *dBase II*, *Multiplan*, *PFS File*, and *PFS: Report* run almost identically on the TI Professional Computer and the IBM PC. "Almost identically" means, for example, that although the software acknowledges the keyboard's function keys in *EasyWriter II*, only F1 to F10 are operable, each carrying the same command as on the IBM. Little effort went into fully adapting these programs to the TI computer.

Only one program, *WordStar*, had a disappointing implementation on the Professional Computer. Although the manual included the IBM PC introductory pages, not one of the function or cursor control keys was actually supported on the powerful TI keyboard. To its credit, the program did read *WordStar* files from an IBM formatted disk with no loss of file access speed.

#### Documentation

Software manuals bearing the Texas Instruments name are surprisingly inconsistent in quality. The biggest let-down is the MBASIC manual. In this manual the BASIC command explanations are run together in the text, instead of started on a new page, and a trip to the index is usually required for looking up a specific command. Even worse, several important points about TI BASIC were left out. Event trapping via the function keys, for instance, is fully operational with the ON KEY(n) command, but this option isn't described in the manual. Nor are DATE\$ and TIME\$ functions mentioned. There's no clue how to put Ctrl- key and ALT- key codes into a program, and only the first 128 ASCII characters are listed, with no reference to the ASCII graphics characters available to programmers. Most command descriptions are woefully inadequate, so don't expect to teach yourself BASIC with this manual.

One of TI's better books is *Operating Instructions*, which takes the reader through the history of computers to setting up the computer for maximum comfort and efficiency. One section presents an illustrated explanation of disk files, while another problem-solving section not only lists the error responses you might get from the computer, but also explains what is wrong and what can be done to correct the problem. Few manuals are as helpful.

The MS-DOS manual, much of it verbatim from IBM's DOS manual (both were prepared by Microsoft), provides examples of EDLIN and other functions using the same problem-solving method as *Operating Instructions*.

#### Expandability: Now and Later

Broadening the present field of applications software available for the TI Professional Computer is a CP/M board called Baby Tex, marketed by Xedex Corporation, the same company that offers the Baby Blue CP/M board for the IBM PC. Baby Tex features a Z-80 micro-processor and 64K, and enables the TI Professional Computer to run CP/M-80 programs.

A truly innovative add-on is planned for later this year. Called a Voice Management System, this dual-card (one slot) accessory will turn the Professional Computer into a telephone message store-and-forward service. Centered around TI's 32-bit signal processor chip, the system digitally stores incoming and outgoing telephone messages in RAM. The computer can send synthesized voice messages to anyone at any time by auto-dialing a specified telephone number at a preprogrammed time. A reply can also be stored, as with an electronic answering machine, for later retrieval.

**Computational Speed (Time in seconds to complete 1000 loops in BASIC)**

	Add		Subtract		Multiply		Divide		Square Root	
	TI	IBM	TI	IBM	TI	IBM	TI	IBM	TI	IBM
Two Integers	54	35	54	35	54	36	55	37	Integer	61 48
Integer & Single Prec.	61	42	61	42	60	42	61	43	Single Precision	61 48
Integer & Double Prec.	80	64	81	65	80	64	85	87	Double Precision	61 48
Two Double Prec.	70	55	77	72	86	71	86	88		

**File Access Times (Reading one hundred 128-byte files and printing to screen)**

IBM Personal Computer:	40 seconds
TI Professional Computer: (TI formatted disk)	60 seconds
TI Professional Computer: (IBM formatted disk)	100 seconds

**Table 2: Benchmark Test Results**

The Voice Management System will also enable the computer to recognize and respond to specific voice commands, limiting contact with the keyboard to data entry. According to TI, existing software will not require modification to run on this "transparent keyboard."

---

## The TI Display Unit doesn't measure up to the easy-on-the-eyes IBM monochrome monitor.

---

Also on tap for later in 1983 are the *Lotus 1-2-3* and *Visi/ON* integrated software systems, the *Oracle* relational data base, and rudimentary artificial intelligence capability in the realm of natural language, which will allow a user to make requests of the computer by constructing sentences from phrases presented on the display screen.

### To Buy TI?

If you're just now getting into the personal computer market, it will be worth taking the time to track down one of TI's 200 or more Professional Computer dealers. If the existing TI software library fulfills your applications needs and the poor quality of the text display or keyboard feel don't concern you, you'll save some money

with the Professional Computer. On the other hand, while there's no sure way to predict new software availability for the TI machine, it's a safe bet that the momentum of the IBM PC will carry its software library significantly further than TI's. And don't regard comparative drawbacks of the monitor and keyboard as trivial matters; you face them every minute you operate the machine.

As the Texas Instruments Professional Computer begins incorporating the applications planned for it, the system may have greater appeal. *Visi/ON* screens will be more finely detailed than on the PC, and the telephone management interface will make your desktop computer a personal processing center—one of the computer's long-range applications goals.

Overall, the Texas Instruments Professional Computer has a lot going for it. Appropriately nicknamed, the Pegasus will fly.

---

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# Data Management without Programming

*A novice takes a look at dBASE II and likes what he finds.*

*Robert Levering*

Like many PC owners, I bought a computer primarily for one function, word processing. As a full-time journalist, I was skeptical that other programs would be of much use. Sure, I'd heard the sales pitches about all the wonderful things I could do with a personal computer, from games to financial forecasting. But *Space Invaders* and *PacMan* bore me, and I work with words not numbers.

Now, after one year as a computer owner, I find myself increasingly immersed in a data base management program called *dBASE II*. Not that I'm ready to trade in my well-worn copy of *WordStar* for a brand new Selectric. But because it can be used for so many varied tasks, *dBASE II* has proved to be my favorite piece of software.

During my first six months with the program, *dBASE II* has helped with the following tasks: researching and preparing the index for a book, sending out several mailings in conjunction with letters composed on *WordStar*, preparing taxes, keeping my checkbook balanced, maintaining a personal phone directory, and addressing the envelopes for my parents' Christmas mailing list. I've also used *dBASE II* to keep the books of a small business (a magazine), including subscriber and advertiser lists, and accounts payable and receivable.

I've been able to do this variety of tasks despite having no previous computer experience, and I still have not written a single line of programming in BASIC or in *dBASE II*'s own programming language. In brief,

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*dBASE II*'s best feature is the ease with which it can create or modify a data base.

---

*dBASE II* is extremely versatile and easy to use once you get the hang of it. The program is not without shortcomings, which seem primarily to be a result of software that was originally designed for programmers. It takes a while to learn, thanks to a manual that borders on unreadable. And the program's report generator is difficult to master.

For *dBASE II*'s original market, functionality was the most important feature. Now that the program's market has been broadened to include end users who have no programming experience, Ashton-Tate is making some required improvements to increase *dBASE II*'s ease of learning and ease of use.

## Capabilities

Before you consider using *dBASE II* to keep your life in order, you should realize specifically what it can and cannot do. *dBASE II* helps the user keep track of information, as do competing data management programs. A checkbook, for instance, is a typical data base. Most data management programs for the PC let you enter all the information that you would normally put into your checkbook: check number, date, who the check was written to, and the amount of the check. Once such data is entered, virtually any data management program can quickly extract a given piece of information; for instance, the amount of check number 125.

Yet *dBASE II* and other powerful data base programs offer much more. In the checkbook example, *dBASE II* can list all checks written for more than \$75 between March 23 and April 15; sort the checks numerically, in order of amounts, or alphabetically by person to whom they were written; or give reports with a subtotal for each type of expense. Checkbook data can be combined with other expense data bases to give a better idea of how money was spent over a given period of time.

## Review

*dBASE II* works best with information that can be presented in tabular form—in rows and columns. A mailing list, an inventory, a checkbook, accounts receivable or payable—all these can easily be defined in rows and columns. In data management jargon, rows are records and columns are fields. So in the checkbook example each check is considered a record, while each item of information, such as check number, date, description, or amount, is a field.

*dBASE II* is most effective when the fields (columns) are relatively short. The program, in fact, sets limits on the lengths of its rows and columns: 1,000 characters and 32 fields per record, and 254 characters per field.

Those limitations don't affect most typical data base applications. But *dBASE II* doesn't work well with free-form information. For instance, don't bother trying to use *dBASE II* to replace index cards when you research a term paper. You would undoubtedly find 254 characters per field too restrictive. Several other software programs on the market are specifically designed to keep track of free-form information.

I've found *dBASE II*'s best feature the ease with which it can create or modify a data base. With the Create command, *dBASE II* lets you define the fields for your data base. The program asks for a filename up to eight letters and automatically provides all its files with a '.DBF' filename extension.

Again using the checkbook example, typical fields are check number, date, description of the check, and amount of the check. Each field must be given a specific field name (up to 10 characters), a maximum field length (the largest number of characters of data that will be used in the field), and a field type. *dBASE II* offers three types: *C* (character) for letters and/or numbers, *N* (numeric) strictly for numbers, and *L* (logical) for the possibilities true or false and yes or no. In the checkbook data

```
*** dBASE II/86 Ver 2.3D
. create
ENTER FILENAME: checkbook
DESTROY EXISTING FILE? (Y/N) Y
ENTER RECORD STRUCTURE AS FOLLOWS:
FIELD      NAME,TYPE,WIDTH,DECIMAL PLACES
001        checkno,c,4
002        date,c,7
003        payee,c,15
004        descriptn,c,25
005        amount,c,9
006        checkclear,l,1
007
INPUT DATA NOW? Y
```

### Create a Checkbook File

```
RECORD # 00004
CHECKNO    :401 :
DATE       :4-18-83:
PAYEE      :Dr. L. Smith :
DESCRIPTN  :annual physical exam :
AMOUNT     :100.00 :
CHECKCLEAR:N:
```

### Enter Data into a Checkbook File

base, for instance, you could add a logical field to represent whether a check has cleared your bank (information you get from your monthly bank statements).

Creating data bases with *dBASE II* is easiest if you follow a few simple rules.

*Keep field lengths as short as possible.* Each *dBASE II* record occupies the same amount of disk space regardless of whether its fields contain any information. In this respect the record is like a telephone directory: the length of the entire phone book is determined by multiplying the longest field by the number of records, and it doesn't matter whether most of the people's names and addresses are long or short.

In the checkbook example, if the total of the field lengths is 100 characters, the information on 200 checks takes up 20K of disk space out of the 320K available on a double-sided disk or the 160K on a single-sided

disk. If the total of all the field lengths is only 50 characters, the same 200 records take up only 10K. The difference in disk storage can be critical when you are working on a large data base.

*Zip code fields on mailing list data bases should be character fields, even though zip codes are obviously numeric.* *dBASE II* always eliminates the initial zero in a numeric field. Massachusetts zip code 02138, for instance, would become 2138 when the mailing list was printed out, much to the confusion of the people trying to deliver the mail.

*Use as many fields as may be needed to extract information.* In other words, when you are creating a mailing list with *dBASE II*, it is often better to separate a person's first and last names into distinct fields than to define only one field for a person's full name. With two different fields the mailing list can be sorted alphabetically according to last names. Also, having two distinct name fields enables form letters to be individually addressed.

*Plan ahead.* Because it is so easy to create a data base with *dBASE II*, you may be tempted to set one up without much advance thought. But it pays in the long run to get out your old-fashioned pencil and paper and consider various possibilities for the structure of the data base. Think of fields that might be required at a later date. Consider other data bases that might be created in the future. Having identical field names and lengths makes joining data bases easy.

There's another reason to plan ahead. Once you have pressed the ENTER key after defining a *dBASE II* field, you cannot return to that field's definition to make adjustments. To change the field definitions at that point, you must either start all over again or use another *dBASE II* command, Modify Structure.

I have found it much more difficult to create or modify data base structures in the two other data base programs I've tried (*Data Bank* from Data Access Corp. of Coral Gables, Florida, and *Personal Pearl* from Relational Systems International of Salem, Oregon). Both programs were menu-driven and forced me to make a number of choices for each option. *dBASE II*'s Create and Modify Structure commands are straightforward and the screen prompts are self-explanatory. Even *dBASE II*'s poorly written manual doesn't obscure how easy it is to set up a data base.

### Data Entry

Once a file's structure has been defined, you are ready to input data. If you do not do so immediately, you can always add records to the data base later by telling *dBASE II* that you wish to USE a specific data base file. After *dBASE II*'s dot prompt reappears, you simply type APPEND and the screen automatically displays the blank form of the data base file you created. Each record has its own record number, and when you type

APPEND the blank record form automatically includes the next record number.

Each field appears on a separate line with the field's name appearing on the left side followed by a highlighted space equal to the field's length. After you enter the information for a field, press the ENTER key to move to the next field. When you have used the maximum space allotted to the current field, the cursor automatically moves to the next field.

If you make a mistake, you can either type over the error or insert letters or words into the field by turning the insert mode on and off with Control V. You may also move the cursor up (Control E), down (Control X), left (Control D), or right (Control S). Use Control G to delete a letter and

---

The program provides a straightforward means for sorting records in a data base using either the Sort or Index command.

---

Control Y to delete a line. *WordStar* users will recognize that these cursor control commands are the same ones used with that program.

Making changes on a record is easy, but once you move to the next record (by pressing ENTER after the last field) you cannot go back to the previous record without leaving the Append mode. This is definitely a shortcoming of *dBASE II*, as it is natural to want to edit an old record while adding a new one.

While new records can be added with reasonable efficiency, that's not enough. What if you need to change the information already in your data base? For instance, if someone on your mailing list moves, it would be easier to edit his or her out-of-date record than to add an entirely new one. All you need to do is type EDIT

from *dBASE II*'s dot prompt and enter the number of the record you wish to change. The old record appears on the screen in the same form as in the Append mode. The same cursor control keys apply. Pressing Control W writes and saves the corrected record to disk, while Control Q aborts the edited version and leaves the original record unchanged.

Two other control characters are especially useful in Edit mode; Control C, which moves you to the next record in the data base, and Control R, which moves you to the previous one.

What if you don't know the record number of the person whose address has changed? If you have a large mailing list, you may find it extremely tedious to use Control C to move one by one through the entire data base looking for the correct record. *dBASE II* provides a variety of ways to extract specific information from a data base.

### Searching

The most elementary method of looking at what is in a data base is to type LIST or DISPLAY from the *dBASE II* dot prompt. Using List, the entire data base appears on the screen, with each record displayed on a single line. Display is similar, except that *dBASE II* stops every 15 records until you press the space bar to make it resume. The information can be printed out by turning the printer on (or off) with Control P.

Those simple commands work well with a small data base or when you want to look at all the information. But *dBASE II* can also search for specific records. Suppose *PC World* is on your mailing list but has moved its offices. Type LIST FOR NAME = 'PC World' (assuming that the mailing list uses a field called 'NAME' where the data 'PC World' is located). *dBASE II* searches through the mailing list and exhibits the entire record for 'PC World', including its record number. (You get the same result using the command Display instead of List.) With that information you

## Review

can type EDIT, cite the appropriate record number, and change the address. This procedure does, however, point out another shortcoming of *dBASE II*: Before you can edit a record, you must find out the record number. Editing would certainly be more convenient if it could be done in a single step.

If you know exactly what you want to change, you can get around the two-step editing problem. For example, to change the address on a mailing list as described above, you can make alterations without entering Edit mode by using the Replace command, as in Replace ADDRESS with '555 DeHaro' for NAME = 'PC World'. The same command can change records throughout the entire data base file, enabling you to replace the word *San Francisco* for the abbreviation SF throughout the mailing list's city field.

Field names in *dBASE II* can be typed in either upper- or lowercase letters, or a combination, since the program recognizes the field name in any form. However, requests to search for a specific record must be typed precisely the way that the record was originally entered. If a mailing list includes a record for 'pc world', the record can't be found by specifying 'PC World' as in the previously described method. If you aren't sure how the record was entered, you can use the command List for 'orld' \$ NAME causing *dBASE II* to search through the mailing list and display any record that has a character string 'orld' within the field of NAME. The dollar sign in this case means contained in.

### Sorting

The program also provides a straightforward means for sorting records in a data base using either the Sort or Index command. This ability marks a crucial difference between *dBASE II* and many less powerful data management programs.

Sort does exactly what it implies. A mailing list could be sorted according to zip code, alphabetically by last name, or according to any other field in the data base. The fields used to specify the sorting order are called keys. Sorts can be done in either ascending or descending alphabetic or numeric order. By repeated and careful sorting, you can have the data base arranged according to several key fields. For instance, the list could be sorted alphabetically by person and street address within each zip code. When several sorts are made, do them in increasing order of importance so that the final sort puts the names in the order you consider most important.

*dBASE II*'s Sort command has a serious drawback, however. It creates an entirely new data base file with new record numbers each time it is executed. Though sorting a data base onto itself is possible, it is advisable to create a new file for each sort.

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Even *dBASE II*'s poorly written manual doesn't obscure how easy it is to set up a data base.

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Otherwise the entire data base is lost due to sudden power outage.

Because a new file gets created using Sort, the command cannot be used when a data base already occupies more than half of a disk's available space. The problem is amplified when the Sort command is used several times to sort the data base file by several key fields.

*dBASE II*'s Index command performs the sorting process on a specified field but does not create a new data base. Instead, Index creates a separate index file (which *dBASE II* automatically gives an '.NDX' filename extension) that normally occupies considerably less space than the data base itself.

As with Sort, the Index command can be used on several fields. Besides

occupying less disk space, Index also leaves the original record numbers undisturbed. Keeping the record numbers constant can be helpful if the data base is updated frequently. When you USE the indexed version of a file, the data base is displayed as if it were sorted. If a mailing list is indexed on its zip code field, it is listed in zip code order.

The Index command offers another advantage. Once a data base has been indexed on a field, you can find specific records more quickly using the Find command. Rather than having to search through the entire data base, as is required when List or Display is used, Find enables you to go directly to a specific record. According to Ashton-Tate, the typical retrieval time using Find is 2 seconds with a floppy disk system. In a large data base, using List or Display may take more than a minute.

### Copying and Converting Files

*dBASE II* has two excellent file handling features: simple procedures to copy all or part of any *dBASE II* file, and easy conversion of a *dBASE II* file to an ASCII file or of an ASCII file to a *dBASE II* file.

In its most elementary form the Copy command copies a data base file to another location, either on the same disk (provided the copy has a separate filename) or on another disk. With the same command you can create new files that fulfill certain conditions. With an accounts payable data base created with *dBASE II*, you can make a separate file for all accounts owing over \$250. Using Copy you could also create a file that has only some of the fields of the original data base file. With an accounts payable data base that has a dozen or so fields, you can create a new file that gives the account name and the amount owed.

The Copy command also allows you to create a non-*dBASE II* file that can be read by other programs, such as a financial forecasting program like *VisiCalc* or a word processing

program like *WordStar*. If the option 'SDF' follows the Copy command, *dBASE II* creates a standard data base (ASCII) file. If the phrase *delimited with* follows the Copy command, you can define how the fields of each record are separated.

*WordStar's MailMerge* program uses commas to separate fields. If you type

Copy to NEWFILE delimited with ,  
*dBASE II* will create a file that uses commas between fields and eliminates the unused space between *dBASE II's* fields.

This feature makes *dBASE II* especially attractive as a mailing list manager. A mailing list can be created, edited, and sorted (or indexed) using *dBASE II*, and then quickly converted for use by a word processing program. Similarly, ASCII files created by other programs can be APPENDED into a *dBASE II* file.

### Report Generation

*dBASE II's* report generation function does not measure up to the rest of the package. The Report command works in much the same manner as the Create command. Once the command is typed, the program asks you to define how the report should be formatted. The report can have a heading and subheads at the top of each column (or field). The length of each field is defined by the user, who can create fields that are arithmetic functions of one or more other fields. If you have an inventory list with one field listing the quantity of parts on hand and another field listing the price per part, a third report field can be created as the multiple of the other two fields.

Once created, a report form (to which *dBASE II* automatically adds a '.FRM' filename extension) can be used by any data base file that uses the same fields as those defined in the report form. The data base file can be displayed in the desired format by typing Report Form followed by the

name of the report. To print the report, turn the printer on with Control P.

A printed *dBASE II* report displays the page number (up to five digits) and the date at the top of each page, in addition to the specified heading of the report and the subheads for

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## *dBASE II* doesn't work well with free-form information.

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each column. SET EJECT OFF will prevent the printer from using an extra page of paper before starting to print.

Altering an established report form can be very cumbersome since no simple or direct mechanism is provided. This is another of *dBASE II's* weak points. Getting the report form situated on the page properly the first time around is rare. Unfortunately, every little change in the report form requires you to start from scratch. The process is easier if the printer is on when the report form is initially defined.

### Ease of Learning

*dBASE II's* documentation is notoriously bad. Wayne Ratliff, the author of *dBASE II*, wrote the first user manual. Ashton-Tate apparently recognized early on that although Ratliff is a brilliant programmer, he is unfamiliar with writing English for nonprogrammers. So the company started to distribute a second version of the manual, written by "a user as he learned to operate his system." The second effort was only marginally more comprehensible than the first. Deciphering a 1½-page section of the revised portion manual on the Total command took me 3 hours. The system is currently sold with both versions of the manual included in the looseleaf binder.

### Evaluation

*dBASE II* is a very flexible data management system that can be useful whether you create programs with it or not. While *dBASE II* is fully functional in either mode, some of the drawbacks encountered using the program without programming can be circumvented by command files if the user is willing to learn *dBASE II's* programming techniques, and English-like language.

*dBASE II* should get high marks for its ease in creating or modifying a data base file. It also deserves praise for its facility in adding or editing records, although the ability to edit a record without knowing the record number would be a vast improvement. The sort facility is adequate, but doing one sort process at a time is a limitation. Sorting a large data base on floppy disks could create a problem since a new copy of the file is created for each sort.

*dBASE II's* report generation feature and standard documentation manual are not up to the quality and accessibility standards set by the rest of the program's features. Ashton-Tate has fortunately seen the light and now offers a book entitled *Everyman's Database Primer* by Robert A. Byers. Though it doesn't cover all *dBASE II* commands, Byers' book is aimed at nonprogrammers like myself. I strongly advise any data management novice to get the Byers book and use it instead of the manuals.

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*Robert Levering is a journalist whose latest book, Everybody's Business Scoreboard: Corporate America's Winners, Losers, and Also-Rans (Harper & Row), was written with the help of dBASE II.*

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### *dBASE II*

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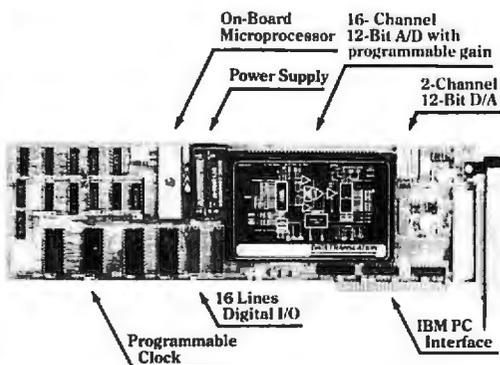
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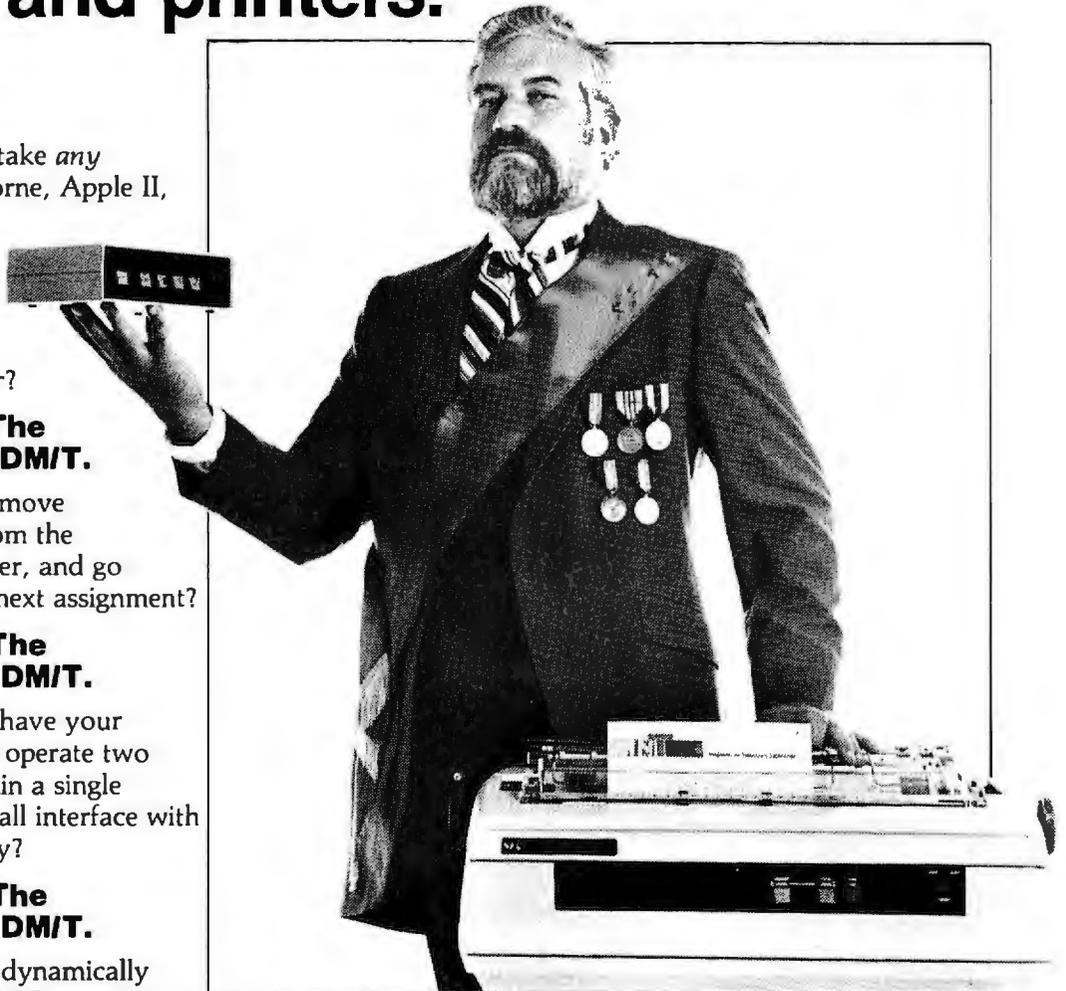
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# Torture Testing dBASE II

*The premise that dBASE II turns your PC into an IBM System 370 mainframe is challenged by an extensive, complex data base.*

*Richard Colman*

Numerous users can attest to the power and flexibility of Ashton-Tate's *dBASE II*. This popular data base management program can be used effectively by experienced programmers as well as novices (see "Data Management without Programming"). For serious business applications, however, you need to ask, "Does *dBASE II* have sufficient power and flexibility for my business applications?" whether your data base is large in size and simple in structure, or small and complex.

To answer this question my partner Nicholas Stein and I, with the assistance of Richard Shaw of Catalyst Productions, recently put *dBASE II* (PC-DOS version) and two IBM Personal Computers through a "torture test." We had the opportunity to investigate the manufacturer's advertising claim that with *dBASE II* a PC assumes the mainframe capabilities of an IBM System 370. In our case, however, we compared the PC's data management performance with that of a minicomputer. The idea for our torture test is similar to that of the old Timex commercials in which a gentleman attaches a watch to a speedboat's propeller. After the speedboat pulls two water skiers around Cape Horn, the man removes the "tortured" watch from the propeller and says, "Takes a lickin' and keeps on tickin'!"

We tested *dBASE II* for four weeks of 18-hour days. After that ordeal, we can announce that *dBASE II* on the PC can take a lickin' and keep on tickin', although not without a few problems.

## Data Management Decision

We were recently faced with the challenge of preparing extensive cost estimates for a proposal to a federal government agency. An initial review of the proposal requirements revealed that a seemingly astronomical number of different cost breakdowns would be necessary. A desktop calculator was obviously out of the question, and even a spreadsheet program wouldn't do the job. In addition, we were under severe time constraints.

Unlike most people, we had access to a Perkin-Elmer 3240, a 32-bit "super-mini," as well as several different microcomputers. At first we leaned toward the minicomputer, which offered several sophisticated data base management systems (DBMS). However, these DBMS are not designed for rapid turnaround, interactive development, or sequential changes in data base structure. Instead, they are powerful production systems, designed for massive applications.

Small-scale applications of these DBMS can require up to 6 man-months of professional program-

ming. Larger applications will usually require several man-years of programming. These powerful DBMS all have extensive query capabilities, but the application must be developed in COBOL or FORTRAN. Even with the assistance of professional programmers, using these DBMS is not a practical approach for a quick-response application. Using *dBASE II* on a personal computer, however, allows for interactive devel-

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The anticipated obstacle was *dBASE II*'s slow speed on the PC, rather than lack of power.

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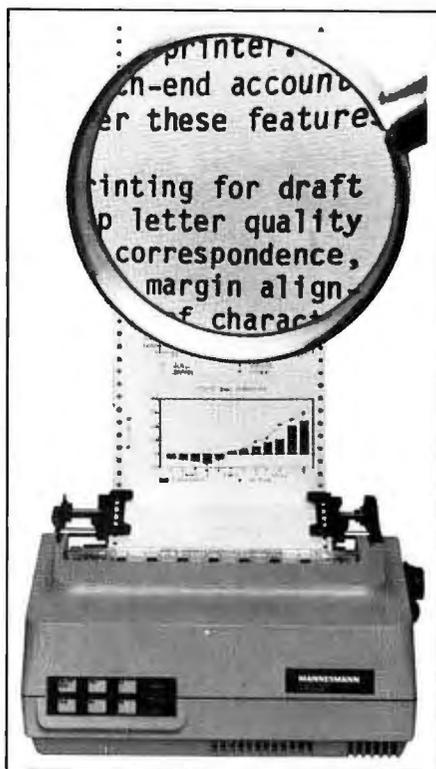
opment so the program or data base can be changed easily throughout the application.

For this reason we turned our attention, with great trepidation, to using *dBASE II* on an IBM PC. In many ways, *dBASE II* is the direct opposite of the DBMS on a minicomputer. On the positive side, *dBASE II* is relatively easy to use and rarely locks you into a given data base structure. In other words, you can usually change the structure of your data base without permanently losing

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## Review

the data already entered. On the negative side, *dBASE II* is slow and has size limitations when compared to a minicomputer DBMS. One of the most annoying limitations is *dBASE II*'s inability to contain more than two data files in memory (primary and secondary).

A major factor was that we were already familiar with *dBASE II* and did not know the minicomputer DBMS very well. While professional programming assistance was available if we chose to use the mini, company management was unwilling to guarantee that these programmers would complete the job before leaving to work on another project. Given these considerations, we decided to use *dBASE II* on an IBM PC to prepare the proposal.

Our associates greeted our decision with amusement, reminding us about the PC's limitations as compared to a minicomputer. They noted that 10 or 20 PCs can fit into the main processor cabinet of the Perkin-Elmer 3240, and that the speed as well as the disk space of the PC is more severely limited (1200 megabytes on the Perkin-Elmer versus 10 megabytes on the PC). They even asserted that playing *PacMan* or *Flight Simulator* was a more appropriate project for the PC. In the end, they were only partially wrong. We finished the proposal using *dBASE II* on the PC, but its slow performance created problems and forced us to work overtime.

### *dBASE II* Under Fire

The success of our proposal was completely dependent on the cost estimates developed with *dBASE II*. To put it plainly, no cost estimates meant no proposal, which in turn meant the company's loss of a \$15 million government contract. Naturally, we were under extreme pressure to obtain results and meet the deadline.

Although this particular situation may not be faced by many other businesses, the power and speed of their DBMS will certainly affect profits. As an example, we recently wrote and installed an inventory system using *dBASE II* with an Apple computer. The inventory data base contained approximately 1500 records with each record containing about 22 fields and 307 characters.

Because of hardware and programming inefficiencies, the operation of the inventory system was very slow. When significant changes were made to the data because of item additions or deletions, almost 21 minutes were required to reindex the data base on two fields. Typically, this operation was done two or three times per day, which meant that a clerk performing the task had over an hour of non-productive time each day. Assuming

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The time needed to create temporary files and print reports is a good measure of a program's overall throughput, or speed.

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the clerk's time cost the company about \$14 per hour (including the cost of fringe benefits), the inventory system wasted almost \$4000 per year as a result of its slow reindexing operation.

In preparing extensive cost breakdowns for our proposal, the anticipated obstacle was *dBASE II*'s slow speed on the PC, rather than lack of power. If we informally define power as the ability to handle large, complex data base structures with multiple fields and many indexes, then *dBASE II* had sufficient power. For example, if a data file structure exceeded 32 fields, we could break that structure into two separate data files without too many problems. The limitation was *dBASE II*'s inability to

# of Records	2,000	5,000	10,000	14,000
1-field INDEX	4:22	15:00	30:15	46:00
2-field INDEX	5:55	18:20	44:25	70:30
3-field INDEX	---	---	---	110:00
REPLACE ALL	---	---	---	8:10

**Table 1: Time Required to Index a Data File**  
(time given in minutes:seconds)

handle more than the primary and secondary data files simultaneously. On numerous occasions, our work would have been much simpler if *dBASE II* could have simultaneously linked a third data file.

Development of our final cost estimates required a large number of intermediate processing steps and the use of temporary data files. The time needed to create these temporary files and print reports is a good measure of a program's overall throughput, or speed. The throughput speed is measured by how quickly the program and disk system process data from the time of input to the delivery of final data.

Our results from timing *dBASE II* on the PC demonstrate how long it took to perform some of the intermediate processing steps (see Table 1). Note that the numbers shown in Table 1 are not the result of exhaustive tests, but are observations made during the preparation of our proposal. However, you can use this information by comparing our processing times with the time requirements of your applications. This comparison will help you determine whether *dBASE II* on the PC has enough speed for your application.

#### Indexing a Data File

The government agency wanted comprehensive cost breakdowns presented from several vantage points. One involved the "work breakdown structure" (WBS), an outline of the proposed tasks. Another involved

"contract line item number," a description of the actual items, such as hardware and software, being purchased. For each line item, there were a large number of physical sites where the actual items would be installed. We had to produce a bill of materials and detail costs for each line item number and task in the WBS. Are you confused? So were we.

However, these cost breakdowns are only the tip of the iceberg. You will be spared the mental anguish involved in considering the more esoteric combinations. Indicative of the complexity of our task, data files grew as large as 2.6 megabytes. The materials data file (the largest file) grew to 13,964 records; each record had 18 fields and a total of 187 characters.

We needed to sort the materials data file by various fields such as cost element and site. But a sort, or rearrangement, of the physical records is impractical for files this large. At the price of additional disk space, the data file can be sorted more quickly and efficiently by creating an auxiliary file of pointers called an index file.

A single data file can be sorted in various ways by creating a number of different index files. However, as shown in Table 1, indexing a large data file, even on a single field such as cost, takes a long time; indexing a large file on two or three fields (which is equivalent to doing a two- or three-level sort) takes even longer.



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## Review

The size of an index file depends on the number and size of its index fields. In general, the size of an index file will range between 15 percent and 35 percent of the size of the original data file. With each data file requiring multiple index files, a significant amount of disk space is needed to hold all the files.

### Indexing Shortcut

Since the process that took the longest was indexing on multiple fields, even though indexing on a single field was acceptably quick, we devised a different way to sort the data base. We created a dummy field, called DUMMY:FLD, in each of the records. Then we combined the data

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The best compromise appears to be a printer capable of an average throughput of 150 to 200 lines per minute.

---

from each of the key fields on which we wanted the data base sorted, and loaded that combination into the dummy field. That combination (or concatenation, as it's known technically) was accomplished with the command

```
REPLACE ALL DUMMY:FLD with KEY:1 +  
KEY:2 + KEY:3 + ...
```

The dummy field in each record then contained data that took the form

```
KEY:1KEY:2KEY:3
```

and when the data base was indexed on the dummy field, it was sorted first on the information from the first key field, then on the data from the second, and so on. That way the data base could be indexed on a single field but give the same results, as if it were indexed on multiple fields.

## Test Results

Despite its many advantages, *dBASE II* on the PC has performance limitations. After using *dBASE II* under our torture-test conditions, we drew the following conclusions.

With imaginative programming *dBASE II* can yield some rather elegant results and improve throughput speed. If you are more skilled at your profession than at *dBASE II* programming, then consider professional *dBASE II* programming assistance. Improved performance as a result of professional programming can quickly make up for additional programmer expense. Using the dummy field to simulate a multiple field index operation is one example that demonstrates the potential for enhanced performance.

Although *dBASE II* theoretically handles over 65,000 records, the practical limit is much lower. For typical file structures (18 or more fields per record and 150 or more characters per record indexed on one or more fields) 7000 to 10,000 records is the practical limit. The slow performance of the PC-*dBASE II* combination requires that larger data files be used in a batch mode, which allows you to "line up" a series of operations; then you must let the computer run overnight in preparation for the next day's work.

### Hard Disk Storage

We recommend that you have a hard disk storage system for most serious business applications of *dBASE II*. The main considerations in this context are program and data file storage capacity and overall disk access speed. These applications often generate files that are too large for 5¼-inch floppy disks. In addition, disk ac-

cess speed has a major impact on *dBASE II* performance because this program constantly accesses the disk system for data. This is not particularly surprising because *dBASE II* was originally written for 8-bit processors with less than 64K of memory address space. If you can't access data in memory, then you have to access data on the disk. The faster the disk I/O, the faster *dBASE II* will run.

Even the slowest hard disk system is two to four times faster than a floppy disk system. If your business requires rapid interactive query such as frequent customer inquiries and regular report printouts, you'll need this fast disk access. Some manufacturers offer high-speed hard disk systems at premium prices that can improve performance by cutting processing times up to 50 percent. A 10-megabyte hard disk system can be purchased for anywhere from \$2000 to \$5000 and should probably pay for itself in terms of improved performance within a few months.

An alternative to purchasing a hard disk is to trade in your old PC for a new IBM Personal Computer XT with 10 megabytes of disk storage available. The new expansion unit provides another 10 to 20 megabytes of disk storage. If you can't afford to purchase a hard disk or an XT, you should consider delaying any attempts to computerize a vital business function.

### Hangs and Crashes

Be fanatical when it comes to program and data backup. Work with your vendors and employees to implement a failsafe backup system. You only have to lose a 2-megabyte data file once to fully appreciate this advice.

We experienced recurring problems with 'hangs' and 'crashes' with our particular system. This often costly system problem, which can result in missed deadlines and frustrated employees, seemed to be hardware based and apparently was more closely associated with the particular hard disks we used than with the PC itself. We thought the cause might be excessive heat buildup from the internally mounted hard disk. However, leaving the cover off the PC and installing large ventilating fans above the computer did not seem to help. These problems occurred on both PCs and were bad enough to eliminate the use of our particular combination of components from further serious business use. Additional diagnostics did not reveal any causes or cures, so the problem remains unresolved.

### Using an Electronic Disk

Disk emulation software (electronic disk) increases the speed and performance of *dBASE II* dramatically. In fact, using an electronic disk was two to three times faster than using a hard disk for our application. Putting *dBASE II* with its overlay files on a RAM disk will improve performance. Further improvements result from placing the index files on an electronic disk while the main data files remain on the mechanical disk. Finally, if you have enough memory and if file sizes permit, the whole program can be run on the electronic disk with dramatic improvement. In this case, access speeds drop by a factor of ten or more.

However, using an electronic disk involves some risks. When the power shuts off, stored data is lost. Therefore, you need an uninterruptible power supply (battery

backup), which can cost from \$300 to more than \$700. Also, the startup, program operation, and shutdown are more complex with greater potential for operator error. For this reason, many employees don't like electronic disk systems.

An alternative approach to using the disk emulation software is disk-cache, track-buffering software such as *Cache-Q* by Techne Software Corporation of Lafayette, California. Instead of accessing one sector of data at a time from a disk, these utilities are able to access (buffer) one or more tracks (multiple sectors are contained in one track) simultaneously in memory. This approach speeds up an operation considerably.

### A Leisurely Pace

*dBASE II* on the IBM PC is also limited by the somewhat leisurely pace of the PC's performance. Some of the new PC-compatible machines offer significant improvements in performance at competitive prices. For example, we tested an Eagle 1630, which has an 8086 processor running at 8 Mhz as compared to the PC's 8088 running at 5 Mhz. Processing times were cut by two-thirds. That result was obtained with similar configurations to those on the PC, as well as by using the same *dBASE II* program and data files that we used on the PC.

A reliable printer is an absolute necessity in any business. However, a high-speed production line printer is not required for data base management. *dBASE II* on a PC cannot produce printer output faster than about 150 to 200 lines per minute, so don't bother to purchase a printer with higher speeds.

## Review

As Table I shows, the time required for the REPLACE and single-field index procedures was much less than that required for an index on two, three, four, or more fields. For example, 110 minutes are needed to index a data file almost 14,000 records in length. By comparison, only about 54 minutes are needed to use the REPLACE ALL (8:10) plus single-field INDEX (46:00) techniques.

Our approach resulted in nearly a 50 percent improvement in processing speed. The actual percentage improvement will vary depending upon

factors such as file structure and number of records. This technique always shows an improvement unless the data file is small and/or the record structure is short and simple.

The time required to perform various *dBASE II* operations is highly variable. It depends upon a large number of factors associated with the file and record structures. For example, our results presented in Table I are based upon a data file where the record structure was 18 fields and 187 characters per record. The single-field index operation was based on a character field (as opposed to a numeric field or a logical [yes/no] field)

that was 8 characters long. The double-field index was based upon character fields that were 8 characters and 6 characters in length. As you may have guessed by now, throughput time performance also depends upon the length and type of the index fields.

### Printing Reports

In addition to indexing data files, generating printed reports for our proposal was time-consuming. A printed report containing subtotals generated from the data file just described took approximately 74 minutes to complete. A high-speed (600 lines per minute) line printer was used. This time reflects the performance of the *dBASE II-PC* combination, not any inherent limitation of the printer.

A 600-line-per-minute printer is too much print power for the *dBASE II-PC* system. In other words, this

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We have very high praise for *dBASE II* on the IBM PC.

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system cannot push data out through the parallel port nearly fast enough to keep the printer busy. A printer like the Printronix P600 spends most of its time waiting for the PC to catch up. On the other end of the spectrum, the IBM Printer (or Epson MX-80) is too slow at 80 cps.

Although no tests were run, the best compromise appears to be a printer capable of an average throughput of 150 to 200 lines per minute.

### Benefits vs. Drawbacks

For our particular application, which required relatively quick results, we can summarize the benefits and drawbacks of using *dBASE II* on the PC. Compared to using a minicomputer, *dBASE II* on the PC is flexible because it allows for last-minute

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changes and reformatting. It's easy to use compared to a minicomputer that requires programming in FORTRAN or COBOL. Another advantage is that *dBASE II* on the PC cuts development time, although data processing time is faster on a mini. Running any application on the PC is certainly less costly. Even though a mini can provide significant improvements in capabilities such as processing speed and number of files and records, the hardware and programming costs will be at least ten times greater.

While flexibility and ease of use certainly make *dBASE II* ideal for developing applications, the slow processing time is a major drawback. This drawback is a result of *dBASE II*'s heavy disk orientation and limited use of memory in current versions. A hard disk or especially an electronic disk will improve the processing speed but won't entirely solve the problem.

For serious business applications involving large or complex data bases, a minicomputer offers slow development but fast throughput. Running *dBASE II* on the PC provides quicker and more flexible development but slower processing time. Despite some of our negative observations, we still have very high praise for *dBASE II* on the IBM PC. We could not have finished our project on time without it, despite the availability of powerful minicomputers.

---

*Richard Colman is president of Vertex Systems in Los Angeles. The company specializes in the development of innovative microcomputer products.*

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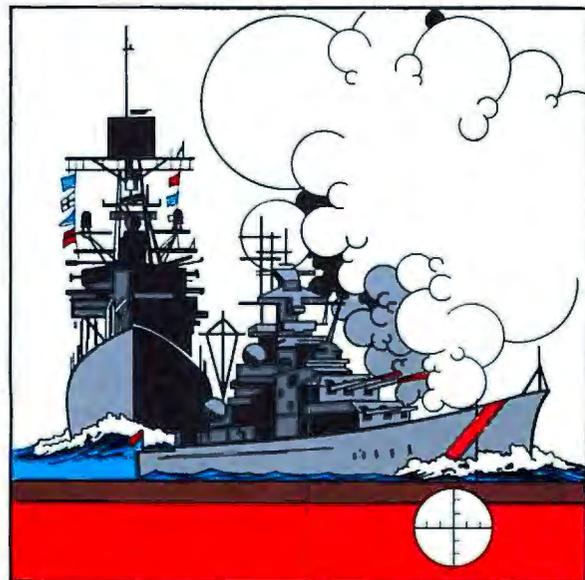
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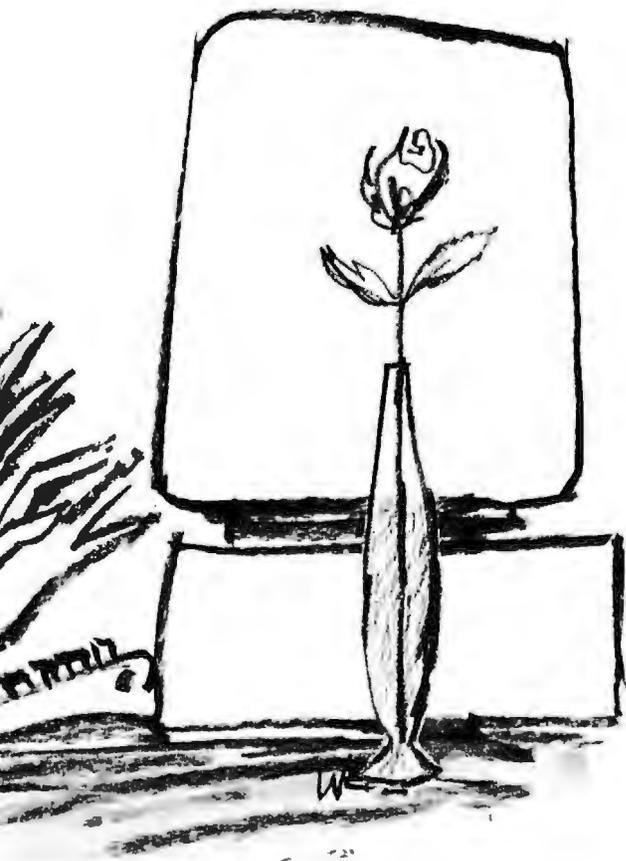
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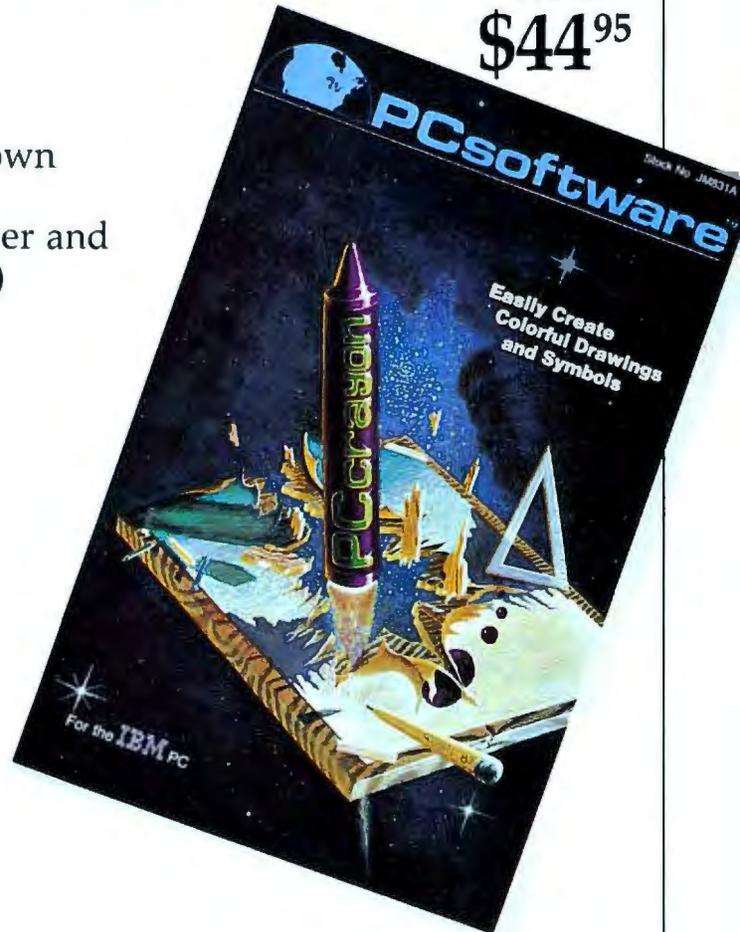
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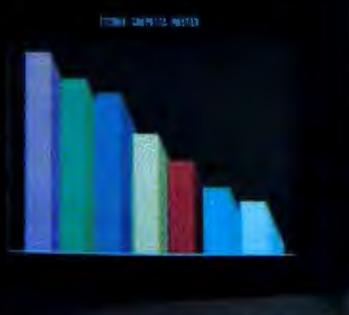
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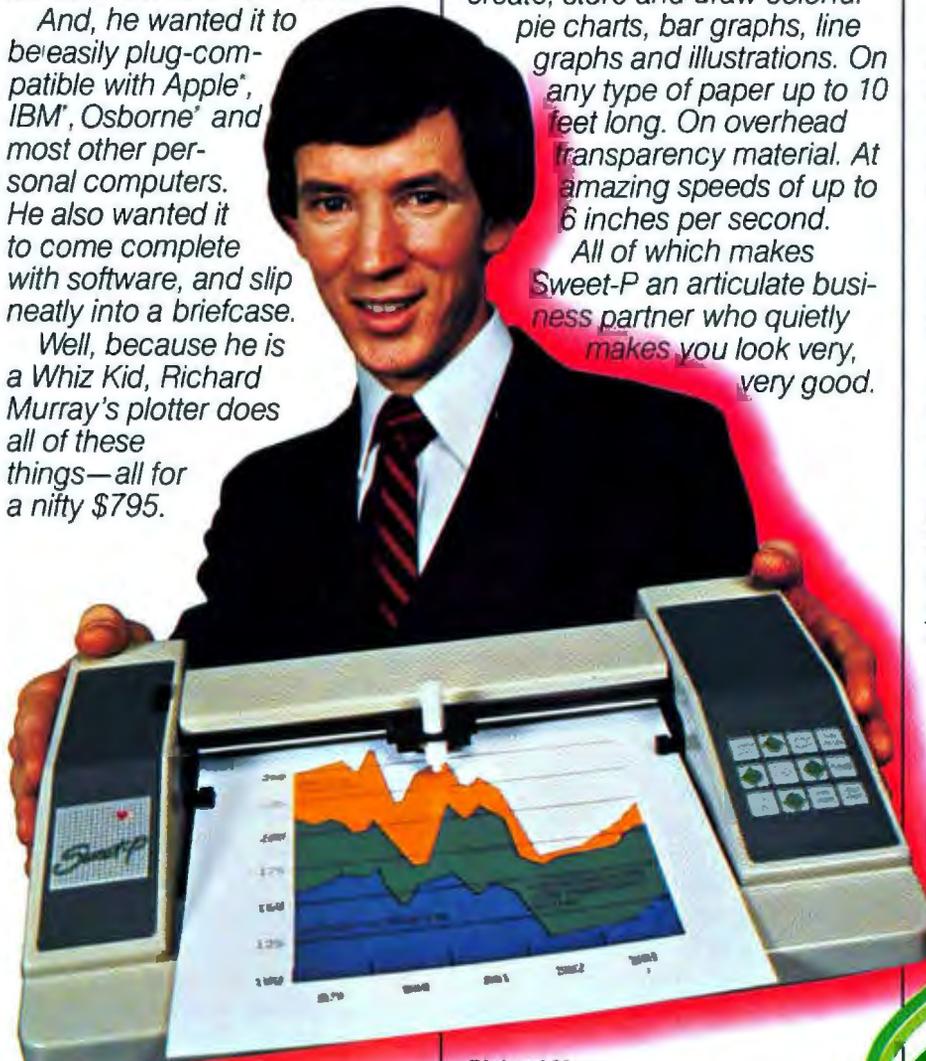
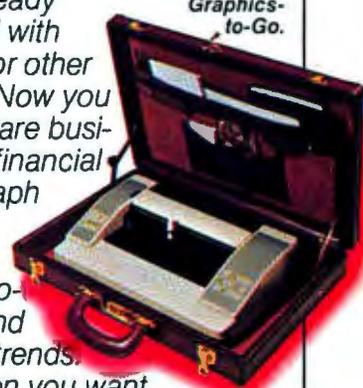


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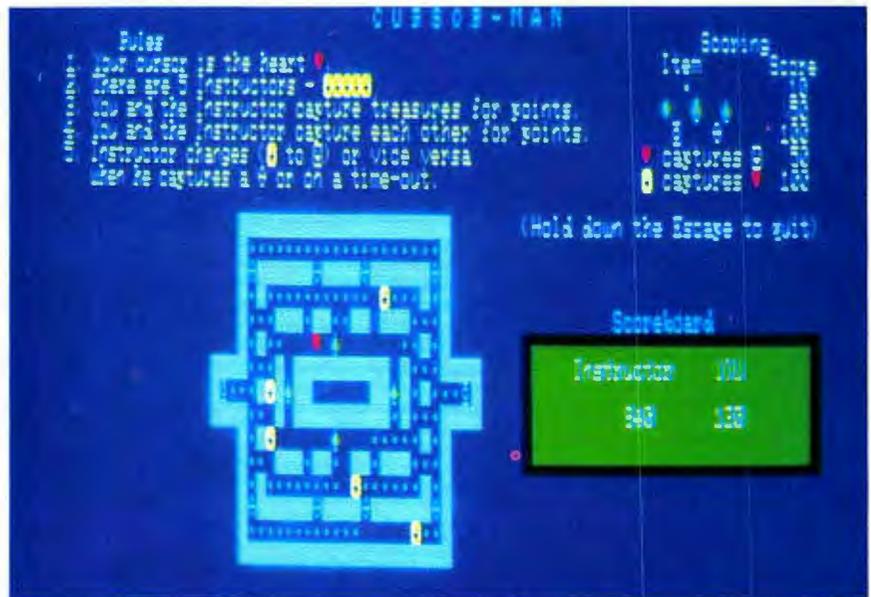
*Christine Whyte*

Using a computer for the first time may evoke feelings ranging from complete fascination to panicky bewilderment. If you're like most people, you probably tend toward mild hysteria when dealing with unfamiliar electronic gadgets. Remember that you're not alone; most first-time users don't know how to turn a computer on, much less how to insert a disk or create a file.

Until last year, much to the chagrin of computer dealers and their customers, the only way to learn to use a computer (aside from classroom training and pestering your neighborhood hacker) was to read the operations manuals supplied by manufacturers or to ask questions of the dealer. Both methods are time-consuming and frequently frustrating.

The good news is that a variety of training products now offer a welcome alternative. With their assistance, you no longer have to dread that first moment in front of the computer when you have no idea how to begin.

These products, called tutorials, are designed to be used with the IBM Personal Computer and are available in three forms: software packages, videocassettes, and audio cassettes. Software packages consist of a program disk that is usually accompanied by a manual. In this interactive approach, you read the lessons on the computer's monitor



The Instructor's Cursor-Man Game

and implement the instructions on the keyboard. Sitting at a computer while watching a videocassette isn't mandatory, but the tutorial is more effective if you practice while watching. An audio cassette gives verbal instructions only as you follow along on the computer.

Tutorials are based on the assumption that you can teach yourself the fundamentals of computer use in a matter of hours. They are designed for different training purposes that have been divided into three broad categories for this review. The first consists of tutorials that offer a general introduction to operating the PC. The second includes tutorials de-

signed specifically for using PC-DOS. And the third category features applications software for word processing and data base management. Tutorials for financial accounting software and BASIC programming will be reviewed in future issues.

The first steps in self-training on the PC are to learn use of the keyboard and how to communicate with the computer. The latter step requires giving commands to the PC and understanding its responses. Teaching these basic skills and others is the task of the following three products, which include two software packages and a videocassette.

## The Instructor

*The Instructor* is a software package designed to make the user's first experience with the PC error-free and entertaining. To guarantee initial success, this program attempts only to teach operation of the keyboard. As a bonus the program includes a dictionary and a reference guide.

To alleviate a beginner's fear of the computer, *The Instructor* uses music, color graphics, and a chatty, low-key style. Jokes and statements such as, "The Instructor knows you're not a computer professional or genius," offer reassurance, and hints flash across the bottom of the screen when you're slow to respond to a question. This approach is appealing, although slightly exaggerated at the beginning of the program. The well-intentioned purpose, however, is to instill confidence at the start, when it's needed most.

You don't need to know anything about operating a computer to start the program. The documentation tells you how to turn on the PC and insert the program disk. The program's main menu has four sections: keyboard operations, a dictionary of common computer terms, a reference guide that lists each use of the control keys and the PC-DOS and BASIC function keys, and a special requests section. The last section allows you to select one of seven reading speeds, to regulate how quickly the helpful hints appear on the screen, to decide whether you want music to play with the program, and to choose whether you want the program to run by itself in "demo mode."

The keyboard operations section is the meat of the program. This section explains the function of every key and lets you practice using them in various games and quizzes. One noteworthy exercise, the "Cursor Man" game (which bears similarities to *PacMan*), helps the user become adept at using the cursor keys.

*The Instructor* should be studied from start to finish, which takes about 1 hour. You can then skip around the program and review sections that were problematic. Instruc-

tions for doing so are in the documentation and on screen. An indirect benefit of this review process is learning to use menus and control keys for more independent interaction with the PC.

Several minor drawbacks occur that prevent running the program with complete ease. If you're interrupted in the middle of a lesson and want to return later, you'll have to start over at the beginning of the lesson. At that point, however, you can proceed quickly to where you left off.

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Most first-time users don't know how to turn a computer on, much less how to insert a disk or create a file.

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Another problem occurs if you want to return to a previous lesson in the keyboard section. In this case, you must go back to the main menu and then to the keyboard menu where you may choose the desired lesson. Similarly, no option exists for returning to a previous screen. Although paging backwards is impossible, you can proceed to the next screen without answering all the questions on the current screen by pressing the Ctrl and N keys.

The manufacturer should emphasize the program's usefulness as a reference guide. Long after graduating from the keyboard introduction, you can refer to this program for definitions of computer terms or for a review of the PC-DOS and BASIC function keys. An index for the contents of each lesson within the keyboard section would be helpful.

Any beginners, whether they are schoolchildren or business professionals, will find *The Instructor* easy to use. The manufacturer has successfully combined the PC's music, color, and graphics capabilities to create an effective, witty, learning tool.

## PC Tutor

The *PC Tutor* software package is for beginners who want more than an introduction to the keyboard. The presentation isn't as entertaining as *The Instructor*'s, but the program offers considerably more information, including sections on computer concepts, disks, files and peripheral devices, PC-DOS commands, and advanced topics such as asynchronous communications.

A PC with two disk drives is required because *PC Tutor* has two disks. The manufacturer reports that this requirement will change so that one double-sided disk drive can run the program. The brief manual clearly explains how to start and exit the program with some additional advice on troubleshooting. You will need from 1 to 8 hours to finish the program, depending on how thoroughly you want to explore each lesson.

Each section, especially those on the keyboard and PC-DOS commands, is explored in sufficient detail for the curious novice. Simple diagrams are used in the beginning; later sections consist mainly of easy-to-understand text. Be forewarned, however, that most of your time will be spent reading the screen, rather than doing drills.

As one of the more important lessons, the PC-DOS commands section has its own menu that includes the most commonly used commands, with each one explained in a separate lesson. The advanced topics section covers the remaining PC-DOS commands. The lesson on the DISK-COPY command, for example, lists five reasons for using the command and explains procedures for copying disks as well as checking if the copy was made.

Quizzes test your understanding and provide correct answers when your response is incorrect. Correct answers are rewarded with a "Nice work" message. Rather than providing actual practice, the lesson emphasizes understanding the meaning and usage of the command.

## ● Review

*PC Tutor* offers a good deal of useful information in a clear, although not overly imaginative, presentation. Using this program is more like reading a textbook on screen than participating in a demanding tutorial. Because the drills are minimal, you are responsible for the practice-makes-perfect part. You should refer back to this program or use the PC-DOS operations manual to get more practice.

### TV Tutor

*How To Use Your IBM PC In 10 Easy Video Lessons* is a videocassette that demonstrates the exciting potential of this medium. The outstanding feature that distinguishes this training product is, of course, its visual dimension. Reading about how to assemble or operate a PC either on screen or in an operations manual is a world apart from seeing a demonstration. Cartoons and graphics help to clarify explanations. The result is a faster, less frustrating learning experience.

This videocassette is intended for the beginner who has never encountered a PC. In ten lessons you advance from learning the parts of a computer and how they work to writing simple programs. The person on screen (who remains faceless because the camera, which focuses on the PC monitor, is positioned behind her) leads you through assembling the computer, using the keyboard, and loading PC-DOS. At the end of the course, which takes from 4 to 6 hours to complete, you'll be programming in BASIC. Due to the breadth of the material presented, plan to view the course over several sessions to avoid feeling overwhelmed.

To use this product you need a Beta or VHS videocassette player and a TV, not an inexpensive consideration. The course is designed so that you can practice on the PC while you are watching the TV screen. At stra-

### PC DOS COMMANDS

Five commonly used DOS commands are:

1. DIR	Displays the directory of all files stored on a disk
2. ERASE	Allows you to erase a file from a disk
3. TYPE	Displays the content of a specific file
4. REN	Allows you to rename a file
5. COPY	Allows you to copy information stored in one file to another file
6. BATCH	Allows you to combine several commands so that they can be executed automatically.

Type the number of the commands you wish to review:

Type **B** if you wish to bypass these commands for the PC DOS external commands.

Press **SPACEBAR** to continue  
Press the **ESC** key to stop

### ATI's PC-DOS Screen

### REVIEW ALL WORDSTAR OPERATIONS

MenuPower can help you learn how to perform several operations:

Opening a document file	Strikeover
Saving a file	Delete
Cursor movement	Printing a document
Insert	Review WordStar menus

Type the number or numbers of the operation you want to review.

The numbers are:

Press **SPACEBAR** to continue  
Press the **ESC** key to stop

### ATI's WordStar Review Mode Screen

tegic intervals you can pause the cassette and practice the skills already presented. A more experienced user may consider the pace too slow; in that case, skipping ahead to more advanced lessons is recommended.

The first half of the course includes two especially useful lessons, "Computer Fundamentals" and "Assembling Your System." The first is an anatomy lesson that describes parts of the computer and how they work. "Assembling Your System" makes the bewildering array of new computer terms more concrete, showing you how to assemble a PC and test for any defects.

Other beginning lessons focus on how to use the PC once it's up and running. "Using the Keyboard," for example, explains the various key functions while you practice, and "Using Disks" demonstrates how to start PC-DOS.

The second half of the course provides some interesting, although less essential information for the beginner. "Software Overview" is more confusing than previous lessons. It explains different types of software as well as various computer languages. Even with the help of explan-

atory cartoons you may still be perplexed after reviewing the lesson several times. The confusion may be the result of the complex subject matter, but the more likely reason is that too much information has been crammed into an abbreviated explanation. This lack of in-depth discussion on each subject can be frustrating for someone who has more computer experience.

On the other hand, a beginner's knowledge of the PC will increase considerably with this introductory course because it anticipates nearly every question a beginner might ask. Clear explanations accompany each demonstration, a teaching approach that almost can't miss. If a lesson remains confusing or you want more practice, simply rewind the cassette to review. The convenience and visual appeal of this product are impressive.

#### PC-DOS Commands

Learning the PC-DOS commands is essential to operating a computer. The sole focus of several training products is to teach these commands. As part of its ATI Training Power series, American Training International offers a software package called the *Interactive Training Disk and Handbook for IBM PC-DOS*. Another manufacturer, Micro Instructional, offers an IBM PC-DOS cassette as part of its audio cassette training series.

An initial problem with the ATI program is that you have to know how to load DOS before you can begin the training. The training handbook guides you from the point the DOS prompt appears on screen. The entire lesson can be followed on screen, but the handbook contains useful reference material on applying DOS commands as well as a troubleshooting section on how to deal with error messages.

Assuming that your primary goal is being introduced to DOS commands rather than learning to use

them with assurance, you'll find the ATI package a helpful instructional aid. The on-screen text is clearly written, and you can choose the amount and the pace of what you learn. This program provides an efficient way to learn the DOS commands without having to wade through irrelevant information.

Although the material is good, the program has some flaws. One problem is that it has no option for returning to the previous screen for review. The chance for review is offered only at the end of a section; if you missed something in the middle of a section, you'll have to run through the entire section from the beginning. An additional problem is that many of the screens require some action before you can advance to the next screen; you can't just press the space bar to move quickly through the program.

An inconvenience occurs when the review screen at the end of a section asks whether you want to review the lesson, go on to the next, or press the Esc key to stop. You will discover by trial and error that this latter action will take you out of the program. ATI reports that newer versions of its program will return you to the beginning of the program instead.

#### Audio Tutor

After viewing videocassette and software tutorials, adjusting to Micro Instructional's PC-DOS audio cassette is not an easy task. You'll need to find a PC in a location where no one else will be disturbed by the tape. Another drawback is that the character of the voice withers to a drone halfway through the hour-long tutorial. Despite its lack of appeal, the audio cassette has one major advantage over the other types of training products: lower cost.

The first lesson covers the PC keyboard. The cassette carefully describes the location of each key and explains its function. The second lesson describes how to run a diagnostics test on the PC, a topic that seems out of place in this context. (The manufacturer reports that a new ver-

sion will include this lesson at the end of the tape.) Unfortunately, no documentation accompanies the cassette that warns you beforehand about the supplies you need to follow the instructions, which include the *IBM Guide to Operations* manual and a blank disk. You will also need other blank disks to practice formatting. Given this annoyance, these practice exercises are thorough.

The next lesson teaches how to load DOS and change disk drives. The commands are then explicitly explained, except those used most infrequently such as Link and Mode. To make the cassette easy to review, the new version will include an index with instructions for noting the cassette-counter numbers of each lesson.

#### Applications Software Tutorials

ATI's *Interactive Training Disk and Handbook for dBASE II* demonstrates the features of this widely used data base management program. The training package takes you through commands ranging from creating a data base and entering information to actually generating a report from the files you create.

Even if you are familiar with *dBASE II*, you can choose the review mode to learn only the more advanced commands such as sorting data and generating a report form. The information on the latter command is most helpful. The program explains exactly how to format a report in terms more easily understood than the instructions in the *dBASE II Users Manual*.

Overall, ATI's program best serves as an introduction to *dBASE II*, rather than as a comprehensive tutorial. Computer retailers could use this product for demonstrating *dBASE II* to customers. After completing the program, you will be familiar with what *dBASE II* can do for you. The next step is to practice with your own applications or to purchase the advanced training package that ATI plans to offer.

As with all of ATI's packages, the *Interactive Training Disk and Hand-*

## ● Review

*book for WordStar* assumes that you can reach the point where the DOS prompt appears on the screen without the program's assistance. Instructions in the documentation are easy to follow from that point onward. Information about materials required for using the program (the PC-DOS and ATI disks) is also presented at the beginning of the handbook. This program, as do all of ATI's programs, offers a choice between two tutorial approaches, introductory or review.

The first topic covered is the basic *WordStar* commands. The purpose of a particular command is defined, and you practice using it once or twice. After you learn to Create, Type, Save, and Exit a file, the program summarizes the skills presented and offers the option of practicing them again.

After you learn these skills, the next step is to edit a document using the cursor movement commands, the insert and type-over modes, and the commands used to delete and print. No clear explanation is provided about the advantages of using the type-over rather than the insert mode. In addition, you are not given advice on how often files should be saved or how to avoid losing them.

After this study of the main menu, the tutorial introduces the *WordStar* No-file, Help, Quick, On-screen, Block, and Print menus. Each menu appears briefly on the screen with a short explanation. Unlike most software packages in which the documentation explains the program, ATI's *WordStar* tutorial explains the ATI manual in detail. The manual has a menu "road map" that illustrates the organization of the various *WordStar* menus. Menu summaries serve as a handy reference guide containing definitions for each command in the seven menus.

ATI doesn't allow you to move around its program at will; you are led each step of the way. The program doesn't accept unasked-for entries; when you type in an incorrect answer, you get no further than the first letter. Pressing the space bar

```
00003      Terry,Larry   90027
. INDEX ON ZIPCODE TO MAILZIP
00008 RECORDS INDEXED
. LIST
00001      Smith,John   90011
00005      Smith,Mary   90011
00003      Terry,Larry   90027
00002      Aaron,Lee    90038
00006      Sullins,Art   90402
00008      Smythe,Eric   90402
00007      Spinal,Tom   93811
. use mailer index mailalph
. report form rep
ENTER OPTIONS, M = LEFT MARGIN, L = LINES/PAGE,
W = PAGE WIDTH:
```

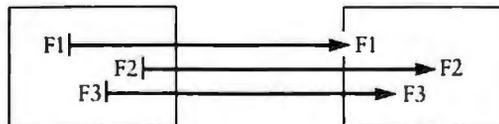
Notice the new message above. dBASE II is asking you to describe the format.

Press SPACEBAR to continue, press ESC to stop

### ATI's dBASE II Choosing Report Format Screen

#### COPYING ENTIRE DISKETTES

DISKCOPY copies everything that's on one diskette (SOURCE) to another diskette (TARGET). DISKCOPY is used to BACK UP the programs and data you buy from others. When the original diskette wears out, you still have a duplicate of what you paid for. All files are put in exactly the same place on the TARGET that they occupied on the SOURCE. Any files that were on the TARGET before DISKCOPY are overwritten.



Press space bar to continue, F7 = prior screen F8 = reference Esc = Menu

### PC Tutor's Diskcopy Lesson

takes you to the next screen, but you cannot return to the previous one. Once again, if you're called away in the middle of the program, you have to restart from the beginning of the interrupted section when you return. Similarly, you can't move quickly through the screens to where you left off because a response is often required before you can proceed.

The purpose of this training package is straightforward: to serve as a quick, efficient introduction to *WordStar*. True to ATI's claim, in less than 1 hour you learn enough about *WordStar* to produce a simple document.

Thus inspired, your confidence should be fortified sufficiently for you to practice more complicated commands on your own by using the ATI manual, the *WordStar Training Guide*, or your own initiative with the help of *WordStar*'s on-screen menus. ATI also offers an advanced *WordStar* package called *Command Power*.

In contrast to ATI's *WordStar Training Program*, Micro Instructional's *WordStar* audio cassette offers plenty of practice, although the pace may seem painfully slow. Several obstacles must be dealt with before you get started. Because no documentation comes with the cas-

sette, you won't know until the tape begins that you need a *WordStar* disk and a blank, formatted disk. You also have to know how to load PC-DOS. On the second side of the cassette you will discover that the *WordStar* companion program, *MailMerge*, is required if you want to practice that function. The cassette takes from 60 to 90 minutes to complete.

To help you key in the proper commands, a sympathetic voice gives explicit instructions. In fact, each command is spelled out letter by letter throughout the lesson. The cassette teaches the following skills: cursor movement and text corrections, insert and delete functions, and moving blocks of text. Each command on the No-File menu is explained, as are a few commands from other menus.

To practice text corrections you need a practice card containing several sample sentences. If for some reason you don't receive this card with the cassette, you must go to the end of the tape where the sentences are spelled out. To make life easier the manufacturer should provide these sentences at the beginning.

The last part of the cassette provides instructions on the use of the *MailMerge* program. First you create a data file containing the variable addresses to be merged into a form letter. After creating a second file that contains the form letter, you merge the files and print the letters. Micro Instructional offers an *Advanced WordStar* cassette if you want to learn advanced *MailMerge* applications.

### The Final Analysis

At least one thing seems clear from this sample group of training products: the beginner's need for self-training materials on the PC has finally been recognized. Manufacturers are now using a variety of media to develop effective training methods. One manufacturer, Interactive Research Corporation of San Mateo, California, is introducing an interactive laser videodisc system and claims

this is the first of its kind. Computer retailers will use the system for demonstrating products, but the primary purpose is to provide instruction on use of the PC as well as popular software packages.

Individual users will as always make the final decision about the value of each training product. The key test of a successful product, whatever its form or purpose, is the degree to which it increases the confidence of the person using it. Three criteria that measure a tutorial's success in this regard are whether it enables the user to start the computer without asking for help, whether the lesson is easy to understand, and how quickly the material can be mastered.

Regardless of the subject, my first choice for training is a videocassette. Its visual appeal makes the lessons more interesting and enjoyable, and it rates highly when measured against the three criteria for a successful tutorial.

Even though the software packages and audio cassettes aren't as appealing as a videocassette, they fare better from the standpoint of practicality and cost. The less equipment and supplies required to get started, the better. This requirement is the main drawback to the videocassette. Employers can provide a videocassette player for on-the-job training, but many individuals can't afford such a purchase.

Software products are the most convenient; all you need is the disk and a computer. In contrast, the Micro Instructional *WordStar* audio cassette requires not only a cassette player, but blank disks, and both *WordStar* and *MailMerge*. Although the audio cassette costs less initially than the other products, this advantage is quickly eroded by the cost of these requirements.

The most rewarding aspect of all these products is that people can teach themselves. Self-training saves time and money for individuals as well as businesses. Both beginners and more experienced users should look forward to further improvements in the quality and sophistication of training products for the PC.

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*The Instructor*  
Individual Software, Inc.  
24 Spinnaker Pl.  
Redwood City, CA 94065  
415/591-4166  
List Price: \$44.95  
Requirements: 64K, one disk drive

*PC Tutor*  
Comprehensive Software  
P.O. Box 90833  
Los Angeles, CA 90009  
213/370-6355  
List Price: \$79.95  
Requirements: 64K, two disk drives  
or one double-sided disk drive

*How to Use Your IBM PC in 10 Easy Video Lessons*  
Kennel Publishing  
150 Shoreline Hwy., Bldg. D  
Mill Valley, CA 94941  
415/332-5825  
List Price: \$69.50  
Requirements: VHS or Beta home VCR player and a TV; IBM PC with 64K, one disk drive, *Diagnostics Master disk*, blank disk

*Interactive Training Disk and Handbook for IBM PC-DOS*  
*Interactive Training Disk and Handbook for WordStar (Menu-Power Vol. I)*  
*Interactive Training Disk and Handbook for dBase II (DB-Power Vol. I)*  
American Training International, Inc.  
3770 Highland Ave. #202  
Manhattan Beach, CA 90266  
213/546-4725  
List Price: \$75 each  
Requirements: 64K, one disk drive

*IBM PC-DOS and WordStar audio cassettes*  
Micro Instructional, Inc.  
6299 W. Sunrise #205  
Fort Lauderdale, FL 33313  
305/584-3133  
List Price: \$29.95 each  
Requirements: audio cassette player, *WordStar* and *MailMerge*, three blank disks; IBM PC with 64K and one disk drive



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tible with your microcomputer, and transparent to most popular operating systems. What is more, they support virtually all application software packages originally designed for micros with floppy disk storage.

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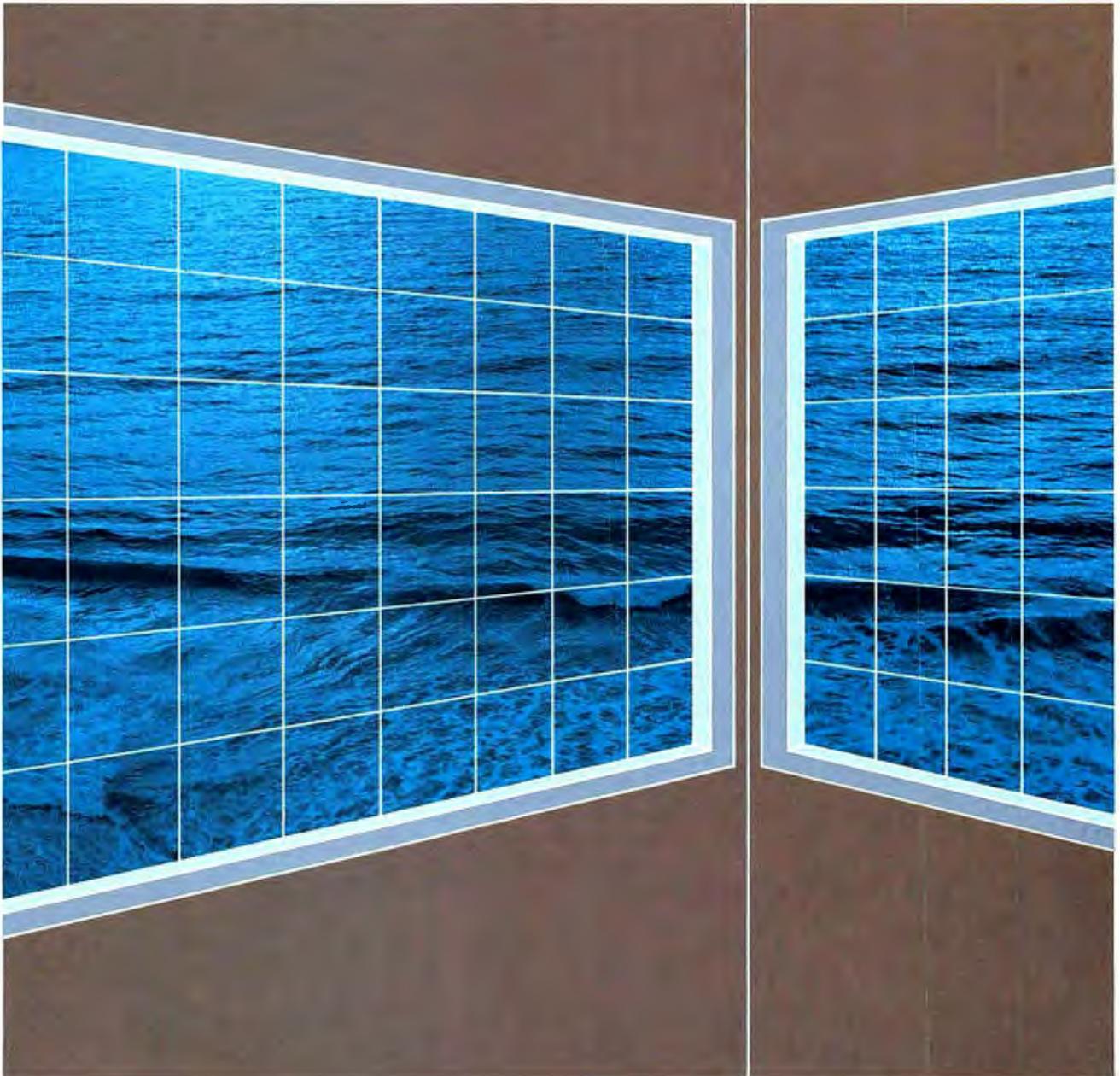
560 Division St., Campbell, CA 95008  
(408)374-6972/Telex: 176309 SCS CMPL

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# Two Rooms, Ocean View

*The PC lands a new job managing property.*

*Ellen Rony Wilson*



Because managing income property demands organization, attention to detail, and logical thinking, the occupation is ideal for a computer-minded person, or, better yet, for the IBM PC. To do the job right one must provide services, solve tenant problems, and, of course, maintain the property. Also involved are the details of recording payments, maintaining a resident file, monitoring expenses, and identifying overdue balances.

The income property environment ranges from single-unit dwellings to apartment buildings, mobile home parks, shopping centers, and large office complexes. Into this environment has arrived a software product designed to assist property owners and managers with their specialized record-keeping requirements. *The Landlord* handles the accounting and record-keeping activities involved in managing income-producing property. The program consists of two systems: a financial package and a records management package.

### Financial Package

The financial package handles property management bookkeeping. It is a simple accounting system for managers who operate on a cash rather than accrual basis, which means that rent is shown as income in the period it is collected, not necessarily when it is charged.

The program allows monthly charges and deposits to rise to a cent short of \$10,000 per tenant. Annual income or expenses for properties may be a staggering \$10 million, and each check may be written for a maximum of \$999,999.99.

No question, these are stunning sums that most likely rise beyond the realm of ordinary requirements, even though *The Landlord* is advertised for use with commercial as well as residential income property. Sample types of property suggested by the promotional literature include shopping centers, mini storage units, marinas, condos, campgrounds, trailer

parks, and—my favorite—aircraft hangars. Properties at the upper levels of *The Landlord's* capacity, however, may require more sophisticated features than the program provides. No special fields accommodate commercial requirements such as square foot calculations, insurance expiration dates, or the Consumer Price Index lease payment adjustments required by shopping centers.

A chart of accounts with codes and descriptive names is provided with the program. The chart lists all

---

An apartment complex is unlikely to need an account designated for golf course maintenance.

---

the types of transactions in the financial system. Only a handful are hard-coded accounts that cannot be changed. This flexibility is necessary since an apartment complex is unlikely to need an account designated for golf course maintenance, and a boat berth owner doesn't normally incur pool expenses.

The chart contains 26 payment categories, 45 expense accounts, and 5 revenue accounts for income from sources other than tenants. Other types of transactions included are deposit refunds, capitalized expense, appreciation and depreciation, and entry of note payment interest. While the variety of account types creates a flexible financial package, commercial property managers may still need more account categories and likely require a more sophisticated account numbering system than the three-digit system used by the program to identify accounts.

*The Landlord* allows monthly rent charges to be posted automatically to each tenant's account. Two-letter transaction codes indicate whether a charge, payment, credit, deposit, or

returned check is being posted. A journal entry screen is used to record nonresident revenues, noncash transactions (e.g., depreciation), or to make adjustments to accounts.

### Records Management Package

The records management system maintains information about owners, properties, rental units, tenants, and charges. Managers may also record tenant payments, inquire into unit availability, or locate delinquent accounts.

Owner records include the name, a user-designated number, and the marginal tax rate to analyze after-tax cash flow on a property and tax analysis report. The property record provides space for the property name and address, a user-designated number, and the owner's name and number (see Figure 1).

The tenant record includes name and resident status, unit description and monthly rent, address and telephone, move-in and lease expiration dates, whether statements should be sent, and two 25-character lines for comments. The program automatically assigns an identification number to new residents. To examine or modify information about a tenant, the number must be entered. Unfortunately, the program lacks name search or alphabetical sorting features. Tenant lists are printed numerically in the order originally entered. Since no alphabetical rent roll is available, anyone managing a sizable roster will have to scan the entire tenant listing to locate a particular name or tenant ID.

### System Requirements

*The Landlord* is designed to run with an IBM PC monochrome adapter and an 80-column parallel printer, although a color/graphics card or a serial printer may also be used. The program requires 128K, two disk drives, and a file called BASRUN.-

## ● Review

EXE. For people who do not have the library disk of the IBM BASIC Compiler containing this file, Systems Plus provides it separately for \$30.

The program's storage capacity depends on the B drive installed in the computer, whether 160K or 320K. Two configuration choices are available for each type of drive (see Figure 2). These configurations are hard coded, meaning that the capacities of each category remain the same regardless of whether the maximum is used. If, for example, the configuration for 20 properties and 510 rental units is designated but in fact only two properties exist, the program's capacity for the configuration remains 510 rental units.

The designers have provided for a few special-case property management situations. An example of such a situation is when the number of tenants exceeds the number of rental units because deposits have been accepted from future residents. Another special case arises when ex-tenants have remaining outstanding balances due because security deposits have not been returned or miscellaneous charges have not been paid by move-out time. The configuration chart shown in Figure 2 provides information about the storage requirements for handling such situations.

### Program Operation

*The Landlord* comes with three master disks: one for file management, another for financial operations, and a third for creating new data disks. Some disk swapping in drive A is required when running the program, but the data disk remains in drive B throughout all operations. The package also includes backup copies of each of the master disks. Additional backup copies may easily be created by using standard PC-DOS copy procedures.

```

PROPERTY NO.: 001
              NAME: WIMBERLY JUNCTION
              ADDRESS: 1501 JOHNSON FERRY ROAD
                   : MARIETTA GA 30062
OWNER NUMBER: 001
              OWNER NAME: HENRY AND SONS INC.
              FY END MONTH: 12

PROPERTY NO.: 002
              NAME: CUCUMBER MALL.
              ADDRESS: HIGHWAY 41
                   : SMYRNA GA 30071
OWNER NUMBER: 003
              OWNER NAME: DR. A. P. WHEELER
              FY END MONTH: 6
    
```

Figure 1: The Property Record (courtesy of Systems Plus)

	160K Disk Drive		320K Disk Drive	
	Config 1	Config 2	Config 1	Config 2
Properties	10	50	20	100
Owners	10	50	20	100
Rental Units	250	160	510	350
Tenants	285	185	590	400
Unit Types	50	50	50	50
Vendors	100	100	200	200
Journal Entries (per month)	150	150	300	300
Checks (per month)	200	200	400	400

Figure 2: An Adaptation of the Configuration Chart (courtesy of Systems Plus)

*The Landlord's* menu tree organization makes the program easy to operate, even for those who are new to personal computers. As options are displayed on the screen, the user makes a choice that leads to a second set of alternatives. That choice results in yet another group of more specific operations.

Built-in safeguards assure that information is accurate. The program gives the user opportunities to verify record entries, reconsider choices, and confirm that no information is being accidentally deleted. For example, tenants with outstanding balances may not be removed from the system. The program also prevents rental units from being deleted if tenants are on file, even if they have moved out. Similarly, a property may not be deleted if any units are listed for it.

### Printed Reports

*The Landlord* prints checks for vendors or tenants and statements for all or selected tenants. Praise should go to the program designers who added a mailing list feature to *The Landlord's* repertoire. Once the list is typed in, it need only be changed as tenants move in and out, and the automatic generation of address labels is sure to be a time-saver.

*The Landlord* produces a number of useful reports. Data may be printed for the properties of one or all owners and for one property or all properties. The reports are preformatted, however, and cannot be redesigned to suit individual printing requirements.

The delinquency report lists tenants with outstanding balances, including those who have moved out (see Figure 3). Unfortunately, this listing is not separated into aged accounts receivable categories of 30,

Delinquency Report							
MGT Company Name Inc.							
For June 1982							
Page 01						06/25/82	
Beaumont Square		002		Simpson & Simpson Inc.		002	
PROP#/UNIT	TENANT/TENANT#	TOTAL DEPOSITS	DATE	CODE	AMOUNT	PREVIOUS BALANCE	PRESENT BALANCE
002	Dober Industries	900.00	06/01	RC	900.00	0.00	900.00
STE123	031		06/01	SP	900.00		
			06/05	RP	-900.00		
			06/14	RX	900.00		
002	Nancy's Gifts and Things	900.00	06/01	RC	900.00	0.00	150.00
STE129	033		06/01	SP	900.00		
			06/05	RP	-750.00		
002	General Business Systems	0.00	06/01	RC	700.00	0.00	700.00
STE301	036						

Figure 3: Delinquency Report (courtesy of Systems Plus)

60, and 90 days overdue, a feature that would be particularly useful for owners with a large tenant roster.

The disbursements report lists check transactions. It shows check date and number, payee, account and property codes, and amount. The account summary report lists account categories that have had activity during the month or year with current-month and year-to-date totals.

In order to close the month, summary reports must be printed for tenant payments, disbursements, and journal entries. These reports not only update current information for the close-month posting but also provide an audit trail of all financial transactions. *The Landlord* documentation advises that the close-month procedure for several hundred units or properties can take an hour or more to complete. If anything interrupts the procedure, the data disks become unusable. Since I was working with a tenant base of only ten, this feature was not really put to the test; but it sounds slow and undesirably vulnerable. I'd feel obligated to sit beside the computer during all this invisible processing just in case a system failure occurred.

Other available reports include listings of owners, properties, units, unit types, tenants, vendors, vacancies, and lease expiration dates. These printouts may be reproduced at any time during the month.

The property and tax analysis report provides a summary of property income and expenses for one or all properties or for a particular owner. This information is calculated automatically and maintained for current-month and year-to-date totals. The analysis shows what percentage of the total each of the account categories makes up. Taxable income, after-tax income, net equity, and spendable income are also shown.

#### System Configuration

The system configuration screen is the first entry screen encountered by a new user. Unfortunately, it is the most difficult part of the program.

Like many software packages that generate reports, *The Landlord* needs to know what type of printer is being used with the system. If a parallel printer is connected, the prompts may be ignored. For serial printers the prompts ask for all those gritty communications details that have become the bane of my interfacing existence: bit rate, number of stop bits, parity, RTS, CTS, and DTR.

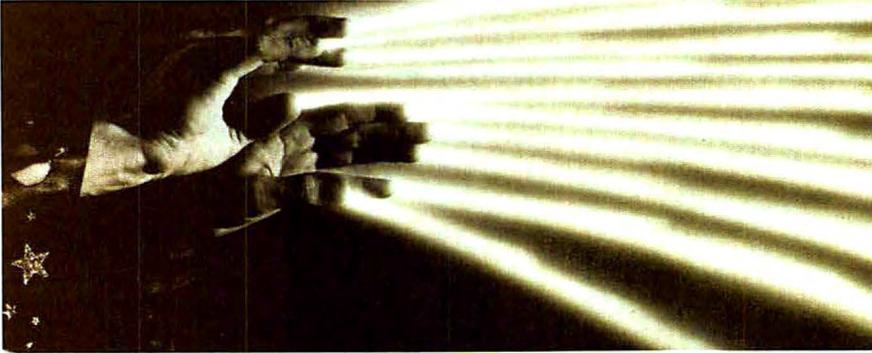
Although the terminology is clearly explained in the documentation, novices are directed to consult their dealers for assistance with system configuration. I produced reports using both parallel (Epson MX-80) and serial (Diablo 630) printers. By using the PC-DOS MODE command to redirect output through the parallel port, I avoided having to reconfigure the program.

#### Documentation

Instructions on the use of *The Landlord* are conscientiously outlined in a 150-page, spiral-bound manual. The documentation deserves applause for its completeness and readability. The appendices contain transaction codes and charts of account listings, menu maps, and samples of all the reports.

Error handling is likewise well conceived. Errors are identified on screen by short messages or, in the case of system failure, by numbers that are referenced in the manual. Some of the built-in error-checking features minimize transaction-entering problems. Checks, for example, may be distributed among six accounts, but the program won't allow you to distribute more or less than the check amount.

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## Review

Overall, *The Landlord* has the features most property managers need for producing and maintaining property records. And fortunately, people are unlikely to require support beyond the information supplied in the documentation. However, the program is not without limitations, particularly if intended for commercial use.

Tenant history may be retained in printout form only. When a tenant moves out and is deleted from the system, no summary history is retained on disk. Accrual accounting, traditionally used by many property managers, is not provided as an option. And further, the program does not furnish a completely automated property management system. Items such as depreciation must be calculated off the computer, and checks for recurring fixed expenses cannot be automatically generated.

Special-purpose programs often seem to provide too much or not enough. How can one program satisfy the needs of land moguls and simultaneously meet minimal maintenance requirements of minor multi-unit managers? *The Landlord* aspires to manage large sums, extensive accounts, and even records for aircraft hangars. The program performs best, however, as a tenant ledger and cash flow monitor.

Now, if only they could get a program to clear stopped drains, fix windows, paint ceilings, and...

---

*Ellen Rony Wilson is a technical writer and a sales representative for a computer retail store in California.*

---

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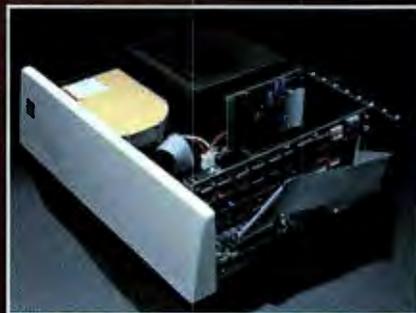
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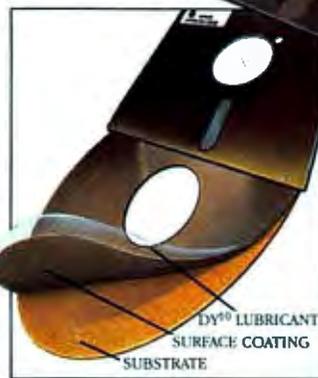
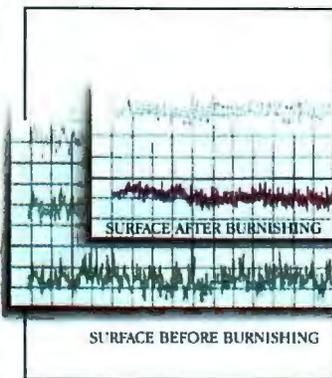
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# Apartment for Rent— See Manager

*An apartment manager inspects the capabilities of a program that handles apartment management bookkeeping.*

Thomas R. Philippi

A few days ago I was called upon to risk my health (not to mention my breakfast) by unclogging a particularly stubborn drain. Two hours later, I retrieved and catalogued the following items: one plastic pen (blue), two pairs of nylons (used), three quarts of sludge (definitely used), and enough surplus hair to bring Samson back to life. This kind of task is one part of my job as a member of the worthy but unrecognized profession of apartment management.

Another part of the job involves keeping track of all the business and accounting matters related to managing an apartment. Unfortunately, modern technology has not yet devised less toilsome ways to fix a leaky roof or unclog a drain, but there are some computer software programs that may take the drudgery out of the business and accounting end.

Among these programs is *The Apartment House Manager*, a product of User-Friendly Software, of Melville, New York. The package consists of five programs that provide a master file and status reports for all apartments, printing of a rent roll and form letters, a journal of all rents and expenses, and a monthly or year-to-date profit and loss statement. The “Tenant,” “Letter,” and “Journal” programs allow you to create, maintain, and access any and all information you enter into three principal

data files: Tenant/Master file, Letter file, and Journal file. The “Sort” program, which operates only in the Tenant/Master file, lets you rearrange and print out information alphabetically by tenant last name, according to apartment number or lease expiration date. The “First” program is used to initialize the three data files and need only be run once when starting up the system.

The “Tenant,” “Letter,” and “Journal” programs each have a menu of

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A novice must apply ingenuity and persistence to overcome some bothersome obstacles.

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options that offer you a variety of ways to enter or access information in the data files. With the “Tenant” program, for example, you can add to or change an existing Tenant/Master file, or you can display the data for any tenant on the screen. With the “Letter” program you can print four different, prewritten form letters (such as overdue rent reminders and lease expiration notices), rent bills, or you can create and print your own letter. The “Journal” program has options that allow you to create ac-

counts payable for services such as maintenance and garbage collection, and monthly profit and loss statements can also be produced.

I’ll use the “Tenant” program to illustrate how *The Apartment House Manager* works. First key in two commands: LOAD “TENANT” and RUN, or substitute the F2 and F3 function keys. A menu of options appears on the screen. If you are entering data for the first time, you must select option A to create a new Tenant/Master file. A prewritten form appears and lists a series of categories that accounts for all the pertinent data an apartment manager needs to know about a tenant, such as name, date moved in, lease expiration date, and rent. The same basic instructions apply to using the Letter and Journal files as well: key in the same two commands and choose the desired options from the menu.

## Vacancies

User-Friendly claims that its programs can be used by anyone, even someone who has never used a computer and, furthermore, that the package is designed to aid all phases of apartment management.

After testing *The Apartment House Manager*’s various programs, I discovered that a novice must apply

ingenuity and persistence to overcome some bothersome obstacles.

The major problem with *The Apartment House Manager* is that the majority of its intended users will find the programs frustratingly difficult to learn. This problem contradicts the claim that using the programs requires no prior knowledge of computers. At best, the test runs I conducted were trial-and-error affairs and somewhat annoying ones at that. I'm not a programmer, although I do have word processing experience on several different computers; however, I'll bet my free rent that most apartment managers have less computer experience than me.

These are some of the problems I discovered as I went through the program. Unless you place two digits per position when typing in the date of a lease in the Tenant/Master file (02/09/82), you can't enter, much less update, Miss Jabberwocky's rent. If you don't capitalize all the letters in Mr., Ms., or Mrs. when entering a tenant's name, you can't compile Mr. Bandersnatch's rental vitae. In using the "Journal" program to open an account, you must choose option E (create new income/expense accounts) or the computer will refuse to accept any account number you assign. When creating an account, a novice could easily choose option A, (enter expenses and income) and get no further than 'account number invalid'—the bewildering message flashed by the computer because the rationale for a simple procedure has been omitted. Nowhere in the instruction manual is any of these procedures clarified.

In the same vein, there is no way to exit an option once it's chosen without doing a system reset. For example, assume you are in the middle of entering data for a new tenant in the Tenant/Master file. If you want to switch to another option within that file or go to the Journal or Letter file, you must go to the end of the current

option—even if you enter only gibberish to complete it. At that point you can switch to another file using the F2 and F3 function keys. The instructions for this procedure are explained in the instruction manual, but not in clearly understandable terms. At the very least, such important functions should appear on screen or be explained (and frequently repeated) as you learn to run each program.

A major obstacle is the quality of the instruction manual. On the cover is a computer graphics illustration of what appear to be apartment buildings; the layout, printing, and design of the cover are done tastefully and hold promise for lucid, practical instructions. Then, before you can say tenant, you open the manual, turn the pages, and discover poorly photocopied, typewritten pages with numerous grammatical mistakes. Sentence construction and phrasing are clumsy, punctuation is erratic, and proofing errors are as thick as complaints at a rent board hearing. However, under certain conditions of need and hardship you could live with the sloppy editing, provided the instructions themselves were clear and accurate. Unfortunately, this is not the case.

#### Assets

When a potential renter comes to look at an apartment, the advantages and disadvantages of the unit must be considered. *The Apartment House Manager* does have some prominent disadvantages, but also some useful features. For example, printing out the commonly used form letters in the Letter file is a useful function. Saving information storage space is another possible advantage. This is especially true when running a large complex, say more than 100 units, where maintaining half a dozen disks is preferable to keeping cumbersome files.

For that matter, after all the trial and error required to learn how to use *The Apartment House Manager*, the individual programs work the way they are supposed to work.

Moreover, none of the various drawbacks, taken individually, represent an insuperable obstacle to running the program. For the novice, however, the simplest problems added together can quickly become major defects.

#### Eviction Proceedings

In the final analysis, however, the efficiency and integrity of the programs are beside the point. Even if the program worked as simply as User-Friendly claims, I found no compelling reason to use it. User-Friendly assumes that the average apartment manager's responsibilities are administrative. Mine certainly are not; they are primarily custodial and public relations, as are the responsibilities of other apartment managers I know. They also assume that management of a building or complex is large enough to generate truly unmanageable quantities of paperwork. Buildings having less than 100 units will not fall into this category.

*The Apartment House Manager* offers a solution to only some of the bureaucratic annoyances, which are at the far end of a broad spectrum of mundane but concrete problems plaguing an apartment manager. There is no conceivable way that the expiration date of a lease coded into a file will help you cope with the triplets in #506 who have just begun to learn tap dancing. Nor will it convince Mr. Grumples in #406 not to go big game hunting in #506 every time he hears hoofing noises through his ceiling.

---

*Thomas R. Philippi manages a large apartment building in downtown San Francisco.*

---

*The Apartment House Manager  
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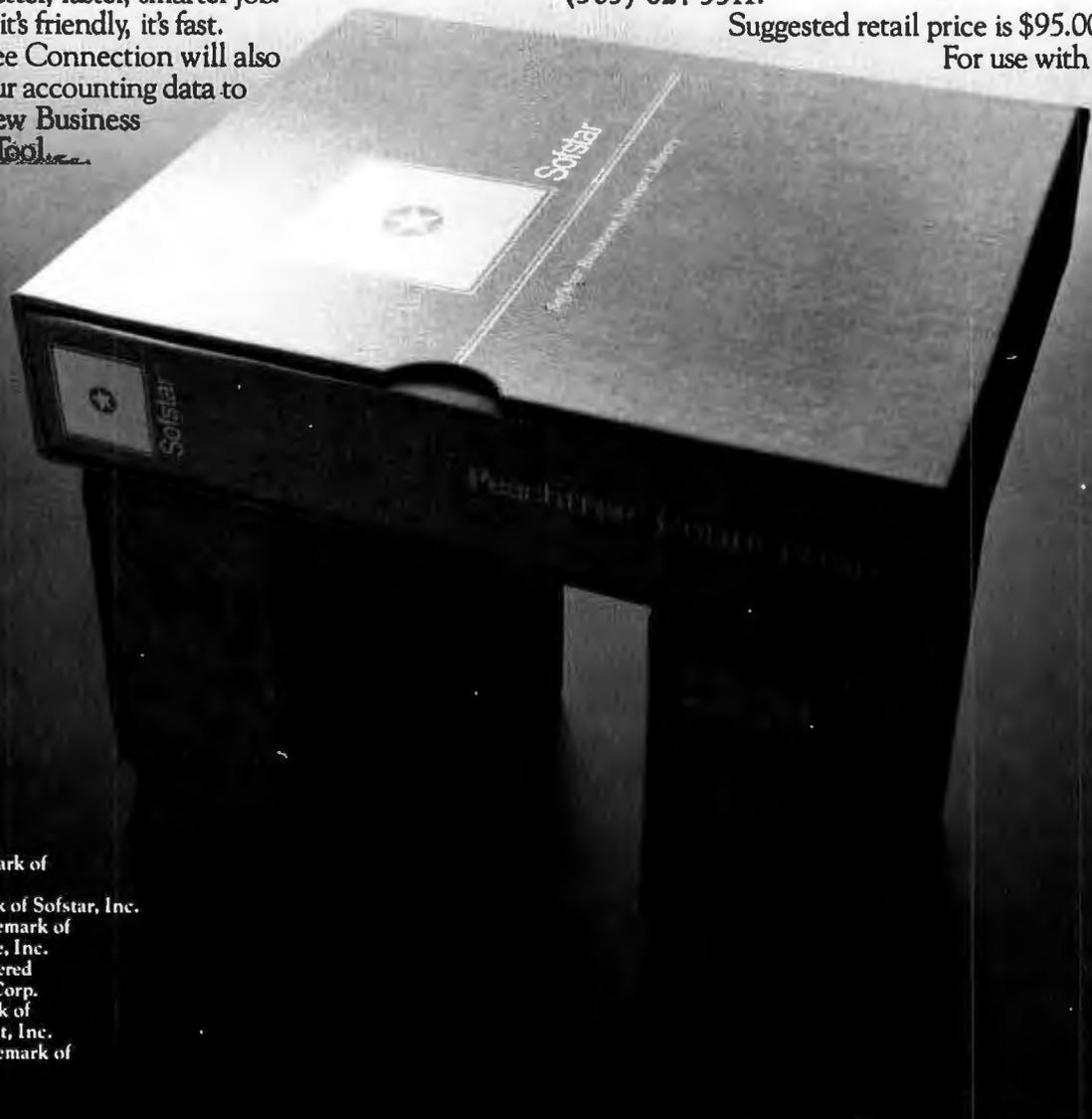
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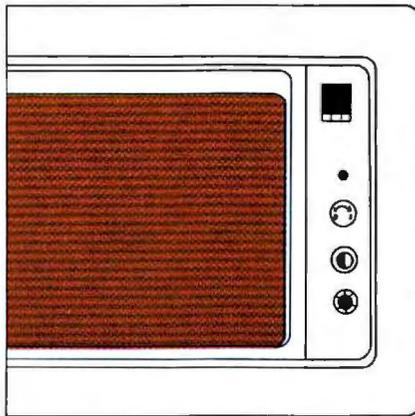
*Karl Koessel*

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IBM Color Display

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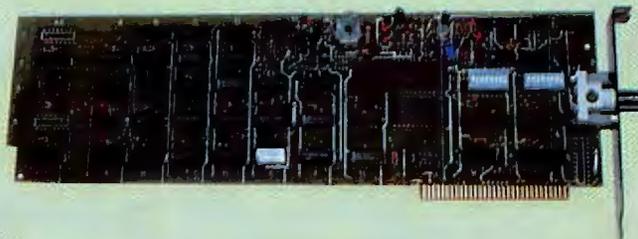
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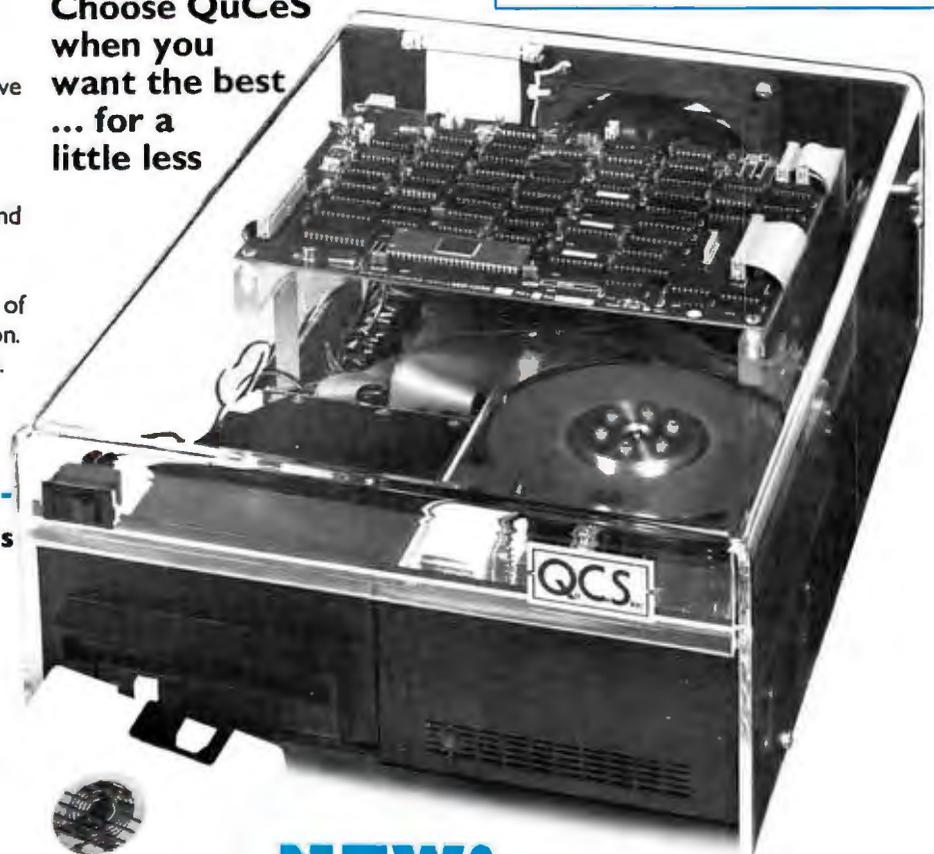
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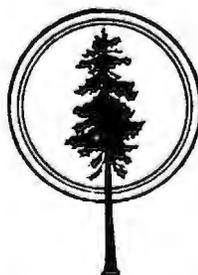
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# MS-DOS 2.00: A Hands-On Tutorial

Tom Sheldon

*Although the announcement of the IBM Personal Computer XT grabbed the headlines after its unveiling, the latest version of Microsoft's Disk Operating System (DOS 2.00), introduced on the same day, marks a significant extension of the capabilities available to all PC users for managing the flow of data between the PC's processor and peripheral devices. This article takes a close look at some of those enhancements, especially the tree-structured filing system and new batch file subcommands.*

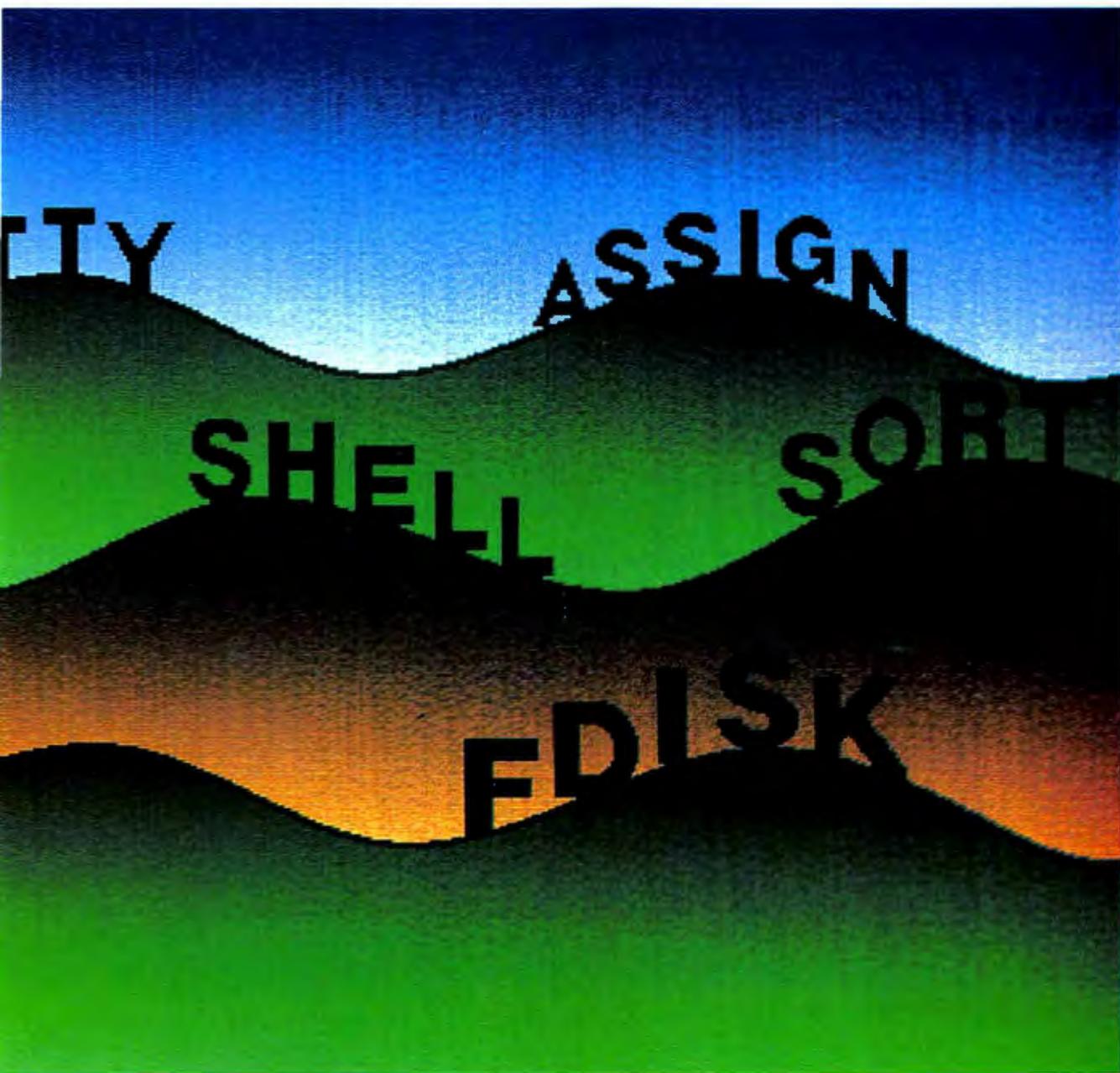
Even before the latest set of changes, MS-DOS was one of the best buys for the PC. For \$40 version 1.10 of this package combines an editor, a file-keeping system, batch processing, a linker and debug program, and much more. Many users touch only the surface of this package. Most of their time is spent in the applications environment of a prepackaged program. The typical word processing operator, for example, rarely uses any DOS commands besides FORMAT and COPY. Some users touch on batch processing and do elaborate directory and copy commands using wild cards or global characters.

The avid computer user, on the other hand, has scoured the manual looking for new and interesting commands and procedures. DOS version 2.00 promises to be a stimulating package for these users, and considering all the new features you get for only \$60, it would be a bargain at twice the price.

## The Forest of Files

DOS 2.00 utilizes a tree-structured filing system. In this type of arrangement a root, or base, directory holds a certain number of files. Some of these files are themselves directories; they are actually subdirectories of the root directory and can contain files and subdirectories themselves.





## ☉ Hands On

Imagine walking through a door into a room that contains many doors. The first room is the root, and the doors represent subdirectories. Walking through one of the doors leads to a subdirectory that may contain files or more doors leading to other subdirectories. The rooms could be called nodes, and files in one node are completely separate and distinct from files in other nodes.

The tree-structured filing system was released in conjunction with the introduction of the IBM XT hard-disk-based PC. When several users are working on the same system, each user's files must be kept separate from the others'. Using MS-DOS 1.10 on a hard disk would be too cumbersome, and the disk would soon become cluttered with files. Listing the files might take three or four pages, even when you are using the wide listing option (DIR/W). Such a large directory increases the chances of erasing files by creating new ones with the same name and storing them on the disk. The tree structure of version 2.00 solves this problem by allowing each user to work in a separate filing environment. Applications may also be kept in separate directories. *WordStar*, for example, could be kept in a directory called *WS*.

Figure 1 shows a possible tree structure for a small business. The base directories include manager's files, MGR; assistant manager's files, AMGR; and several other directories including one each for *Spellbinder*, SB, and *Multiplan*, MP. The directory MGR contains the subdirectories, SCHED, where employee work schedules are kept, and STAFF, which keeps employee files. STAFF contains subdirectories for each employee, and those subdirectories are divided into further subdirectories. PERS holds employee personal data, and PAYROLL holds employee payroll data.

MKDIR (which can be shortened to MD) is the command used to make new directories. Once a directory is made, you can move into it to make subdirectories using the same MD command. RMDIR (RD) is the opposite of MD. You cannot remove a directory if subdirectories are dependent on the directory you are attempting to remove. That would be analogous to pulling the foundation out from under them.

The command CHDIR (CD) is used to move into the different directories. The topmost (root) directory can be accessed by typing CD\ when the C> prompt is displayed. The backslash character is used to denote or separate directory names.

Subdirectories can be accessed by specifying a "path," a description of the route between the current directory (the one the user is in) and the desired file. The concept is similar to the "currently logged disk" that users of earlier versions of MS-DOS will recognize.

If the manager (owner of the MGR directory in Figure 1) logs on and wants to view Tom's payroll files, he types

```
CD\MGR\STAFF\TOM\PAYROLL
```

This moves him out of the logon ROOT directory, which is specified as '\', down through the specified path (the MGR directory to STAFF, then to TOM, and finally to PAYROLL) and into Tom's payroll file area. Issuing a DIR command at this point lists only Tom's payroll files. The manager cannot view Joe's payroll files since he is not in Joe's subdirectory.

When the manager finishes working in Tom's payroll subdirectory, typing CD\ returns him to the top-most node. Without that last step, the manager runs the risk of creating and storing files in the wrong subdirectory.

### Lost in the Forest?

The current path may be displayed at any time by typing CD . If the manager is working in Joe's payroll file, the path C:\MGR\STAFF\JOE\PAYROLL is displayed.

The TREE command is used to view the entire structure of the file system. You don't need to be in the root level to use TREE. If the command file TREE.COM resides only in the root level, however, the path from the current directory to the root must be specified so that DOS will know where to look for that command file.

To avoid that potentially complex path specification, the PATH command can be used to tell the system where to look for any command or batch files that it doesn't find in the current directory. An alternative would be to copy the TREE.COM file down into the current directory, but this method is repetitious. Leaving the DOS commands in the root level and specifying paths to them may be the best method. The following is a listing of the path from the MGR directory to Tom's payroll directory in the tree structure illustrated in Figure 1.

```
Path: \MGR
Sub-directories: STAFF
                  SCHED
```

```
Path: \MGR\STAFF
Sub-directories: TOM
                  JOE
                  SALLY
```

```
Path: \MGR\STAFF\TOM
Sub-directories: PAYROLL
                  PERS
```

```
Path: \MGR\STAFF\TOM\PAYROLL
Sub-directories: None
```

Files may be moved from one directory to another. This becomes important if the manager wants to create employee payroll figures using *Multiplan* and transfer that information into the employee payroll files. The

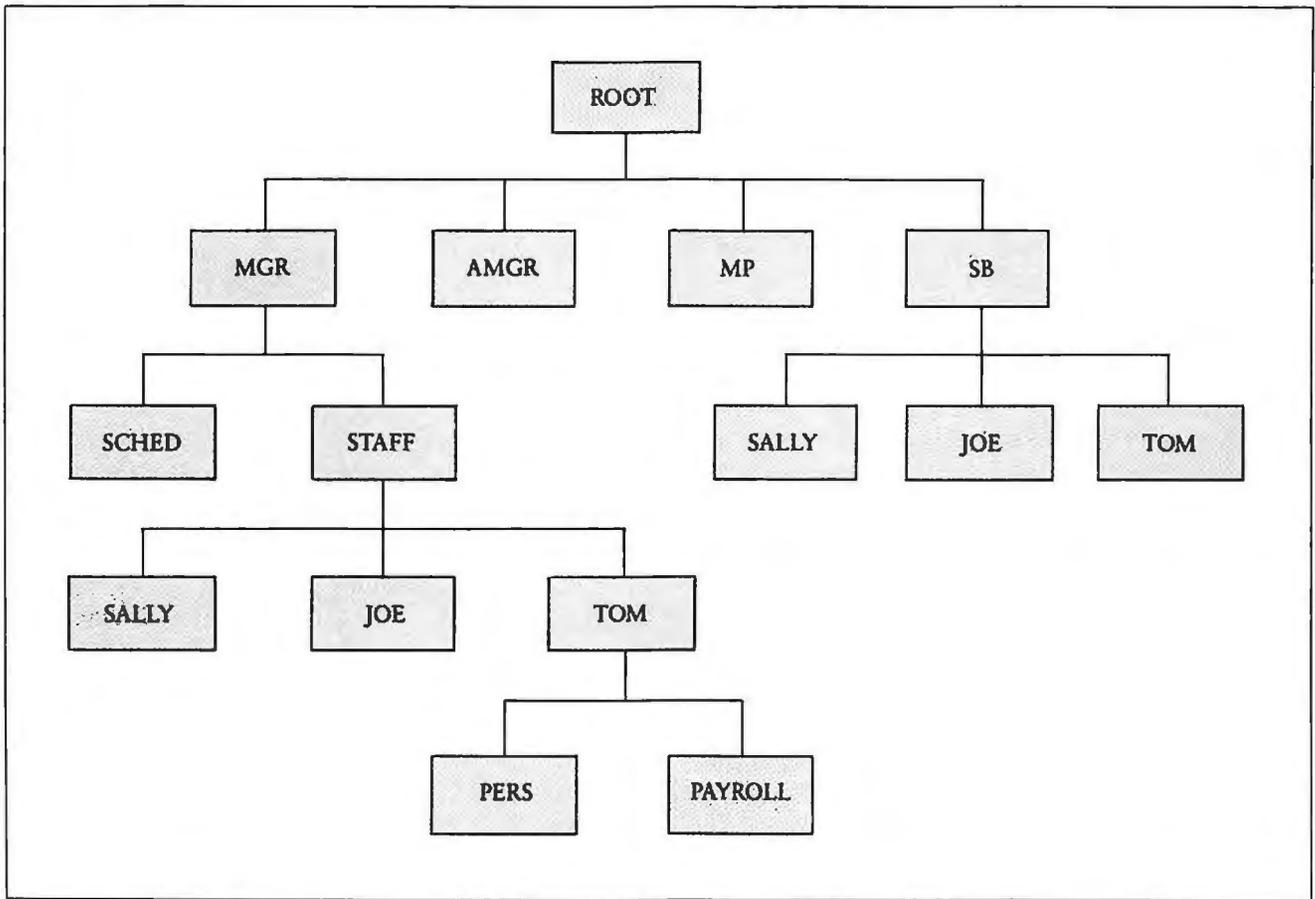


Figure 1: Tree-Structured Filing System

COPY command can be used to do this. The statement  
 COPY C:\MP\PRTOM.MP C:\MGR\STAFF\TOM\PAYROLL  
 would copy the file PRTOM.MP (Tom's payroll information created on *Multiplan*) from the MP subdirectory into Tom's PAYROLL subdirectory, which must be accessed by the path ROOT('\') to MGR to STAFF to TOM to PAYROLL. This may seem a bit awkward; it is when many subdirectories have been created.

For example, a batch file called TRANSFER.BAT could be created with the commands:

```

COPY CON:TRANSFER.BAT
COPY C:\MP\%1 C:\MGR\STAFF\%2\PAYROLL
CD \MGR\STAFF\%2\PAYROLL
DIR
<Ctrl> Z
  
```

The meaning of this sequence is as follows:

```

COPY CON:TRANSFER.BAT
creates a batch file called TRANSFER.BAT from the
next few lines typed on the screen.
COPY C:\MP\%1 C:\MGR\STAFF\%2\PAYROLL
  
```

copies the file named just after the TRANSFER command (the source) from the *Multiplan* (MP) directory to the PAYROLL subdirectory (the target) that resides in the directory named after the file on the command line. Replaceable parameters '%1' and '%2' are used. The expression '%1' means the first value (name, number, or text) typed after the command, and '%2' means the second value typed after the command.

```

CD \MGR\STAFF\%2\PAYROLL
changes directories to the target payroll subdirectory.
DIR lists the directory of the target directory to check
that the file was actually moved. In other words, the
command structure would be
TRANSFER [sourcefile] [targetdirectory]
  
```

As an example, typing the following sequence transfers the file PRTOM.MP to Tom's payroll directory:

```

CD\
TRANSFER PRTOM.MP TOM
  
```

The CD\ statement is used before TRANSFER to ensure that the user is in the top level (root) directory. PRTOM.MP becomes parameter '%1' and TOM becomes '%2'. This file is very useful because parameter '%1' can be replaced with any *Multiplan* payroll file and '%2' can be replaced with any employee name, ensuring that the file is copied to the right subdirectory.

## ☉ Hands On

Loading applications from the floppy disk to the hard disk is easy to do. You may want to create a directory in which the application will exist. The statement `COPY A:WS*. * C:\WS` copies all necessary *WordStar* files from floppy disk drive A into a predefined *WordStar* directory on the fixed disk drive C, bypassing the root directory.

The `PATH` command is used to search the tree structure for command or batch files that may not be in the current directory. Each directory in the specified path is searched until the command is found. For instance, you may want to establish a directory for a word processing application one level down from the root. The applications programs and a subdirectory for each person using the application will reside in this directory. Each person will thus have his or her own file storage area. A `PATH` command specifying the location of the word processing program is issued in each of these user subdirectories. File storage commands from DOS or from within the word processing program will put files in the current (user) directory.

Figure 1 shows the directory `SB` (*Spellbinder*) with subsequent branching nodes for each user. The user goes to his or her particular subdirectory, issues the `PATH` command, `PATH \SB`, and executes the start-up command for the word processing program.

This procedure can be simplified by creating a batch file at the root called `SB.BAT`, as follows:

```
CD\  
COPY CON:SB.BAT  
CD \SB\%1  
PATH \SB  
SB  
<Ctrl> Z
```

To run the program the user types  
`SB TOM`

The specified name, in this case `TOM`, replaces parameter `'%1'` so that any person using the system simply types `SB` and the name of their subdirectory to get to their text files. Once there, the path is automatically specified and the `SB` command is executed to start the *Spellbinder* word processing program. This method works fine using *Spellbinder*. However, *Volkswriter* and *WordStar* destroy the `PATH`, so text files must be stored in the same directory as the program. Either one works fine unless you try to access it from a subdirectory. In that case *WordStar* will find `WS.COM` and display the copyright screen, but it bombs when it tries to find the `WSMSG.S.OVR` file.

Some programs insist on looking for their files on drive B. The new DOS command `ASSIGN` circumvents that problem, providing a means for temporarily changing the name of a disk drive. For example, you can say

that drive B is drive A or, in the case of the IBM hard disk, drive C is drive B. Most programs can then run properly under a single volume (on a single drive). This should be a useful command for accounting applications that require the data disk to be in drive B. However, `ASSIGN` does not correct the *Volkswriter* and *WordStar* problem. Text files must be stored in the same directory as the program files.

### Filters and Pipes

Some new commands have been added to enhance the new filing system. These commands give MS-DOS 2.00 the ability to sort a file, find a character string within a file, pipe the output of one program into the input of another, and redirect the input and output of data. To demonstrate these capabilities, you can create a phone list file directly from the console. These examples assume that hard disk volume C is the default drive.

```
COPY CON:PHONE.NUM  
TOM 687-0865  
JOE 965-3654  
SALLY 682-0935  
JANE 963-3567  
ANDY 987-6543  
DAVE 687-1234  
<Ctrl> Z
```

Using the `SORT` command, you can rearrange and "filter" the file. The command will sort specific lines of data or simply arrange the file in ascending or descending order. Using the less-than symbol, the command line can use a disk file or the data from a modem, instead of the keyboard, for the input. With the greater-than symbol, output can be directed to files, printers, or other devices. The command  
`SORT < PHONE.NUM > CON`  
causes the phone list to be sorted in ascending order and the sorted file output to be sent to the console (screen):

```
ANDY 987-6543  
DAVE 687-1234  
JANE 963-3567  
JOE 965-3654  
SALLY 682-0935  
TOM 687-0865
```

The greater-than and less-than symbols act as redirection indicators. The symbol `'<'` indicates that the input for the sort is to come from the file named `PHONE.NUM`, and the symbol `'>'` directs the sorted output to the screen. You could direct the output to the printer by typing  
`SORT < PHONE.NUM > PRN`

```
COPY CON:YELPAGES.DAT
```

```
PLUMBER      DR. ROOTER      967-9876
LOCKSMITH    UNLOCKITSHOP   687-0345
BANK         1ST WORLD      687-0987      DOWNTOWN
BANK         1ST WORLD      687-5555      UPTOWN
LAWYER       BARNEY BUGLE    345-9867
DOCTOR       DR. FEELGOOD    987-3456      FAMILY
DOCTOR       DR. EYEBALL     567-0987      EYE DOCTOR
DOCTOR       DR. STANDRIGHT  876-0987      CHIROPRACTOR
TRAVEL       FLYBYNIGHT SERVICE 567-9876
```

```
<Ctrl> Z
```

### Listing 1: Phone Directory Data File

To filter the file you can specify criteria for the sort. One way to filter the file is to use the FIND command, as in the statement

```
FIND "DAVE" PHONE.NUM!SORT >TELE.FIL
```

```
TYPE TELE.FIL
```

The result of this command is displayed as follows:

```
-----PHONE.NUM
DAVE      687 1234
```

This command essentially says: find the name DAVE in the file PHONE.NUM and sort it to the file TELE.FIL. The TYPE TELE.FIL command line was executed to look into the destination file and see if the filter command worked.

To find another name in the PHONE.NUM list and add it to the TELE.FIL file, use double greater-than symbols (>>) to specify that the output of the SORT command should be appended to the end of the file:

```
FIND "TOM" PHONE.NUM!SORT >>TELE.FIL
```

```
TYPE TELE.FIL
```

Once this command is executed, both names will be in the file:

```
-----PHONE.NUM
DAVE      687-1234
-----PHONE.NUM
TOM       687-0865
```

The vertical bar symbol (!) is a pipe command that allows the user to put several commands together and redirect the output of one command to the input of the next.

When used in conjunction with the pipe feature, the SORT command can rearrange the directory. Typing DIR!SORT sorts the directory alphabetically by file name.

```
DIR!SORT/+25
```

sorts the directory by date, since the date is displayed in the 25th column of a listing.

```
DIR!SORT/R/+25
```

sorts the dates in reverse order with the most recently created file listed at the top. And

```
DIR!FIND "<DIR>"!SORT>CON
```

lists all subdirectories in the current directory, since all subdirectories use "<DIR>" in place of a file name extension.

To make all this easier, the filter commands may be incorporated in batch files. The file commands in Listing 1 create a data file YELPAGES.DAT, which could be called "Instant Yellow Pages."

The FINDIT batch file created with the following commands will search YELPAGES.DAT for a particular specified record:

```
COPY CON:FINDIT.BAT
```

```
FIND "%1" YELPAGES.DAT!SORT >CON
```

```
<Ctrl> Z
```

When the file is run to search for the plumber (FINDIT PLUMBER) or the doctor (FINDIT DOCTOR), it will produce these results:

```
-----YELPAGES.DAT
PLUMBER DR. ROOTER      967-9876
-----YELPAGES.DAT
DOCTOR  DR. FEELGOOD    987-3456 FAMILY
DOCTOR  DR. EYEBALL      567-0987 EYE DOCTOR
DOCTOR  DR. STANDRIGHT    876-0987 CHIROPRACTOR
```

The replaceable parameter '%1' in the batch file is replaced by the category you specify after the FINDIT command. The YELPAGES.DAT file can be as long as you want.

### A Batch of New Commands

Batch files contain DOS commands, which are executed by DOS one after the other. The files may be created using a text editor such as EDLIN or *WordStar* in the nondocument mode, or directly from the keyboard using the COPY.CON: command. The file name extension must be BAT.

## ● Hands On

The new batch file subcommands available with DOS 2.00 make the operating system well worth its price. These new commands include FOR, GOTO, and IF statements that programmers will recognize and appreciate immediately. The ECHO on/off subcommand controls the display of commands and remarks during the execution of the batch file. The SHIFT subcommand allows for the use of replaceable parameters past the normal limit of ten.

The IF subcommand is a conditional statement. It takes the form

IF [NOT] *condition command*

If a condition is true, the batch file will execute the command; otherwise it will be skipped. The condition can compare two strings, look to see if a file exists on the disk, or check for an ERRORLEVEL number. The *command* portion of the IF statement usually includes a GOTO statement. In the TEST batch file created with the following commands a replaceable parameter is compared to a string of characters; if they match, a branch is made to label A using a GOTO statement. GOTO labels start with a colon, and the GOTO statement will execute the command on the line below the GOTO label.

```
COPY CON:TEST.BAT
ECHO OFF
IF %1 == JIM GOTO A
ECHO NO MATCH
GOTO END
:A
ECHO SUCCESSFUL MATCH
:END
<Ctrl> Z
```

The double equals sign ('=') is used to denote "is equal to," so that confusion with assignment statements is avoided. To try out the TEST.BAT batch file, type TEST JOHN, which gives the result ECHO OFF NO MATCH, or TEST JIM, which results in ECHO OFF SUCCESSFUL MATCH.

ECHO was turned off at the beginning of the batch file so that the execution process would not be displayed on the screen. The ECHO command may be used in one of two ways: to turn the display of the batch process on or off, or to display comments during the execution of the batch file when the screen display is turned off. The ECHO command is similar to the REM command except that ECHO displays only the message, while REM displays 'REM' followed by the message.

The next example uses the IF subcommand to develop a simple password procedure.

```
COPY CON:OPEN.BAT
ECHO OFF
IF %1 == TOM GOTO A
IF %1 == JIM GOTO A
IF %1 == JOE GOTO A
IF %1 == SALLY GOTO A
ECHO ACCESS DENIED GOTO END
:A
ECHO WELCOME TO THE SYSTEM
ECHO ENTER YOUR COMMAND
:END
<Ctrl> Z
```

To try this out, type OPEN TOM, which causes the screen to display  
WELCOME TO THE SYSTEM ENTER YOUR  
COMMAND.

The batch file uses the name entered as parameter '%1' and checks it against a list of names. If a match is made, the file branches to :A and displays the greeting messages. If a match is not made, the file branches to :END.

The following lines could be inserted instead of the line 'ECHO ENTER YOUR COMMAND' in the batch file to cause a menu of the options available on the system to be displayed:

```
ECHO THE FOLLOWING APPLICATIONS ARE
AVAILABLE ON THIS SYSTEM
ECHO
ECHO A = Spellbinder
ECHO B = Multiplan
ECHO C = PC-TALK
ECHO
ECHO TYPE THE LETTER OF YOUR CHOICE
FOLLOWED BY YOUR NAME
```

Now you'll need a batch file for each of the applications listed for start-up characters A, B, and C. These batch files should reside in the root directory; they automatically lead the user through a directory pathway into his or her data file storage area for that application. The following is a sample batch file for the *Spellbinder* program (option A). It assumes that Tom, Jim, Joe, and Sally have already created subdirectories for their text files under the existing directory SB, and that the *Spellbinder* program files also reside in the SB directory.

```
COPY CON:A.BAT (create the file)
CD \SB\%1 (change directories to SB\users name)
PATH \SB (specify the path)
CD (display the current directory)
SB (start the Spellbinder program)
<Ctrl> Z
```

Typing OPEN TOM, for example, gives a complete run of the previous batch files:

```
ECHO OFF
WELCOME TO THE SYSTEM
THE FOLLOWING APPLICATIONS ARE AVAILABLE
  ON THIS SYSTEM
A = Spellbinder
B = Multiplan
C = PC-TALK
TYPE THE LETTER OF YOUR CHOICE FOLLOWED
  BY YOUR NAME
```

Typing A TOM selects *Spellbinder*. The current directory path is displayed as \SB\TOM.

The current directory is changed to the user's text file area (subdirectory TOM) for *Spellbinder*. The PATH command is executed to ensure that the *Spellbinder* program files will be found when the SB command is issued from the user's subdirectory. The last line of the batch file then executes the *Spellbinder* program automatically.

One element missing from the batch feature is the ability to enter values for the replaceable parameters as a batch file is executing. All values must be entered as part of the command line when the batch file is specified. For instance, the password/menu file (OPEN.BAT) could have paused to ask the operator for the menu selection character. Instead, another batch must be executed by the user who has to reenter his or her name. The next version of DOS will probably add more flexibility in this area. On the other hand, a menu system like the one above, or an even more elaborate one, could be written in BASIC and called from a batch file.

The batch subcommand FOR allows DOS commands to be repeated. The command takes the structure:

```
FOR %%variable IN (set) DO command
```

The following example uses the TYPE command. The replaceable parameters are replaced with the file names specified on the command line.

```
COPYCON:LOOKIN.BAT
FOR %%A IN (%1 %2 %3) DO TYPE %%A
<Ctrl> Z
```

To view the contents of the files CHAP1, CHAP2, and CHAP3 in succession, type

```
LOOKIN CHAP1.TXT CHAP2.TXT CHAP3.TXT
```

The command says, essentially: for each parameter specified in the set, let the variable '%A' represent one of the set (the chapters) and DO the specified command (in this case, TYPE) on '%A'. The first time through CHAP1.TXT becomes the value of variable '%A' and a TYPE is executed, which displays that file. CHAP2 is displayed next and CHAP3 after that.

The following example can be used to make a new directory, move into the new directory, and create sub-

directories for each name specified on the command line:

```
COPY CON:MDIR.BAT
MKDIR %1
CD %1
FOR %%A IN (%2 %3 %4) DO MKDIR %%A
<Ctrl> Z
```

To make a directory called APPTS with subdirectories for TOM, JOE, and SALLY, type

```
MDIR APPTS TOM JOE SALLY
```

The screen will display each command as the file executes:

```
MKDIR APPTS (the main directory is created at the
  root)
CD APPTS (moves to the new directory)
FOR %A IN (TOM JOE HARRY) DO MKDIR %A
MKDIR TOM (sub-directories are created)
MKDIR JOE
MKDIR HARRY
C> (end of file - "C" is name of currently logged drive)
```

The problem with this file is that it allows you to make only three subdirectories. The SHIFT subcommand can be used to get around that limitation. All parameters on the command line are shifted one position to the left. The '%1' parameter would be replaced by the '%2' parameter. For example, the following commands create a VIEW.BAT batch file, which you could use to view the contents of data files:

```
COPY CON:VIEW.BAT
TYPE %1
SHIFT
TYPE %1
<Ctrl> Z
```

Typing VIEW TOM JOE results in the following display:

```
TYPE TOM (TOM is used as %1)
SHIFT
TYPE JOE (due to the SHIFT, '%1' is now Joe)
```

Now you can adapt the MDIR.BAT file to accommodate as many subdirectories as you want to create:

```
COPY CON:MDIR.BAT
MKDIR %1 (Make the main directory)
CD %1 (Move to the new directory)
:A (Label A)
SHIFT
IF %1 == STOP GOTO END (Ends subdirectory file creation if
  true)
MKDIR %1 (Make the subdirectory)
GOTO A (Goto A and pull out next name)
:END
<Ctrl> Z
```

## ☉ Hands On

Try out the file using the name TEST as the directory name and TOM and JOE as the subdirectories. The screen should display the following lines as the batch file executes:

```
MDIR TEST TOM JOE STOP
MKDIR TEST
CD TEST
SHIFT IF TOM == STOP GOTO END
MKDIR TOM
GOTO A
SHIFT
IF JOE == STOP GOTO END
MKDIR JOE GOTO A
SHIFT
IF STOP == STOP GOTO END
C> (end of file)
```

The directory TEST now has two subdirectories called JOE and TOM. Adding a 'CD\' statement at the end of the file to return to the root directory is a good idea since line 3 of the batch file changed directories to TEST. A CD command is also appropriate at the end of the batch file to display the name of the current directory.

Two more types of IF subcommands are available for batch file execution: IF ERRORLEVEL and IF EXIST. The former tests to see if a program failed. So far, according to the DOS manual, only the BACKUP and RESTORE commands for the hard disk can be tested for failure. The IF EXIST command tests to see if a file exists on the disk. If it does, the batch file executes the command following the IF statement. The subcommand takes the form:

IF EXIST *filename command*

For example, the batch file created by the following commands could be used to check for the existence of any file:

```
COPY CON:SEARCH.BAT
ECHO OFF
IF EXIST %1 GOTO A
ECHO Someone erased your file
GOTO END
:A
ECHO The file is on the disk
:END
<Ctrl> Z
```

Typing SEARCH MYFILE would result in a 'Someone erased your file' response.

## From the Outside In

IBM has been listening. They've added a few commands to DOS 2.00 that were previously marketed by third-party software houses. The GRAPHICS command now dumps a graphics display screen to a matrix printer like the IBM Graphics printer or an Epson MX-80. In the 320 by 200 color mode, four shades of gray are used. In the 640 by 200 mode, the screen is printed sideways on the paper.

Peter Norton's utility package, *The Norton Utilities*, includes a CLS (clear screen) command and a FILEFIX command for recovering lost data due to defective sectors or bad directory tracks. IBM finally got the idea and included a CLS and their version of FILEFIX, called RECOVER. You can recover a single file or an entire disk. If the directory has been lost, a RECOVER command would rename each individual file with a standard file name in the form FILEnnnn.REC, in which 'nnnn' is a sequential number starting with 0001.

The BACKUP command is used to back up the hard disk onto floppies. Several options are available. BACKUP /S backs up files in all subdirectories as well as those in a directory. BACKUP /M backs up only the files that have been modified since the last backup. BACKUP /D is used to back up files created only after a certain date. These commands are very useful, as backing up the entire hard disk every time would be impractical. The BACKUP command keeps track of all files that have been copied to the backup disk. The RESTORE command is used to copy the files back to the hard disk when needed.

The PRINT command allows you to enter a list of files in a queue that will be printed. Up to ten files may be printed as a background process while you are doing other tasks on the computer.

There is much more to learn about DOS, but one article can cover only so much. A future article will guide you through the DOS 2.00 feature that reassigns the keyboard with special character sequences, thereby changing the meaning of the keys. And you'll learn how BASICA has been revised to take advantage of the tree-structured file system.

---

*Tom Sheldon is a technical consultant for ComputerLand stores in Santa Barbara and San Luis Obispo, California.*

---

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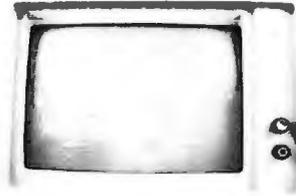
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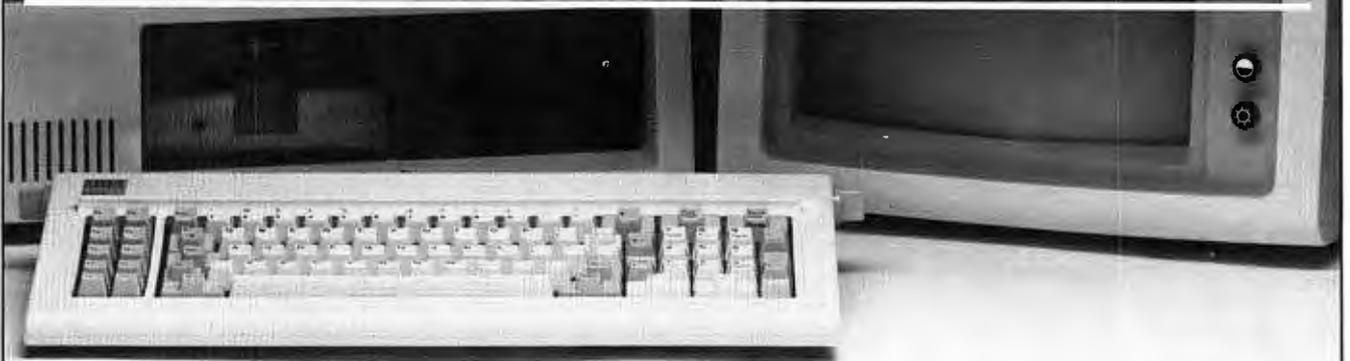
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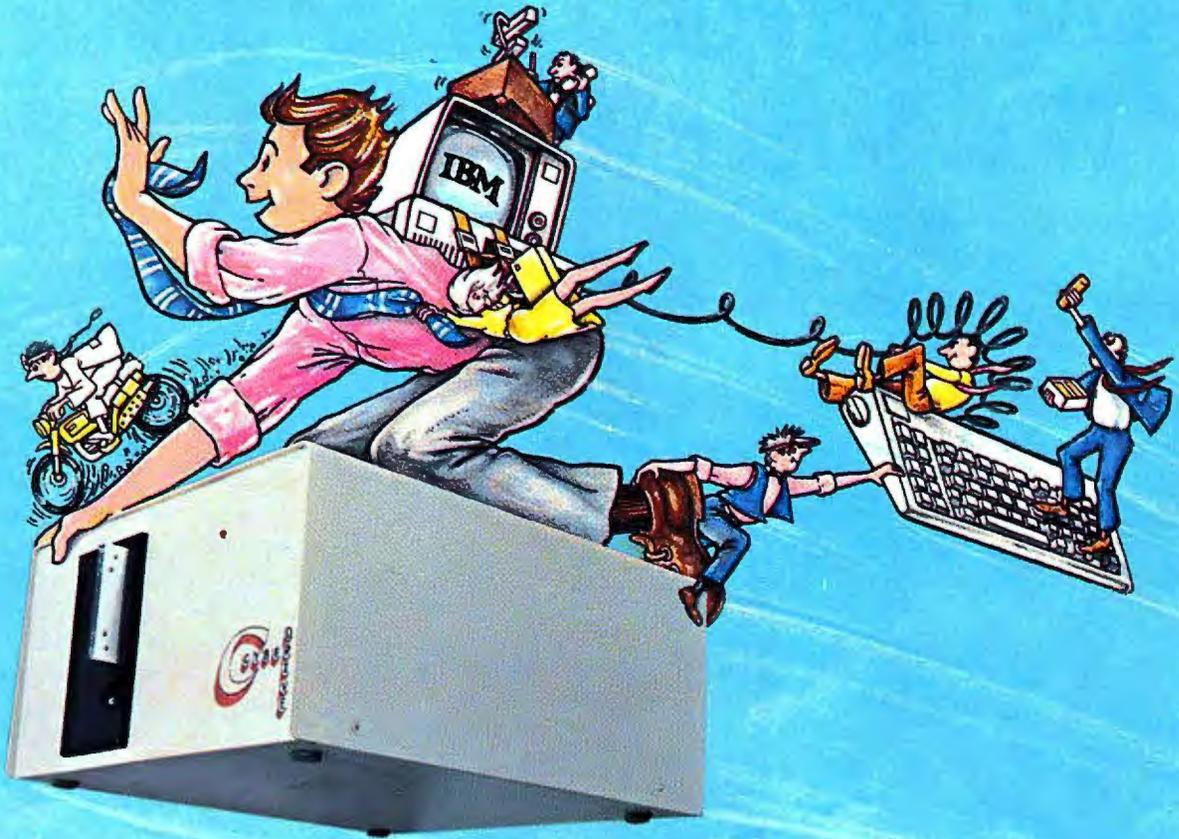


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# The Elves of “Wall Street Week”

*Chief Elf Robert Nurock shares the secrets of his highly successful Technical Market Index.*

Andrew T. Williams



“Wall Street Week,” public television’s most popular program, is famous for two things: its punful potentate, Louis Rukeyser, and its uncannily successful Technical Market Index (TMI), commonly known to viewers as “the elves.”

Last summer, on the second Friday in August, Rukeyser was on vacation, but the elves certainly weren’t asleep at the switch. After noting that during the previous week the Dow Jones Industrial Average (DJIA) had slumped to its lowest point in almost 2 1/2 years, guest host Carter Randall turned his attention to the TMI. “The elves, meanwhile,” he said, “jumped sky high. Their Technical Market Index is now a very bullish +6 reading.”

The following week prices soared, volume exploded, and Wall Street records wilted like an overweight boxer in the middle rounds. Some of the records set that week have since been surpassed, but the week of August 16, 1982 will long be remembered when traders get together to swap war stories. That week the DJIA rocketed up a record 81 points; August 17 saw the largest 1-day gain in history—nearly 39 points. Volume for the week topped the previous record by 100 million shares, and the two busiest trading days up to that time were recorded, including what then seemed like a gargantuan 132-million share day.

Who are these elves and how did they see this coming?

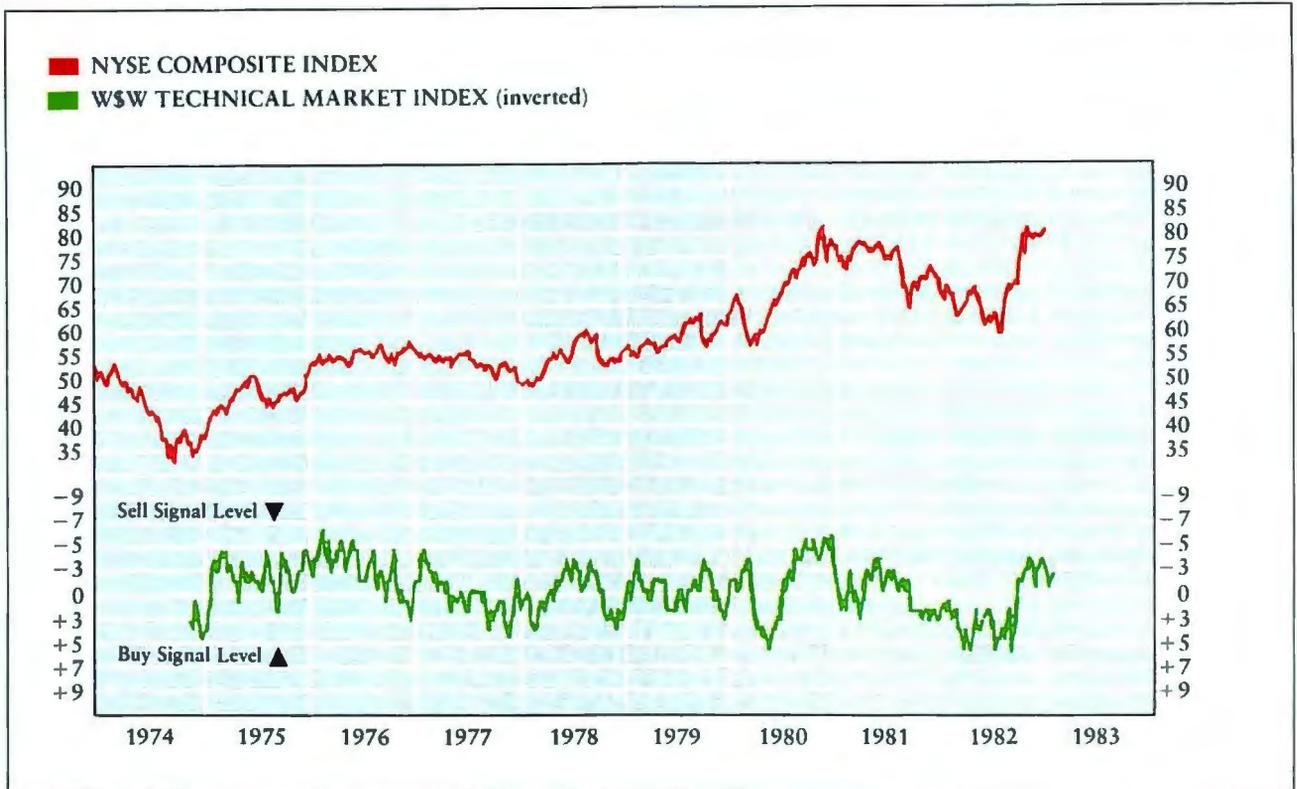


Figure 1: Wall Street Week Technical Market Index versus New York Stock Exchange Composite Index (posted through September 14, 1982)

### The TMI

According to respected technical analyst (and chief elf) Robert Nurock, president of Investor's Analysis of Paoli, Pennsylvania, the TMI is "a simple consensus index of ten publicly available indicators." In other words, each of the ten elements has equal weight in compiling the index, and the information for each can be found in financial publications. (The ten indicators are described in Table 1.)

Nurock devised the TMI in 1972 to increase interest in and credibility for the discipline of technical analysis. This discipline, according to Nurock, "is the study of transaction data in an effort to determine or analyze the forces of supply and demand for stocks." Technical analysis is just one of several approaches to predicting whether the market is going to go up or down, and some observers consider it too complex or obscure to be

useful. But the technicians—also known as the elves—were right on target on that fateful Friday in August.

Because the TMI is compiled from published data, anyone can become an elf by monitoring and analyzing the ten indicators that make up the index. This is a sophisticated task, but one that many investors will find well worth the effort. The remainder of this article explains how the index works and how to use an electronic spreadsheet program and your IBM PC to calculate it. You too can know what Louis Rukeyser and his elves are going to say before they say it.

### Compiling the Index

Table 1 provides a guide to preparing and evaluating most of the technical indicators. Some, such as number 8, the Lo-Price Activity Ratio, appear each week in *Barron's*. Other indicators represent the ratio of one statistic to another. Number 10, the Fed Policy Index, is the ratio of the weekly average interest rate on

Federal Funds to the average discount rate for the week. These numbers are also available in *Barron's*.

Data for some indicators must be obtained from private investment information services, such as Investor's Intelligence and the Stock Research Corporation. The reports published by these services are available at many business libraries, or you can subscribe to the services. (See the addresses at the end of this article.)

The remaining elements of the TMI are in one way or another based on moving averages. A moving average is a calculation technique used by investment analysts, statisticians, and others to smooth out the fluctuations in a series of numbers in order to expose the underlying trends.

All of the moving averages in the TMI are calculated in the same fashion, so I will only describe in detail how to set up a worksheet to calculate a moving average for indicator number 1, the Dow Jones Momentum Ratio. This index measures the

## ● Hands On

point differential between the latest DJIA and its 30-day moving average.

If this index is -30 or below, it is telling us that the market is likely to go up. Because the current reading is so far below the average of the past

30 days, its level is abnormal relative to the market's performance in the recent past. Such investment terms as "oversold" or "due for a correction" also describe this situation; each refers to the fact that, at the current level, the market is out of line and therefore due for a reversal.

Similar reasoning applies to a reading of +30 or more in this indicator. Here the current level of the DJIA is so far above its average for the past 30 days that a downward correction is likely. In this case, technicians would say that the market is "overbought."

INDICATOR	INTERMEDIATE BOTTOM INDICATION (indicator given a score of +1)	INTERMEDIATE TOP INDICATION (indicator given a score of -1)
1. Dow Jones Momentum Ratio (DJIA-30-day moving av.)	-30 or below	+30 or above
2. NYSE Hi-Low Index (NYSE new highs/new lows on a daily basis)	An expansion of the 10-day average of new highs from less than 10 to a number exceeding the average number of new lows	An expansion of the 10-day average of new lows from less than 10 to a figure greater than the average number of new highs
3. Market Breadth Indicator (10-day moving average of net advances or declines)	An expansion of this index from below +1000 to the point where it peaks out and declines 1000 points from this peak. Readings between +1000 and -1000 are neutral.	A contraction of this index from -1000 to a point where it bottoms out and rises 1000 points from this trough is negative. Readings between -1000 and +1000 are neutral.
4. Trading Index (10-day moving average of volume in advancing stocks divided by volume in declining stocks)	10-day average above 1.20	10-day average below 0.80
5. Percent Over Moving Averages (% NYSE stocks selling above their 10- and 30-week moving averages)	A 10-week reading below 30% and a 30-week reading below 40%	A 10-week reading above 70% and a 30-week reading above 60%
6. Premium Ratio on Options (Weekly average premium on puts divided by calls)	Ratio above 125%	Ratio below 40%
7. Advisory Service Sentiment (Percentage of services that are bearish)	Above 47.5%	Below 26.0%
8. Lo-Price Activity Ratio (Weekly ratio of volume in Barron's Lo-Price Stock index divided by volume in DJIA stocks)	Below 12.0%	Above 18.0%
9. Insider Activity Ratio (Weekly ratio of insider sell transactions divided by buy transactions)	Below 1.5	Above 2.5
10. Fed Policy (Weekly ratio of Fed Funds rate divided by the discount rate)	Below 103%	Above 125%

Table 1: "Wall Street Week" Technical Market Index

## A Word of Caution

The Dow Jones Momentum Ratio is only one of the ten elements in the index; the TMI requires the use of all ten. "I don't think there is any one magic indicator that works well and consistently all the time," says Nurock.

Different indicators can point to opposite conclusions. One may say up, another down, and a third neutral. It is the sum of the readings from the ten different indicators that provides the total index. And it is the index as a whole that purports to forecast the direction of the market. Table 2 presents instructions for interpreting readings from the TMI.

## Calculating a Moving Average

Table 3 shows an electronic worksheet set up to calculate the Dow Jones Momentum Ratio. The procedure makes extensive use of logic functions and is a good introduction to these often neglected, yet powerful aspects of electronic worksheet programs.

The worksheet stores 30 days of DJIAs and calculates a 30-day average from that data. When a thirty-first DJIA is added, the worksheet ignores the first day's data and calculates a new average for days 2 through 31. With each new

day's data, the average moves forward one day.

To accomplish this feat with an electronic worksheet, you need to use the @IF function. The following directions are in *VisiCalc* terminology, but you can easily translate them into the correct commands for *SuperCalc*, *MBA*, or any electronic worksheet you may be using.

Tables 3 is divided into two sections. To the left, in columns A and B, is a work area in which data on the DJIA is accumulated. To the right, in columns D through J, is the main table. This table contains the index and a set of "flags," in columns I and J, to indicate the top or bottom of a cycle.

To use the worksheet you must first enter 29 days of data in column B, cells 9 through 37. On the thirtieth day, enter the date under "Date" in column E and the Dow Jones Industrial Average for that day under "Dow Av" in column F. The worksheet is programmed to pick up that entry for the thirtieth day and load it into the appropriate cell in the data table, column B. The program then calculates the 30-day moving average and the Dow Jones Momentum Ratio. The worksheet also sets a flag, if appropriate.

The following paragraphs supply column-by-column instructions for

the formulas you will need to enter into the worksheet. These instructions do not include formats, column width settings, or common commands, which should be familiar to anyone who has worked with a spreadsheet program.

**Column A:** Contains "Entry Numbers." These allow you to keep track of the entries and to coordinate them between column B and column F. About 150 numbers will give you enough space to keep the index for six months.

**Column B:** Contains figures for the DJIA. This is the work space in which the worksheet calculates the moving average. You must enter data for the first 29 days. After that, enter F9 into cell B38, which is opposite entry 30. This references the cell in the right-hand part of the table in which you will later enter the DJIA for the thirtieth day. Replicate the formula in cell B38 down column B. The reference is relative.

**Column C:** Leave this column blank.

**Column D:** Contains "Entry Numbers" that correspond to the numbers in column A. This column begins with the number 30 because this is the first entry for which you will have enough data to calculate the moving average.

**Column E:** Each time you update the index, enter the current date in this column.

**Column F:** Each time you update the index, enter the most recent value for the DJIA in this column.

## The @IF Function

The next four columns are the heart of the worksheet. Each uses the @IF function to determine which calculation is appropriate to make at each step.

**Column G:** Until the worksheet contains 30 days of data, the moving average cannot be calculated, and the appropriate cell of column G should

SCORE (Sum of Individual Indicators)	INTERPRETATION
+5 or higher	Extremely bullish: BUY NOW!
+4	Strongly bullish: Get ready to buy.
+3	Bullish
+2	Mildly bullish
+1	Neutral
0	Neutral
-1	Neutral
-2	Mildly bearish
-3	Bearish
-4	Strongly bearish: Get ready to sell.
-5 or less	Extremely bearish: SELL NOW!

Table 2: Interpreting the "Wall Street Week" Technical Market Index

# Hands On

show a zero. To achieve this, enter the following formula into cell G9:  
 (@IF(F9>0,(@AVERAGE(B9...B38),0)

The worksheet will contain 30 days of data when there is an entry for the DJIA in cell F9, and only then will F9 be greater than zero. When this occurs, the (@IF function will

execute the first argument, '(@AVERAGE (B9...B38)', and place the average of the last 30 days in the cell.

If there is no entry in cell F9—if

	-A-	-B-	-C-	-D-	-E-	-F-	-G-	-H-	-I-	-J-
1	WALL STREET WEEK TECHNICAL MARKET INDEX:									
2	DOW JONES MOMENTUM RATIO									
3										
4	WORKSPACE									
5										
6	ENTRY		ENTRY			30 DAY		FLAG FOR	FLAG FOR	
7	NUMBER	DJIA	NUMBER	DATE	DOW AV	MOVING	AVERAGE	INDEX	TOP	BOTTOM
8										
9	1	995.13	30	Dec 6	1055.65	988.96		66.69	*****	
10	2	1006.07	31	Dec 7	1056.94	1024.15		32.79	*****	
11	3	1006.35	32	Dec 8	1047.09	1059.38		-12.29		
12	4	990.99	33	Dec 9	1027.96	1061.11		-33.15		*****
13	5	991.72	34	Dec 10	1018.76	1061.84		-43.08		*****
14	6	1005.70	35	Dec 13	1024.28	1062.25		-37.97		*****
15	7	1022.08	36	Dec 14	1009.38	1063.36		-53.98		*****
16	8	1065.49	37	Dec 15	992.64	1063.95		-71.31		*****
17	9	1050.22	38	Dec 16	990.25	1063.52		-73.27		*****
18	10	1051.78	39	Dec 17	1011.5	1062.45		-50.95		*****
19	11	1037.44	40	****	****	0.00		0.00		
20	12	1060.25	41	****	****	0.00		0.00		
21	13	1044.52	42	****	****	0.00		0.00		
22	14	1054.73	43	****	****	0.00		0.00		
23	15	1039.92	44	****	****	0.00		0.00		
24	16	1021.43	45	****	****	0.00		0.00		
25	17	1008.00	46	****	****	0.00		0.00		
26	18	1027.50	47	****	****	0.00		0.00		
27	19	1032.10	48	****	****	0.00		0.00		
28	20	1021.25	49	****	****	0.00		0.00		
29	21	1000.00	50	****	****	0.00		0.00		
30	22	990.99								
31	23	1000.00								
32	24	1007.36								
33	25	1002.85								
34	26	1039.28								
35	27	1031.09								
36	28	1033.11								
37	29	1031.36								
38	30	1055.65								
39	31	1056.94								
40	32	1047.09								
41	33	1027.96								
42	34	1018.76								
43	35	1024.28	64	****	****	0.00		0.00		
44	36	1009.38	65	****	****	0.00		0.00		
45	37	992.64	66	****	****	0.00		0.00		
46	38	990.25	67	****	****	0.00		0.00		
47	39	1011.50	68	****	****	0.00		0.00		
48	40	0.00	69	****	****	0.00		0.00		

Table 3: Electronic Worksheet Set Up to Calculate Dow Jones Momentum Ratio

F9 is not greater than zero—the @IF function executes the second argument and places a zero in the cell. Replicate the formula in cell G9 down the column. The references are all relative.

**Column H:** The Dow Jones Momentum Ratio is calculated by subtracting the DJIA from the moving average for the corresponding day. To make this calculation, place the following formula in cell H9: +G9-F9

---

The best the elves can do is whisper advice in your ear.

---

When it is valid to calculate the index, it will appear in cell H9. Otherwise, the result of this formula will be zero. Replicate the formula in cell H9 down the column. The references are relative.

**Columns I and J:** The formulas for these columns automatically set a row of asterisks as a flag to indicate when the index predicts a top or a bottom. A top (see Table 2) is indicated when the DJIA for the day exceeds the average for the past 30 days by 30 or more points. When this happens, the entry in H9 will be a number greater than 30. A bottom is indicated when the index in cell H9 is a number less than -30.

To create the flags, begin by formatting the cells in columns I and J as graph columns (/F\*). Then enter the following formula into cell I9 (“Flag For Top” column):

IF(H9>=30,10,0)

And into cell J9 (“Flag For Bottom” column), enter

@IF(H9<=-30,10,0)

When the conditions are met for one or the other of these formulas, the number 10 is placed in the corresponding cell. The graph format governing that cell changes the 10 into ten asterisks—the flag. Otherwise, the @IF formula places a zero in the cell and the cell remains blank.

### Hints

The two data columns, A and B, constitute a work space that you may not want to include if you are printing a copy of your index. You may think it more convenient to hide the work space off to the right of the main table. If you do this, however, you will be creating a “forward reference”—your formulas in the main table will refer to values that are forward in the worksheet. Thus, the index that is calculated when you enter another day’s data in column F will be wrong. Correcting this error requires another recalculation of the worksheet. By placing the work space to the left of the main table, you avoid the problem of a forward reference.

You can save time in setting up the worksheet by entering the formulas for cells G9 through J9 and then replicating these four formulas down the columns at the same time.

Finally, to avoid having to wait while the program does useless calculations, turn off the automatic recalculation feature of your spreadsheet when entering the data for the first 29 days into column B.

### How to Use the TMI

Once you have your Technical Market Index up and running, you’re ready to predict the direction of the DJIA. To do this you must evaluate each of the ten indicators, subtract the number of negative indicators from the number of positive indicators, and compare the result with Table 2. If the reading is +5 or better, it is time to buy. If it is -5 or lower, it is time to sell. Intermediate readings are less conclusive.

“Simply put,” says elf master Robert Nurock, “the TMI can be used as a basic guide to the background technical conditions for investing. It doesn’t tell you where to invest. But it can tell you when technical conditions indicate overall risks are high or overall risks are low.

After that, your basic strategy should be oriented towards the economic outlook for the sectors you are considering investing in, the fundamental outlook for the companies or industries within those sectors, and then, obviously, the specific outlook for the stocks themselves. It isn’t the Holy Grail, but it still can be a very, very effective tool for investors.”

The TMI, as Figure 1 shows, has performed remarkably well over the past eight years. The elves gave buy signals at the right times in 1974, 1977, 1980, and, of course, last August. They also gave correct sell signals in early 1976 and late 1980.

Still, I must end on a cautious note. To quote “Wall Street Week” host Rukeyser, “The management doesn’t guarantee the recommendations.” The best the elves can do is whisper advice in your ear. That advice has been remarkably accurate in the past, but no one—not even statistic-spewing little green men—can guarantee that it will work as well in the future.

---

*You can obtain a more detailed description of the “Wall Street Week” Technical Market Index by writing to the following address. Include a stamped, self-addressed, business-size envelope.*

---

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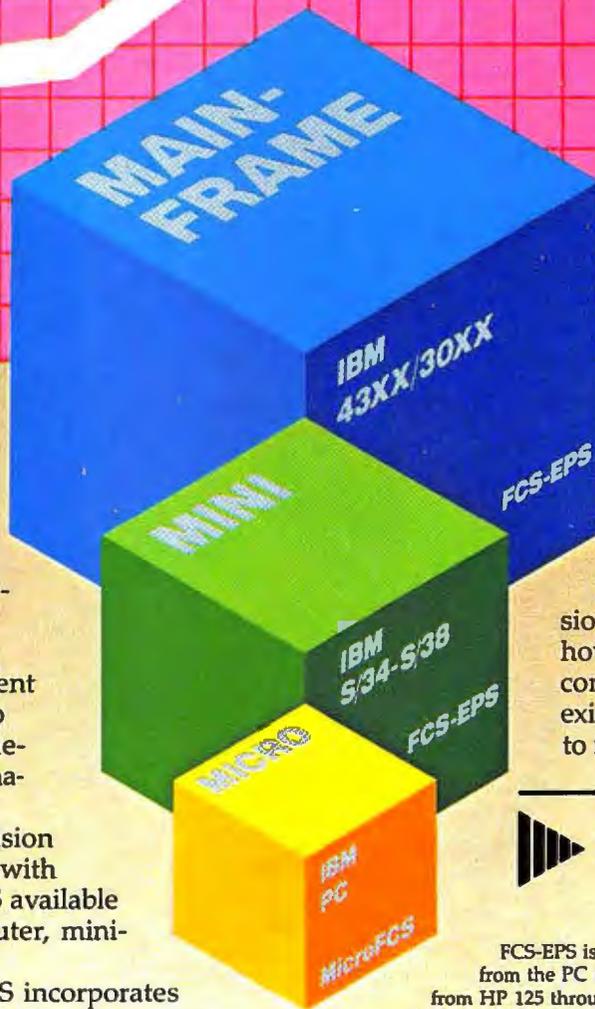
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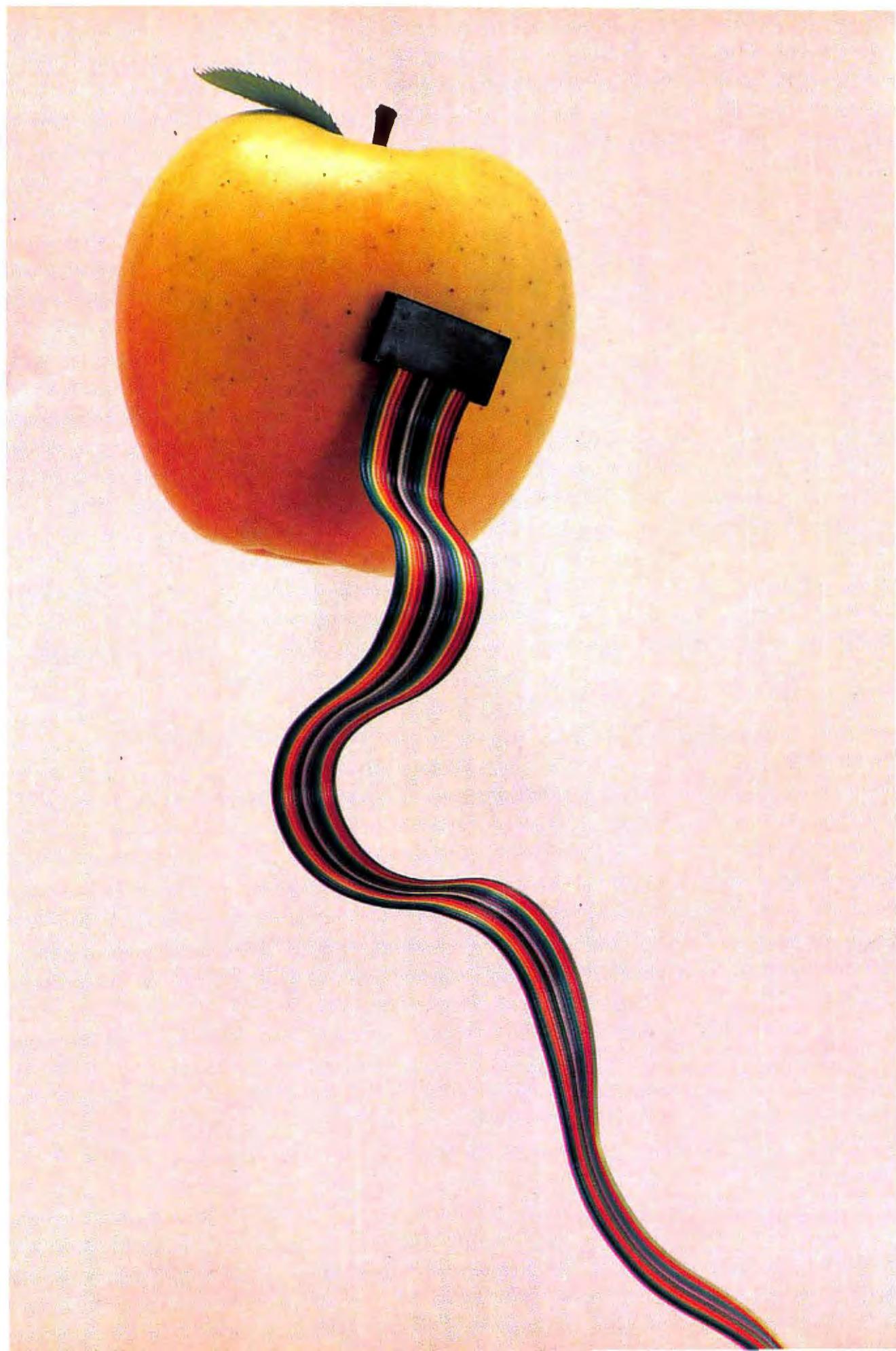
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# The Apple-IBM Connection

*Information transfer between the IBM PC and the Apple: do it yourself or let Alpha Software's new program do it for you.*

*Richard Steck*

Like two strangers on a bus, content to ignore each other, different makes of computers can sit side by side and never exchange a bit of information. They may be traveling down the same road, but they're not on speaking terms. Personal computer owners, however, are increasingly finding the need to break the ice between different brands of computers and get them to share programs and data files.

Some people receive an introduction on one computer, say an Apple, and migrate to another, like the IBM PC, when their computing needs change. Others use one system at home and another at work. In some cases, people have libraries of programs and data files they want to carry with them when they move to another computer. In other cases, specific software, like templates for *VisiCalc*, may be available for one system and people may want to use it on another.

## Not So Easy

If the PC could just read Apple disks, communication would be simple. But the PC can't read Apple disks, and the Apple can't read PC disks, because there are significant differences between the formatting and encoding techniques the two systems use.

Information on an Apple disk is stored in text or nontext format. Text

files are designated by a *T* next to the file name in a disk directory listing. Nontext files on the Apple are designated as *A*, *I*, or *B* (for Applesoft BASIC, Integer BASIC, or Binary). You can convert Applesoft and Integer BASIC programs into text format with a simple program given in the Apple-DOS documentation. This

---

You needn't be hindered  
by communication gaps  
between the Apple and  
the PC.

---

is fortunate because, as you will see below, all information exchange must take place in text format.

Information on a PC disk can also be stored in either text or nontext format. Most sequential data files are stored in text format and are therefore ready for data transmission; however, BASIC programs are stored in nontext format unless the *.A* option is included with the *SAVE* command. One simple way to tell a PC text file from a nontext file is to use the *DOS TYPE* command. If you use the *TYPE* command to display a file and it is readable, it is probably a text file. If the *TYPE* command displays any special characters on the screen, you probably have a nontext file.

An annoying difference between Apple and PC text files becomes evident when you begin to transfer files. Apple text files use a carriage return to designate the end of a line of information, while PC text files use a carriage return followed by a line feed. If you transfer files between the Apple and the PC without allowing for this fact, each line appears to be printed on top of the previous line when you display the files on the PC screen.

Fortunately, programs exist for the PC that add the missing line feed to each transferred line. I use a public domain program known as *ADD-LFBAS*, which works very well (see Listing 1). In transferring text files from the PC to the Apple, you must perform the reverse operation—the redundant PC line feeds must be removed. While I don't know of a program that does this, I suspect that, in the vast libraries of programs available for the Apple, such a program must be available.

Another aspect to be aware of in transferring files is the difference in file capacity between Apple and PC disks. A double-sided PC disk has a capacity of 320K bytes, while a DOS 3.3 Apple disk has a capacity of approximately 142K.

Do not expect Applesoft and Integer BASIC programs to run in IBM BASIC. Differences exist between the



```

5 CR$=CHR$(13):LF$=CHR$(10)
6 PRINT"=== This program converts each CR to a CR/LF ==="
7 PRINT
8 INPUT"File to convert: ",FIL1$
10 OPEN FIL1$ FOR INPUT AS #1
11 INPUT"Convert to file: ",FIL2$
15 OPEN FIL2$ FOR OUTPUT AS #2
20 A$=INPUT$(1,1)
30 IF A$<>CR$ THEN PRINT #2, A$; ELSE PRINT #2, CR$+LF$;
40 IF EOF(1) THEN CLOSE:END
50 GOTO 20

```

Listing 1: ADD-LF.BAS

```

REM CAPTURE
D$ = CHR$(4): REM CTRL-D
PRINT D$; "OPEN LISTING"
PRINT D$; "WRITE LISTING"
POKE 33,30
LIST 2270,5130
PRINT D$; "CLOSE LISTING"
TEXT : END

```

Listing 2: Program for converting Applesoft and Integer BASIC files into text format

PC files. Public domain programs for this procedure can be found on many of the popular PC bulletin board systems across the country. The program I use, *ADD-LF.BAS*, is reproduced in Listing 1.

If you have CP/M on the Apple, you can use CP/M communications packages such as *MODEM 7*, *CLINK*, or *Crosstalk*. An alternative is a popular program known as *BYE.COM*, available on many bulletin board systems. *BYE.COM* permits you to operate the sending Apple system from your PC and to initiate all the operations from your console, eliminating the problem of synchronizing the operations of two computer operators who cannot talk to or see each other. From the PC you can issue a CP/M TYPE command to display the contents of a remote text file. In the reverse process, PC to Apple, a simple program can be written to read lines of incoming text and store them in a CP/M file.

### The Apple-IBM Connection

If you are not up to the computer gymnastics suggested in the preceding part of this article, there is a simpler way to connect the Apple and the PC. Alpha Software Corporation of Burlington, Massachusetts, offers a tailored software package called the *Apple-IBM Connection* that runs on both the Apple and the PC and handles file transfer between the systems with a collection of utility programs. The package includes utilities that convert Applesoft and Integer BASIC programs to text format, and a program that inserts or deletes the missing or redundant line feeds. You also receive a simple, menu-driven program designed to do one thing—transfer files between the Apple and the PC.

The *Apple-IBM Connection* can be used for different kinds of transfers. Some of these are Apple to Apple, Apple to PC, PC to Apple, and PC to PC. Files may be *VisiCalc*, *DIF*, *WordStar*, Apple text files, Pascal, CP/M, or BASIC. The sending and receiving systems can be connected via modem or cable.

One restriction the *Apple-IBM Connection* imposes is that the Apple have either of two specific boards installed: the Hayes Micromodem II plug-in modem board or the Mountain Hardware CPS MultiFunction Card. The Micromodem II is used quite commonly on the Apple. The CPS card is a programmable accessory card for the Apple that provides serial and parallel ports and a clock. The *Apple-IBM Connection* will not run without one of these cards and you cannot use any other type of serial interface. (Alpha plans to release an enhanced version of this product in May 1983 with no restrictions on modems and support for both CCS and Super Serial boards.)

To begin a transfer session, make sure that either of the above cards is properly installed and initialized in the Apple. The PC must have a serial board such as the IBM Asynchronous Communications Adapter (if the transfer is made via phone lines, you will also need a modem). The CPS card requires you to run a setup program to select the desired CPS card characteristics. Diagrams in the *Apple-IBM Connection* documentation clearly explain the many conditions under which the program can be used. The documentation is particularly helpful for beginners, and if that isn't sufficient, the *Apple-IBM Connection* provides a cassette tape with voice instructions.

Remember that the *Apple-IBM Connection* transfers text files only. If files are not in text format, they must

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## ☺ Hands On

be converted before transfer. Apple text files are marked with a *T* in a disk directory listing. Files shown as type A, I, or B are not text files and must be converted before transfer. The *Apple-IBM Connection* provides the necessary utility programs to convert file types A, I, or B, and to correct file peculiarities after transfer.

The *Apple-IBM Connection* is menu driven, which makes it easy to use. The initial menu on the PC lets you indicate whether you wish to send or receive, whether the link is to be established via direct cable or modem, whether error checking is to be carried out, and what baud rate is to be used. Baud rates up to 9600 can be used in direct (nonmodem) connections.

On the Apple a menu asks if you are using the CPS card or the Micro-modem board. Master and slave terminal relationships are established at the beginning of a transfer session. Press Esc to begin the process of linking the two computers. The *Apple-IBM Connection* examines the hardware on both systems, and then uses a diagnostics feature to determine whether the systems are ready for transfer. After the program establishes a successful link and requests file names for both ends, transmission begins.

A successfully completed transmission is indicated to both computers. A checking feature can also be activated that insures the integrity of the data, although this feature lengthens transmission time.

### The Choice is Yours

It is impossible to cover all the situations in which the *Apple-IBM Connection* can be used. I suspect that the most common use will be transferring text files and data files from the Apple to the PC. The program can be used as an electronic mail system, although I didn't test this feature.

For transferring files between the Apple and the PC, I prefer a program that provides complete control of both computers from one site. When

I transfer from a remote Apple to my PC, for example, I prefer to dial the Apple and have it answer my call automatically. I then initiate a file transfer from the Apple through commands issued from my PC.

Data communications between Apple and Apple and between PC and PC are old hat. Such transfers have been occurring with the Apple for about three years and with the PC for about one year. Popular data communications programs have achieved a high degree of sophistication, and it would surprise me if anyone found it difficult to carry out data communications between the Apple and the PC, provided they had the required hardware and software.

Your choice of programs and techniques depends on your level of experience and on the hardware and software available to you. If your experience with both computers is limited, the *Apple-IBM Connection* is a straightforward package to use. If you have communications experience on both systems and know the nature of the file formats involved, you may prefer to create your own techniques. In any case, you needn't be hindered by communication gaps between the Apple and the PC. With a little persistence, you will get the strangers talking.

---

*Richard Steck is the vice-president of management information systems for a Chicago investment firm. He is librarian of the Association of PC Users in that area.*

---

*Apple-IBM Connection  
Alpha Software Corp.  
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617/229-2924*

*List Price: \$195  
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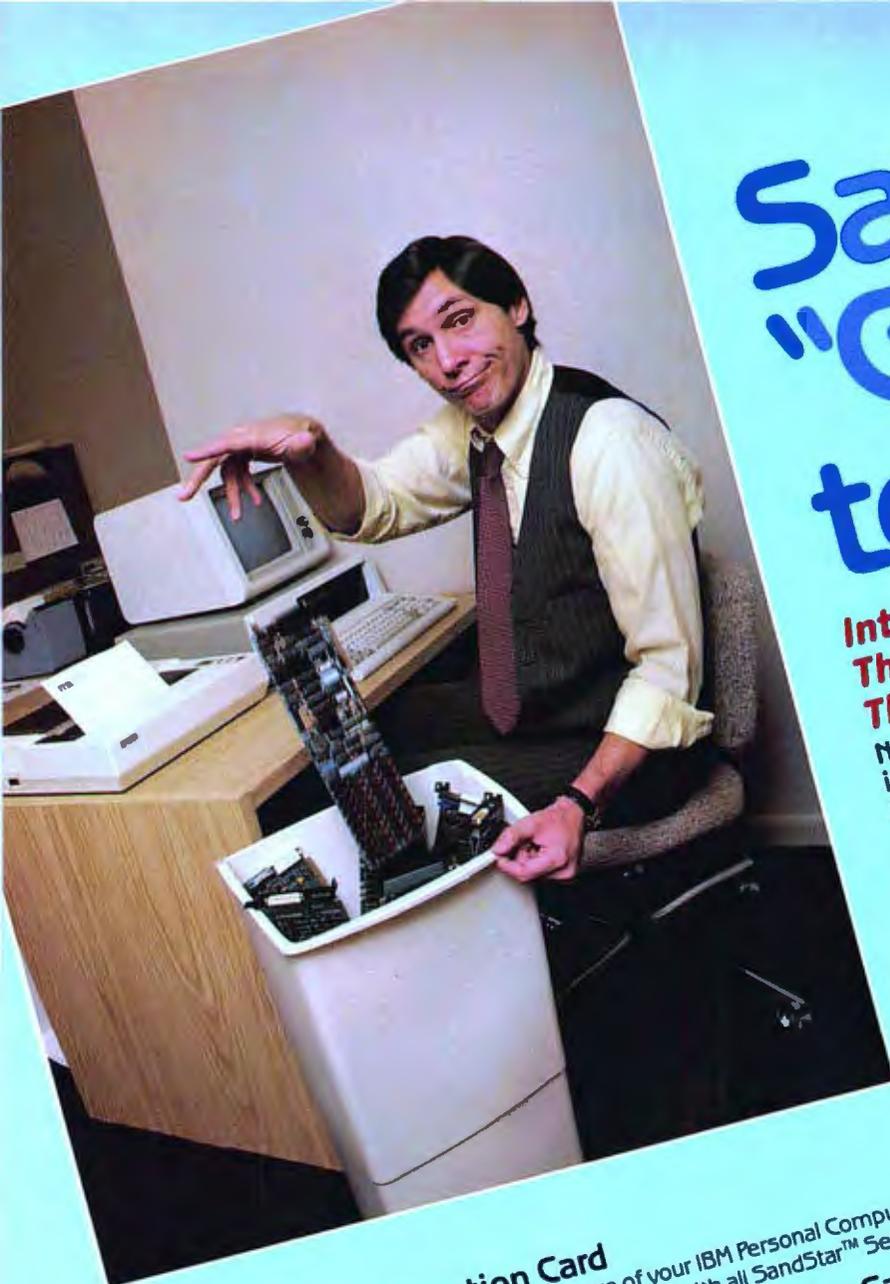
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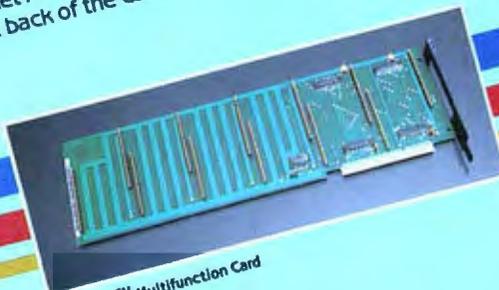
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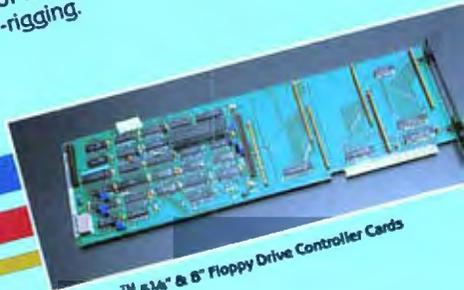
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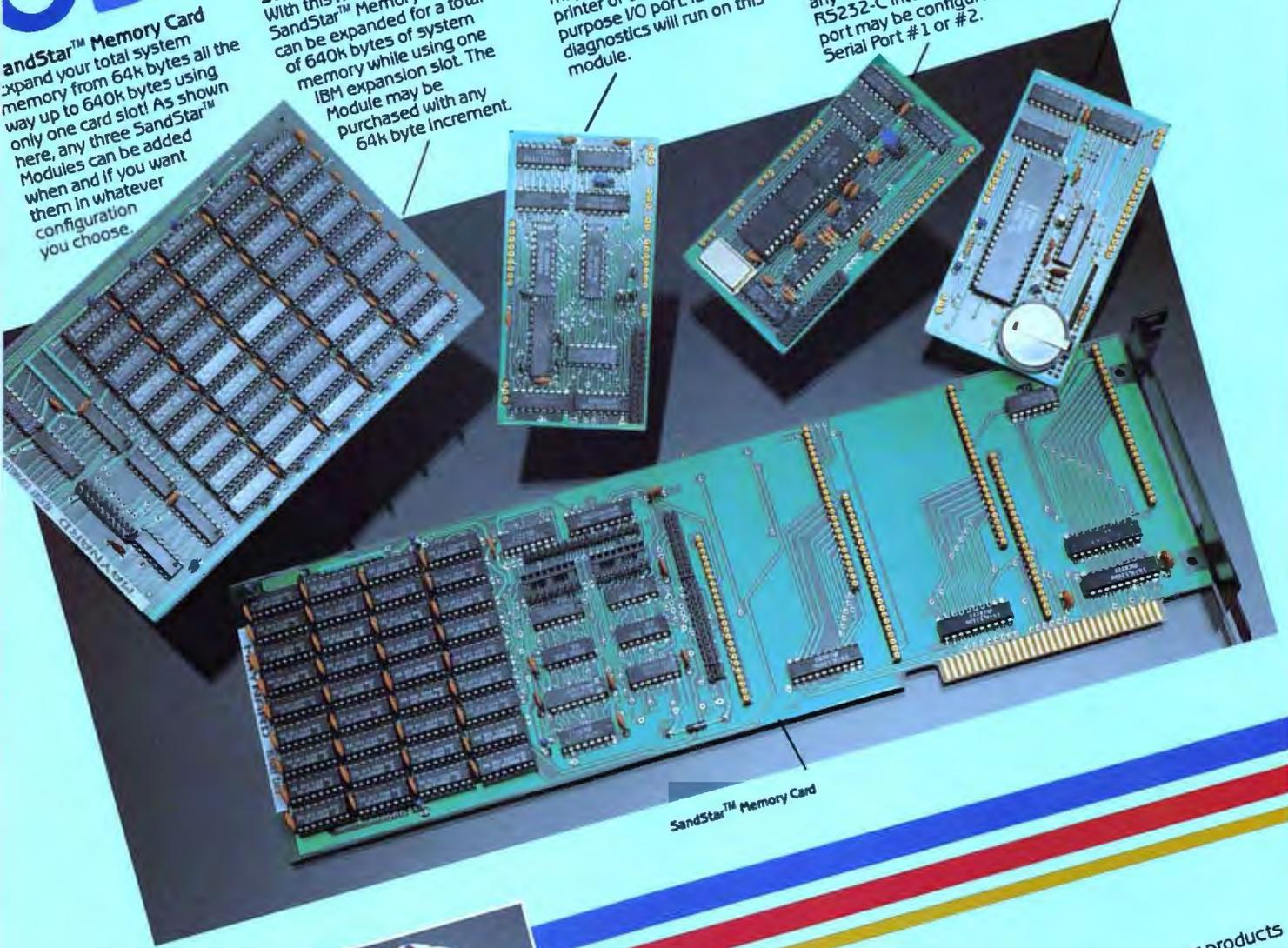
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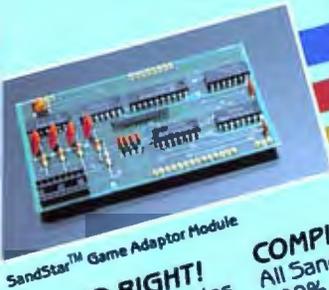
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SandStar™ Memory Card



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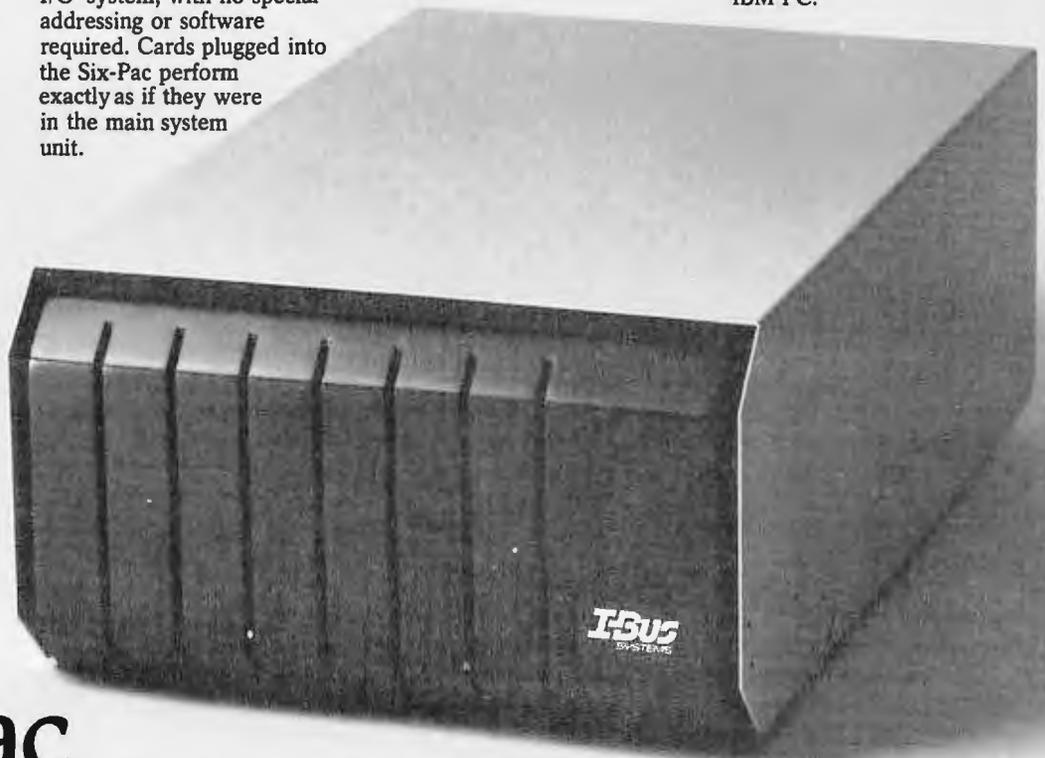
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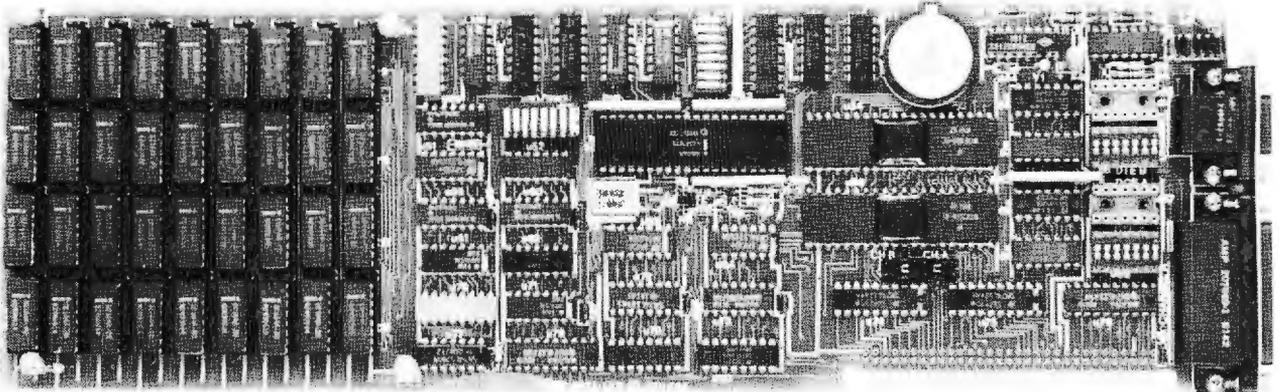
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The PDI464 features six separate functions — expansion memory, two asynchronous serial channels, a real-time clock, a disk emulator, and a print spooler. Together with its high quality, the PDI464 offers a price-performance ratio that is tough to beat.

The memory section of the PDI464 provides up to 256KB of fully socketed expansion memory with parity generation and checking. Four memory sizes are available from 64 up to 256KB to meet a variety of needs. Regardless of memory size ordered, each PDI464 is tested with a full complement of 256KB of memory to ensure trouble-free future expansion. Disk-based memory diagnostics are included which can test memory integrity and report problems down to the chip level.

Two asynchronous serial channels are provided which are completely compatible with IBM serial channels. Each channel can be selected to reside at one of four addresses to allow for future expansion. A unique feature is provided which allows simple selection of data terminal or data communication equipment [DTE/DCE] configurations, thus eliminating the need for special cables or null modems. Each channel comes complete with a 6 foot RS-232 cable.

The Real-Time Clock section features quartz-crystal control and lithium battery back-up to ensure years of trouble-free operation. The RTC features hours, minutes, seconds,

day-of-the-week, date, month, and year with automatic leap year adjustment. Software is provided to initialize system time and date information automatically upon power-up.

p-Disk™, a disk-emulation package provided with the PDI464 allows memory to be treated as an ultra-fast disk drive. p-Disk™ can be configured as a single or double-sided drive and can appear as drive B, C, or D. p-Disk™ does not require modification or patching of the BIOS or DOS files on system diskettes and is fully compatible with IBM software and diagnostics.

A background printer spooler is included with the PDI464 which allows files to be printed on a printer while other software is being used in the foreground. The spooler offers features such as menu-selectable configuration, multiple copies, and upper case options.

Comprehensive documentation is provided with numerous illustrations to simplify installation procedures. All documentation fits neatly into existing 3-ring binders provided with the Personal Computer.

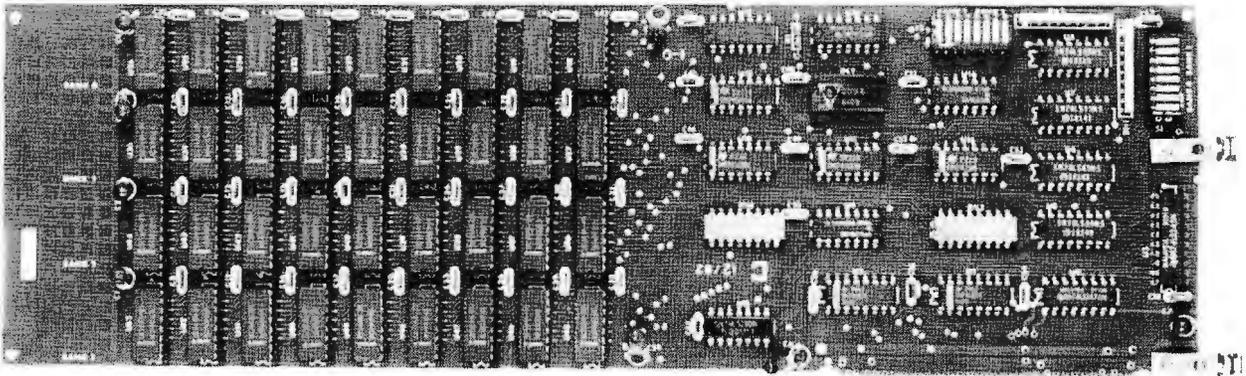
Each PDI464 is "burnt-in" at elevated temperatures and fully tested. Packaging material provides protection from static and mechanical shock during shipment to further ensure reliability. The PDI464 is covered by a one year limited warranty.

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- Available in: 64KB [PDI 256-64]; 128KB [PDI 256-28]; 192KB [PDI 256-92]; 256KB [PDI 256-56]
- Field expandable up to 256K bytes
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The PDI 256 provides up to 256KB of user memory with parity on a single expansion board for the IBM Personal Computer. Memory is organized as 4-64KB memory banks, each bank can be set to any 64K boundary within the 1 MB address space. Individual memory banks may also be deselected. All address mappings are made by DIP switch settings for easy configuration. All RAM chips are socketed to allow for easy memory add-on or replacement. Memory refresh for PDI series memory boards coincides with the planar board's refresh. No wait-states are required for expansion memory accesses. The PDI 256 is also available in 64, 128 and 192KB versions which are easily upgraded in 64K steps to a maximum capacity of 256KB.

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# Building a BASIC Program

*A BASIC program is built, not written. Here is an example of the steps you must take to create your own masterpiece.*

Donald B. Trivette

You've had your IBM PC for several months; you've learned to run *Visi-Cal* and *WordStar*; you've mastered DOS, at least as far as formatting disks and backing up files; now you're ready for the fun—writing your own programs. In preparation, you've skimmed a book on BASIC and read Chapters 2 and 3 of the IBM BASIC manual. (If you haven't read these chapters, do so now.) All well and good, but how to begin?

First you need a problem to solve, one that you can do by hand or in your head. If you don't know how to solve the problem manually, you can't possibly tell a machine how to come up with the answer.

This article shows you how to write a program to count the number of words in a disk file. If the file were a typewritten report, you would start in the upper left corner of each page and count each word in each line, top to bottom, page after page. When there are no more pages, you have the answer.

Now that you know how to do it manually, which admittedly would take a dunce about one second to deduce, you can think about how to actually get started programming.

Computer programs are built, not written. Even the most experienced programmer doesn't start at the beginning and work straight through to

the end. Start with the core and work outward—add a statement here, move a statement there, test a section, add a few more statements, test again, try something different. Programming is not a sequential or exact process.

---

Even the most experienced programmer doesn't start at the beginning and work straight through to the end.

---

When you wrote a term paper in school, you made note cards, an outline, a draft, and then the final report. Didn't you? Books that teach computer programming recommend that you write a flow chart first (the outline), and then translate that into a computer language. A good idea, but in practice most flow charts, like most outlines, get written after the program. It's human nature.

You could begin by writing statements to read records from a disk file, but that's not much fun. Input/output statements are tedious, and I always need to get out the manual to check on formats, commas, device

numbers, and the like. A better plan is to get the program running first with a simple statement that will provide data to test the word-counting algorithm (*algorithm* is a fancy way of saying plan or method), and worry later about getting the data from disk.

## Building the Program

The following will do as a first statement to test the counting program.

```
100 AS="The quick brown fox jumped over  
the lazy dog."
```

'AS' was selected as the variable name for no other reason than that it is short and easily typed. It could just as well have been 'SENTENCES' or 'MYDATA\$'. In fact, if you like self-documenting programs, it probably should be something more descriptive. If you're lazy, AS is fine. The dollar sign after the A tells BASIC that the variable will store characters rather than numbers. Variables that store characters are called string variables.

Next you'll need a statement or statements to compute how many words are in AS. That's the algorithm. Suppose you count the number of blanks. That works as long as one word is separated from another by a blank. Thus the definition of a



INSTR

PR

GOTO

IF

THEN

OPEN

CLO

INPUT

FOR

NEXT

SAVE

DA

OR

CALL

GOSUB

GET

REM

WH

## Hands On

word will be a group of characters separated by blanks. This means you will be counting things like 5280', 280Z, and 5'-9" as words. Whether this is acceptable largely depends on why you're counting words in the first place. If you are a typist paid by the word, then it's acceptable to count "\$.10" as two words.

In order to count blanks your program must find blanks. The BASIC function INSTR (IN STRing) can do that.

```
100 A$="The quick brown fox jumped over  
the lazy dog."  
120 I=INSTR(J,A$," ")
```

INSTR will start looking in A\$ at position J for the first occurrence of " " (blank). It will assign the position of the first blank it finds to the variable I. This seems to be what we are after, but we must give J an initial value—a place to begin looking. This can be done with the following statements:

```
100 A$="The quick brown fox jumped over  
the lazy dog."  
118 J=1  
120 I=INSTR(J,A$," ")
```

Just to be sure you understand how INSTR works, put a temporary print statement after line 120 (e.g., 125 PRINT I) and run the program. The value of I should be 4—the location of the first blank. Type RUN and press ENTER; you should see

```
100 A$="The quick brown fox jumped over  
the lazy dog."  
118 J=1  
120 I=INSTR(J,A$," ")  
125 PRINT I  
RUN  
4  
OK
```

This last step demonstrates the value of working with an interactive language like BASIC. Whenever you are unsure of how a section of a pro-

gram works, you can put in print statements temporarily and run it.

Now that you have found the first blank, you have also found the first word. The next step is to add a statement to keep count of the words—something like  $W=W+1$ . Initial values should go at the top of the program, so you should add these lines to produce the following:

```
20 W=0  
100 A$="The quick brown fox jumped over  
the lazy dog."  
118 J=1  
120 I=INSTR(J,A$," ")  
125 W=W+1
```

The new line 125 replaces the PRINT statement added earlier.

We are now ready to loop—to go back to line 120 and look for the next blank. If you don't make changes, the program will look for the next blank starting in position 1, and it will find the blank in 4 again. This is an example of the famous, endless loop (few things are actually endless; after several minutes the value of W would get so large that the computer would report an error

---

### Programming is not a sequential or exact process.

---

and stop). To avoid this, set J to the value of  $I+1$ . This causes the computer to resume looking one position after where it found the last blank.

```
20 W=0  
100 A$="The quick brown fox jumped over  
the lazy dog."  
118 J=1  
120 I=INSTR(J,A$," ")  
125 W=W+1  
130 J=I+1  
140 GOTO 120
```

Type RUN and press ENTER to see what happens. If you don't know what the Ctrl/Break keys do, now is a good time to learn. The program is

in an endless loop again. To find out what's wrong, insert as a temporary statement 121 PRINT I and rerun the program.

```
20 W=0  
100 A$="The quick brown fox jumped over  
the lazy dog."  
118 J=1  
120 I=INSTR(J,A$," ")  
121 PRINT I  
125 W=W+1  
130 J=I+1  
140 GOTO 120
```

The screen will rapidly fill with 4, 10, 16, 20, 27, 32, 36, 41, 0, 4, 10, 16. Those are locations of the blanks all right, but when the program gets to the end of the sentence, it goes back to the beginning, over and over. Why?

When the INSTR function doesn't find a blank, it returns a zero value. Zero plus 1 is 1, so J is reset to 1 and the program begins looking at the first character again. In short, you didn't tell it what to do when there were no more blanks. You need an IF statement and a statement to print the value of W. The program should look like this:

```
20 W=0  
100 A$="The quick brown fox jumped over  
the lazy dog."  
118 J=1  
120 I=INSTR(J,A$," ")  
122 IF I=0 THEN 150  
125 W=W+1  
130 J=I+1  
140 GOTO 120  
150 PRINT W
```

Just one problem: The program counts the number of words as eight (there are nine). This is the old fence post paradox—how many fence posts, spaced 10 feet apart, does it take to erect a 100-foot fence? One more than you first thought. There is one more word in your sentence than there are blanks. This calls attention to a flaw in the algorithm—it's counting blanks instead of words. What would happen if a typist put two blanks between some words? If

```

10 DEFINT A-Z
15 PRINT "This program counts the number of words in"
16 PRINT "a sequential ASCII file by counting the blanks"
17 PRINT "between groups of characters."
20 W=0 'word counter
35 PRINT:INPUT "ENTER FILENAME:";FILENAME$
40 OPEN FILENAME$ FOR INPUT AS #1
90 PRINT:PRINT "RUNNING TOTAL IS ";W;" WORDS":A$=""
100 FOR X=1 TO 255
101 X$=INPUT$(1,#1)
102 IF X$=CHR$(13) THEN A$=A$+" ":GOTO 105 'convert CR to a blank
103 A$=A$+X$:IF EOF(1) THEN 145
104 NEXT
105 I=0 'location of blank
106 PRINT A$
118 J=1 'start looking here
119 OLDI=I 'save location of last blank
120 I=INSTR(J,A$," ") 'find a blank
122 IF I=0 THEN 90 'get next line
123 IF OLDI+1=I THEN 130 '2 blanks together, don't add
125 W=W+1 'add one to count
130 J=I+1:IF J>255 THEN 90 'next location
140 GOTO 119 'keep looking
145 CLOSE #1
150 PRINT:PRINT FILENAME$;" CONTAINS ";W;" WORDS"

```

## Listing 1

you're in doubt, alter the text in line 100 and run the program.

The solution is to add statements to cause the program to skip over consecutive blanks without incrementing the word count. You can do this by saving the location of the last blank (we will call it OLDI), and comparing it with the position of the current blank. If the location of the current blank (I) is just one greater than the location of the old blank (OLDI), you do not want the word count to increase. Instead, OLDI should be set equal to I, and the program should look for the next blank. It's a little confusing at first, but this idea is used frequently in computer programming. Three statements are needed to modify the algorithm.

```

20 W=0
100 A$="The quick brown fox jumped over
the lazy dog."
105 I=0
118 J=1
119 OLDI=I
120 I=INSTR(J,A$," ")

```

```

122 IF I=0 THEN 150
123 IF OLDI+1=I THEN 130
125 W=W+1
130 J=I+1
140 GOTO 119
150 PRINT W

```

Be sure to change line 140 to jump to line 119 instead of to line 120.

We still have the problem of the last word not getting counted when there are no trailing blanks. One way to assure that a trailing blank will be there is to always add one. A statement like 104 A\$=A\$+" " would accomplish this.

```

20 W=0
100 A$="The quick brown fox jumped over
the lazy dog."
104 A$=A$+" "
105 I=0
118 J=1
119 OLDI=I
120 I=INSTR(J,A$," ")
122 IF I=0 THEN 150
123 IF OLDI+1=I THEN 130
125 W=W+1
130 J=I+1
140 GOTO 119
150 PRINT W

```

But does it really work? You can't be sure until you've tested every combination of data you can imagine. Here are some sample tests.

```

100 A$=" The quick fox jumped the
brown dog. "
100 A$="The quick brown fox jumped over
the lazy dog and the lazy dog jumped
over the quick fox."
100 A$="The quick fox jumped the dog."
100 A$="The fox."
100 A$="The."
100 A$=" "
100 A$=" "
100 A$="The brown fox ."

```

The last test points to a problem. The program counts four words in "The brown fox ."; the period is counted as a word because it is preceded by a space.

Is this a bug? The answer depends on how the program is to be used. If the purpose is to fire MX missiles based on a word count, then it is a serious bug indeed. Fortunately, this program will give only an idea of the length of a document.

## ● Hands On

Even after careful testing you can be sure someone, some day, will try to use your program for a purpose or with data you never intended. If the program gives the correct answer, the user will feel like a genius; if not, he or she will swear there's a bug in your program.

### Reading a Disk File

The next step is to add statements to cause the program to read data from a disk file. BASIC supports two types of files: random and sequential. Random files store data in groups called records. When you are done with one record, you must specifically select the next record you want. In sequential files, all the data is stored as one large group. Text is usually stored in a sequential file, so this demonstration will use input statements that perform sequential input.

There are two such statements—`INPUT #` and `LINE INPUT #`. `INPUT #` reads a string of characters until it finds a comma and then terminates. Clearly this is not what you want. The `LINE INPUT #` statement reads all the characters in the input file until it encounters a carriage return. But the maximum length of a string is 255 characters, and since it is entirely possible that your data file will contain more than 255 characters in a row without a carriage return, the `LINE INPUT #` statement cannot be used. To get around this limitation, use a series of commands to read the file in 255-character chunks. In place of the assignment statement in line 100, change the program as follows:

```
20 W=0
40 OPEN "WORDS.BAS" FOR INPUT AS #1
90 AS=""
100 FOR X=1 TO 255
101 X$=INPUT$(1,#1)
102 IF X$=CHR$(13) THEN
    AS=AS+" ":GOTO 105
103 AS=AS+X$
104 NEXT
105 I=0
```

```
118 J=1
119 OLDI=I
120 I=INSTR(J,AS," ")
122 IF I=0 THEN 90
123 IF OLDI+1=I THEN 130
125 W=W+1
130 J=I+1
140 GOTO 119
145 CLOSE #1
150 PRINT W
```

This change prevents lines from becoming longer than BASIC can handle (255 characters).

Unfortunately, by removing the `AS=AS+" "` statement we've re-introduced the trailing blank bug. But there's a better way to fix this

---

If something doesn't work, at least half the time it's because the statements aren't getting executed.

---

bug that also avoids another potential pitfall. We can simply count the end of a line as a blank, and then count the words in that line and keep a running subtotal. This allows us to reset `AS` to an empty line and reuse it for each succeeding line.

The file number specification, `#1`, could have been `#2` or even `#9`. Its purpose is to associate this input statement with a DOS file name. The file name and some other characteristics must be supplied prior to the input statement in an `OPEN` statement. Look up the `OPEN` statement in the BASIC manual and fill in the file name.

```
OPEN "filename" FOR INPUT AS #1
```

(Note the quotation marks around the file name.) You should close a gate that you've opened, and the same goes for files—this is done with a `CLOSE` statement.

If you don't have a test file on disk, you can make one now by using the ASCII option to save a BASIC program. In fact, if you name this pro-

gram we're working on `WORDS`, you can save it; type `SAVE "WORDS.BAS",A` and then have the program count the number of words in itself.

In addition to `OPEN`, `CLOSE`, and `INPUT`, you'll need to modify the program logic to loop back to line 100 so that once it has counted the words in one character string, it will go back for another. You can do this by modifying line 130. When you run the program in this form, you will see the error 'Input past end in line 100'. Also, the program won't print out the number of words in the file.

```
20 W=0
40 OPEN "WORDS.BAS" FOR INPUT AS #1
90 AS=""
100 FOR X=1 TO 255
101 X$=INPUT$(1,#1)
102 IF X$=CHR$(13) THEN AS=AS+" ":GOTO 105
103 AS=AS+X$
104 NEXT
105 I=0
118 J=1
119 OLDI=I
120 I=INSTR(J,AS," ")
122 IF I=0 THEN 90
123 IF OLDI+1=I THEN 130
125 W=W+1
130 J=I+1:IF J>255 THEN 90
140 GOTO 119
145 CLOSE #1
150 PRINT W
```

Line 150 prints the value of `W`, but the program doesn't have any way to get to line 150. Simple as this is, it's one of the most common errors in programming. If something doesn't work, at least half the time it's because the statements aren't getting executed.

The message about 'Input past end...' probably won't make sense to the beginning programmer. When a BASIC program reads the last record in a disk file, it notices (and remembers) that it has reached the End of the File (EOF). If you try to read from that file again, BASIC displays

the message 'Input past end...' and stops the program. Check Appendix A of the BASIC manual for explanations of error messages.

If you thumb through the BASIC manual (maybe a lot of thumbing if you don't know what to look for), you'll find a built-in function called EOF. The value of EOF is false until the last data is read, and then it is true. You can use this to signal the program to jump to line 145 when it can't read any more records.

The placement of this statement is confusing. If you put it after the INPUT statement, the last data won't get processed. The EOF condition is set when the last record is read—not after—so we must check the condition before the next input. Modify line 103 by adding an end of file test. You should also modify line 122 to jump back to line 90, rather than jumping to line 150.

```

20 W=0
40 OPEN "WORDS.BAS" FOR INPUT AS #1
90 AS=""
100 FOR X=1 TO 255
101 XS=INPUT$(1,#1)
102 IF XS=CHR$(13) THEN AS=AS+
    "" :GOTO 105
103 AS=AS+XS:IF EOF(1) THEN 145
104 NEXT
105 I=0
118 J=1
119 OLDI=I
120 I=INSTR(J,AS," ")
122 IF I=0 THEN 90
123 IF OLDI+1=I THEN 130
125 W=W+1
130 J=I+1:IF J>255 THEN 90
140 GOTO 119
145 CLOSE #1
150 PRINT W

```

For a final test, run the program on itself. It counts 67 "words"—67 groups of characters separated by one or more blanks.

### Clean-Up

The final two steps in writing a program are clean-up and documentation. In the clean-up phase you should look for ways to make the program more efficient—to eliminate

unnecessary statements and perhaps combine others. You might realize that counting words is an integer task. BASIC makes more efficient use of storage if it knows that everything will be whole numbers. Statement 10 DEFINES all variables starting with the characters A through Z to be INTEGERS.

Clean-up also involves making the input and output as friendly and easy to read as possible. For this example, your program will print a description of what the program is designed to do, ask the user for the file name, and tidy up the output. The friendly, documented, more efficient program is now what you see in Listing 1.

No program is ever finished; there's always some way to make it more efficient, easier to use, more useful, and better documented. In this program, statements 123 and 125 could be combined; the program could check to be sure the file name exists on the disk and report an error if it doesn't; you could produce a frequency count by...and you could ...

---

*Donald Trivette is a computer consultant based in Wrightsville Beach, North Carolina.*

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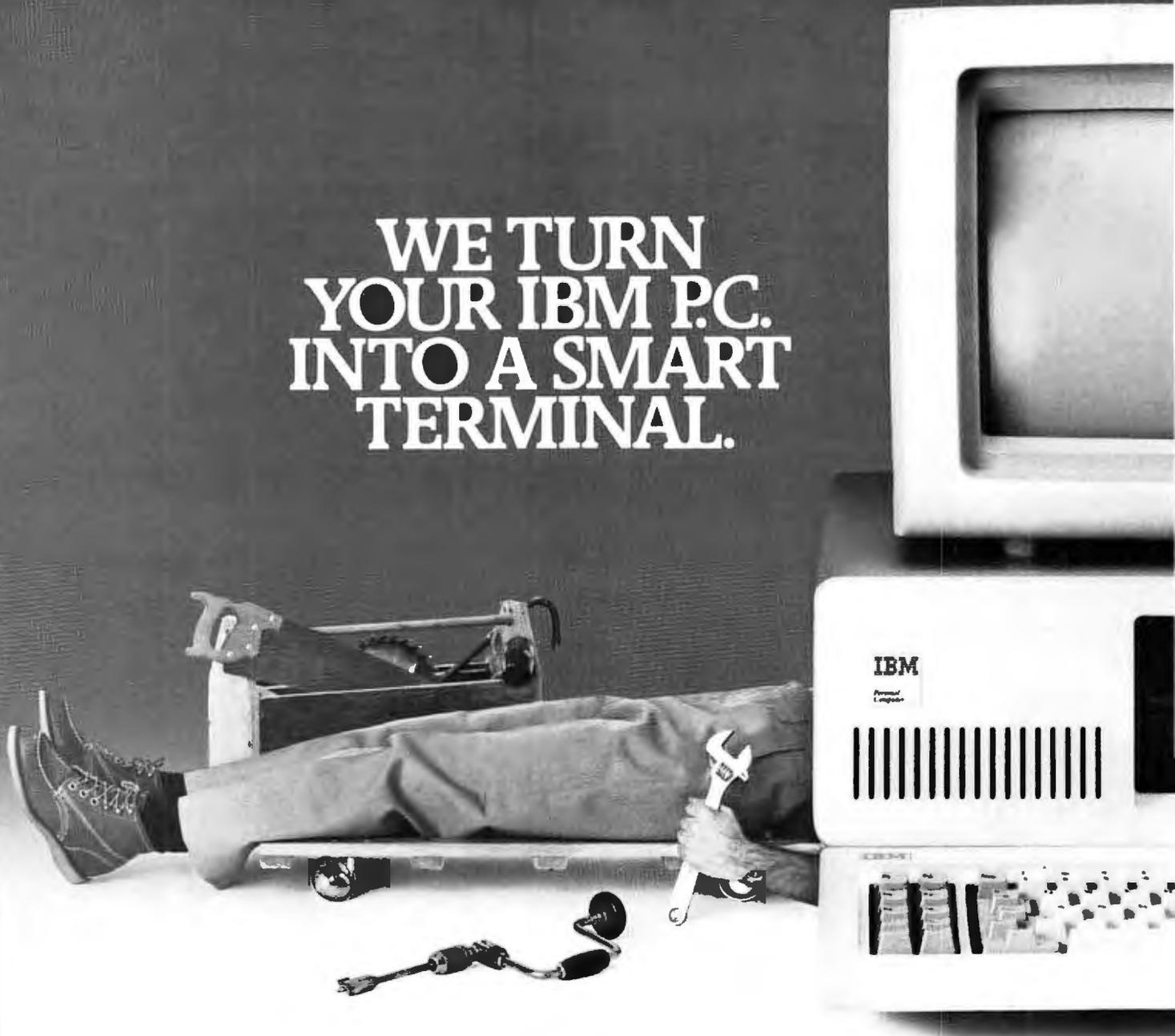


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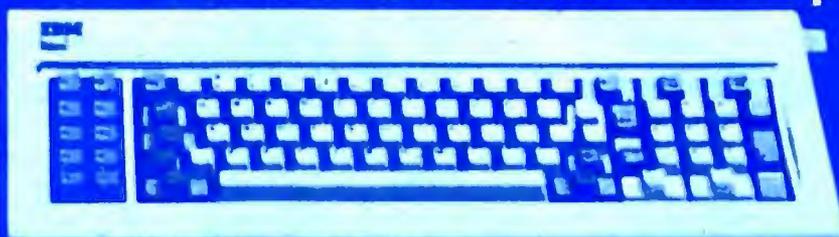
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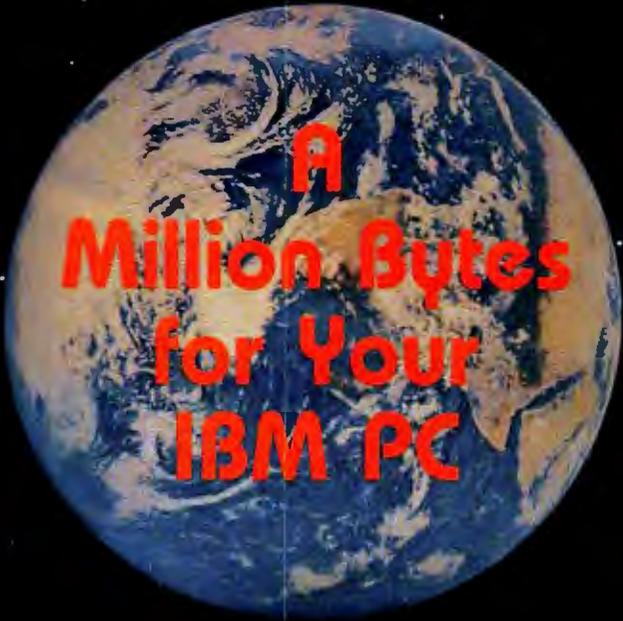


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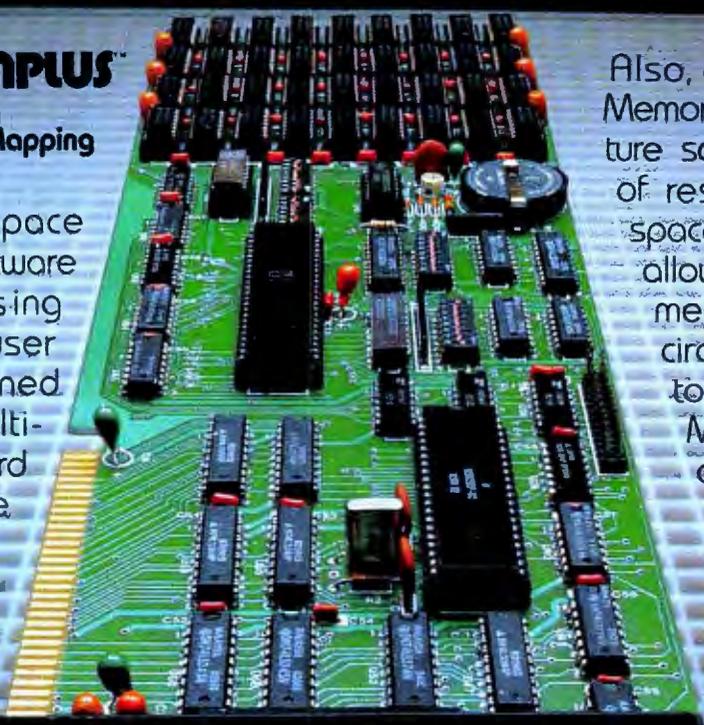
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# How the PC Thinks

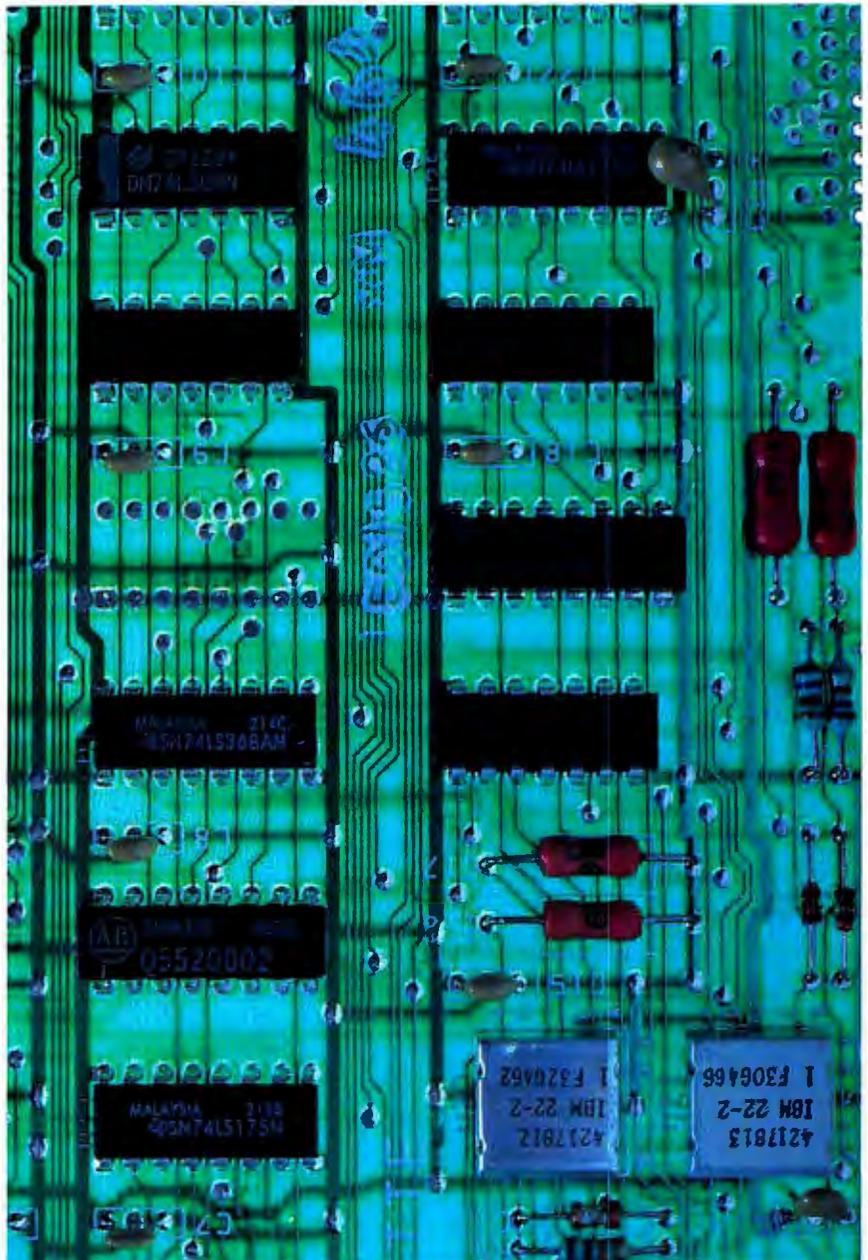
*An in-depth look at stacks and how data is passed between Pascal and assembly language*

*Peter Norton*

One of the topics covered in the last article in this series was the stack, a fundamental part of the 8088 microprocessor that is the brain of the IBM PC. The stack is a temporary storage place for work in progress. When the PC needs to suspend some processing, such as setting work aside while it services an interrupt, the stack keeps track of the processing that was suspended. The stack works on a last-in-first-out basis, which means that when data is stored, or “pushed,” onto the stack, it is put onto the top of the stack; later, when information is “popped” off the stack, the most recently stored data is used.

Closely related to the temporary storage function is the stack’s role in passing subroutine parameters. When programs invoke a subroutine, they have to convey to the subroutine the address of where to return control when the subroutine is finished. This address is called the return address and is passed through the stack. Most subroutines are called with parameter values (such as passing a number to BASIC’s SIN function) that are also passed through the stack.

This article will cover the way data is passed between a subroutine and its caller, specifically in reference to how this is done between Pascal and assembly language, which is probably



the most important interlanguage connection made by PC programmers. While the specific information concerns Pascal and assembly language, the principles apply to any language calling any other language (or calling its own language). Special notes for BASIC programmers will also be provided.

If you're not a Pascal enthusiast, you may wonder why this discussion focuses on Pascal. The reason is simple: however easy BASIC may be to use, it is not a suitable language for serious program development. For serious programming, a modern structured language is needed, and only three languages suit this purpose—C, Pascal, and PL/I. Pascal is the only one supported on the PC by both IBM and Microsoft.

### Calling Routines

For Pascal to use an assembly language routine, the routine must be declared in Pascal terms, with the 'external' directive indicating that the routine's working code lies elsewhere:

```
PROCEDURE assembly__routine;  
EXTERNAL;
```

The assembly language routine may need parameters, and it may be a function that returns a value. Characteristics of the assembly language routine, such as parameters and the way a function returns a value, have to be included in the declaration of the routine.

Pascal follows the DOS convention for returning values of 1 or 2 bytes from a function. One of the 8088 microprocessor's registers is used to pass back a function's value. Single-byte values are returned in the AL half-register, and 2-byte values are returned in the full AX register. Pascal automatically picks up the values from these registers. (While writing Pascal code, you don't need to be concerned about the AL and AX registers, but with assembly language code the registers have to be considered.) Assembly routines should be declared as functions, provided that the value being returned is a 1- or 2-byte number (in Pascal terms, byte, sint, word, or integer). These rules

also apply to most other languages for the PC.

While short 1- or 2-byte values are passed back to the caller through the AL and AX registers, longer or more complex returned values such as strings and records are passed back by a more intricate mechanism. If a value other than a 1- or 2-byte number has to be returned, the value can be passed through the parameter list, which is a simpler method.

When you are linking assembler to BASIC, the task of returning a function value from a DEF USR function is more complicated than connecting Pascal and assembler. With BASIC, using a regular called subroutine to pass any values back to the caller by changing a parameter value is simpler and safer.

Pascal offers two main ways to pass a parameter: with or without the VAR option.

```
PROCEDURE subroutine (parm1 : WORD; VAR  
    parm2 : WORD);
```

With VAR the called subroutine is given permission to modify the variable being passed; in some way the subroutine must be given the memory address of the variable's location. Without VAR the subroutine is forbidden to change the variable; to protect the variable, the subroutine can be given access only to a copy of the original variable.

BASIC provides only one way to pass parameters. It uses the same method Pascal uses when VAR is specified: the memory address of the variable is passed instead of a copy of the variable's value. This is the more powerful and flexible of the two methods, but more programming is involved.

Because the subroutine needs the address of the variable when the VAR option is used, the memory address of the variable is placed on the stack during the calling sequence. Since two types of addresses exist (single-word offset addresses and double-word segmented addresses), the VAR option has two variations: VAR passes a single-word relative ad-

dress, and VARS passes a double-word segmented address. BASIC uses the equivalent of Pascal's VAR with offset addresses, rather than VARS with segmented addresses. (For a discussion of segmented addresses, see "How the PC Thinks," *PC World*, Vol. 1, No. 1.)

When VAR is not used, the subroutine must be given a copy of the value to be passed. In this case two

---

When a subroutine finishes and returns to its caller, it is responsible for cleaning up the stack.

---

situations can occur. If the value being passed is sufficiently small and simple, the value itself is pushed onto the stack, which is very efficient for both the caller and the called routine. If the value is not simple, a copy of it is made in memory (to prohibit the subroutine from changing the value) and the address of the copy is pushed onto the stack. This procedure is quite inefficient from the perspective of both the caller and the called routine.

An assembly language routine must know exactly what values the caller places on the stack, and in what order. The best way to find values placed on the stack is to compile an example and inspect the Pascal compiler's object code listing. The method I recommend is this: declare the subroutine parameters in Pascal the way that you think best; then compile a short sample program that calls the subroutine and inspect the object code listing. If the stack manipulation is what you expected, proceed to tailor your assembly routine to the stack as Pascal sets it up. If the stack manipulation isn't workable, tinker with the declaration of the subroutine in Pascal until you find a solution.

## ● Hands On

Following is a step-by-step example of what goes on with the stack during a call from Pascal. This example is taken from the IBM Pascal manual (pg. 10-23). The subroutine declaration is:

```
FUNCTION uaddok (a, b : WORD; VAR c :
    WORD) BOOLEAN;
```

```
EXTERNAL;
```

When Pascal calls this routine, the parameters are pushed onto the stack in the order declared. Because variable *a* is not VAR or complex, its 2-byte value is pushed onto the stack. The same situation occurs with variable *b*. Variable *c* is declared VAR, so its offset address is pushed onto the stack. The stack now holds 6 bytes connected with this call. Then the routine is called, and the calling process pushes the return address onto the stack. Since this is an external routine, the call is “far,” and the return address is a full, double-word segmented address consisting of the code segment (CS) register value and the instruction pointer (IP), updated to point past the call instruction. At the entry point to the subroutine, 10 bytes are loaded on the stack for the call: 6 bytes for the parameters and 4 bytes for the return address.

### Assembly Language Coding

Listing 1 offers some assembler fundamentals that show you how to wade through some of the peculiarities of the 8086 processor. It lists the minimum coding needed for a routine that does nothing but return to its caller.

If you have labels and branching instructions, one additional bit of overhead will be needed. The assembler requires an “assume” statement to indicate the value loaded in the CS register. This statement is needed even if all addressing is in the short relative form that pays no attention to the CS register. Expecting an assembler to know when it does

and doesn't need to know the CS contents is not practical. If you have any labels for jump commands, add a statement such as the following to your routine:

```
assume cs:test
```

If all jumps are in the short relative form, which is common for simple routines, any ‘assume cs:’ can be used; if the assembler uses your assumption to produce a true relative address, the real value that will be in the CS register has to be declared.

Programming conventions also need to be provided to support stack control through a mechanism known as a frame pointer. For a full explanation of this mechanism consult a guide to 8086 assembly language programming.

The instructions ‘push’, ‘mov’, and ‘pop’ shown in Listing 2 are used to maintain a frame pointer and to allow the contents of the stack to be addressed. While the stack-pointer (SP) register points to the current location on the stack, the SP register

register are inferred; ‘mov bp,sp’ takes the value stored in the SP register and moves that value into the BP register. If ‘bp’ is in brackets, the contents of ‘bp’ are used to specify an address in memory; ‘mov [bp],sp’ means to take the value stored in the SP register and move it, not into BP register, but into the memory location that ‘bp’ points to.

Secondly, when a subroutine finishes and returns to its caller, it is responsible for cleaning up the stack. The subroutine must first undo anything that it has pushed onto the stack. This procedure can be accomplished either by popping off anything that was pushed onto the stack or by moving the frame pointer, which ought to be sitting in the BP register, into the SP register, thereby automatically popping any garbage off of the stack.

Another essential part of cleaning up the stack is removing the subroutine calling sequence from the stack. In calling a subroutine, the re-

Relative offset from base pointer	Significance of the contents register of the stack
0-1	the old frame pointer, pushed from BP
2-3	return address, segment part (CS register)
4-5	return address, offset part (IP register)
6-7	last parm pushed: address of variable <i>c</i>
8-9	previous parm: value of variable <i>b</i>
10-11	first parm: value of variable <i>a</i>

Figure 1: Stack contents of the ‘uaddok’ Function

cannot be used as an addressing register to access the stack. The SP value must be loaded into another register that can be used for addressing, such as the base-pointer (BP) register.

You need to know two more points about setting up assembly language routines. The first is the notation for direct and indirect values. When a register is referred to by its simple name, as in the instruction ‘mov bp,sp’, the direct contents of the

turn address and the parameter are put on the stack. The return instruction (ret) takes care of popping the return address off, but the number of bytes of parameter placed on the stack must also be specified so that the ret instruction can pop them off. In Listing 2 the subroutine ‘test’ does a simple ret instruction, taking no parameters off the stack. But the sub-

routine 'uaddok' (given on page 10-23 of the IBM Pascal manual) has 6 bytes of parameter (three 2-byte parameters), and it ends with a 'ret 6' instruction. The 6 is necessary to take the parameters away from the stack.

How does the assembly language routine gain access to the parameters on the stack? Because the BP register, as frame pointer, points to the stack (which holds the parameters), the stack parameters can be accessed using addresses relative to the BP reg-

ister. The stack runs backwards (from high addresses to low), and accessing the parameters placed on the stack before the frame pointer is done with positive relative displacements. (With a backwards stack, negative displacements move ahead on the

```
tests segment 'code' ; the segment is named "tests"
                    ; "code" is a classification you can ignore

    public test     ; our subroutine is named "test"- making it
                    ; public gives the world access to it, by name

test  proc         far ; declaring our routine, a procedure named "test"
                    ; the attribute "far" is very important

                    ; so far everything has been declarative
                    ; overhead -- no executable code at all.

                    ; the next line begins (and ends) our code.

ret                                     ; a return instruction. Since the procedure was
                    ; declared "far" this is a far return- it pops
                    ; both a CS and an IP off of the stack

                    ; now we complete the overhead, ending
                    ; everything in sight.

test  endp         ; end the procedure

tests ends        ; end the segment

end               ; end the assembly
```

Listing 1: Minimum coding for a routine that returns to its caller

```
test  proc         far
push   bp          ; save the old frame pointer on the stack
                    ; this completes the calling sequence

    mov    bp,sp   ; establish a new frame pointer -- the stack
                    ; pointer after the call sequence is complete

                    ; at this point the working part of your
                    ; assembler routine will appear;

                    ; the frame pointer can be used to access the
                    ; parameters on the stack

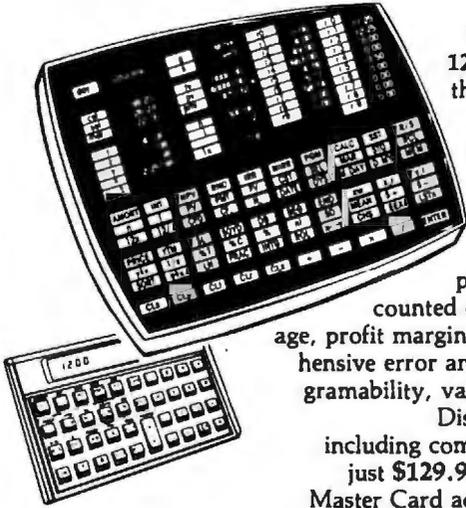
                    ; regardless of what else is now pushed onto
                    ; the stack

pop    bp          ; before returning, pop the old frame pointer

ret
test  endp
```

Listing 2: Subroutine "test"

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## ☉ Hands On

stack and positive displacements look back.)

Figure 1 shows a table of the stack contents of the 'uaddok' function.

With these stack contents, a reference to '[bp + 10]' yields the value of *a*, while a reference to '[bp + 6]' yields the address of *c*. The value of *a* can be loaded into a working register to do arithmetic, as in the instruction

```
mov ax,[bp + 10]
You can move the address of c into an addressing register with the instruction
```

```
mov bp,[bp + 6]
```

You can then use the address to change the value of *c* back in the calling program

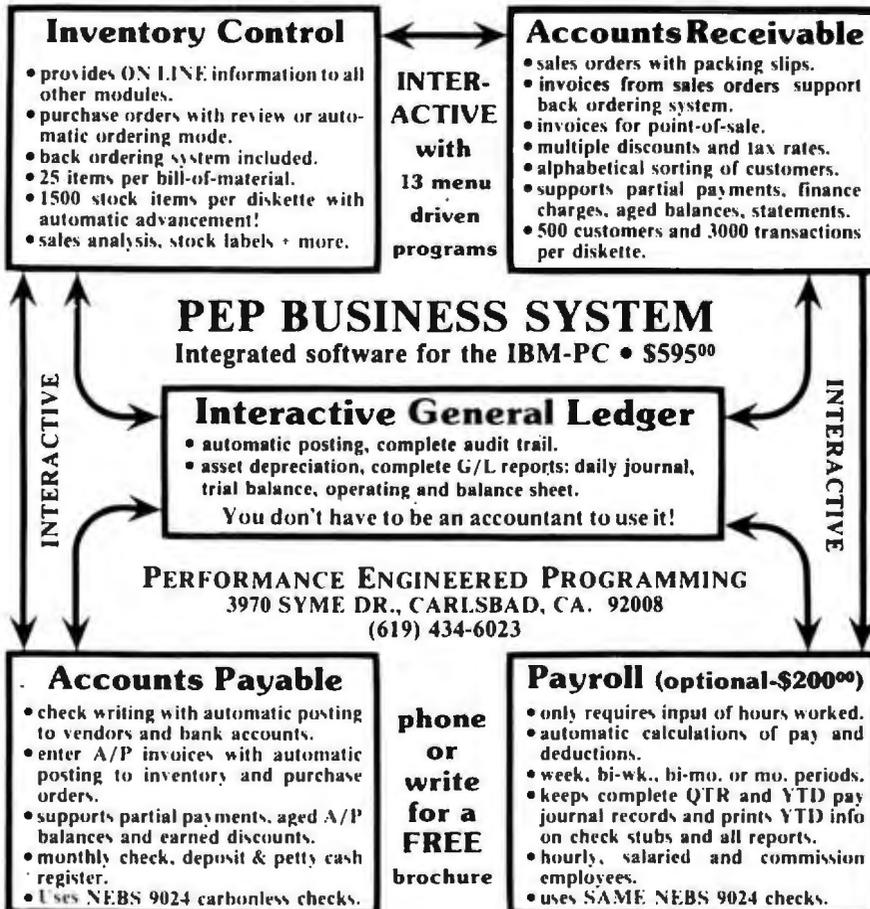
```
mov [bp],ax
```

When coding an assembly language routine that takes 1-byte parameters, you need to take into account that all push and pop operations work 2 bytes at a time. If a 1-byte parameter value is pushed onto the stack, 2 bytes are placed there. The first byte, located at an even offset from the SP or BP register is the actual value, and the second, at an odd offset, is a filler value.

This information should provide all the basics you need to get started in assembly language programming, and to link Pascal or any other language with assembly code. Trying these ideas out with your own programs is the best way to learn how to use the IBM PC.

---

*Peter Norton has worked in computing as a programmer, designer, and author. He wrote and produced The Norton Utilities. This article will be included in his forthcoming book, Inside the IBM PC: Access to Advanced Programming. It is used with permission of the Robert J. Brady Co., copyright 1983, Peter Norton.*



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# Around in Circles

*Last issue in “Getting Acquainted with Graphics” you learned to draw lines with PC graphics. This tutorial shows how to draw and color more complicated shapes.*

*Dan Illowsky and Michael Abrash*

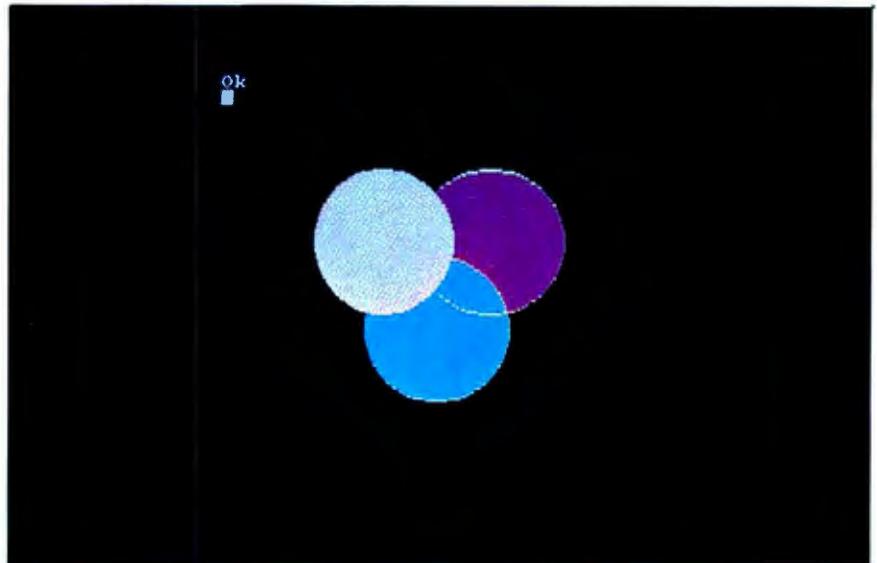
Drawing a circle is something we all mastered at a tender age. Soon after that, we learned that circles were important parts of all our creations. Without them stick men would have no heads, the world would again be flat, and zero and the letter o would be forever banished from our script. Our life simply revolved around the round.

Then came the computer age and some aging of our own, and drawing a circle became a complicated procedure. The children who once doodled on wallpaper want, as adults, to doodle on PCs, but they can't draw that simple circle anymore.

With the BASIC CIRCLE command, we can use our PCs to again create circles, ellipses, arcs, and wedges. We can even color the shapes we create with the PAINT command, the electronic equivalent of a painter's brush. These two commands, CIRCLE and PAINT, can replace machine language routines or whole sections of BASIC, leaving us to draw—and color—circles as quickly and easily as we did when we were children.

## The CIRCLE Command

Drawing a circle is simple with PC BASIC. First, get into medium-resolution mode with palette 0. (A quick refresher on how to do this is in



Demonstration of PAINT commands

“Getting Started with BASIC.” In the command `CIRCLE (x,y),radius,color` *x* and *y* are the coordinates of the center of the circle (in either absolute or relative coordinates), *radius* is the distance from the center to the outer edge of the circle, and *color* is the color of the circle. Note that *radius* is the distance from the center as measured in picture elements, or pixels, on the screen. *Color* is an optional parameter that defaults to color 3.

To draw a red circle, for example, type

```
CIRCLE (160,100),50,2
```

To draw two concentric circles, enter

```
CIRCLE (160,100),30,1
```

The command `CLS` clears the screen when it gets too cluttered. Since `CLS` clears only the top 24 lines, use the command `KEY OFF` to clear the twenty-fifth line. The function keys displayed at the bottom of the screen are easily memorized and the `KEY OFF` command followed by `CLS` leaves the whole screen clean and ready to use. Remember to use the up-arrow key to move back up the screen so the display doesn't scroll your artwork off the top as you enter commands on the bottom line. Alternatively, with several commands in a program you can first clear the

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## ☉ Hands On

screen and then execute each command, producing a clean output. You can then put the line  
9999 IF INKEY\$ = "" GOTO 9999 ELSE END  
at the end of your program, so nothing appears until you've hit a key. This gives you time to admire your handiwork.

Run the program in Listing 1 to draw circles with the help of these hints. The last point referenced by the CIRCLE statement (for purposes of relative addressing via STEP, as discussed in "Getting Acquainted with Graphics") is the center of the circle. If any part of a circle is off the screen, that portion simply is not drawn; no error message is given. The last point referenced is the center, even for a circle off the screen.

Typing

```
CIRCLE (100,100),30:CIRCLE STEP(0,1000),30  
followed by  
CIRCLE STEP(0,1000),30:CIRCLE STEP(0,-2000),50  
produces two concentric circles. This result is straightforward; just remember that off-screen circles are handled like any other circles except that they aren't shown on screen.
```

---

## Wedges, or pie slices, follow naturally from arcs.

---

### Arcs and Wedges

By definition, the circle may be one of nature's most perfect forms, but even perfection has its limits. A circle can be the sun, a target, or a ball; but a collection of circle fragments, or arcs, can be hills, waves, seagulls, or plots on a diagram. Similarly, a circle with a wedge removed can be a pie, a pie chart, or even *PacMan*, the most popular arcade creature of all time. Two more parameters to the CIRCLE command make this world of imperfect circles available.

With the expanded CIRCLE command  
CIRCLE (*x,y*),*radius,color,start,end*  
*start* and *end* are the two ends of the arc to be drawn. The values of *start* and *end* are specified in radians. When measuring in radians, for example, the three o'clock point on the circle is 0, and the values increase counterclockwise to 3.14 (pi) at nine o'clock, and to about 6.28 (2 times pi) back at the three o'clock position. These numbers should be familiar to anyone who can remember high school geometry.

*Start* and *end* are optional parameters; if they are omitted, the whole circle will be drawn. Remember that if you use *start* and *end* in the command, you must either use the *color* parameter or insert an extra comma to hold the *color* parameter's place.

To draw a few arcs, clear the screen and enter  
CIRCLE (160,100),30,,0,3.14  
for the upper half of a circle.  
CIRCLE (160,100),30,2,3.14,0  
draws the other half in a different color. Entering  
FOR I = 10 TO 319 STEP 20:CIRCLE  
(I,100),10,2,3.14,0:NEXT

draws a series of peaks. Remember that arcs are always drawn counterclockwise, so a *start* and *end* of 0 and 3.14 draw the top half of a circle, while 3.14 and 0 draw the bottom half.

Wedges, or pie slices, follow naturally from arcs. A wedge is nothing more than an arc with lines connecting the end points to the center of the circle. With the CIRCLE command, if either *start* or *end* is a negative number, then that point is connected to the center of the circle. (The *start* or *end* value is then used as if it were a positive number; this is not the same as adding 2 times pi to the number, which is the standard practice.) If both points are negative, a wedge is formed. For example,  
CIRCLE (160,100),30,,-1.57,-3.14  
draws a pie quarter, while  
CIRCLE (240,100),30,2,-3.14,-1.57  
draws the pie the quarter was cut from. Only one of the sides of the

```

10 REM initialize screen
20 KEY OFF:CLS:SCREEN 1,0:COLOR 0,1
30 REM draw circles of various sizes and colors
40 FOR R=1 TO 90 STEP 5
50   CIRCLE(160,100),R,R MOD 4
60 NEXT R
70 REM wait for a key to be pressed
80 IF INKEY$="" GOTO 80 ELSE END

```

### Listing 1

```

100 REM example of varying the aspect ratio in the CIRCLE command
110 REM initialize screen
120 KEY OFF:CLS:SCREEN 1,0:COLOR 0,1
130 REM draw ellipses of different widths
140 FOR ASPECT=10 TO 2 STEP -.1
150   GOSUB 220
160 NEXT ASPECT
170 REM draw ellipses of different heights
180 FOR ASPECT=1 TO .1 STEP -.1
190   GOSUB 220
200 NEXT ASPECT
210 END
220 REM subroutine to erase old ellipse and draw a new one
230 CIRCLE(160,100),60,0,,,OLDASP
240 CIRCLE(160,100),60,3,,,ASPECT
250 OLDASP=ASPECT
260 REM wait a bit so the new ellipse can be viewed
270 FOR PAUSE=1 TO 500:NEXT PAUSE
280 RETURN

```

### Listing 2

wedge need be drawn, as demonstrated by

```
CIRCLE (100,100),20,,-1.57,4
```

and

```
CIRCLE (100,160),30,,1.57,-4
```

These wedge-drawing capabilities of the CIRCLE command will be most useful when we create a pie-chart-drawing program.

#### Aspect and the Screen

The final capability of the CIRCLE statement is the drawing of ellipses. Strangely enough, due to the nature of the monitor, the circles plotted earlier were all ellipses.

On the screen the vertical distance between two pixels is greater than the horizontal distance between two pixels. The two values are close

enough so that the effect of this is unnoticeable for a small drawing. For example, draw a square with

```
LINE (50,50)-(150,150),B
```

The difference should be apparent if you look closely. Leave the image on the screen and draw a circle of the same size by entering

```
CIRCLE (100,100),50
```

Now the effect will be unmistakable.

The CIRCLE command automatically compensates for the screen's irregularity by drawing ellipses elongated enough to compensate for the screen; the effect is a figure that looks perfectly round. Measured in inches, the figures we produced were indeed circles, but measured in pixels, they were not. This is why we need to remember that *radius* is measured in pixels rather than inches. For this reason the radius is not actually the distance from the center

to the edge of the circle at all points, but only at two special points. This brings us to the concept of aspect ratio.

A circle can be measured either horizontally (on the *x* axis) or vertically (on the *y* axis). The ratio of the *y* axis to the *x* axis is the aspect ratio, which in a true circle is 1. For consistency, all aspect ratios from now on will be discussed in terms of length in pixels, not inches. For the circles we plotted, the aspect ratio was 5/6; the slight shortening of the *y* axis produces the visual effect of a circle. A shape like a flying saucer would have a low aspect ratio, perhaps 1/5, while a shape like an egg standing on end would have a high aspect ratio of perhaps 5/1.

## Hands On

The shape of an ellipse drawn with CIRCLE is defined by the aspect ratio. The complete CIRCLE command is of the form

```
CIRCLE (x,y),radius,color,start,
end,aspect
```

where *aspect* is the aspect ratio of the ellipse. Enter

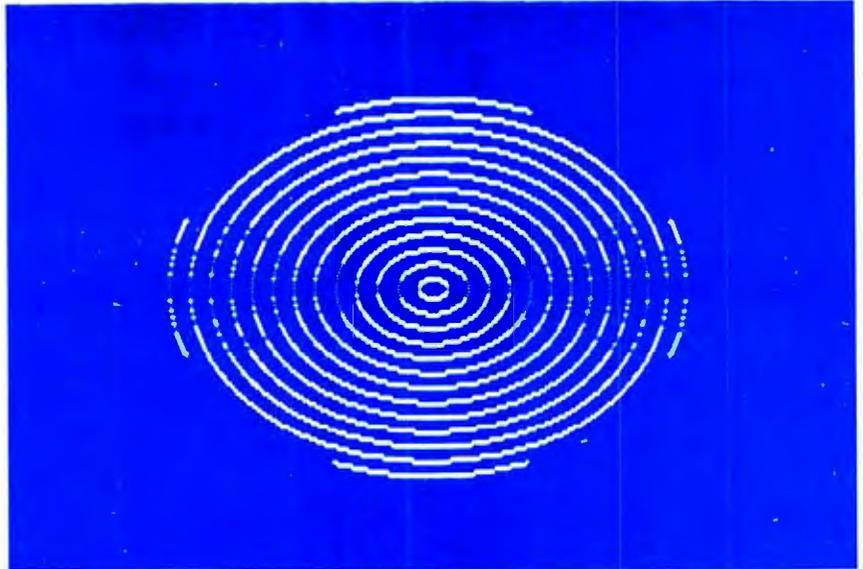
```
CIRCLE (160,100),50,,,,1
```

and the noncircularity of a circle with an aspect ratio of 1 will become apparent.

With aspect ratio in mind, consider the actual meaning of the *radius* parameter, which alone determines the size of the ellipse. Simply put, *radius* is measured in pixels along the longer of the two ellipse axes. If the aspect ratio is 1, for example, then *radius* is the distance from the center to every point on the circle, particularly along the two axes. If the aspect ratio is less than 1 (this means that the *x* axis is the longer axis) then *radius* is the distance from the center to the edge of the circle along the *x* axis only. Similarly, if the aspect ratio is greater than 1, *radius* is the distance from the center to the edge along the *y* axis only.

To see this yourself, run the program in Listing 2. This program first decreases the aspect ratio from 10 to 1 while holding *radius* constant; notice that the length of the *y* axis is constant from circle to circle, while the *x* axis steadily lengthens. Since the aspect ratio is greater than 1, it is taken relative to the *radius* as measured in pixels along the *y* axis. The aspect ratio is then decreased from 1 to 1/10; here, the length of the *x* axis remains constant at *radius*, while the *y* axis steadily shortens.

As a final note on ellipses, the BASIC manual states that an aspect ratio of 1 may produce more attractive circles (which appear to be slightly ellipsoidal) than the default 5/6 aspect ratio. This is because circles are drawn symmetrically with fewer jagged edges when the aspect ratio is 1. The manual states that circles with an aspect ratio of 1 are



Concentric ellipses

drawn somewhat faster; the increase in drawing speed is negligible. Also, the IBM BASIC manual says that *aspect* is the ratio of the *x* axis to the *y* axis, when *aspect* is actually the ratio of the *y* axis to the *x* axis.

### CIRCLE in High-Resolution Mode

Using the CIRCLE command in high-resolution mode is only slightly different from using the command in medium-resolution mode.

First, all aspect ratios in high-resolution mode should be half of those used in medium-resolution mode to produce the same images. The default aspect ratio in high-resolution mode, for example, is 5/12, rather than the 5/6 in medium-resolution mode.

Second, it takes significantly longer to draw a circle in high-resolution mode than it does in medium-resolution mode. Since CIRCLE is a fairly slow-acting command, this can be a major consideration.

Finally, figures drawn in high-resolution mode can be in only black and white, but they are smoother than their medium-resolution counterparts. This can be especially important with CIRCLE, which produces jagged edges, most noticeably with aspect ratios not equal to 1.

When running the program in Listing 3, notice the smooth lines in the concentric ellipses.

### PAINT—the Artist's Brush

We have covered most of the BASIC commands for drawing figures. The figures, however, are essentially line drawings. To get the full effect of color graphics, you should use areas of solid colors. While the BF option in the LINE statement produces a solidly colored area, it is not flexible enough to meet demands extending beyond rectangular figures; in particular, the statement doesn't complement figures produced with combinations of the LINE, PSET, and CIRCLE commands. What we need is a brush capable of coloring in the bars in histograms, the wedges in pie charts, and the countries on maps.

PAINT is just such a command. In the command

```
PAINT (x,y),paint,boundary
```

*x* and *y* are the absolute or relative coordinates at which the painting is to start, *paint* is the color to be painted in, and *boundary* is the color of the border of the shape that is to be colored. *Paint* and *boundary* are optional. *Paint* defaults to the foreground color, while *boundary* defaults to the *paint* color. If the start point is *boundary* color, PAINT has no effect; the last point referenced by PAINT is the point at which painting starts. One note here: an 'ILLEGAL FUNCTION CALL' results if you attempt to PAINT at a point off the

```

100 REM clear screen and set high-resolution mode
110 KEY OFF:CLS:SCREEN 2
120 REM draw concentric ellipses
130 FOR RADIUS=10 TO 250 STEP 15
140   CIRCLE(320,100),RADIUS,1,,.3
150 NEXT RADIUS
160 END

```

Listing 3

```

100 REM demonstration of paint command
110 CLS:SCREEN 1,0:COLOR 0,1:KEY OFF
120 REM draw three circles and paint at the centers with
130 REM   three different colors
140 CIRCLE (100,80),40,3
150 PAINT STEP(0,0),3,3
160 CIRCLE (130,120),40,3
170 PAINT STEP(0,0),1,3
180 CIRCLE (160,80),40,3
190 PAINT STEP(0,0),2,3
200 END

```

Listing 4

```

100 REM pie chart program
110 REM initialize the screen
120 KEY OFF:CLS:SCREEN 1,0:COLOR 0,1
130 REM get all the values needed
140 INPUT "Number of items:";N
150 TOTAL=0
160 FOR I=1 TO N
170   INPUT "Number, Label";ITEM(I),L$
180   LABEL$(I)=LEFT$(L$,8) 'max of 8 characters
190   TOTAL=TOTAL+ITEM(I)
200 NEXT I
210 CLS 'CLEAR THE SCREEN
220 OLDANG=0 'ANGLE AT WHICH LAST WEDGE WAS DRAWN
230 TWOPI=6.28 'THE RADIAN EQUIVALENT OF 360 DEGREES
240 FOR I=1 TO N 'THERE WILL BE N WEDGES BE DRAWN
250   REM calculate the fraction of the circle to draw for this wedge
260   ADDANG=TWOPI*(ITEM(I)/TOTAL)
270   REM calculate the ending angle for this wedge
280   NEWANG=OLDANG+ADDANG
290   REM draw the wedge with a radius of 60 dots in white
300   CIRCLE(160,100),60,3,-OLDANG,-NEWANG
310   REM calculate the x and y components of the line which would
320   REM   go through the center of the wedge
330   XCOMP=COS(OLDANG+(ADDANG/2))
340   YCOMP=-SIN(OLDANG+(ADDANG/2))*(5/6)
350   REM fill in the wedge by painting starting at a point in the
360   REM   center of the wedge
370   PAINT(160+XCOMP*30,100+YCOMP*30),I MOD 4,3
380   REM find a place in text character location terms to put
390   REM   the label for this wedge
400   LOCATE (100+YCOMP*95)/8,(140+XCOMP*95)/8
410   PRINT LABEL$(I)
420   REM the new angle for this wedge is the old angle for the
430   REM   next wedge
440   OLDANG=NEWANG
450 NEXT I
460 REM wait for a key to be hit before ending
470 IF INKEY$="" GOTO 470 ELSE END

```

Listing 5

screen, by either absolute or relative addressing. However, that off-screen point is the last point referenced, despite the error. For instance, PAINT (160,200)

produces an error, but if the command is immediately followed with CIRCLE STEP(0,0),50 a circle is drawn with the center off the screen at (160,200).

In plain English, the PAINT command says, "Starting at x,y, paint everything you can the *paint* color, but don't touch or go past anything that is *boundary* color."

Let's PAINT a little. Clear the screen and enter

```
LINE (20,100)-(50,130),,B:PAINT (30,110)
```

to produce a solid square. Now try CIRCLE (110,100),50:PAINT STEP(0,0)

```
to create a colored ball, and
```

```
CIRCLE (220,100),50,3:PAINT STEP(0,0),2,3
```

to make a colored ball with a differently colored edge. (This may not be clear on a TV monitor.) Clear the screen and enter

```
CIRCLE (160,100),50:PAINT STEP(0,0),2
```

Notice that the whole screen fills in. This is because the *boundary* color defaults to the *paint* color, which is 2 in this case. Since the circle is drawn in color 3, no *boundary* color is found, and the painting continues to the edge of the screen. PAINT, incidentally, is an easy way to set the screen to a color other than the background color.

Use the program in Listing 4 to paint a complex figure. Also notice that the PAINT command for this figure is no more complicated than for a box. PAINT for the high-resolution mode is similar to PAINT in medium-resolution. In this case the command is

```
PAINT (x,y),paint
```

where *paint* is 0 or 1 for black or white. There's no sense in specifying a *boundary* color; since there are only two colors, *boundary* must be the same as *paint*.

Like the CIRCLE command, PAINT takes about twice as long to execute in high-resolution mode as in medium-resolution mode.

## Getting Started With BASIC

If you missed "Getting Acquainted with Graphics" (*PC World*, Vol. 1, No. 2), that taught readers how to get into medium-resolution color mode in BASIC, here's a summary to help you along. The procedure is a snap, unless you have both the monochrome and color/graphics adapters. Even so we'll help you through the procedure for one or both monitors.

First, put a copy of your DOS disk into drive A and boot up the PC. (See the DOS manual for more information on the booting process.) When the A prompt appears, enter the command BASICA. The BASIC OK prompt will soon appear.

This is where life becomes a tad complicated for people with two screens. If your system has a color/graphics adapter but boots on the monochrome screen, you need to switch to the color screen. To do this, just type in the program in Listing 6 exactly as it appears (each line is ended with the enter key). When you're sure the pro-

gram is correctly entered, type SAVE "SWITCH" and press the enter key. Then type RUN (or press the F2 key). The monochrome screen should blank, and the OK prompt should appear on the color screen. If this does not occur, reboot the system and try again. When you do get the proper result, you're ready to go with the color/graphics adapter. In the future, all you have to do after entering BASIC is enter RUN "SWITCH" to get to the color screen.

Once you're in BASIC on the color screen, SCREEN 1,0 puts you in medium-resolution color mode. COLOR 0,0 and COLOR 0,1 select palettes 0 and 1, respectively, on a black background. Once you've issued these SCREEN and COLOR commands, you're all set to do medium-resolution color graphics. If you have problems with any part of this, consult the BASIC manual or, better yet, read "Getting Acquainted with Graphics" in the last issue of *PC World*.

### PAINTing Tips

The use of PAINT is straightforward: if there is a figure you want filled in, start PAINT somewhere inside that figure; if there is an area you want filled in, outline and PAINT it.

You may have noticed that PAINT goes off in each of several directions when it starts in the middle of a figure or when it comes to an irregular surface. This is the PAINT command's way of ensuring that an entire area is covered. Starting the command in a corner (preferably the upper or lower edge of the figure, such as the 12 o'clock edge of a circle), enables PAINT to occur more smoothly.

PAINT uses a good deal of memory to keep track of the turns it must make. With a complex figure, there can be many pending turns, and the PAINT command may run out of memory. If this occurs, an 'OUT OF MEMORY' error message is displayed. More memory can be allocated for the use of the PAINT command (at the expense of program memory) by entering CLEAR „3000

This should solve any memory problems related to PAINT while leaving plenty of memory available for your

```

10 'Program to toggle from graphics board to monochrome board or vice-versa
20 'Figure which board is active & switch to other board
30 LOCATE 1,1,0:DEF SEG=0:A=(PEEK(1040) AND 48):IF A<>48 GOTO 110
40 'Switch to color/graphics board
50 KEY OFF:CLS
60 A=PEEK(1040):POKE 1040,(A AND 207) OR 32
70 SCREEN 0:LOCATE 1,1,1,6,7
80 KEY ON:WIDTH 40
90 END
100 'Switch to monochrome board
110 KEY OFF:CLS
120 A=PEEK(1040):POKE 1040,A OR 48
130 SCREEN 0:LOCATE 1,1,1,12,13
140 KEY ON:WIDTH 80
150 END

```

Listing 6

programs. Note that the CLEAR command zeroes all variables, so it should be used only at the beginning of a program. Check the IBM BASIC manual for more information on the CLEAR command.

A condition to watch for on TV and composite monitors is the appearance of gaps in the boundary of a figure, especially of a circle. The edges are there whether the screen displays them or not. PAINT recognizes these edges and stops at them. The gaps appear because only every other pixel may appear on these screens. If you become confused in such a situation, use white, which shows every pixel, to draw the boundary of the figure.

Finally, you may have noticed that PAINT can be slow. This is most noticeable with large, irregular figures such as those in the sample program in the BASIC manual. To use PAINTed forms in animation, the GET and PUT graphics commands must also be used. Generally, though, PAINT is a remarkably useful, easily applied command that puts the splashy color graphics of the PC at your fingertips.

### A Pie Chart Program

Let's put our knowledge of the CIRCLE and PAINT commands to work in designing the pie-chart-drawing program in Listing 5. The function of this program is to accept a number of data points, and then to draw a

circle sliced into wedges based on the data points. The pie charts produced are useful for quickly communicating the relative magnitudes of various data.

First, line 120 sets the cleared screen to the medium-resolution mode with palette 1 on a black background. Next, in line 140 the program prompts the user for the number of items to be drawn. The FOR...NEXT loop in lines 160-200 gets the label and value of each data point. Also maintained is the sum of

---

## PAINT puts the splashy color graphics of the PC at your fingertips.

---

all the data points for creating wedges. Each label is limited to 8 characters.

Line 210 clears the data input dialogue from the screen.

Since each wedge is drawn in turn, it is simplest to start drawing a new wedge at the end of the previous wedge. The variable OLDANG is the angle (measured in radians) of the end of the previous wedge. OLDANG is initially set to zero in line 220 so that the first wedge will begin at the three o'clock position.

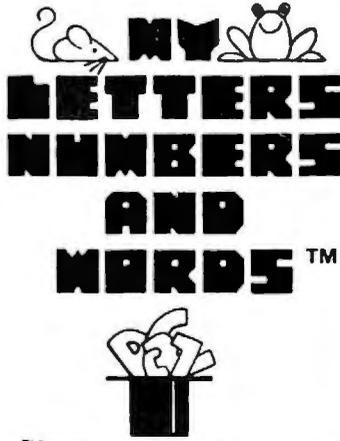
The variable TWOPI is used to hold the constant value of the number of radians in a complete circle, which is 6.28, in line 230.

We are now ready to begin drawing each wedge in turn. The FOR...NEXT loop extending across lines 240-450 does this while also plotting each wedge and coloring and labeling it.

Line 260 calculates the fraction of a full circle that the data point represents. Stored in the variable ADDANG, this fraction is equal to the distance around the circle from the start of the wedge for which the edge is to be plotted. On line 280 this wedge width is added to the wedge starting point to produce the wedge end point, which is stored in the variable NEWANG.

Line 300 is all that is required to actually draw the wedge. Note that the circle is centered on the screen, has a radius of 60, and is drawn in color 3 (white). Also note that the use of negative signs in front of OLDANG and NEWANG causes lines to be drawn from the ends of the arc to the center of the circle, forming the wedge.

Now let's PAINT the wedge. First we must figure out where to start the PAINT. The simplest approach is to start halfway between the edges of the wedge, and halfway between the center and the edge of the circle. Lines 330-340 calculate XCOMP and YCOMP, the x and y compo-



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## ☉ Hands On

nents of the line that extends from the center of the circle midway between the sides of the wedge. Note that SIN is made negative; this is because mathematical convention has  $y$  increasing from the bottom upward, but as we have already mentioned, on the PC screen  $y$  increases from the top downward. Also, the  $y$  component is multiplied by  $5/6$  to compensate for the aspect ratio of the screen.

Line 370 colors in the wedge. White is the boundary color for the PAINT (line 300 always uses white). The section reading '1 MOD 4' generates the values 0,1,2,3,0,1,2,3,0,1,... over and over as 'I' increases, thus cycling through each of the four available colors in turn. Each wedge is a different color from its neighbor with the possible exception of the first and last wedges.

The label is now printed with lines 400–410. The label is centered on the same central line used to pick the point that PAINT began on, but it is located outside the circle. The value 95 is used in line 400 so that the label is printed well outside the circle. The values are divided by 8 because the LOCATE command, which sets the screen position at which the next PRINT occurs, works in terms of characters, not pixels, and each character is 8 pixels wide and 8 pixels high.

The wedge is now complete. Since the next wedge begins where this wedge ended, the next wedge's trailing edge (OLDANG) is set equal to the leading edge of the current wedge (NEWANG). The FOR...NEXT loop then proceeds to the next data point.

If all data points have been plotted, it remains only to terminate the program. The INKEY\$ function returns a null string (" ") when no key has been hit. Line 470 monitors the keyboard continually and ends the program only after a key strike is detected. At that point the program is finished.

As you will see in the pie chart program, text can be put on the screen in graphics or text modes with

the LOCATE and PRINT statements, which let BASIC draw the letters on the screen for you. If you write a good deal of text in graphics mode, you will notice that this process of drawing text is considerably slower than putting text on the screen in text mode; it is, however, convenient to be able to mix text with graphics. One problem is that it is only possible to put characters in graphics mode at the same places they appear in text mode; that is, characters can begin at graphics  $x$  coordinates 0, 8, 16, 24, and so on and at  $y$  coordinates 0, 8, 16, 24, and so on, but at none of the in-between points. This maintains compatibility with text modes but makes it difficult to get labels in the right places in graphics mode.

To dump graphics screens to your printer, investigate the companies that provide software for printing graphics screens on an IBM printer. There is even software available for dumping screens to color printers such as the IDS Prism printer.

## Until Next Month

So far we've made drawing and painting circles on the PC easy. Next month we'll discuss the nature of the graphics screen in enough detail to show you how to save pie charts, graphs, and other drawings to disk. We'll also cover the GET and PUT graphics commands. This will ultimately lead to some real-time animation as in video games. In the meantime, practice drawing and painting on your PC. Arcs, wedges, and ellipses are as easy as pie!

---

*Dan Illowsky and Michael Abrash coauthored the Snack Attack II video game for the IBM PC. Illowsky, author of the original Snack Attack for the Apple II, is president of Funtastic, Inc., in Drexel Hill, Pennsylvania. Abrash has written several video games and is an energy consultant with Delphi Energy Group in Philadelphia. The authors are planning to adapt the information in this article for a future book.*



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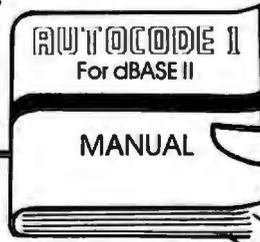
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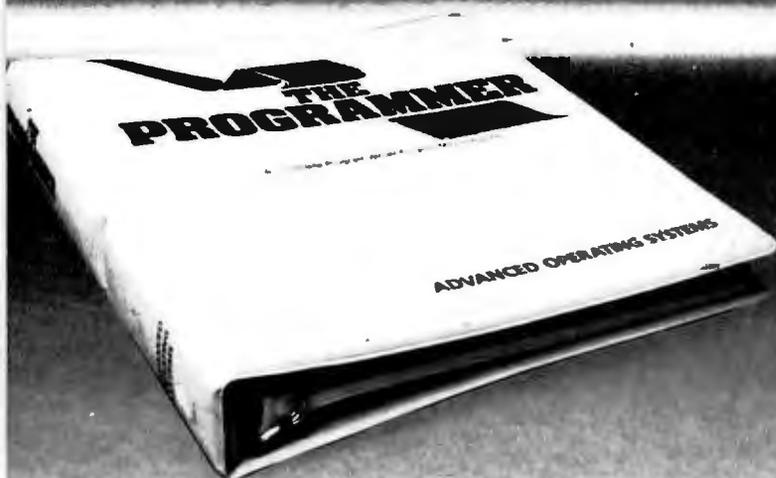
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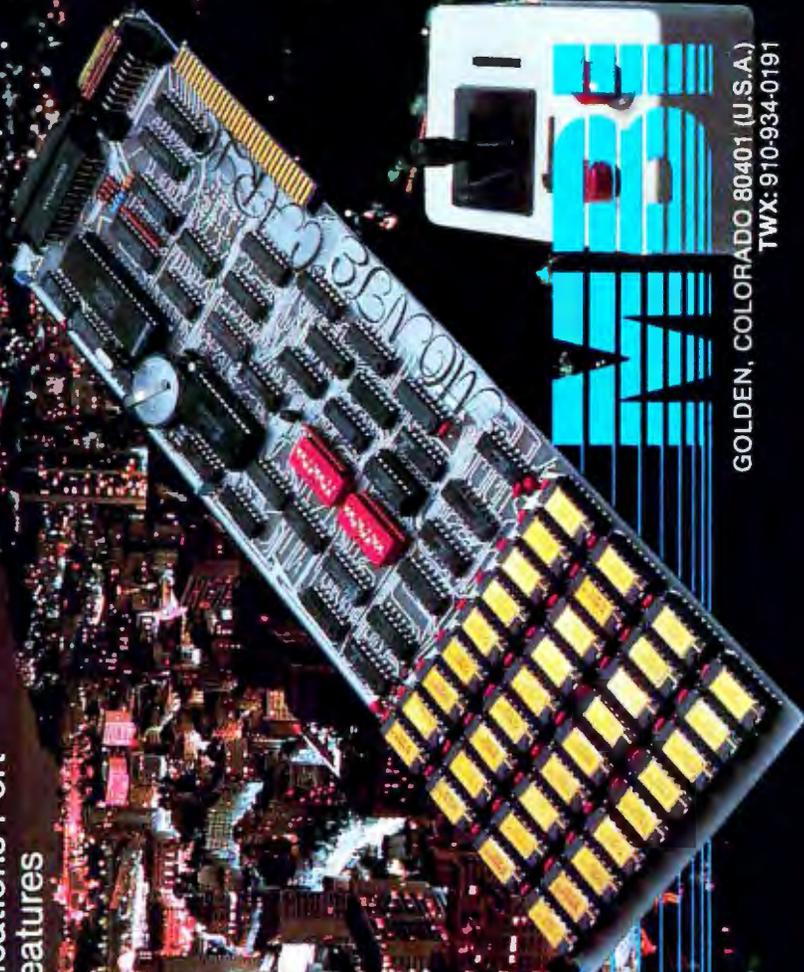
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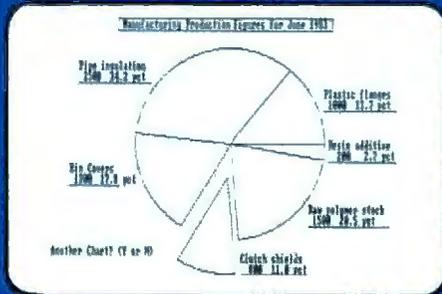
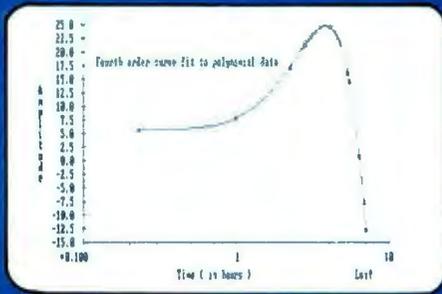
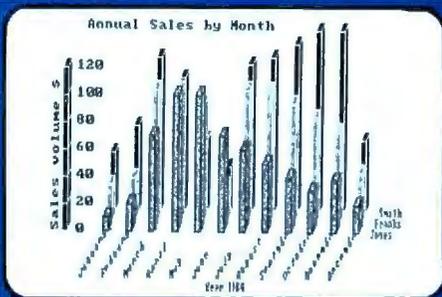
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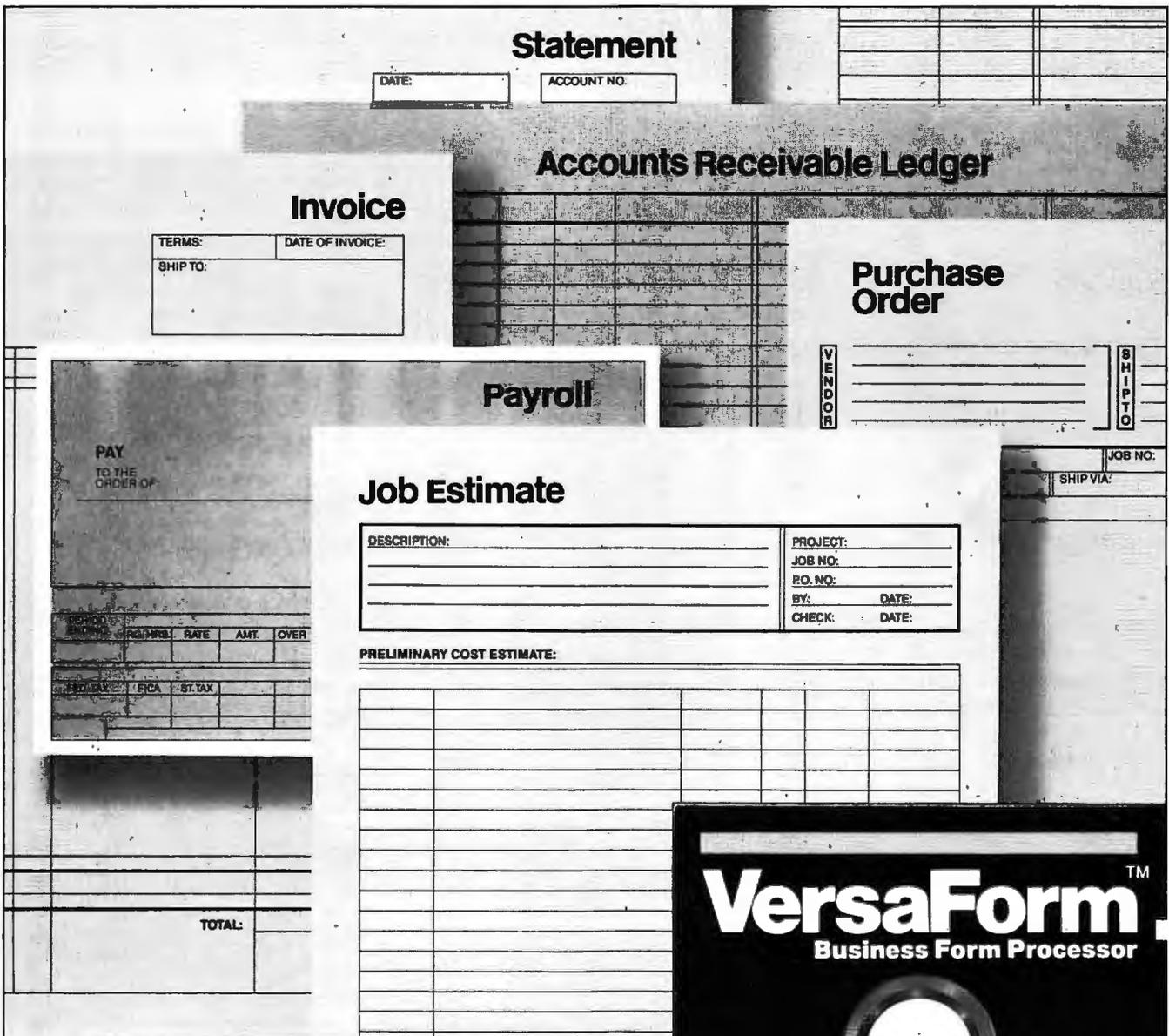
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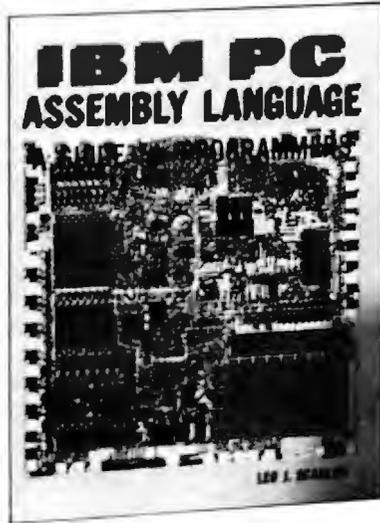
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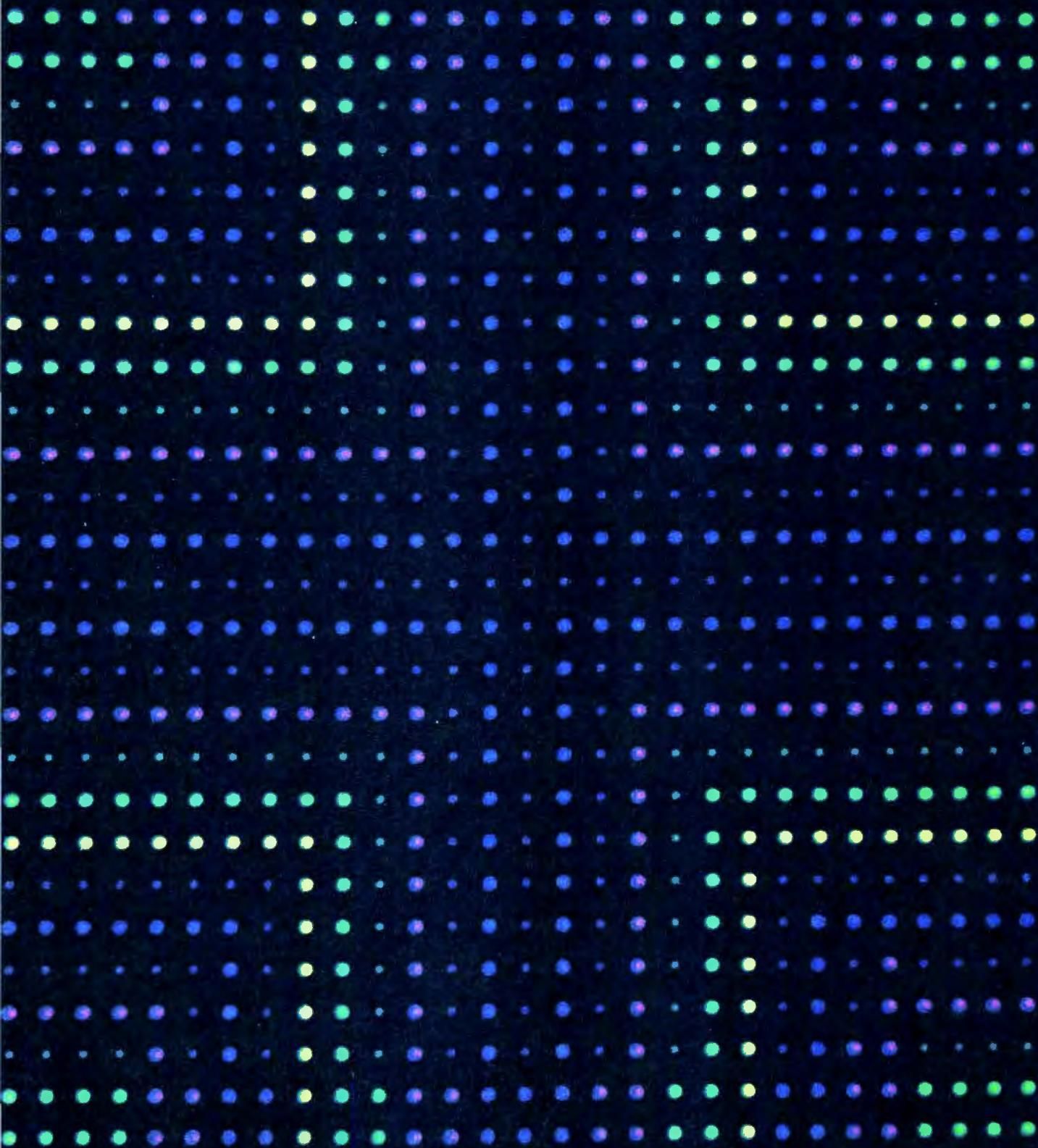
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# Announcing The PC World Software Review written by the readers of PC World



**You can be part of the most useful reference tool ever compiled for the IBM PC and compatible computers. In the process you may get your name in print and win up to \$1500 worth of software.**

With the assistance of our readers, *PC World* is compiling a guide to the most useful software products available for the IBM PC. The *PC World Software Review* will be published in fall 1983 and will be followed in the spring by the *PC World Hardware Review*.

The *Software Review* will list and evaluate all categories of software available for the IBM PC. From spreadsheets and communications programs to operating systems and games, the *Software Review* will be a user guide to the complex software marketplace. The *Software Review* will reflect the experience of the community of PC users, with selections and evaluations based on insights acquired through hands-on testing.

Contributors will be credited for each evaluation published in the *Software Review*, and published contributors will be eligible to win a grand prize of \$1500 worth of software or five prizes worth \$500 of software each. Contest winners will be selected in a drawing and their names will be announced in the *Software Review*.

Anyone who has used a product on the IBM PC or a compatible computer can write an evaluation of that product and submit it for inclusion in the *Software Review*. Manufacturers are invited to write about their own products, but they must credit the submission to an individual within the company. There is no limit to the number of evaluations that may be submitted. *PC World* must receive all materials by June 1, 1983.

Once received, submissions will be checked for accuracy, edited, and compared. If *PC World* receives more than one submission for a product, the most useful evaluation will be selected on the basis of completeness, clarity, and insight into the product's features. *PC World* reserves the right to edit reviews to conform to the magazine's format and style. A review form for the submission of evaluations is provided with this announcement.

If you have found a software product especially valuable, this is an opportunity to help your fellow users learn about it. We invite you to be a part of this exciting collaborative venture.

#### Form Instructions

Use the attached form for each evaluation you wish to contribute to the *Software Review*. The form may be photocopied to submit more than one evaluation.

- *Provide general product information.* Write the product's name with the spelling, capitalization, and punctuation used by the manufacturer. Check the box next to the category name that best describes the product. If you check the box for integrated applications, you must also check the applications that are integrated. Describe the minimum system requirements in terms of RAM (in K), number of disk drives, interface cards, and any other hardware or software needed by the user to effectively operate the program. Don't include the monochrome monitor, keyboard, DOS, or BASIC.
- *Describe and evaluate the product by its features.* Give a one-sentence summary of general features. Briefly explain two features that distinguish the product from its competitors. Describe two relevant limitations of the product (what the product doesn't do that users might ideally expect from a product in that category).

Describe the type of user for whom the product is intended. For example, is the product best suited for business, programming, personal use, or some other activity? The section for comments may be used for remarks that elude the review format but are essential to understanding the product.

- *Provide consumer information.* Include the product's list price and the price for the various available configurations and options. Give the manufacturer's complete name, address, and telephone number. A Source or Telex number can be included if available.
- *Tell us who you are!* List your name so we can publish it (unless you want your review to be anonymous). Include your address and telephone number in case you are a winner in the contest or we need to contact you for more information.

Check whether you are the product manufacturer. If you are, we encourage you to send us press information and a black and white, glossy photo for publication.

Please avoid advertising hyperbole, wordiness, and ambiguity. Identify concrete product features rather than making sweeping remarks. *PC World* reserves the right to edit submitted materials, all of which become the property of *PC World* magazine.

**Review Form**

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**B. APPLICATIONS SOFTWARE**

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| 2. <input type="checkbox"/> Word processing       | 9. <input type="checkbox"/> Business management        |
| 3. <input type="checkbox"/> Data management       | 10. <input type="checkbox"/> List management           |
| 4. <input type="checkbox"/> Business graphics     | 11. <input type="checkbox"/> Design graphics           |
| 5. <input type="checkbox"/> Communications        | 12. <input type="checkbox"/> Job and industry specific |
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System requirements \_\_\_\_\_

**II. Product Features**

General features: \_\_\_\_\_

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Two distinguishing features: 1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

Two limitations of the product: 1. \_\_\_\_\_

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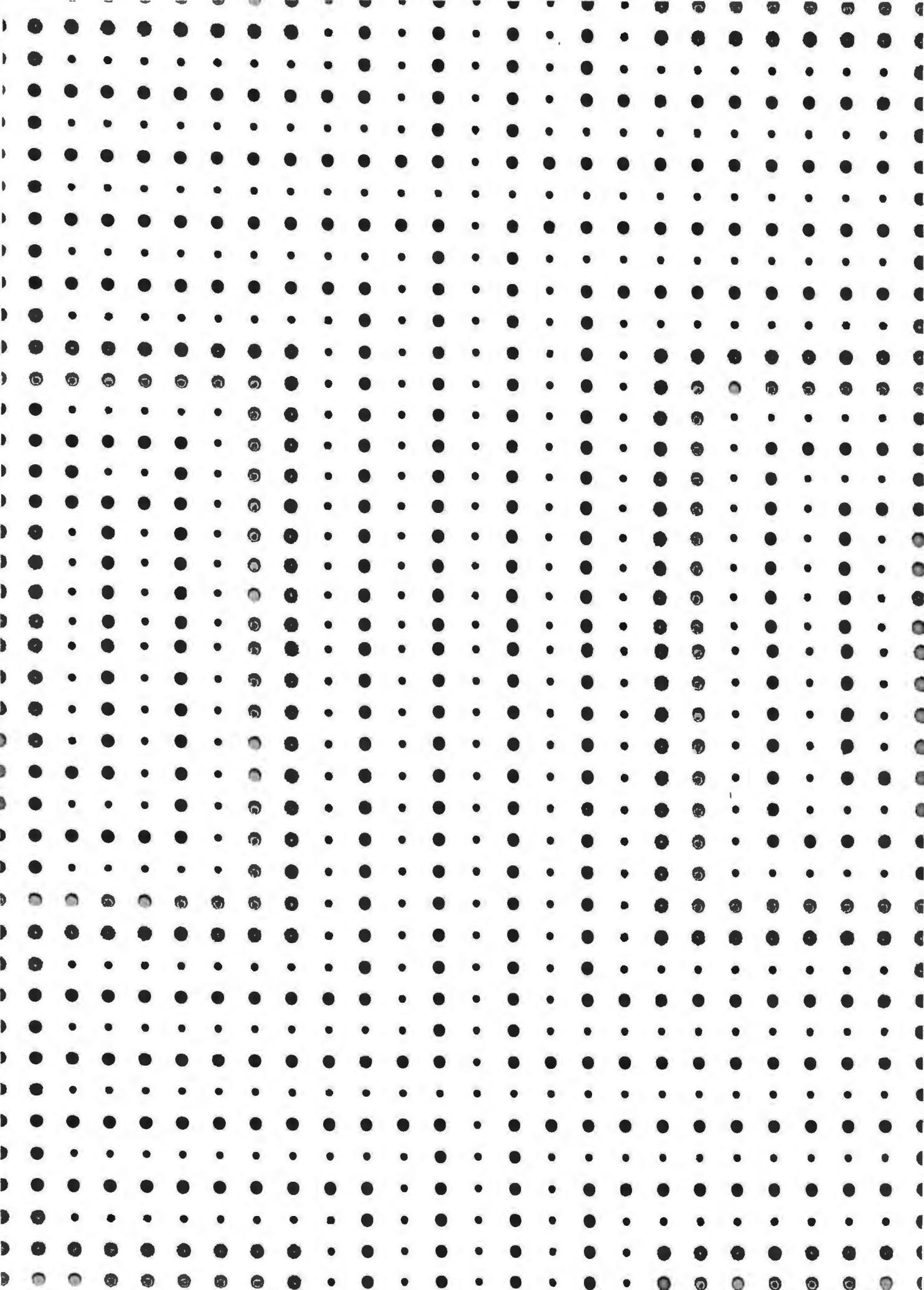
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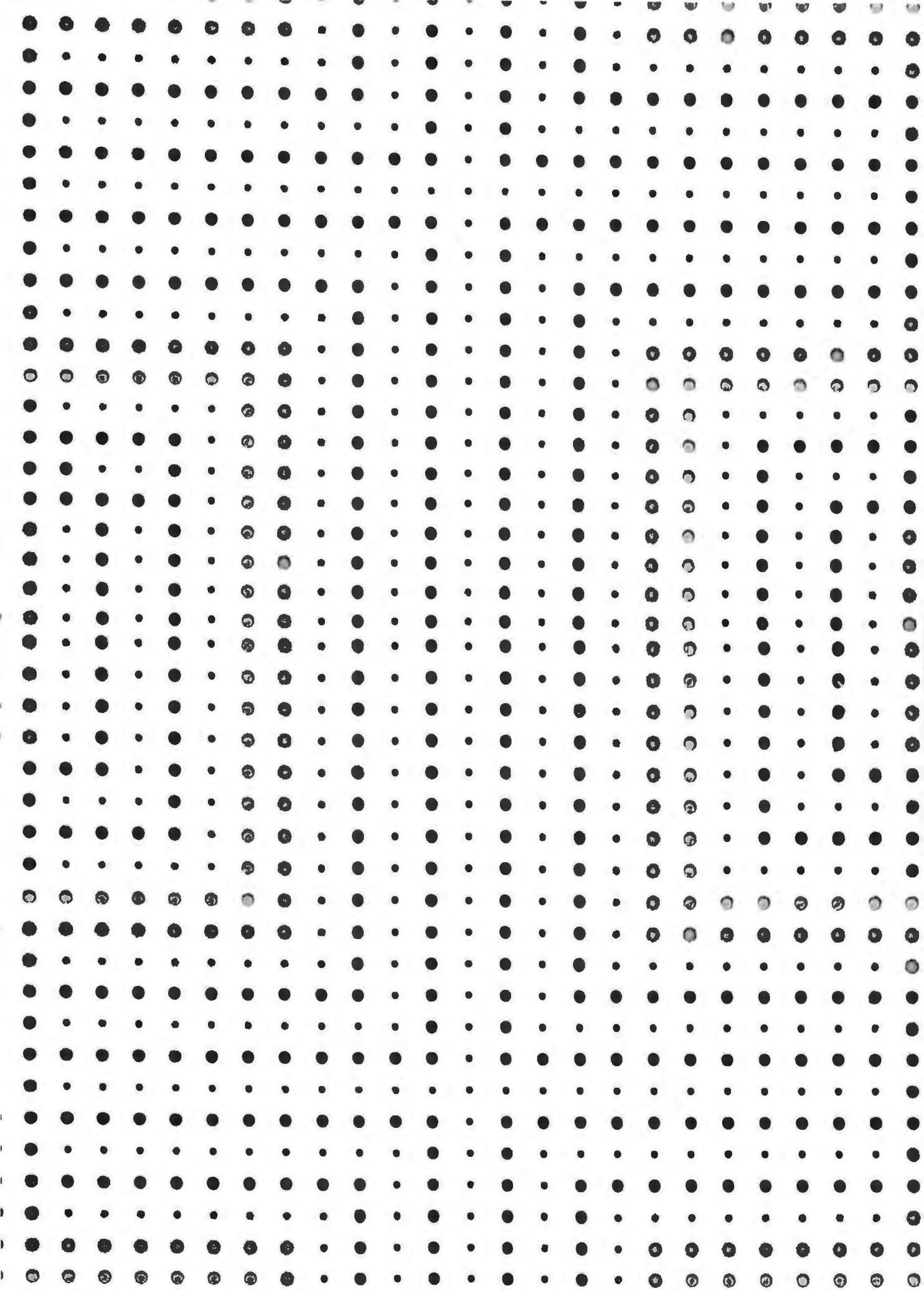
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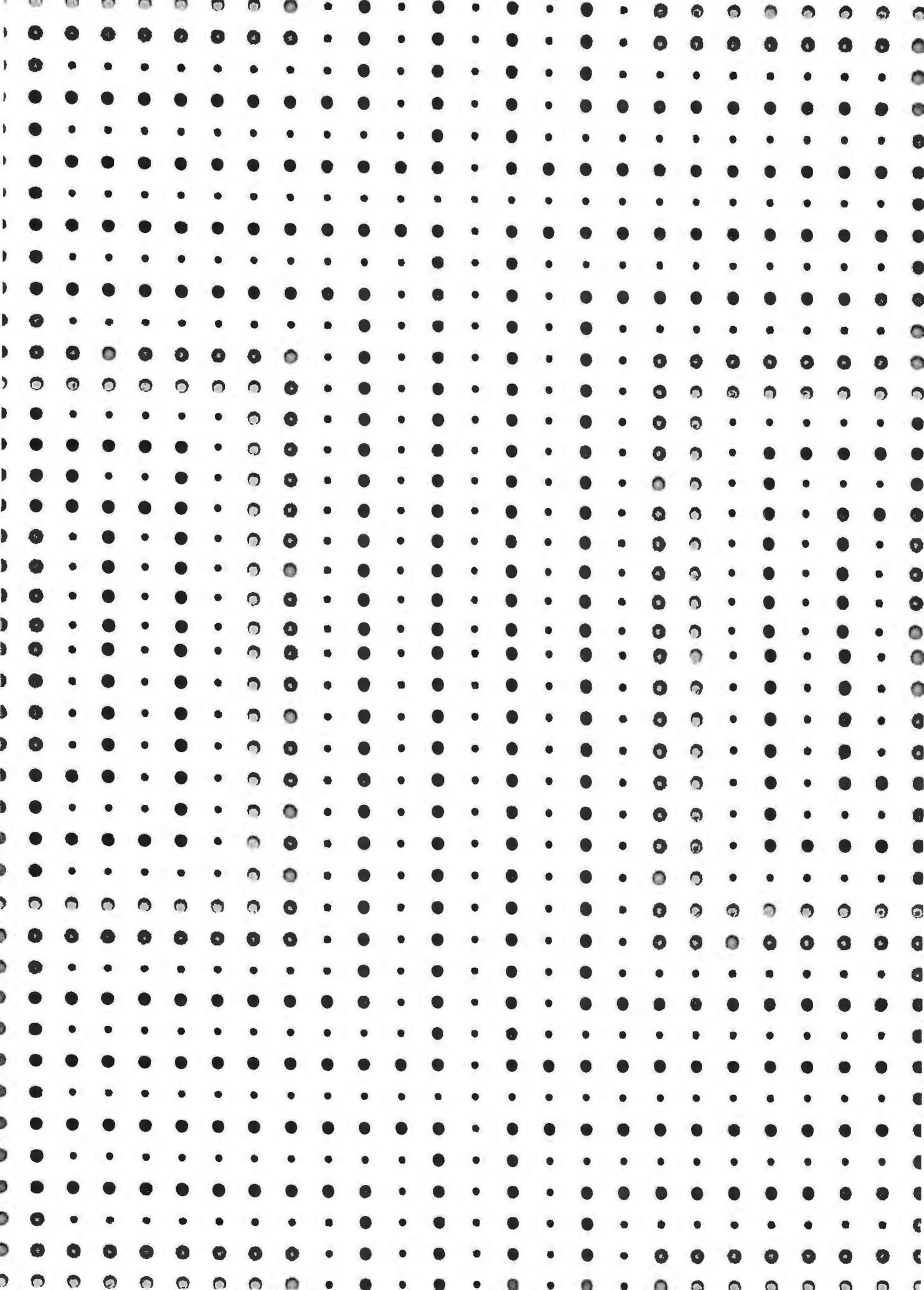
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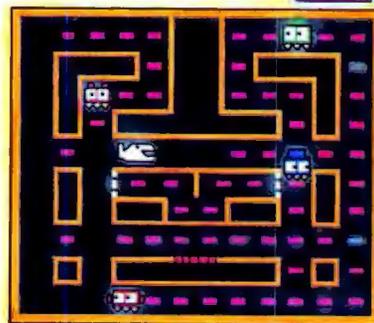
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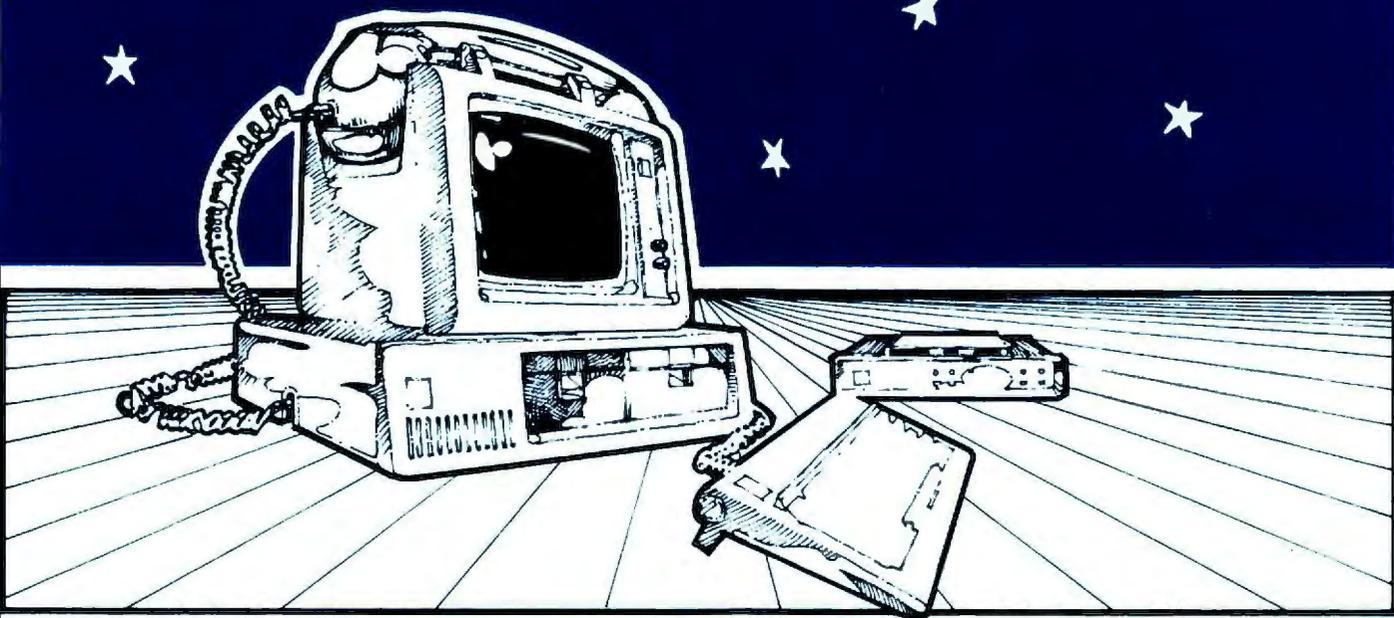
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*A series of BASIC programs that simulates a throw of the dice and a shuffled deck of cards*

*Karl Koessel*

The ability to create an ordered set of numbers is expected of computers, but they can also generate random, disordered numbers (see “The Random Number Generator”). Random number sequences have applications that range from scientific to recreational. Some mathematical techniques, for example, use them to calculate statistical averages to derive approximate solutions in cases in which direct formulas are not available, such as simulating emissions from radioactive materials. Computers are well suited to this type of task because they can loop quickly through the many iterations necessary to obtain a satisfactory average: the larger the number of trials, the more accurate the result.

On the lighter side, a sequence of random numbers can be used in simulating a sequence of random throws of dice or a shuffled deck of cards. The BASIC programs in this article demonstrate these two applications of the random number generator.

The random number generator produces only values between 0 and 1, but with the aid of some simple math, BASIC can pick random integers between any bounds, and each possibility has an equal chance. The dice-throwing program (Listing 1) uses three statements (lines 60, 70, and 80) that demonstrate different ways to simulate a throw of the die.



None of the three methods is better than the others; each one is a different way to perform the same task.

Changing the dice program to pick a random integer between 1 and 52 simulates drawing a random card from a full deck. To simulate drawing more than one card from a deck, however, the cards must be different. One way to accomplish this is to choose two random integers and

compare the second value to the first; if the values are equal, choose another random integer and compare it to the first value, repeating the cycle until two different values are chosen. This simple method is readily expandable to simulate the choosing of 52 different cards, an entire shuffled deck.

```

10 DEFINT A-Z
20 CLS:KEY OFF:LOCATE 25,1
30 PRINT "PRESS THE ESC KEY TO QUIT, ANY OTHER KEY TO THROW DICE"
40 X$=INPUT$(1)
50 IF X$=CHR$(27) THEN KEY ON:END
60 DIE(1) = RND * 6 MOD 6 + 1
70 DIE(2) = FIX( RND * 6 ) + 1
80 DIE(3) = RND * 6 + .5
90 PRINT DIE(1),DIE(2),DIE(3)
100 GOTO 40

```

Listing 1

```

9 '***** Shuffler *****
10 GOSUB 100 'Initialization
20 GOSUB 200 'Shuffling routine
30 GOSUB 300 'Sample sequence
90 END
99 '**** Initialization common to all four shuffling routines
100 DEFINT A-Z
110 TOTAL=52
120 DIM CARD(TOTAL)
130 RANDOMIZE VAL(RIGHT$(TIME$,2))
139 '*** Additional initialization for any one routine
140 '*** is merged into this area
190 RETURN
199 '***** Shuffling routine
200 '*** One of the four shuffling routines
210 '*** must be merged into this area for
220 '*** the shuffler program to demonstate
290 RETURN
299 '***** Sample sequence
300 FOR POSITION=1 TO TOTAL
310 PRINT USING " ##";CARD(POSITION);
320 NEXT
330 PRINT
390 RETURN

```

Listing 2

```

9 '***** Compare candidate with each value already chosen
139 '*** Additional initialization for this routine
140 TRUE=NOT FALSE
190 RETURN
199 '***** Shuffling routine
200 FOR POSITION=1 TO TOTAL
210 CARD(POSITION)=RND*TOTAL MOD TOTAL +1
220 USED=0
230 FOR CHOSEN=1 TO POSITION-1
240 IF CARD(POSITION)=CARD(CHOSEN) THEN USED=TRUE:CHOSEN=POSITION
250 NEXT
260 IF USED THEN 210
270 NEXT
290 RETURN

```

Listing 3

## ● Hands On

### Short-Distance Runner

This routine works well while making its initial choices but becomes inefficient as the number of chosen cards increases. The reason for this problem is twofold: each new, randomly selected number must be compared to a growing number of already chosen values; in addition, the statement for choosing a random integer is repeated more often as new candidates match chosen values more frequently. Using this routine to draw a few cards from a deck is quick, but to build a shuffled deck of 52 cards takes an average of about 50 seconds, which is too long to be practical.

The shuffling demonstrator program (Listing 2) is used to demonstrate several shuffling techniques. Load BASIC, type in the program, and save it with 'SHUFFLER'. Then type NEW to delete the saved program from memory. Next type in the shuffling routine in Listing 3 and save it in ASCII format (use the A option) with the name 'COMPARE'. Now load 'SHUFFLER' and type CHAIN MERGE "COMPARE" <ENTER>. Notice that the time required to shuffle the deck varies each time the program is run.

Employing an array of flags is one way to speed up this shuffling routine. Each of the 52 possible values has its own flag, indicating whether the value is available or already

chosen. Initially all the flags are false (= 0). Whenever an available value is chosen, its flag is set true (= -1). Instead of comparing a new candidate to each of the already chosen values, a single check of the candidate's flag indicates its status. To demonstrate this routine, delete the program in memory with the command NEW, type in Listing 4, and save it in ASCII format (use the A option) with the name 'ARRAYFLG'. Then load 'SHUFFLER' and type CHAIN MERGE "ARRAYFLG" <ENTER>.

This routine is far more efficient than the first, taking an average of about 3.5 seconds to perform the same task, even though this routine also suffers from having to make increasing use of the statement that

---

## The Random Number Generator

BASIC's random number generator generates random numbers between 0 and 1. The format is  $y = \text{RND}(x)$ . If the optional ( $x$ ) is positive or not included,  $\text{RND}(x)$  generates a random number.  $\text{RND}(0)$  repeats the last number generated. Using the RND function with a negative value for  $x$  will reseed the random number generator.

The sequence of random numbers generated by BASIC is determined by the random number seed, a number that starts a particular sequence of numbers. For any given seed, the same sequence of numbers will always be generated. BASIC reseeds the generator with its default seed value whenever a program is run or cleared, so the same sequence of numbers will be repeated. If a different sequence is desired, the program must supply the random number generator with a different seed value.

Although using the RND function with a negative  $x$  reseeds the random number generator, the same sequence of numbers will be generated by seed values that are two or four (or any multiple of two) times each other, as though the seed values were equal. For example, a seed value of -2 will generate a different sequence than a seed value of -3, but seeds of -1, -2, -4, or -8, and so on, all generate the same sequence of numbers; the sequence generated from a seed value of -1.5 will be the same as the sequence generated from a seed value of -3.

Using the RANDOMIZE statement to seed the random number generator avoids the duplicate sequence problem presented by the RND function. The format is: `RANDOMIZE [N]`

If  $N$  is omitted, program execution is suspended and BASIC prompts you to enter a seed value by displaying 'Random Number Seed (-32768 to 32767)?'. If  $N$  is included, it is used as the seed.

The RANDOMIZE statement re-

places only the seeding function of RND. The RND function must still be used in the manner described above to access the random numbers.

In the shuffler demonstrator program (Listing 2) the random number generator is seeded by a RANDOMIZE statement in line 130. The seed value to be used is obtained from the seconds portion of TIME\$, so 60 random number sequences, and therefore 60 shuffles, are possible. If you desire a larger number of shuffles, replace line 130 with the following statement:

```
RANDOMIZE  
(VAL(LEFT$(TIME$,2)) MOD 18)*3600 +  
VAL(MID$(TIME$,4,2))*60 +  
VAL(RIGHT$(TIME$,2)) - 32768
```

This will create more than 64,000 possible seeds for the random number generator; even an experienced card player will not be able to keep up with the PC's playing.

```

9 '*****   Use an array of flags to tag used values
139 '***   Additional initialization for this routine
140 TRUE=NOT FALSE
150 DIM USED(TOTAL)
190 RETURN
199 '*****   Shuffling routine
200 FOR POSITION=1 TO TOTAL
210     CARD(POSITION)=FIX(RND*TOTAL)+1
220     IF USED(CARD(POSITION))=TRUE THEN 210
230     USED(CARD(POSITION))=TRUE
240 '
250 '
260 '
270 NEXT
290 RETURN

```

Listing 4

```

9 '*****   Shift unchosen cards to consecutive positions
139 '***   Additional initialization for this routine
140 '
150 DIM DECK(TOTAL)
160 FOR POSITION=1 TO TOTAL
170     DECK(POSITION)=POSITION
180 NEXT
190 RETURN
199 '*****   Shuffling routine
200 FOR UNCHOSEN.CARDS=TOTAL TO 2 STEP-1
210     CHOSEN.POSITION=RND*UNCHOSEN.CARDS+.5
220     CARD(UNCHOSEN.CARDS)=DECK(CHOSEN.POSITION)
230     FOR PLACE=CHOSEN.POSITION TO UNCHOSEN.CARDS-1
240         DECK(PLACE)=DECK(PLACE+1)
250     NEXT
260 '
270 NEXT
280 CARD(1)=DECK(1)
290 RETURN

```

Listing 5

```

9 '*****   Swap random card with last in line of unchosen cards
139 '***   Additional initialization for this routine
140 '
150 '
160 FOR POSITION=1 TO TOTAL
170     CARD(POSITION)=POSITION
180 NEXT
190 RETURN
199 '*****   Shuffling routine
200 FOR UNCHOSEN.CARDS=TOTAL TO 2 STEP-1
210     SWAP CARD(RND*UNCHOSEN.CARDS+.5),CARD(UNCHOSEN.CARDS)
220 '
230 '
240 '
250 '
260 '
270 NEXT
280 '
290 RETURN

```

Listing 6

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## ☉ Hands On

chooses a random integer as the number of chosen values grows. Each of these shuffling routines chooses a random integer an average of about 240 times to build one shuffled deck of 52 cards.

### Pick a Card

Another possible technique is to simulate 52 cards fresh out of the box and randomly choose from the cards that have not been chosen. The random card-picking statement will never be able to pick the same card twice and will be used only 51 times to build a shuffled deck of 52 cards (the fifty-second card will be the last unchosen card). Listing 5 implements this method. To demonstrate it, delete the program in memory with the command NEW, type in Listing 5, and save it in ASCII format (use the A option) with the name 'SHIFT-POS'. Then load 'SHUFFLER' and type CHAIN MERGE "SHIFTPOS" <ENTER> .

In effect, a new deck of cards is layed in one long line (an array); a random position from this line is chosen, and the card from this position is put into another line (another array that will become the shuffled deck). Then the cards in the first line are shifted so that the unchosen cards occupy consecutive positions from the beginning of the line.

The next random position is chosen from the first 51 consecutive positions, and the cycle continues, with one less position to choose from each time until only one card is left. Finally, this last card is put into the shuffled deck. This routine uses the random-position choosing statement only 51 times, but because it must shift cards to new array positions between each choice, it takes an average of 5.3 seconds, which is longer by more than 50 percent than the routine using an array of flags (Listing 4).

### A Fast Dealer

What is needed is a way to place the unchosen cards in consecutive positions without having to shift so many cards between each choice. Since the cards are being shuffled, the un-

chosen cards don't have to stay in the same order, but they have to be in consecutive positions. After a random position is chosen from the line of unchosen cards, the card in that position is put into another line to build the shuffled deck.

Subsequently, moving a card from the end of the line of unchosen cards into that now-vacant position will place the unchosen cards in consecutive positions in one move. Since the number of shuffled cards grows at the same rate that the number of unchosen cards decreases, the routine using this method (Listing 6) can keep all the cards in one line by

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A random integer between 1 and 52 will simulate drawing a random card from a full deck.

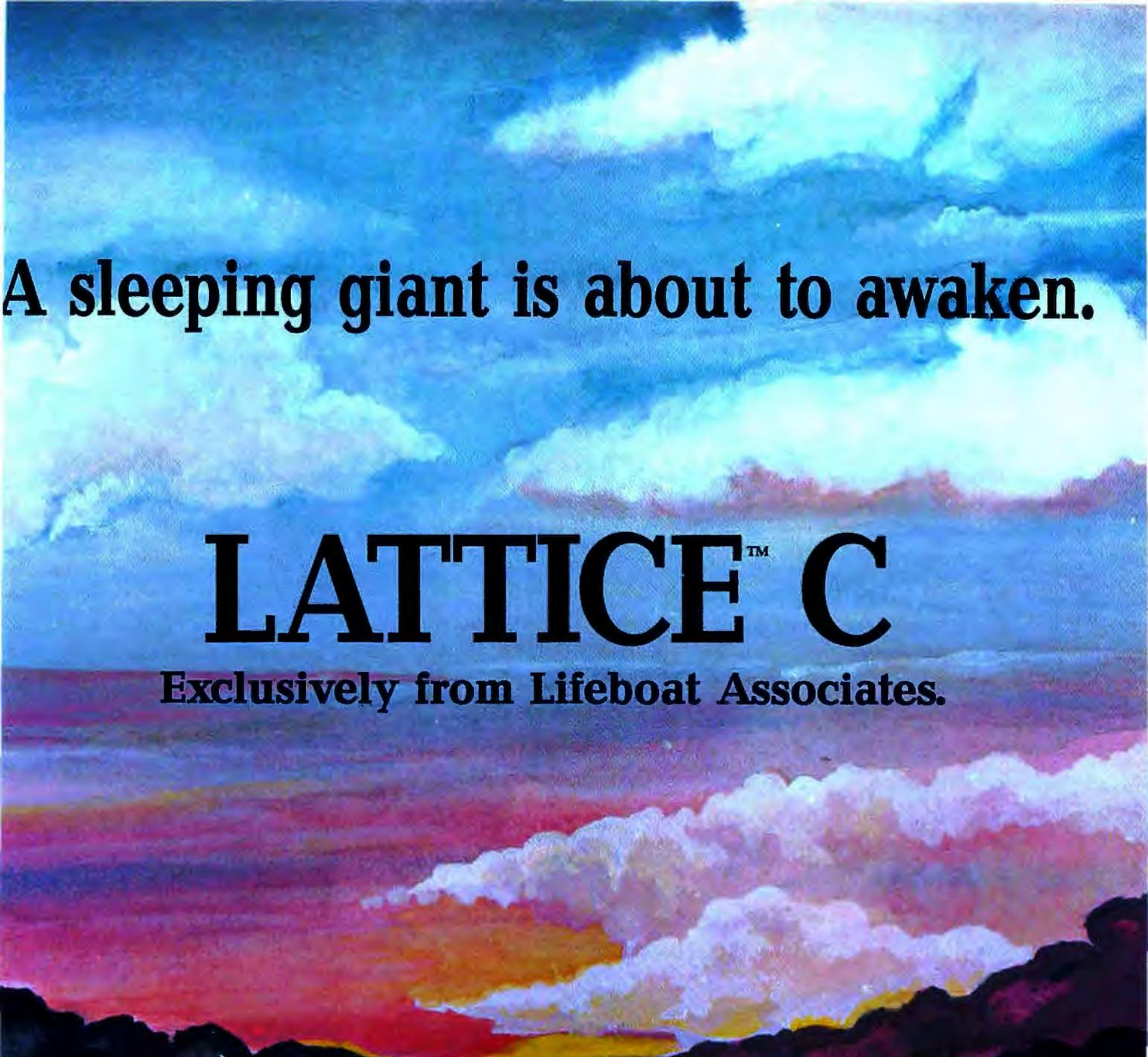
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swapping a random, unchosen card with the last unchosen card in the line. As the program continues, it selects the next random card from only those cards that have not yet been chosen, building the shuffled deck from the back forward.

To demonstrate this last and most elegant routine, delete the program in memory with the command NEW, type in Listing 6, and save it in ASCII format (use the A option) with the name 'SWAP'. Then load 'SHUFFLER' and type CHAIN MERGE "SWAP" <ENTER> . This routine is fast; it performs the same task as the other routines in less than 0.83 seconds.

As you can see, computers have many ways to perform the same task; some are better than others. Hopefully, the information presented here will give you some insight on how to make your own programs more efficient.

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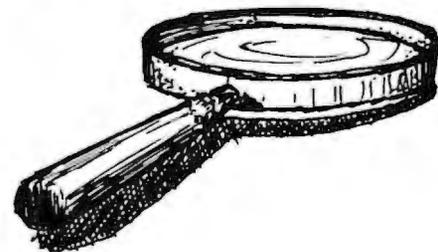
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# BASIC 2.0

*The PC's most popular language has been improved.*

*Karl Koessel*

The latest version of DOS comes with a new release of BASIC and BASICA. Release 2.0 of Disk and Advanced BASIC is included on the DOS 2.00 disk labeled DOS (DOS 2.00 is shipped on two disks). BASIC 2.0 contains several changes: enhancements to the BASIC command line, support for DOS 2.00 tree-structured directories, improvements in file handling, expanded music support, numerous graphics enhancements, simplified handling of time, an increased number of key traps, support for screen-printer echo, and enhancements to RANDOMIZE and DELETE.

## The BASIC Command Line

Three enhancements have been added to the BASIC command line. An optional parameter called *max blocksize* has been added to the existing /M: switch, allowing you to reserve additional memory above the work space reserved for BASIC. (Switches are additions to the BASIC command line that specify optional features.) The reserved memory can then be used for machine language programs and will not be used by BASIC.

The /D switch has been added to allow calculations for the transcendental functions ATN, COS, EXP, LOG, SIN, SQR, and TAN to be performed using double-precision.

When this option is specified, approximately 3000 additional bytes are reserved by BASIC.

A BASIC program usually receives its input from the keyboard (standard input device) and writes its output to the screen (standard output device). The `<stdin and [>]>stdout` options redirect BASIC to read its input from file instead of the keyboard and to write or append its output to a file or device instead of the screen. For example, `BASIC APROG <DATAFILE.IN >PRN:` will load BASIC, run APROG and cause it to read data for INPUT, INPUT\$, INKEY\$, and LINE INPUT from the file DATAFILE.IN instead of the keyboard, and write all data written by PRINT to the printer instead of the screen. The command `BASIC APROG>>DATAFILE.OUT` will cause input to be read from the keyboard as usual, but data written by PRINT will be appended to the file DATAFILE.OUT.

## Tree-Structured Directories

The filename syntax of BASIC 2.0 has been expanded, allowing specification of a path to a device or file by all statements and commands that accept a filename. The statements CHAIN and OPEN now support paths, as do the commands BLOAD, BSAVE, KILL, LOAD, MERGE, NAME, RUN, and SAVE.

Three new commands provide further support for handling the tree-

structured directories of DOS 2.0 from within BASIC. The CHDIR command allows you to change the current directory, the MKDIR command creates a directory on the specified disk, and the RMDIR command removes a directory from a specified disk. For more information on tree-structured directories, see "The Path to UNIX" in this issue.

---

Many of the new features of this BASIC reduce the need to write special routines.

---

## Improved File Handling

The PE option has been added to the OPEN"COM... statement syntax to allow for parity checking.

The LOF function now returns the actual number of bytes allocated to a file created by BASIC 2.0 rather than rounding up to the nearest multiple of 128, and the function EOF(0) returns the end-of-file condition on redirected standard input devices.

GET and PUT now allow up to 16,777,216 records per random file, a 512-fold increase over the 32,768 records allowed by BASIC 1.1.

## ☉ Hands On

### Music

Two new character commands have been added to the PLAY statement's *music definition language*. The characters  $>n$  will lower the current octave and play note  $n$ . The sequence  $>n$  will raise the current octave and play note  $n$ . For example, PLAY "03 ABC>>ABC ABC" and PLAY "03 ABC 02 ABC 04 ABC" will both play the same tune. The new function PLAY( $n$ ) returns the number of notes currently in the Music Background buffer.  $n$  is a dummy argument and may have any value. The new statement ON PLAY transfers control to a specified line when the music background buffer empties below a specified number of notes and may be used to play continuous background music during program execution.

### Graphics

Two new character commands have been added to the DRAW statement's *graphics definition language*. TAN turns angle  $n$  up to  $-360$  or  $360$  degrees. P *paint,boundary* sets figure and border colors. For example,

```
10 SCREEN 1,0:COLOR 1,0:CLS
20 DRAW "C2 TA30 U49 TA150"
30 DRAW "U50 TA270 U50"
40 DRAW "TA60 BU25 P1,2"
```

will draw a green triangle with a red border on a blue background (see Figure 1). The LINE statement has a new option, *style*, to determine a pattern for the line to be plotted. For example,

```
10 SCREEN 1,0:COLOR 1,0:CLS
20 LINE (15,15)-(90,80),3,B,&HAAAA
30 LINE (115,15)-(190,80),2,B,&HFF
40 LINE (115,15)-(190,80),2,B,&HFF00
50 LINE (215,15)-(290,80),1,B,&HFOFO
```

will draw three boxes with different line patterns (see Figure 2). The F (fill) option is not allowed when



Figure 1: The new DRAW instructions

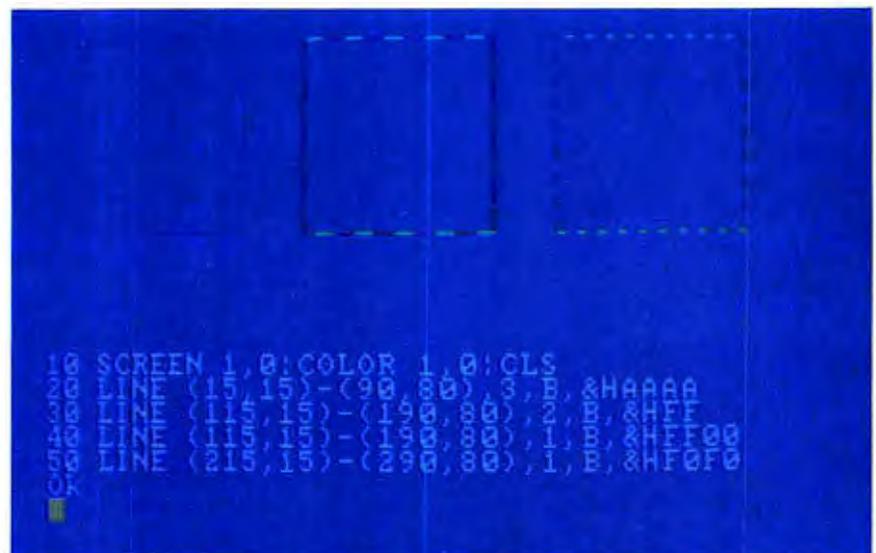


Figure 2: LINE styling

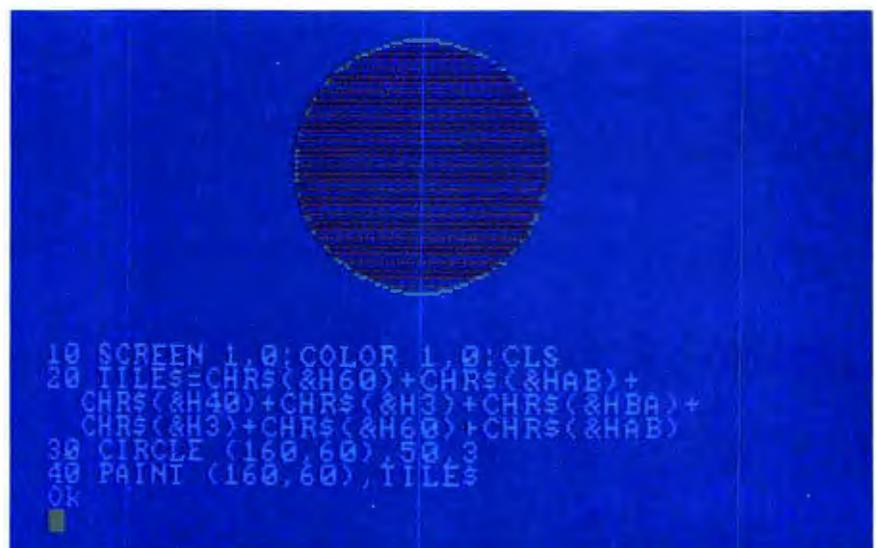


Figure 3: PAINT tiling

using *style*. The PAINT statement has been enhanced, allowing you to do paint tiling. Tiling embeds a specified pattern to a painted figure, as though the figure were cut from wallpaper. The following example draws and tiles a circle. (See Figure 3).

```
10 SCREEN 1,0:COLOR 1,0:CLS
20 TILES$ = CHR$(&H60) + CHR$(&HAB) +
    CHR$(&H40) + CHR$(&H3) +
    CHR$(&HBA) + CHR$(&H3) +
    CHR$(&H60) + CHR$(&HAB)
30 CIRCLE (160,60),50,3
40 PAINT (160,60),TILES$
```

For more information on graphics and the PAINT statement, see "Around in Circles" in this issue. The new statement WINDOW redefines the coordinates of the screen, and subsequent graphics are scaled to the new coordinates. In the following example, the upper left corner of the screen has the coordinates (-10,10) and the lower right corner is point (10,-10). (See Figure 4.)

```
10 SCREEN 1,0:COLOR 1,0:CLS
20 WINDOW (-10,-10)-(10,10)
30 LINE -(5,5),1
40 LINE -(6,6),2
```

Note that this is the normal orientation for Cartesian coordinates, with X increasing to the right and Y increasing upwards. The WINDOW statement format includes an optional attribute, SCREEN, which reverses the direction of the Y axis. In the following example, the upper left corner of the screen has the coordinates (-20,-20) and the lower right corner is point (20,20). (See Figure 5.)

```
10 SCREEN 1,0:COLOR 1,0:CLS
20 WINDOW SCREEN (-20,-20)-(20,20)
30 LINE -(5,5),1
40 LINE -(6,6),2
```

Another new statement, VIEW, positions a viewport within the physical limits of the screen. Optional parameters allow the viewport to be

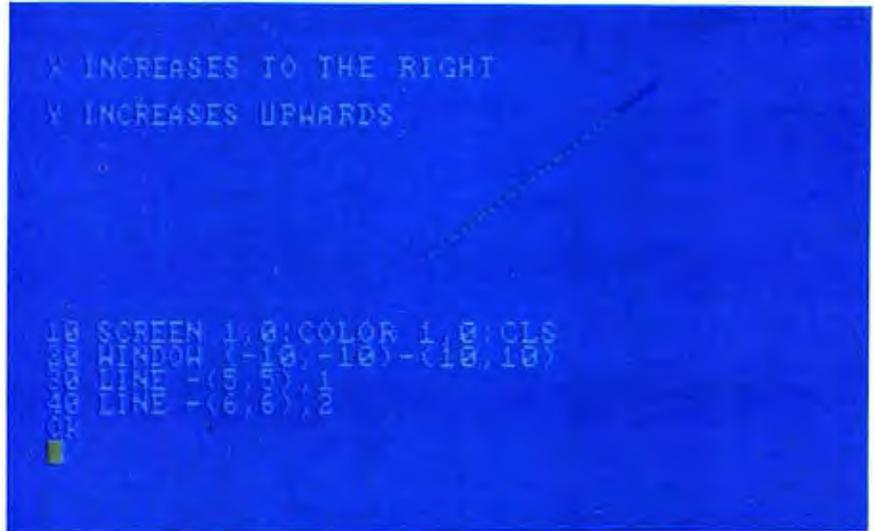


Figure 4: The WINDOW statement

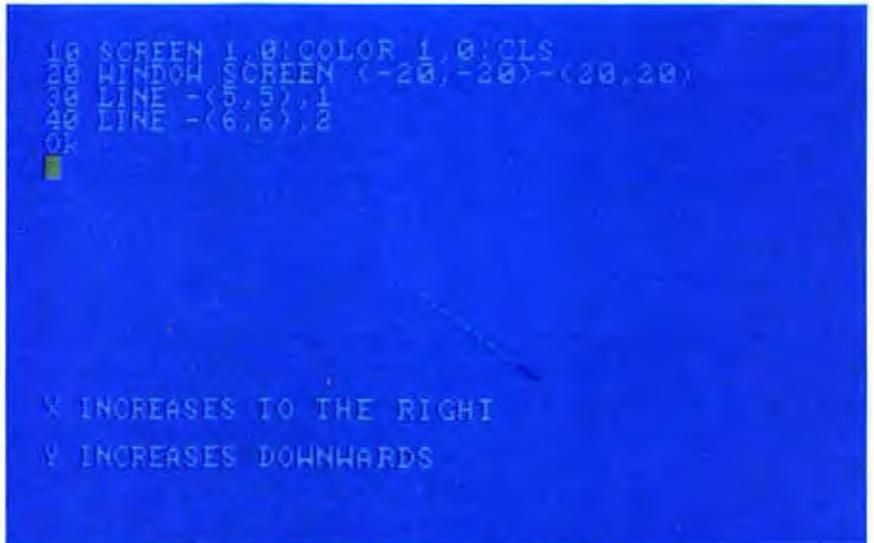


Figure 5: WINDOW with SCREEN

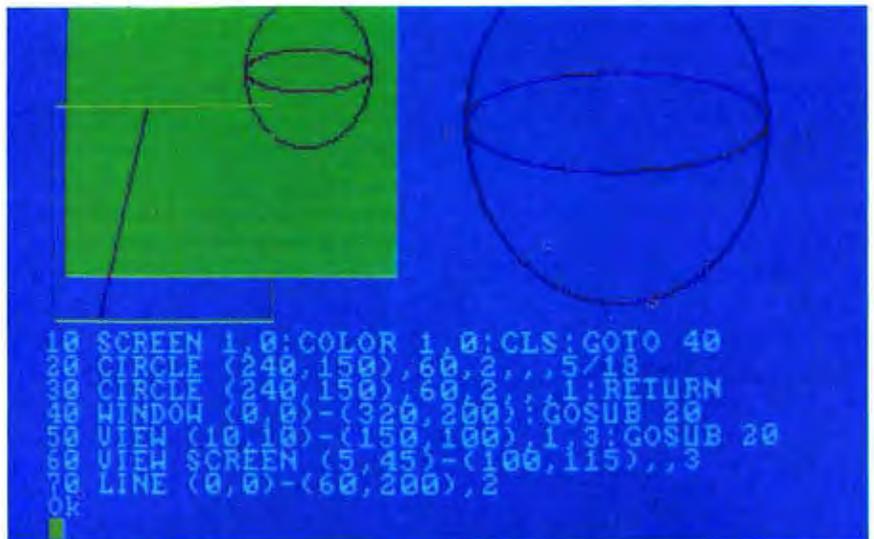


Figure 6: The VIEW statement

## ☉ Hands On

filled and bordered with specified colors. The coordinates of the viewport are determined by the last executed WINDOW statement and scaled to fit the viewport. For example, this program

```
10 SCREEN 1,0:COLOR 1,0:CLS:GOTO 40
20 CIRCLE (240,150),60,2,,,5/18
30 CIRCLE (240,150),60,2,,,1
40 WINDOW (0,0)-(320,200):GOSUB 20
50 VIEW (10,10)-(150,100),1,3:GOSUB 20
60 VIEW SCREEN (5,45)-(100,115),,3
70 LINE (0,0)-(60,200),2
```

defines normal Cartesian coordinates with (0,0) as the lower left point, draws two circles, defines a portion of the screen as a green viewport with a brown border, and draws the same two circles. (See Figure 6.) Note that they have been scaled into the viewport. Next, the program defines another viewport and its border. Because the optional SCREEN attribute is included in this VIEW statement, subsequent graphics (the red line) are not scaled into the viewport. Instead, the coordinates specified by the previous WINDOW statement are used and only those points within the viewport are plotted.

### A Simpler Time

TIMER is a new function that returns the number of seconds since midnight (according to the system clock). Using time to measure speed or control program flow is no longer a combined exercise in BASIC string manipulation and algebra. For example,

```
10 CLS:FOR I=1 TO RND*3000:NEXT
20 START=TIMER
30 PRINT "Hit a key"
40 X$=INPUT$(1)
50 FINISH=TIMER
60 DURATION=FINISH-START
70 PRINT DURATION "seconds"
```

will measure your response time. TIMER may also be used to seed the random number generator. The new statement ON TIMER transfers control to a specified line when a defined period of time has elapsed. This is useful for programs that need to repeat a subroutine at timed intervals.

### Key Traps

The ON KEY(*n*), KEY(*n*), and KEY statements now support six additional definable keys, numbered 15-20, to let you trap any Ctrl, Shift, Alt, or multiple shifted key (e.g., Ctrl-Alt-Del).

### Screen-Printer Echo

After pressing Ctrl-PrtSc all text that appears on your screen also prints on your printer until you press Ctrl-PrtSc again. Prior to BASIC 2.0, screen-printer echo was only supported by DOS.

### RANDOMIZE and DELETE

The RANDOMIZE statement now allows double-precision expressions for seed values. This change allows the TIMER function to seed the random number generator, even though TIMER has values approaching 86,400. (BASIC 1.1 only allowed seed values from -32768 to 32767. For more on the RANDOMIZE statement in BASIC 1.1 see "The Random Number Generator," a sidebar to "Shuffles" in this issue.)

The DELETE command syntax has been expanded to include a new option. DELETE *linenumber-* is now valid and deletes from the specified line through to the end of a program.

A package of over 100 additional and replacement pages that merge into your present BASIC manual is included with BASIC 2.0. In addition to documentation for the changes listed above, the package contains:

- New sections on running a BASIC program, running a BASIC program from another disk, running

the (included) SAMPLES program, and running the (included) COMM program.

- A new section on techniques for formatting your math output and a new section to help you use the tree-structured directories of DOS 2.00.

- The new error messages for BASIC 2.0, including a Quick Reference table.

- A binary-to-hexadecimal conversion table, which is helpful for determining hexadecimal parameters for PAINT tiling and LINE styling.

- A new appendix, "Keyboard Diagram and Scan Codes."

Not only has the BASIC manual grown, but so has BASIC itself. In release 2.0, BASIC is 16,256 bytes (4.75K larger than release 1.1) and BASICA is 25,984 bytes (9K larger than release 1.1). Because BASIC 2.0

---

The characters `!`, `<`, `>`, and `\` now have special meaning and may no longer be used in filenames.

---

is larger than BASIC 1.1 and requires DOS 2.00 (which needs approximately 12.4K more memory than the 4,959 bytes required by DOS 1.1), systems with under 96K of RAM may require additional memory to run large BASIC or BASICA programs.

BASIC 2.0 also has additional syntax rules that must be observed. The characters `!`, `<`, `>`, and `\` have special meaning to DOS 2.00 and may no longer be used in filenames. Also the new commands, functions, statements, and internal variables of BASIC 2.0 have been added to the list

of reserved words. (Reserved words have special meaning to BASIC and may not be used as variable names.) The additional reserved words are:

CHDIR (new command)  
ENVIRON (internal variable)  
ENVIRON\$ (internal variable)  
ERDEV (internal variable)  
ERDEV\$ (internal variable)  
INTER\$ (internal variable)  
IOCTL (internal variable)  
IOCTL\$ (internal variable)  
KEY\$ (internal variable)  
MKDIR (new command)  
PMAP (new function)  
RMDIR (new command)  
SHELL (internal variable)  
TIMER (new function)  
VIEW (new statement)  
WINDOW (new statement)

BASIC 2.0 is a superset of BASIC 1.1. Therefore, most of your current BASIC programs will run under BASIC 2.0 (assuming, of course, that your system has sufficient memory to support your programs after accommodating the larger size of DOS 2.00 and BASIC 2.0, and that the programs do not have filenames using the new special characters of DOS 2.00 nor variable names matching the new reserved words of BASIC 2.0). To assure upward compatibility, any BASIC programs you may be developing with BASIC 1.1 should abide by the syntax of BASIC 2.0.

Furthermore, if you are a programmer, you should upgrade to BASIC 2.0 soon. Many of the new features of this BASIC reduce the need to write special routines, thus improving your programming productivity.

BASIC 2.0 does not supersede BASIC 1.1, but because of the added power the new features give the IBM PC, and because almost every IBM XT and PC with an IBM Expansion Unit will be equipped with BASIC 2.0, it should eventually become more popular than BASIC 1.1.

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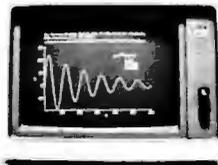
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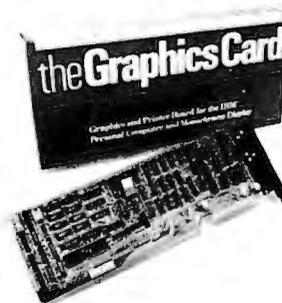
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# Extended Disk Directory Program

*A program that will modify the disk directory tracks of a blank, formatted disk to provide room for extended disk directory information*

*Kevin Scoot*

Extended directory information can be retrieved by using the /W option with the DIR command (e.g., DIR/W) whenever you see the DOS prompt and includes the date of the last update to the file, the number of sectors in use, and the sector number of the first sector of the file's File Allocation Table.

Several files will be created on the modified disk to illustrate the extended directory features. You may delete these files anytime after the program is complete.

When compiled the program runs much more rapidly and can be incorporated into a batch file to execute

automatically after the DOS FORMAT command. I name the batch file EFORMAT to distinguish it from the normal FORMAT program, but you may choose any name you wish.

Note: The program will destroy any data stored on the disk being modified. Be sure to use only blank, newly formatted disks.

```
10 DEFINT A-Z: DIM A(4)
20 CLS: KEY OFF: PRINT "Extended Disk Directory Program": PRINT
30 PRINT "NOTE: This program will destroy any data that is stored on
40 PRINT "the diskette being modified. Be sure to modify only blank,
50 PRINT "newly formatted diskettes.": PRINT
60 PRINT "Insert diskette into drive B.
70 PRINT "Press Y to proceed, any other key to stop: ";
80 LOCATE, 1: IF (ASC(INPUT$(1)) AND &H5F) <> 89 THEN END
90 LOCATE 10, 1: PRINT "Working... Do Not Interrupt!"
100 PRINT: PRINT "Pass 1 - Update disk";
110 ON ERROR GOTO 130 'make sure dir is empty
120 KILL "B:COMMAND.COM": GOTO 140
130 RESUME 140
140 ON ERROR GOTO 0
150 FOR I=0 TO 4: READ A(I), X: NEXT 'init. sector specs
160 DX=&H80: PF=0: FOR I=1 TO 25: M5=I MOD 5
170 ON M5+1 GOSUB 350, 350, 360, 370, 350 'setup for each sector
180 GOSUB 550: GOSUB 410
190 IF M5=3 THEN GOSUB 490 'these need extra step
200 NL$=LEFT$(A$, NL): XL$=LEFT$(A$, XL) 'example
210 GOSUB 540: NEXT 'loop till done
220 PRINT " - Complete.": PRINT "Pass 2 - Verify";
230 FOR J=1 TO 5: READ NL, XL 'setup for next pass
240 M5=J MOD 5: GOSUB 470: GOSUB 540: NEXT
250 RESTORE 590: FOR I=0 TO 4: READ X, X: A(I)=A(I)-X: NEXT
260 PF=-1: FOR I=1 TO 25: M5=I MOD 5 'verify earlier work
270 ON M5+1 GOSUB 400, 380, 390, 390, 380
280 GOSUB 550: GOSUB 410
290 IF M5=3 THEN A$=MID$(A$, 2)+LEFT$(A$, 1) 'don't forget these
300 NL$=LEFT$(A$, NL): XL$=LEFT$(A$, XL) 'and the examples
310 IF M5=2 OR M5=3 THEN GOSUB 510
320 IF I=20 THEN NL$=CHR$(39) 'special case DSDD drive
330 GOSUB 540: NEXT: PRINT " - OK
Continued
```

Extended Disk Directory Program continued

```

340 PRINT:PRINT"Program complete.":END
350 XL=(M5=1)*-3:RETURN 'FAT handled here
360 XL=0:XL=XL-((I<13)*2)-(I=7):RETURN 'most dir sectors
370 XL=2:XL=XL-(I=8)+((I=18)*2):RETURN
380 XL=0-(I=1)*3:RETURN 'verify FAT
390 XL=3+(I=2)+(I=3)+(I=22)+(I=23):RETURN 'and dirs
400 XL=2-(I=20)+(2*(I=10)):RETURN
410 A$="":FOR J=1 TO NL+XL 'actual data grouped here
420 JX=(A(M5)+M5)*(J MOD 2)
430 JX=(JX-(7^2+(I-1)\5)*(JX=0))-(PF*5)
440 IF JX=58 THEN JX=48 'except if DSDD
450 A$=A$+CHR$(JX)
460 NEXT:RETURN
470 NL$=STRING$(NL,95):XL$=STRING$(XL,95):RETURN
480 EX$=NL$+"."+XL$:RETURN 'for examples
490 IF I<18 THEN RETURN
500 FOR J=1 TO I\5:MID$(A$,3+J,1)=CHR$(39):NEXT:RETURN
510 IF I>3 AND I<19 THEN RETURN 'these bytes unique
520 MID$(NL$,1,1)=CHR$(39):RETURN
530 DEF SEG:POKE 51,JX:DEF SEG=6:CALL DX:RETURN 'let DOS do it
540 GOSUB 480:OPEN "B:"+EX$ FOR OUTPUT AS #1:CLOSE:RETURN 'examples
550 NL=3:RESTORE 600:IF PF THEN RESTORE 620 '1st or 2nd pass
560 X=-1:WHILE X 'checksum calc
570 READ X:IF X=I THEN NL=NL+5
580 WEND:RETURN
590 DATA 108,-2,96,32,78,6,79,8,101,2
600 DATA 25,23,18,13,12,11,3,2,1,0
610 DATA 8,3,8,1,8,2,3,0,8,0
620 DATA 1,2,3,5,11,15,22,23,24,25,0
    
```



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# WordStar Patches—P.S.

*A few more tips to help you have it your way*

Steven Cook

There has been some confusion regarding the popular article "WordStar Made to Order" (Vol. 1, No. 2). Author Emil Flock has found that a few corrections and amplifications are needed so that everyone can make full use of the information presented.

The patches apply to *WordStar* versions 3.2, 3.2M, 3.21, 3.24, and 3.24\*. If you are using version 3.02, you may obtain a free update by taking the original *WordStar* disk to your dealer.

Early versions of DEBUG.COM (those that were supplied with DOS 1.0 and 1.05) do not return the message "Writing 5000 bytes" when you issue a W command at the end of a session. The bytes are, however, written.

The patches for function keys F7 and F8 are incorrect. They should read:

**F7 Function Key I (F7 Function Key I and II must be used together)**

Function: Sets F7 to Delete Line  
 Address: 6a6  
 Change: From 2 to 1  
 Debug: -F 6a6 L1 1  
 Result: Ctrl-Y  
 WS Access: No

**F7 Function Key II**

Function: Sets F7 to Delete Line  
 Address: 6a7  
 Change: From 0b to 19  
 Debug: -F 6a7 L1 19  
 Result: Ctrl-Y  
 WS Access: No

**F8 Function Key I (F8 Function Key I and II must be used together)**

Function: Sets F8 to Delete Character  
 Address: 6af  
 Change: From 2 to 1  
 Debug: -F 6af L1 1  
 Result: Ctrl-G  
 WS Access: No

**F8 Function Key II**

Function: Sets F8 to Delete Character  
 Address: 6b0  
 Change: From 0b to 07  
 Debug: -F 6b0 L1 07  
 Result: Ctrl-Y  
 WS Access: No

**More on Function Keys**

Actually, the information given for the function keys was not complete. Not mentioned was the fact that each function key can be defined to supply up to six characters. To change the definition for a key, first select the key's address from the following table:

Key	Address
F1	670
F2	679
F3	682
F4	68b
F5	694
F6	69d
F7	6a6
F8	6af
F9	6b8
F10	6c1

Next, determine which characters you want the key to supply. You may select no more than six characters per key, but they can be any letters, numbers, or control characters you wish. Obtain the numeric value of each character from Appendix G of the BASIC manual. The numbers on that list are in decimal (base 10), but you will need the hexadecimal (base 16) equivalents.

The conversion from decimal to hexadecimal can be done most easily by loading BASIC and typing ?HEX\$ (value), replacing value with each number from the appendix. The HEX\$ function will print the hexadecimal equivalent of the decimal value, and you should keep a record of the values. Remember, you will need one value for each character you want a key to supply.

## Hands On

Now comes the fun part. Following Emil Flock's instructions, execute DEBUG to operate on *WordStar*, wait for the hyphen prompt, and then type F address L7 and a space—but do not press ENTER. Instead, type the number of characters you will have the key produce, a space, and the list of hexadecimal values recorded earlier, separating each value from the others by a space. Press ENTER when you have typed all the values for the key.

Another discovery is the location of key definitions for ten of the cursor control keys on the right side of the keyboard. You may wish to change the effect of some of the keys such as Home, End, or Del. Make the changes using the above instructions for function key changes, using the key's address from the following table:

Key	Address
Home	6ca
Up	6d3
PgUp	6dc
Left	6e5
Right	6ee

End	6f7
Down	700
PgDn	709
Ins	712
Del	71b

### Default Disk Drive Patches

To ensure the success of the Default Drive patch, you must perform the Disk Reset patch as well as the two following patches:

#### Enable New Default Drive

Function: Sets drive that program looks to for command files  
 Address: 1e04  
 Change: From b1 to 90  
 Debug: -F 1e04 L1 90  
 Result: Enables Default Drive change  
 WS Access: No

#### Enable New Default Drive

Function: Sets drive that program looks to for command files  
 Address: 1e05  
 Change: From 01 to 90  
 Debug: -F 1e05 L1 90  
 Result: Enables Default Drive change  
 WS Access: No

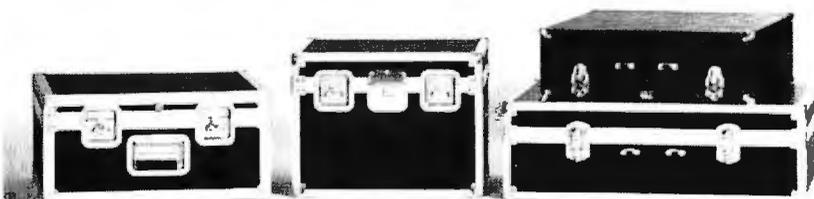
C. Michael Barnett of Martinez, California, sent the following patch to cause *WordStar* to display text on all 25 lines of the PC screen:

#### Number of Screen Lines

Function: Change number of lines on screen  
 Address: 248  
 Change: From 18 to 19  
 Debug: -F 248 L1 19  
 Result: 25 lines WS  
 Access: No

We would like to make more of this information public, but to do so we must rely on tips from our readers. If you know of other patches to *WordStar*, please pass them along so we can share them with our readers.

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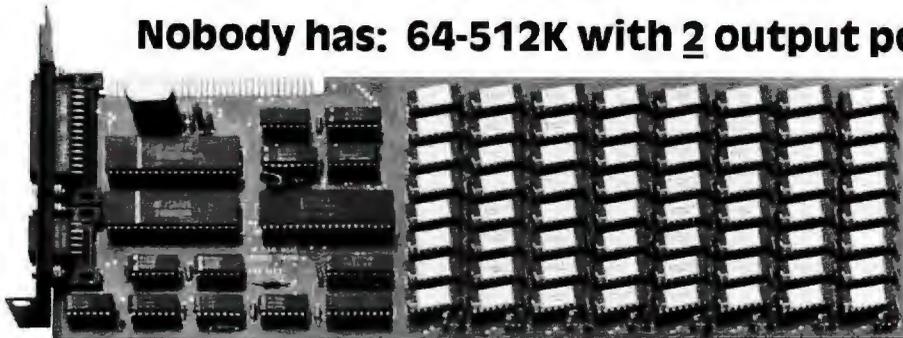
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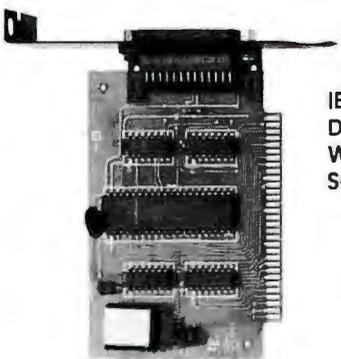
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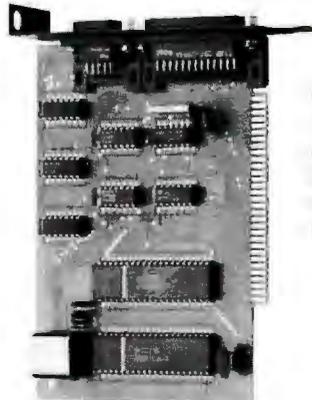
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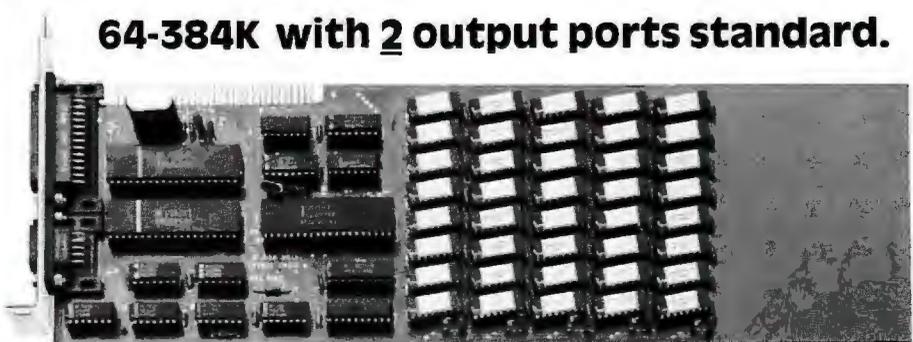
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# The Prophet from Xanadu

*Clifford Barney*

*Philosopher and author Ted Nelson has written his visions down in a new book, which foretells the creation of a vast electronic library that holds all the world's writing—and anyone with a computer has a permanent library card.*

Once again the prophet of the PC is trying to turn the computer world upside down. Nearly 10 years ago Ted Nelson published *Computer Lib*, the underground best-seller that accurately described the personal computer before one had ever been built and predicted its pervasiveness throughout our culture. Like other prophets, though, Nelson has never been considered entirely respectable in his own backyard.

Now he has favored us with *Literary Machines*, a far more personal vision but an equally outrageous one, as the subtitle suggests: *The Report on, and of, Project Xanadu/Concerning Word Processing, Electronic Publishing, Hypertext, Thinkertoys, Tomorrow's Intellectual Revolution [!], and Certain Other Topics Including Knowledge, Education and Freedom.*

This is vintage Nelson, by turns breezy, angry, funny, dull, subversive, untidy, serious, and imaginative. As usual, the message is heretical; in Nelson's world technology is driven by human needs, not by technical feasibility or commercial gain. "It doesn't matter who makes the chips, or what they can do for us," Nelson says. "The question is, what do we do with them."

## The Vision of Xanadu

Nelson's goal is to implement Project Xanadu, a plan to use the world's computers as so many windows on all the writing ever produced, or as much of it as can be digitized. All this literature would be stored in one huge electronic file accessible from any PC or other computer.

Anyone could browse randomly in this digital repository, choose any number of passages, and assemble them into a new document that would become another part of the Xanadu collection.

Nelson's name for the vast seamless document from which all subdocuments are assembled is *hypertext*, a word that has been seized upon so gratefully by the chroniclers of the information society that it has accumulated many interpretations. It really means, says Nelson with the pride of authorship, "nonsequential writing"—what that means is up to you.

A library, for instance, contains writing organized according to a specific sequence, in documents bound by covers and arranged on shelves. Project Xanadu's text, on the other hand, has no real boundaries and can be manipulated or added to according to the user's need or

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This Xanadu is still a dream, the author concedes, caught like the original between vision and reality.

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whim—that's hypertext. *Literary Machines* itself is a kind of hypertext frozen into print—a collection of Nelson prose that can be read backward or forward with equal reward.

Why hypertext? What's so important or valuable about being able to sample anything from the computer's "shelves" instead of looking through a catalog or index to find a specific title or topic? One answer is in the difference between having entry to a library's stacks and having to request books from a librarian: we are more likely to find something we didn't expect when simply wandering the aisles than when a precise target has to be identified beforehand.

## ● Community

### Freedom through Computers

On another level Project Xanadu is political. Press critic A. J. Liebling noted that freedom of the press means most to those people who can afford one. But as any newspaper executive will tell you, the press is no good without trucks to deliver the papers. If Ted Nelson's vision of Xanadu ever reaches fruition, every PC owner will indeed have the distribution system to go with the personal "electronic press."

In its ideal state Xanadu will not only be a text organizing system, but an entire publishing environment with computers linked by phone, microwave, and satellite throughout the world. This is meant to be a business, of course, and it will be arranged, Nelson says, so that "everybody makes money," and (the corollary) "all systems are self-supporting."

We are a long way from that state; in fact, Xanadu is presently marketed only as a data base management system (DBMS) for businesses that can afford the kind of computing power it requires. Nevertheless, something of Nelson's political commitment may be seen in the dedication of this book to Eric Blair (George Orwell) and in the evangelistic fervor that permeates both Nelson's conversation and his prose.

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*Literary Machines* describes Xanadu as a distributed information network on which every computer user is an independent node.

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Ted Nelson is surprised that everyone doesn't share the Xanadu vision of interconnected computers unifying humanity. Occasionally this mass refusal to see leads him to the edge of paranoia: "Why do they call PCs micro-computers?" Nelson growls. "Is it to make us think they are inferior to real computers?"

Freedom is a constant theme in his writing, expressed throughout *Literary Machines* and in this passionate outburst from an on-line computer conference: "The idea of freedom has always been central to me; the author being free to create pathways, the reader being free to choose them. If we are to write on computers, these freedoms must be guaranteed from the ground up—writer's freedom and reader's freedom... This is the computer age. We computer people are accused, with good reason, of taking away human freedom. I say freedom now and forever, and that's what hypertext is for."

### Xanadu Between Covers

What saves this message from stridency in *Literary Machines* is Nelson's warmth and his irrepressible humor. No one who takes himself too seriously could possibly contemplate franchising his beloved Xanadu stands so that giant neon X's would dot the landscape like so many McDonald's arches (a proposal detailed in the book).

As the author describes it, "A cheery young person in futuristic garb will sit you down at a screen...at the moment of Xanadu Shock, when you *get it*, when you cry 'Holy—!'" [the dashes are Nelson's], the kid grasps your forearm and says 'Mr. Jones, Welcome to Xanadu!'" Nelson is already hawking Xanadu handles (pen names), called *Xandles*, at \$100 a pop, complete with wallet card "to subdue unbelievers."

Yet this same Ted Nelson once called me back, only minutes after ending a long and hilarious phone conversation, to make it clear that he is quite serious about his ideas. Fun's fun, he said, but Xanadu is not some idle fantasy. He has, after all, devoted 20 years of his life to it.

Nelson calls Xanadu a "virtual" system, a conceptual black box. You define it and then you implement it, and each instance is different. Nelson uses the automobile as an example to explain this notion: the virtuality of an automobile is how it feels to drive, Nelson says; the real car (its implementation) can have front- or rear-wheel drive, any number of cylinders, two doors or four, and so on.

Just as you can't say what a generic car looks like, except in general terms, you can't really say what Xanadu looks like. Nelson sometimes calls it a conceptual back end to the user's own computer system, which would be implemented differently by each user.

Nelson's description of the way in which Xanadu tracks alternate versions of text, allowing readers and writers to alter it freely, is at times almost lyrical, though at other times he makes Xanadu sound like a top-heavy collection of boiler plate through which documents quote one another endlessly without the need for an original contribution. ("That's the way Ted writes," says a friend, "with an Exacto knife and a pastepot.")

Yet the Nelson style is full of sock. He writes directly, if seldom in a straight line, and you are never in any doubt as to how he feels, though sometimes the meaning may be "hypervalued" and difficult to track.

*Literary Machines* describes Xanadu as a distributed information network on which every computer user is an independent node. The software that controls Xanadu organizes textual material according to user-specified instructions and stores them, not as entities, but as so many chunks to be accessed or reassembled on each retrieval. Nelson deliberately does not reveal exactly how this assembly and storage of hypertext is accomplished, although a great deal about its structure is revealed, and we are given a glimpse into a new kind of literature and a new method of publishing it.

## Poetic Origins

Xanadu began, Nelson relates, as part of a project in which he attempted to write a text processor in assembly language for the IBM 7090. He wrote 40,000 lines of code, he says, which were never implemented. They remain in literary limbo like the 200 to 300 lines of text that Nelson's illustrious predecessor, Samuel Taylor Coleridge, penned in his imagination while seeing the original Xanadu vision, which we all read about in high school:

In Xanadu did Kubla Khan  
A stately pleasure-dome decree.

Coleridge was interrupted by the notorious Person from Porlock and never did get the entire vision down; *Kubla Khan* remains one of the great fragments of English literature.

Nelson's vision of Xanadu also exists in fragmentary form in Ann Arbor, Michigan, on a Sun Microsystems 68000-based micro with 1 megabyte of main memory and 80 megabytes of disk storage. What is needed to complete this system is not the vision, but venture capital. Within 6 months, says Roger Gregory, leader of the Xanadu collective in Ann Arbor, an operational version of Xanadu ("... a miracle of rare device/A sunny pleasure-dome with caves of ice!") could be demonstrated.

This Xanadu is a still a dream, the author concedes, caught like the original between vision and reality. Coleridge described the legendary Xanadu in two images, the wellspring of creation and the cold caves of infinite logical regress ("caverns measureless to man").

The shadow of the dome of pleasure  
Floated midway on the waves;  
Where was heard the mingled measure  
From the fountain and the caves.

## Today's Kubla Khans

Nelson's Xanadu seems to exist somewhere between the great vision of a unifying human achievement and its corporate compartmentalization. Today's Kubla Khans operate in a mercantile world and today's Xanadu is a product, with its own trade secret—the algorithm for managing text without running out of memory to store and track it or incurring so much overhead as to make searches impractical.

The algorithm is of such breadth and sophistication that it will revolutionize data processing when he reveals it, Nelson promises. System performance degrades only as the logarithm of the size of the data base, not the

other way around. Skeptical? The Ann Arbor group has a prototype up, containing some 60 documents and is currently offering demonstrations to interested businesses.

Nelson, meanwhile, toils in San Antonio, Texas, where he most recently authored another literary work, entirely practical—the documentation for Datapoint's proprietary operating system, RMS. That book runs a solid 272 single-spaced pages. He has also designed his own word processor, written in FORTH for use on an Apple II or Apple IIe; the documentation comes on a card that fits into the floppy jacket. (You can obtain more information about the word processor, called *Jot*, from Nelson at the post office box listed at the end of this article.)

San Antonio is a long way from Ann Arbor, even in the network nation, and Nelson, in fact, seems isolated from the computer world he and the other gurus helped create. ("I'm the only one," he points out, "who hasn't gotten rich from it.") He professes not to miss the presence of a peer group. "I need disciples," he says boldly, "that's the only way it works." Gregory and the others in Ann Arbor were indeed disciples before they peeled off to make Xanadu commercial; still, that kind of remark can set off alarm bells in a society that is at least nominally egalitarian.

Yet, no one could see a snob in Ted Nelson. He is acknowledging his own role as a prophet who has had the vision and has been commanded to express it. Not an easy fellow to work with, possibly, nor is his book easy to evaluate; you need an instinct about when Nelson is on the mark and when he's not. Or as Coleridge presciently put it in *Kubla Khan*:

... Beware! Beware!  
His flashing eyes, his floating hair!  
Weave a circle round him thrice,  
And close your eyes with holy dread,  
For he on honey-dew hath fed  
And drunk the milk of Paradise!

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*Clifford Barney* been writing about computers and communications for more than a decade. His work is published regularly in both trade and general interest magazines.

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*Literary Machines/The Report on, and of, Project Xanadu/Concerning Word Processing, Electronic Publishing, Hypertext, Thinkertoys, Tomorrow's Intellectual Revolution [!], and Certain Other Topics Including Knowledge, Education and Freedom* by Ted Nelson is available from the author at P.O. Box 128, Swarthmore, PA 19081. *Computer Lib and Literary Machines* are available for \$15 each from The Distributors, 702 S. Michigan, South Bend, IN 46618.

# The Corporate Computer

*The IBM PC ventures into the professional world with some predictably successful results.*

*Lisa B. Stahr*

After a State dinner given by President Reagan in honor of Queen Elizabeth during her visit to California, a San Francisco newspaper reported this brief exchange between dinner guests Steven Jobs, president of Apple Computers, and J. Gary Shansby, chairman and chief executive officer of Shaklee Corporation:

"What business are you in?" Jobs questioned from across the table. When Shansby answered "Vitamins," Jobs pressed on.

"What's the name of your company?"

"Shaklee," Shansby said, and Jobs nodded in recognition.

"Yes, I've heard of you," the computer whiz kid responded knowingly.

"You should have," Shansby replied, "We just bought 50,000 IBM Personal Computers."

Shansby's claim may have been hyperbole, a bitter pill for Jobs to swallow, but it's indicative of the IBM PC's growing acceptance in the corporate world. As large corporations complete their in-depth evaluations of the personal computers on the market, IBM PCs are turning up on desks at companies like Foremost-McKesson, General Foods, Arthur Young and Company, and Airborne Freight Corporation. Based on a combination of the PC's competitive price (just lowered almost 15 per-

cent), computing power (recently strengthened with the announcement of the hard disk expansion unit), and unparalleled complement of professional software packages, the decision of these companies to integrate the PC into their daily operations may soon turn the IBM Personal Computer into the IBM Corporate Computer.

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The computer's versatility and comparative usefulness will be challenged constantly.

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## First and Foremost

The operations of the four companies mentioned are diverse, yet all are finding ways to use PCs in their work. Foremost-McKesson, for example, has four major operations; the Food, Chemical, and Drug and Health branches are located in California, and the Wine and Spirits branch is in New York City. Charlie Hoerner, manager of office systems at the San Francisco headquarters, says

they are just beginning to put the PC to work: "We have 25 to 30 PCs in operation right now and expect to triple the number by next year."

The computers in the offices of the president, treasurer, and corporate controller are being used primarily for financial analysis, while other PCs are being put to the test by the Drug and Chemical Planning Analysis groups. Using prepackaged software such as *Crosstalk*, *WordStar*, and *dBASE II*, the Water Division is using its four new PCs to service its Alhambra and Sparkettes bottled water accounts. The computers are so useful that the division controller was able to attend meetings that at this time of year he normally missed because of budgetary concerns. The president, somewhat surprised by the controller's presence, was pleased—and relieved—to hear that the PCs were responsible for his employee's extra time.

## F-M Has EIS

Now that these Foremost-McKesson top executives are getting used to their PCs, Hoerner is working on a project he hopes will make the IBM PC an executive tool companywide. The Executive Information System (EIS) currently being developed contains the financial information required by all executives, including the figures for 33 operating groups such

as Corporate Consolidation and International Development, 25 financial accounts from the general ledger (also available as tables, charts, or graphs), and 130 financial data elements. It also has nonfinancial data available in numerical and graphic form to track such things as absenteeism and warehouse space and utilization. All data in the prototype is given in monthly time spans, but the real system will provide data in quarterly and cumulative increments as well.

"EIS was developed to get a work station on every executive or senior manager's desk," Hoerner explains, "but in an unthreatening form."

To make that work station as easy to use as possible, Hoerner designed the prototype to boot directly into a menu that includes the Dow Jones News/Retrieval service, The Source, and EIS. A light pen is used for menu selection.

Hoerner says that the EIS program is so easy to use that users need only 5 minutes to learn to operate it;

learning Dow Jones and The Source requires 1 to 2 hours of training time each.

"EIS was written in interpretative BASIC," Hoerner adds, "and takes only 4 seconds to complete the new screen after a menu is selected."

#### Lisa vs. the PC

Hoerner admits he is a PC fan, but as a successful businessman, he knows that all alternatives must be examined. Casting his preferences aside, he is evaluating Apple's Lisa for use at Foremost-McKesson instead of the PC. Lisa's integrated software and desktop-like layout make it easy to use, which is always an advantage in a corporate setting.

"But Lisa's not a shoo-in just because it's the new kid on the block," Hoerner warns. "I still think you just can't go wrong with a PC."

The same day Hoerner was testing Apple's Lisa, another PC-loyal corporation was doing the same. "Dealers come into our Personal Computer Center [PCC] to give demonstrations," explains Lee Rivers, center coordinator for General Foods. "Today it was Lisa's turn."

The PCC at General Foods was founded to educate employees on the use of personal computers. Rivers estimates she's placed between 150 and 175 IBM PCs within the company in the last year; with all those machines around, a training program had to be developed.

A mixture of Apples, TRS-80s, and IBM PCs make up the 18 computers at the PCC. Rivers and her two full-time staff members offer training courses three days a week using *VisiCalc*, *dBASE II*, and soon *VisiDex* and *VisiFile*. Employees are welcome to visit the PCC at anytime to try out a computer or a software package. Rivers even puts out a newsletter announcing new software and courses at the center.

For members of upper management who don't have time during the day to stop by the PCC, an executive program provides a way for executives to take computers home. "We used to have classes for executives

too," Rivers says, "but now instruction is individual and by appointment."

Once General Foods employees learn to use personal computers, their needs become more complex than Rivers and her staff can comfortably manage. This is when the Information Services Division of the company takes over. "We're mainly an internal consulting group for data access," explains Maureen Mayes of Information Services. "Say someone

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An executive program provides a way for executives to take computers home.

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wants sales data on a certain product, we find out where that data is stored and how to get it on the person's personal computer."

Mayes says one of their two main consulting functions is telling people how to download information from mainframes to personal computers. "Profit and loss statements, cash flows, and balance sheets, for example, can be accessed through our time-sharing system. Using the General Foods financial package *AS-PLAN*, we show people how to download data to make *VisiCalc* files on personal computers. Our other function is showing them how to upload *VisiCalc* files to a mainframe using a data base management package."

Information Services also helps in situations in which mainframes are not involved. "One man wanted to get his Wang talking with his IBM PC," Mayes explains, "so we found out what it would take to accomplish that and ordered the necessary software." Mayes says General Foods' employees are just starting to tap the substantial resources of personal computers.



The Foremost-McKesson EIS program provides executives with a variety of graphic information.

## Community

### Accounting for the PC

Training is an important part of helping employees realize the PC's full potential, and that's why corporations like General Foods and Arthur Young and Company pump thousands of dollars into their personal computer centers each year.

The two Professional Computing Resources Centers (PCRCs) at the Dallas office of Arthur Young and Company, a leading tax consulting and auditing firm, have an assortment of 25 Apple, IBM, and Texas Instruments personal computers. The PCRCs are open to any employee or client interested in learning to use a personal computer. Like the General Foods PCC, the Arthur Young PCRCs offer training courses once or twice a week and distribute bulletins to keep employees informed of what's available. Hundreds of software packages are available for training and use, according to Ellen Persefield, a PCRC supervisor.

"Every week we review one or two packages. These 2-hour seminars review the basics of the package and allow 1½ hours for the student to use it," Persefield explains. "A seminar doesn't make them proficient in 2 hours, but it does get them up and running."

People are asked to sign up for the classes in advance so that the number of students can be limited to 10 or 12 each session.

Persefield and her staff closely monitor which machines get the most use and by which department.

"All three major departments—tax, audit, and management services—use the centers equally, although audit is the strongest user of *VisiCalc*. We monitor machine usage so that we can evaluate each system and buy more machines as needed." Currently, they are acquiring three or four machines per month.

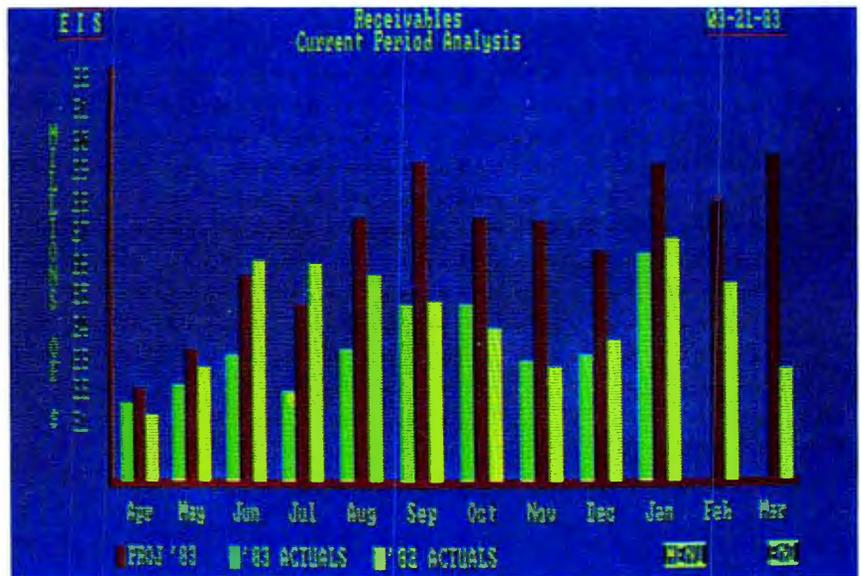
When researching the computer purchase, the PCRC staff considers the software available for the machine, how state of the art the hardware design is, and what computer

Arthur Young's clients are using. The standard configuration for their IBM PCs includes 256K, two floppy disk drives, a color monitor, and communications capabilities.

"Two years ago, when the first PCRC opened at the Dallas office, we had 2 machines. Today we have 33," Persefield says proudly. "And now of the 80-plus Arthur Young offices in the United States, 60 have personal computers and training programs, including PCRCs in New York City, Houston, Tulsa, and San Francisco, to name a few."

Today Samson consults with large corporation clients who are looking into the idea of using personal computers with mainframes. "There is going to be a lot of pressure in the next 6 to 12 months on companies that have dumb terminals to buy personal computers," Samson says. "These companies will have to decide whether they would rather have a dumb terminal or a personal computer that can be a terminal or an independent work station."

Samson warns that linking personal computers to mainframes is a



An EIS bar graph compares monthly receivables balances for current, prior, and projected years.

The PCRC was the brainchild of Tom Samson, now regional director of computer auditing and an Arthur Young partner working out of the Dallas office. "He did it to get technology to our people," Persefield says of her boss. "It helps them be more effective for our clients and for themselves."

Samson adds, "We formed our first complete system with an Apple III and an Altos computer. We chose the Apple mostly because it offered *VisiCalc*." After deciding to use the machines in more than just the auditing practice, the PCRC was born.

puzzle with three pieces: "One, you have to consider the hardware line that goes from the personal computer to the mainframe; two, consider the software that's needed to turn the personal computer into an intelligent terminal; and three, consider the mainframe modifications required to connect it to the personal computer."

Arthur Young and Company has linked some of its personal computers to clients' mainframes for audit operations primarily, but the personal computers act as terminals only.

"We're linking up to mainframes in a limited way in-house," Samson says, although projects are underway

to communicate on a larger scale. "Right now we're using the IBM System 34 and some Texas Instruments Professional Computers."

Why the TI? "We're a professional firm that services clients with a broad range of machines, so we need a broad range ourselves," Samson explains. "We have a number of clients with IBM PCs, so we bought PCs. But one of this office's clients is Texas Instruments...."

Arthur Young and Company now is investing in TI Professional Computers for itself.

"We'll continue to buy some IBM PCs, but we'll also buy a lot more TI's now," Samson adds.

### The Feds

The IBM PC may be fighting another Alamo with its competition at Arthur Young and Company, but it's still on the most-wanted list with the Feds.

At the Federal Reserve Bank district headquarters in San Francisco, almost a dozen PCs are used internally and more than 250 are leased out to customers. "We offer a service called FedLine," John Hoover, vice-president of financial services, explains. "Some of the banking institutions that access FedLine do so with the PCs we lease to them."

FedLine offers five services to participating banks: check processing wire transfer, currency and coin transportation, automated clearing houses, and security safekeeping and coupon collection.

Many years ago the Federal Reserve Bank provided these services free of charge only to the mostly large commercial banks that were members of the elite banking organization.

"But the Monetary Control Act of 1980 required the Federal Reserve to open its doors to all depository institutions; so where FedLine once had 144 member banks in our 12th Federal Reserve District [the nine western states including Alaska and



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## Community

Hawaii], there are now over 4500 participating institutions," Hoover says.

In addition, Congress directed the Federal Reserve Bank to begin charging for the services, but not to subsidize or make a profit from them. "To do this," Hoover continues, "we had to reduce the costs of the services, price them strategically, and then market them as a company would market a product line."

The Federal Reserve Bank's 12th District evaluated several personal computers before deciding on the IBM PC for small and medium in-

stitutions to use to access FedLine.

"Each district is incorporated individually and independently," Hoover says, so the decision to use a particular personal computer is also individual and independent. "But the Dallas Federal Reserve district uses PCs, and other districts are currently evaluating PCs for their own uses."

Internally at the San Francisco office, PCs are used for training and demonstrations and for daily departmental operations. "The training and demonstrations are for our customers. Originally, training was done at the customer's location, but now we're starting a centralized training center at the Federal Reserve Bank

that will handle most of the training," Hoover reports.

The Federal Reserve Bank will continue to send one of its ten training specialists to help clients if necessary, but Hoover expects more clients to send one or two employees to them instead.

For daily departmental operations such as marketing, the PCs keep track of customer profiles, and sales and performance statistics. "We have every depository institution's address, its deposit size, when the last sales call was made to it, when the next one is scheduled, the number of calls and sales our representatives make per month, quarter, and year, and so on."

Hoover also expects to put the complete marketing plans for FedLine on disk in the near future.

**Q:** How did the IBM\* PC become a test and measurement controller?

**A:** With a Ziatech ZT 1488 interface, of course!

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### Airborne PCs

While the Federal Reserve is banking on the PC to help make its FedLine service a success, Airborne Freight Corporation is counting on the computer to help the company reach a 100 percent overnight delivery rate on express mail packages.

With an experimental program that gives Airborne's larger corporate clients a free PC to track their own shipments, Airborne is hoping to attack the high cost of shipping by making shippers more cost efficient. If customers are concerned about a shipment sent via Airborne, they can access the overnight mail company's tracing routine with the PC, saving both companies the time and expense of having Airborne trace it.

"Airborne is a progressive company when it comes to keeping up with technological advancements," says Stuart O'Steen, Airborne's communications specialist. O'Steen explains that with *Focus* (Freight On-line Control and Update System), the program that runs on Airborne's mainframe, the whereabouts of a package are always known. With the help of *Focus*, customers can also prepare airbills, print shipping labels, maintain and print customer files, and produce a daily shipping log on their PCs.

Depending on the customer's shipping requirements, Airborne will supply one of three PC services. "The total system," O'Steen describes, "comes with the PC, a modem to connect to our *Focus* program, and a printer." Customers who place 100 orders per day usually get this system.

"For those with around 50 orders per day, we normally send a system without the printer, and customers who already have a PC get a modem to tie into *Focus*."

Already Airborne has 14 total systems loaned out to companies such as Standard Oil, Rolm Corporation, and Northern Telecom. "We also have some [loaned] out to two large computer manufacturers," O'Steen adds, "but they probably wouldn't want to be named."

O'Steen estimates that it costs Airborne close to \$6500 for each total system sent to a customer. "Then add another \$1000 on to that for the cost of training," says O'Steen of the costs of sending an Airborne employee to train each customer on how to use the *Focus* program.

"*Focus* is a communications network with a lot of capabilities," which is necessary in a business like freight shipping that requires immediate answers to certain questions, O'Steen explains. "With *Focus*, for instance, you can put a 'hound' on someone's PC; if that person doesn't answer your message in a specific time, you can keep sending a message at timed intervals until he does."

The PC giveaway program has already elicited a favorable response from participating Airborne customers, including being credited with improving morale at Rolm Corporation. As O'Steen explains, "It brings high technology to the routine of a shipping warehouse."

If customers continue to enjoy the benefits of having a PC to help with their shipping, then O'Steen expects Airborne to continue the program. "But we'll never charge more than a nominal user fee," he adds.

### The Benefits We Reap

Now that the PC has ventured into the boardrooms of large corporations, it will be expected to perform just as any top executive would: with speed, confidence, and few mistakes. The computer's versatility and comparative usefulness will be challenged constantly as the professionals who use it become more accepting of and dependent on what it can do for them.

The IBM logo on the PC is indicative of the expertise that went into building the machine, but by no means is that sign a guarantee that the computer will always be the best. The PC's acceptance in the profes-

sional world brings with it challenges that even IBM will sweat to meet. As any good business person knows, maintaining a product's good reputation is never enough; to be successful the PC must continue to grow as quickly and dynamically as the needs of its users.

New products like the IBM PC hard disk expansion unit and broader applications such as linking PCs to mainframes are just the first in a long line of changes precipitated by the PC's entrance into the corporate world. The more these professionals demand of their PCs, the more advancements we'll find for ours.

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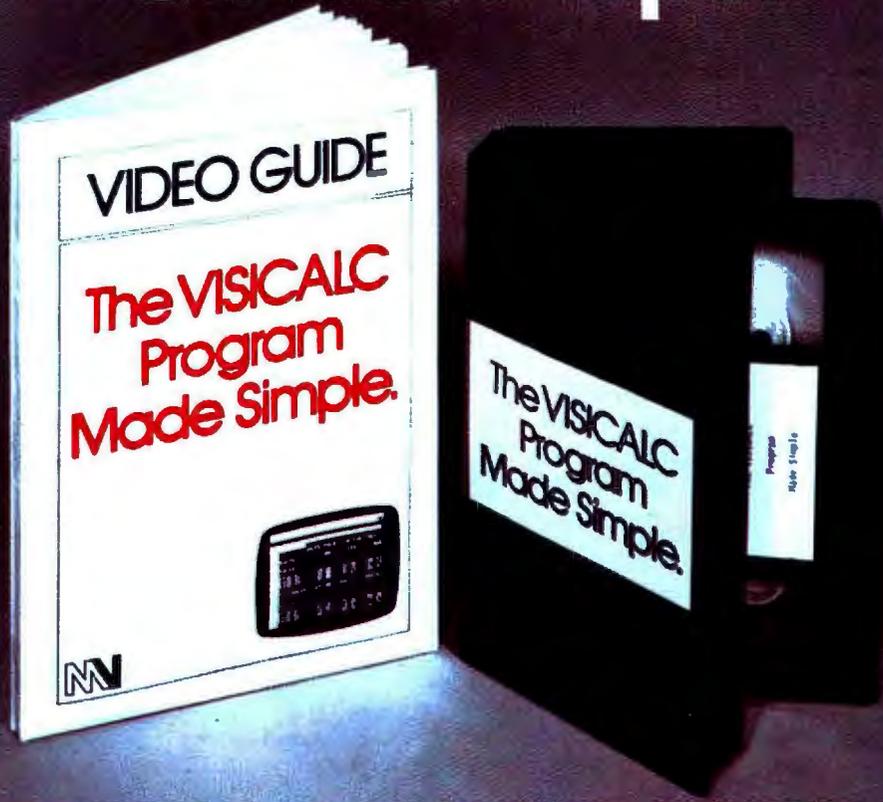
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On one hand, having all those options is a good thing. On the other, it can make picking the right one pretty difficult.



*Computers come in two parts.  
You have to buy both.*

We'd like to help. So here are a few suggestions about how to buy the computer that's right for you.

## **Computers come in two parts.**

One part is the "hardware," which is the machinery itself. The other is the "software," or a program, as it's sometimes called.

Software is the part that tells the computer what to do, the way a driver tells a car what to do.

Without software, a computer can't do anything.

And vice versa.

You have to buy both.

## **Buy the software first.**

Since the reason you're buying a computer is to get the capability the software gives you (remember, it's the software that knows how to get things done), it makes good sense to pick the software first.

Start by making a list of the things you want to use the computer for. It can include almost anything—any kind of inventory, filing, accounting, graphics, reporting, record-keeping, analysis—you name it and there's probably a software program that does it.

Next, take the list into a computer store and ask the salesperson to give you a demonstration of the program, or programs, that will do the things you want.

Even though you'll need a computer for the software demonstration,

keep in mind the computer is just a vehicle. The software is the driver. And once you've decided on the software, picking out the rest of the computer system will be much easier.

## **The simpler the better.**

Look for software that's easy to learn, easy to use, and that does the job in the simplest way possible.

Good personal software should be, as the computer people say, "friendly." Meaning that it helps you do what you have to do without getting in the way.



Meaning there are no complicated routines to follow to perform a simple task. And no programming language to learn.

Some people, however, will tell you that software has to be complicated to be powerful.

Nothing could be farther from the truth.

Because in order for a program to appear simple to you on the outside, it has to be extremely complex on the inside.

# ABOUT BUYING A HERE'S SOME HELP

Good software keeps the complications in the computer, where they belong. And keeps the capability at your fingertips. It's that simple.

## You simply have to see for yourself.

You can read any number of interesting books and magazines about personal computers. You can ask friends who have them. You can look at all the sales literature you can get your hands on. And you should do all those things before you decide to buy.

But as helpful as all that can be, there really is no substitute for a real, live demonstration.

When you do go out shopping, we recommend you take a look at the PFS® Family of Software.

The PFS family is designed the way we think all software should be: simple, straightforward and powerful.

Currently, three products make up the family, PFS:FILE, PFS:REPORT and PFS:GRAPH, with more programs on the way. Here's a little more about each of them.

## PFS:FILE. The simplest way to get organized.

Basically, FILE works like a paper filing system, without the paper. So you can record, file, retrieve and review information in a fraction of the time it takes with a conventional filing system.

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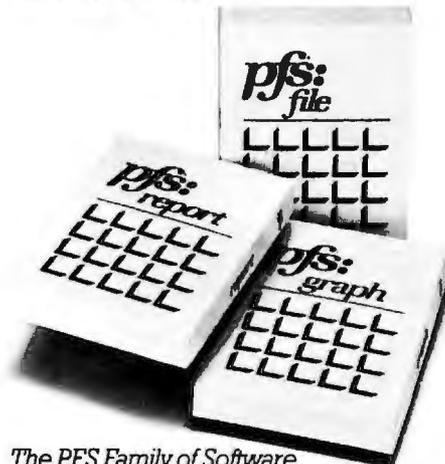
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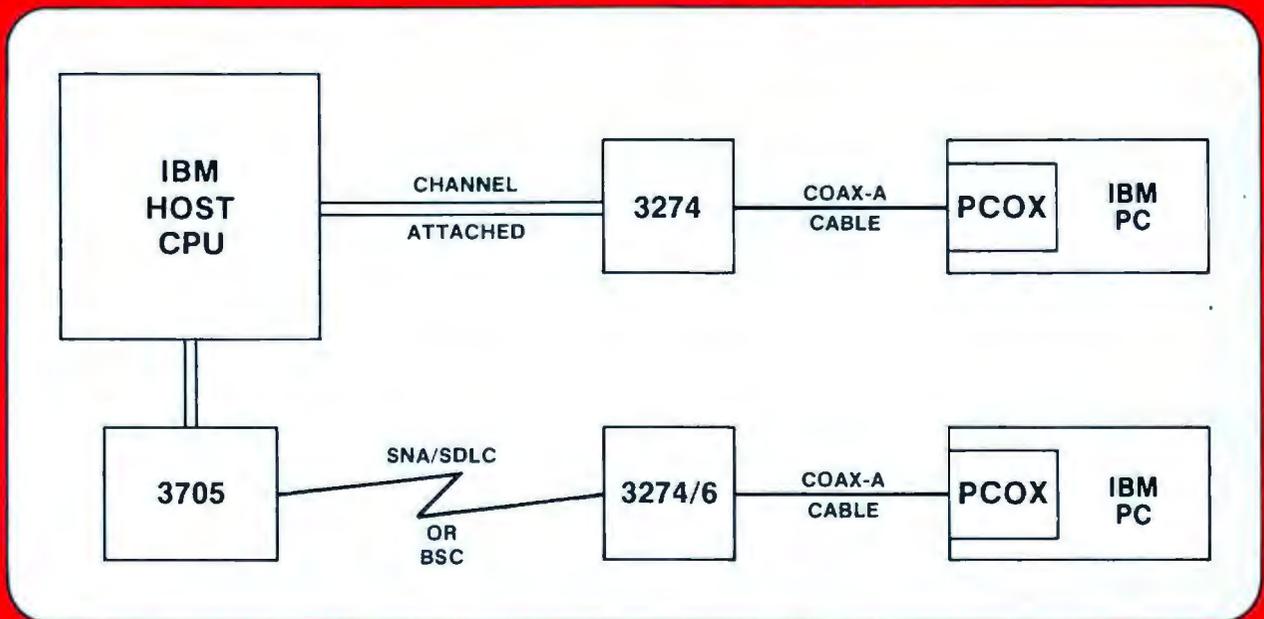
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# Feuding to Do Business

*Who do you root for when retail stores and mail-order houses punch it out?*

*Katie Seger*

Whenever the Hatfield family got together at the farm, you never heard much good talk about the McCoy's. Of course, when the McCoy clan gathered around the old homestead, a lot of bad mouthing was directed the Hatfields' way.

That's the way it is with feuds, even present-day ones. Each side has tales to tell about the opposing side with the truth most likely somewhere in between.

Take, for instance, the feud between computer retail stores and mail-order houses. After all, says the retail dealer, all mail-order houses are suspect, sleazy operations that a month after cashing a customer's check won't be at the same location to answer software questions or repair faulty equipment.

But hold on there, friend. Any mail-order business person can tell you that retail stores sell overpriced merchandise with the excuse that their neighborhood service and training is available when you need it—only to turn you over to salespeople who haven't even read the documentation for the software they're selling.

Do the good guys wear white hats and the bad guys black? Identifying the leading players in this drama is not that easy. Retail store and mail-order house business boundaries are not rigidly enforced; customers, man-

ufacturers, and distributors are shared between the two sides.

For the most part, the retail dealer and mail-order business person both buy merchandise from manufacturers to sell to end users; one sells in a store and the other conducts business through the mail. Wholesalers, distributors, and brokers sometimes act

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Mail-order houses offer manufacturers the advantage of free advertising and a large sales volume.

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as middlemen, buying from manufacturers and selling to both retail stores and mail-order houses, but not end users.

Additional meshing in the marketplace results in some retail stores purchasing merchandise from mail-order houses, and mail-order houses relying on former and current retail store customers for much of their business.

Who is stealing customers and who is overstepping boundaries? The real story behind the retail store and mail-order house feud is just like that of the Hatfields and McCoy's. The truth lies somewhere in between.

## Horror Stories

"I am strongly opposed to purchasing any electronic equipment, especially the computers themselves, through a mail-order house," said Ellen Rony Wilson, a salesperson at Computer-Land of Marin in California. "Some people wouldn't think of buying anything as delicate as a [stereo] turntable through a mail-order house, but they think nothing of buying a computer that way. But computers are delicate devices too."

Retail dealers complain that they are often left to pick up the pieces once the customer has spent money with the mail-order houses. "People will buy something from a mail-order house and then come in and ask us to help them with their problems. I don't think that is fair," she said. "We don't discount; we give service and training as part of the item price. Many people don't realize that."

Fredric V. Saland, co-owner of Shoreline Software in San Rafael, California, voices a similar complaint about computer owners who expect their neighborhood stores to teach them how to use a product after buying it from a mail-order house. "I am happy to help people who have gone astray," he said, "but I have to run my business." Saland told a story about mail-order buying in which "all the cliches are true."

"A man came into my shop and was looking through the magazine rack," he began. The man said that he had purchased *VisiFile*, and he couldn't figure out how to make it work. Saland told him to go back and ask the dealer to explain it. The man said he had purchased the software from a mail-order house. When he called the 800 number, there wasn't anyone to answer technical questions, only a telephone operator who took orders. The operator told the man to call the manufacturer, but when he called, the company told him to see his dealer.

The gentleman came into the store a few weeks later, Saland continued. This time he was having trouble with a different program, *EasyFiler*. The man's tale was a repeat of his first narrative, Saland said. He had bought the program from a mail-order house and was getting the same telephone runaround. The mail-order house told him to call the manufacturer; the manufacturer told him to talk to his dealer.

The same fellow came back to Saland's store several weeks later looking for a *dBASE II* user guide. It was the same Catch-22 story, Saland said. The fellow had purchased the data base program from a mail-order house and couldn't get the house or the manufacturer on the phone to help him. Saland admitted that this man was not the ideal candidate for mail-order purchasing, but he pointed out that the man had spent about \$2000 on three software items and still didn't have anything he could use. "This is not an atypical story," Saland said.

### Counterpoint

"The mail-order people that I've dealt with are more knowledgeable about software than retail salesmen," said Microhouse General Manager George Gamard. "We can support *WordStar* on the phone better than ComputerLand does in the store."

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## The Do's and Don'ts of Mail-Order Shopping

One computer programmer who often buys from mail-order houses goes in person to inspect an operation before making a purchase. That's fine if you live within a 2- or 3-hour drive of the mail-order house, but even people who live in a different state can, with some preparation and careful shopping, avoid many of the pitfalls of long-distance ordering without on-site inspection.

Following are some tips gleaned from mail-order veterans:

- *Know your technical limitations.* If you are new to computers and don't know a disk drive from a memory board, mail-order probably isn't for you.

- *Ask friends who have computers and user group members which mail-order houses they use.*

A satisfied customer is the best recommendation a business can have.

- *Call the local Better Business Bureau.* The office can run a check on a mail-order house across town or across the country.

- *Know your own computer.* You must be able to order the proper software and hardware for your system configuration.

- *Know what job you want the software to do.* Many mail-order houses stock only best-selling software; a less popular program might be better suited to your task.

- *Know which version of a program you are buying.*

- *Read the fine print.* Mail-order house advertisements carry information on handling and shipping charges, sales tax (if any), and credit card and personal check policies. Add the charges to the cost of your purchase to see if the discount price is still a good deal.

Veteran buyers recommend making use of the free, 800 telephone number that most mail-order houses operate. Take time to ask questions before ordering a product. Following are suggested questions to ask:

- *How long has the mail-order house been in business?*

- *What is the refund policy for both hardware and software?* Because of the amount of illegal copying, many mail-order houses will not give a money-back refund with game software; only an exchange is honored.

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George Gamard and Loren Couplin, a buyer and spokesperson for Alpha Byte, said that they understood user scepticism about mail-order houses. They admitted that several mail-order houses advertised in buyers' guides published last year are no longer in business in 1983.

Alpha Byte and Microhouse have been in business more than 3 years, and both men said that their businesses have reputations for supporting the computer hardware and software that they offer. Couplin said that Alpha Byte has people on staff to answer software or hardware questions. If the mail-order house staff doesn't know the answer, Alpha

Byte contacts the manufacturer and calls the customer back with the information. Microhouse also employs customer support personnel to handle customers' problems and questions.

### The Third Party

Software and hardware manufacturers find themselves "walking a narrow line between retail dealers and mail-order houses," according to J. Charles DePew, vice-president of

- *What is the return/refund policy for goods damaged in transit?*
- *What is the return/refund policy for defective or incorrectly labeled merchandise?*
- *Does the merchandise carry the manufacturer's warranty and, if so, how long a time period does that cover?*
- *Are all the product's parts from the manufacturer?* Some mail-order computers, for instance, are not configured with the manufacturer's disk drives and chips, which might create problems if you need to rely on the manufacturer's warranty.
- *Does the mail-order house offer a discount with prepaid orders?*
- *Is the product currently in stock?* Some mail-order houses will wait until they have several orders for an item before they order it from the manufacturer.
- *After ordering, how long will it take for the item to be delivered?*
- *How much longer will it take if the payment is made by personal or company check?*
- *Can you order C.O.D.?* You can refuse to pay for a package damaged in transit.

You might feel safer ordering your merchandise with a credit card. If a dispute arises over the purchase and the mail-order house refuses to refund or exchange the merchandise, your bank will step in on your behalf. Usually banks require that you return the merchandise, and they will credit your charge account for the money spent. The banks then bill the mail-order house.

Bank personnel cite cases of unauthorized credit card orders made with charge account numbers given over the telephone. They caution that you check the reputation of a mail-order house before you use your credit card with a telephone order.

Being a careful consumer might take extra time, but it can save money and unnecessary annoyances in the long run.

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marketing and sales for Davong Systems, Inc.

Mail-order houses offer manufacturers the advantage of free advertising and a large sales volume, but "retail store owners jump on you when they see your products in the mail-order ads," DePew said. Recognizing that mail-order houses serve a certain type of customer well, Davong sells its products to two mail-order houses. "We screened them pretty carefully before we started doing business with them," he said.

Other manufacturers aren't as open-minded. In September of last year MicroPro announced that it would no longer sell its products to any mail-order house (the last of the company's contracts with mail-order houses expires in July 1983).

"While we do recognize that some mail-order houses are better than others," said Will Luden, director of marketing and retail communications for MicroPro, "we strongly feel that software requires hands-on demonstration prior to the sale."

Rod Turner, Ashton-Tate's director of sales, thinks that MicroPro is taking the wrong approach. "Mail-

order houses will exist whether MicroPro or Ashton-Tate sells to them or not," Turner said. "We screen all our dealers, retail and mail-order. But the fact is that a distributor or wholesaler may sell [our product] to anyone, including mail-order houses.

"You can walk away from a problem or you can walk in and deal with it. We would rather walk into a mail-order house, shake hands with the guy, and train the staff so they understand our product," he said. Turner said that Ashton-Tate has recently created a department within the company that will offer formal course training for dealers.

### A Money-Saving Alternative

Gamard thinks that mail order is an alternative method of purchasing that shouldn't be overlooked by computer owners; good information and advice can be obtained from the mail-order houses. "It's a free phone call. Ask away," Gamard said. "We know our business."

Mail-order houses offer customers better prices than the retail stores. Consumers can save as much as 30 to 50 percent off the list price with some mail-order purchases. As a former manager of a retail computer store noted, "Anyone who is technical is crazy not to buy through a mail-order house. Why pay for the support if you don't need it?" Even Saland admitted that a businessman proficient with *VisiCalc* who wanted to buy three additional copies of the program for his office would be foolish not to buy from a mail-order house.

The flip side of the argument is just as validly stated by Wilson: "People new to technology run the risk of getting hurt for the savings of a couple hundred dollars."

Both sides agree that first-time computer owners do not receive the hand holding they need if they buy from a mail-order house. The proximity and accessibility of local computer stores is a major reason many consumers feel safer buying from retail stores.

## Retail Revenue: Facts and Figures

Five years ago only a few hundred retail stores sold personal computers. More than 15,000 sell personal computers today, and of this number more than 650 retail stores sell the IBM PC.

Studies and surveys conducted by Future Computing Incorporated, a market research company based in Richardson, Texas, provide a picture of the average retail store selling the IBM PC.

The typical store is 2000 to 2500 square feet and is more likely located in the suburbs than in a downtown shopping area. The store is usually part of a small shopping center of five to seven businesses joined on one block, or it is located in a free-standing building. The average store requires a city with a population of 200,000 to support it.

Retail store sales grew more than 20 percent between 1980 and 1981. In 1981 the average store did \$1 to \$1.1 million in sales; the estimated total sales per store for 1982 was \$2 to \$2.5 million, with an 8 percent after-tax profit.

In addition to the IBM PC, the average store sells two to four other personal computers. Seventy-four percent of a typical store's sales is hardware; the personal computer system itself accounts for the largest portion of hardware sales, followed by printers and add-on disks. Fifteen percent of sales is in software, and the remaining 11 percent is made up of miscellaneous items such as books, magazines, service, training, and supplies.

Most stores carry approximately 30 entertainment software titles, accounting for 48 percent of unit software sales. Statistics show that 3 financial planning, 4½ data base, 4½ word processing, and 3 accounting packages make up 15, 14, 15, and 8 percent respectively of the remaining unit software sales.

Retail software stores have recently entered the marketplace. Just 1 percent of the software distributed in 1982 was sold by retail software stores. However, Future Computing predicts that retail software stores will follow the growth pattern of retail computer stores and by 1987 will be responsible for 27 percent of software sales nationwide.

The typical retail store employs seven to nine people. According to Harold Kinne, senior vice-president of Future Computing, selling a computer takes 2 to 4 hours of a salesperson's time. Customers make at least three trips to the computer store before buying their first computer, and the initial purchase is \$3900. Hardware and software add-ons for the first and second year total \$1300 and \$860 respectively.

More than 80 percent of retail stores provide training classes; those in word processing and BASIC programming are the most popular. Most classes feature hands-on training.

Training classes have turned out to be beneficial for both customers and stores. Retail stores that offer training classes have total sales of 3 percent above average; those that don't offer classes have sales of 13 percent below average.

Future Computing estimates that by 1988 sales for the IBM PC and other comparable computers will be \$12.1 billion, and their researchers predict that computer retail stores will be responsible for 50 percent of those sales.

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For more sophisticated computer consumers, mail-order prices are a tempting reason to investigate the alternative way to shop. Mail-order houses have to please and placate their customers, too, Gamard said. "We are very vulnerable to criticism," he said. Microhouse has to meet its customers' needs as much as a retail store because it relies on repeat customers for 38 percent of its business. "I will sooner give a person a refund, even if I think we are in the right, than lose him as a customer," Gamard said.

### Buying Tips

The policy for refunds (or the lack of them) is an area where consumers should read the fine print and ask questions before they buy, whether the purchase is made at a retail store

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Retail dealers complain that they are often left to pick up the pieces once the customer has spent money with the mail-order houses.

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or mail-order house. Prospective buyers should take advantage of the free, 800 telephone number that most mail-order houses operate, and ask questions about warranties, refunds, shipping and handling charges, and service. If a mail-order house is hesitant to detail its policies on these important points, take your business elsewhere.

The Hatfields and the McCoy's never did live in peace and harmony. But there appears to be enough room in the marketplace for both the retail stores and the mail-order houses. It's up to you, the end user, to decide which shopping alternative is the right one for you.

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# X.T. Phone Home

*IBM expands its dealer support services to include a self-propelled demo and an on-line information exchange.*

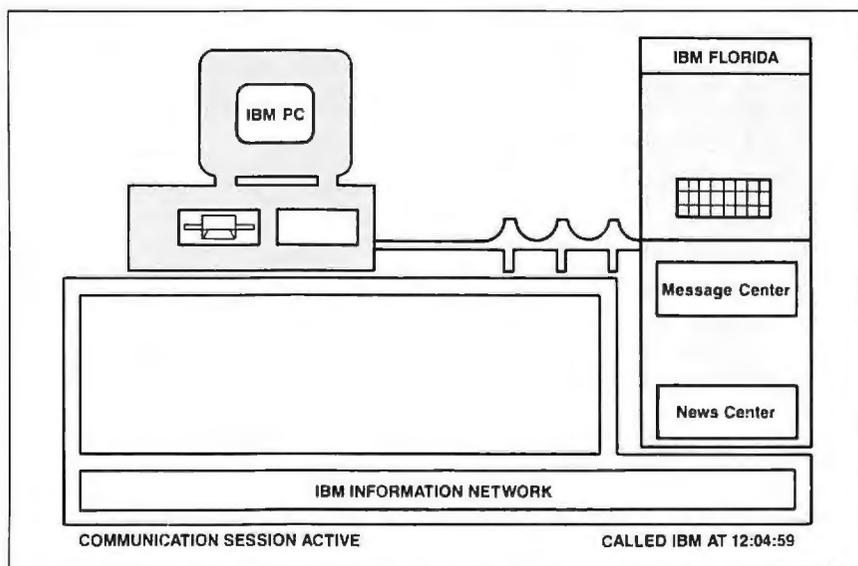
*Jeremy Joan Hewes*

Concurrently with its introduction of the XT, IBM announced a two-pronged Customer Support System to enhance sales and provide dealers with a more effective link to the "home office." In the words of Rodney Roberts, Senior Program Manager in IBM's Marketing Support Planning Group in Boca Raton, "It's going to allow customers to get the support and responsiveness from IBM that they have become accustomed to in other areas of our business."

One part of this new support system is designed for customers to use directly. It's a compiled BASIC program that demonstrates the features of all the PC (and XT) hardware and software marketed by IBM. The second part of the system is, unfortunately, for dealers only. This is an interactive communications arrangement that permits dealers to connect to IBM's internal data base system (via telephone or modem). Both parts of the support system operate on the XT and make effective use of the new color monitor.

### On-Screen Sales Tool

The customer-oriented component of the support system provides a menu-driven collection of information consisting of product directory, digest of new products, and product demonstrations. This on-screen sales tool is



Dealer's on-line communications system interacting with IBM's information network



## Community

self-timed and can run unattended, or a customer or salesperson can interrupt it at any point and sample its contents at will. A status line at the bottom of the screen displays several one-key commands that allow viewers to pause, move backward or forward in a demonstration, or return to a previous menu.

The product directory is divided into software and hardware sections, which are further subdivided into logical categories such as printers and monitors or personal and busi-

ness programs. Each choice from a category yields a listing of products, which are then detailed in a product demonstration. If a customer does not know into which category a program fits but does know the program's name, he or she can search the directory for that name.

Once the viewer selects a product for demonstration, the Customer Support System responds with what IBM's Roberts candidly calls a "sales presentation."

The pitch for *Multiplan*, for example, utilizes a vertically split screen; the left side shows an example of what you'd see while using the pro-

gram, and the right side contains a series of notes about the visual. Because all the demonstrations are in color, you're actually seeing enhanced versions of most programs. An on-screen note specifies, however, that the graphics in the demo may differ from the actual program.

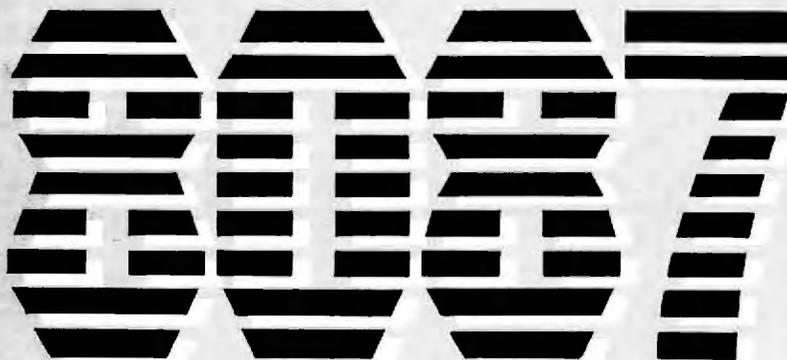
As the demonstration progresses, the viewer can move backward and forward by pressing the PgUp and PgDn keys. Many of the demos have several pages of information, each of which shows the flip-chart graphics on the left and the explanatory text on the right.

At least some of the new products are also introduced with a demonstration that runs on its own. The XT was an obvious candidate for this treatment; its introductory sales pitch makes good use of the IBM color display and the graphics in BASICA. This kind of demo is arranged somewhat differently from those accessed from the product directory; the XT demo cycles through its series of pages (or screenfuls of information) until someone interrupts it by pressing the F1 key. This action introduces a new series of pages that provide more detailed data about the XT.

Of course this use of a self-timed demonstration is not new; many computer stores have had such demos running in their windows for a couple of years. But IBM's split-screen, viewer-controlled sales pitches are cleverly implemented and the little taste of each program is ingenious. Most important, the public part of the Customer Support System is certain to lure thousands of potential buyers into putting their hands on the keyboard and making things happen with the computer. And that's the most potent sales pitch of all.

### Special Effects

The second component in IBM's new support system is essentially private, because only dealers have access to the telecommunications network that features a PC-related data base. Dealers may search the data base for spe-



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cific terms, file claims for warranty service, leave or retrieve messages, and read news bulletins from IBM.

Like most long-distance networks, however, there is a charge for this service. Roberts states that the probable fees for dealers using the network will be \$25 per hour during business hours and \$15 per hour at other times, with the first 2½ hours of use free.

This network is still in the testing stages, but an advance demonstration had an entertainment level that would make E.T.'s head hit the ceiling. Using the XT with color display and a modem, Roberts punched up the program that provides access to the information network.

He elected to search the data base for the term "printer"; when he entered that command, the program automatically dialed the IBM access number. Once connected, the screen was divided into three areas: one for messages, one for news, and one for the search. Had there been any messages or news addressed to the identification number Roberts used to sign

onto the network, such information would have been displayed automatically, even though his purpose was to search the data base, not to retrieve other information. The screen also showed the elapsed time of the call and noted that we were connected to the IBM Information Network in Tampa, Florida.

Roberts selected the search function and entered the word he wanted located in the data base. Within about 15 seconds of receiving the search term, the network began to show its colors. On the right side of the XT's color monitor was a rectangular device that perfectly recreated the Hollywood version of a mainframe computer—complete with an array of bright red blinking lights. Next to the imitation Univac was a less convincing representation of a row of telephone poles and lines over which the tiny lights also blipped.

All this blinking presaged the results of the search, which appeared in a vacant space on the screen. As soon as the network's answer was displayed, the modem connection was broken; this is an intentional feature

of the communications program, designed to keep on-line charges to a minimum. In the demonstration search, no information was found for the term "printer," but if some data had been found, the dealer could have chosen to expand the search by reconnecting with the network.

At present the PC-related data base has not been completed, so it's difficult to know how useful this support service will be. One dealer commented that he liked everything about the service except the cost, and he doubted that he'd use it much. A salesperson for another dealer suggested that the service would be most helpful if dealers could ask technical questions and get prompt, accurate answers.

Whatever the long-term impact of the on-line support system, this slightly Hollywood, slightly space age experiment indicates one important fact: IBM is making an effort to work with its dealers and is using its own technology to do it.

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## Star-Dot-Star: A Global Exchange of Computer Discoveries

Edited by Andrew Fluegelman

This department runs the gamut of user tips this month, from screen dumps and a hardware project, to a wacky exercise in POKEing.

### Poor Person's Word Processor

If you want to write a short note or letter and don't care about saving it to disk, you don't need a word processor—or DOS for that matter. Just turn on the computer and let Cassette BASIC take over.

Type `KEY OFF <ENTER>` to turn off the line 25 display. Then press `Ctrl-Home` to clear the screen. You're now ready to compose your letter. You can use `Tab`, `Backspace`, and any of the four cursor control keys, plus the `Ins` and `Del` keys, for editing your letter.

The only precaution is that when you want to skip to a new line, you must use `Ctrl-ENTER`. If you just press `ENTER`, you'll get a 'Syntax error' message.

Once you have composed your letter using as much of the screen as you need, turn on your printer and press `Shift-PrtSc` to print the letter. Repeating `Shift-PrtSc` allows you to make multiple copies.

If you accidentally press `ENTER` without `Ctrl`, you can repair the damage using the editing keys. Just remember that your entire letter is a kind of string, and that too many inserts and deletes will require editing to correct the rest of the display.

*T. R. Dickson  
Aptos, California*

### More Screen Dumps

The BASIC Print Screen program, as listed in *\*.\** (Vol. 1, No. 1), assumes that your PC has exactly 64K of memory. To use this program for other memory sizes, the constant in line 10 would have to be changed.

There is another way to do a Print Screen function from within a BASIC program that will work regardless of memory size. Put the following subroutine at the end of your program:

```
60000  PRTSCS = CHR$(205) + CHR$(5) +  
        CHR$(203)  
60010  PRTSC = VARPTR(PRTSCS)  
60020  PRTSC = PEEK(PRTSC + 1) +  
        256*PEEK(PRTSC + 2)  
60030  DEF SEG  
60040  CALL PRTSC  
60050  RETURN
```

The following line will print the contents of the screen:

```
100  GOSUB 60000
```

Programmers who call machine language routines from their BASIC programs should note that this subroutine resets the current segment to BASIC's data segment.

*Robert Pirko  
New York, New York*

### Printing Screen Graphics

Listing 1 is a program to print medium- and high-resolution screen graphics on the NEC 8023 or Pro-writer dot matrix printer. The easiest way to use it is to `RENUMBER` it to a sufficiently high range and `SAVE` it in ASCII using the `'A'` option, and then `MERGE` it onto the end of any graphics program you want to print. The screen orientation is rotated 90 degrees counterclockwise, and the vertical aspect is slightly compressed,

but the entire screen is printed in less than 90 seconds, so you're getting your money's worth.

Line 10 defines the starting address of the screen buffer on the color/graphics adapter. Line 20 is a very useful statement that prevents BASIC from sending a carriage return after every 80 bytes sent to the printer. Line 30 sets the printer to double-width mode and  $\frac{1}{4}$ -inch line pitch. Line 40 begins a loop that increments the scanning of the screen columns from right to left. Line 50 alerts the printer to accept 200 bytes of "bit-image" graphics information.

Line 60 is where the action is—it executes loop to `PEEK` at a byte in memory containing the information about eight dot positions in a particular column, moving from scan line 0 to 199, and sending each byte to the printer as a decimal (ASCII) number.

Line 70 sends a carriage return to the printer and finishes the loop to move to the next lower numbered column. Finally, Line 80 resets BASIC's line width and the printer to normal character width and line pitch, and sends the print head home.

Listing 2 prints medium-resolution screen graphics. Some of the previous comments apply, but now the screen orientation is preserved and the aspect ratio of the printout is excellent. There is always a catch—now the running time is almost 7 minutes because all 64,000 points on the screen must be examined individually and only the top two pins of the print head are utilized for the entire print. (Both of these programs print the screen literally, including any and all characters.)

*Robert B. Relf  
Bothell, Washington*



```

10 DEF SEG=&HB800
20 WIDTH "LPT 1:",255
30 LPRINT CHR$(14)CHR$(27)CHR$(84)"16";
40 FOR Y%=79 TO 0 STEP -1
50 LPRINT CHR$(27)+CHR$(83);"0200";
60 FOR X%=Y% TO 7920+Y% STEP 80:LPRINT CHR$(PEEK(X%))
   CHR$(PEEK(X%+&H2000));:NEXT
70 LPRINT CHR$(13);:NEXT
80 WIDTH "LPT1:",80:LPRINT CHR$(15)CHR$(27)CHR$(65)CHR$(13)

```

Listing 1

```

10 WIDTH "LPT1:",255
20 LPRINT CHR$(14)CHR$(27)CHR$(84);"04"
30 FOR Y%=0 TO 199:LPRINT CHR$(27)+CHR$(83);"0320";:FOR X%=0 TO
   319:LPRINT CHR$(POINT (X%,Y%));:NEXT :LPRINT CHR$(13);:NEXT
40 WIDTH "LPT1:",80:LPRINT CHR$(15)CHR$(27)CHR$(65)CHR$(13)

```

Listing 2

## Profeel Interface

When I looked at the features of the Sony Profeel Monitor, I was impressed and decided to get one for my IBM PC. The Profeel Monitor has a provision for RGB input and composite video and also has a stereo amplifier. The monitor can be used as a high-quality TV with the optional tuner. I could buy a 19-inch Profeel Monitor at a discount store for \$568. The resolution of the monitor matches well with the color graphics of the IBM PC and supports an 80-column display.

When I connected the cable between the PC RGB output and the monitor, I found to my surprise that the screen kept scrolling diagonally. The monitor did not correctly interpret the horizontal and vertical synchronization signals from the PC. With the help of my friend, Dan Nosenchuck at Caltech, I made an interface to use the Sony Profeel with the IBM PC.

The problem is that Sony employs negative TTL logic and the IBM PC color/graphics RGB output uses positive TTL logic. An interface should therefore consist of an inverter to change the polarity of the horizontal and vertical synchronization signals. The simple circuit and cable for interfacing can be made in less than an hour and for under \$15 (see Figure 1). The 5-volt supply to the inverter can be obtained from Pin 5 of the light pen connector or Pin 4 of the speaker interface without any soldering on the board, using a simple connector that can be obtained from any electronics supply store.

*Malladi Subbaiah  
Palo Alto, California*

## Pinwheel POKE

*If you've read this far, you're in for a treat. Regardless of how intimidated or disinterested you might be with POKEing around in BASIC, it's worth keying in and running the two*

*lines of code. If you learn something from it, all the better.*

In a recent Beagle Brothers Apple computer newsletter I found a BASIC two-liner that I adapted to run on the IBM PC. It looks like this:

```

1  To operate type:"CLS:LIST" & "RUN"
2  A$="I/-" + CHR$(92):OUT 97,79:FOR A=1
   TO 48:OUT 67,161:OUT 66,A:FOR C=1
   TO A:NEXT:X$=MID$(A$,A-
   INT(A/4)*4 + 1,1): LOCATE 2,7:PRINT
   X$X$X$;:NEXT:GOTO 2

```

It caused the four characters (I/-\ ) to "windmill" in the second line. Sound effects were included that made a raspy buzzing sound like paper hitting the spokes of a bicycle wheel, slowing as time progressed.

The three OUT commands are what cause the strange buzzing sound in the speaker. The second and third 'OUT' can be fiddled with to produce other sounds. The rest of the program simply loops through an alternate selection of one of the four

characters in 'A\$' to give the appearance of motion when it is printed on the screen.

The original Apple program contains a 'CLS:LIST' in the first statement, but putting a LIST in IBM BASIC causes the program to stop after execution of the LIST. To get around this, I decided to first POKE a RUN 2 <ENTER> command into the keyboard buffer before issuing the LIST so that the program would merrily carry on with statement 2 after LISTing the program. Page A-3 in the *IBM Personal Computer Technical Reference* manual BIOS listing shows the 16 double-word keyboard buffer, buffer-head, and buffer-tail pointers that can be modified using the BASIC POKE command.

A new BUZZ program was constructed that looks like this:

```

1 CLEAR:CLS:DEF SEG = &H40:POKE 26,32:
  POKE 28,44:POKE 32,82:POKE 34,85:
  POKE 36,78:POKE 38,32:POKE 40,50:
  POKE 42,13:LIST 'by Walter Cooke
2 AS="|/-" + CHR$(92):FOR A=1 TO 48:
  OUT 97,79:OUT 67,161:OUT 66,A:FOR
  C=1 TO A:NEXT:X$=MID$(A$,A-
  INT(A/4)*4+1,1):LOCATE 5,7:PRINT
  X$X$X$,:NEXT:GOTO 2

```

This listing is set up for a 40-column display. Change the 'LOCATE 5,7' to 'LOCATE 3,7' for 80-column displays, since program Line 1 will fit onto two lines when you type it in 80-column format.

Now the program automatically clears the screen, POKES a RUN 2 <ENTER> into the keyboard, lists the program out, and carries on executing Line 2. The POKE to address &H40+26 sets the keyboard header to the start of the 16 double words. The POKE to address &H40+28 sets the keyboard trailer after the last character of our inserted command. Then, beginning at &H40+32, we POKE ASCII character codes to be executed whenever input is requested

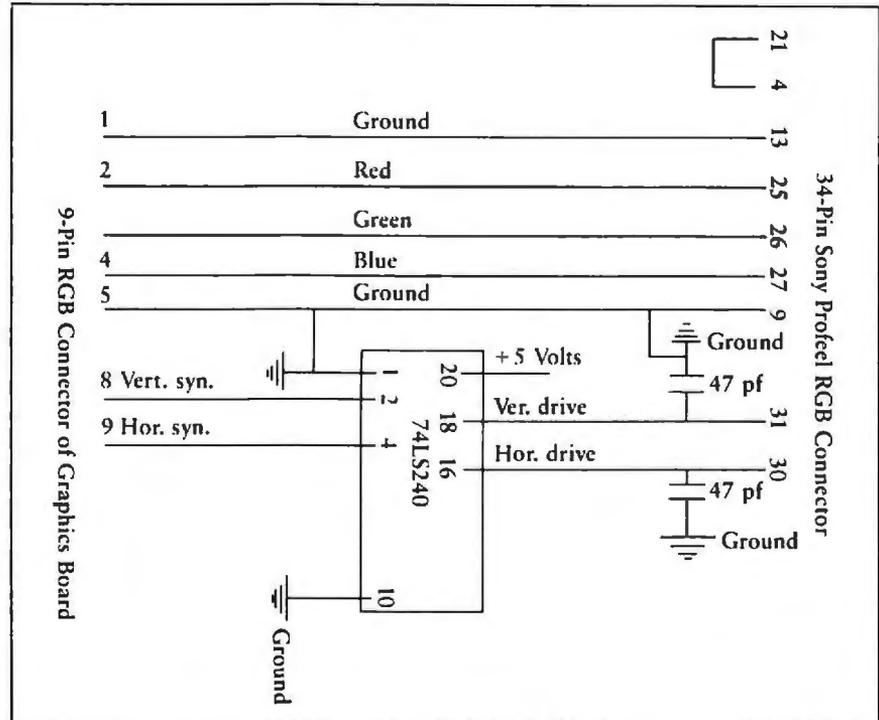


Figure 1: Profeel Cable and Inverter Schematic

(82 = R, 85 = U, 78 = N, 32 = Space, 50 = 2, 13 = ENTER). Don't forget to include a carriage return (code 13) at the end of your command or it will sit in the buffer but will not be acted on until you press ENTER.

Another obvious use for the keyboard POKE, is to clear the buffer of all characters by setting the buffer head equal to the buffer tail. Use POKE 26,PEEK(28) to accomplish this. This is a good hint to keep in your notebook for future reference, since the example IBM lists on page 3-23 of the *IBM Technical Reference* manual for clearing the keyboard buffer, "POKE &H6A,0", works in DOS 1.0 but not in DOS 1.10. I haven't checked, but DOS 2.00 probably has a different address again.

It is, of course, necessary to be careful when you are experimenting here. If you POKE a ridiculous address into the head/tail words, you

can cause the PC to branch off the edge of the memory universe with no trouble at all.

What else can the keyboard buffer POKE be used for? In BASIC programs it is often useful to anticipate future input from the user, or even complete the remainder of a command input based on the first character typed (as done in *SuperCalc*) to save the user some keystrokes. This is easily done using the technique shown above.

Walter Cooke  
Andrew Tuline  
Vancouver, British Columbia

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# BBS Watch

## *An Easy Approach to File Transfer for PC Users*

**Gene Plantz**

File transfer between your computer and a bulletin board system is an important part of what a community BBS can offer. It is also a money-saving approach to building a software collection because it allows you to acquire programs for the cost of a phone call. At the same time, transfer allows you to acquire files and on-line documentation that contain operational information about programs on the bulletin board.

The programs found on a BBS are public domain; they were given to the bulletin board for noncommercial distribution and are not to be sold. Commercial, copyrighted programs are not found on a BBS. The authors of public domain programs are most often computer hobbyists who have developed programs to solve problems or satisfy interests and want to share their creations with others.

### **BBS Programs**

Programs found on a bulletin board vary from system utilities such as a fancy directory display or file sorter to business applications programs for maintaining and balancing a checkbook. Data base management programs such as *PC-File* are also popular. The programs available on a particular BBS may vary according to the objectives set up for the system. Some bulletin boards specialize in technical programs such as operating system modifications, assembly language coding, and high-level languages such as C and Pascal.

Programs available for downloading (transfer from the BBS to users) are stored on the BBS in one of two ways. They are either encoded in a

normal ASCII format (such as a BASIC program saved with the A option) or in a binary format (such as a command file created with the .COM or .EXE filetype). The main difference between these two file formats is that the ASCII type does not use the eighth bit in a character of data while the binary type does use the eighth bit to hold data. The eighth bit, sometimes called the high-order bit, causes a conflict on some communications systems because the hardware uses an error-checking method called parity that also uses the eighth bit in every character of data transmitted.

The file transfer method used depends on the capabilities of your communications program and the program the BBS uses. Most bulletin board systems use the ASCII transfer method. When using this method you must first give the BBS enough information for it to locate the file you want to download. The bulletin board then sends the file from disk storage to the communications line (the modem). At the same time, your communications software reads the data and displays it on the screen. To keep the file, your communications program must be able to save the data the BBS is transferring to a disk file (or to a printer for later manual entry into your computer).

This ASCII method is a reasonably straightforward procedure for data transfer, but it has a serious drawback in that it lacks error checking. If a character gets lost or changed in transmission, you may not be aware of it until you attempt to run the program or use the data. Errors can be caused by noisy telephone connections (common during long-distance calls) or by satellite echo delays encountered when using some of the

alternate long-distance telephone services. If your communications program detects a parity error during transmission, it will give you a warning that something is wrong, but no signal indicating a problem goes back to the sender.

To overcome the lack of error checking in ASCII file transfer, Ward Christensen, co-creator of the first bulletin board, developed an error-free method of data transmission for CP/M users. Known as the Modem/Xmodem Protocol or the Christensen Protocol, the method specifies the form in which data is sent during transmission. This protocol can be used with all types of files.

The Modem/Xmodem Protocol sends 128-character blocks of data with special header characters, a sector number, and a checksum character from one system to another. When this protocol is used, the receiving system accepts each transmission block, extracts the data from it, checks the sector number, adds up all the characters in the data block, and checks the sum against the checksum character sent with the transmission block.

If everything matches, the receiving system signals the sender with HEX 06. If something is wrong, the system signals HEX 15. HEX 15 signals the sending system to resend the transmission block. Ten retries for each error are usually allowed before the sending system cancels the transmission. This transfer method handles binary files with the restriction that both the receiver and the sender use the same communications settings of 8 data bits, no parity, and 1 stop bit.

Each Modem/Xmodem Protocol data block looks like this during transmission:

```
<SOH><blk #><255-blk #><-128 data bytes-><cksum>
```

However, you don't see the file in this form because your communications program decodes the data before it comes to your screen. When all the file data has been transmitted, the bulletin board sends a special character such as HEX 04. This EOT (end

---

## File transfer is a money-saving approach to building a software collection.

---

of transmission) character signals the receiving system to close its file and return to normal terminal mode.

The Modem/Xmodem Protocol has been incorporated into many IBM PC bulletin boards and communications programs such as *MODEM.COM* (a public domain program), *PCMODEM*, and the just-released *PC-Talk III*. An added benefit of running a communications program with the Modem/Xmodem Protocol is that you can also transfer data from the many remote CP/M systems around the country.

### File Transferring

To begin a file transfer session on a bulletin board system you must get your communications program set up properly and dial the system (see *BBS Watch*, Vol. 1, No. 2).

Once you are on the system, select the menu option that calls up the file transfer functions. At this level an option is usually provided that shows a list of the files on the system. The next step is to select the files you want to transfer.

Here is an example of how my system presents its menus:

```
IBM PC R B B S MENU
Choose ONE of the following functions:
MESSAGE SYSTEM ——> M
FILE TRANSFER ——> F
LOGOFF ——> G
EXPERT MODE ——> X (Short Menus)
TOGGLE ECHO ——> D (Currently ECHO
From BBS)
```

Choosing the F function calls up the following options, which include the Directory of Files to Transfer (LIST), currently a collection of 120 files.

```
Transfer A File TO This System (UPLOAD)
——> U
Transfer A File FROM This System (DOWN-
LOAD) ——> D
Directory Of Files To Transfer (LIST) ——>L
Information on These Features (HELP)
——> H
Quit This Section - Return to MENU (QUIT)
——> Q
```

Choosing the L option displays a file transfer list that names each file and gives the file's size in bytes. The byte size of files is not shown in the following example.

```
——> FILE TRANSFER LIST (Newest First) <—
Use Ctrl-S to Pause, Ctrl-K to Abort.
MPG.BAS - CALCULATES MPG AND
APPX.COST
STAR3D.DOC - DOC ON GRAPHICS DEMO
STAR3D.ASM - COLOR/GRAF DEMO-SOURCE
CODE
STAR3D.HEX - COLOR/GRAF DEMO
(MAKE.EXE)
```

```
XFERLIST - THIS LIST (ALWAYS CURRENT)
RUNOFF.RNO - ASCII DOC/SAMPLE FILE FOR
RUNO
RUNOFF.EXE - DEC RT-11 COMPATIBLE WORD
PROC
CHESS.BAS - PLAY CHESS WITH IBM PC
```

Items on the list with filetype .BAS (for BASIC program) have been saved in ASCII format. Items with filetype .COM or .EXE are binary format files.

Files with filetype .HEX are a special type of file; they are either .COM or .EXE files that have been processed by a program called BIN2HEX. (BIN2HEX is among the programs on my BBS.) Transferring binary files usually requires using the Modem/Xmodem method. However, since some systems cannot use the Modem/Xmodem method, the BIN2HEX program is used to convert binary format files into ASCII format so they can be transmitted.

To transfer a .HEX file you must have the BIN2HEX.BAS program on your system so you can convert the .HEX file back to its original binary format.

To continue the file transfer choose the D (Download) option from the file transfer functions menu. You then see the following prompt on the screen:

```
ENTER *FULL* NAME OF FILE TO BE TRANS-
FERRED ——>
```

Type the name of the file to be downloaded; for this example we will use the MPG.BAS file. The line Xfer Time 2 minute(s) 23 sectors then appears on your screen. This line tells you how much time it will take to transfer the MPG.BAS file and the number of sectors on disk it requires.

The BBS then asks you to choose the transmission method for the file transfer. The bulletin board gives you three choices:

STRAIGHT ASCII Transfer ---A  
MODEM/XMODEM Protocol Transfer ---X  
QUIT (Exit File Transfer) ---Q

Since you are transferring an ASCII file, select the A option. The BBS sends you the message:

**\*\* PRESS YOUR ENTER KEY TO BEGIN \*\***

At this point you should set your communications program to begin saving ASCII data sent from the BBS to a disk. Do not begin saving data before this point or you will find extraneous characters in the program. As the download function begins, you will see the program or data appear on the screen.

When a downloading operation is completed on my BBS, you see this line on the screen:

65399 **\*\* DONE - PRESS ENTER TO RETURN TO MENU \*\***

Signal your communications program to stop saving data, close the file, and return to terminal mode. The terminal mode signal is usually issued with a function key or some control key sequence. Press ENTER to return to the file transfer menu.

After you finish downloading a BASIC program from some bulletin boards, you may find you have trouble loading the file in BASIC. If this occurs, your computer will signal DIRECT STATEMENT IN FILE indicating that a program line has been transferred without a line number. This trouble results from situations such as a bad telephone connection or a miscellaneous character added at the end of a file transfer sequence. If this happens, exit BASIC without saving the file and use a text editor such as *Word-Star* in the nondocument mode to remove the characters or lines without line numbers. You can then save

the file with the text processing program, call up BASIC, load the file, and run it.

Sending data or programs to a BBS (uploading) from your computer is as easy as downloading. Just follow the menu options and instructions given on the bulletin board.

## IBM PC Bulletin Boards

Following is a partial listing of the IBM PC bulletin boards on line in the United States. The list is updated as the author receives information about new bulletin boards.

CompuServe now has a bulletin board for IBM PC users. The bulletin board has messages and uploading and downloading options. Once logged on to CompuServe, type GO PCS131 after the '!' prompt. If you have trouble accessing the BBS, call CompuServe's customer service number, 800/848-8990.

201/678-6670  
New York, New York  
SYSOP: Donald David  
(TC7057)  
24 hrs

213/649-1489  
Culver City, California  
SYSOP: George Peck  
24 hrs, download & upload,  
messages

213/390-3239  
Santa Monica, California  
SYSOP: Marc Schoenber  
24 hrs, download & upload,  
10 MB disk, 300/1200

215/250-0173  
Easton, Pennsylvania  
SYSOP: Jerry Lotto  
24 hrs, download & upload,  
300

301/949-8848  
Rockville, Maryland  
SYSOP: Rich Schinnell  
24 hrs, download & upload  
(Passwd = IBMPC)

301/251-6293  
Gaithersburg, Maryland  
SYSOP: Larry Jordan  
24 hrs, communications info  
(Passwd = IBMPC)

301/460-0538  
Bethesda, Maryland  
SYSOP: Ramona Landberg  
24 hrs, upload newsletter  
articles

301/937-4339  
Beltsville, Maryland  
Small People Software  
SYSOP: Chet Rhodes  
24 hrs, games, messages

312/259-8086  
Chicago, Illinois  
SYSOP: Gene Plantz  
(PCMODEM)  
24 hrs, download & upload,  
messages, 300/1200

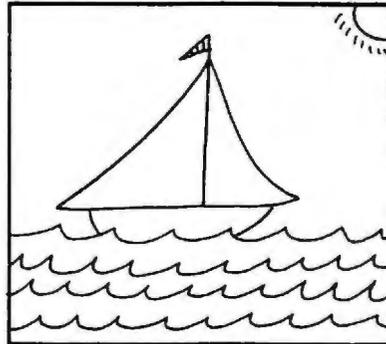
312/376-7598  
Chicago, Illinois  
SYSOP: Pete Coniceak  
24 hrs, download & upload,  
messages, 300

404/252-9438  
Atlanta, Georgia  
SYSOP: Rod Roark  
24 hrs, messages, download  
& upload, tips, news

608/262-4939  
Madison, Wisconsin  
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ABBS with IBM PC  
Conference  
24 hrs, download & upload,  
messages

703/978-0921  
Fairfax, Virginia  
SYSOP: Bruce Churchill  
(Hostcomm)  
24 hrs, software eval/purchase  
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703/978-9592  
Fairfax, Virginia  
SYSOP: Don Withrow  
(Hostcomm)  
24 hrs, download & upload,  
tips  
(Passwd = IBMPC)

714/624-1767  
Claremont, California  
SYSOP: Laurance Staples  
24 hrs, software eval/purchase  
(Passwd = IBMPC)

913/842-5749  
Lawrence, Kansas  
24 hrs, download & upload,  
messages

Comments and suggestions are always welcome. I would especially like to hear from the operators of other IBM PC bulletin boards. Send information on your system and any special services you offer to Gene Plantz, P.O. Box 95638, Hoffman Estates, IL 60195. CompuServe: EMAIL 70040,245; Source: SMALL STG476.

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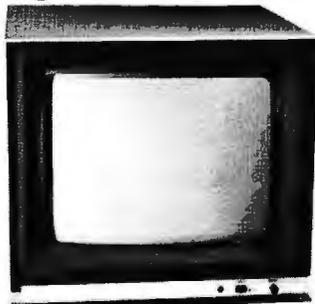
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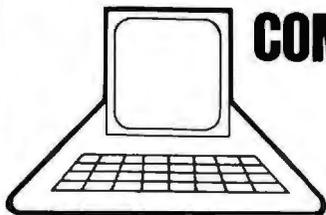
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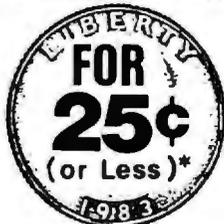
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# User Group Dispatch

*User Group News from Around the World*

Anna Bunker

*User Group Dispatch* is a regular *PC World* department featuring user group profiles, topics of special interest to group members, and excerpts from group newsletters. Each column includes a directory of user groups. We will publish names, addresses, and phone numbers for all groups related to the IBM PC and compatible systems, regardless of whether the groups publish a newsletter.

## Group Activities

Last month *User Group Dispatch* focused on starting a user group. This month *Dispatch* will cover group activities—meeting agendas, software libraries, buying clubs, newsletters, and bulletin boards.

### Meeting Everyone's Needs

A group's membership often covers a wide range of experience levels, from the novice who doesn't know where the on/off switch is located to the hobbyist who has been tinkering with computers for years. A group should plan meeting agendas that address these different levels of interest, a task that can be delegated to the steering committee. One way of skirting the problem of different levels of expertise is to open the monthly meetings with a random access session, an informal question and answer period that encompasses the whole range of interests from neophyte to technical heavyweight. Many groups invite speakers who discuss subjects at an intermediate level to appeal to this broad spectrum.

Another way to ensure that the group addresses everyone's level of experience is to divide it into special interest groups (SIGs) at the end of the general meeting. Popular SIGs include programming and languages such as Pascal, assembly language, BASIC, and FORTRAN; games; word processing; financial applications; and statistics. SIGs not only provide an opportunity for members to keep abreast of new developments in their field of interest, but they may also inspire significant contributions to the field.

### A Software Library

Software libraries provide members with disks of public domain software and member-written programs. According to Peter Harris of the Silicon Valley Computer Society in Sunnyvale, California, managing the software library is good training for members interested in software publishing, because the library often deals with some of the same problems as a publishing company. Members learn to review, evaluate, select, debug, duplicate, and catalog a variety of programs in their capacity as librarians.

One problem that many groups encounter is the wear and tear on the drives used to duplicate disks for the software library. This problem can become especially apparent as membership grows. Ramona Landberg of Capital PC in Washington, D.C., reports that her group is considering hiring a disk-duplicating service to copy software, rather than using the group's equipment. Capital PC would then start a software subscription service for members that would provide the revenue to finance the contract.

Bulletin boards and other user groups are good sources of public domain software. Established groups are usually happy to exchange software libraries. But such exchanges, as Glenn Yunashko of the Association of PC Users in Chicago notes, result in substantial duplication of software, since the same programs are included in many groups' libraries and thus get circulated again and again. Yunashko recommends that authors among the membership be encouraged to donate original programs to the library. By keeping good records of the library's contents, a group's librarian can identify duplicate programs.

Freeware, programs that are neither anonymous nor commercially marketed, can also be included in a group's software library. *PC-Talk*, a communications program by Andrew Fluegelman, and *PC-File*, a data base management program by Jim Button, are two widely used freeware programs. The freeware concept, as explained by Jim Button in the *PC-File* documentation, is based on the tenet that "copying and networking of programs should be encouraged rather than restricted." Freeware authors are recognized and reimbursed for their work. After receiving and evaluating a freeware program, the user is encouraged to send the author a contribution if the program suits his or her needs. A user-supported copy of *PC-File* can be obtained by sending a formatted disk to Jim Button, P.O. Box 5786, Bellevue, WA 98006; *PC-Talk* is available from Freeware, P.O. Box 862, Tiburon, CA 94920.

Copyright infringement is a prominent danger in software duplication. Both the Copyright Act of 1976 (17USC) and the Computer Software Copyright Act of 1980 specifically provide that software may be copyrighted. For more detailed information see *Legal Care For Your Software: A Step-by-Step Guide for Computer Software Writers* by Daniel Remer (Nolo Press, Berkeley, 1982). User group members, especially the software librarian, should be well aware of the difference between proprietary and public domain software, and stay on the lookout for software piracy, which is by no means uncommon.

#### Group Purchases

Discounts for both software and hardware such as floppy disks or memory boards is another service groups offer members, often referred to as the buying club.

Cooperative manufacturers will supply the products in bulk at a discount, and the buying clubs will then sell these items to members at cost or with a small markup.

Ramona Landberg cites the buying club as a "sticky issue." Dealers are apt to be offended when their prices are undercut by the buying club and may complain to the manufacturer. The manufacturer often retracts the initial offer to the club; as a result, says Landberg, everyone ends up mad.

Landberg recommends that groups check into local tax laws because they may have to charge sales tax and file sales tax reports. Requirements differ from state to state; if a group incorporates, the state will supply a list of required reports.

#### Keeping In Touch

There seems to be widespread agreement that newsletters are essential to the well-being of user groups. At the very least, they include meeting announcements; at best, when members contribute material, newsletters provide a means of communication that supplements the group's monthly meeting.

Ramona Landberg, editor of Capital PC's newsletter, *The Monitor*, suggests that the editorial staff of user group newsletters take advantage of telecommunications. (Landberg notes that she has reached the point of being offended by paper copy.)

Editing and mailing a newsletter involves many hours of work, even with computer printout labels—they still have to be stuck on. Landberg reports that Capital PC is considering hiring staff to help with its newsletter. Newsletters should be mailed first-class, if possible, because the articles and event listings are most useful to the members when they are hot off the press.

#### Electronic Bulletin Boards

Many fledgling groups want to start their own bulletin board. Capital PC's bulletin board, run by Wes Merchant, is well known across the country. Gene Plantz, *PC World's* bulletin board columnist and operator of the IBM PC Information Exchange of Northwest Chicago, has some good advice on starting a bulletin board. "The hardest part is acquiring the equipment," says Plantz. The bulletin board system needs a computer, an auto-answer modem, bulletin board software, and a telephone line. Another difficulty is finding someone willing to donate a PC during evening hours when the bulletin board is in highest demand.

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Plantz reports that some computer stores will let a group use their equipment after store hours in return for a short plug or free advertising on the bulletin board.

Writing bulletin board software is difficult even for the most experienced programmers, says Plantz. Among the commercial packages available are *HostComm* by Janadon Consumer Software and *SPS-BBS* by Small People Software Corporation.

Plantz has written bulletin board software that he is willing to make available to any seriously interested user group. His program requires a PC with 192K of RAM and two 320K disk drives, and an auto-answer modem that operates at either 300 or 300/1200 baud. To receive the software a group should send a formatted disk and an SASE to Gene Plantz, P.O. Box 95638, Hoffman Estates, IL 60195. The program is free but Plantz offers no user support.

Once the bulletin board is up and running it requires 30 minutes to 1 hour per day of the system operator's, or SYSOP's, time. The bulletin board supplies the group members with a means of easy communication. Members can announce group news or exchange private messages. One of the major benefits a user group gets from operating a bulletin board is the ability to upload and download public domain software.

The bulletin board can be used by members only, or it can be made available to nonmembers. If it is going to be available to nonmembers, the group can establish the nonmember access level by instigating a member name file or a password. Your group might decide, for instance, to limit downloading to members.

With this brief outline a new user group can begin to decide what it wants to offer members. In future issues *User Group Dispatch* will cover facets of user group structure, such as buying clubs, software libraries, and SIGs. We invite suggestions, questions, and contributions from readers.

## Newsletter News

The question of who is responsible for user support—manufacturers or dealers—has become a controversial issue among user groups. Some groups feel that both IBM and dealers such as ComputerLand have been supportive. Other groups started because support was not forthcoming from either quarter.

We recently learned that IBM may be considering starting a user group support system, but we couldn't get concrete information from the PC division in Boca Raton. It seems, however, that IBM has been contacting quite a few groups, as the following newsletter excerpts show.

### From the PC-Post

*The following item by Liz Leedom is reprinted from PC-Post, February 1983, Modesto-Turlock PC User Group.*

Boca Raton called. No fooling. An IBMer did a 15-minute survey with Liz. Gist was IBM is thinking of going to a more direct relationship with users, at which suggestion Liz cheered long and loud. Seems we are due for all kinds of system updates and bulletins I suspect few of us get, unless we happen to think of contacting our dealers. Anyway, the IBM user group liaison in Boca Raton, Florida, is now on our mailing list. Let us pray that means something.

# BASIC?

## THE DEBATE RAGES ON

The IBM customer service number in Boca Raton, by the by, is 305/998-6048. Despite rumors to the contrary, I have found them helpful. Call before 8 a.m. for good Ma Bell rates.

### News from NEI

The following item by George Gynn is reprinted from The North East Indiana IBM-(PC)^2 Newsletter, February 1983, The NEI User Group.

Last week I was surprised to get a call from a Mr. Ben Penney of IBM, Boca Raton. Apparently IBM must be doing its homework and learning its lessons.

They must have come to appreciate that PC users are a unique group in many respects. People buying \$10,000 cars don't form user groups and have newsletters, but PC users do. It must have dawned on IBM that the club newsletters would be an excellent way to communicate with users.

Right off the top they wanted to know about you, and wanted to know the details of our survey last year, how large the club was (over 40 active members and growing daily), how often we met, where and when and if speakers from IBM would be welcome (yes).

They wanted to know about the newsletter, who wrote it (me), who paid for the printing and mailing (ComputerLand), and how many were mailed out (over 200 this month). They asked for and were sent all copies to date.

This was followed by queries about interclub relations, who we corresponded with, and who we exchanged newsletters with.

Following this they wanted to know what they could do to help clubs get started and be successful. I

Computer magazines and journals are filled these days with theoretical discussions on the merits of BASIC as a programming language. Defenders praise its ease of use, while critics contend that it is not "pure", not "structured", not "PASCAL". The high priests of computerdom have refused to anoint the language with their blessings.

Yet micro owners in the hundreds of thousands are rendering the debate academic.

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suggested that with all their lawyers they could put out a sample club charter and bylaws that clubs could use. We still need one. Also provide advice on forming a nonprofit organization.

After all this Mr. Penney stated that IBM was considering doing a number of things. Among the items under consideration are: establishing a user club hot line, setting up a communications system for users (ala The Source), and sending out mailings directly to the club newsletters covering user hints, updates, and

announcements. But the real shocker was when he said they were considering making some free software available to clubs. (I think he referred to utility-type software, but I'm not sure. Anything would be appreciated!) Of course there's a long way between considering and reality.

This action on their part seems to give indication that someone down there has their head put on right. If they carry through with this, it would not only be of great benefit to us, but certainly would help to build a good image in the users of Big Blue.

Maybe that elephant can dance!

# NUMBER THREE

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## User Group Dispatch

### News from Capital PC

The following item by Jess McIlvain is reprinted from the Monitor, February 1983, Capital PC.

I have written IBM in Boca several times regarding better communications with end users. Recently, I received a telephone call from their Customer Relations people. No, IBM isn't ready yet to publish a helpful bulletin for IBM PC owners. But they do request that owners who don't get the service they need or have technical questions not answered by their dealers give them a call. IBM says that dealers are required to give technical support and that dealers have a toll-free, 800 number to call for technical assistance at IBM PC headquarters in Boca Raton.

PC owners can request that dealers call for assistance on PC-related problems from IBM's support center. If the dealer is uncooperative, then IBM would like you to personally call them on a special hot line to Customer Relations. Customer Relations offers no technical support, but they will follow up on your problem with the dealer and attempt to get the proper information to the dealer. The IBM PC Customer Relations Hot Line number is 305/998-6048.

Also, anyone who is developing software programs for the PC, and who is a software vendor, can get a special telephone number for assistance. Contact the above Customer Relations Hot Line, provide necessary information to identify your company, and IBM will provide you with their special assistance telephone number.

They also recommend that PC buyers contact their dealers weekly for new information relating to technical problems.

If enough people keep writing to IBM PC headquarters in Boca Raton, they will eventually get the message that users need and want better service and communications. They might even start publishing an informative newsletter.

*We welcome reader participation and suggestions. We would like to receive subscriptions to group newsletters so that we may report on group ideas and activities. Address pertinent information to User Group Dispatch, PC World, 555 De Haro St., San Francisco, CA 94107.*

## User Group Directory

PC World publishes a User Group Directory every month. If your group is not in this list but would like to be, send the group's name, address, contact, and other information to *User Group Dispatch, PC World, 555 De Haro St., San Francisco, CA 94107.*

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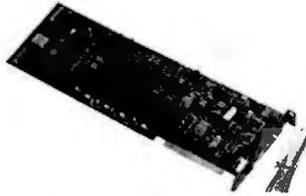
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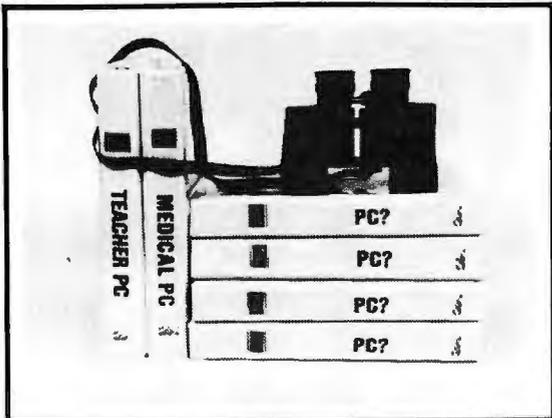
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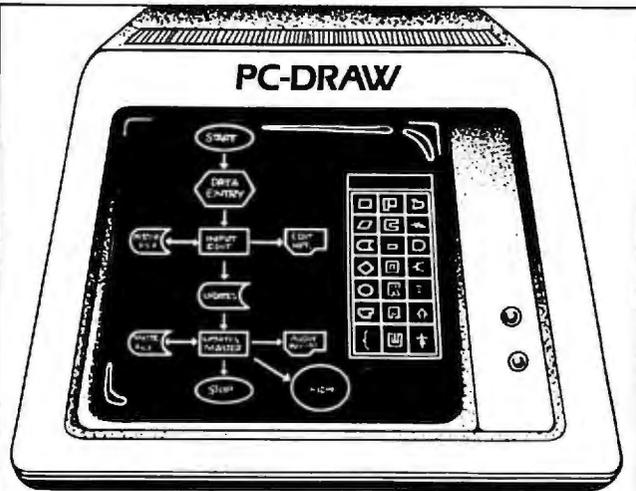
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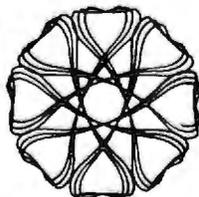


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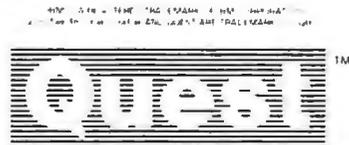
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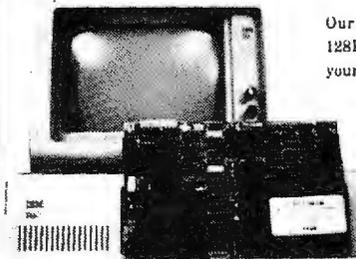
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3. Chart of Accounts with prior year comparisons
4. Daily Transactions Report
5. Itemized Monthly Transactions
6. Balance Sheet
7. Balance Sheet with prior year comparison
8. Income Statement
9. Income Statement with prior year comparison
10. Departmental Income Statement(s)
11. Departmental Income Statement(s) with prior year comparison
12. Detail report for individual accounts
13. Trial Balance Statement

#### Accounts Receivable

1. Daily Transactions Report
2. Invoices (with or without pre-printed forms)
3. Statements (with or without pre-printed forms)
4. Summary Aging Report
5. Detailed Aging Report
6. Itemized Monthly Transactions
7. Detailed Cust. Activity Report
8. Summary Cust. Account Report

#### Accounts Payable

1. Daily Voucher Report
2. Daily Credit Report
3. Checks with Detailed stubs
4. Check Register
5. General Ledger Transfer Report
6. Cash Requirements Report
7. Transaction Register
8. Open Voucher Report
9. Aged Payables Report
10. Detailed Vendor Activity Report
11. Summary Vendor Account Report

#### Payroll

1. Federal Tax Tables
2. State Tax Tables
3. Payroll checks with stubs
4. Payroll Check Register
5. Monthly Payroll Summary
6. Quarterly Payroll Summary
7. Gen'l. Ledger Transfer Report
8. Detailed Employee File Listing
9. 941 Worksheet
10. W-2 Forms Printing

### SYSTEM CAPACITIES

Acct'g. Module	Master File Capacity	Transaction Capacities per month (approximate)		
		Single-Sided Diskette	Double-Sided Diskette	Hard Disk per Mb
GL	400 Accounts	800	1,600	7,000
AR	400 Customers	800	1,600	7,000
AP	400 Vendors	800	1,200	7,000
PR	400 Employees	—	—	—

### SYSTEM REQUIREMENTS

Requires either CP/M® or MS-DOS (PC-DOS), MBASIC for CP/M®, BASICA for MS-DOS; 56K to 64K RAM; 2 Disk Drives or Hard Disk; at least 200K of mass storage (we recommend more); 132 column printer (an Epson MX-80 or similar printer with compressed mode is acceptable); call for exact requirements on specific systems.

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FILE DEFINITION

FUNCTION: Edit Individual Entry

Record Size: 127 Maximum Records Per Disk: 1202

FIELD NAME	LENGTH	LINE NO.	COLUMN
1 PATIENT NAME	30	1	1
2 ADDRESS 1	30	2	1
3 ADDRESS 2	30	3	1
4 CITY	15	4	1
5 STATE	2	5	1
6 ZIP CODE	5	6	1
7 REFERRING PHYSICIAN	15	7	1
8 AGE	2	8	1
9 DATE BORN	8	9	1
10 DATE OF LAST ILLNESS	8	10	1
11 ALLERGY 1	12	11	1
12 ALLERGY 2	12	12	1
13 ALLERGY 3	12	13	1

FILE DEFINITION

FAST SELECTION

FUNCTION: Selection Entry

No. of active records: 1

FIELD NAME	LENGTH	Selection Field No.
A PATIENT NAME	30	1
B ADDRESS 1	30	2
C ADDRESS 2	30	3
D CITY	15	4
E STATE	2	5
F ZIP CODE	5	6
G REFERRING PHYSICIAN	15	7
H AGE	2	8
I DATE BORN	8	9
J DATE OF LAST ILLNESS	8	10
K ALLERGY 1	12	11
L ALLERGY 2	12	12
M ALLERGY 3	12	13

FAST SELECTION

CUSTOM MAILING LABELS

FUNCTION: Mail Customization

COLS: 9

FIELD NAME	LENGTH	LINE NO.	COLUMN
A PATIENT NAME	30	1	1
B ADDRESS 1	30	2	1
C ADDRESS 2	30	3	1
D CITY	15	4	1
E STATE	2	5	1
F ZIP CODE	5	6	1
G REFERRING PHYSICIAN	15	7	1
H AGE	2	8	1
I DATE BORN	8	9	1
J DATE OF LAST ILLNESS	8	10	1
K ALLERGY 1	12	11	1
L ALLERGY 2	12	12	1
M ALLERGY 3	12	13	1

CUSTOM MAILING LABELS

FAST SORT

FUNCTION: Selection Entry

No. of active records: 1

FIELD NAME	LENGTH	Sorting Order Entry
A PATIENT NAME	30	1
B ADDRESS 1	30	2
C ADDRESS 2	30	3
D CITY	15	4
E STATE	2	5
F ZIP CODE	5	6
G REFERRING PHYSICIAN	15	7
H AGE	2	8
I DATE BORN	8	9
J DATE OF LAST ILLNESS	8	10
K ALLERGY 1	12	11
L ALLERGY 2	12	12
M ALLERGY 3	12	13

FAST SORT

FILE MAINTENANCE

FUNCTION: Maintenance

Record Number	Patient Name	Address 1	Address 2	City	State	Zip Code	Referring Physician	Age	Date Born	Date of Last Illness	Allergy 1	Allergy 2	Allergy 3
1	Jim L. Smith	1775 W. Stonegate Rd		Apri 28	Ill	60221	Dr. Johnson	37	02/17/29	01/17/79			
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													

FILE MAINTENANCE

SYSTEM MENU

1	File Maintenance
2	Select & Sort
3	Mailing Labels
4	Report Printing
5	File Definition
6	System Initialization
7	Change Size & View

Enter Selection:

SYSTEM MENU

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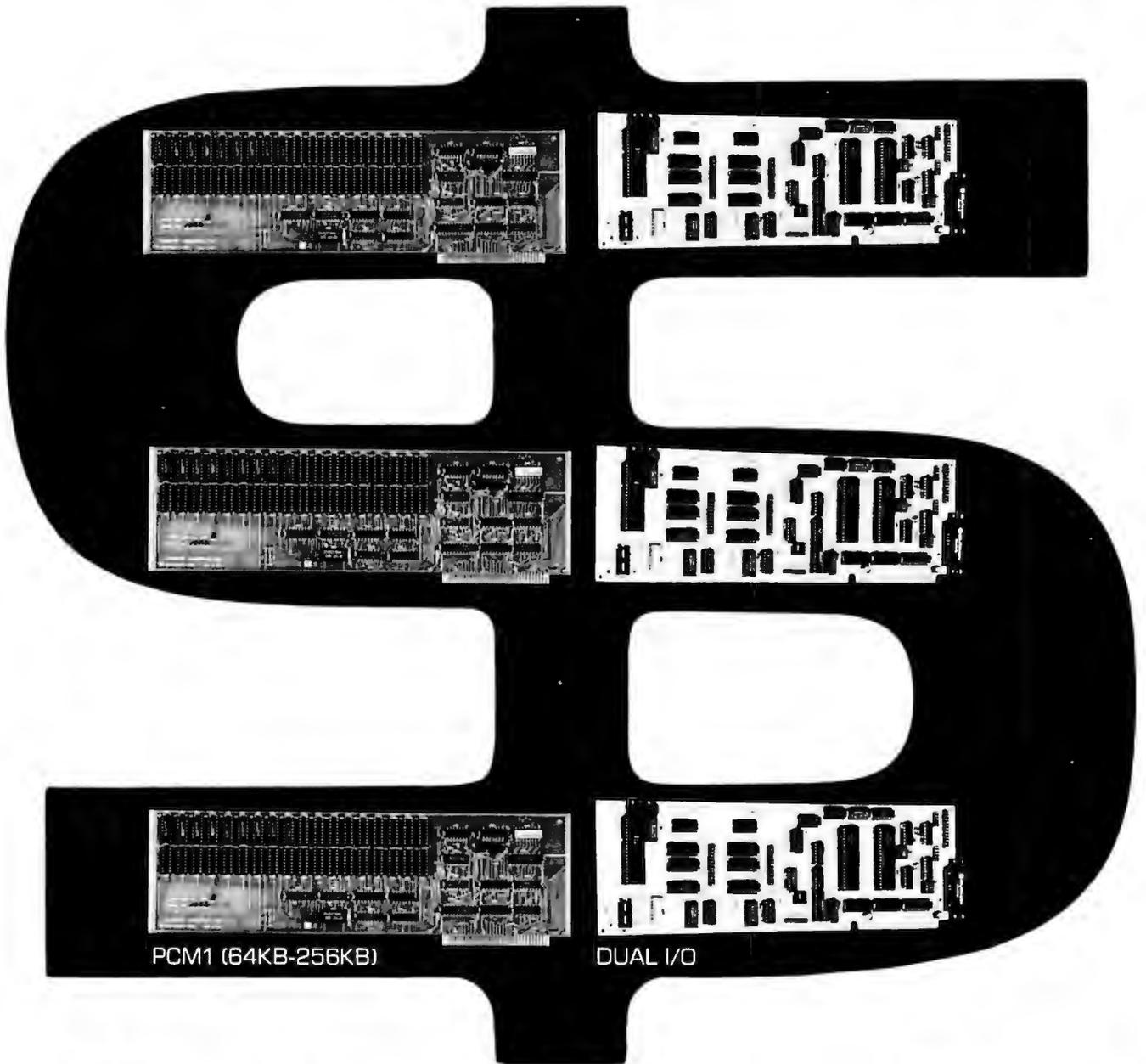
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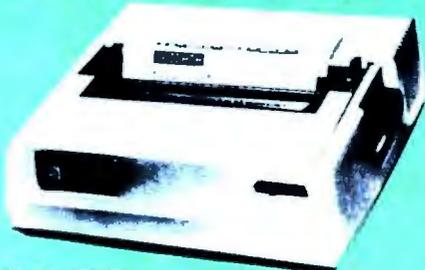
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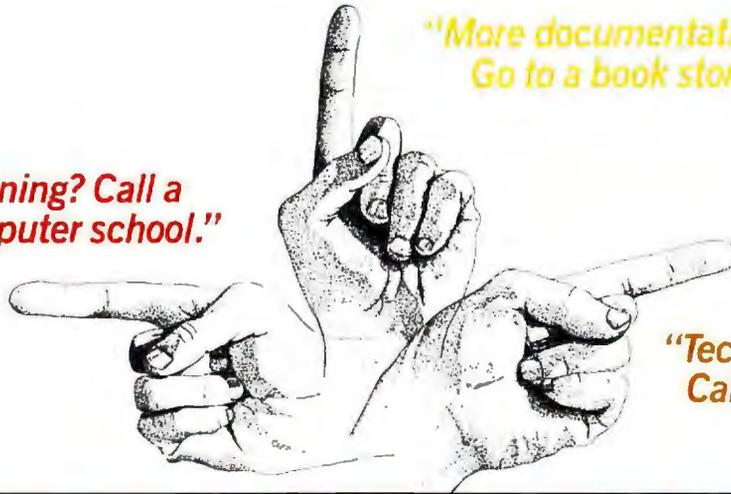
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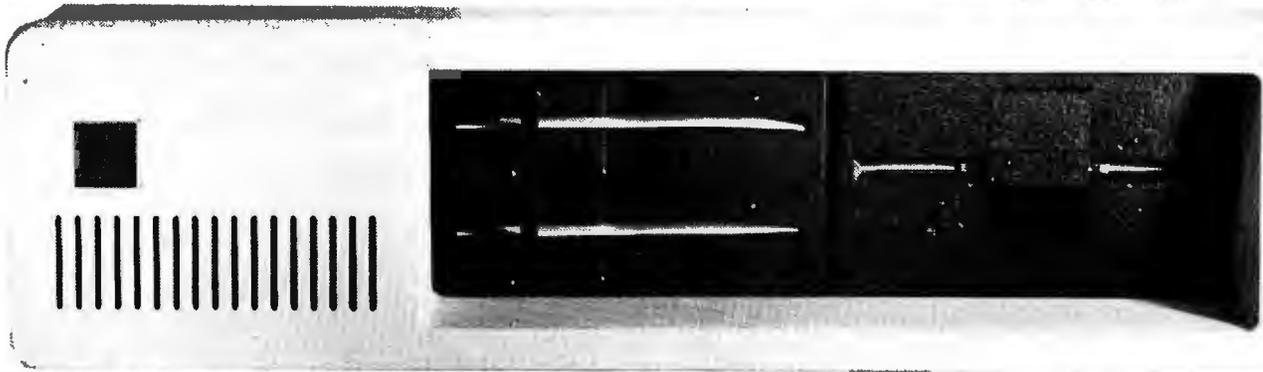
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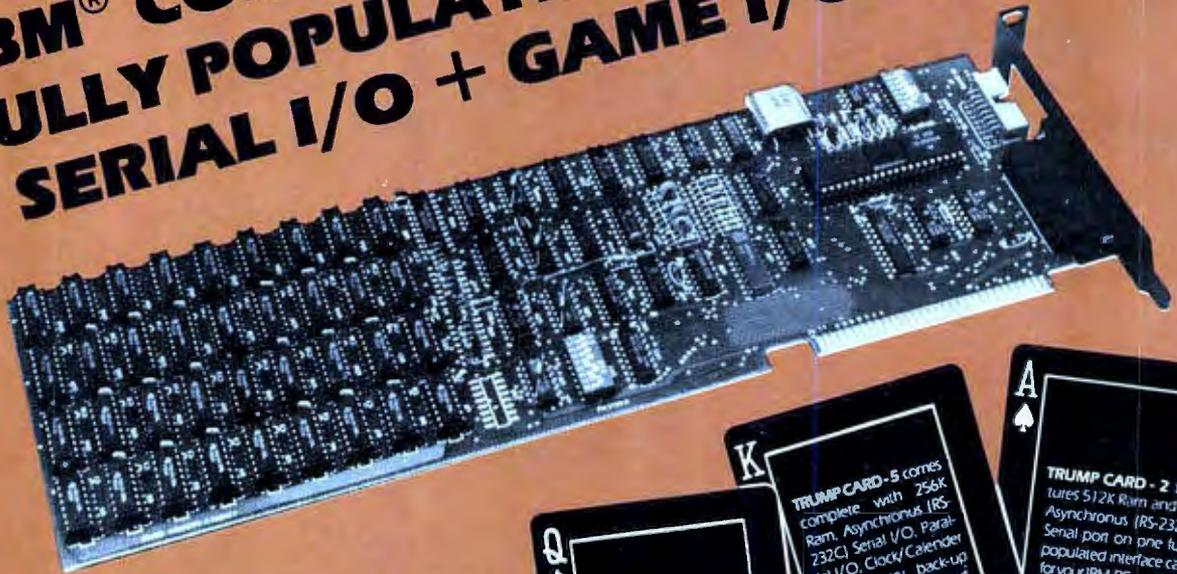


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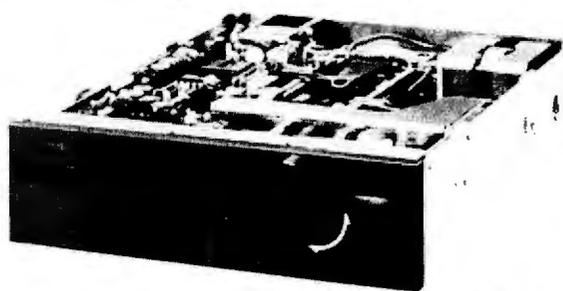
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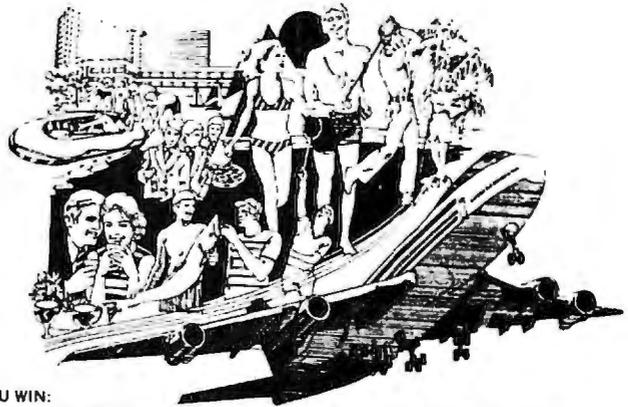
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IDS PRISM 132 w/opt.	\$1595

### MONITORS

AMDEK 300A	\$165
AMDEK 310A	\$179
AMDEK COLOR II	\$675
AMDEK COLOR III	\$429
AMDEK COLOR IV	\$1129
TAXAN 12" Hires RGB II	\$529
TAXAN 12" Med Res RGB	\$369

### MODEMS

HAYES Smart Modem 300	\$215
CAT Smartcat 1200	\$595
CAT Acoustic 300	\$225
CAT DCAT Direct Conn	\$175

### SYSTEMS

Wesper - Microsystems	
Parallel Buff. Spooler	\$230
Parallel/Serial Spooler	\$289

**THANK  
YOU!**

Prices are  
Subject To  
Change.  
Dealer Inquires  
Are Invited

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No C.O.D.S  
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# PC World Directory

PC World Directory is a comprehensive listing, by category, of products and services for the IBM PC, lookalikes, and compatibles. It provides rapid access to the burgeoning PC marketplace for both readers and advertisers.

**FORMAT:** The standard format includes a product ID, a 300-character descriptive ad, and company name, address, and telephone number. Use of a company logo is optional.

Advertisers may choose among categories already being used or may create their own. Display advertisers can cross-reference their current ad to the PC World Directory for increased exposure at low cost.

**RATES:** Listings are accepted for 3-time consecutive insertions at a rate of \$300 (\$100 per issue). Listings must be prepaid (except for established display advertisers) upon submission of ad copy and logo art. Checks, money orders, VISA, and MasterCard are acceptable.

**DEADLINE:** For space reservation and artwork deadlines, contact a PC World Directory sales representative at 415/472-3575. Please send copy, optional artwork, and prepayment to: PC World Directory, 555 De Haro Street, San Francisco, CA 94107.

See you next issue!

## Accessories

### Cases

**Computer Shipping Cases**  
Tough, high quality shipping and carrying cases for computers, displays, printers, peripherals, and instruments. All case designs available in three models: Airline, Deluxe, and economy. (See display ad this issue.) *Data Case, P.O. Box 8459, Scottsdale, AZ 85252, 602/252-8060*



### Computer Covers

**Quilted Computer Covers**  
Attractive, washable dust-covers available in 5 colors; evergreen, claypot, chocolate, navy or cream. Order in sets of 3 or 4 (one or two piece monitor & system unit, keyboard and printer cover). Specify wide or narrow printer. \$66 per set. CA residents add 6%. Allow 6 weeks for delivery. *Covers A Lot, P.O. Box 369, La Honda, CA 94020, 415/747-0352 (M-Th, 10 a.m.-4 p.m.)*

**Custom Made PC Covers**  
Keep your PC free of dust with custom design, washable & durable fabric covers. Colors-black, blue, brown, grey & jade. Specify system/monitor, brand name/model # for perfect fit. Sysmon unit \$16, with two diskette pockets \$25, keyboard \$6.95. Avail. in quilted material at good prices. S/H \$2, CA res. 6% tax. *PC Covers, P.O. Box 8286, Foster City, CA 94404, 415/341-0101*

**Contemporary Dust Covers**  
"You've waited long enough!" High quality, custom design, protective dust covers are available for your IBM PC. Embroidered rose, woven binding, and unique fabric ensure quality, fit, and protection. Beige color blends with any decor. Order Now: (1pc,2pc)Sys/Mon:\$36/Kybd:\$16/Prntr: \$18. CA add 6%. *Contemporary Covers, 1320-36th Ave., San Francisco, CA 94122, 415/564-0506*

**IBM PC Protection**  
Keyboard cover (#KC210) \$12. A custom design dust-cover to protect keyboard. Rigid smoked bronze low silhouette. **DISK DRIVE COVER (#DC310) \$10.** Contemporary black plastic design with vinyl foam perimeter seal to lock out harmful elements. *Nat Hellman III, Inc., Micro-computer Accessories, 400 S. Beverly Dr., # 312, Beverly Hills, CA 90212, 213/273-0133*

### Furniture

**Printer Pedestals**  
Stands feature an opening for bottom feed as well as rear feed and allow paper storage under the printer. They are available for 80-column and 132-column printer. List price for 80-column printer \$29.95, for 132-column printer \$49.95. We invite dealer inquiries on our complete line of products. *RGB Designs, 3375 Woodward Ave., Santa Clara, CA 95050, 408/748-0400*

**System Unit & Printer Stands**  
New! The Highest Quality Stands on the market today! Sturdy Welded Steel Construction, tapered sides w/mitered corners and textured finish. \* PC Stand: Designed for the IBM PC; Raises System Unit for Keyboard Storage and Cable Routing under unit. \$34.95. \* Printer Stands: sm. \$32.95, Lg. \$42.95, Lg. w/slot \$49.95. *Personal Computer Accessories, 4456 Partridge Court, San Jose, CA 95121, 408/578-7798*



### Jewelry

**Computer Jewelry**  
Signifying professional involvement in the microcomputer industry. Unique designer pieces are perfect for gifts, awards, or premiums. Lapel pins, tie tacks, and stick pins in 18K gold vermeil (\$12) or sterling silver (\$10). Satisfaction is guaranteed, or your money back. (See display ad this issue.) *MC/N, Computer Jewelry, Simms Center / Box 9393, San Rafael, CA 94912, 415/453-7033*



### Supplies

**Continuous Computer Forms**  
Over 350 computer forms including checks, statements, invoices, purchase orders, tax forms, and letterhead. Forms designed for Peachtree Series 8,40,4,5,BPI, open systems,

MBSI, State of the Art, Accounting Plus, Great Plains, Continental, Fedder, and Structured Systems. 24 hour shipment on blank stock. *Checks To-Go, 8384 Hercules St., La Mesa, CA 92041, Nat. 800/854-4261, CA 800/552-8817*



## Consultants

### Alaska

#### Construction/Computer Mgmt.

Computer consultant specializing in construction management, hardware/software selection, custom programming and software such as Estimating, Job costing, and Critical Path Scheduling for MS-DOS. Applications are ready and only a phone call away. *Rambow Enterprises, 7-480 A "I" St., Elmendorf AFB, AK 99506, 907/753-2291*

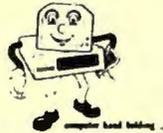


### California

#### Manual Aversion?

Learn computing one-on-one at your own speed from friendly training specialists. Use your computer or ours. Also, keyboard enhancement and customization of WordStar™ and other software. See our article, "WordStar™

Made to Order," in issue #2. *Computer Hand Holding, 1800 Market St. #91, San Francisco, CA 94102, 415/561-9189*



#### Advance Info Systems

A micro is still a computer! Let me help you save your time & money. Services offered include user needs analysis, hardware & software selection & personalized training. Ask me about dBASE II spreadsheet programs, networking, telecommunications etc. IBM PC system integration is my specialty. *Advance Info Systems, 2818 Clay St., San Francisco, CA 94115, 415/922-6539, 346-0329*

**PC Accounting Applications**  
CPA firm specializing in computerized accounting. We have tested and evaluated all major accounting software packages (12) through actual use. Experienced engineering and accounting professionals will help you select and implement your system. General business consultations. *Sherry Knight, Certified Public Accountant, 6644 Heartwood Dr., Oakland, CA 94611, 415/339-9036*

**Sherry Knight**

Certified Public Accountant

**Advice, Assistance & Software**  
Experienced engineers offering assistance & "plain English" advice to business and the professions. Programming

services include troubleshooting, maintenance, customization & development. Other services include equipment & program selection, user orientation, program & data conversion. *Computer Tamers, 1514 Manhattan Beach Blvd., Los Angeles, CA 90266, 213/379-1276*

#### PC and Mainframe Consulting

- PC system configuration
- Mainframe interface
- Audits and Controls
- Networking
- Applications Development
- Support for non op users
- System evaluation and selection.

*MIS Consultants, Inc., 1065 E. Hillsdale Blvd. # 114, Foster City, CA 94404, 415/345-6000*

#### The PC Software Experts

Experienced specialists in all areas of PC software. We can help you with hard disk drivers, spoolers, ram-disks, diagnostics, communications, data bases, and business applications. Let us handle the entire job for you - design - implementation - documentation - training. *PCX, 21941 Cayuga, Lake Forest, CA 92630, 714/951-8320*

### Massachusetts

#### Business Consulting

Systems development, programming, and in-house training on the IBM-PC. Our background in IBM mainframes will be helpful to data processing installations trying to cope with the PC invasion! Proficient in BASIC, COBOL, PL1, dBASE. *Springfield Associates, 37 Parker St., Newton Centre, MA 02159, 617/969-5183*

## Diskettes

#### No-Flop Floppy

100% certified AND guaranteed diskettes. Box of 10 soft sector, 5 1/4 inch, reinforced hub. To keep cost down, mail order only.

MEMOREX SSDD \$27.00 DSDD \$37.00  
MAXELL SSDD \$29.00 DSDD \$40.00  
No EXTRA CHARGE! CA residents add 6.5% sales tax. Please send check or M.O. to: *Ramsys, 225 W. Broadway #500, Glendale, CA 91204, 213/240-9521*

#### Premium Diskettes in Color!

CenTech is first to offer red, blue, green, yellow and orange diskettes for color coding. If locally unavailable then factory direct. 5 1/4" single side, double density \$19.95 a box. Double side, double density \$28.95 + \$2.50 freight. 30 day moneyback guarantee. 5 yr. warranty. Dealer inquiries welcome. *Cenna Technology, 183 Cottage Ave., Sandy, UT 84070, 801/261-1600*



#### Elephant Memory Systems

Quality diskettes are available in all popular 5 1/4" and 8" models and custom formats. They're guaranteed to meet or beat every industry standard for quality. They come standard with reinforced hub rings and they sell at some of the lowest prices in the business. *Leading Edge Products, 225 Turnpike St., Canton, MA 02021, 800/343-6833, 617/828-8150*

## Diskette Copy Service

Superior Diskette Copying  
Lifetime guaranteed duplicating for most systems and formats using sophisticated reliable equipment. Serialization, copy protection (encryption), and packaging available. Double boot for Apple and TRS. Supplied on OEM Allenbach diskettes. Rapid delivery for 100 to 100K copies. *Allenbach Industries, Inc., 2101 Las Palmas, Ste. A, Carlsbad, CA 92008, 800/854-1515, 619/438-2258*



## Educational Seminars

PC Training for Business  
Silicon Valley training and consulting firm offers hands-on workshops for corporate executives. Workshops include WordStar, 1-2-3, dBASE II, SuperCalc, MultiPlan, local area networks and decision support systems. In-house courses available. Send for our corporate training brochure. *Personal Computer Seminars™, 525 University Avenue, Palo Alto, CA 94301, 415/324-1759*



## Hardware

### Add-On Boards

**Lab Master**  
A sophisticated system that includes 16 channels of 12-bit A/D with 30 KHz conversion rate, 2 channels of 12-bit D/A, 5 timer/counters and 3 8-bit parallel ports. Options: programmable gain up to 1000, 14 and 16 bit accuracy, 40 and 100 KHz conversion, up to 256 channels. (List price \$995.) *Tecmar, Inc., 23600 Mercantile Rd., Cleveland, OH 44122, 216/464-7410*

**M-192 Memory Expansion Board**  
192K byte memory board for only \$259. It is compatible to all IBM PC softwares. Easy to install by users. Requires PC system with 64K memory. Offer one-year warranty. Chintronics also offers 9 RAM chips (64K) for only \$59. Fully tested and burned-in. *Chintronics Co., 19 Longmeadow Rd., Chelmsford, MA 01824, 617/256-7862*



**IEEE 488 Interface**  
Complete implementation of industry-standard IEEE 488 interface lets the PC operate as Controller, Talker or Listener on the IEEE 488 bus; DMA and interrupt capabilities set this IEEE 488 board apart. IEEE 488 Software is available. List Price \$395. *Tecmar, Inc., 23600 Mercantile Rd., Cleveland, OH 44122, 216/464-7410*

Z-80, 8086, & 68000  
**Microcards**  
512K VersaCard for IBM PC. Sritek brings ultimate price/performance to IBM PC with Z-80, 8086, 68000 MicroCards and UNIX/XENIX operating system. The user can start with 256K bytes of VersaCard expansion memory for the IBM PC and upgrade it to 512K bytes by mounting a RAM Module. *Sritek, 3637 S. Green Rd., Cleveland, OH 44122, 216/292-0011*



**IBM PC Products to Remember**  
\*Dual I/O PCB, 2 IBM Printer port 2 Async RS232 I/O, clock with battery backup \$192.40.  
\* Multifunction PCB, Mem expandable 256KB with Parity check, 1 IBM Printer port, 1 Async RS232 port, clock with battery backup, 64KB at \$495. \* Others include Mem PCB expandable 512KB, Mem with Async I/O, Mem with parallel I/O. *Computer Peripherals, Inc., 1117 Venice Blvd., Los Angeles, CA 90015, 213/298-1297, Telex: 194561 LSA*

**Error Correcting RAM**  
A memory card that corrects a single-bit error in any byte and detects a dual-bit error. It is designed for applications where memory must be non-stop. Any RAM chip in a row can be removed and the memory will continue to function perfectly at full system speed. List price: \$775. *RGB Designs, 3375 Woodward Ave., Santa Clara, CA 95050, 408/748-0400*

**Three-In-One-Board**  
A hardware and software replacement for three IBM cards: two serial cards and one game adapter card. List price: \$289. We invite dealer inquiries on our complete line of products. *RGB Designs, 3375 Woodward Ave., Santa Clara, CA 95050, 408/748-0400*

**Quality Boards at Low Prices**  
**RAM CARD 64K Expandable** - 256K w/parity, price \$149. 64K expansion kit \$79. **EPROM PROGRAMMER** for most 4K to 64K 24 P10 EPROMS \$129. **COMBO CARD** w/parallel printer asynchronous communications (RS232C) & clock calendar, price \$199. **PROTO CARD** holds 85 14 pin chips, ground plane design 3.5 X 8" \$29.95. *Apparat, Inc., 4401 S. Tamarac Pkwy., Denver, CO 80237, 303/741-1778*



**BYAD DS1**  
Circuit board transforms PC into CP/M 2.2 system, giving user access to abundant software. 64K RAM expansion card is plug compatible and couples Z-80 microprocessor to IBM 8088 microprocessor, speeding memory access 30 times with complete buffering. Requires 48K, 1dd. *Byad, Inc., 101 Lions Dr., Barrington, IL 60010, 312/381-2330*

**Graphics Master**  
A multifunction board that interfaces to the monochrome or color display and does high-resolution graphics. External sync allow you to display IBM characters over a video image

with an external mixer. Ideal for adding legends, arrows, bar graphs, etc. on a screen. (List price \$595.) *Tecmar, Inc., 23600 Mercantile Rd., Cleveland, OH 44122, 216/464-7410*

#### Quadboards & Quadram Products

1-256K Quadboards \$645 delivered!  
Coda, Inc. has all QUADRAM Products at mail order prices. All products carry the QUADRAM warranties and can be used for any special offers from QUADRAM. We will meet or beat any advertised prices. Call or write for a complete price list. *Coda, Inc., P.O. Box 1054, Lilburn, GA 30247, 404/925-0640*



#### Cables

**Video Extension Cable**  
A 3-meter-long combined power and D-9 video extension cable set for locating the video display remotely from the processor unit. List price: \$75. We invite dealer inquiries on our complete line of products. *RGB Designs, 3375 Woodward Ave., Santa Clara, CA 95050, 408/748-0400*

#### IBM Cables

Mail order only. Cable to connect IBM PC CPU to the keyboard, non-accordion. Can be used stand-alone or as an extender. 10 ft. length \$25. *Clark Systems, 389 Pheasant Run, Batesville, IN 47006, 812/934-3817*

#### Printer Cables

Our printer cables connect the IBM PC with MX-80, Prowriter, NEC and other parallel printers. Connectors are high quality with gold plated contacts. Our price is only \$35, including shipping. MasterCard/VISA accepted, COD add \$2. Quantity Discounts, Custom Lengths Avail. *Austin Computer Technologies, P.O. Box 26595, Austin, TX 78755, 512/835-6136*

#### Microcabling

Looking for the right connections?  
MNM offers a complete line of cables to connect your IBM-PC to any peripheral. All MNM products carry a lifetime guarantee & are available at Authorized MNM Cable Dealers. Call toll free for the name of your nearest MNM dealer. *Milford Null Modem, Phoenixville Pike & Charelstown Rd., Malvern, PA 19355, 800/345-2121*



milford null modem

#### Computer Graphics

##### High Resolution Color Graphics

Introducing the RA-640 color board with 640 x 480 resolution, 16 colors selectable from a palette of 4096. Complete software support for all MS DOS languages including multiple fonts, pattern fills, etc. Complete presentation graphics package available. *Media Cybernetics, Inc., 36 Columbia Ave., Takoma Park, MD 20912, 301/270-2272*

#### Computer Graphics Camera

##### Videoslide35

A computer graphics camera that records video images onto 35mm color film & is compatible with microcomputers & most color graphics terminals. Inputs accepted include RS-170 RGB, TTLRGB and NTSC. The price is \$2799 complete with camera cables & IBM PC interface. *Lang Systems, Inc., 1010 O'Brien Dr., Menlo Park, CA 94025, 415/328-5555*



#### Disk Drives

##### Versatile Space Saver

2 TEAC Disk Drives fits in space of 1 standard unit. 40Tr DS & 80Tr DS available. DOS 1.1 compatible on 80Tr w/ JFORMAT program. Capacity to 800KB. Available w/mounting brackets. Price 40Tr DS \$299 - 80Tr DS \$435. Winchester Hard Disk System w/capacities to 20Mb are available. *Apparat, Inc., 4401 S. Tamarac Pkwy., Denver, CO 80237, 303/741-1778*



##### 5 1/4-inch Disk Drives

Single-sided single-density, single-sided double-density, double-sided single-density, double-sided double-density, 5 1/4-inch disk drives available for IBM PC. We invite dealer inquiries on our complete line of products. *RGB Designs, 3375 Woodward Ave., Santa Clara, CA 95050, 408/748-0400*

#### Hard Disk III

Leading Edge® hard disk III is a 5 1/4" Winchester disk subsystem. Features a (Z80A) microprocessor which provides 18 high level commands. TRS-80 model III & I and IBM PC compatibility. Provides power for 2 Winchester disk drives. Full sector buffer 256-512 bytes. *Leading Edge Products, 225 Turnpike St., Canton, MA 02021, 800/343-6833, 617/828-8150*

#### Disk Drives for PC

Save on Tandon Disk Drives.  
TM100-1, SS, 40T: \$195  
TM100-2, DS, 40T: \$259  
TM100-4, DS, 80T: \$349  
All drives are new. VISA/MC or checks. NJ residents add tax. Shipping extra. *VLM Computer Electronics, 10 Park Pl., Morristown, NJ 07960, 201/267-3268*

**Cartridge Winchester in PC Package** includes Removable-Cartridge Winchester, cartridge, new 'superspeed' controller, software, and kit for installation into PC. Additional power supply optional. (List price \$1795) *Tecmar, Inc., 23600 Mercantile Rd., Cleveland, OH 44122, 216/464-7410*

#### General

##### TCC-Swap-Meet

Sell or buy used PC compatible products!  
Deal Direct! No Middlemen!  
Receive list of buyers  
Receive list of sellers  
List 1 to 5 products  
60 day listing service \$5.00  
Use our database to upgrade your system! *Tulsa Computer Consortium, P.O. Box 14097, Tulsa, OK 74104, 918/747-0151*

## Monitors

### Displays

13" medium-res display with 420 pixels x 625 lines res. Displays all 16 colors, plugs directly DB-9 socket with 8' cable. 19" display is high-res and is adequate for full 320 x 200 matrix of color graphic display board. List: 13" display \$639, 19" display \$745. Requires: Color/graphics adapter. *RGB Designs, 3375 Woodward Ave., Santa Clara, CA 95050, 408/748-0400*

### RGB Monitors & Mods. for SONY

RGB conversion kit, SONY 19" & 25" PROFEEL: 16 color display, 8' cable, complete instructions, \$99. RGB interface for 12" SONY KX1211HG, 16 color display, no mod. req., just plug in, \$139. Modified SONY 19" & 25" PROFEEL, 16 colors, 19" \$825. 25" \$1375, Comp. with 8' cable. 23" CONRAC B&W, recond. \$225. *Telexmax, Inc., Video Marketing Division, 780 Lorraine Dr. Box 339, Warrington, PA 18976, 215/343-3000*

## Plotters

### Sweet-P Personal Plotter

Adds high resolution, hard copy graphics to the IBM PC. Software & interface hardware incl., \$795. Sweet-P Graphics Software enables users to draw colorful pie charts, bar graphs, line graphs and illustrations on paper or transparencies. BPS Business Graphics software is avail. See display ad this issue. *Enter Computer, Inc., 6867 Nancy Ridge Drive, San Diego, CA 92121, 619/450-0601*

## Power Protection

### Ramlok

Standby power supply/line voltage conditioner. Automatically switches to standby power if incorrect line voltage is reaching equipment. Contents in memory are saved. Requires auto battery. Includes 10 amp battery charger, overcharge and reverse-polarity protection. *Ladco Development Co., P.O. Box 464, Olean, NY 14760, 716/372-0168*



## Printers

### Sprint II Plus™

QUME is the largest daisywheel printer manufacturer in the world. Our new SPRINT II PLUS™ is the one low-cost, premium-quality printer that is plug-compatible with virtually any microcomputer. It prints at 40 cps, boasts the latest in sophisticated features, and the best reliability record in the industry. *Qume Corporation, 2350 Qume Dr., San Jose, CA 95131, 408/942-4000*



### Prowriter

Offers a printing speed of 120 CPS, bidirectional printing, 8 character sizes, and 5 alphabets. Prowriter's NX9 matrix produces correspondence quality print and high resolution graphics. The Prowriter 85 IOA provides a 10" carriage. Prowriter 1550 provides a 15" carriage. *Leading Edge Products, 225 Turnpike St., Canton, MA 02021, 800/343-6833, 617/828-8150*

### Starwriter F-10

This 40 CPS daisy wheel includes low profile design, industry standard ribbons and print wheels, standard centronics parallel or RS 232C, and extensive built-in word processing functions. The Starwriter F-10 printer is supported by a full year warranty and national authorized Leading Edge service centers. *Leading Edge Products, 225 Turnpike St., Canton, MA 02021, 800/343-6833, 617/828-8150*

### Printmaster F-10

The 55 CPS model with all the same features as the Starwriter F-10 plus faster print speed and carriage return time, accept data transmission up to 0.600 baud, dual-color ribbons, and original plus 4 copies. The Printmaster F-10 is supported by a year warranty and national authorized Leading Edge service centers. *Leading Edge Products, 225 Turnpike St., Canton, MA 02021, 800/343-6833, 617/828-8150*

## Storage Devices

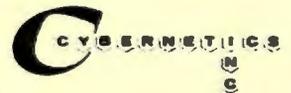
### Versatile Print Buffer

SPOOL/64 increases operator throughput by letting printer operate from 64K buffer while operator uses PC for other tasks. Program control space compression & copies parallel version \$319. Optional serial board for serial/serial & parallel/serial conversion. Option price \$99. Cables available. *Apparat, Inc., 4401 S. Tamarrac Pkwy., Denver, CO 80237, 303/741-1778*



### Cyberdrive™

Ultra-high speed hard disk using swingarm positioner for fastest average seek times (33 milliseconds!!) Speed up performance and use the integrated backup device. 13.5, 27, or 40 Mbytes per cabinet. Over 100 Mbytes supported with additional cabinets. Quantity discounts. *Cybernetics, Inc., 8041 Newman Ave., #208, Huntington Beach, CA 92647, 714/848-1922*



### Winchester Hardfile Subsystems

Tallgrass Technologies offers a family of high performance, high capacity HardFiles with formatted capacities from 6.25 Mb to 70.7 Mb. With integral streaming tape cartridge backup, the Tallgrass HardFile System has set the industry standard on Performance and reliability. From \$3,095 with back up. *Tallgrass Technologies Corp., 9207 Cody, Overland Park, KS 66214, 913/492-6002*



### CTI Storage Boosters

Boost your storage capacity with versatile state-of-the-art add-ons. RAM to 576K; 5 1/4" Floppy to 3.2 MB; 8" Floppy to 4.8 MB; 5 1/4" Hard Disk (either fixed or removable) to 18 MB; Serial/Parallel/Clock/Calendar/Game/Mem on one-slot cards. Send for our FREE MEMORY

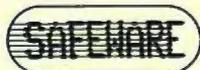
OFFER. Also see our ad this issue. *CTI - Computer Technology Innovations, 1037 North Fair Oaks Ave., Sunnyvale, CA 94086, 408/745-0180*



## Insurance

### Safeware™

If your computer is important to you, insure it! SAFEWARE provides full replacement of hardware, media and purchased software. As little as \$35 a year covers: fire, theft, power surges, earthquake, water damage, auto accident. *Columbia National General Agency, 88 E. Broad St., Columbus, OH 43215. Toll free 1/800/848-0598. In Ohio 1/800/848-2112*



## Mailing Lists

### IBM PC Mailing Lists

16,000 IBM PC owners mailing list available now! We are the largest dealer of micro-computer owner's names, with over 300,000 total. . . many different brands. Plus 7 store lists, 1880 computer clubs, educational lists, micro publications, and much more. Write or call for free catalog. *Irv Brechner, Targeted Marketing, Box 453, Livingston NJ 07039, 201/731-4382*



## Mail Order

### Guaranteed Lowest Prices!

We offer a complete line of software and hardware products, for the PC, at the lowest prices. We also provide advice and support at no extra charge. See our ad this issue and compare our prices. We're sure that you will be pleasantly surprised. *Applied Computer Products, Inc., 1916 Welsh Rd. #6, Philadelphia, PA 19115, 800/223-3860*

### Software & Hardware Sales

The mail order house with a difference. Micro Flash sells the best, top-of-the-line hardware and software as well as some of the newest innovations in the ever-changing micro market, factory-fresh and guaranteed, at low, low prices. And, Micro Flash supports every product sold! *Micro Flash Computer Products, 120 Village Sq. # 126, Orinda, CA 94563, 415/680-1157*



## Publications

### IBM/PC Survivors Manual

New, short introduction to the IBM Personal Computer for the complete novice. Easy step-by-step "how to" for every IBM PC buyer or prospective buyer. Ideal for secretary, spouse, friend. Immediate delivery. Price:

\$11.95 + \$2 shipping/handling. *Mayer Associates International, 6009 Walnut St., Pittsburgh, PA 15206, 412/362-1290, Source STO910*

### Free Directory

32 pgs. on top-quality software at mass production prices. Integrated accounting system and payroll, ultimate data base manager, advanced inventory, mailing list, text formatter & many more. Send a legal-size, self-addressed, stamped .37 cent envelope to: *Micro Architect, Inc., 96 Dot-han St., Arlington, MA 02174, 617/643-4713*



### Advertising Tracking

Analysis of ad space, expenditures and market share in over 30 computer publications. Used by ad managers, publishers, space reps, media buyers. Call for complimentary newsletter. *Adtrak, Inc., 1901 Old Middlefield Way, Mountain View, CA 94043, 415/965-7473*



### Quickguide - IBM PC

The best of the tutorial/command reference guides with Dos, edlin, basic, "batch files", etc. to take the user from day one to confidence on the PC. A must for you, your office help and others suffering from "manual shock". More practical than disk tu-

tors. Get up and running fast! \$12.95. *Public Data Corporation, Dept. PC-3, 420 S. Beverly Drive, #207, Beverly Hills, CA 90212*

## Educational Publishers

### CBS Publishing

Now one of the leading publishers of machine specific text/tutorials produces software too! We've expanded our extensive IBM PC series to include diskettes. Other 1983 features include a timely book on Apple/II, and texts on UCSD p-system, 86 CP/M and Unix. *CBS Educational & Professional Publishing, Att: Deborah Mitera, 383 Madison Ave., New York, NY 10017, 212/872-2000*

**CBS EDUCATIONAL AND PROFESSIONAL PUBLISHING**

## Retailers

### California

Large Group Hardware Buys Cost-effective multiple PC buys. CTI expertise in IBM-PC and PC Workalike machines, peripherals and sources enables us to assist you make the most cost-effective total systems buy and helps you get the most out of it after purchase. See our ad this issue! *CTI-Computer Technology Innovations, 1037 North Fair Oaks Ave., Sunnyvale, CA 94086, 408/745-0180*



## Florida

**Sales - Support - Training**  
Specializing in IBM PC hardware, peripherals, software, and books. Individual training and training seminars provided. Second store in South Miami at 12105 S. Dixie Hwy. 305/238-7238. Exclusive software shop at 1625 NE 163rd St. Miami Beach 305/945-1015. *Computer Scene*, 1641 NE 163rd St., Miami Beach, FL 33162, 305/945-1014

## New York

**IBM, Columbia Systems**  
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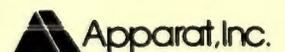
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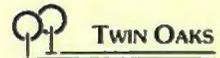
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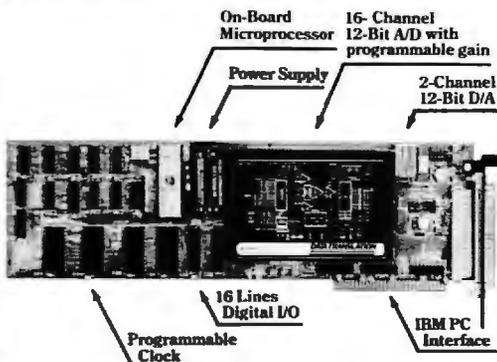
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## The Wide World of PC Products

Edited by Adrian Mello

In the fast-paced personal computer marketplace *Just Announced* acts as an alert service to keep you abreast of the latest developments in IBM PC and compatible technology. Information for this department is provided by manufacturers; these write-ups are not reviews. Many of these descriptions will be followed up by reviews in this or future issues.

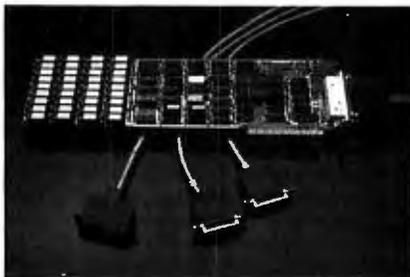
## Hardware

### Boards

#### answerRAM

A multifunction board that combines various amounts of memory expansion with two serial ports and one parallel port. It requires a system with 64K, and comes with a disk emulator and a 64K print spooler as well as a set key program that allows any of 40 function keys to be defined. A print format program permits the user to reprocess ASCII values so that the special features of various printers can be accessed.

Another software routine allows the user to change the system default printer. A 3-into-1 cable permits take-off of all three ports from one connector that sits in the rear expansion slot of the PC. List price: 64K \$595, 128K \$716, 192K \$837, 256K \$958. Anatron, Inc., 202 W. Bennett St., Saline, MI 48176, 800/521-0521.



answerRAM, Anatron

#### ALL Card

A combination board designed to facilitate multitasking and multiuser operating systems. It is available with a variety of hardware and software options. The board can be added to a system with 64K already in place, but more memory is recommended to take full advantage of its features. The board works with Concurrent CP/M-86, CP/M-86, and MS-DOS, and a UNIX-like operating system is planned. The board reduces overhead time by using high-speed circuitry such as 35-nanosecond memory.

The ALL Card 5/1 comes with Concurrent CP/M-86 and product features the manufacturer labels FMPM (Fast Disk, Multi-User/Multi-Task, Protection, Management). The protection feature creates impenetrable memory partitions for each user or task during a multitasking or multiusing situation.

The management feature maps all memory in 2K units to manage memory and I/O functions more efficiently. Another feature of FMPM is a disk emulator, which is protected when it is used with MS-DOS.

Memory can be added to the board from 64K to 256K, and the board will be able to add 256K chips for up to 1M of memory when these chips become available.

An FMP variation of the board is available that comes with all the features of the standard ALL Card except memory and I/O management. The FMP version comes with GSX-86 graphics software and CBASIC.

The ALL Card D is a disk controller card that piggybacks the ALL Card. The user can attach any combination of the four following storage devices: floppy disk, hard disk, hard

disk cartridge, and multiple floppy cartridge drive. List price: ALL Card 5/1 \$395, FMP version \$395, ALL Card D piggyback controller card \$595, Clock/Calendar \$75, 64K \$200, each additional 64K \$100. Computers ALL Inc., 110 Bloor St. West #501, Toronto, Ontario M5S 2W7 Canada, 416/960-0111, Telex: 06-986766.

#### DASH-1

A hardware/software package that enables electrical engineers to display and make revisions during the schematic design phase. System requirements are 256K, two double-sided double-density disk drives, a parallel port, and a monochrome display. Software is configured for a C.Itoh 15-inch Prowriter printer.

The package consists of a graphics controller card, a mouse, and software. The graphics controller has 640 by 360 resolution and a port into which the mouse is plugged directly without another hardware interface. The three-button mechanical mouse is used to position the cursor and make graphics selections.

The first button on the mouse defines or deletes the end point of lines used to represent circuits. Once end points are established, a line can be drawn between them. The second button creates interconnects (a type of circuit junction) by translating a line crossing as a junction. The third button deletes line segments.

Software consists of graphics editor and parts library programs that come with an initial listing of parts such as memory, microprocessor, and peripheral chip descriptions that can be pulled from the library and manipulated on screen to create electrical diagrams. The library can be updated by adding new symbols and part designations. The program auto-

matically checks and warns the user of common errors such as dangling interconnections or inputs with no outputs. List price: \$4980. Future-Net, 21018 Osborne Ave. #5, Canoga Park, CA 91304, 213/700-0691.

## Storage Devices

### Micro-Floppydisk Drive System

An external unit that has two 3-inch micro-floppy disk drives. The system requires the standard floppy disk controller and uses the C and D drives. A single cable is provided that attaches the unit to the controller card. The system is plug compatible with the 5 1/4-inch drives in recording format, data transfer rate, and disk rotation speed. Four cartridges are included, and each cartridge provides 500K unformatted storage capacity.

The double-density, single-sided drives require that the cartridge be flipped to take full advantage of a cartridge's storage capacity. The unit comes with a built-in power supply. List price: \$799. Amdek Corporation, 2201 Lively Blvd., Elk Grove Village, IL 60007, 312/364-1180, Telex: 25-4786.

## Display

### Transtar 20

A high-resolution, 2000-character (80-column by 25-line) monitor with a 12-inch nonglare green CRT. It is housed in a lightweight case and can be connected to the PC with a standard RCA jack. The controls are out of sight but easily accessible.

Transtar reduced the angle of the screen to cut down on the glare from overhead lights. The Transtar 20 comes with a limited warranty: 1 year parts and labor with a 90-day

no charge replacement. List price: \$169.95. Transtar, a division of Omega Northwest, Inc., Box C-96975, Bellevue, WA 98009, 206/454-9250, 312/634-1511.



Transtar 20, Omega Northwest

## Printers

### Juki Model 6100

A letter quality daisy wheel printer with limited graphics capabilities that supports a Centronics parallel interface (an RS-232C serial interface is optional). Model 6100 prints at 17 cps, and both a tractor feed and a cut-sheet feeder are available. It includes an ASCII 96-character set and a 2K buffer expandable to 8K, features proportional spacing, and has an acoustical noise level of less than 62 dBA. List price: \$699 (excluding cables or paper feed). Juki Industries of America, Inc., 20437 S. Western Ave., Torrance, CA 90501, 213/320-9001, Telex: 2155434.

## Modems

### Toyocom Autodial 212AD

An intelligent modem designed for network and independent communications that operates with built-in communications software. It requires

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### E-Z COLOR BOARD

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## Just Announced

a serial interface. A software disconnect feature permits the user to hang up a call by entering 2 definable characters on the PC keyboard. The advantage of this feature is that the user no longer needs to push the analog loopback switch on the modem to disconnect a call, enabling the modem to be placed at a distance from a single PC. This feature also facilitates the use of a modem within a network.

A remote boot feature allows a computer to be reset from a remote terminal by entering a 2-character command so that the computer can be freed from software lockup when all else fails. The modem stores up to nine 40-digit phone numbers and ten names (one for the number last called) for use with the autodial feature.

Autodial can be activated by one of the stored names such as *PC World* or by memory position (1 through 9). Tone, pulse, and blind dialing are interchangeable within a stored number sequence to allow users on pulse circuits to dial over MCI and Sprint lines.

A built-in voice/data transfer switch allows a single phone line to be changed back and forth between voice and data transmission, eliminating the need to plug and unplug the phone-line wire. This feature also permits a user who wants to talk over the phone to take advantage of the modem's autodial capability by switching to the voice mode after the connection has been made in the data mode. An answer back of up to 16 characters can be programmed and transmitted upon connection to assure that transmission has been completed.

The full-duplex modem operates at 300 or 1200 baud. List price: \$795. Bytcomm Inc., 900 Larkspur Landing Circle #240, Larkspur, CA 94939, 415/461-0894.



**Toyocom Autodial 212AD,**  
Bytcomm

## Software

### *Applications*

#### **Financial Analysis Package**

A package designed for CPAs and financial analysts that requires 64K and one disk drive. The program helps executives determine whether to lease or buy, figure loan and lease payment schedules, analyze capital budgeting alternatives, and determine depreciation schedules based on the Accelerated Cost Recovery System. The program saves nothing to disk; all reports must be printed. List price: \$92.95. Execuware, Aeronca, Inc., 4530 Park Rd. #348, Charlotte, NC 28209, 704/525-9881.

#### **Real Estate Analysis Package**

A vertical market analysis package designed for real estate professionals. It requires 64K and two disk drives. The program produces a 54-line property analysis that analyzes loans and property income, taxable in-

come, cash flow, equity income depreciation, net equity income, and increase of property value, and summarizes the total gains as a percentage of original investment. The bottom line gives the internal rate of return after taxes. List price: \$274.95. Execuware, Aeronca, Inc., 4530 Park Rd. #348, Charlotte, NC 28209, 704/525-9881.

#### **BPS Business Graphics**

A business graphics package with a variety of color charts and graphs that are produced with English-language commands. It requires 128K, two disk drives, and a color/graphics adapter. Data may be entered directly from the keyboard or extracted from *VisiCalc*, *SuperCalc*, accounting reports, or word processing documents.

BPS Graphics can also perform several statistical functions: moving average and exponential smoothing; curve fitting and specification by constant, line, logarithm, parabola, and sine; and calculation of minimum, maximum, sum, mean, variance, and standard deviation. List price: \$350. Business & Professional Software, Inc., 143 Binney St., Cambridge, MA 02142, 617/491-3377.



**BPS Business Graphics, Business & Professional Software**

### Tycoon

A game that simulates the commodity market by allowing a player to trade futures contracts for up to 15 commodities. It requires 64K and one disk drive and is available in MS-DOS or CP/M-86. The player makes trading decisions by considering newspaper stories that indicate the performance of the various commodities. Newspaper excerpts develop with each turn, representing weekly trading periods.

Besides the news stories, graph and text histories show price fluctuations. Four levels of play develop as the game progresses. As a player's net worth increases, more commodities can be traded. The objective of the game is to make \$1 million. Although each game is played over 52 weeks, the player can start another game year with the previous year's assets intact. A program generator allows the user to create new scenarios each time the game is played. List price: \$99.95. Blue Chip Software, 19824 Ventura Blvd. #125, Woodland Hills, CA 91364, 213/881-8288.

### Cosmic Crusader

An arcade-style space game written in machine language that has nine skill levels. It requires 64K, one disk drive, and a color/graphics adapter (a joystick is optional). Aliens have stolen the star charts, and the player must retrieve them before the aliens reach home base. High scores are saved to disk. A sound on/off and a stop/start function are included. List price: \$38.95. Funtastic, Inc., 5-12 Wilde Ave., Drexel Hill, PA 19026, 215/622-5716.

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## Just Announced

### Quick Text

A word processor that creates, edits, and prints documents and files, and requires 64K and one disk drive.

*Quick Text* features word wrap, right justification, block and line move/copy/delete, character insert and delete, centering, text insert, file merge and create, search and replace, tabs, text reformat, and spelling verify.

The text screen provides a status line and ghost cursor for easy entry of tabular data. *Quick Text* handles the insertion of headers, footers, underlines, and page numbers as documents are printed. Documents can be chained so that many document files are printed with one command. List price: \$55. Distributed Software Systems, Inc., 950 Knollwood Dr., Buffalo Grove, IL 60090, 312/634-1511.

### Coins

A coin inventory program for dealers and collectors that can be used for investment and tax purposes. It requires 64K and two disk drives. A printer is required for hard copy reports.

Four types of reports can be produced from information entered by users on their coin collections. A report of a collection's total value shows the purchase cost and current market value of each coin with the percentage of increase or decrease in value from the time of purchase. The program can report all coins purchased in any year for tax purposes. Another report shows all the coins sold in any year. The fourth type gives a listing of all the owner's coins ever bought or sold. All reports are sorted in order by denomination and year of each coin.

To maintain up-to-date market values the user may purchase a quarterly updates program that has the market

prices on 1600 of the most common United States coins in all grades of condition. The initial purchase includes this update program, but it must be paid for separately after the first quarter. List price: \$95; quarterly updates \$25 each. Compu-Quote, 6914 Berquist Ave., Canoga Park, CA 91307, 213/348-3662.



Coins, Coin Inventory Program, Compu-Quote

### The Exterminator

An arcade-style maze game with three skill levels. It requires 64K, one disk drive, and a color/graphics adapter (a joystick is optional). The player navigates a maze trying to exterminate bugs with hidden bug spray. List price: \$29.95. Distributed Software Systems, Inc., 950 Knollwood Dr., Buffalo Grove, IL 60090, 312/634-1511.

### PC-Talk III

An improved version of the asynchronous communications program that requires 64K and one disk drive. With the new version users can send binary files and implement automatic error checking during transmission. It also stores stripping functions for each dial directory en-

try. The directory has been expanded to hold 60 phone numbers compared to 15 in the original program. *PC-Talk III* has 40 definable function keys instead of 10. All program features are fully operable at 1200 baud. List price: Production copies are available for \$35; anyone who sends a blank formatted disk and a postage-paid return mailer may receive a free copy, but a \$35 contribution will be requested. Freeware, Headlands Press, P.O. Box 862, Tiburon, CA 94920.

### Flipper Ball

A fast-paced, arcade-style pinball game for one or more players. It requires 64K, one disk drive, and a color/graphics adapter (a joystick is optional). The game simulates a pinball machine with both sound and graphics. List price: \$29.95. Distributed Software Systems, Inc., 950 Knollwood Dr., Buffalo Grove, IL 60090, 312/634-1511.

### Snack Attack II

The sequel to Apple's *Snack Attack* is an arcade-style maze game that requires 64K, one disk drive, and a color/graphics adapter (a joystick is optional). *Snack Attack II* has nine skill levels. The snacker has to foil the gumdrop guards in order to eat the gumdrops. There are doors through which the snacker can enter, where the gumdrop guards can't follow, and vice versa. A bite from the apples that pop up makes the snacker go faster. List price: \$38.95. Funtastic, Inc., 5-12 Wilde Ave., Drexel Hill, PA 19026, 215/622-5716.

### Pie Writer

A word processing system with a machine buffer that allows text to be entered as the document is scrolling. It requires 64K and one disk drive. *Pie Writer* features tabbing, centering, an automatic paragraph indenting mode, a global word search that can place or correct words throughout an entire document, and placement and correction of words, sentences, and paragraphs. List price: \$99.95. Hayden Software Co., 600 Suffolk St., Lowell, MA 01853, 617/937-0200.

### GrafTalk

A business applications graphics package that allows the user to produce bar, pie, line, and symbol charts using English-language commands. It requires 64K, one disk drive, and a color/graphics adapter. *GrafTalk* includes a full set of move and draw commands that allow the user to design customized graphs. It features a text editor that can be used to create a command file for regularly updated graphs. *GrafTalk* accepts data from the keyboard or from a disk file, and it has 16 drivers that support a wide range of plotters and printers. List price: \$450. Redding Group Inc., 609 Main St., Ridgefield, CT 06877, 203/431-4661, Telex: 643351.

### The Landlord

Two programs that help landlords record and report information about their properties. The package requires 128K, two disk drives, the BASRUN.EXE program, and an 80-column printer to produce reports.

Purchasing the entire BASIC compiler is not necessary because Systems Plus will sell BASRUN.EXE separately.

*Property Manager* keeps records on rental units, tenants, terms, location, and owners. It also records up to eight financial transactions per month for each tenant.

*Financial Manager* is an accounting system that handles journal entries when the user adjusts accounts or transfers funds from one charted account to another. It also has a check register for checks written to pay bills associated with a property. Reports can be printed by single property, owner, or all properties. Printed reports cover property and tax analysis, account summary, journal entries, and disbursements. The program can also print checks. List price: \$595. Systems Plus, Inc., 1120 San Antonio Rd., Palo Alto, CA 94303, 415/969-7047, TWX: 910 379 5060.

### Home Budget Program

A home applications program that provides extensive ledger capabilities without the need for accounting experience. It requires 64K, one disk drive, PC-DOS with advanced BASIC, and an 80-column monitor. The program allocates monthly spendable income into as many as 48 categories including charge accounts, savings accounts, food, auto expenses, and utilities.

*Home Budget Program* provides budget status information on a month-to-date or year-to-date basis. Approximately 2500 entries may be recorded and tax-deductible expenses can be annotated. List price: \$60. IBM, Systems Products Division, Entry Systems, P.O. Box 1328, Boca Raton, FL 33432, 305/998-6045.

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## HARDWARE SPECIALS

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### Blingsplatz!

An arcade-style game in which the player defends space outposts against attacking "Blingsplatz" creatures. The game requires 64K and one disk drive. Blingsplatz creatures approach randomly through the top of the screen and attempt to bomb the player's outposts located along the bottom of the screen. The player maneuvers and fires a launcher to protect the outposts and can activate an ion shield for short periods of time to protect the launcher. As the game advances the attackers gain speed and the player acquires launcher and shield reinforcements. The game awards 100 points for each attacker destroyed and a bonus for each level successfully completed. List price: \$34.95. Omnic Corporation, 258 Tower Hill Rd., P.O. Box 309, Chaplin, CT 06235, 203/455-0492.



Blingsplatz!, Omnic Corporation

### BASIC Primer

An interactive tutorial program that introduces the editing capacities of the IBM PC keyboard. It requires 64K and one disk drive. *BASIC Primer* teaches the user beginning BASIC and more complex BASIC concepts; it is recommended for young students. List price: \$60. IBM, Systems Products Division, Entry Systems, P.O. Box 1328, Boca Raton, FL 33432, 305/998-6045.

### PC Draw

An interactive design and documentation tool that can create, store and print high-resolution (640 by 200) black and white drawings. It requires 128K, two disk drives, a color/graphics adapter, and an Epson MX-80, MX-100, or an IBM printer with Grafrax. A light pen is optional.

*PC Draw* includes two predefined symbol templates developed for software design and electrical design. Customized templates can be developed by the user. Graphics functions include object scaling, rotation, and placement. The program supports two types of freehand line drawing: a "line-draw" between two points and a "pixel-draw" controlled by the cursor's movement. *PC Draw* prints in compressed, expanded, or emphasized format. List price: \$250. Micrografx, 8526 Vista View Dr., Dallas, TX 75243, 214/343-4338.

### Systems

#### Pascal Development Tools

A series of 45 procedures and functions that provides the IBM Pascal programmer with many of the functions that make software programming easier but are unavailable with the IBM Pascal Compiler. The pack-

age requires 128K, two disk drives, and an IBM Pascal Compiler. It includes six separately compiled, integrated units: basic intrinsic functions, string functions, applications routines, screen handling, fast form utilities, and a graphics interface. *Pascal Application Development Tools* was developed for IBM Pascal and the IBM PC; all procedures are written in IBM Pascal except a general BIOS interrupt routine written in Macro Assembler. All source code is distributed to provide flexibility and to assist the programmer in learning IBM Pascal. List price: \$125 including a User Reference Manual. Blaise Computing Inc., 1609 Acton St., Berkeley, CA 94702, 415/524-6603.

#### View Manager

A screen management program for Pascal that allows the user to create and edit a screen, write a program to access the screen, and use the screen for data entry. It requires 128K and two disk drives. *View Manager* makes creating applications faster by eliminating the coding required to define a screen display.

The program consists of three parts: View/Screen, View/Document, and View/Library (which requires the IBM Pascal Compiler). With View/Screen the user paints and edits the screen, centering and moving blocks, and choosing colors, field locations, and lengths. View/Screen can specify seven data types: integer, decimal, positive integer, general text, alphanumeric text, alphabetic text, and numeric text. Input and output fields remain unprotected for future data entry or retrieval. The user can create as many as 255 screens with up to 255 fields each. The screens are stored in a data base for future use.

View/Document produces hard copy of screen data base directories, screen images, and descriptions of all fields for a specified screen.

View/Library is an IBM Pascal unit of procedures that allows the user to access and use screens from applications programs. It includes both a read and a write procedure. List price: \$275. Blaise Computing Inc., 1609 Acton St., Berkeley, CA 94702, 415/524-6603.

#### micro/SPF

A utility program for professional programmers that provides the full-screen editing features of the mainframe Structured Program Facility (SPF) for the IBM PC. It requires 256K and one 320K disk drive. The program runs under MS-DOS, CP/M-86, and Concurrent CP/M-86. Phaser Systems recommends Concurrent CP/M-86 to take advantage of its upcoming mainframe communications software, which will run under CCP/M-86.

The program has complete cursor control and the same set of primary and line commands used in the SPF system. Other features include definition of key functions, full scrolling, and tabs that can be set for any language or format. List price: \$249. Phaser Systems, Inc., 50 W. Brokaw Rd., San Jose, CA 95110, 408/298-6303.

#### Financial Planning Mind Tools

A series of programs that work in conjunction with *Multiplan*, *SuperCalc*, and *VisiCalc*. The package requires 64K and one disk drive. Each tool contains 18 commonly used financial calculators with formulas and column headings that are instantly superimposed on the *Multiplan*, *SuperCalc*, or *VisiCalc* spread-

sheet. The 18 formulas include compound interest, annuities, internal rate of return, depreciation, and linear regression. *Mind Tools* can produce hard copy reports. List price: \$89.95. Howard W. Sams & Co., Inc., 4300 W. 62nd St., P.O. Box 7092, Indianapolis, IN 46206, 800/428-3696, 317/298-5566.

#### APL\*PLUS/PC

An extended APL language for the IBM PC that includes built-in communications software, allowing the PC to communicate with another PC or a remote time-sharing computer. It requires 128K and one disk drive, and includes a custom character ROM that allows the user to display the APL character set on the monitor.

In communications mode the PC can act either as a simple terminal, sending only what the user types, or as a smart terminal, automatically transferring data and programs to and from the remote computer. The package includes a 400-page programmer's reference manual, an introductory APL tutorial, and an APL textbook. List price: \$595. STSC, Inc., 2115 E. Jefferson St., Rockville, MD 20852, 301/984-5000.

#### Correction

Last issue's *Just Announced* listed an incorrect price for *Wordtrix*. The correct price is \$34.95.

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# Product Index

Reader  
Service  
No.

## Computers

- 33 Columbia Data Products, Inc., 60-61
- 34 COMPAQ, 22
- Eagle Computer, 10, 313
- 79 International Business Machines Corporation, 5

## Hardware

### Boards

- 3 Advanced Data Technology, 99
- 9 Anatron, 92-93
- 10 Apparat, Inc., 28
- 18 AST Research Inc., 34-37
- 46 Computer Peripherals, Inc., 346
- 54 Data Translation, Inc., 119
- 77 Hercules Electronics, 279
- Infotools, 387
- 98 Maynard Electronics, 202-203
- 105 Microcode Corporation, 193
- 99 Microcomputer Business Industries Corporation, 240-241
- 135 Pasocom, 204
- 143 Plantronics/Frederick Electronics, 406-409
- 147 PureData Ltd., 206-207
- 149 Quadram Corporation, 30-31
- 151 Qubie' Distributing, 97
- 155 Raytronics, 219
- 167 Scion Corporation, 73
- 168 Seattle Computer, 235
- 169 Sigma Design, 217
- 179 SRITEK, Inc., 48-49
- STB Systems, Inc., 82
- 187 Tall Tree Systems, 166-167
- 190 Tecmar Inc., 84, 138, 154, BC
- 192 USI Computer Products, 226
- 200 Zen/Tek, 291
- 201 Ziotech Corporation, 300

### Storage Devices

- 48 Corona Data Systems, 6
- 51 Cybernetics, Inc., 185
- 55 Datamac Computer Systems Inc., 242-243
- 91 Leading Edge Products, Inc., IFC
- MicroDisk, 183

Reader  
Service  
No.

- 152 Quality Computer Services, Inc., 164
- 153 Quentin Research, Inc., 194
- 164 Santa Clara Systems, Inc., 147
- 180 Star Logic, 317
- 188 Tallgrass Technologies Corporation, 32

## Monitors

- Amdek Corporation, 20
- 124 NEC Home Electronics, 39
- 149 Quadram Corporation, 50
- 192 USI Computer Products, 226

## Printers, Plotters, and Typewriter Interfaces

- 57 Diablo, 24, 134-135
- 67 Enter Computer, 139
- 84 Intek Manufacturing Co., 120
- 91 Leading Edge Products, Inc., IFC
- 97 Mannesmann Tally, 126
- 115 Micro Systems Exchange, 343

## Communications

- Anchor Automation, 337
- 24 Biz Comp, 122-123
- 49 Corvus System, 17
- CXI, 308
- 119 Milford Null Modem, 314
- 128 Novell Data Systems, 29
- 133 Orchid Technology, 162
- 193 Ven-Tel Inc., 63
- 196 Vynet Corporation, 329

## Miscellaneous

- 1 Add MEM, 343
- 13 Ariel, 339
- 5 Alamo Electronic Components, Inc., 281
- 42 Computer Gold, 264
- 50 Cuesta Systems, Inc., 72
- 66 Electronic Specialists, Inc.,
- 73 FTG Data Systems, 269
- 78 I-BUS Systems, 205
- 109 Micro General Corporation, 271
- 114 Micro Q Incorporated, 224
- 122 Mouse Systems, 33
- 133 Orchid Technology, 180
- 149 Quadram Corporation, 136

Reader Service No.	
151	Qubie'Distributing, 163
158	Renaissance Technology Corporation, 152
159	RGB Designs, 326
188	Tallgrass Technologies Corporation, 32
	Telecon, 340

## Systems Software

### *Operating Systems*

62	Digital Research, 4
150	Quantum Software Systems, 272
163	RTCS Corporation, 128

### *Utilities*

4	Advanced Software Interface, 215
25	Blaise Computing, Inc., 228
26	Bourbaki, Inc., 198
31	Central Point Software, 326
71	Fox & Geller, 81
74	Funk Software, 393
118	Microware, 334
	MLI Microsystems, 340
127	Norton Utilities, The, 325
140	PCX, 332
154	Quest Research, Inc., 338, 342
157	Relational Solutions, Inc., 328
162	RoseSoft, 256
174	SofTool, 333
	Stemmos Ltd., 238
191	Watsoft Products, Inc., 341, 343

### *Languages*

89	Laboratory Microsystems, 290
92	Lifeboat Associates, 265
100	MBP Software Systems, 181

## Applications Software

### *General Business*

19	Applied Software Technology (Astec), 165
12	Applied Software Technology (Versa Form), 245
14	Arlington Software Systems, 259
28	Business Master, Inc., 216
68	EPS, 195
	Great Plains Software, 169

Reader Service No.	
92	Lifeboat, 265
96	Lotus Development Corp., 7
	Microsoft Corporation, 2-3
134	Owl Software Corporation, 83
172	Sofstar, 160, 266
176	Software Dimensions, 86
189	Techland, 278

### *Financial & Spreadsheets*

8	Analytical Software Inc., 201
202	Best Programs, 192
37	Computech Group Incorporated, 184
69	Financier Inc., 38
	H&E Computronics, Inc., 98, 257
121	Morgan Computing Co., 288
141	PEP, 224
161	Rocky Mountain Software Systems, 344
182	Strohl Systems Group, Inc., 342

### *Job and Industry Specific*

32	CMA-Micro Computer Division, 338
113	Micro M.R.P.Inc., 179

### *Data Management*

	ABW Corp., 68-69
61	Digital Marketing, 12, 133
70	Foresight Software, 304
	Innovative Software, 146
83	Insoft, 64
	Micro Technical Products Inc., 21
173	Soft Craft, 152

### *Word Processing/Text Editing*

17	Aspen Software Company, 62
21	Berzurk Systems, 347
	Bruce & James Program Publishing, 85
56	Datatek, 225
93	Lifetree Software, Inc., 65
145	Professional Software Inc., 26-27
156	Readiware Systems, Inc., 200
165	Satellite Software International, 51
184	Symmetric Software, 277

# Product Index

Reader  
Service  
No.

## *Mailing Lists*

- 38 Computer Age of San Francisco, 338
- 139 PCEZ Business Software, 345
- 183 Sunward Systems, Inc., 329

## *Communications*

- 6 Alpha Software Corp., 1
- 106 Microcom, Inc., 157
- 125 N.F. Systems, Ltd., 270
- 142 Persoft Inc., 198
- 166 Saturn Consulting Group, Inc., 214
- 189 Techland Systems, Inc., 168
- Westico, 95

## *Graphics*

- 39 Computer Aided Design (MicroCAD), 339
- 37 Conographic Corporation, 94
- MICROGRAFX, 341
- 120 Mirror Images, 41
- 129 Omicron, 244
- Orchid Technology, 180
- 138 PC Software Inc., 137

## **Educational, Personal, Entertainment & Misc. Software**

### *Educational*

- 7 American Training International, 91
- 35 Comprehensive Software Support, 70
- 81 Individual Software Incorporated, 327
- 88 Kennen Publishing, 255
- 94 Lightning Software, 131
- MicroVideo Learning Systems, 305
- 181 Stone Software Marketing, 234

### *Personal*

- Bible Research Systems, 405
- 30 Camrass Corp., 341
- Digital Engineering Group, 18
- 148 Puyallup Valley Software, Inc., 338
- 65 Tax Help Incorporated, 284
- 195 Virtual Combinatics, 302

Reader  
Service  
No.

## *Entertainment*

- 15 Armonk Corporation, 127, 349
- 64 E&S Software Services, 325
- 72 Friendlyware, 218
- 75 Funtastic, Inc., 258
- 102 Med Systems Software, 389
- 120 Mirror Images Software Inc., 132
- 130 Omniware, 340
- 198 Wood & Clay, 289

## *Miscellaneous*

- Anderson-Bell, 14
- 11 Applications Techniques, Inc., 213
- 16 Artificial Intelligence Research Group, 341
- Hauppauge Computer Works, 316
- Mentor Computer Services, 267
- 131 Open Systems Inc., 156
- 170 Simsoft Associates, 339
- Single Source Solution, 283
- 177 Software Laboratories, Inc., 268
- 178 Software Publishing Corporation, 306-307

## **General**

### *Accessories*

- BASF Systems Corporation, 153
- 203 Covers A Lot, 342
- 44 Computer-Mate, Inc., 282
- 53 DataCase, 74, 286
- 63 Dysan Corporation, 155
- 123 MicroComputer Accessories, Inc., 343
- 111 Micro Learning Concepts, 237
- 101 MC/N, Inc., 299
- 186 Systems Management Associates, 25
- 194 Vertex Systems, 405
- Williams & Foltz, 16
- Wood Works, The, 90

### *Services*

- Armco/Columbia National General Agency, 287
- 191 United Computer, 96

Reader  
Service  
No.

### *Books, Catalogs, and Periodicals*

- 20 B. Dalton Bookseller, 246,328  
Howard W. Sams & Co., 239  
146 Warner Books, 11

### *Events*

- 41 Computer Faire, 74  
29 EMCE, 121, 303  
137 PCEXpo, 110  
Raging Bear Productions, 112

### *Mail Order*

- 2 Advanced Computer Products, 364  
Applied Computer Products, Inc., 360  
Bard Software Publishers & Distributers,  
The, 367  
22 BHRT, Inc., 387  
Bottom Line, The, 351  
36 Compushack, 362-363  
40 Computer Biz, 397  
43 Computer-Line, 365  
45 Computer Outfitters, 339  
52 Cypher, 331  
58 Diamond Software Supply Co., 361  
60 Digital Dimensions, 391  
800 Software, 350  
Frederick E. Deeg & Associates, 395  
86 Interactive Telemarketing, 301  
85 International Disk, 366  
95 Logicsoft, Inc., 108-109  
Programming International, 368  
103 Memory Point, Inc., 327, 355  
108 Micro Flash, 342  
110 Micro House, 352-353  
112 Micromart, 358-359  
136 PC Connection, 356-357  
175 Software Banc, 354  
185 Systems IV, 369  
199 Your Business Software, 302

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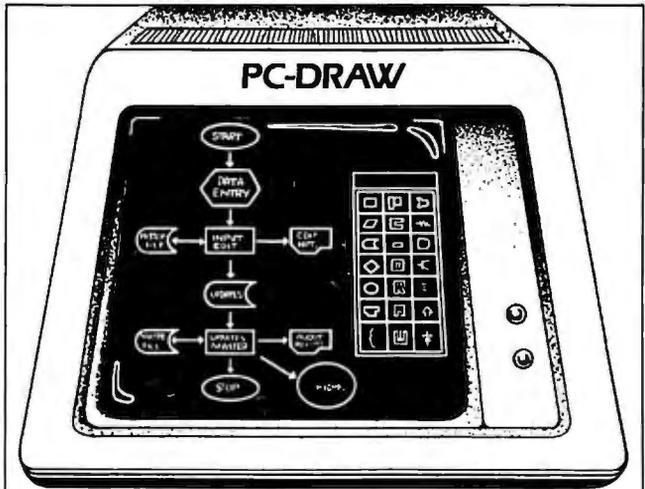
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# Advertiser Index

Reader Service No.		Reader Service No.	
1	Add-MEM, 343	37	Computech Group Incorporated, 184
2	Advanced Computer Products, 364	38	Computer Age of San Francisco, 338
3	Advanced Data Technology, 99	39	Computer Aided Design (MicroCAD), 339
4	Advanced Software Interface, 215 ABW Corporation, 68-69	40	Computer Biz, 397
5	Alamo Electronic Components, Inc., 281	41	Computer Faire, 74
6	Alpha Software Corp., 1 Amdek Corporation, 20	42	Computer Gold, 264
7	American Training International, 91	43	Computer-Line, 365
8	Analytical Software Inc., 201	44	Computer-Mate Inc., 282
9	Anatron Inc., 92-93 Anchor Automation, 337 Anderson-Bell, 14	45	Computer Outfitters, 339
10	Apparat, Inc., 28	46	Computer Peripherals, 346
11	Applications Techniques, Inc., 213 Applied Computer Products Inc., 360	47	Conographic Corporation, 94
19	Applied Software Technology (Astec), 165	48	Corona Data Systems, 6
12	Applied Software Technology (VersaForm), 245	49	Corvus Systems, 17
13	Ariel, 339	202	Covers A Lot, 342
14	Arlington Software Systems, 259 Armco/Columbia National General Agency, 287	50	Cuesta Systems, Inc., 72 CXI, 308
15	Armonk Corporation, 127, 349	51	Cybernetics, Inc., 185
16	Artificial Intelligence Research Group, 341	52	Cypher, 331
17	Aspen Software Company, 62	53	DataCase, 79, 286
18	AST Research Inc., 34-37 Bard Software Publishers & Distributers, The, 367 BASF Systems Corporation, 153	55	Datamac Computer Systems Inc., 242-243
20	B. Dalton Booksellers, 246, 328	56	Datatek, 225
21	Berzurk Systems, 347	54	Data Translations, Inc., 119
202	Best Programs, 192	57	Diablo, 24, 134-135
22	BHRT, Inc., 387	58	Diamond Software Supply, 361
23	Bible Research Systems, 405	60	Digital Dimensions, 391 Digital Engineering Group, 18
24	Biz Comp, 122-123	61	Digital Marketing, 12, 133
25	Blaise Computing, Inc., 228 Bottom Line, The, 351	62	Digital Research, 4
27	BPS, 80	63	Dysan Corporation, 155
26	Bourbaki, Inc., 198 Bruce & James Program Publishers, Inc., 85	66	Eagle Computer, 10, 313 800 Software, 350
28	Business Master, Inc., 216	67	Electronics Specialists, Inc., 340
30	Camrass Corp., 341	EMCE, 121, 303	
31	Central Point Software, Inc., 326	67	Enter Computer, Inc., 139
32	CMA-Micro Computer Division, 338	68	EPS, Inc., 195
33	Columbia Data Products, Inc., 60-61	64	E&S Software Services, 325
34	COMPAQ Computer Corporation, 22	69	Financier, Inc., 38
35	Comprehensive Software Support, 70	70	Foresight Software, 304
36	Compushack, 358-359	71	Fox & Geller, Inc., 81 Frederick E. Deeg & Assoc., 395
		72	FriendlyWare, 218
		73	FTG Data Systems, 269
		74	Funk Software, 393
		75	Funtastic, Inc., 258 Great Plains Software, 169
			Hauppauge Computer Works, 316
			H & E Computronics, Inc., 98, 257
		77	Hercules Computer Technology, 279
			Howard W. Sams & Co., 239

Reader Service No.

- 78 I-BUS Systems, 205
- 81 Individual Software Incorporated, 327
- Infotools, 387
- Innovative Software, 146
- 83 Insoft, 64
- 84 Intek Manufacturing Company, 120
- 86 Interactive Telemarketing, 301
- 79 International Business Machines Corporation, 5
- 85 International Disk, 366
- 88 Kennen Publishing, 255
- 89 Laboratory Microsystems, Inc., 290
- 91 Leading Edge Products, Inc., IFC
- 92 Lifeboat Associates, 265
- 93 Lifetree Software, Inc., 65
- 94 Lightning Software, 131
- 95 Logicsoft, Inc., 108-109, 111
- 96 Lotus Development Corporation, 7
- 97 Mannesmann Tally, 126
- 98 Maynard Electronics, 202-203
- MBP Software Systems Technology Inc., 181
- 101 MC/N, Inc., 299
- 102 Med Systems Software, 389
- 103 Memory Point, Inc., 327, 355
- Mentor Computer Services, 267
- 104 Metasoft Corporation, 130
- 105 Microcode Corporation, 193
- 106 Microcom, Inc., 157
- 123 Microcomputer Accessories, Inc., 343
- 99 Microcomputer Business Industries Corporation, 240- 241
- Micro Disk, 183
- 108 Micro Flash, 342
- 109 Micro General Corporation, 271
- MICROGRAFX, 341
- 110 Micro House, 352-353
- 111 Micro Learning Concepts, Inc., 237
- 112 Micro Mart, 358-359
- 113 Micro MRP, Inc., 179
- 114 Micro Q Incorporated, 224
- Microsoft Corporation, 2-3
- 115 Micro Systems Exchange, 343
- Micro Technical Products Inc., 21
- MicroVideo Learning Systems 305
- 118 MicroWare, Inc., 334
- 119 Milford Null Modem, 314
- 120 Mirror Images Software, Inc., 41, 132
- MLI Microsystems, 340



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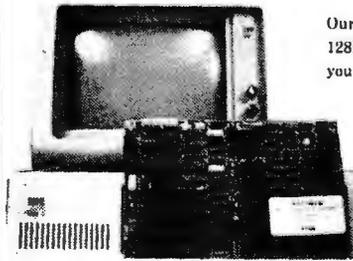
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# Advertiser Index

Reader Service No.		Reader Service No.	
121	Morgan Computing Co.,Inc., 288	168	Seattle Computer, 235
122	Mouse Systems Corporation, 33	169	Sigma Designs, Inc., 217
124	NEC Home Electronics, 39	170	Simssoft Inc., 339
125	N.F. Systems Ltd., 270	171	Single Source Solution, 283
126	Norell Data Systems, 318	172	Sofstar Inc., 160, 266
127	Norton Utilities, The, 325	173	Soft Craft, Inc., 152
128	Novell Data Systems, Inc., 29	174	SofTool Systems, 333
129	Omicron Software, 244	175	Software Banc, 354
130	Omniware, 340	176	Software Dimensions, 86
131	Open Systems Inc., 156	177	Software Laboratories, Inc., 268
133	Orchid Technology, 162,180	178	Software Publishing Corporation, 306-307
134	Owl Software Corporation, 83	179	SRITEK, Inc., 48-49
135	Pasocom, 204	180	Star Logic, 317
136	PC Connection, 356-357		STB Systems, Inc., 82
137	PCEXpo, 110		Stemmos Ltd., 238
139	PCEZ Business Software, 345	181	Stone Software Marketing, Inc., 234
138	PC Software Inc., 137	182	Strohl Systems Group, Inc., 342
140	PCX, 332	183	Sunward Systems, Inc., 329
	PEP, 224	184	Symmetric Software, 277
142	Persoft Inc., 198	185	Systems IV Limited, 369
	Phaser Systems, Inc., 236	186	Systems Management Associates, 25
143	Plantronics/Frederick Electronics, 406-409	188	Tallgrass Technologies Corporation, 32
	Programing International, 368	187	Tall Tree Systems, 166-167
145	Professional Software Inc., 26-27	65	Tax Help Incorporated, 284
147	PureData Ltd., 206-207	189	Techland Systems, Inc., 138, 168, 278
148	Puyallup Valley Software, Inc., 338	190	Tecmar Inc., 84, 138, 154, BC
149	Quadram Corporation, 30-31, 50, 136		Telecon Systems, 340
152	Quality Computer Services, 164		3Com Corporation, 52-53
150	Quantum Software Systems, Ltd., 272	191	United Computer, 96
151	Qubie' Distributing, 97, 163	192	USI Computer Products, 226
153	Quentin Research, Inc., 194	193	Ven-Tel Inc., 63
154	Quest Research, Inc., 338, 342	194	Vertex Systems, 405
	Raging Bear Productions Inc., 112	195	Virtual Combinatics, 302
155	Raytronics, 219	196	Vynet Corporation, 329
156	Readiware Systems, Inc., 200		Warehouse Software, 355
157	Relational Solutions, 328	146	Warner Books, 11
158	Renaissance Technology Corporation, 152	191	Watsoft Products, Inc., 341, 343
159	RGB Designs, 326		Westico, 95
161	Rocky Mountain Software Systems, 344		Williams & Foltz, 16
162	RoseSoft, 256	198	Wood & Clay, 289
163	RTCS Corporation, 128		Wood Works, The 90
164	Santa Clara Systems Inc., 147	199	Your Business Software, 302
165	Satellite Software International, 51	200	Zen/Tek Corporation, 291
166	Saturn Consulting Group Inc., 214	201	Ziatek Corporation, 30
167	SCION Corporation, 73		

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## (About Our Gatefold)

The image inside the gatefold cover was created by *PC World* Design Associate Dennis McLeod using an IBM Personal Computer with the Plantronics COLORPLUS card and software. The artwork was then photographed with the Lang VideoSlide camera.

Dennis found that the program commands allowed him to create art without infringing upon his spontaneity. The M (move) key used extensively in this collage permitted him to make a free-form image out of a circle. Pressing the S (square) key brought a square to the screen. He then decided which part of the circle to alter and made the change with the M key. He also could have used the D (dot) key to alter the shape of the image. The M key and one of the directional keys moved the square to a new position on the screen. The F (fix) key fixed the image in its new form and location.

The Plantronics gatefold is a regular feature of *PC World*. Each month we ask a different artist, architect, or designer to experiment with this system and create an image. At the end of the year a *PC World* blue ribbon panel will evaluate the series and award a cash prize and a plaque to the artist who makes the most dazzling use of COLORPLUS. If you have any suggestions or if you have a COLORPLUS board and would like to be considered for our contest, please contact our editorial department.

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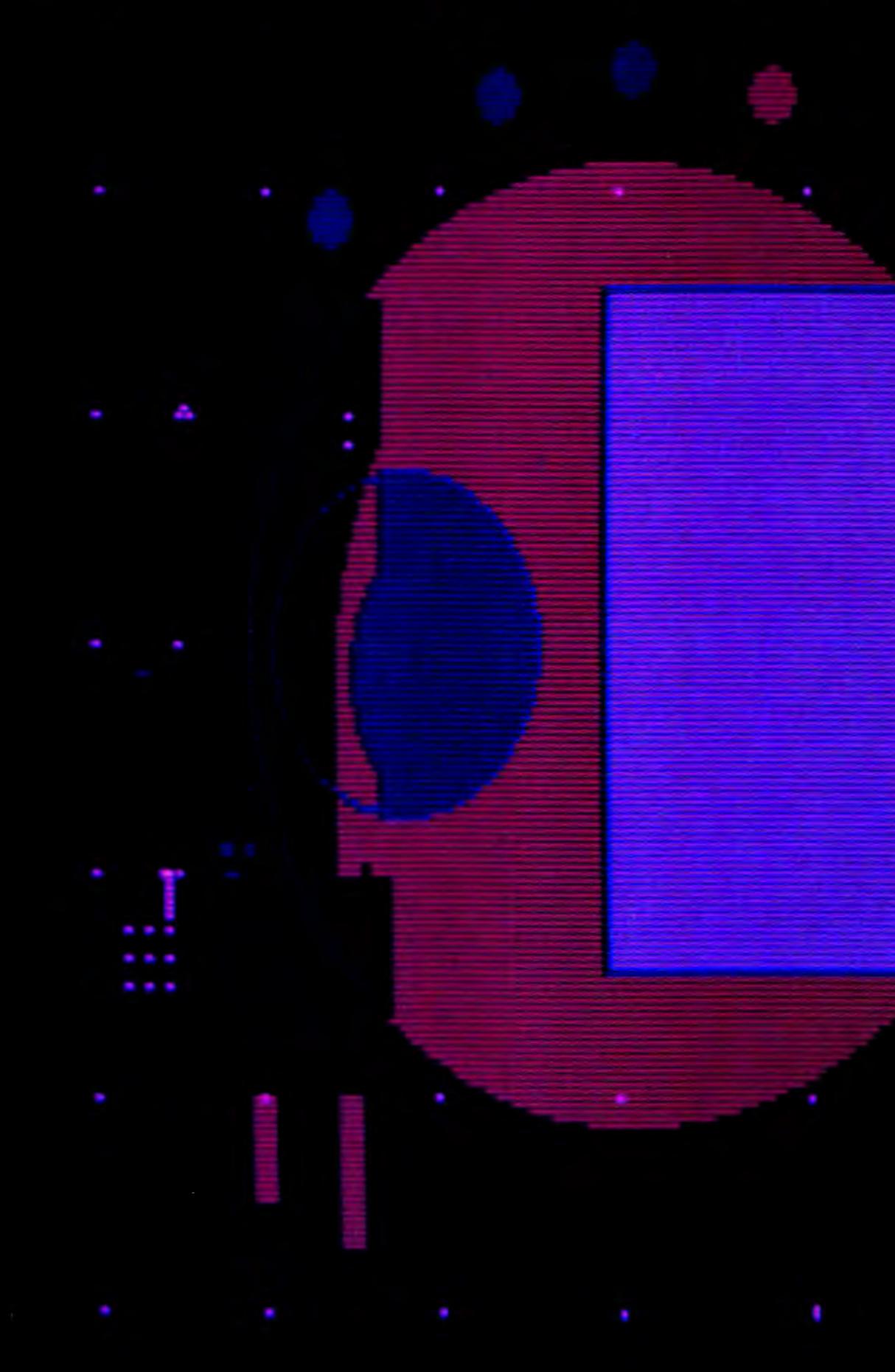
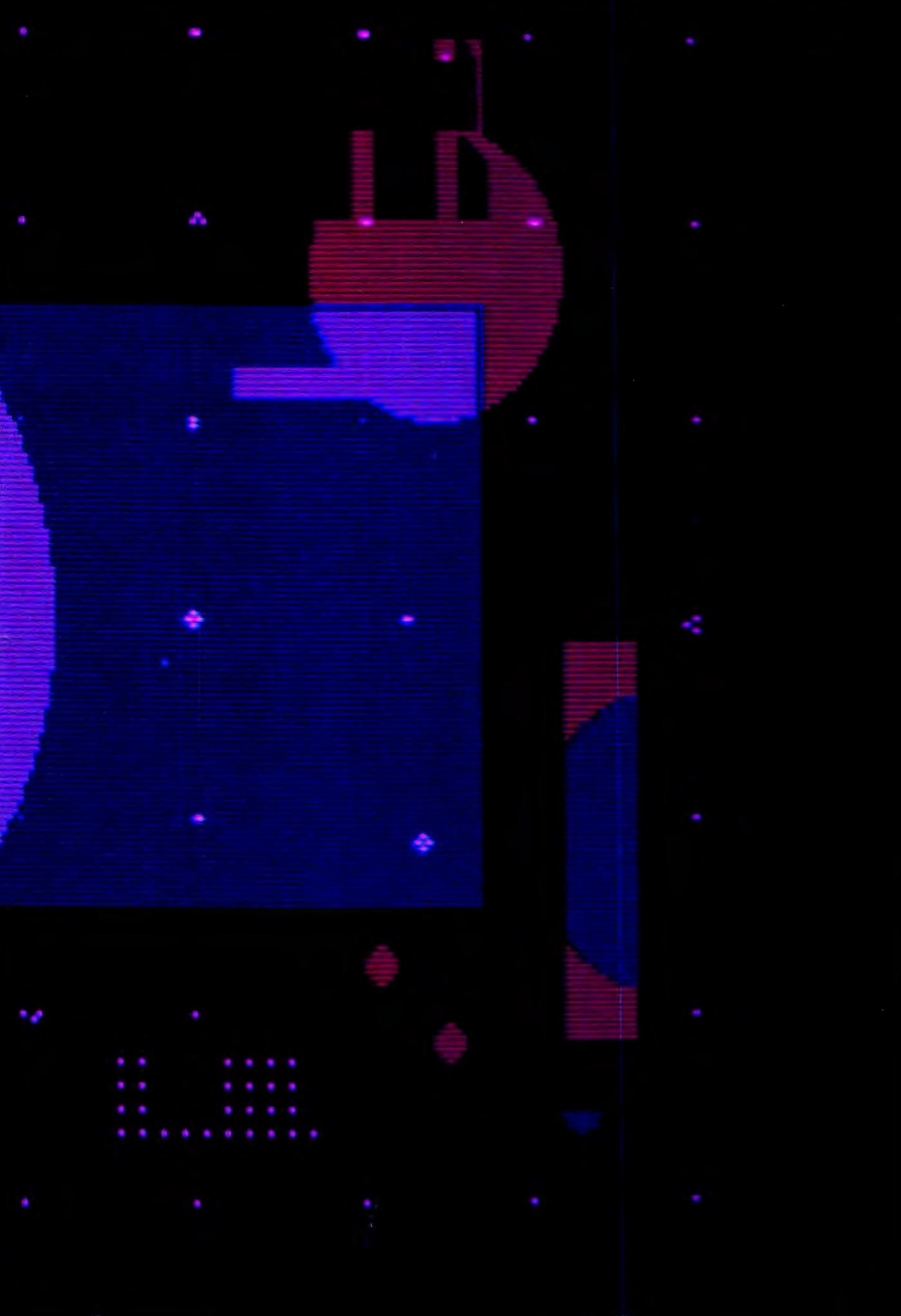


Figure 1: A schematic diagram of a mechanical assembly with various colored components and geometric shapes.



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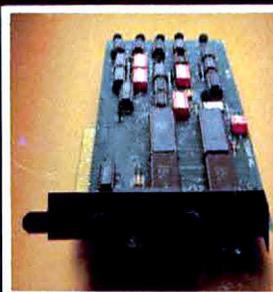
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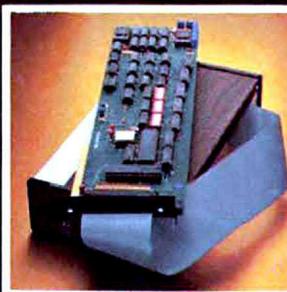
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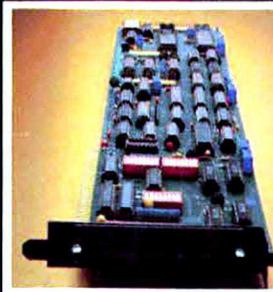
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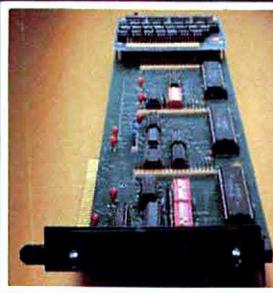
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