PC WORLD

Here Comes Bubble Memory

Hard Disk Buyer's Guide

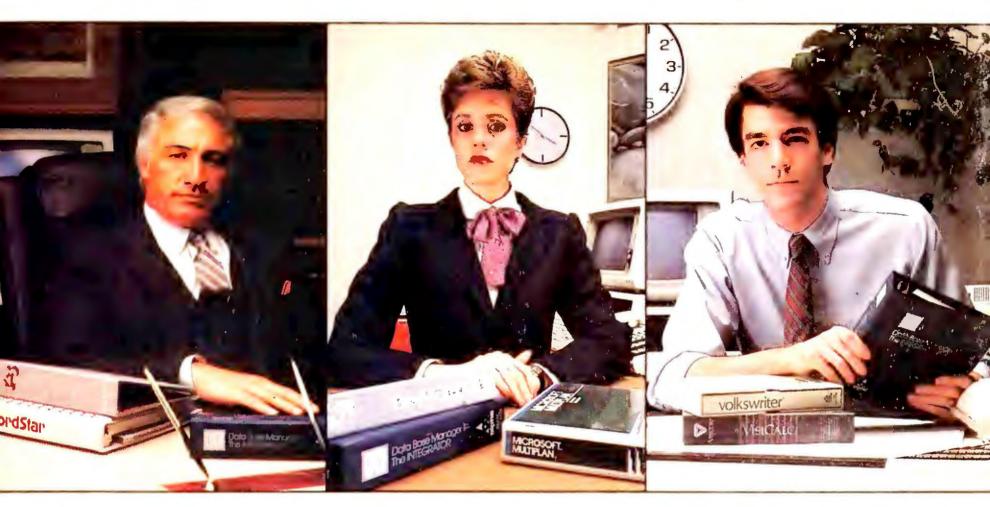A Head-to-Head Comparison of 9 Hard Disks for the IBM Personal Computer

Build Your Custom 1-2-3 LEDGER

History will record as a profound irony
that the most powerful word processing package
ever created for the IBM* Personal Computer
wasn't created by IBM.

LEADING EDGE.®

*IBM is a registered trademark of International Business Machines Corporation.

ZERO TO MULTIPLAN™ IN 5.2 MINUTES.

FINANCE OR ACCOUNTING WORKSHEETS FAST.

Gentlemen, start your computers.

`Time: 0`

Select budget intervals.

`Time: 0.5`

Enter sales revenue.

`Time: 1.0`

Enter selling expenses.

`Time: 1.5`

Your sales budget on the Multiplan electronic worksheet - in record time.

`Time: 5.2`

First, Microsoft created the Multiplan interactive electronic worksheet, to help you analyze your business problems and explore possible solutions. Without asking you to become a computer expert.

Now we've added the Multi-Tool™ budget and financial expert systems.

They can help design

and build financial or accounting worksheets tailored to your specific needs. In minutes.

You won't have to worry about developing formulas or formatting screens to build your Multiplan worksheets. Because the expert systems literally do it for you.

For example, the Multi-Tool Budget expert system creates seven inter-related

Multiplan worksheets for a total budget planning and control environment.

What's more, each system is developed by experts: business professionals and leading authorities in finance and accounting.

You'll benefit from their knowledge immediately, through the powerful worksheets each Multi-Tool expert system builds for you. And with the sophisticated tutorial manuals that accompany each system. Each manual provides in-depth information about both the design of the worksheets and the areas of finance and accounting they cover.

The result: a tailored electronic worksheet that helps you make high quality decisions.

That's just what you'd expect from Microsoft. The people who let you concentrate on your business rather than on your computer.

Ask your computer dealer to let you test drive the new Multi-Tool expert systems. Better tools that help you put your business in first place.

THE MULTI-TOOL EXPERT SYSTEMS. A POWERFUL ADDITION TO THE MULTIPLAN ELECTRONIC WORKSHEET.
Available now:
The Multi-Tool Budget expert system.
The Multi-Tool Financial Statement expert system.

BETTER TOOLS FOR MICROCOMPUTERS

MICROSOFT™

Microsoft is a registered trademark, and Multi-Tool, Multiplan and the Microsoft logo are trademarks of Microsoft Corporation.

Keyboard instruction
Learning DP
Maintaining school files
School administration
Metric conversion lessons
Learning computers
Drawing a face
Learning FORTRAN
Interactive training
Educational games
Lease classification
Property management
Engineering circuitry
Fuel oil tracking
Medical accounting
Cataloging librarian
Dental invoice generator
Income tax preparation
Data base for insurance
Apartment building system
Athletic statistics
Structural engineering
Medical office system
Medical diagnostic analysis
Travel agency tracking
Trucking system
Church management
Forms designer
Fixed asset manager
Mortgage tracking
Amortization system
Games for executives
Automated recipe file
Personal tax planning
Home finance
Writing CAI courses
Administrative reports
Geometric graphics
Color graphics
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
Printing paychecks
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
Arithmetic drill
Touch typing lesson
BASIC programming
Financial analysis
Spreadsheet program

*How many pieces of software can
you use on the IBM Personal Computer?
1,000 and up.*

IBM

PC WORLD

*The Personal Computer Magazine for
IBM PCs and Compatibles*

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

September 1983

Photo/illustration credits: David Bishop, cover, 98, 192, 154, 280; Ed Kashi, 74; Jerry McDonald, 208; Karen McDonald, 294; Nick Pavloff, 268; Harry Vertelney (Via Video System One picture processing system), 266; Mick Wiggins, 15, 39; Molly Windsor-McLeod (from photos courtesy of John Suter, Datamac Computer Systems), 223.

Reader Service #250

David Bunnell

The Home Computer Shakeout

Strange things are going on in the personal computer industry. As Apple and IBM gear up for a full frontal assault on the home and educational markets, the prices of existing home computers are diving to all-time lows. Commodore, Texas Instruments, and Atari are running scared—and they should be.

I once paid over $300 for a Commodore Vic 20, which you can now get at Toys R Us for less than $80. My sources tell me that it costs Commodore about $55 to make a Vic 20. Let's see, that's a $25 spread— $12.50 for Toys R Us, $5 for the distributor, and $7.50 for marketing, advertising, and operating expenses. Not exactly an appealing business proposition.

Competition with Texas Instruments and Atari are major factors in Commodore's pricing. However, the looming shadows of IBM, Apple, and the giant Japanese consumer electronics companies are what's really got them shaking.

Prior to the introduction of the IBM Personal Computer on August 11, 1981, few people knew anything about IBM's intentions. Even after the announcement was made, many personal computer industry gurus expressed skepticism about the commercial potential of the IBM PC.

But this time the situation is radically different. Rumors about the upcoming IBM home computer are cartwheeling throughout the industry, and press leaks appear frequently in dozens of publications, including the *Wall Street Journal* and the *New York Times*.

If my best sources and hunches are correct, the IBM home computer will be fully compatible with the PC, making it the first 16-bit and by far the most powerful home computer ever. It will include color graphics as a standard feature, 64K of memory, two standard IBM PC expansion slots for additional circuit boards, a single disk drive that can be expanded to two drives, and quite possibly PC-DOS 2.00 on a chip along with Microsoft BASIC. Digital Research's DR LOGO will be offered at the time of the computer's introduction, along with other programming languages from Digital Research and a wealth of programs.

The price of the IBM home computer will not include a monitor. If you can tolerate fuzzy screen resolution, you can interface it with your TV. Nor will it include a printer interface board, and many users will want additional memory. Still, its rumored price of $600 is low enough to attract at least 1 million buyers within a year of its introduction this fall.

Most home computers currently available have poorly written educational software at best and very few home management programs that are truly useful or that merit purchasing the computer in the first place. These puny machines are largely used to acquire fundamental programming skills and play video games. Thus, it is no wonder that the sky has come falling down.

Apple's response, rumored to be a low-cost version of the Apple II also priced at $600, will only add more pressure to the low-ball guys, as will the new Japanese portables such as the model 100 currently distributed in the United States by Radio Shack.

For the first time, home computers will have easily perceived value, and thus the people will take them seriously enough to consider owning a computer a necessity.

The Apple II and the IBM PC have the largest software bases of any computers. Spurred on by the proliferation of new machines, new software development will accelerate.

David Bunnell

Meanwhile, mass market pressures will force software prices to drop at the same time that the demand increases.
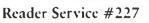
Programming languages like DR LOGO and sophisticated educational courseware from a variety of software publishers, including McGraw-Hill and IBM subsidiary SRI, will

---

One of the most exciting results in home computing is that millions of kids will be turned on to computers.

---

make the IBM home computer the most versatile and powerful one on the market. Even the Apple II will have a tough time maintaining a significant market share. If IBM can,really pull it off and introduce a PC-compatible home computer for around $600, the wildest predictions will come true.

One of the most exciting results of this revolution in home computing is that millions of kids will be turned on to computers. This possibility really came to me recently when I returned to my office following a management meeting and found five kids huddled around my IBM PC checking out my library of games. They were having such a great time that I couldn't bring myself to disturb them. So instead of working on my PC, I took my Radio Shack model 100 into the lunchroom.

These kids will become known as the computer generation. Their subsequent impact on society could well be an order of magnitude greater than that of the '60s generation.

We older PC folks are in for some interesting times. ≜

REMark: Burton L. Alperson

Who Needs User-Friendly?

The most popular buzz words of the microcomputer industry are *user-friendly software*. The phrase has all the characteristics of a good Shibboleth. It is mystifying to the uninitiated and slippery enough so that members of the microcomputer tribe can use it on one another in a variety of contexts without revealing that they don't know what they are talking about. It is a wonderful device for concealing ignorance, keeping conversation flowing, and selling software.

If the meaning could be pinned down, *user-friendly software* would probably be defined as software that is easy to learn and easy to use, even if you have never touched a computer. In other words, user-friendliness is a useful promotional gimmick for convincing computerphobes that computers aren't really so difficult after all.

Nothing is inherently wrong with the idea of user-friendly software. Some of my best friends have been know to write it. Even I, in unguarded moments, have succumbed to the temptation. The phrase *user-friendly program* however, is not synonymous with the phrase *well-designed program*. More and more it seems that concern for user-friendliness is outweighing far more important design considerations.

Friend Indeed?

One recently released program, for example, is extremely user-friendly. No manual is supplied—only instructions telling you to put the program disk in the left drive and the data disk in the right drive and turn on the machine. If you follow these instructions successfully, the program boots itself and leads you through a series of questions like, "Are we still in the year of our Lord 1983?" (apparently the program is friendly to Christians only). Depending on the task to be performed, you are forced (in the most obsequious language possible) to answer between 10 and 18 such questions. Only then can you begin your work.

In addition to the friendly tedium involved in answering all the required prompts, the author made the mistake of implementing the whole pro-

REMark

gram in UCSD p-System. The result should have been obvious to anyone paying attention to both design considerations and user-friendliness. Loading the program takes almost 2 minutes, and moving from one question to the next takes 20 to 45 seconds. It is not unusual with this program to spend 7 minutes getting to a point at which you can begin your work. Once there, making a single data entry requires up to 30 seconds. The bottom line is that it's faster to do your work by hand than to use your computer. With friends like this, who needs enemies?

An additional penalty for all this friendliness is that the program has no flexibility whatsoever. Because there is no documentation that might frighten you, you are forced to use the program the way the author intended or not use it at all. It is friendly in the same way that the old Brownie box cameras were friendly. They produced fine pictures as long as nothing unusual was going on. If the lighting conditions weren't just right, however, you were simply out of luck.

Another example of user-friendly software is an otherwise beautifully designed personal finances management program that requires a minimum of 12 separate responses to enter a single check. Although this program is capable of great flexibility and its output is superb, identical information must be entered over and over in the process of entering a series of checks. In the interest of being user-friendly, the program forces you into taking extra steps. Friendship is hard work.

Flexible Design
Many authors program as though there were only two alternatives. Either they write user-friendly, menu-driven programs or they write cold, hard, command-driven programs. The former approach, common in microcomputer software, is time con-

suming but allows users gentle access to programs and protects them against themselves. The latter approach, common in mainframe software, throws users back on their own resources and makes them susceptible to errors.

The proponents of these methods should realize that it is possible for users to have their cake and eat it too. One possibility is the use of configuration files that users can set up to control parameters governing chosen options. If you prefer to route output to the screen rather than to the printer, for example, you have only to call for this output in a configuration file, rather than making the choice from a menu each time you run the program. If you prefer a par-

---

> More and more it seems that concern for user-friendliness is outweighing far more important design considerations.

---

ticular set of margins and tabs for a type of document generated by your word processor, you can simply call for a configuration file containing the parameters, instead of setting them individually each time you run the program.

A more elegant alternative is the use of macro definitions. A financial management program with a well-designed macro capability, for example, requires you to respond to all the menu prompts when you enter the first check only. For all other similar checks entered in the same session, you simply enter the payee and amount. If provision is made for saving the macros, they can be used in later sessions, serving as configuration files.

There are excellent macroprocessing programs available. Unfortunately, they are frequently defeated

by copy-protection schemes. Macroprocessing programs can also be defeated by improperly implemented software that uses absolute addressing in forbidden memory areas. It should be the responsibility of program authors to integrate macroprocessing capability into their programs.

Authors argue that it is impossible to design software that anticipates the habits of every user. Configuration files and macro-definition capabilities, however, sidestep this issue. Authors can be as friendly and menu-driven as they wish and can write general programs with broad appeal. Users who wish to be as menu-driven as the authors can operate that way. At the same time, other users can have the equivalent of custom software.

A good analogy to personalized program operation is the design of many modern cameras that are capable of fully automatic, semiautomatic, or manual functioning. With these cameras the novice photographer can take acceptable snapshots by letting the camera make all the choices. The expert, however, can override automatic operation wherever desired. It takes skill, experience, and study to take the camera off automatic, but the power is there when you are ready for it. This kind of flexibility should be built into computer programs.

User-friendliness is much less important than solid design. Lack of user-friendliness can be overcome with study. Poor design can only be overcome by buying a new program. All things considered, I'd rather have a well-designed, grumpy program in my machine than a poorly designed, friendly one. ◒

Burton Alperson is a professor in the psychology department at California State University at Los Angeles. He developed the department's first computer programming class in 1975.

HANG ON TO YOUR HAT, CHARLIE...

Letters

Consumer Conciousness

This letter is to present the Better Computer Corporation (BCC), a nonprofit organization created to help consumers and companies with complaints against companies who in the past have had to answer to no one. We at BCC would like to see a change in attitude among those giants who never would have made it if we, the consumers, did not invest in their products and services.

Our purpose will be to address the needs of dissatisfied buyers through compiling their complaints and mailing our list to any party that requests it. We ask all *PC World* readers to join hands and voice their complaints to us. We will do everything possible to help them by making these complaints public through mailings, by publishing a monthly top-10 chart for the worst service, by writing to the major personal computer magazines, and most important of all, informing the firms in question of their performance.

We are starting to build a data base on manufacturers and retail outlets that have had problems with consumers (one company's file is getting as large as *PC World* itself). It is the cooperation of all of us that will bring about more responsible, consumer-oriented service.

People interested in our services or in making a complaint should write to the Better Computer Corporation, 10301 Holly Hill Place, Potomac, MD 20854. We request that all complaints submitted to us also be submitted to the company about which you are complaining, in order to give them a chance to respond. If you are requesting our information kit, please include a self-addressed, stamped envelope.

Farid N. Ghadry
Potomac, Maryland

Bugged

Your *PC World View* item "Bug Off" (*PCW*, Vol. 1, No. 3) is a disservice to your readers and to the industry. A manufacturer that sells a defective product should not be protected. Your concern for hiding the name of the manufacturer (and possible advertiser) can only aggravate your subscribers, and without us you won't have many advertisers.

Why not start your own computer consumer service by being forthright and outspoken about faulty products and programs. There are more of us readers than there are advertisers. You might end up with your own Good Housekeeping Seal of Approval that would benefit readers, advertisers, and *PC World*.

Ronald Sheff
Great Neck, New York

We understand your concern about products that have problems, and we were not out to mislead users or protect advertisers. Rather, we were sworn to secrecy by our source. We felt that the report of a corporation supplying one of its programmers to fix the bugs in a commercial program was of sufficient interest to use the item—even with its anonymous parts. We will certainly be aware of users' concerns as we consider such items in the future.—Miriam Medom

Pure PC

David Bunnell's response to Richard Thompson's complaint (*PCW, Letters*, Vol. 1, No. 4) has me worried. Mr. Thompson thought it peculiar that, although you state right on your front cover, "...for IBM PCs," you would consider reviewing another line of computers. Bunnell's cavalier comment was, "We are interested in personal computers of all stripes." This annoys the heck out of me.

I'll side with the reader. I can find plenty of info on other computers elsewhere. I bought an extended subscription to *PC World* because of the contract that appears right under its title on the cover, and I certainly hope you will adhere to it.

If I have to page through the journal to find IBM PC-related articles among the others, forget it. Please stick to what you're good at, and right now you're tops.

John Raleigh
Hampton, New Hampshire

Rest assured that PC World *will continue to be devoted to the IBM Personal Cumputer and compatible systems. We will report on dissimilar computers from time to time if we feel that they will be of use or interest to PC users (look for an article on the TRS Model 100 in an upcoming issue).—David Bunnell*

Your Typical Pirates

I read with interest Charles Kelly's REMark column on copy protection (*PCW*, Vol. 1, No. 3). I don't like copy protection either, but let me offer another viewpoint.

I am an engineer with a high-tech, Fortune 500 corporation. A number of my co-workers have PCs, and they always "share" software. They chip in (as many as eight to ten people) to buy a single copy of a program and then make copies for everybody, using special nibble-copying programs if necessary. I would conservatively estimate that the more active

Introducing Lock 'N' Chase™* for your Apple and IBM. It'll give you a run for your money.

No, it's not a computer scheme to beat the stock market. It's Lock 'N' Chase™* from Mattel Electronics. For your Apple® II and IBM® Personal Computers. The computer game worth its weight in gold.
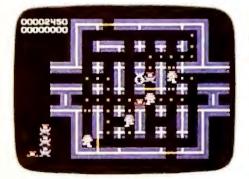
Picture yourself in a bank vault helping yourself to gold bar after gold bar. Tax free!

But here come the cops! And the chase is on. While you try to slow your pursuers by slamming locked doors on them.

Lock 'N' Chase™* from Mattel Electronics. Good as gold.

Apple® II, II Plus, and IIe

IBM® Personal Computer
Coming soon.

LOCK 'N' CHASE
M NETWORK™ by MATTEL ELECTRONICS®

Letters

participants in the group have $2000 to $3000 worth of illegal software. Can you blame the software publishers for trying to protect their interests?

It is admirable but, I fear, naive to trust the user as Mr. Kelly suggests. I would like to think that my experience is a unique one, but I rather suspect that it is very typical.

Jon Fleese
San Jose, California

Squeezed by IBM

I'm very disappointed by the marketing strategies IBM is using with the PC. They're squeezing the hell out of us. I bought my PC in October 1981, when it first came into the marketplace. I got it with 64K, a Color/Graphics Adapter, and one drive. During the next 3 months I purchased (from IBM) an async board, a parallel board, and another drive.

For the price I paid for the second single-sided drive I could now buy two double-sided drives. Why didn't IBM come out with double-sided drives in the first place? Don't tell me that they didn't have the technology or weren't ready for it yet—the code to control double-sided drives is built right into ROM (not to mention the disk controller card). For the price that I paid for the async and parallel boards, which take up two slots, I could now buy one board that has both features, a real-time clock, 128K RAM (expandable to 512K), and even a disk emulator and a print spooler.

Now IBM has released DOS 2.00. Terrific. I want it. I'm willing to pay the 60 bucks. But for some reason I can't buy it. Every ComputerLand I've talked to doesn't have it in stock.

"What do you mean you don't have it?" I asked. "Are you ordering them one at a time or what?" "No," they replied, "IBM sends them to us one at a time. Now if you want to buy an XT, I can get you the DOS."

All IBM is doing with its marketing strategy is forcing me (and I'm sure many others) to acquire DOS 2.00 by hook or by crook. Smart move, boys. I now have to call my old friend Bluebeard because I don't have the time to wait around and, after investing $5500 plus, I'm not about to buy an XT. Sue me.

The last time I was at Computer-Land the owner and I started talking. He asked me which PC I had; did it have the new or the old motherboard. I had no idea what he was talking about.

"Oh yeah, all the new PC's that we get in are expandable to 256K on the motherboard."

"How come this is the first I've heard of it?"

"Because IBM is not through selling their memory expansion boards."

This type of calculated gouging is something up with which we should not put. I'm appalled that (if I see this in print) this is the first real criticism of IBM and its PC that I've seen. Are the editors and journalists of the slick magazines boot lickers who want to get in good with the big boys? Or am I the only person who feels taken for a ride?

Don't get me wrong, I think the PC is an excellent machine and I wouldn't trade it for anything. But believe you me, I'll never buy another piece of hardware from IBM until it's been on the market for at least a few years and they're through screwing around.

Russ Lane
Wilmette, Illinois

On the Levels

Since I have not yet purchased a personal computer, I found the article on compatibility ("How Compatible Is Compatible?") in your premier issue particularly interesting. The description of the levels of compatibility was very useful. I think that you should use this scale of compatibility in your product reviews, such as the review of the COMPAQ Portable Computer in the second issue.

In the future, could you please make reference to the compatibility level of the products you are reviewing?

Raymond J. Klaassen
Grand Rapids, Michigan

We are planning reviews of a number of compatibles in future issues and will rate them according to our compatibility scale.—Ed.

TI Compatibility

Your article on the Texas Instruments Professional Computer (*PCW*, Vol. 1, No. 3) tended to confirm my own impressions after the short time I have had to experiment with one. There is one difference between the TI and the PC that I noticed and that was not mentioned in the article. The TI machine powers up much more quickly than an IBM with the same amount of memory. I assume this means that TI's machines do not have the power-on memory checking the IBMs have.
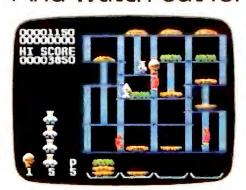
Although an IBM .EXE file will not run on a TI machine and vice versa, it is possible to create a module that will run on both. The MS-DOS

Introducing BurgerTime™*
for your Apple and IBM. To beat this game, you've really got to move your buns.

Now you can make your Apple®II and IBM®Personal Computer sizzle. With fast-food action from BurgerTime™* by Mattel Electronics.

Build a better burger. Hold the mustard. And watch out for those pickles!

It's a tall order to fill. But you've got to do it before those hostile hot dogs cancel it. BurgerTime™* from Mattel Electronics. A rare opportunity for computer game excitement.

Apple® II, II Plus, and IIe
Available this Fall.

IBM Personal Computer

M NETWORK™ by MATTEL ELECTRONICS®

Letters

version of Microsoft's *Multiplan* will run on both machines. Microsoft manages this via some self-modifications with the Install command. I have checked, and a copy that has been installed for the Pegasus will not run on the IBM. Even so, the same module can be installed on either machine, and the Install command itself runs on both (and, apparently, on a long list of other machines).

I really like your magazine. You've started at a level that some of the older PC magazines are just now reaching.

Carrington Dixon
Garland, Texas

Point-to-Point Counterpoint

I would like to comment on Arlin Torbett's article on PC to mainframe communications ("Learning to Speak Mainframe," *PCW*, Vol. 1, No. 4).

In general it is a good basic introduction to telecommunications principles. However, its obvious slant toward external protocol conversion devices (understandable when we learn of Mr. Torbett's employer) makes the article gloss over the point-to-point environment. Admittedly, in some environments where many terminals are concentrated in one area (such as in a records department) the multiterminal protocol converter is a viable solution. But in cases where terminals are scattered throughout a building or even across the country, the point-to-point solution is much more cost effective.

The concept of batch (or RJE, Remote Job Entry) transmission to and from a PC in a point-to-point fashion was overlooked as an excellent method of retrieving information quickly from a mainframe for local,

independent processing by a PC—with a later update to the mainframe if necessary. This frees the mainframe from the time-consuming overhead required to respond to many on-line, interactive 3270 terminals, and enables a PC to do what it does best—compute. The PC is, after all, a computer not a terminal. Certainly the idea of batch processing is not new, but as PCs proliferate maybe it is an idea whose time has returned.

Finally, I wish to correct a point made regarding bisync transparency. Mr. Torbett implied that bisync does not support the transmission of transparent data. This is not the case. Bisync makes provisions for transparent data within the definition of the protocol. In fact, some bisync emulators (Gateway Microsystems' Microgate 2780/3780 emulator and Texas Instruments' 3780 Emulator, for example) expand on this provision to allow files that do not directly translate from ASCII to EBCDIC, such as .EXE files, to be exchanged between two PCs. This capability is referred to as binary data (or binary file) mode.

David L. Keenan
Austin, Texas

Devious

In his recent editorial (*PCW*, Vol. 1, No. 4) David Bunnell takes the position that the Japanese should hire English majors "by the thousands" to prepare their instruction manuals and training materials. How devious; by suggesting that English majors are those most qualified to prepare these items, he could become the party responsible for saving the American computer industry.

You see, the most successful companies in this country rely on instructional designers to prepare their documentation and training, not on

English majors. Although, I must admit, his idea does help explain the large number of abstruse and convoluted materials on the market.

Instructional designers, generally with backgrounds in education and training, are those who are probably best suited to the critical task of programming that most difficult of computers— the human mind. If the Japanese, or American computer and software companies for that matter, really want the marketing advantage that comes from clear, easy to understand instructions for their product, I suggest they contact those who specialize in instructional design to do the work.

David Lichtman
Arleta, California

Out of the Bag

In his column in *PC World* issue four David Bunnell writes: "If the Japanese want to penetrate the American PC market, they should hire thousands of English majors from our finest universities to write their documentation and instruction manuals."

I totally agree. But why should we tell them? Valid and pertinent as Mr. Bunnell's thoughts are, I would prefer that they had never reached print. Customers today, competitors tomorrow, monopolistic sole suppliers the next day.

R. H. Delp
Sunnyvale, California

Thanks to your letter, the information now has a second chance to get out. But perhaps it will create activity on this side of the Pacific as well.
—David Bunnell

Letters

86 It

I agree with Les Cowan in his evaluation of *The 8086/8088 Primer* (PCW, Vol. 1, No. 2). I had hoped that the book would get me started writing assembly language, but it leaves out many important details. My IBM Macro Assembler probably covers everything, but I find it very hard to comprehend. It's like having a puzzle containing all of the pieces but no instructions on how the parts fit together.

Walter R. Illston
Jefferson City, Missouri

You're not the only one who finds assembly language puzzling, which is why we have run a number of tutorials on the subject. For help putting those pieces together, try Dan Rollins' "Easy to Assemble" in our last issue and Leo J. Scanlon's "Using an Assembler" in this issue. Look for another article by Scanlon next month.—Ed.

The RPG-II Challenge

During the past 11 years, a great deal of my work has involved using RPG-II on minicomputers to develop business accounting applications. I have found RPG-II a highly desirable programming tool and I prefer it over COBOL for a variety of reasons.

The thing that amazes me is that although IBM has pioneered the RPG-II language, in addition to marketing the language as an entry-level programming tool, RPG-II is currently not available for the PC.

My challenge to IBM is to offer an RPG-II programming language along with a screen format generator equivalent to the System 34 screen format generator and source entry utility for the IBM PC.

Richard M. Smith
Dallas, Texas

If you stick with timesharing after reading this ad, you haven't read this ad.

Typically, financial planning on a timesharing service runs $2,000 a month and more. Month after month after month.

And it doesn't take a spreadsheet to figure that as a $24,000-a-year-after-year expense.

The incredibly cheap alternative.

The Financial Planner™ from Ashton-Tate can stop this cash drain once and for all.

You pay $700 — one time — for the Planner. And handle your financial planning quickly, easily and completely on your microcomputer.

Without having to share your time or your money with anyone.

A forecaster's dream come true.

The Financial Planner has enough depth to solve the most complex business problems you can foresee, yet can be used almost intuitively.

The Planner automatically performs calculations on individual items, rows, columns and entire models. Understands conditional logic. Solves simultaneous equations. Computes Present Value and Internal Rate of Return. Reads and writes dBASE II™ files. And much, much more.

But you use abbreviated names, not mysterious formulas. And you communicate with the computer in the English-like vocabulary of FPL™ (Financial Planning Language), so you can easily set up your budgeting and evaluation models.

Editing and report-writing are an integral part of the package, and you can preview results on the screen, then produce presentation-quality financial reports directly.

And when you have your models and reports just right, you can automate them so even your President can run them.

With the Planner, you produce P & L forecasts and financial consolidations in minutes. Explore "what if" alternatives. Analyze new business ventures and mergers. Plan real estate acquisition and development. And fine tune operations until you reach the financial objectives you've set.

It's one of the most comprehensive business tools available on any computer. All for a fraction of what you've been spending on timesharing services to do the same things.

For the ardent skeptics.

It may sound too good to be true, but you can check out the Financial Planner with no financial risk.

Run through a hands-on demo at your nearest computer or software store. Then take a package home and use it for 30 days on your IBM PC or CP/M microcomputer. If it's not everything we said it was, just return it and you'll get your money back.

For the name of your nearest dealer, contact Ashton-Tate at 10150 West Jefferson Boulevard, Culver City, CA 90230. Or better yet, call (213) 204-5570 today.

Time's a-wasting.

The Financial Planner™

ASHTON·TATE

Letters

No Satisfaction

Katie Seger's "Feuding to Do Business" (*PCW*, Vol. 1, No. 3) hit a nerve and prompted me to write concerning the state of the retail computer store. My experiences with the type of salespeople described by Ms. Seger (the ones "who haven't even read the documentation for the software they're selling") has prompted me to do my software and hardware evaluations from magazine articles and information I can get from the manufacturers and take my business to the mail order houses.

It would seem that the salespeople at the local retailers are capable of little more than taking an order. If the consumer is faced with this kind of support, why shouldn't we go to the mail order houses and at least save a few dollars? I think that the entire computer industry will suffer in the long run from this lack of support in the field. Perhaps it is time for the manufacuters of both hardware and software to start demanding that their customers get the attention and support they deserve. Maybe consumer advocacy groups will give the personal computer retail sales industry the direction it needs to be competitive in the trade instead of casting stones from within its glass house at the mail order industry.

Douglas B. Eddy
San Francisco, California

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.*

How to mak
work like a

First, neatly cut out the "370" label.

Now, when nobody's looking, nonchalantly tape it to your terminal, just under the "IBM," as if it really belonged there.

Then wait for your chance and quickly slip a dBASE II™ disk into your main drive.

That's it.

Your IBM Personal Computer is now ready to run a relational database system, the kind that IBM put on their mainframes last year.

And you're ready with more data handling power than you would have dreamed possible before dBASE II.

You'll wonder how you managed without it.

You'll find that dBASE II, because it's a relational database management system (DBMS), starts where file handling programs leave off.

dBASE II handles multiple databases and simplifies everything from accounting to department staffing to monitoring rainfall on the Upper Volta.

With a word or two, you CREATE databases, APPEND new data instantly, UPDATE, MODIFY and REPLACE fields, records and entire databases. Organize months worth of data in minutes with the built-in REPORT. Do subfield and multi-field searches, then DISPLAY some or all of the data for any condition you want to apply.

And you've just begun to tap the power of dBASE II.

Easy to look at, easy to use.

Input screens and output forms couldn't be easier—just "paint" your format on the CRT and what you see is what you'll get.

You can do automatic calculations on fields, records and databases, accurate to 10 digits.

And you can use dBASE II interactively for answers right now. Or save your instructions, then repeat everything with two words: DO Manhours, DO ProjectX, DO whatever has to be done.

Use dBASE II to help make your choice:

If you've got a 96k IBM PC, send us $700 and we'll send you a copy of dBASE II to use free for 30 days.

Pick up a SixPakPlus™ for your IBM® PC.

Introducing ... SixPakPlus,™ the refreshing new 384KB multi-function card! In response to the changing needs of the IBM PC and PC-XT marketplace, AST Research, Inc. is proud to announce the latest addition to our line of multifunction enhancement products, the SixPakPlus! This new product is the result of extensive marketing research into the needs of IBM PC users whether they have the original 64K system board, the newer 256K system board, or the PC-XT. The SixPakPlus has been engi-neered to meet these needs at a competi-tive price while main-taining AST's high standards for quality and reliability.

The SixPak, as we like to call it, could have been named for the six banks of RAM on it. However, we like to think that it was named for the six functions of the card. The features of the SixPak include:

1. RAM memory starting at 64K, user-expandable in 64K increments to 384K. This makes the SixPak ideal for the PC or PC-XT with a 256K system board; 384K on a SixPak added to 256K on the system board yields 640K, the maximum addressable user memory in these systems.

2. One Serial (async) communications port, con-figurable as either COM1 or COM2, for use with serial printers, modems, a "mouse" and other serial devices. The serial port has on-board jumpers for easy management of the RS-232C lines, simplifying the wiring of cables in many installations.

3. One Parallel (printer) port, configurable as LPT1 or LPT2 (LPT2 or LPT3 when the IBM monochrome card is installed), for use with the IBM, Epson and other compatible printers. The port is compatible with IBM diagnostics.

4. A Clock-Calendar with battery backup, featur-ing an easily replaceable Lithium battery and a quartz-controlled timebase for a high degree of accuracy.

5. An optional IBM-compatible Game Adap-ter port, for use with an IBM-type joystick. In conjunction with application programming, this game port may be used for cursor con-trol, in generating graphics or for playing games at the end of your work day!

6. Every SixPak comes with an AST Super-Pak utility diskette which includes SuperDrive and SuperSpool, the most powerful disk emulator and print spooler software you can get. These programs will greatly enhance the throughput of your PC or PC-XT by emulating disk drive and printer access at RAM speeds rather than the normal slower speed of mechani-cal devices. SuperPak is the first of such software to be compatible with both DOS 1.1 and DOS 2.0.
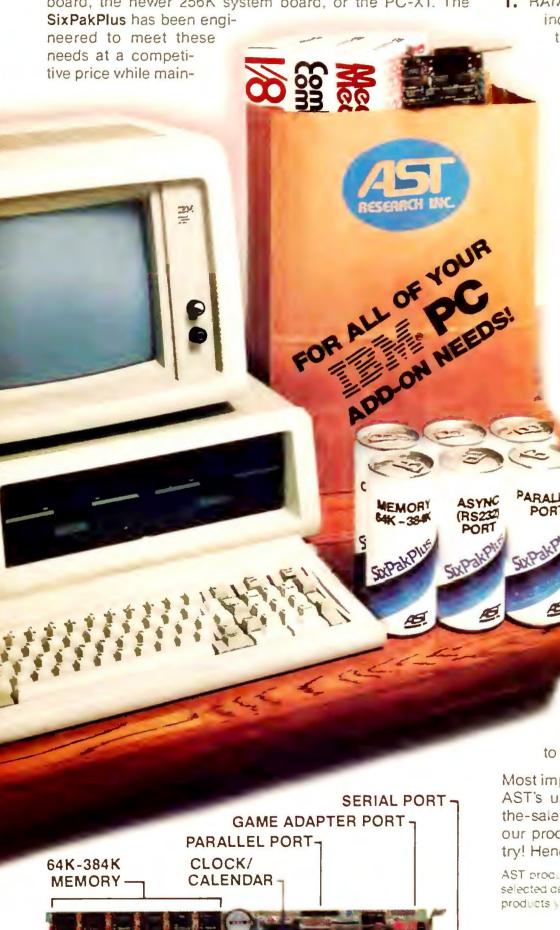
Most important of all, the SixPak comes with the AST "Plus,", AST's unsurpassed reputation for quality, reliability, after-the-sale support, and overall design excellence that gives our products the best price performance ratio in the indus-try! Hence the name, SixPakPlus!
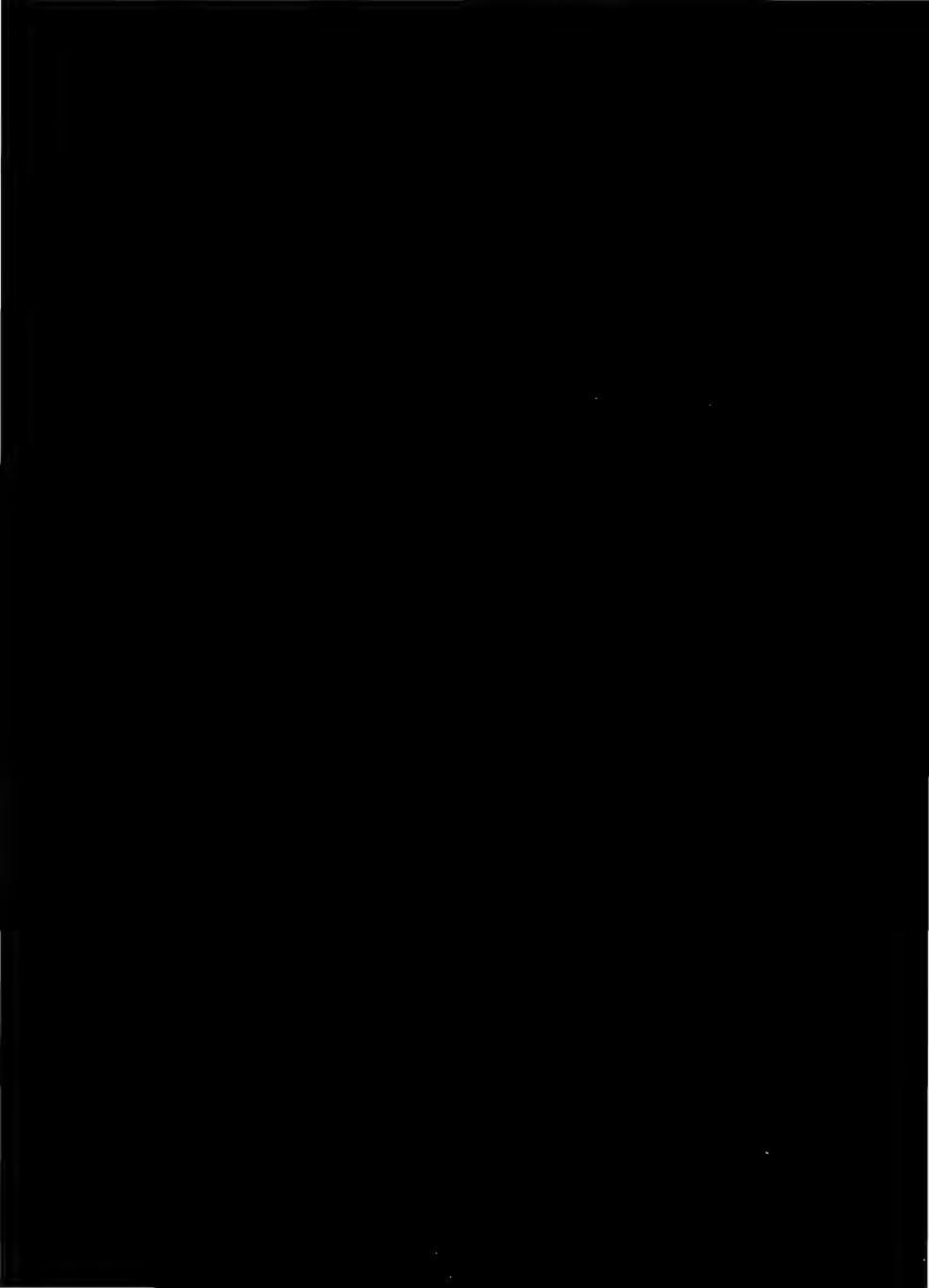
AST products are available from Computerland, Entre, ComputerMart and selected dealers worldwide. Call factory if your dealer does not have the AST products you want.

SERIAL PORT
GAME ADAPTER PORT
PARALLEL PORT
CLOCK/CALENDAR
64K-384K MEMORY

AST RESEARCH INC.

2372 Morse Avenue • Irvine, CA 92714
(714) 540-1333 • TWX 295370ASTRUR
Dealer Inquiries Welcome

PC W🌐RLD View

News and Notes for the Computing Community

Miriam Medom

The *PC World View* staff is avidly attuned to new 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
Reverse Bundling

According to several reports from dealers and industry sources, copies of IBM's new DOS 2.00 are so scarce that the $60 operating system is essentially being "reverse bundled" with the $5000 XT computer. That is, in a few places at least, you have to buy an XT to get DOS 2.00. Several dealers acknowledged that the paucity of copies of the new DOS led them to restrict sales of DOS 2.00 to buyers of the XT.

Other dealers bemoaned the fact that when they finally received their allotments of the XT, they were still short on copies of the new DOS, which is necessary for use of the XT's hard disk. So the XT has been warming the bench for lack of a vital piece of equipment, rather like a baseball player who can't find any shoelaces.

MightyRAM

At a time when many observers are worrying about Japan's growing slice of the high-tech pie, one financial analyst predicts that IBM will be first to market with an operational 256K RAM chip. Whether IBM does beat the competition—Japanese and American—to market with the "mightyRAM" chip, it probably will introduce the new chip later this year in a high-end computer, whose price can absorb much of the chip's development costs. Whether we'll see a PC or XT with 256K of RAM on a nine-chip motherboard remains to be seen.
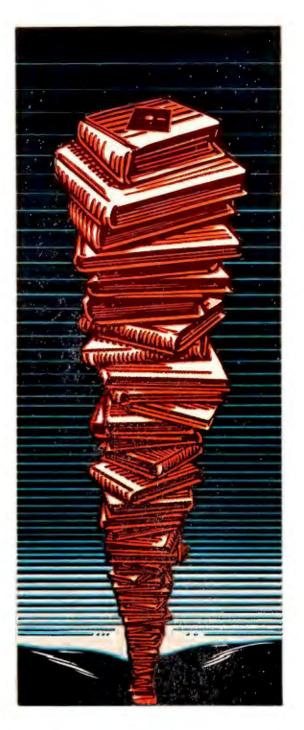
Down on the Farm

If the computer industry can be judged old enough to have traditions, one of them certainly must be the rapid turnover of executives and the frequency with which top people leave one hot company to start another firm. Naturally the IBM PC market has its examples: COMPAQ Computer Corporation was founded by former staff members of Texas Instruments, and two former employees of Quadram have formed Easitech Corporation, which will sell multifunction boards for the PC.

Among the newest people to follow the spin-off trail are two former MicroPro staffers, who now operate Software Farms. One of this company's principals is Bruce Van Natta, one of the original top men at MicroPro; another is Phoebe Williams, whose special project for her former employer was the *Starburst* operating environment. Industry reports indicate that Software Farms will offer an integrated product, perhaps rivaling MicroPro's *InfoStar* and *Starburst* or VisiCorp's *Visi/ON*.

Call It RAMdom House

A report in *Publishers Weekly*, the trade magazine of the book publishing industry, notes that the *Random House Electronic Thesaurus* has sales figures that rival anything on the lists

of best-selling books. In one recent month, one of the program's eight distributors sold 25,000 copies of the thesaurus.

The software versions of the thesaurus and its companion program, the *Random House Proofreader*, are licensed to Dictronics Publishing, which has in turn granted seven sublicenses for the programs. Four of these seven vendors produce software for the PC: MicroPro, Microsoft, Peachtree, and Aspen Software.

Now that bookstores have plunged into the software-selling race, *Publishers Weekly* may become a sort of electronic-literary interface. If so, they'd better get some facts straight. Their report on software thesaurus sales also noted, parenthetically, that "Peachtree recently became the exclusive supplier of software for the IBM Personal Computer." Now that's news!

Move Over Mailer

Also on the book publishing front, it appears that computer books of all kinds are earning their keep on bookstore shelves. One official of the B. Dalton bookstore chain predicts, in fact, that computer books will outsell fiction in 1983.

Since *PC World* has recently established a book division, which will publish ten books in conjunction with Simon & Schuster, we're delighted to know that computer book sales are booming. But we're not sure *Assembly Language Demystified* will ever replace a good spy story for bedtime reading. And even if PC World Books outsells Norman Mailer and friends for a few years, we're secretly rooting for the novel in the long run.

Joining Forces

Two giants in the software arena, VisiCorp and Digital Research, have recently announced a cooperative venture. Digital Research has pledged to work with its clients to make certain that its CP/M operating system will support VisiCorp's new *Visi/ON* operating environment. In practice, this means that CP/M users can utilize *Visi/ON*'s software-integrating features, so that two or more pro-

grams may be used simultaneously, and cursor movements can be controlled with a mouse instead of keyboard commands. All this takes a large amount of memory, however, which may mean that only 16-bit computers using CP/M-86—and not 8-bit machines using CP/M-80—can take full advantage of the *Visi/ON* features.

The alliance between VisiCorp and Digital Research is especially interesting for users of the PC and compatible systems, because it could represent a viable alternative to the PC-DOS and MS-DOS operating sys-

tems supplied by Microsoft. Digital Research and Microsoft have been engaged in intense rivalry, with Microsoft's OS dominating the 16-bit market and Digital Research's dominating among 8-bit computers. If *Visi/ON* puts a snappy new face on CP/M software for 16-bit computers, Digital Research may do some fast catching up with Microsoft. Still, Microsoft is reportedly preparing its own answer to *Visi/ON*—an operating environment similar to the VisiCorp product that will use the already available Microsoft mouse.

Visi Versus Lisa

Initial price information disclosed by VisiCorp spokes people suggests that a person who buys an IBM PC or other personal computer equipped with *Visi/ON* and four related software packages will get Lisa power for $7500 or less. Since Apple's Lisa costs $10,000, the *Visi/ON* system represents significant savings. As yet, however, nobody has set up a Lisa and a *Visi/ON*-equipped computer for a head-to-head comparison. In fact, we'd like to see a lineup of the Lisa and the several computers that

will be fitted with *Visi/ON*, including the XT (which has the minimum memory and disk storage needed for *Visi/ON*), one or more of DEC's new 16-bit machines, the Wang 16-bit computer, and a new Xerox offering.

Big Blue's News
New Computer

In a series of hastily planned press conferences, IBM announced its new small-business computer, the System/36. This system will ultimately replace the rather dated System/34, which has less expandability and

memory capacity than the 36. This new computer makes an interesting study in how IBM behaves when selling to a straight business market rather than to the "personal" market for which the PC is targeted. In short, a "business" computer costs a whole lot more.

The low-end configuration of the System/36, for example, costs $34,000. For this price the buyer gets the computer with 128K of RAM, 30 megabytes of disk storage, two terminals, a printer, and the specialized operating system. (If purchased separately, the operating system costs $4700—a far cry from PC-DOS at $40 or $60.) Two major software packages for the 36 are equally pricy: the *Text Management* program is $1500, and its companion *Office Management* program is $1950. With prices like that, maybe the company should hire J. R. Ewing to do its commercials.

Some Changes Made

Observers of the computer industry have long agreed about two principles of IBM's behavior: the company manages to keep its secrets (through effective secrecy or downright intimidation), and it never announces new products at a trade show. As of May's National Computer Conference (NCC), though, we Big Blue watchers had to scrap the second principle. In a break with custom, IBM announced and displayed the System/36 during the event, while concurrently holding several press conferences in major cities for media members who didn't attend NCC.

The System/36 announcement has been widely anticipated, but IBM

worked very hard to keep the announcement and the relevant product a secret until the last possible moment. Mailgram invitations to the Monday press conference at NCC weren't mailed until the prior Thursday, and the actual computer was hidden behind a curtain in the IBM booth until the exhibit officially opened. A few savvy exhibitors and reporters peeked behind the curtain during the time allotted for setting up exhibits, however, prompting the careful corporation to station employees at strategic points to keep the curtain of security from being further penetrated.
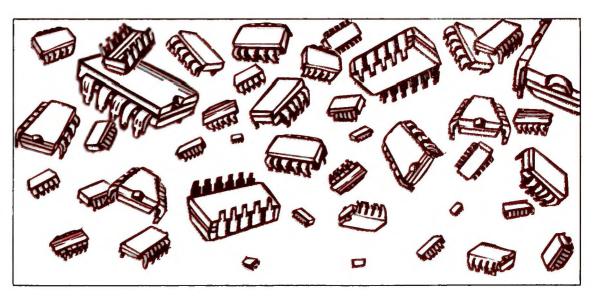
Chip-Boom

The phenomenal sales of the PC, from its announcement in 1981 to today, has influenced many competing firms to design compatible or similar computers that utilize the same mi-

croprocessor, Intel's 8088, or its cousin, the 8086. Now Intel and other chip makers licensed by Intel to produce these chips are reaping the harvest of PC compatibility: demand for the 8088 and 8086 family of microprocessors is three times what the manufacturers can readily produce.

Intel and other chip suppliers are scrambling to expand production and meanwhile are allocating their inventories among customers so that everybody gets some chips. Among the producers enjoying this boom, in addition to Intel, is its Silicon Valley neighbor, Advanced Micro Devices, as well as Japan's NEC Corporation and West Germany's Siemens.

Beware of Boards

Two readers have sent in some useful information about memory boards for the PC. Roger J. Buffington of Santa Ana, California, cautions that many RAM expansion boards are designed for use with the "old" PC, which could accommodate only 64K of RAM on the motherboard. These boards may not function properly with the newer PCs that can accommodate 256K of RAM on the motherboard.

Buffington recently installed a memory expansion board in a new PC that had 256K on the motherboard and discovered that he had to change the location of the RAM chips on the expansion board to

make its memory addresses compatible with those already in use by the PC. The board he used was the Vista Maxiboard, and the company's technicians told him where to move the chips to get the board working. He advises anyone who purchases a memory expansion board to verify with the dealer or manufacturer that it can be configured for either the new or the old PC.

William A. Weil of San Francisco paints another memory expansion picture with the old PC. He maintains that all the new combination boards allow for plenty of functions in the five expansion slots, even in a machine with only 64K on the motherboard. His souped up PC would have a 512K RAM board with serial and parallel ports; a 256K RAM board with additional serial and parallel ports and a game controller; a video board combining the monochrome display/parallel printer adapter and a color/graphics adapter; and the floppy disk controller board. That leaves one empty slot for some really frivolous purpose.

Weil also aptly points out that the PC can utilize the 832K of memory that that machine would have. The first 640K would occupy the lowest address space (hex 00000 to 9FFFF), and the other 192K would occupy an unused block beginning at hex C0000. This latter memory assignment requires a memory board that allows the user to specify multiple starting addresses for blocks of memory. He adds that applications programs cannot use all 832K of RAM, but a large chunk of this memory can be assigned to one or more electronic disk emulators and print spoolers.

Picky, Picky

Our resident expert on the Pick Operating System, Steve VanArsdale, has chided us for stating (*PC World View*, Vol. 1, No. 3) that Pick originated on Honeywell computers. In fact, VanArsdale notes that the Pick OS was first implemented on the IBM 360 mainframe computer. Now the operating system will be coming back to its beginnings, in a way, with its imminent availability on the PC.

Mea Culpa

While we're admitting our mistakes, we may as well adjust our biases. Here's a response from Gregor Clark of San Francisco to our taking issue (*PC World View*, Vol. 1, No. 4) with the use of *access* as a verb.

"My dear Medoma: You may shudder every time you hear *access* used as a verb, but those of us who grew up speaking Latin feel right at home with that usage. I think it's about time you took a peek in your dictionary. If you do, you'll see that the computer age has done us a favor in bringing the word *access* back to its origins as a Latin verb form. *Access* actually started out as the past participle of the Latin verb *accedere* and later put in a stint in Middle French as *acces*. Now, thank Jupiter, it's a verb again. Is this what you descendants of barbarians refer to as an infinite loop? Or would you call it a classic comeback?"

One More Solution

We've received more solutions to our first Mystery of the Month (*PC World View*, Vol. 1, No. 2), and one of the writers deserves a mention for the postscript to his letter. Chuck

Mangi of New Milford, Connecticut, suggested that the hard disk power supply temporarily overheated, either from having its air flow blocked or from the strain of the electric blanket's pull on the power. He adds this caveat, which may be extreme but seems appropriate for our mystery at least: "Mice are okay with PCs, but not dogs and cats."

Mystery of the Month

We're hoping for more variety in mysteries for future issues; please pass along your tales of woe or horror. This month, though, we have another hard disk oddity to report, from a source who prefers to remain anonymous.

The fellow with this mystery bought a 20-megabyte hard disk and controller board about six months ago. He installed the hard disk in one of the disk drive enclosures in his PC and inserted the controller board in one of the expansion slots according to the instructions supplied with the disk and board. For about five months his system worked perfectly, including the hard disk, which he quickly filled almost to capacity.

A month ago, however, the hard disk began to give him trouble. This fellow has 512K of RAM in his PC, and he customarily uses a portion of the memory as an electronic disk emulator. But he found that after he loaded certain programs and files from the hard disk into the electronic disk, he couldn't get those programs and files to work.
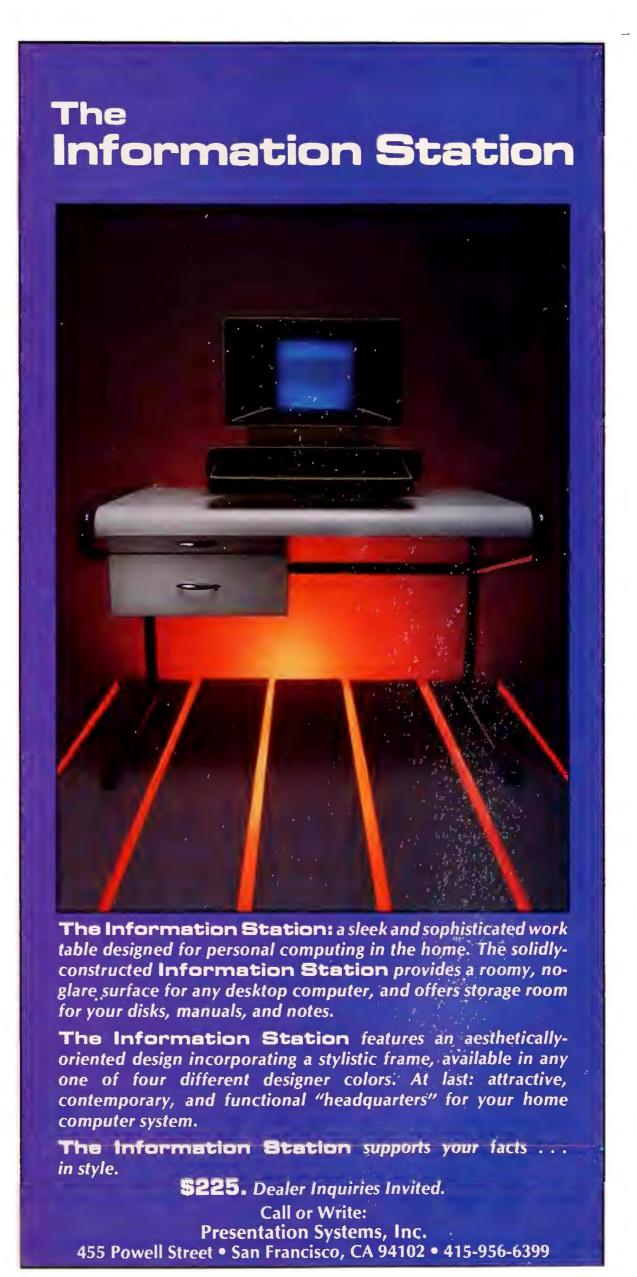
Thinking the problem might be with the electronic disk, he then tried to use the programs and files directly from the hard disk. That didn't work either.
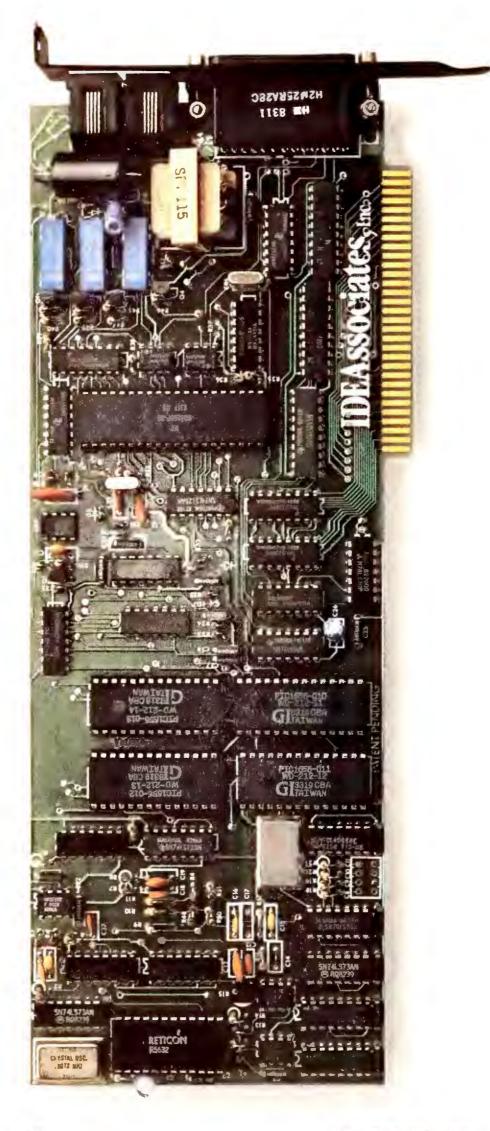
The only way this man is able to use the majority of programs and files on his hard disk is by turning on the computer and allowing the hard disk to "warm up" for at least half an hour. Once the disk itself or the controller board is warm, the programs and files are accessible and cooperative. Without the requisite warm-up period, his files are gibberish and his programs either don't operate or crash after a short time of operation.

Our friend notified the disk supplier, and the company sent him both a new disk and a controller board. This change of hardware brought mixed results. With a new disk and a new controller the problem is worse; with the original controller and either the old or the new disk, the system works only after the half-hour warm-up. No other purchasers of this supplier's hard disk have reported a similar problem.

Our friend is stumped, the disk supplier is equally mystified, and we're sure that our readers can suggest some dandy solutions. ◉

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

The IDEAComm 1200: Fast, reliable communications on a plug-in card.

Now you don't need an external modem to get 1200 baud communications capability for your IBM-PC. The IDEAComm 1200 is an integral modem that combines the functions of an in-board asynchronous communications card and an out-board modem in one integrated plug-in unit. Snap it into an expansion slot, plug in a modular telephone jack, and you have direct 1200 *or* 300 baud communications without the confusion and added expense of external boxes and cables. And there are no switches to set; the speed is software-selectable or automatically selected by the card. Plus, we've designed in outstanding reliability: four powerful on-board microprocessors replace conventional analog circuitry with digital precision and reliability.

One Card That's a Great Deal

The fast-talking IDEAComm 1200 is one sharp card: it eliminates the need for an external modem, gives you 1200/300 baud communications capability with the exceptional reliability of digital design; provides an additional plug so you don't lose regular telephone voice communications; and includes a standard RS232C interface and connector that can be used as an additional serial port. All for only $545. That's about the cost of a conventional external modem alone, saving you the entire cost of the internal asynchronous card.

One Card Gives You a Full Hand

The IDEAComm 1200 comes complete with software diskette enabling easy, menu-driven selection of all

IDE Software

Expansion Memory Board

"The IDEAboard"

communications, autodial, and auto log-on procedures, and easy recall at the touch of a single key. It also allows the IDEAComm 1200 to work with most other terminal emulation packages—including IBM Comm 2.0 communications software.

We've Stacked Our Deck With Better Ideas

IDE's Better Ideas for your IBM-PC include expansion memory boards, "The IDEABoard" combination boards, fixed or removable Winchester disk drives for either internal or external mounting, and printer spooler and RAMFloppy disk emulation software. We have Better Ideas on product support, too. Superb technical support and documentation, including full programming specifications for the IDEAComm 1200 . . . an aggressive pricing policy . . . a unique upgrade policy that lets you trade up any IDE product for another in our line . . . and our full year warranty.
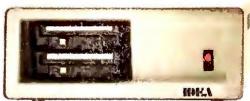
Get the IDEA

To see IDE's Better Ideas for yourself, contact any of the knowledgeable dealers listed below. If there is no listing for a dealer near you, call us. We'll provide you with the name of your nearest dealer or take your order over the phone.
1-800-257-5027
(In Massachusetts, call 617-275-4430)

Removable Winchester disk drive

Technical Specifications	
Speed 0-300 bps or 1200 bps	**IBM Port** COM 1
Data Format Serial, binary. 7-8 data bits, 1-2 stop bits	**Modem Compatibility** Bell System 103 or 212A in both Originate and Answer mode
Dialing Capability Touch-Tone (TM) or rotary dial pulse	
Operation Full Duplex	**Physical Data** 3.9″ x 10.8″ x .6″ (one card slot)

IDE Associates
Better ideas for personal computers.
IDEAssociates, Inc. 7 Oak Park Drive, Bedford, MA 01730

Envision a single high-speed communications board with integrated, easy-to-use software that emulates any terminal.

A Lasting Memory

Robert Luhn
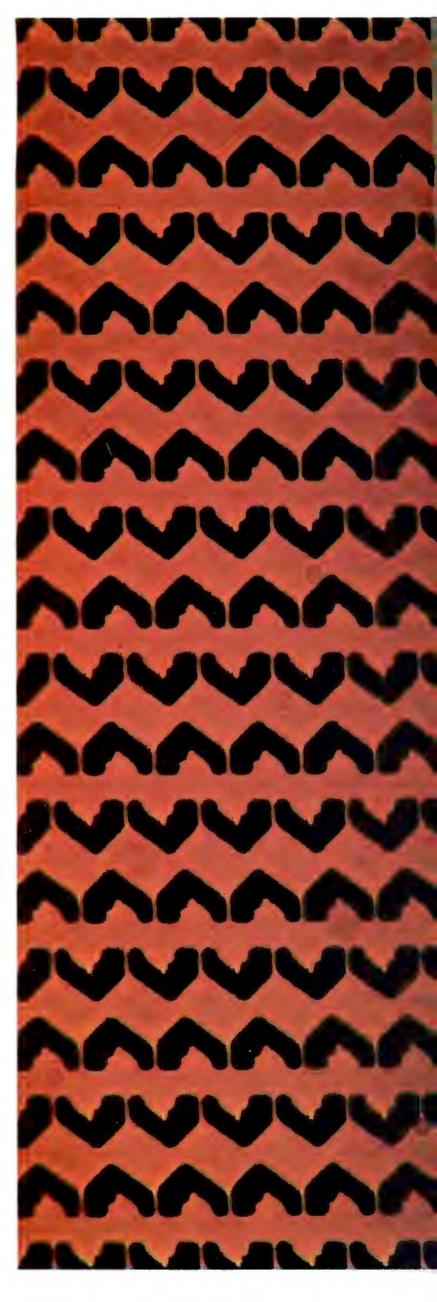
Bubble memory, the newest type of chip memory, is now within the grasp of the average PC owner. No longer unaffordable, bubble memory should prove to be a tough, reliable alternative to its better-known peers, RAM and disk memory.

The name *bubble memory* stands out in a crowd of acronyms that grate harshly against the ear: RAM, ROM, PROM, EPROM. All are names for a variety of memory chips common to every computer made. "Bubble" sounds delicate by comparison, reminiscent of the bubbles you blew as a kid through plastic pince-nez dipped in dish soap.

In actual use bubble memory has little to do with delicacy and even less to do with liquid or physical movement. Bubble memory is a second cousin of contemporary chip and disk memory. Its history stretches back to the era of James Clerk Maxwell's nineteenth century studies of magnetism and a technology as young as the computer itself.

Like the floppy disk, bubble memory stores information magnetically with microscopically magnetized areas representing a 1 to the computer and unmagnetized areas representing a 0. Similar to RAM, bubble memory is found on a chip (of garnet instead of silicon) and thus is solid state with no moving parts. Unlike disk and RAM memory, however, data is not lost from bubble memory when the power goes off. In addition to this nonvolatility—an outstanding advantage in most applications—bubble memory is faster than floppy or hard disk memory, although it is considerably slower than RAM.

Photomicrogram of V-shaped metal pathways deposited on a bubble memory chip
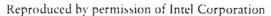
Bubble Close-Up

The bubble that gives its name to this type of memory is not a physical bulge raised in the garnet wafer, but comprises small cylinders of magnetism. Each cylinder, or domain, is positive on one end and negative on the other and is formed by a group of atoms in the garnet whose magnetic poles are aligned. These domains normally point in random directions within a garnet crystal. When the garnet has been properly cut into a thin, flat wafer, the domains jut perpendicularly through the plane of the chip, with their positive ends pointing either up or down.

The old rule of opposites attracting comes into play in bubble memory technology. The more "up" domains you have, the more strongly they interact with those pointing "down," causing the bubble to grow larger. An opposite force to this ballooning effect occurs at the wall of the bubble, where domains are in various stages of

Intel's bubble memory board

pointing down, crossways, and up. This area of transition bounding the bubble tends to widen and slow the bubble's growth (see Figure 1). As nature will have it, one force always overcomes the other. The bubble either continues to expand or it collapses upon itself.

Making bubbles stable (and useful) is accomplished by pointing an external magnetic field down over the entire chip (see Figure 2). In actual bubble memory devices, the field is supplied by a fixed, permanent magnet. The domains shrink considerably until they are approximately 1/10,000 of an inch wide; when viewed from above through a microscope they appear round—hence the bubble designation. The garnet is magnetized in a

"down" direction and those domains whose positive poles point "up" against the field are the bubbles in their useful form. Because like charges repel, spacing between bubbles is more or less uniform. As long as the external field is kept constant, the bubbles neither collapse nor expand and are held to an acceptable size.

The presence of a bubble indicates a 1, its absence a 0. Bubble memory employs the same binary method of representing information magnetically, as is commonly used in disk storage. However, getting the information to the computer is where the analogy breaks down. With disk storage the information is magnetically embedded in the disk and a mechanical head moves out to read it. With bubble memory the magnetic domains (bubbles) are moved through the chip to a location where they can be read. The sequence of bubbles/no bubbles makes up the stored data.

Moving bubbles requires setting up a rotating magnetic field within the plane of the chip. This is accomplished by wrapping the chip with two crossed wire coils and running the appropriate current through them. The bubbles are then shuttled down metal pathways that have been deposited on the chip. These paths are not grooves, but rather thousands of inlaid, miniature V-shaped steps arranged in certain patterns. One arm of each V is thicker than the other, and when the rotating field is on, it acts like a magnet, drawing the bubble up one side of the V and down the other. In this manner each bubble travels from step to step on its way to a desired location (see Figure 3).

The problem with bubble memory is that access to the stored information is sequential. Data on a RAM chip can be accessed randomly because each bit has its own addressable location. But bubbles move like links in a chain. If you have 1 million bits stored on a bubble chip and the information you need is halfway down the chain, all the bubbles must move half the length of the chain, in this case 500,000 steps. A typical rate of movement for a bubble is about 200,000 steps per second. In the above example, it would take a little over 2 seconds to get the information you wanted. While this may seem relatively quick, it is far too slow for a computer.

Getting around this limitation means redesigning the pathways on the chip. Approaches vary in minor respects, but most modern bubble chips use a system of major and minor looped pathways. The minor loops, which are thin and elongated, are laid next to each other and constantly circulate corresponding bits of stored information. Surrounding the minor loops is a larger, major loop whose straight sides contact both ends of each minor loop. One side of the major loop is the input track, while the other is the output track (see Figure 4).

The advantage of this configuration is that blocks of data are separated from one, long continuous chain. To read data from a minor loop, the circulating bubbles are duplicated and sent down the output track of the major

Figure 1: The magnetic force exerted by the domain wall combines with the force of the external magnetic field (arrows at right) to reduce the bubble's growth.
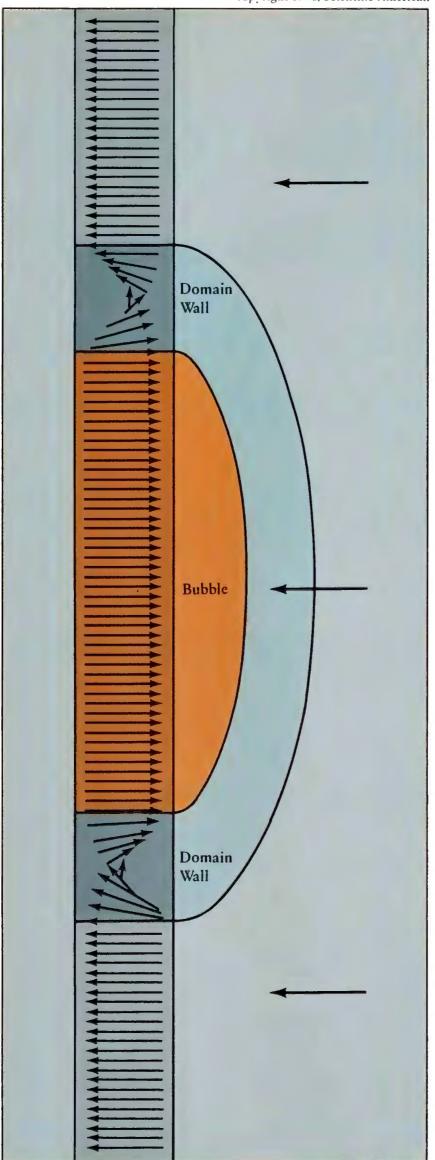
loop to be read and then collapsed. Meanwhile, the original data remains intact in the minor loop. Bubbles can be exchanged (on the input side) and replicated (on the output side) between the major loop and all of the minor loops simultaneously.

As a result, instead of taking 500,000 steps to read a record, an average of only 1500 steps is needed. This reduces access time from 2 seconds to 40 milliseconds. While this is 1000 times slower than RAM memory, it is 2 to 4 times faster than either hard or floppy disk drive systems.

The bubble chip is something of a hybrid. It can act as a passive external storage medium or function as internal memory for a computer. It is even capable of some logical functions, because the metallic V-shaped patterns imposed on the bubble chip can be altered to include two-position cells. The presence or absence of bubbles in designated upper and lower cells can then be used for certain comparison operations.

Staying Power

The real appeal of bubble memory is the amount of data that can be stored and how well it remains intact. The error rate for a bubble memory device (say the 128K bubble made by Intel) is exceedingly low; chances of a user receiving an incorrect bit are 1 in 10^{15}. In real use this translates roughly to one error in 100 years of normal bubble operation. This reliability is further supported by a storage environment that is free from the ravages of power failure. The reason lies in the design of the bubble memory device.

The external magnetic field that lets the bubbles exist is created by permanent magnets. They are not subject to the whims of a downed power pole or a computer power plug that is accidentally kicked out. If the current in a bubble device is suddenly cut off, the rotating field that drives the bubbles stops and so do the bubbles. The crucial point is that the external magnetic field is unaffected and the bubbles are held in place. Therefore, the data they represent is secure.

Bubble memory's nonvolatility makes it useful for almost any situation in which data that is being stored or worked on must be maintained. Nonvolatility also makes bubble memory portable, so a user can remove a bubble device from a computer, transport it across country, and then plug it into another computer and find all the data intact. The fact that bubble memory is not electromechanical (such as a disk drive) adds to its reliability and durability.

Most important is the amount of data that can be packed onto the bubble chip. A typical chip with its attendant magnets and shielding occupies about 2 square inches and offers 128K of storage. A 512K bubble that takes up even less space should be available from Intel in 1984. Comparable EPROM (erasable programmable read

No External
Magnetic Field

Small External
Magnetic Field

Larger External
Magnetic Field

Figure 2: Magnetic domains in garnet wafer under the influence of an external magnetic field

only memory) and RAM chips can hold a maximum of 32K; a floppy or hard disk system can certainly hold as much, if not more, information than a bubble. But the size, or volume, of the system can be an important factor when you consider portability, storage space, and ease of use.

David Airel, manager for advanced development at Teleram Communication Corporation, a maker of portable computers and terminals using Intel bubbles, has come up with a memory cost efficiency table comparing bubble memory to disk memory (see Table 1.) While Airel admits that the table is not strictly scientific, it reflects the relative value of each approach.

As the table indicates, bubble memory often outperforms a floppy disk system and manages to float along nicely in the wake of a hard disk. The bubble provides compact, cost-efficient storage, two factors that are crucial in certain applications. When the price of systems is compared though, bubble memory does not take first place. A typical floppy disk system (as shown in Table 1) is $135 cheaper and offers removable storage in the form of inexpensive disks; a hard disk drive, though bulky and delicate, offers true mass storage at a reasonable price.

Cheaper Bubbles

Why is bubble memory still playing catch-up in the marketplace? The answer is tangled within 15 years of production problems, mistimed marketing moves, and a dearth of research money. The irony is that in the late 1960s bubble memory was seen as the answer to unwieldy mainframe magnetic "core" memories and slow disk systems.

Bell Laboratories, ever in pursuit of cheaper ways to store telephone numbers, gave bubble research its first big push. Contemporary mainframe computers used at Bell to handle telephone data were slow, power hungry, and not terribly efficient in their use of storage. The cost of storing a bit was about 1 cent. This may seem a small amount, but as applications grew larger and more com-

The predominant question is not whether bubble memory will be a force, but where?

plex, a storage demand requiring 1 megabyte of memory became a $10,000 expense. Bell scientists quickly realized that bubble memory could offer much lower power consumption coupled with speed and greater data density.

Research continued at Bell Labs and at a number of other companies such as IBM, National Semiconductor, Motorola, and Texas Instruments, all of which eventually began to produce or use bubble memory. The problem was that the technology supporting it was untested and expensive. The promise could not begin to beat the cost of production. Sales of bubble memory products faltered, and one by one, companies cut back or dropped bubble production and research. With the advent of RAM and ROM chip memories, bubble memory languished.

The lull was finally broken in 1979 when Intel introduced a 128K bubble device. Although a late entrant in bubble memory production, Intel made a decision to de-
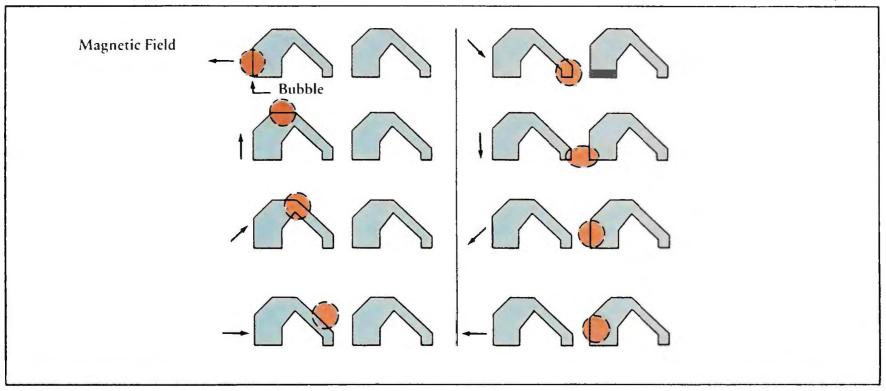
Figure 3: Movement of bubble around V-shaped patterns

velop a commercial bubble and support it in the marketplace. The price tag was a stiff $2500, but the increased use of specialized and industrial computers encouraged production. Technology thereafter advanced sufficiently to allow a better bubble to be fabricated in less time and at a lower cost. Today the same 128K component sells for $300.

Cost is still a problem though. As one former IBM bubble engineer noted, "It's the old Catch-22. The cost of bubbles will depend on how many are sold. As production goes up, the cost drops. The technology will receive more resources if more bubbles are sold. The barriers for a new technology are very high. In the United States there are probably 200 engineers working on bubble memory, and on silicon memories maybe 50,000. Those are long odds for any new technology to overcome; it has to offer a big payoff to be accepted."

In the Marketplace

During the past year attitudes toward bubble memory have gone from grudging acceptance to something almost resembling enthusiasm. A few industry insiders scoff at the notion of bubble memory being anything but a specialty item. But the predominant question being debated is not whether bubble memory will be a force, but where? By its very design, bubble memory is something of a fence sitter, and this is both its weakness and its strength. It can work inside a computer like RAM or externally like a disk storage system. Right now bubble memory doesn't completely satisfy either need.

Nonetheless, bubble memory has found its way into a variety of computers. Its nonvolatility and durability make it a natural for factory computers, where dust, vapor, and vibration would give any disk drive a nervous

breakdown. It is also tailor-made for more exotic locales such as robots on an assembly line or test equipment stationed atop a mountain.

While overcoming obstacles of harsh environments, the bubble has managed to slip off its overalls and don a three-piece suit. From the factory floor the bubble now finds itself inside every sleek Grid Compass computer. This high-tech, executive portable computer combines Fortune 500 pizzazz with no-nonsense number-crunching and color graphics. The unit is a little bigger than a textbook, in large part because it uses bubble memory.

Those who watch and report on the Fortune 500 (or the Indy 500 for that matter) can use the Teleram 3000, a briefcase-sized portable computer with bubble memory. A reporter can take the 3000 on location, write up the story, and send it back to the office over a pay phone using a modem built into the unit.

Competition has reared its nascent head as well. Until recently, Intel was the lone commercial manufacturer of bubble memory in the United States. Now Fujitsu has appeared on the scene and is tentatively marketing its own 128K bubble to hardware and peripheral companies. Hitachi, a long-time bubble leader in Japan, is said to be eyeing the American market. But most significant is Motorola's re-entry into the field under an agreement with Intel. This move alone is expected to boost bubble production (and lower costs) enough to encourage independent companies to take a chance on bubble memory.

⬢ **State of the Art**
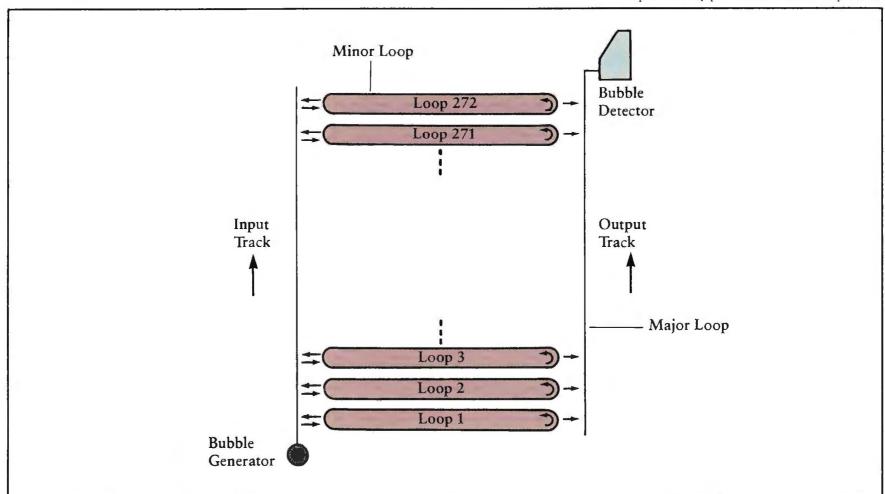
Figure 4: To speed up data access, most bubble chips use a system of major and minor loops.

	Shugart SA455 5¼-inch floppy disk	Computer Memories CM5000 5¼-inch hard disk	Intel 7110 bubble memory board
Capacity	320K	12.7M	256K
Cost*	$315	$1250	$450
Cost per kilobyte stored	$.98	$.10	$1.76
Volume**	100 cu. inches	190 cu. inches	18 cu. inches
Volume density (capacity/volume)	3.2 K/cu. inch	66.8 K/cu. inch	14.2 K/cu. inch
Cost efficiency: cost ($) per volume density (K/cu. inch)	98	19	32

*Includes manufacturer's quantity (500 units) at manufacturer's prices, plus estimated cost for controller and associated electronics.

**Typical disk-based storage system includes disk drive volume and estimates for controller circuit boards.

Figures for capacity, cost, and volume are based on typical storage systems.

Table 1: Cost efficiency comparison of bubble memory vs. disk memory

Eminent Domain

Use of the bubble is already on the upswing. Portable computers will no doubt continue to use bubbles as the demand for such machines grows. Bubble memory is also seen as a logical element in telecommunications and networking, processes that require data to be sent and received quickly and reliably. With the coming of Intel's 512K bubble memory chip next year (and a 2-megabyte version by 1986), it's likely that bubble memory will find wider acceptance in the personal computer market. How it will be implemented, however, is a subject of sometimes-heated discussion. As a replacement for RAM? For floppy disk? For both?

To paraphrase an old saying, a computer is only as reliable as its weakest link. As a solid state device, the computer's relationship with any mechanical device (such as a disk drive) is bound to be difficult on occasion.

"Disk drives always crash at the most inopportune times," says Intel's Mike Eisele, head of marketing for bubble memory. "Not every day...but they are mechanical and they wear out. We see the bubble as a complement, the ideal second drive. You get the benefits of both worlds: cheap archival storage with the floppy, and performance and reliability with the bubble."

This notion has met with resistance in some quarters. David Airel of Teleram feels that bubble memory is not a disk drive replacement, if only from a cost performance basis. But he admits that drives are nearing the end of their innovative period: "Drives have been around for nearly 15 years. It's a mature technology and a lot of major breakthroughs have been made. I don't know how many are left to be made. Bubble memory is young. How far it can go is still unknown."

For Rick Ostrow, chief engineer and developer of a bubble memory board for the IBM PC for MPC Peripherals, it's a matter of bubble memory finding its own niche. "The real question," he says, "is whether the floppy market is going to be there in the future. The hard disk is quickly replacing it. There's a 5-megabyte cartridge system that costs $600 for the drive and $30 for the cartridge. That's going to replace the floppy if anything does."

Bubble for the PC

Whatever the issues, bubble memory is apparently here to stay. How it will reach the personal computer user, and in particular the IBM PC user, is still not clear. This is due in part to IBM's shifting commitments to bubble memory and to the PC.

IBM was one of the first computer manufacturers to show an interest in bubble memory. Until last year, the company maintained a number of research labs dedicated to this technology. But in the words of a former IBM engineer, the company is "rather schizophrenic." Technological innovation has given way in the last decade to marketing innovation.

"They take a flinty-eyed look at what you do," says the same engineer. "It can be rather frustrating. You can go to them and say, 'Look at what we have. It's much better than what we're using.' And they will ask if it will work for 5 years and meet a maintenance schedule, and so on. IBM is not on the leading edge. They don't like their customers to do product testing for them."

This conservative approach has generally paid off. But a survey of IBM marketers, product managers, and researchers indicates that something is going on behind the usual "no comments." Bubble research is apparently continuing at some company labs. Attendees at the April 1983 COMDEX show also reported that IBM showed more than just a passing interest in bubble memory for the PC. This interest is confirmed when independent vendors of bubble products and memory peripherals are queried. Though it is stingy in providing details, IBM is clearly aiding some companies in their production. While this may not coincide with IBM's official line, it is in keeping with the company's approach to the PC market.

What does this mean to the IBM PC user? An IBM bubble memory product will possibly be available in the form of a board or detachable subsystem by year's end. A better bet for the PC user would probably be one of the several independent companies producing memory peripherals for the PC based on Intel's 128K bubble chip.

The bubble provides compact, cost-efficient storage.

Bubbletech of Dublin, California, is the world's biggest bubble system manufacturer. It has quietly turned its attention to the PC, apparently with the help of IBM. Though Bubbletech is also quiet about the nature of the product, chances are it will have an external bubble device ready by the end of the year.

Closer at hand are add-in memory boards being produced by MPC Peripherals in San Diego and Pure Data in Toronto. Both companies have special pricing and production arrangements with Intel and should release their products this summer.

The PC board from MPC is an outgrowth of the success the company has had with its Apple bubble memory board. Having designed this board with company prestige rather than profit as an initial incentive, MPC was surprised to find a ready and willing market for Apple bubble memory products. The success of the IBM PC in the marketplace naturally led to the development of a PC board. MPC's first release, scheduled for July 1983, will feature a 128K bubble with sockets for

🌐 State of the Art

The Teleram 3000 uses bubble memory.

The Grid Compass computer is small and portable because it uses bubble memory.

two more bubble chips. (Later versions will carry the 512K Intel bubble chip.) At $875 the board emulates the disk drive and can be plugged into any slot. Complete support circuitry and an auto-boot ROM are built into the board. Early versions will require PC-DOS 2.00; later ones will also support such operating systems as CP/M-86.

Pure Data's PC boards also emulate a disk drive, but they work off the motherboard. Originally preparing for May 1983 release, Pure Data will hold off until its boards can be redesigned for use in the XT. Two versions will be marketed: the first is a half-length board with only one 128K bubble chip for $750; the other is a full-sized board that can accommodate four 128K bubble chips at a cost of $250 for each additional chip. The boards can be configured as drive A. Either board includes the appropriate software, which is menu-driven.

Pure Data has been designated as a test site for Intel's 512K bubble chip. Both Pure Data boards are designed to accept this chip and will be on sale in late 1984.

Despite some unresolved cost questions, the future of bubble memory looks promising. No one is yet ready to proclaim that it will replace floppy disks or RAM. There is talk of removable bubble cartridge systems, 125-megabyte bubble chips, and other developments. One thing is certain: there will always be a need for fast, reliable memory, especially as computers become more gregarious devices for communication as well as information management. Of course, one never knows in exactly what direction all of this will lead us. But in the volatile world of computers, it's always nice to have something nonvolatile to hold onto. 🌐

Robert Luhn is a freelance writer who also works for a San Francisco Bay Area educational software firm.

PeachText
5000

All backed by Corona's exclusive DataGuard™ and FailSafe™ data protection systems for maximum reliability.

So if you're hungry for power and your IBM just can't keep you fulfilled, get your hands on the Personal Hard Disk from Corona.

It'll set you free.

The Personal Hard Disk is available in internal and external, 5 and 10 megabyte versions. For the name of your nearest Corona dealer, just call us toll-free at 800-621-6746. Or write Corona Data Systems, 31324 Via Colinas, Westlake Village, CA 91361. (213) 991-1144.

FEEL THE POWER.

Reader Service #48

The Articulate Network

*Tecmar's ComNet offers an office of
the future today.*

Steven Cook

Local area networks, telecommunications, and speech recognition are the building blocks of the future. Now these building blocks have been combined to make the office of the future available today.

Imagine a scene from a hypothetical science fiction movie: a modern office staffed by efficient personnel who are busily performing their duties. The boss walks through the crowded office and sits down at his desk.

"Any messages?" he asks.

"Two phone calls and a cable from France," replies the computer on the desk.

"Let me see that cable," he says as he turns to face the display. The text of the cable appears and he nods with satisfaction.

"Send this on to Sam and tell him to take care of it right away. What about those phone calls?"

"One twenty-eight p.m.," intones the machine, and then a new voice comes from the speaker: "Hi Mark, this is Paul Simpson. I need to talk with you about the Xenik project. Give me a call as soon as you have some time."

"One forty-three p.m.," says the computer, and then another voice says, "This is Sandy at Ace Automo-tive. You car is ready and you may pick it up anytime before 6 p.m."

"Call Paul Simpson," says the boss, "and remind me to leave at 5:30 so I can get my car."

Science fiction? Perhaps, but not for long, according to the wizards of Cleveland-based Tecmar. Their newest offering combines several types of technology to achieve futuristic office automation—what they refer to as "the stuff of science fiction."

> Tecmar's newest offering combines several types of technology to achieve futuristic office automation.

Tecmar is widely known as the most prolific manufacturer of peripherals for the PC, averaging one new product per week since the PC was released in late 1981. The new product, called ComNet, is a combination of hardware and software designed to be used with the Ethernet local area network. ComNet can control a dictation machine and has an interface for a mouse, but its most important feature is, perhaps, the ability to capture, transmit, and reconstruct voice.

Ethernet Speeds

The foundation of the system is the Ethernet network, selected because its 10 million bits-per-second communications speed allows ComNet to perform complex tasks quickly. Data can be taken from a hard disk and sent across Ethernet to a PC faster than the PC can get the data from its own floppy disks. This speed advantage can greatly reduce the cost of the network because floppy disk drives will not be needed for many of the PCs on the network.

ComNet software allows captured voice to be sent over the network and stored or reconstructed at a remote location. Sending voice information over the Ethernet network has always been possible, but the technology to do so has never before been available in a consumer product.

ComNet is offered in three configurations to suit different needs within an office. The entry level system, The Secretary, consists of software and two cards that plug into the PC. One card is an Ethernet interface, and the other, the Ethernet Companion, provides the voice interface plus connections for a dictation machine, foot-pedal control, and mouse. With the software provided these two cards allow a PC to share peripherals and data with other computers on the network and to send and receive written and voice messages.
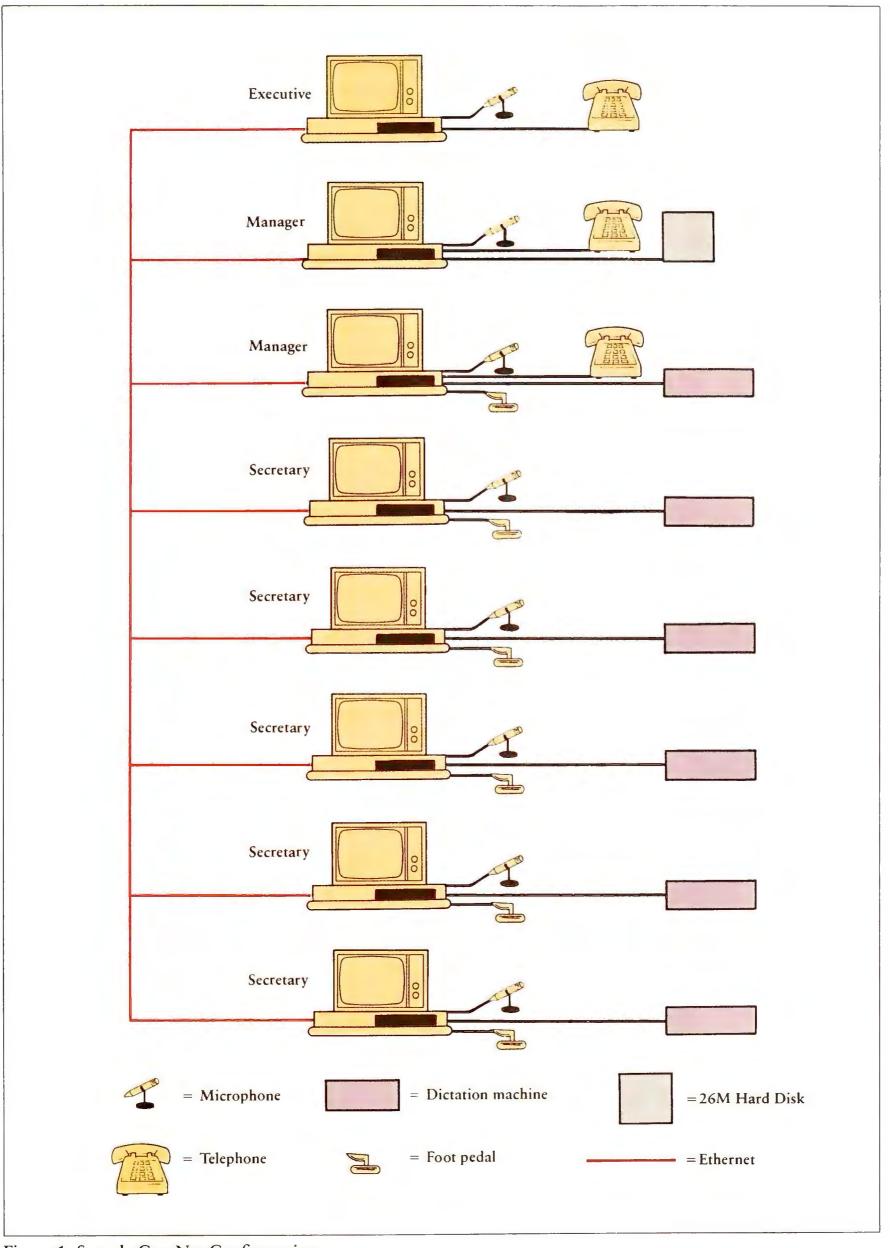
Figure 1: Sample ComNet Configuration

⬤ State of the Art

Voice and written messages may be stored on any disk on the network, and voice messages may also be directed to dictation machines. Password security is provided for restricting access to confidential information. Figure 1 depicts a typical ComNet configuration.

Telephone Link

An enhancement to ComNet provides a link between the PC and the telephone—not just a modem connection, but a voice link. A connection on the card allows a telephone handset to be plugged into the unit so that the PC may be used in place of a standard telephone. The telephone link can also interpret the tones generated by push-button telephones.

With the addition of the telephone interface, the ComNet configuration becomes The Manager. This configuration allows the PC to function as a telephone answering machine while it simultaneously performs other tasks such as word processing. Authorized

---

Voice and written messages may be stored on any disk on the network.

---

users can call the computer from anywhere in the world, identify themselves by pressing a tone sequence, and then instruct the PC to perform specific tasks, again with the aid of push-button tones.

The Manager can also direct voice messages to individuals on the network who are identified by tone sequences entered from the remote phone. Likewise, the network can be instructed to accept dictation and forward it to any station.

Tecmar's BSR device controller card can also be incorporated in the system so that tone commands can activate virtually any kind of electrical device. Suddenly the office of the future becomes the home of the future as visions of automatic houses and remotely activated meals come to mind.

The third configuration, The Executive, has all the features of The Manager plus voice recognition capability. Tecmar claims that a 100-word vocabulary can be recognized with 98 percent accuracy. While a vocabulary of 100 words is not sufficient for dictating letters, it is useful for commands such as "take a letter" to invoke a word processing program, or "dial 567-8901" to place a telephone call.

ComNet Software

These new products are provided with software to perform a wide range of tasks. The ComNet system includes software for electronic mail, device sharing, printer spooling, message management, and time management, and creates periodic backup copies of disk data automatically.

The electronic mail software supports written mail, voice mail, and voice annotated text, and provides such advanced features as "store and forward" and "forward and store" capabilities.

Sophisticated telephone support maintains a dialing directory on disk and can look up and dial upon keyboard or voice command. The system can sense dial tones so it can be programmed to wait for an outside line and dial through long-distance service networks. It can also detect busy signals, redial automatically, and inform you when the call goes through.

How ComNet Works

The heart of the ComNet system is the Ethernet Companion, which captures voice by digitizing, converting the analog signal of sound into digital information that can be more easily manipulated by computers. Once digitized, voice data can be stored on disk, transmitted over the network, or reconstructed into sound.

Approximately 4K of storage is used per second of voice digitized. While a 360K floppy disk will hold about 90 seconds of voice, a 20 megabyte disk can record voice for about 90 minutes. This might appear to be a serious limitation, but most of the voice stored on disk will be brief messages. Longer messages can be directed to a dictation machine connected to the local computer or sent over the network to a dictation machine connected to any other computer.

One impressive aspect of ComNet is concurrency, the ability to perform several tasks simultaneously. One PC, for example, can answer the telephone, provide disk data to the network, and execute an electronic spreadsheet program, all at the same time. Of course, each additional task slows the response time of the machine, but for most uses the lowered response time is acceptable.

ComNet software automatically rates each task with a priority level so that the most important tasks receive the best response time. Voice operations, for example, must occur in real-time and therefore receive the highest priority. Most programs are usually performing input and output between the keyboard and screen or printer, or doing calculations. These tasks can be slowed with almost no noticeable effect, so they have the lowest priority. Other tasks such as servicing the network are less time-critical than real-time operations but more important than keyboard input and screen output, so they will be assigned priority levels somewhere between the two extremes.

As the number of users on the network increases there will be a more obvious loss of response time. The recommended configuration has one PC dedicated to providing resources to the network for every eight machines connected.

According to Tecmar President Martin Alpert, the concurrency feature required more effort to achieve than all the other features of ComNet combined. The reason for the

difficulty is that concurrency had to be added to MS-DOS. An easier approach would have been to design the system around an operating system such as Concurrent CP/M or XENIX, but that would have precluded the use of the largest number of programs available for the PC, those designed to run under MS-DOS.

> The network can be instructed to accept dictation and forward it to any station.

Sight of the Future
Tecmar is busily adapting to its new offices, which will be wired with Ethernet for over 50 ComNet stations. The fact that they will be using ComNet throughout the company means that there will probably be ComNet enhancements in the near future.

Although Tecmar is not revealing any plans, one look at its current products leads to some speculation: among the products listed is a board to interface a video camera to the PC and one that can display those images on a monochrome display. Those two boards could be added to the ComNet system to allow video images to be handled in the same manner as voice—storing and forwarding images for later reconstruction, perhaps even over telephone lines. Such capabilities are indeed "the stuff of science fiction," but science fiction has a way of becoming science fact. ⬗

ComNet
Tecmar, Inc.
23600 Mercantile Rd.
Cleveland, OH 44122
216/464-7410
List Price: $1695-$2995

Reader Friendly

PC W⬤RLD

The Complete Magazine for IBM Personal Computer and IBM PC Compatible Users.

You are using or soon plan to use an IBM Personal Computer or IBM-compatible personal computer. You've just scratched the surface, just started to explore the vast potential of this remarkable machine.

How can you use this potential and get more out of your PC? How can you keep pace with the fast-moving news and developments in the field, with the rapidly growing body of available software and the new ideas, discoveries, applications, and innovations?

Now there's a way—with **PC WORLD,** the lively, authoritative, new magazine devoted exclusively to IBM and IBM-compatible PC users.

Every month **PC WORLD** will keep you posted on the most interesting, intriguing, and potentially useful applications for the IBM PC and compatible PCs. And it will explain them to you with a minimum of technical jargon—and with a degree of clarity you'll appreciate if you try them out on your own PC.

It's a magazine that will help you get more of everything you want out of your PC—utility, versatility, value, and satisfaction. And it will present you with well researched, scientifically correct, easy to read articles in magnificently designed issues that are beautifully illustrated in full color. You'll want to keep each one for your' future reference—beginning right now.

Now for a limited time only you can become a charter subscriber to **PC WORLD** and save up to 55% off the regular price. Enter your subscription today and you will receive three FREE issues—for a total of 15 monthly issues at the low charter rate of only $24. If you're not fully satisfied, cancel your subscription after three issues, keep your copies of **PC WORLD,** and we'll cheerfully refund your full subscription price.

If you already have an IBM personal computer or are thinking of buying one, then this is the magazine that revolves around you.

**15 issues for $24,
27 issues for $39,
36 issues for $53.**

VISA and MasterCard orders call: 800/247-5470 (800/532-1272 in Iowa).

Subscribe Now

Don't miss our Charter Subscription Offer:

A BETTER SYSTEMCARD FOR THE IBM PC. FROM THE PEOPLE WHO WROTE ITS OPERATING SYSTEM.

When you choose a multi-function card for your IBM® PC, choose the best.

No other company understands your IBM PC like Microsoft®. We developed its operating system, MS™-DOS. That's why the SystemCard has features no other add-in card can match.

The SystemCard advantage.
The Microsoft SystemCard takes up only one slot, but gives you everything you need to complete your IBM PC or PC XT system.

Its features include 64K or 256K of extra RAM memory plus Microsoft's RAMDrive™ disc emulation software which allows you to use RAM as you'd use disk. But 50X faster.

It includes a parallel interface and a print spooler that lets you continue computing even while printing your biggest files.

The SystemCard also includes both an IBM compatible RS232 serial interface and a parallel interface. Plus terminal emulation software that lets you connect your PC to other computers. The SystemCard even includes a calendar/clock and time utilities for your time-based applications.

And it's fully compatible with DOS 1.1 or DOS 2.0.

The right choice.
One card—the SystemCard—does more than a host of slot-munching peripherals. And since Microsoft understands your PC so well, we've avoided many of the problems you might find in other cards. You can run RAMDrive and the print spooler at the same time, as a true multi-function add-on. Run the clock utilities without a resident language interpreter, because our drivers are written in the PC's own assembly language. This saves memory.

What's more, you can queue up to ten files of any length by name on a command line, like a true system spooler—and interrupt them any time to make additions, deletions or changes, right from the keyboard.

You'll also run DOS 2.0 with the SystemCard's own installable drivers. And run the serial Interface through IBM PC PORT 1 or PORT 2 with no translation codes necessary and with full interrupt support.
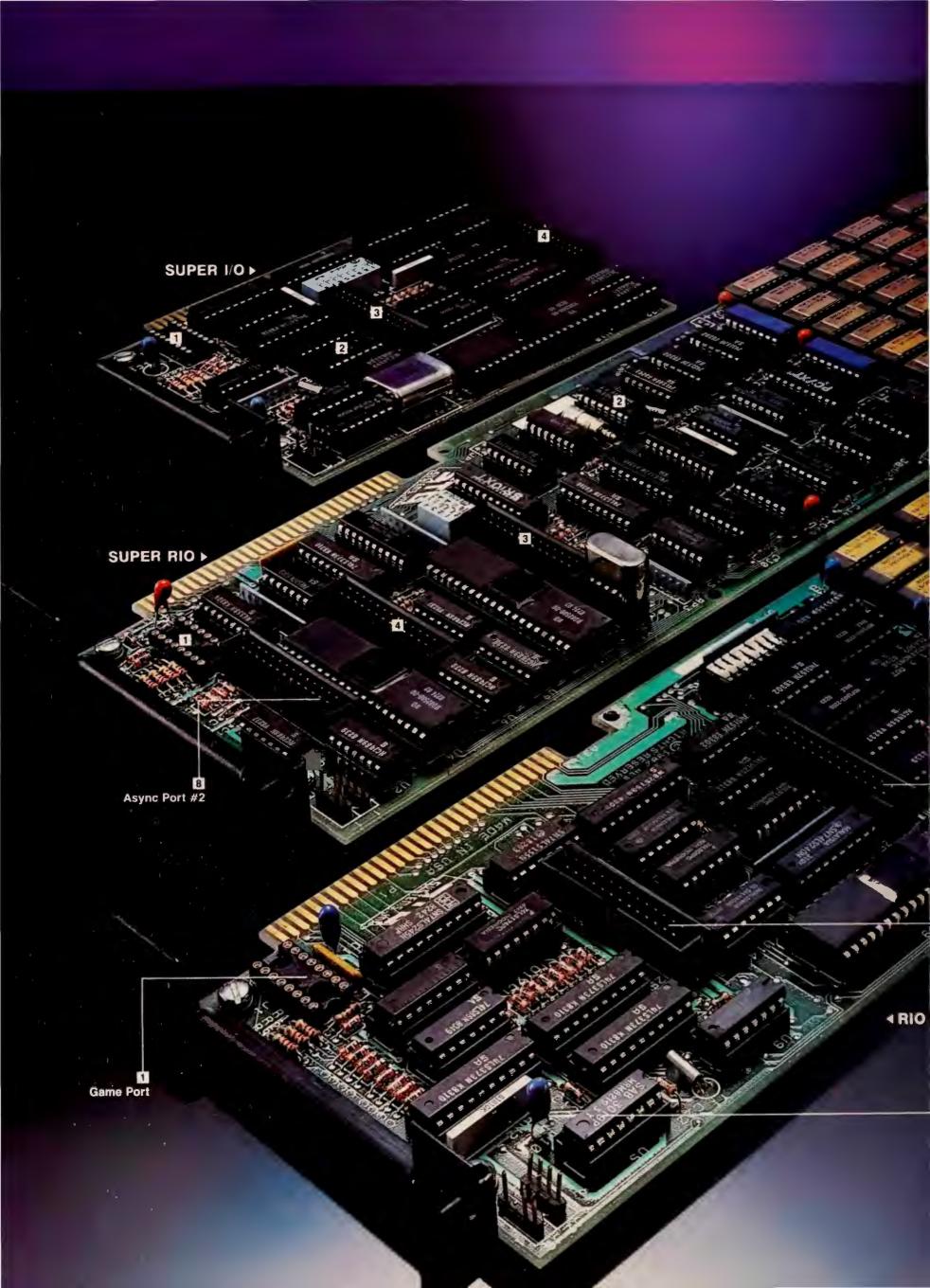
A great value.
Ask your dealer for a demonstration of the Microsoft SystemCard for your IBM PC. Consider all the things one card can do for you. Then think who made it. The SystemCard. From Microsoft.

BETTER TOOLS FOR MICROCOMPUTERS
MICROSOFT®
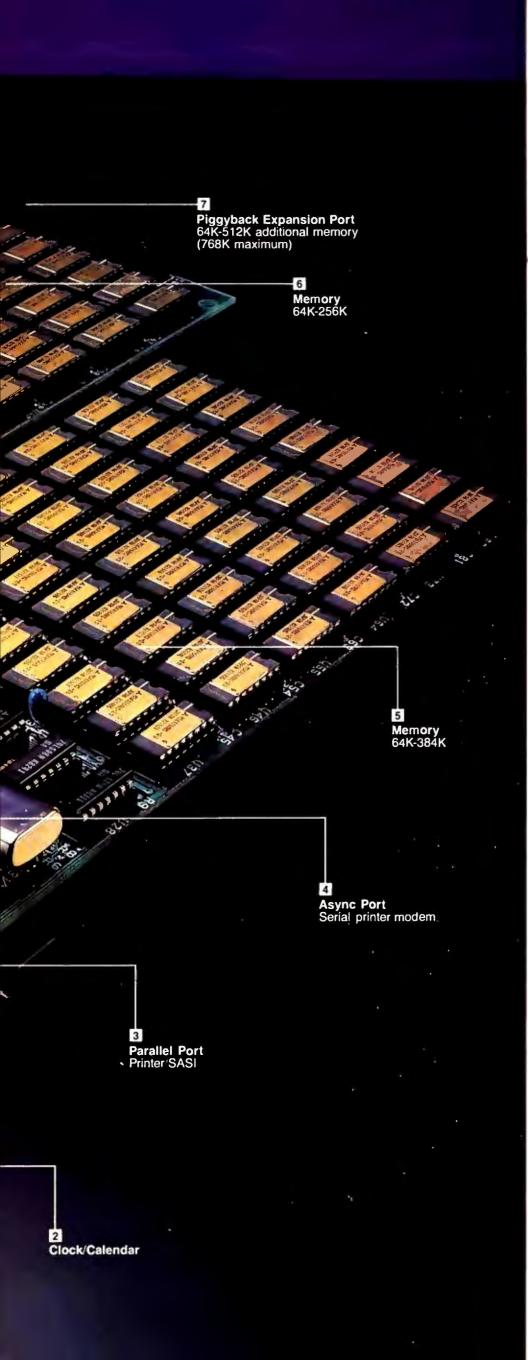
Microsoft is a registered trademark. MS and RAMDrive are trademarks of Microsoft Corporation.

SUPER I/O ▶

SUPER RIO ▶

Async Port #2

Game Port

◀ RIO

Dialog: the Ultimate On-line Library

Jeremy Joan Hewes

Everything you'd ever want to know, and more, is literally at your fingertips in this data base behemoth. Though searching can be a complex process, Dialog offers rich rewards of information.

Imagine a room crammed with 7000 10-megabyte hard disks. Imagine that the hard disks are all interconnected and that they collectively hold one gigantic library of electronic information. Now imagine that you can use a PC and a modem to connect with this library and search its files—arranged by subject categories—for any word, phrase, or topic your heart desires.

This is not some futuristic fantasy or an inside look at the IRS computer system; it is the Dialog Information Retrieval Service, and it's available to anyone with a modem and computer or terminal.

The History

Dialog is the granddaddy of dial-up information services. A subsidiary of Lockheed Corporation located in Palo Alto, California, this collection of some 200 separate data bases has developed from an in-house information retrieval system begun in 1963. In 1969 Lockheed received a contract from NASA to organize a half-million documents from the space program into a coherent data base;

subsequent contracts from the Atomic Energy Commission and the U.S. Office of Education added more information to the system. During the next few years the Lockheed staff continued to acquire and organize data bases, and they created a special command language for searching through this electronic library. That

---

Dialog is the granddaddy of dial-up information services.

---

language, Dialog, became the name for the commercial service Lockheed offered to the public in 1972.

Dialog acts as a clearinghouse for the data bases in its library. Other firms actually collect the information and prepare the data bases, and Dialog integrates them into its specialized system. For this purpose, Dialog uses two mainframe computers from National Advanced Systems (made by Hitachi) that are comparable to IBM's most powerful 3081 computers, along with 200 to 300 state-of-the-art disk drives.

Since 1972 more than 500,000 users have searched the Dialog files. Most of these information seekers are specialists—librarians for industrial firms, large businesses, government agencies, and educational institu-

tions. Many public libraries offer a Dialog service, but the library patron usually pays for the search. Some enterprising individuals also search the Dialog data bases in their capacity as "information brokers"; this may be an occupation whose time has come—and one that PC owners might want to consider. Although cost-effective searching requires sophisticated techniques, the price of admission to this information-age arena is ideal—nothing.

The Connection

Opening a regular Dialog account costs nothing; instead, each user pays telephone connect charges (conventional long-distance rates or approximately $8 per hour for Telenet, Tymnet, or Uninet) plus a varying per-hour fee for using each separate data base in the Dialog system. The standard Dialog service has no minimum monthly charge, and Dialog offers discounts for multiple-hour usage, including an automatic reduction in fees for any month during which a user logs at least 5 hours. New subscribers are allowed $100 worth of free time in their first 30 days of use, and the service offers a free half hour of time on a different data base each month. (Telecommunications costs are not included in these free allowances.)

Floor-to-ceiling tapes for the 200-plus Dialog data bases

State of the Art

The Dialog data base fees range from a low of $15 to a high of $165 per hour; charges are calculated for the actual connect time (to the nearest thousandth of an hour). Experienced Dialog customers estimate that the average cost of using the various data bases is about $1 a minute, because most of the data bases are in the $35- to $90-per-hour range.

Dialog is available 22 hours a day during the week, 12 hours on Saturday, and a few hours on Sunday. The precise times vary according to location (see Figure 1 for a sampling of worldwide on-line hours). The service maintains a toll-free customer service number in Palo Alto during normal business hours and has addi-tional offices in Boston, Chicago, Houston, New York, Washington, and Toronto, as well as overseas bureaus in London, Sydney, and Tokyo.

The Collection

Although the price per hour or minute of use may seem high, the amount of information available from Dialog is staggering. The service offers approximately 200 data bases with subjects ranging from popular to technical and from general to arcane. This on-line library indexes some 60,000 journals in addition to dissertations, research and conference reports, patents, government documents, books, pamphlets, and corporate financial reports. All that information adds up to 70,000 megabytes of data, excluding the software used for searching or the work space that the system provides for each user.

Among those billions of bytes is the means to find everything you'd ever want to know about practically anything. Interested in water? Try Aqualine, a data base that covers water quality, treatment, conservation, waste management, and more; or try Aquaculture, which offers data on all aspects of growing organisms in water. Need help with business planning? Check Management Contents, which contains 90,000 citations of articles and research reports about business; or the Trade and Industry Index, which provides selective coverage of some 1400 trade journals. If science and technology are your subjects, Dialog offers four

BRS: Dialog's Competition

Bibliographic Retrieval Services (BRS), located in Latham, New York, is another major source of specialized information via computer. Although not as large a service as Dialog, BRS offers at least 70 data bases. As with Dialog, the cost per hour for use of these data bases varies.

BRS's fee structure includes three components: a telecommunications cost of $6, $7, or $11 per hour, depending on the communications network used; a connect fee ranging from $16 to $35 per hour, depending on the user's contract with BRS; and a royalty established by the data base compiler. The average charge for 1 hour of research by an occasional user would be at least $41 and would probably range between $60 and $70. In addition, BRS charges a start-up fee of $50, which is credited toward regular use charges.

BRS also offers in-depth training for users of its service. One-day sessions are given at several locations throughout the country; the $245 price includes 1 free hour of system use after the training session.

The search methods and commands used in the BRS system are similar to those used with Dialog, although a BRS spokesperson says that the BRS system can pinpoint a topic more accurately than Dialog's searching software. Users of the Free Text Search component of the Dow Jones News/Retrieval service may be familiar with this software, because BRS supplies both the searching software and the manual for this service.

The BRS data bases are available virtually around the clock. The system is shut down between 4 a.m. and 6 a.m. daily, and from 2 p.m. to 7 p.m. Sundays. (These hours refer to eastern time.)

BRS has introduced a low-cost evening and weekend service, After Dark. Aimed at microcomputer users (like Dialog's Knowledge Index), After Dark offers some 25 data bases on such topics as business, science, education, and the social sciences. The cost per connect hour varies with each data base, ranging from $6 to $15 per hour. After Dark requires a $50 start-up fee, plus a $12 per month minimum, all charged to the user's major credit card.

---

data bases for geology, six for geophysics, eight for biology, six for computer science, eight for medicine, seven for pharmacology, six for physics, and ten for toxicology. And that's just the beginning (Table 1 lists a sampling of Dialog data bases and their subjects).

Most of the records in Dialog's data bases are arranged in the standard bibliographic format—author, title, source, date, and an abstract that summarizes the main points in the item. Some of the data bases are

> The average cost of using the various data bases is about $1 a minute.

numeric, however; these sources generally include statistics or limited text and usually require a more detailed searching technique than the bibliographic data bases.

In essence, using Dialog is much like being in a library while sitting at your computer. Each data base is equivalent to a few shelves of reference books, and in most cases you also have the on-line equivalent of finding the book or report and copying it or checking it out. This copying service from Dialog is called DialOrder; it records users' requests for complete copies of documents and relays the orders to one of several dozen firms that copy and send the items to users. This service is not cheap—a 10-page article costs about $8—but it may be the only source of complete documents from truly obscure publications or events.

Dialog offers two distinct advantages over conventional libraries: it contains far more material than all but the most prestigious university collections, and that material can be searched with astounding speed. According to Dialog's marketing staff, a

A few of the several hundred disk drives used by Dialog

Data Base Name	Subject	Cost/Hour
ABI/INFORM	Business management and administration	$56
ADTRACK	Advertisements in 148 consumer magazines	$95
AGRICOLA	Contents of National Agricultural Library	$35
AMERICA: History & Life	Comprehensive index to Canadian and American history	$65
APTIC	Air pollution, its causes, effects, and solutions	$35
BIOGRAPHY MASTER INDEX	Index to biographical information in 600 publications	$55
CATFAX	Directory of mail order catalogs	$65
CLAIMS (7 data bases)	Records of all U.S. patents for various subject areas	6 are $95 each; 1 is $300
DISCLOSURE II	Extracts of reports to SEC filed by publicly held firms	$60
ERIC	A guide to educational journals and resources	$25
LIFE SCIENCES COLLECTION	Abstracts from numerous life sciences journals	$45
MEDLINE	3.8 million records of medical articles and reports	$35
POPULATION BIBLIOGRAPHY	Comprehensive index to reports on population	$55
SCISEARCH	Multidisciplinary index to science literature	$165
STANDARD & POOR'S NEWS	General and financial news of 9000 public companies	$85
TRADE OPPORTUNITIES	Index of export opportunities for U.S. businesses	$45
U.S. PUBLIC SCHOOL DIRECTORY	Data on public schools throughout the U.S.	$35

Table 1: Selected Dialog data bases

typical search within one data base takes approximately 15 minutes for a novice searcher and 10 minutes for an experienced user. Compared with combing the index of a reference book, looking up the appropriate listings in the text of that book, and then finding the articles among a library's stacks, a Dialog search is virtually instant.

Dialog's search speed is impressive, even for seasoned computer users. As Figure 2 shows, four short searches of Insurance Abstracts, a data base containing 15,000 records, took between 3.1 and 12.6 seconds each, and printing one full record took a mere 34.2 seconds. The total time for that operation, including typing in commands and pausing to think, was 2 minutes, 22 seconds, and the total cost was $2.34. Clearly both the time and the cost of such a search on Dialog make a trip to the library seem like traveling by oxcart.

The Search

The information age does have its demands, though, and one of them is learning enough about the technology to take advantage of it. For potential Dialog users, this means becoming familiar with the system's powerful searching methods and thinking out a good search strategy. Dialog has provided ample tools for finding and extracting the information in its files; the plan of action, however, is up to you. By making good use of the searching commands and devising a step-by-step search plan in advance, you can get the maximum information and value from your Dialog connect time.

The first step in the search process is choosing the appropriate data bases to survey. If you have an extremely narrow topic, you may be able to search one or two data bases in that subject area and locate all pertinent references. A more typical search would include several data bases, because the subject matter of many specialized and generalized data bases overlaps.

New York

Monday through Thursday
down only 10 pm to midnight

Also Available:

Friday:	midnight to 8 pm
Saturday:	8 am to 8 pm
Sunday:	—

Paris

Monday through Friday
down only 4 am to 6 am and Monday midnight to 4 am

Also Available:

Saturday:	midnight to 2 am and 2 pm to midnight
Sunday:	midnight to 2 am

Tokyo

Tuesday through Friday
down only noon to 2 pm

Also Available:

Monday:	2 pm to midnight
Saturday:	midnight to 10 am and 10 pm to midnight
Sunday:	midnight to 10 am

San Francisco

Monday through Thursday
down only 7 pm to 9 pm

Also Available:

Friday:	midnight to 5 pm
Saturday:	5 am to 5 pm
Sunday:	9 pm to midnight

London

Monday through Friday
down only 3 am to 5 am and Monday midnight to 3 am

Also Available:

Saturday:	midnight to 1 am and 1 pm to midnight
Sunday:	midnight to 1 am

Sydney

Tuesday through Friday
down only 1 pm to 3 pm

Also Available:

Monday:	3 pm to midnight
Saturday:	midnight to 11 am and 11 pm to midnight
Sunday:	midnight to 11 am

Figure 1: Dialog's hours of operation worldwide

⬣ State of the Art

Dialog offers two major aids in selecting the most useful data bases. The first is the *Database Catalog*, which provides a brief explanation of each collection of information, including the time span its material covers, the approximate number of records it contains, the firm that prepares it, and the cost to use it. The catalog is a good starting point for understanding just how huge this system is and for determining whether its resources are needed for a particular project. In some instances, a search may be so general that you'd benefit more from checking out several library books on the topic. Or alternately, the search may be so specialized that a librarian's help is required before or instead of using Dialog.

Dialog also provides a highly useful tool called DialIndex, which subdivides the data bases into 47 subject categories. A printed DialIndex guide lists the data bases within each category. Besides providing a handy reference guide to the contents and subjects of data bases, each DialIndex category can be searched by typing its name instead of having to type the number of each member data base. Figure 3 shows a search of one of DialIndex's groupings of environmental data bases. The DialIndex search identifies one or more data bases containing pertinent

---

File168: Insurance Abstracts—79–82/Sep
(Copr. UMI)

Command:	Response:	Elapsed Time:
? ss IBM		
4	23 IBM	3.1 sec.
? ss s4 and microcomputer		
5	7 MICROCOMPUTER	8.6 sec.
6	0 4 AND 5	
? ss IBM and personal(w)computer		
9	23 IBM	14.1 sec.
10	2 PERSONAL(W)COMPUTER	
11	0 9 AND 10	
? ss fire and computer		
12	922 FIRE	12.6 sec
13	574 COMPUTER	
14	14 12 AND 13	

? t 14/5/1
14/5/1
    033600
    Using Computer Graphics To Plan Fire Station Locations.
    Holba, Martin S.
    Fire Journal 74:5. (9/80). p34–38   1980
    Illus.
    Property and Liability Insurance Index, Vol. 1, Iss. 4. Microforms and article copies available
from UMI.
    The National Loss Control Service Corporation has developed a computer program which
uses graphics to give a clear, understandable picture of the effectiveness of existing fire station
locations in a community and to identify areas which are not covered by an existing fire station
within a reasonable response time. Summarizes other analyses which have been used to study
fire station location and explains how this program is different and how the program can be used
to provide data for a wide variety of purposes.
    Descriptors: FIRE FIGHTING; ELECTRONIC DATA PROCESSING

? logoff

        $2.04   0.037 Hrs File168 7 Descriptors
        $0.30   Telenet
        $2.34   Estimated Total Cost

(Elapsed Time: 34.2 sec.)

Figure 2: Example of Dialog search times—four searches of a data base with 15,000 records and printing of one complete record

```
? b 411 ───────────────────────────────── command to enter DialIndex
                                           Dialog's prompt
File411:DIALINDEX™                         Dialog's response
     (Copr. DIALOG Inf.Ser.Inc.)

? SF ENVIRMT1 ──────────────────────────── command to search group of data bases
File28:Oceanic Abstracts—64–82/Apr
File40:ENVIROLINE—71–82/Aug
File41:Pollution Abstracts—70–82/Jun
File44:Aquatic Science Abstracts—78–82/Jun  Dialog's list of data bases in this group
File45:APTIC—66–78/Oct
File53:IRIS—82/Jun

        File Items Description ──────────── Dialog's format for search results

? SS Pollution and (Redwood? or
Sequoia?)                                   command to begin searching, search terms,
                                            and combining words

        (28) ─────────────────────────────  data base number
            5990  POLLUTION
               9  REDWOOD?                   number of records located for each search term and
               1  SEQUOIA?                   combined search terms
               0    1 AND (2 OR 3)
        (40)
           17104  POLLUTION
              39  REDWOOD?
              17  SEQUOIA?
               4    1 AND (2 OR 3)
        (41)
           19600  POLLUTION
              12  REDWOOD?
               3  SEQUOIA?
               3    1 AND (2 OR 3)
        (44)
            9410  POLLUTION
               6  REDWOOD?
               1  SEQUOIA?
               0    1 AND (2 OR 3)
        (45)
           26794  POLLUTION
              15  REDWOOD?
               3  SEQUOIA?
               9    1 AND (2 OR 3)
        (53)
            2110  POLLUTION
               1  REDWOOD?
               0  SEQUOIA?
               1    1 AND (2 OR 3)
```

Figure 3: Annotated example of a DialIndex search. The user's input is shown in boldface; Dialog's responses are shown in regular type; explanatory notes are in red. When the user types in ENVIRMT1, Dialog responds with a list of all data bases in that grouping. When the user enters the search commands and terms, Dialog then proceeds to search each of the data bases, responding with a list of results for each search. These results are listed as groups of records found for each search term (pollution, redwood?, and sequoia?) and for the combined search terms. Unlike searches of individual data bases, these groups of records in DialIndex searches are not given set numbers.

⬚ State of the Art

Command	Operation
Begin (B)	Enter a specified data base
Select Files (SF)	Select files to search in DialIndex
Select (S)	Search a data base for a specified term
Select Steps (SS)	Search a data base for more than one term and produce sets of data
Expand (E)	Display part of an index
Combine (C)	Combine sets in a search
Type (T)	Type records while on-line*
Display (D)	Display records on video terminal*
Print (P)	Print specified records off-line
Print (P)	Cancel order for off-line prints
Logoff	Disconnect from Dialog
Logoff Hold	Disconnect and hold the search history for at least 10 minutes

*The Type and Display commands provide the same result on computers with a video screen, but the Type command is designed for use with print-only terminals that do not have a screen.

Table 2: Dialog's basic search commands

records; each data base is then searched separately.

Dialog offers a sophisticated set of search commands and a specific vocabulary for combining search terms, as well as a detailed information sheet about each data base. All this information is included in the primary user's manual, the *Guide to Dialog Searching*. Expanded guides to each data base are available at $4 each, but these are not necessary for ordinary searching.

The basic search commands are listed in Table 2; these are used in conjunction with the search terms and certain combining words to make the actual search. In essence, these commands specify the data base to be searched, show the words used as subject terms in the data base and the contents of its index, select groups of items containing one or more search terms, display the records located by a search, and sign off the system.

Conducting a Dialog search is an interactive process: you specify a data base to search, Dialog responds with a signal that the data base is available, and then you enter the commands, search terms, and searching vocabulary that you've devised for a particular project. When Dialog has located records that contain the designated search terms, it responds with numbered sets of records. You can then instruct Dialog to show you some or all of the records it has located.

Figures 4 and 5 show the actual on-screen results of searching a Dialog data base. Figure 4 demonstrates the first part of the search, in which the search terms are specified and the sets of records are identified. The information sought in this search is the

Tips for Searching Dialog Data Bases

With its 70 million records and its myriad search commands and options, the Dialog system can be as challenging as it is potentially rewarding. The following tips are designed to help Dialog users get the most from their search time and dollars.

○ Learn to think like a librarian. The 200-plus Dialog data bases primarily include articles and reports, rather than collections of unrelated facts and figures on all possible subjects. Thus, you should choose search words and phrases that will locate articles and reports—you can't just ask for 'the top-ten television programs in 1970.' Unless someone had written an article with that title, that search phrase or an abbreviated version of it probably wouldn't yield useful results. The librarian's way of translating that request into data base vocabulary would include such search terms as 'television', 'programs', 'ratings', 'Nielsen', and '1970'. If that search located a large number of records, the topics could be further narrowed by combining the set of records from the initial search with phrases such as 'top(w)rated' and 'top(w)ten' to see if any records contained those specific terms. In other words, you should try to think in terms of phrases and words that would be used in an article or report.

○ Plan your search strategy in advance. Write out a list of search commands and phrases, and—if your software permits—establish a disk file containing the search data before connecting with Dialog. Then you can simply transmit the file to the appropriate data base when you are on line. If your communications software doesn't allow you to send a disk file to Dialog, be sure to type in your list of search commands and phrases while you're connected to one of the least expensive data bases; you can save the whole search and transfer it to the data base you really want after typing it in.

○ Dialog begins charging for connect time as soon as you enter your password. Its default data base (the one you automatically enter when you are connected to Dialog) is #1 (on education), which costs $25 per hour—one of the least expensive in the Dialog collection. Still, the seconds fly by as you enter a series of commands or think about what to do next, and you could save $10 per hour by changing your default data base to one of the practice data bases (numbers 201, 204, 216, or 290) or to Dialog's publications (numbers 200 or 410), which cost $15 per hour. Changing the default data base can be accomplished with help from Dialog's staff.

○ Since Dialog provides an easy method for saving a search in its computers, always give the 'search save' command and log off when the telephone rings or you are otherwise interrupted. You can reconnect right where you left off, and you won't be spending extra dollars for the time spent taking care of other business.

○ Dialog provides a free half hour of search time in one of its data bases each month. You can hone your searching skills and often gather some useful information by logging on at least once each month, seeing what the free data base is, and searching its files for up to 30 minutes. (You will still be charged for the telecommunications costs, however, which are currently $8 per hour.) If you need additional practice, use the Ontap data bases ($15 per hour each) created by Dialog for this purpose. They contain partial contents of selected data bases and can be used with the regular search commands and topics. If you cannot attend a Dialog training seminar but have the *Guide to Dialog Searching* and are determined to use this gigantic on-line library, Ontap is the place to begin.

○ Each new Dialog user receives $100 worth of free search time. This time must be used within 30 days of the user's first log-on to the service. If you want to use this free time to search an expensive data base, do some practicing first in the Ontap data bases, but be sure to make that $100 search before your first month of use expires.

---

same as that in the DialIndex example shown in Figure 3. The object of the search is information about the effects of pollution on redwood or sequoia trees. The question mark after the words *redwood* and *sequoia* indicates that any word with those terms as the root—such as *redwoods* or *sequoiadendron*—should be located by the search. Figure 5 shows the on-screen display of a complete record located by the search.

Dialog offers several options for "previewing," or displaying less than the entire contents of a record. You can look at just the titles of articles, for example, to determine which ones you'd like to have displayed as full records. The forms of shortened records available include the full record minus the abstract, the bibliographic citation only, the title only, the title
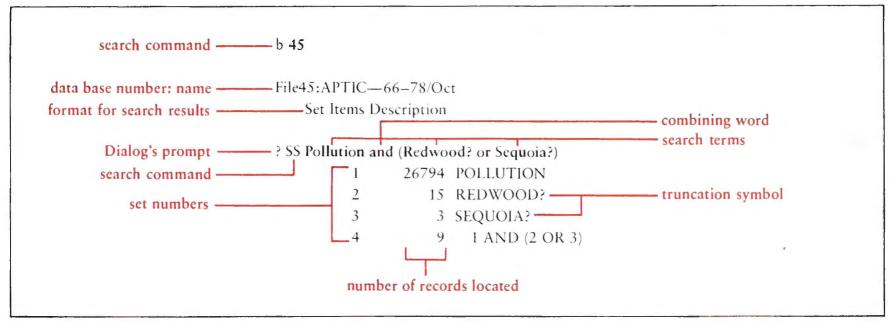
search command ——————— b 45

data base number: name ——————— File45:APTIC—66–78/Oct

format for search results ——————— Set Items Description

combining word

search terms

Dialog's prompt ——————— ? SS Pollution and (Redwood? or Sequoia?)

search command ———————

1	26794	POLLUTION
2	15	REDWOOD?
3	3	SEQUOIA?
4	9	1 AND (2 OR 3)

set numbers ———————

truncation symbol

number of records located

Figure 4: Annotated example of the first phase of a Dialog search. The user's input is shown in boldface; Dialog's responses are in regular type; explanatory notes are in red. After the user enters the command to begin searching a specific data base, Dialog makes that data base available; then the user enters the command, search terms, and combining words to be located. Dialog responds with a set of records for each search term (sets 1 to 3) and a separate set of records that reflect the combined search terms (set 4).

command to type a record

? t 4/5/4 ——————— format for typing record (set #/full record/4th record)

4/5/4 ——————— Dialog's response

051449 ——————— Dialog's number (on for each record)

RELATIVE AIR POLLUTION SENSITIVITY OF SOME LOS ANGELES ARBORETUM PLANTS ——————— title

Hanson, George P. ——————— author

Lasca Leaves, 22(4):86–89, Dec. 1972 ——————— publication and date

LASCA LEAVES 1972
TIC Accession No.: HANSON G P ——————— other bibliographic data
Document Type: FLD Method of Support: NONE

Factors are identified which may lend tolerance in plants from the few studies which have investigated the mechanism of air pollution tolerance in plants. These include small stomate size, low stomatal frequency, ability to close stomacats upon contact with air pollutants, high concentrations of carbohydrates, free amino acids, ascorbic acid in leaf tissue, increased fatty acids in cell membranes, defective root system, and slow growth rate.

Many of the proposed air pollution tolerance mechanisms would be detrimental to a plant competing with other plants in a pollution-free environment, and the plant would probably lose out in the single survival.

The ponderosa pines which have evolved as the dominant vegetation in many forested areas are suddenly finding themselves at a severe disadvantage by their inability to cope with a drastically altered air composition. The cedars and giant sequoias previously handicapped because of the genetic restraints upon their growth and development now find themselves better able to compete in the polluted air.

abstract

Descriptors: PLANTS (BOTANY); LEAVES; PLANT DAMAGE; GENETICS: BIOMEDICAL TECHNIQUES AND MEASUREMENT; TOXICITY; BIOLOGICAL PROCESSES AND FUNCTIONS; TOXIC TOLERANCES; LOS ANGELES; AMERICA; CALIFORNIA; NORTH AMERICA; UNITED STATES; URBAN AREAS; METROPOLITAN AREAS
Category: EFFECTS—PLANTS, LIVEST

bibliographic identifiers

Figure 5: Annotated example of an on-screen Dialog record. The user's input is shown in boldface; Dialog's responses are shown in regular type; explanatory notes are in red. When the user enters the type command and designates a set number, record number, and the way the record is to be displayed, Dialog responds by repeating the command and then printing the record as specified.

and indexing terms only, and the Dialog identification number for that record only.

Previewing records often helps you eliminate undesirable citations, reducing the number of full records that are ultimately printed. For example, two of the partial records in the search for redwood or sequoia and pollution contained the terms sought but did not pertain to pollution of redwood trees.

Instead, one cited pollution in Redwood City, California, and the other noted that some pollution can be controlled by the use of devices made of redwood.

An important principle of using the Dialog data bases is that the search begins with general terms or topics and moves toward ever more specific sources of information. Figure 6 shows one way of narrowing a search when a known term or topic can be eliminated. In this case, the word *not* in the second command specifies that *Redwood City* should be excluded from the items located in the search.

Dialog's off-line printing service is a real money saver.

Combining search terms and eliminating specific terms or topics is accomplished with a specialized vocabulary called Boolean operators. These are the terms *and, or,* and *not*; their use indicates the logical relationship of the various search terms to one another. For example, Figure 7 shows diagrams of the relationships of search terms used in the 'pollution-redwood?-sequoia?' search.

Once a group of related items has been identified, it is displayed by Dialog as a set. Each term searched for in a data base is assigned its own set number, such as those in the example in Figure 4. Set 1 is the 26,794 re-


```
? b 45

File45:APTIC—66–78/Oct
          Set Items Description

? SS Pollution and (Redwood? or Sequoia?)
      1      26794   POLLUTION
      2         15   REDWOOD?
      3          3   SEQUOIA?
      4          9     1 AND (2 OR 3)
? SS S4 NOT Redwood(w)City
      5          2   REDWOOD(W)CITY
      6          7     4 NOT 5
```
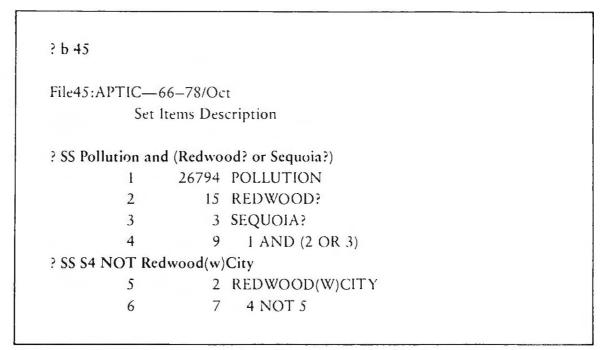
Figure 6: Example of narrowing the redwood/pollution search. By using the combining word "not" to eliminate any references to "Redwood City," the user can instruct Dialog to exclude records from this search that contain "Redwood City" and "pollution" but do not otherwise relate to redwood or sequoia trees. Boldface indicates user input.
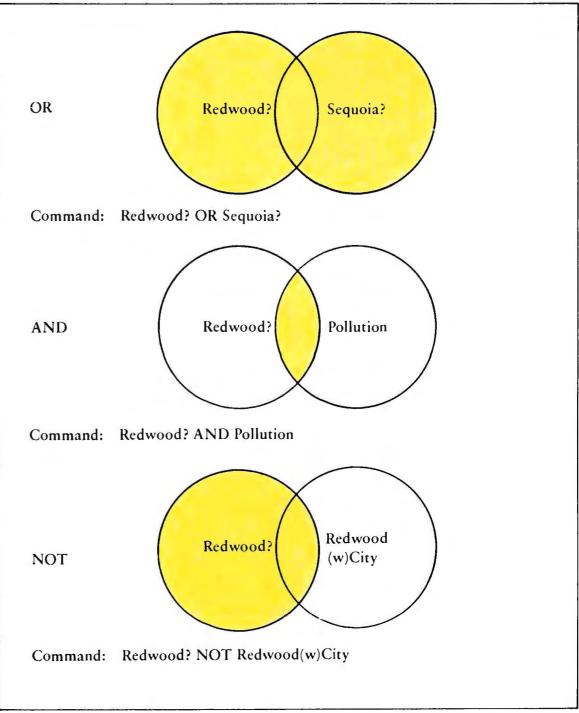
Figure 7: Relationships shown by Boolean operators. "Or" includes all records in both groups; "and" includes only records that contain both search terms; "not" excludes records in the group labeled "not."

cords found for *pollution*; set 2 contains 15 records for *redwood?*; set 3 has 3 records with *sequoia?*; and set 4 consists of 9 records with *pollution* and either *redwood?* or *sequoia?* in them. Set numbers are handy for quick searching; the number can be used instead of the search term, and

---

Attending a Dialog Day session is an excellent way to determine what this service has to offer.

---

set numbers can be combined in commands. If a new search term were to be added to the search in Figure 4, for example, the command could be expressed as 'SS S4 and (automobile? or car?)', in which *SS* is the command to select sets, *S4* indicates set 4, *and* is a Boolean operator, and (*automobile? or car?*) adds those terms and terms with those roots to the search.

Dialog provides other searching vocabulary besides the combining or limiting terms *and, or,* and *not*. Ordinarily the Dialog software recognizes only one word, rather than a phrase, as the search term. Thus, a search for 'personal computer' would yield a set of records containing *personal* without *computer*. If the symbol '(w)' is added between the two words, however, Dialog searches for the phrase. This symbol establishes the adjacency and order of words in a phrase, and it can be varied to allow for a longer phrase with unknown intervening words—such as 'personal(2w)computer' to designate any phrase containing the words *personal* and *computer* with as many as two words in between.

Because Dialog does not distinguish between upper- and lowercase, the preceding search would yield records that contain any reference to *personal computer*. To identify the IBM Personal Computer only, the search phrase could be lengthened to 'IBM(w)Personal(w)Computer.' Words can be strung together in this way to create phrases up to 50 characters long.

Dialog provides still other methods to pinpoint a search. For example, suffixes or prefixes added to a command can locate the search terms in the title of a record only or in records by a particular author only. These searching refinements vary according to the data base used, and they require some experience with Dialog before they can be used effectively.

The Results

Dialog's sophisticated search commands and methods can locate extensive collections of records. As noted previously, whole or partial records can be displayed on the screen, but displaying records may be an expensive way to sort through a large volume of material. Dialog offers a very attractive alternative means of obtaining records, however, through its off-line printing service. To get an off-line print, simply type 'p' and specify one or more records; Dialog responds with an estimated printing cost. The cost of off-line printing is uniformly low, usually 15 to 20 cents per complete record. A few data bases have a charge for displaying records on screen; this cost is usually 10 to 25 cents per record.

Dialog's off-line printing service is a real money saver because the cost of connect time to display any appreciable amount of text is certain to be higher than the pennies per record for printing. All records are printed within 24 hours of an order and are mailed first-class from the system's Palo Alto offices. Dialog even offers an automatic updating service, called SDI (Selective Dissemination of Infor-

---

Record of the Month

Shoe size and obstetrics? Indeed a curious item:

    0499695   81229695
        Correlation of shoe size and obstetric outcome:
    an anthropomorphic study.
        Kennedy JL; Greenwald E
        Am J Obstet Gynecol   , Jun 15 1981,   140 (4) p466-7
        ISSN   0002-9378   Journal Code: 3NI
        Languages: ENGLISH
        Journal Announcement: 8110
        Subfile: AIM; INDEX MEDICUS
        Tags: Female; Human
        Descriptors: Adolescence; Adult;
    *Anthropometry; Birth Weight; Body
    Height; Cephalometry; Cesarean
    Section; Delivery; *Dystocia—
    Occurrence (OC); *Foot—Anatomy and
    Histology (AH); Maternal Age;
    Pelvimetry; Pregnancy; Shoes
                (Medline, File 154)

Figure 8: An amusing sample record from the Dialog newsletter (August 1982)

Knowledge Index: Dialog's Low-Cost Alternative

Late last year Dialog began a new data base service aimed at owners of personal computers. Called Knowledge Index, this service offers fewer data bases but is easier to use than Dialog and a lot less expensive. Knowledge Index has a one-time $35 fee that entitles the user to 2 free hours of connect time; thereafter the service costs $24 per hour including telecommunications charges. This is a great savings over current Dialog charges: the 19 Knowledge Index data bases cost from $25 to $95 per hour on Dialog, in addition to at least $8 per hour in phone charges. Knowledge Index's fee is effectively only $16 per hour, plus the $8 per hour phone charge. These charges are billed to the user's major credit card.

Knowledge Index includes more than 4 million records from 10,000 publications. Its 19 data bases include major reference sources for business and finance, engineering and computers, education, government publications, psychology, medicine, and four separate data bases covering major newspapers and magazines.

Two data bases of particular interest to PC owners are Microcomputer Index, which covers 40 computer magazines, and the International Software Directory, which lists commercially available microcomputer software.

Like other commercial dial-up services, Knowledge Index is an evening and weekend service. Its hours are 6 p.m. to 5 a.m. Monday through Friday, 8 a.m. to midnight Saturday, and 3 p.m. Sunday to 5 a.m. Monday. All times refer to the user's local time.

The Knowledge Index searching options and commands are less sophisticated than Dialog's, making the new service easier to learn but somewhat less powerful. For example, a user can't have records printed off-line, specify automatic updates through the SDI function offered by Dialog, or save searches as Dialog allows. These limitations in search options, however, are easily offset by the low costs of using Knowledge Index. In short, Knowledge Index is a practical and powerful information source in its own right.

---

mation), which locates and copies new records on user-specified subjects each time the data bases are updated. Copies of the records are then sent to the user. The cost of SDI varies among data bases, usually ranging between $8 and $15 per month.

Support Services
With help from a batch of illustrations and tables, this article has scratched the surface of Dialog's capabilities and offerings. The Dialog system is so powerful and complex

that such an overview is not really sufficient preparation for searching; only the documentation and, preferably, Dialog's own training can provide the know-how for effective use of this on-line library. Fortunately, Dialog's documentation and training are thorough and relatively inexpensive. The *Guide to Dialog Searching* costs $30 and gives complete searching instructions, individual sheets for each data base, and information on each data base for the DialOrder service. Dialog subscribers also receive the monthly newsletter, *Chronolog,* which reports changes in services

⬭ State of the Art

and prices, offers searching tips, and often contains an off-beat "record of the month" (see Figure 8 for a sample).

Dialog's training is superb and widely available. Anyone considering serious searching should take the System Seminar, a 1½-day course with plenty of hands-on practice. This course costs $135 (quickly recouped in connect-time savings) and is offered in major cities throughout the United States and abroad. A free orientation program, Dialog Day, is offered on the first Monday of each month in Chicago, Houston, New York, Palo Alto, and Washington, D.C. Attending a Dialog Day session is an excellent way to determine what this service has to offer and whether it meets your needs. Once you are a Dialog user, you can sample numerous seminars for specialized subject matter and refresher courses if you need them.

The Dialog staff also offers telephone support via toll-free numbers in the United States; this department is staffed from 9 a.m. to 8:15 p.m. (EST) weekdays. Both the training and customer support staff members are information specialists who continually keep their Dialog searching skills sharp.

Dialog can open an electronic door to billions of facts and ideas. Although the costs are high and the training is demanding, the rewards in knowledge to be gained are enormous and assuredly worth the effort. And beyond the power of this system's information resources, anyone who uses Dialog is certain to be struck by the marvel of speed and excellence that humans and computers have wrought together. ⬭

Bright.

The IBM PC. It's one of the smartest investments you've ever made. Chances are, it's changed the way you perform hundreds of tasks in your business. And now you're ready to explore more ways to expand its functions.

That's bright thinking. The kind that makes you and your company look good. Now here's an idea that will make you look brilliant. Literally.

Introducing The SCION PC640 Professional Color™ Display System.

With 4096 brilliant colors to choose from and the sharpest professional resolution at 640 × 480, SCION has raised the science of business graphics to a fine art.

For graphing, plotting, charting, drawing an infinite variety of images, or even creating images for color slides, our PC640 is indispensable. For graphics that fully communicate your ideas, it's unsurpassed.

Quite simply, the PC640 is far superior to any other IBM PC color add-on for both cost-effectiveness and performance. And while our PC640 board is easily installed, our software

Brilliant.

is even easier to follow. Our standard HALO*
package allows programmers to create limitless
displays. And with our Cheetah** Fast Track
package, even non-programmers can create
complex graphics in minutes.

Best of all, with its multitude of capabilities,
the PC640 will substantially reduce what you
spend for graphics preparation. In many cases,
it will more than pay for itself in a single busi-
ness presentation.

To us, that makes getting the PC640 better
than brilliant. That makes it just plain smart.

For more
information
about all the
ways a PC640
makes sense
for your busi-
ness, please

*The PC640 Professional Color™ board delivers
superior resolution at 640 × 480, and the simulta-
neous use of 16 out of 4096 colors.*

contact Harry Freer at (703) 476-6100 or TWX:
710-833-0684. Or write: SCION Corporation, 12310
Pinecrest Road, Reston, Virginia 22091.

SCION

PREMIERING
IN SAN
FRANCISCO
AT THE
IBM PC FAIRE.

AUGUST 26-28

BOOTH #1443D

XOR CORPORATION
PROUDLY ANNOUNCES
A NEW STANDARD OF
EXCELLENCE.
FIRST CLASS
SOFTWARE THAT
TAKES YOU
SOMEWHERE AND
GIVES YOU
SOMETHING SPECIAL.

XOR
CORPORATION

FIRST CLASS SOFTWARE

The Complicated Way or The Easiboard Way

The Complicated Way
Five Cables
Seven Instruction Books
Serial Board
Parallel Board
Chronograph
Memory Board
Buffer/Spooler
Three Disk Drives
Print Switcher
Several Days

The Easiboard Way
One Easy Board
Ten Seconds

EASITECH
CORPORATION

EASITECH
EXCELLENCE
Exclusively at IBM PC Dealers

2215 Perimeter Park, Suite 22, Atlanta, Ga. 30341 (404) 452-7576

THE CREATOR™

Sophisticated adult's play.

THE CREATOR™ may be the only piece of software that you'll ever need for your IBM PC*.

THE CREATOR™ will be your BASIC applications library. You create versatile, customized applications by simply answering English questions.

Even the beginner can create hundreds of applications easily and quickly. In about the time it takes to make a cup of coffee an application can be created by you. It's like *child's play.*

With THE CREATOR™, canned software may become a thing of the past. The source code is provided so that you can customize your results. To help along the way, THE CREATOR™ comes with its own detailed documentation and tutorial.

The reviews are in: "it's remarkable", "very powerful", "delivers what they claim", "a major software breakthrough."

THE CREATOR™ is your software solution. It just may be the last one you'll ever need! Available now at your dealer.

IBM is a trademark of International Business Machines
THE CREATOR is a trademark of Software Technology for Computers
*Versions for other computers available soon

Ready Made Applications
• GRAPHICS • INVOICING
• DATA BASE • SEARCHING
• SORTING • INSTRUCTIONS
• LISTING • MAILING LIST
• SOUND • WORD PROCESSING
• OUTPUT • TITLE PAGES
• INPUT • FORMAT • BUDGET
• MENU • AGING

SOFTWARE TECHNOLOGY for COMPUTERS
430A Main Street, Watertown, MA 02172, 617-923-4334

Hard Disk Roundup

Jonathan Sachs

Ten mass storage devices were subjected to an exhaustive comparative evaluation that considered packaging, electrical safety design, ease of installation, performance, and customer support. The results have already brought about some hardware and software design improvements, raising standards for the industry.

In October 1982, MIS Consultants, Inc. began to develop *MAX—The Manufacturing Manager,* a manufacturing requirements planning package. *MAX* may be the most ambitious software product ever written for the IBM PC. The object code alone takes 1500K of disk space. For a system this large a hard disk is essential. Rather than leaving its customers' choices of hardware to chance, MIS decided to evaluate the major brands of hard disk drives available for the PC (see Table 1).

The Evaluation Project

MIS's evaluation project was as thorough as the software product it was meant to support. The drives weren't just tested; they were opened up and studied by a team of technicians that included William Lee, a practicing engineer. Each drive was installed and used by experts and beginners. Both groups contributed their findings on performance, reliability, and ease of use. Finally, each drive was subjected to a timing test so demanding that a floppy disk drive couldn't even survive it.

The Packaging

MIS evaluators found evidence of problems as soon as they unpacked the drives. Protection against shipping damage ranged from fair to dreadful. MIS learned that at one point about 10 percent of one manufacturer's drives had been returned with shipping damage. The company (Davong) has since redesigned the shipping carton and eliminated the problem.

⬟ Review

Shipping damage is an obvious risk for mail order purchasers of delicate equipment. However, even those who buy from dealers are not immune. Dealers get much of their equipment through the same carriers that mail order houses use. A drive that appears healthy when the dealer tests it may yet fail prematurely due to shipping damage.

Sears Roebuck and Company requires that anything it ships be sturdy enough to survive a drop of 3 feet onto a hard surface. MIS judged that, as packaged, none of the drives tested could pass the Sears drop test.

All the drives were held away from the walls of their shipping cartons by form-fitted foam blocks. The blocks were intended to absorb any shocks sustained by the carton during shipping. In some packaging the blocks enclosed the drive only at each end. This left the equipment vulnerable to an object that could penetrate the carton along most of its length. The better packages enclosed the drive completely. Some left the cables and adapter cards in exposed parts of the carton or packed them next to the drive; others gave them separate foam block protection.

Drive:	Corona	Corvus
Capacity in megabytes (M)	5	5
Internal/External	Internal	External
Cache memory in drive	No	No
Cable length	n/a	58"
Cable socketed	n/a	Drive end
Hardware backup facility	n/a	n/a
Repair	Factory & dealer	Factory & dealer
Price (as of 2/83)	$1995	$2795
$/M	399	559

Table 1: Features and Prices

Hardware Evaluation

To the investigators at MIS it appeared that not all drive makers were aware of a simple truth: making a hard disk subsystem is more than a matter of designing an adapter card and mounting a disk drive and a power supply in a box.

Protection against shipping damage ranged from fair to dreadful.

Many of the drives showed evidence of careless design. Some of their delicate hard disk mechanisms were poorly cushioned against shock, increasing the risk of damage in a fall.

A few drives were electrically unsafe. One (Xcomp) had a fuse on the device side of the main power switch, so that a short circuit in the switch could start a fire in the wiring of a building instead of blowing the drive's fuse. The same drive had wires passing through ungrommetted holes in metal, so that the edge of the hole could—and did—gradually cut through the insulation of the wires. Both of these problems have been corrected in the current production version.

Electrical devices with these faults could not gain Underwriters' Laboratory (UL) approval, and none of the drives MIS tested had passed the UL tests at the time the evaluations were done.

When the MIS staff talked to hard disk makers about design problems, they found the companies eager to make improvements. Many of MIS's suggestions were incorporated into the drives. After the manufacturers learned of MIS's findings, several began pursuing UL approval. Corvus has since become the first maker to gain UL approval on a hard disk drive for the PC.

Radio frequency emission was another area in which MIS found problems. At the time of the evaluations none of the drives except Tecmar had FCC certification as class B devices suitable for residential use. Some did not even have the less rigorous class A certification for commercial use, although selling the drives without it was technically illegal.

Lack of class B certification alone will not create problems. But if an uncertified disk drive makes a neighbor's TV sets do flip-flops, the FCC can force its owner to shield the drive or stop using it. Since extra shielding may interfere with a drive's heat dissipation, this sort of difficulty could turn a hard disk drive into an expensive doorstop.

In several drives, MIS found heat-producing components mounted in such a way that the heat could not dissipate properly. This was judged likely to shorten the lives of those components or other nearby components. All the internal drives (those mounted in one of the sys-

Davong ext. 1	Davong int. 1	Genie	IBM	Santa Clara	Tallgrass	Tecmar	Xcomp
5	5	5 fixed 5 removable	10	10 fixed 5 removable	12 fixed 12 tape	10	16
External	Internal	External	Internal (PC XT only)	External	External	External	External
Yes	Yes	No	No	Yes	Yes	No	No
40"	n/a	60"	n/a	72"	34"	18"	48"
Drive end	n/a	Both ends	n/a	Both ends	PC end	No	PC end
Tape cartridge	n/a	Disk cartridge	n/a	Disk cartridge	Tape cartridge	n/a	n/a
Factory & dealer	Factory & dealer	Factory	Dealer	Factory & dealer	Factory & dealer	Factory & dealer	Factory & dealer
$1995	$1995	$3995	n/a	$4795	$3795	$2495	$2995
399	399	399	n/a	319	316	249	187

tem unit's two disk drive spaces, except the IBM PC XT) overheated. The PC's case and fan were never meant to dissipate the amount of heat that a hard disk drive generates.

Hardware Installation

Drive installation instructions varied in quality. Some were incomplete or inaccurate. None were clear enough to give an inexperienced user all the help he or she might need. For anyone who didn't have some hardware experience, the internal drives were too difficult to install. The installation process did not necessarily look difficult on paper, but it required the kind of judgment and skill that only a technician is likely to have. One drive, for example, started producing I/O errors when its mounting screws were tightened too far. When the screws were backed off a bit, the drive worked fine. The delicate drive mechanisms had little protection from shock until properly installed. An inexperienced installer could easily destroy the most expensive part of the drive before ever having a chance to use it.

The external drives (those mounted on a separate chassis) were easier to handle, since installation consisted of little more than installing an adapter card and connecting some cables. Even then, installation was not without pitfalls.

For example, Tecmar made its data cable unusually short to help the drive get FCC certification. When the adapter card was installed in a left-hand system expansion slot, the cable could not reach a drive positioned to the right of the system unit, and vice versa. This forced one evaluator to install the card and then remove it and replace it in a different slot. The moral: don't try to install a hard disk by following the instructions one step at a time. Before you start, read all the instructions and plan the entire procedure. Better yet, have the drive installed and tested by your dealer.

Once in place, some drives proved more convenient to use than others. The main difference was in the data cables. The best designs had plugs at both ends, making the drive easy to attach and remove. Other cables were more or less permanently attached to the drive, the adapter card, or both, making it impossible to disconnect the drive without tools. The internal drives were hardly more convenient than the external drives. All required external power supplies.

Some drives turned out to be incompatible with certain brands of RAM cards, a problem that MIS traced to two manufacturers using the same unassigned I/O port addresses for different purposes. This could create a nasty surprise for an inexperienced user, who could only tell that his or her PC worked without the drive installed and failed to work with it. Such a user would naturally return the drive for repair, and the repair people would find nothing wrong with it.

⬟ Review

The disk makers seemed unaware of this compatibility problem when the MIS evaluators first called them for help. After MIS diagnosed the problem, the disk maker (Genie) and the RAM maker (AST Research) agreed to change their designs and eliminate the conflict. Several companies developed software patches for buyers of existing hardware and went out of their way to notify customers who might be having the problem.

Software Installation

Software installation for most drives involved two steps. First the hard disk was formatted, a process that took anywhere from 5 minutes to 3 hours (see Table 2). Then a program was run to select software options (usually from a menu) and create a modified version of DOS to support the hard disk. When the PC was booted from a disk carrying this modified DOS, the hard disk appeared

> The PC's case and fan were never meant to dissipate the amount of heat that a hard disk drive generates.

as one or more logical disk drives, generally drives C, D, E, etc. Most brands allowed the user to set the capacity of each logical drive; some did not.

The software was no easier to install than the hardware. It seemed to have been written by people who had technical competence but lacked skill in writing friendly programs for the average user. Many of the user manuals were inaccurate or incomplete. None was clear enough to give a beginner adequate help. None offered a no-frills procedure that would enable a beginner to install the drive without having to make choices.

Other Software Features

Some drives in the MIS review came with RAM disk support. This was significant, since most of the drives' DOS modifications made it impossible to use electronic disk programs, which make some of the computer's RAM available for use as an emulated disk drive.

Most drives can be divided into several "virtual disks" that to the user look like several smaller disks. Partitioning a hard disk in this way makes it easier to organize files. A user can keep all word processing files on one virtual disk, all spreadsheet files on another, and so forth. The best software implementations let the user reconfigure the disk with a varying number of virtual disks, each of a different size. Less flexible ones had a

Drive:	Corona	Corvus
Time for hardware (hr:min)	0:45	0:30
Format time (hr:min)	0:15	0:15
Total time for software (hr:min)	0:15	0:15
Notes	Easy to install	Easy to install

Table 2: Installation Time

fixed number of disks or required all disks to be the same size. The IBM Fixed Disk was the most restrictive of all: it supported no virtual disks, just one 10-megabyte volume designated as drive C. The tree-structured directory feature of DOS 2.00 overcomes some of the earlier restrictions in partitioning a hard disk. Under that system, word processing files would be kept in one directory area, while files for spreadsheet or other applications would be kept in other separate areas.

Other features offered with some drives were save/ restore programs similar to BACKUP in DOS 2.00; local area network support, which allows two or more PCs to share one hard disk; and the capability to change floppy disk drive specifications during installation, during use, or both.

Performance

MIS believes that the speed with which the PC can run a program with a certain disk drive is a better measure of the drive's performance than statistics such as seek time and data transfer rate. For this reason MIS tested the drives by running programs that simulated actual use of a disk drive under demanding conditions.

Two test programs were developed, one for sequential I/O and the other for random I/O. Both used a data base containing 1000 records, each 240 bytes long. One program read the data base sequentially, updated it, and wrote it to another file. The other program read the data base randomly, updated it, and wrote it to another file.

MIS implemented each test program in three languages: Advanced BASIC, Compiled BASIC, and COBOL. The COBOL tests proved unsatisfactory because of shortcomings in the COBOL compilers that were used. Thus, the COBOL results are not reported here. The results of the other two sets of tests are incorporated into Table 3.

Davong ext. 1	Davong int. 1	Genie	IBM	Santa Clara	Tallgrass	Tecmar	Xcomp
0:45	0:30	0:30	0:00	0:30	0:30	0:45	0:30
0:20	0:20	0:30	0:20	0:05	2:00	0:21	0:30
0:20	0:20	0:30	0:20	0:05	3:00	0:21	0:45
Cable very hard to connect to card; design needs refinement	Easiest internal drive to install	Cable not flexible enough	No installation required	Easiest drive to install		Cable too short; installation requires careful planning	Missing information

The tests were run using DOS 1.10 on an IBM PC with 320K of RAM, two double-sided floppy disk drives, and a monochrome display. Some tests were run with preliminary versions of DOS 2.00 device drivers for the hard disks as well, but not all of the disk manufacturers were able to deliver DOS 2.00 software early enough to be tested. The tests under DOS 1.10 were run in January 1983. Since that time, all the manufacturers have been progressively increasing the speed and performance of their products, partially as a result of this study. Therefore, there is no guarantee that the drive you buy today will have the same relative performance position it had in January. The drives tested under DOS 2.00 used the most current version of driver software available at press time. After the first round of tests, the manufacturers knew the kind of benchmark MIS was using and could have optimized their software for that type of test. Since all the software tested were production versions, the net result is that the consumer gets a faster disk drive. It is not recommended that you base a purchase decision on a few seconds of speed difference in these tests.

The initial test results varied greatly, and some were not impressive. One of the most popular drives took 9 minutes to complete the random I/O test. MIS found that a drive's device controller hardware and software have a lot to do with its speed. The device driver routine can also have a major effect on a drive's performance.

MIS discussed the test results with the drive makers and found many of them unaware of the effect software could have on their products' performance. They had developed device drivers that worked, but they had never considered how fast—or slow—they were.

As a result of MIS's findings several manufacturers rewrote their device drivers for greater speed. Some drives, for example, now have "caches," which reduce the number of physical reads and writes the drive must do by buffering whole tracks of data in RAM. The slowpoke of the first round of testing tripled its performance after its device driver was revised, running through the random I/O test in just over 3 minutes instead of 9 minutes. One disk maker's vice-president of software engineering told MIS that his experience with MIS's tests had transformed the way he viewed his software development group. The efforts of MIS, he said, had changed the whole industry for the better.

It was natural to wonder how the hard disks stacked up against floppies, so MIS tried to run its test programs on a Tandon floppy disk drive. The drive never made it. Part way through the random access test the drive failed, and when the engineers examined it they found that its head-positioning coil had burned out. MIS tested another Tandon drive with 100-record files and multiplied by ten the resulting run times. After the 100-record tests, the floppy drive ran more noisily than before, but it survived.

Some drives turned out to be incompatible with certain brands of RAM cards.

Customer Support

The evaluators of each drive called the manufacturer's customer support line, if there was one, to determine how much help a user could expect if problems were experienced. The installation process gave them ample reason to ask most of the drive makers for help. One drive (Corvus) presented no installation problem at all, so the evaluators invented a problem.

Most of the customer support personnel were willing to help and displayed commendable patience with the evaluators' real or pretended troubles. Not all of them

Drive:	Corona	Corvus	Davong ext. 1		Davong int. 1		Genie
Operating system	DOS 1.1	DOS 1.1	DOS 1.1	DOS 2.0	DOS 1.1	DOS 2.0	DOS 1.1
BASICA test run times							
(min:sec) seq. 1:	5:28	5:58	5:21	4:06	5:23	4:05	6:44
(min:sec) random:	3:01	3:59	3:01	1:56	3:03	1:37	3:59
Compiled BASIC test run times							
(min:sec) seq. 1:	4:10	4:48	3:54	2:46	3:56	2:45	5:28
(min:sec) random:	3:00	3:18	2:29	1:14	2:30	1:14	3:41
Utilities provided with disk**	Backup, file status utilities	Backup, spool, diagnostics, volume write protect	Copy, backup, file conversion between operating systems, cache allocation				Copy, backup, assign drive to drive name. Quadram RAM disk works
Local area net	No	Yes	Yes	Yes	Yes	Yes	Yes
Variable virtual drive size	Yes	Yes	No	Yes	No	Yes	Yes

  *Extrapolated results from a test with 100 records.

**All subsystems come with an install program and a program for checking disk and file status.

Table 3: Software and Performance

were able to help effectively, though. As noted above, some of them were unaware that their adapter cards were incompatible with common RAM cards, a problem that many users were likely to experience and not be able to solve by themselves.

When MIS had hardware problems, the factory generally repaired the drive in less than a day. The drive makers were aware that their products were being evaluated, however, so an individual user might not get the same level of response. MIS recommends that anyone who depends on a hard disk drive generally look to his or her local dealer for service. The dealer should be able to solve most problems in one business day, by either making an on-site repair or loaning another drive while the broken one is in the shop.

The drive makers' attitude toward software upgrades was encouraging: most said that they intend to supply copies of revised software free or at nominal cost to current owners of their equipment.

Results

The most significant result of MIS's testing program was the effect that the testing program itself had on the hard disk drive industry. Many drive makers made improvements in hardware and software that were direct results of the findings. Several drive makers' efforts to obtain UL approval and FCC certification were also sparked by MIS's tests. As a consequence, whatever hard disk drive you buy in the future, you'll get a better drive for your money.

Head to Head

How well did each of the drives stack up in the overall evaluations? The MIS group's findings are summarized in Table 4 and in the descriptions that follow.

Corona

Corona's shipping package consisted of foam blocks suspending the drive within the shipping carton. This packaging gave the drive minimal protection. Installation was straightforward and the hardware design was judged satisfactory. The drive performed reliably; in fact, it was the only one that never failed or caused a system crash during the evaluation.

Corona's software was convenient to use. A particularly nice feature was a utility that lists the files stored on all parts of the disk, not just one virtual disk at a time.

IBM PC XT		Santa Clara		Tallgrass		w/o cache	w/ cache	Tandon floppy drive	Tecmar		Xcomp
DOS 1.1	DOS 2.0	DOS 1.1	DOS 2.0	DOS 1.1	DOS 2.0			DOS 1.1	DOS 1.1	DOS 2.0	DOS 1.1
—	4:51	5:04	4:46	7:00	4:48			13:30*	6:15	4:24	5:38
—	2:28	2:42	2:23	4:30	2:31			13:12*	3:57	2:30	3:20
—	3:30	3:44	3:20	5:41	3:34	4:06	2:49	Not tested	5:04	3:40	4:12
—	2:04	2:22	2:00	4:08	2:34	2:43	1:15	Not tested	3:30	2:28	2:59
Supported in DOS 2.0 only		RAM disk, spooler	RAM disk, spooler	Extensive backup				None	None	None	None
No	No	Yes	Yes	Yes	Yes			No	Yes	Yes	No
No	No	Yes	Yes	Yes	Yes			No; only 1 drive name per drive	No	Yes	No

The documentation was judged below average. It was difficult to understand and in several places lacked important information.

Corona Personal Hard Disk IPHD5, Corona Data Systems, 31324 Via Colinas, Westlake Village, CA 91361, 213/707-0672. List price: $1795.

Corvus

Corvus' packaging was judged above average. The drive was suspended in foam blocks inside a box packed inside a second box. Cables were packed separately. Installing the Corvus drive was fairly simple. The original installation program was particularly easy to use. It was fully menu driven and installation took about 10 minutes. (Corvus has since replaced this program with a new one that is more powerful but is more difficult to use.)

This was the most mature product MIS tested. Its engineering was so refined that most "rough edges" were gone. For example, where wires passed through holes in metal, the holes were grommetted to prevent insulation from fraying. The disk was properly shock mounted. One weak point was the data cable socket on the back of the adapter card, which one evaluator considered not sturdy enough to stand up to routine rough treatment.

Corvus' drive was the first hard disk for the PC to receive UL approval. A high level of reliability reflects the product's maturity.

Software was designed to support Corvus' local area network, so it had several unusual features. Two or more network users can share a file, but if one user needs exclusive control of data to update it, he or she may lock other users out of a record, a file, or a whole disk. It is possible to define several "user IDs," which function like passwords: no user can access another user's files without the owner's permission. The same files can be read in both PC-DOS (1.10 or 2.00) and CP/M-86.

The evaluators found the documentation well written and organized, but one user reported that he could find no information on how to reconfigure the disk to function as one large volume instead of five small ones— a major omission.

Corvus Models 6 and 11, Corvus Systems, 2029 O'Toole Ave., San Jose, CA 95131, 408/946-7700. List price: Model 6 $2495, Model 11 $3495.

Davong

Davong's packaging was judged above average, with each component boxed inside the main carton. The Davong external drive was not considered easy to install. The data cable had to be cut to fit and was supposed to

⊜ Review

be installed with an elaborate set of clamps. MIS found that the easiest way to install the Davong controller card was to remove all other adapter cards from the PC during installation.

The internal drive was easier to install, but the hardware evaluators felt it ran too warm. Overheating was a problem with all the internal drives tested, not just Davong's. MIS concluded that the PC simply can't dissipate the amount of heat generated by a hard disk and shouldn't be used with internal drives. (This conclusion doesn't apply to the IBM PC XT, which was redesigned to accommodate the IBM Fixed Disk.)

Davong's software installation was the easiest of any drive tested. On the other hand, this drive had less flexibility than some others. Davong reports that it is working on a revised software package that will offer more options.

The evaluators determined that the Davong drive's outstanding characteristic is quality of support. During installation, MIS called Davong about a technical problem; when asked where the drive was purchased, the installer said "mail order." Davong's technical support people were helpful and stuck with the problem until it was solved.

When the drive was damaged by a power glitch during an electrical storm, Davong provided same-day factory repair service. The instant service may have been due in part to Davong's awareness that the drive was being evaluated, but a local ComputerLand reported that it was able to turn around Davong repairs in one or two days.

Davong's typeset documentation was judged above average in thoroughness and clarity. The installer did find errors in the installation instructions, however. An errata sheet was packed with the drive, but the installer missed it until he had wasted over an hour trying to make the drive work with incorrect switch settings. A version of the documentation that corrects the earlier errors is now available.

DSI 501 and 506, Davong Systems, 217 Humbolt Ct., Sunnyvale, CA 94089, 408/734-4900. List price: 501 $1845, 506 $1995.

Genie

The Genie drive's packaging was judged average. The drive was suspended on foam blocks inside a carton. It was more difficult than most to install. Its data cable was thick and round rather than the more common ribbon type. It was so rigid that positioning the PC or disk drive close to a wall was difficult.

The hardware and software seemed well designed and functioned properly. Reliability was judged above

Drive:	Corona	Corvus
Noise level*	Low	Low
Hardware evaluation	Good	Good
Shipping package	Fair	Good
FCC approval	No	No
Documentation	Fair	Very good
UL approval	No	Preliminary

*Noise level was judged relative to background noise level in a typical office.

Table 4: Technical Evaluation

average. The evaluators had occasional problems with backup and restore procedures that failed to restore all of a file. Genie claims that this problem was due to bugs in an early version of the controller board and that these bugs have since been fixed.

The evaluators found Genie's documentation accurate and complete, but difficult for a novice to understand. It used many technical terms without defining them.

Genie 5 + 5 (Model 1200), Genie Computer, 31131 Via Colinas, Westlake Village, CA 91362, 213/991-6210. List price: $3995.

IBM

The evaluators felt that IBM's Fixed Disk was typical of IBM products: impeccably designed and constructed. The drive has gotten full UL approval and FCC Class B certification. The shipping package seemed excellent. The IBM PC XT comes with the Fixed Disk already installed, so hardware installation was not an issue. Software installation was quick and reasonably easy.

IBM's software worked well, but was less extensive than that offered by many other drive makers. The only significant utility provided by IBM was a backup/restore program.

DOS 2.00 has a provision for "partitioning" the disk so that different parts of it can be used by different operating systems. No provisions are made for transferring files from one operating system to another. There is also no provision for dividing the disk into separate virtual disks, although subdirectories, a new feature of DOS 2.00, tended to provide the same function.

The documentation for the Fixed Disk is part of the DOS 2.00 manual. The evaluators considered it thorough and accurate, but not easy for a novice to understand.

Davong ext. 1	Davong int. 1	Genie	IBM	Santa Clara	Tallgrass	Tecmar	Xcomp
High	High	Low	Low	Low	High	Low	Low
Good	Fair	Good	Very good	Very good	Very good	Good	Fair
Good	Good	Fair	Very good	Fair	Fair	Very good	Good
No	No	No	Class B	No	No	Class B	No
Good	Good	Good	Good	Fair	Good	Excellent	Good
No	No	No	Yes	No	No	No	No

DOS 2.00 is a more complex system than DOS 1.10, and they thought that IBM did not do an adequate job of adapting the manual to deal with the extra complexity.

10M Fixed Disk, IBM, Systems Products Division, P.O. Box 1328, Boca Raton, FL 33432, 800/447-4700, 800/322-4400 Illinois, 800/447-0890 Alaska, Hawaii. List price: $1695.

Santa Clara

Santa Clara's shipping package was judged average. Installation was easy: all that was required was plugging in the adapter card and connecting the cable. Because the unit was larger than most, it had good ventilation and was easy to disassemble for servicing. However, the drive's upright box shape was judged inconvenient by some testers, since it could not be put under the system unit or between the system unit and the display.

The data cable was long enough to allow the drive to be placed under a desk, away from the system unit. The cable was color coded, presumably to help the user orient each plug correctly. Unfortunately, the color coding was backwards (the coded side was supposed to be up on the system unit end and down on the drive end), making the color coding a trap rather than an aid.

Santa Clara's software support seemed unusually versatile. It had several valuable conveniences, including the ability to assign virtual drives to different drive letters after booting. The Santa Clara manuals were judged below average. They were unclear in many places and included several errors. Santa Clara reports that the manuals are currently being rewritten.

SCS-15/5R, Santa Clara Systems, Inc., 560 Division St., Campbell, CA 95008, 408/374-6972. List price: $5056.

Tallgrass

The Tallgrass drive took longer to install than any other, mainly because it took about two hours to format the 12-megabyte disk. This seemed to be due to the fact that the formatting program verified and tested each track during the formatting process.

Hardware and software fit together nicely in this well-thought-out product. MIS appreciated that the utility programs were menu driven and that Tallgrass provided extensive facilities for backing up files on the built-in digital tape cartridge and restoring them to the disk. One user reported recurring problems with files that appeared to have been saved but could not be restored. The MIS group did not determine whether this was a hardware or software problem.

Tallgrass has a provision for duplicate directories, which are a valuable aid to reliability. If a hardware error wipes out the main directory, the secondary directory can be used to recover files. In addition, Tallgrass was the only drive tested that provided cache memory allocation as an option. The user can test the speed of the disk for a specific application with or without cache and use the appropriate version.

The documentation was judged good. It seemed as if an inexperienced person could install the drive and make it work. All the important information was clear and complete.

Tallgrass TG 3012, Tallgrass Technologies, 11667 W. 90th, Overland Park, KS 66214, 913/492-6002. List price: $3495.

Tecmar

Tecmar had the best shipping package of any of the drives evaluated. The drives were protected by two cartons, one inside the other, with foam blocks in between. Tecmar's installation instructions were judged the most

⊜ Review

complete of any of the drives tested. They were clear, easy to use, and accurate. Installation was complicated by the short data cable, however. The drive was intended to sit under the PC system unit and not be moved from one side of the system unit to the other unless the adapter card was moved from a left-hand to a right-hand slot. Due to the short cable, the assembled system was difficult to move. Because neither end of the cable had a plug, the hard disk could not be unplugged and moved separately.

After the evaluations, Tecmar was the first hard disk maker to obtain the FCC's class B (residential use) certification. Since no adequate test facility was available close to Tecmar's plant, the company had to build its own lab at a cost in excess of $100,000.

The MIS team felt that an important advantage of the Tecmar drive was that it added free expansion slots to the PC. The drive is built into a cabinet that has six expansion slots. One of the drive slots is occupied by the hard disk controller, and one drive slot and one system unit slot are occupied by bus expansion cards. This leaves a net gain of three slots.

Tecmar's software support was judged less thorough than average. Many of the utilities that other drive makers offer were not included. The drive proved incompatible with RAM disk programs other than Tecmar's. And Tecmar's program in turn worked only with Tecmar's RAM card.

Winchester Share/10 Expansion (Model 40200), Tecmar, Inc., 23600 Mercantile Rd., Cleveland, OH 44122, 216/464-7410. List price: $2795.
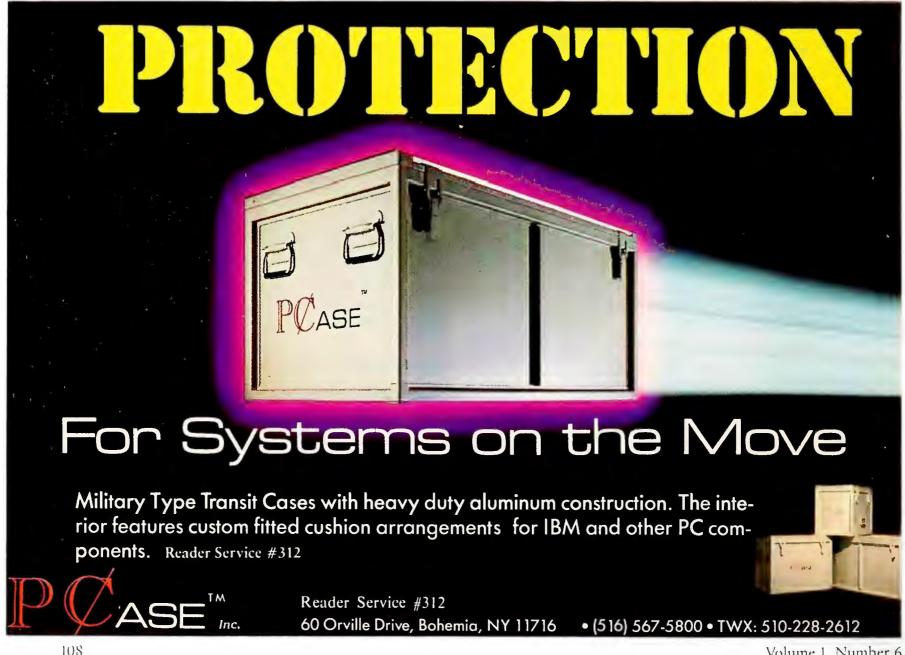
Xcomp

Xcomp's shipping package was judged average and installation straightforward. The hardware design had some shortcomings, however. An internal cable blocked the ventilation fan, impairing air flow. Another internal cable was routed over a sharp metal edge of the chassis, exposing it to the risk of fraying insulation. In addition, the power switch was placed on the wrong side of the fuse. The manufacturer reports that these conditions have been corrected in the current production version.

The software seemed adequate, although one evaluator reported persistent problems with lost information when he copied files. The evaluators found Xcomp's documentation easy to read but discovered several errors. Most of the errors seemed to have been caused by software changes not reflected in the manual.

PHD 8 by 8 (Model 050346-I), Xcomp, 7566 Trade St., San Diego, CA 92121, 619/271-8730. List price: $2395. ⊜

Jonathan Sachs is an independent consultant living near San Francisco who specializes in end user documentation and text processing software development.

StatPac

StatPac: Statistical Analysis Package is a complete data manager and statistical analysis package similar to mainframe SPSS*. StatPac's features include: batch processing, variable and value labels, select if, recode, recode if, compute, compute if, sort cases, list cases, write subfile, frequencies, descriptive statistics, crosstabs & chi-square, correlation & linear regression, t-test for matched pairs or independent groups, multiple linear regression, anova for pregrouped or ungrouped data, two kinds of multiple variable response.

StatPac can handle fixed or free format data files and 5000 cases with up to 255 columns of information per case. Statistic selections and printing options are available on all analysis including paper saving ecology feature.

StatPac is a professional research package and is not recommended for the novice researcher.

**Walonick Associates
5624 Girard Av. So.
Minneapolis, MN 55419
(612) 866-9022**

The quality analysis package for the professional.

Now there's a software package that catches mistakes faster than you can make them.

Typing time for 10-page report: 35 minutes.

Proofreading time with Super SpellGuard: 39 seconds.

Super SpellGuard™

By Sorcim® 2310 Lundy Ave., San Jose, CA 95131 • (408) 942-1727

⊘ SORCIM®

Announcing the Eagle PC. From $1995, simply a better PC.

Eagle clears the air on what it takes to buy a computer.

Announcing the Eagle PC. This compact, economical computer gives you a headstart with its 16-bit microprocessor. User friendliness to a degree which may only be termed: simplicity with elegance. Just plug it in, flip the switch, and go to work.

The Eagle PC is compatible with hardware and software for the IBM personal computer, offering you a host of hardware extras, and your choice of programs from a large library of MS-DOS business and personal application software.

Save time without losing space. Silent, compact and modular, the Eagle PC is small enough to fit on a credenza. Its handsomely sculpted keyboard designed for word processing and financial planning conveniently stores inside the processor enclosure when not in use to save space.

Eagle productivity organizes your business. The Eagle PC is available at a base system price of $1995. Complete, turnkey systems for under $3000 include operating systems, word processing, and financial planning software at no additional charge. For those needing greater disk storage, the Eagle PC-XL, with 10 megabytes of hard disk storage, starts at $4495. High resolution graphics are standard.

Designed for the first-time computer user, the Eagle PC keeps pace with your growth. It is

expandable, so you can add memory, additional disk storage, peripherals, and other options to build a system that will expand with your needs.

The Eagle PC. Simply, a better PC.

Also Announcing New $1595 8-Bit Eagle Power:

Introducing the Eagle IIE Series. Economic sense for business. All models of this exciting product line include disk storage, the CP/M operating system, word processing, financial planning, and the CBASIC programming language. What's more, all models include a full size display, a keyboard tailored for word processing, and Eagle's renowned user-friendly interface. Starting at $1595, the Eagle IIE Series is the best value in the computer industry today.

See Eagle Power in action today. For names of Eagle dealers nearest you, phone toll-free 800-538-8157, Ext. 938. In California 800-672-3470, Ext. 938.

EAGLE COMPUTER

Above and beyond.

IBM is a registered trademark of International Business Machines Corp.
MS-DOS is a trademark of Microsoft Corp.
CP/M and CBASIC are registered trademarks of Digital Research, Inc.

The PC's Perfect Mate

Softword's MultiMate brings the capabilities of a dedicated word processor to the PC.

Janette Martin

There's a new suitor in word processing software for the IBM Personal Computer that just might win your heart. The contender is *MultiMate*, and it courts the market with promises of "full utilization of the IBM PC's hardware capabilities, fast screen response, comprehensive online help facility, minimal training time, and user-friendliness."

If that sounds like the old line you've heard a hundred times before, take another look. In the arena of word processing software for the PC almost everything about *MultiMate* is new and miles ahead of the competition. Designed to emulate a Wang dedicated word processor, *MultiMate* demonstrates the same elegance, functionality, and versatility.

The Connecticut Mutual Life Insurance Company of East Hartford, Connecticut, commissioned Softword Systems, a development and consulting firm, to program this Wang lookalike word processing package. Like many companies involved in bringing state-of-the-art automation into their offices, Connecticut Mutual had been adding IBM PCs to its group of Wang dedicated word processors. Having the two systems side by side presented the inevitable problem of integrating the superior features of dedicated word processing and the multifunctional potential of personal computers.

Word spread concerning the format of this exciting new program, and by late 1982 Softword was marketing its word processor as *Word-Mate* (*MultiMate*'s original name). The most recent release of the program is available in two versions. One version is for a PC or PC XT using DOS 1.10 and requires 128K. The other is for a PC or PC XT with DOS 2.00 and requires more than 128K. The reason for the difference is that DOS 2.00 takes up 12K more disk space than DOS 1.10. Users should make the distinction between versions when buying or ordering *MultiMate*, at least for the present time. Softword expects to produce one version for all configurations in the future. The minimum RAM requirement in any case is 128K. The PC should be equipped with two disk drives, while one disk drive is sufficient for the PC XT.

A difference has persisted between word processing with software on a microcomputer and word processing on a dedicated system like the Wang. This difference might be summed up as loose and tight control over text in edit. Microcomputer word processing software has loose control over text, which describes the situation in which inserted text throws following lines of text out of position on the screen instead of simultaneously reformatting during the insertion. The result is that a reform command must be issued to consolidate the new text.

Inadvertent reformatting of text can have undesirable effects. An extreme example of the effect of loose control is when you have to embed control codes throughout a body of text while entering and then run a format program to see how the text will look on the printed page.

Tight control, a characteristic of editing on a dedicated word processor, means that the program takes care of the formatting while you take care of the writing. Text is consoli-

> **Each function key provides multiple editing features that are often related.**

dated simultaneously when you perform an editing function such as insert, move, or copy. The text appears on the screen as it will appear on the printed page. Tight control also enables you to access common editing commands with a single keystroke. *MultiMate*, like dedicated word processors, offers this sort of tight control over text in edit.

🌢 Review

The Screens

MultiMate is menu driven with menus that are easily manipulated, usually in a keystroke or two. The menus display numbered choices; you can pick a number and press ENTER or F10 to call up your selection or get more information. Figure 1 shows the main menu for document creation, editing, printing, and document handling utilities. This menu is called up on the screen by entering the command WP from PC-DOS.

Once you choose to create or edit a document from the main menu another screen is displayed that asks you to enter the name of a new or existing document. This screen lists all documents currently in *MultiMate*'s file directory. *MultiMate* automatically adds the extension .DOC to all files you create through its program, which allows you to locate your document files easily from the *MultiMate* directory in DOS.

Once a file name is entered, a document summary screen is displayed. If you are creating a new document, you can enter the author, addressee, and operator on the summary screen. The current and last revision dates are displayed automatically at the bottom. Areas on the screen allow you to enter key words and comments to help you clarify the nature of the document and store formatting or printing instructions for later use. If you are editing an old document, the summary information stored with the document during the last edit is displayed, and you can keep or change information as necessary.

After the document summary screen is displayed, you can call up the first screen of the document and begin entering or editing text. In the edit mode each document screen has a status line on the first line of the 24-line display that identifies the document by name and gives page, line, and column numbers to indicate where the cursor is positioned (Figure 2).

System prompts are displayed on the right side of the status line during move, copy, insert, and delete functions. For instance, when a move function is initiated, the program prompts 'Move What' on the status line. After you indicate the text to be moved, the system prompts 'Move Where'. The prompts are convenient reminders of the stages of an editing function in progress.

The second line of the screen shows the format line that controls line spacing, tab positions, and the right margin setting. F9 positions the cursor on the format line. You can then move the cursor to change line spacing, tab positions, and the right margin setting. You can also change formats in the middle of a page by entering a new format line. The new line is positioned on the screen at the place you enter it and controls formatting of all following text until a

---

Almost everything about *MultiMate* is new and miles ahead of the competition.

---

new format line is encountered. If you want to insert a table in the body of your document, for example, you can add a format line with new tab settings to control the tabular data and then enter the data.

To switch formatting back to the way it was before you entered the table format line, you can press Alt-F9, which copies the format line from the top of the current page to the cursor's location. Ctrl-F9 inserts a default system format line. You can enter as many format lines as you want on a page or throughout the document that stay with the document after it is saved and can be recalled for subsequent edits until you change or delete them.

In the current release *MultiMate*'s format lines are limited to 156 character spaces. This line length is peculiar since the Wang system that

MultiMate emulates allows 158 character spaces. The difference could cause a problem, for instance, if you're converting files from Wang to *MultiMate* and the Wang files use the full 158-character line. The reason for the difference is unclear, but Softword claims that the January 1984 release will allow maximum horizontal spacing to be increased dramatically to accommodate, believe it or not, as much as 64K on one line.

At the bottom of the screen the characters *S* and *N* appear. *S* indicates the status of the CapsLock key, and *N* indicates the NumLock key. An arrow pointing down means that the lock is off, and an arrow pointing up means that the lock is on. This message compensates for the PC keyboard's lack of indicator lights on the lock keys. As another useful reminder, these characters appear underlined when auto-underlining is in effect during editing.

In the edit mode *MultiMate* displays formatting symbols on screen, such as codes for tabs, indents, returns, and centered lines. Overall, these symbols prove easy to work with during editing, and they can be handy during a search and replace procedure. For people who are bothered by the symbol displays, a future enhancement to *MultiMate* is supposed to provide a "view mode" that will allow display of a document in edit without any formatting symbols.

One of the most useful aspects of *MultiMate*'s display of documents is that it uses page orientation. This feature provides for text to be presented on the screen as it will appear on the printed page. This orientation is comparable to pages in a book; when a page is ended, no text from succeeding pages is displayed, and you have to press a key to direct the system back to the top of the current page, to the next page, or to any other page in the document. Word processing systems that are not page oriented display document pages in a format similar to text on a scroll of paper; pages may be delineated by a broken line across the screen, but document pages scroll continuously

up and down the screen one after the other. This process can make finding a specific page a time-consuming operation.

MultiMate's page orientation feature allows you to vary the number of lines entered per page so that you can intersperse letter and legal size pages by entering text until you want to insert a page break. You can specify a lines-per-page parameter, such as 56, and the system will issue a prompt when the 56th line is reached during text entry. Setting this parameter produces a prompt that makes you aware of how many lines you are adding to a page. You can continue to enter up to 150 lines per page, but be careful if you combine two pages with a combined count of more than 150 lines.

The Keyboard

MultiMate makes excellent use of the keyboard function keys. They are well assigned for frequently used editing and formatting functions. During document editing these function keys in unshifted position initiate the functions of page break, center, indent, go to page number, enter library, search, move, copy, position cursor on format line, and save text/exit document. Each function key provides multiple editing features that are often related. This logical design makes it easy to remember which functions are accessed through particular keys. For example, F2 breaks a page, Shift-F2 combines two pages, Ctrl-F2 starts document repagination, and Alt-F2 establishes page length.

MultiMate also uses the Alt and Ctrl keys combined with alphanumeric, function, and numeric keypad keys. Alt pressed in conjunction with specific function keys, for example, provides highlighting of text to indicate text to be moved, copied, and deleted. Alt-F5 highlights words, Alt-F6 highlights lines, Alt-F7 highlights sentences, and Alt-F8 highlights paragraphs. Line scrolling is speeded up with Alt-F3 (line left) and Alt-F4 (line right). Combining Alt with the numeric keys at the top of the keyboard allows you to save and

MULTIMATE
Word Processor Ver 3.10

1) Edit Old Document
2) Create New Document

3) Print Document Utility
4) Printer Control Utilities
5) Merge Print Utility

6) Document Handling Utilities
7) Other Utilities

9) Return to DOS

DESIRED FUNCTION:
Enter the number of the function, press RETURN

S: ↓ N: ↓

Figure 1: MultiMate Main Menu

DOCUMENT: NEWDOC   PAGE: 1 LINE: 1 COL.: 1
1——>>——>>——>>————————————————————<<

S: ↓ N: ↓
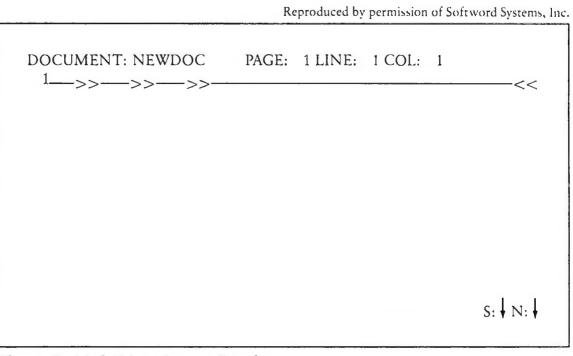
Figure 2: MultiMate Screen Display

exit the document in edit and go directly to utilities such as Print Document or Create New Document without returning to the main menu.

The Ctrl key combined with numeric keypad keys changes the cursor position on the screen. Ctrl-6 (cursor right) moves the cursor to the first character of the next word, and Ctrl-4 (cursor left) moves to the preceding word. When using Ctrl to move the cursor, the program doesn't recognize nonalphanumeric characters such as angle brackets. This fea-

ture should be changed so that Ctrl key movement of the cursor recognizes all keyboard characters.

Editing

The major editing functions provided in *MultiMate* are listed in Figure 3. The program is comprehensive, but it does have some limitations. It doesn't generate automatic paragraph numbering, provide justified dual-column

formats on a page, or format footnotes automatically. However, along with basic editing features, the program provides for headers and footers, including alternating headers and footers for formatting facing pages, and auto-page numbering that may also be included in the header and footer formats. One drawback to the header and footer feature is that each is limited to five lines.

Once a document has been entered and stored, subsequent editing is easy. *MultiMate*'s insert function is as simple to use as pressing a button. While you are inserting text into a line of existing text, all text on the screen from the cursor's current position forward is temporarily cleared. As a reminder of what text follows the point of insertion, the program displays the first 30 characters of text following the insertion point at the bottom of the screen. Once the insertion is complete, all temporarily cleared text returns to the screen.

Moving, copying, and deleting blocks of text are also easy. You position the cursor at the beginning of the block, press the appropriate function key, and then highlight the text by using an Alt-function key combination or pressing any key on the keyboard (including the cursor keys). If you don't highlight text with a function key, the program highlights all text up to and including the first encounter of the key you pressed.

You may want to copy text from a different document into the document in edit. This is called an external copy, since the text to be copied is outside the document in edit. Once the external copy function is activated, you name the document from which to copy and the cursor moves to the first line and column of the external document. You then find and highlight the text to be copied back into the document in edit. An external move feature would be at least as useful as the external copy feature, but *MultiMate* does not offer it yet.

MultiMate also allows you to manipulate columns of text and numbers through the use of Column mode.

Cursor Positioning	Escape	Printing Functions
Up Cursor Position	External Copy	Background Print
Dn Cursor Position	Footers	Draft Print
Rt Cursor Position	Hard Space	Enhanced Print
Lft Cursor Position	Headers	Right Justification
End (of Screen)	Hyphen (Soft)	Stop Print
Go Go Page Number	Indent	Variable Print Pitch
Go Go Page Mark	Insert	
Home	Move	Advanced Functions
Next Page	Page Break	Column Calculations:
Next Word	Page Combine	Horizontal Addition
Page Down	Page Length	Vertical Addition
Page Up	Repaginate	Column Manipulation
Previous Page	Replace	Document Merge
Previous Word	Req'd Page Break	Library
Set Place Mark	Search	Library Attachment
Scroll Cursor Left	Stop Print	Repaginate
Scroll Cursor Right	Strikeover	
Search	Subscript	Misc. Functions
Top of Page	Superscript	Help Screens
		Highlighting by:
		character, word,
Editing Functions	**Formatting**	line, sentence
Auto Page Number	**Functions**	paragraph, page and
Auto Underline	Format-Change	cursor positioning
Character Insert	Format-Current	arrows.
Character Delete	Format-Delete	
Copy	Format-Page	
Decimal Tab	Format-System	
Delete	Status Line	
Document Merge		

Figure 3: MultiMate Edit Functions

Columns may be moved, copied, inserted, and deleted within a page of text in a document. One problem with the Column mode occurs when you move a column that has carriage returns at the end of each line. The returns are also moved if they are highlighted, throwing the alignment of preceding columns out of format. If you wanted to move the column below, for example, and each number were followed by a return, the returns would be moved because you have to highlight far enough to the right to encompass the longest line (the second one) in the column:

    25.50

     7.025

  2000.99

The problem can be resolved if you enter blank spaces at the end of lines 1 and 3 to fill out to the longest position in the column. But this sort of

manipulation should not be necessary. (A Softword spokesperson says that this problem is being corrected.)

The Column mode also allows you to do simple summing of vertical columns and horizontal rows of numbers. In my tests this feature worked perfectly for positive and negative numbers.

The Esc key allows you to stop any editing or formatting operation in progress while you are editing a document. For instance, once you begin to highlight text to be moved and the system displays the 'Move What' prompt on the status line, you can press Esc to interrupt the move in progress. You return to normal edit mode with the cursor at the position it had before you started the move operation.

The search and replace feature allows you to do global as well as discretionary replacements in text, even though there is no back-to-front feature in the procedure, and the system makes no distinction between upper- and lowercase letters.

Editing is extremely fast. Pages are called up in an instant, even in lengthy documents, and moves, inserts, and deletes take just a few seconds to perform. The keyboard is easy to learn, not only because of the intelligent assignment of keys to functions, but also because a color-coded keyboard layout illustration is included with the user manual (Figure 4). When you put the layout between the keyboard and monitor, editing functions can be located at a glance. Color-coded mylar tabs naming the keys' functions are also included so that you can adhere them to the keys if you want a more permanent reminder of key locations.

The Library Feature

The Library feature is another part of *MultiMate*'s program. A library document is a special document used to store text and formats that can be recalled and inserted with a couple of keystrokes while you are entering regular documents or editing. For example, you may want to use a library document to store words you commonly misspell, optional paragraphs in legal contracts, or page formats and column headings for statistical documents that you frequently use and don't like to set up each time you need them.

To create a library document you select Create New Document from the main menu and enter a new name. The first page of the library document looks like a normal document screen but doesn't have a page number. The program asks you to give the page a 1- to 3-character code. This code will appear in place of a number in the status line. You enter text or formats to be stored under this code and indicate a page break to enter more text to be stored under a different code. The system continues to ask for a code for each page.

Figure 4: MultiMate Keyboard Layout

After you have completed a library document, saved the document, and accessed a regular document through the main menu, you must attach the library to the document in edit if you want to recall library entries. Attaching means that you tell the system to retrieve stored data from the library document specified in the attach statement.

When I wrote this article, I created a library document called WP with two pages to store the words *Multi-Mate* and *MultiMate's*. I gave the first word a code, *M*, and stored it on the first page of the library document. I coded the second word *MS* and entered it the second page. During edits of nonlibrary documents, I attached WP at any point in my writing. I could press F5 (library) and MS, and the word *MultiMate's* was inserted long before I could have keyed it in. Giving the library documents an extension such as .LIB when they are created, instead of the current .DOC that the program also names regular documents, would be helpful. There
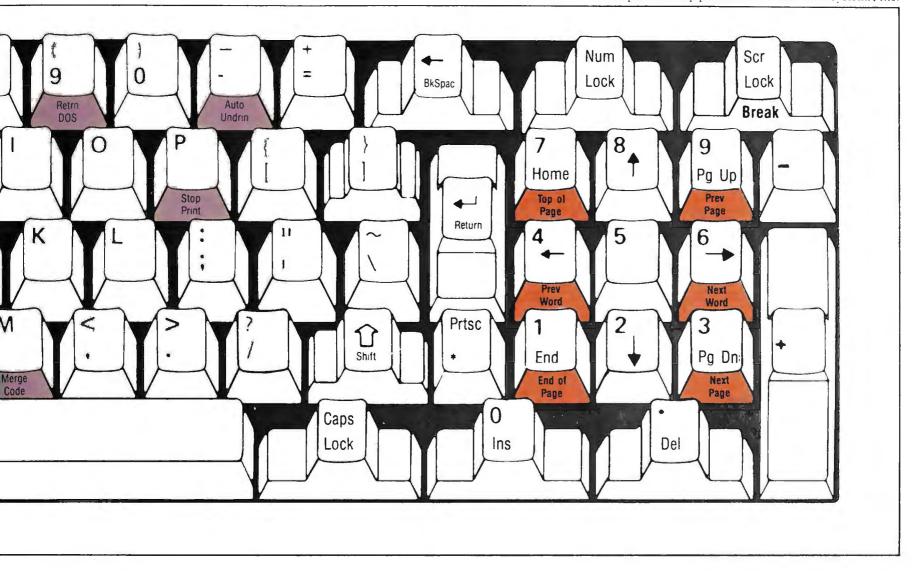
are only two kinds of documents (library and regular); a different extension for library documents would make finding them in directories much easier.

The Merge Feature

MultiMate's merge feature provides easy production of form letters. Through the main menu's Create New Document selection you create primary documents that contain the form, or fixed, information and secondary documents that contain variable information inserted into the form during merge printing. Figures 5 and 6 show how the primary and secondary documents look on the screen during editing.

Each record of the variable data file is divided into fields, and each field is given a user-defined name that is used in both primary and secondary documents. If you want to create a secondary merge document containing customer data, for example,

you can define the record field information as: first name, last name, company, address, zip, first contact date. Each record of the variable data file is entered into the secondary document a field at a time, and the field name surrounded by merge symbols must precede each field for each record in the file. A page break must follow each record entry in the variable file.

But even for a short list of variable data, keying in every field name for every record of the file is a trying task. If you use the library feature to store the field names, you can either recall each field name from the library before entering the corresponding variable data, or you can recall a whole page of field names for each record with blank lines following each field name so that you can insert the variable data into the form.

When a primary document is created, you insert the field names enclosed in merge symbols at points where the variable data from the secondary file will be inserted during printing. When you create a primary document, an excellent advantage in *MultiMate*'s use of naming fields in a record becomes apparent. By naming the fields in the variable file, you can position them by name in the primary document in any order you want, regardless of their order in the secondary document.

Many merge programs, including Wang, do not allow this flexibility, since field data is located by the program and placed in the primary document during merge printing, by position rather than name in each record in the secondary file. For example, if the records in the variable document list the first name and then the last name of a person, merge printing of the primary document would not allow you to output the last name followed by the first name as *MultiMate* does.

Printing Documents

When you want to print nonmerge print documents, you can either select the Print Document utility from the main menu or, if you are editing a document, press Alt-3 and the page you're working on will be saved, the document in edit will be exited, and the cursor will appear positioned on the Print Spooler menu with the document you just exited queued for printing—all in a split second. The Print Spooler menu offers a number of useful specifications that you can change for each printing (Figure 7). Parameters on the Print Spooler menu are underlined, which makes detection of the cursor on the screen difficult.

When you do find the cursor, you can move it with the ENTER key or cursor keys from parameter to parameter. The first two parameters allow you to queue the document for printing at a specified time and date. If you choose to print the queued document's statistics, *MultiMate* will print a copy of the document's summary screen before printing the document itself. And you can print the spooling if you need a hard copy of the Print menu with current specifications for the document about to be printed. The background print selection is especially useful because you can queue up several documents for printing while editing others, thereby making full use of the PC and printer at the same time. The print spooler display shows you a list of printers that *MultiMate* supports, such as IBM, Epson, C. Itoh, Centronics, Qume, and Diablo.

Softword continually adds new printer attribute tables. You enter the name of your printer on the Printer Type line, and your printer's specific

☉ Review

characteristics are supported. If your printer is not specifically listed, you can use a general printer specification (TTYCR or TTYCRLF), and most document formatting is carried out. When I use 'TTYCRLF' with my Toshiba P1350, I do not get boldface, or super- and subscripts. Since my Toshiba is not currently supported by *MultiMate,* I called my printer's technical support staff, and they told me which printer selection I should use. The results were great. All of *MultiMate*'s formatting features worked.

You can also set up your own printer attribute table to make the most of your printer's characteristics if you are technically inclined. You do this through the Editpat utility accessed in PC-DOS. Softword suggests that even if you feel you can set up a customized printer attribute table on your own, you should call them for some helpful advice before beginning. Softword will customize a table for your particular printer at a nominal charge if you send them your printer's technical manual and *MultiMate*'s system disk. During editing you can embed *MultiMate*'s printer control code in text along with ASCII control characters. The codes signal *MultiMate* to take advantage of the specified printing functions unique to your printer.

Utilities
In addition to the Editpat utility *MultiMate* offers several document handling utilities that help you maintain your data efficiently. From DOS you can run *MultiMate*'s file conversion utility that converts your ASCII files to *MultiMate* format. *MultiMate* control codes aren't added to files converted from ASCII to *MultiMate,* but you get the file in a text file format. Going the other way, from *MultiMate* to ASCII, all of *MultiMate*'s formatting codes are stripped from the text.

```
DOCUMENT: NEWDOC        PAGE:  1 LINE:  1 COL:  1
  1——>>——>>——>>————————————————<<
  <<
  ⊢date⊢<<
  <<
  <<
  <<
  <<
  ⊢mr./mrs.⊢⊢first⊢⊢last⊢<<
  ⊢street⊢<<
  ⊢city⊢,⊢state⊢⊢zip⊢<<
  <<
  Dear ⊢mr./mrs.⊢⊢last⊢<<
  <<
  It was a pleasure seeing you at Computer Conference last week. Thank you again
  for your interest in our newest product.<<
  <<
  As discussed, I am enclosing information regarding ⊢product⊢ for your review.
  I hope you find it informative; and if you have any questions, please do not
  hesitate to give me a call.<<
  <<
  I look forward to hearing from you.<<
  <<
                                                    S: ↓ N: ↓
```

Figure 5: Primary Merge Document

```
DOCUMENT: NEWDOC        PAGE:  1 LINE:  1 COL:  1
  1——>>——>>——>>————————————————<<
  ⊢date⊢<<                                            '
  November 25, 1982⊢<<
  <<
  ⊢mr./mrs.⊢<<
  Mr.⊢<<
  <<
  ⊢first⊢<<
  John⊢<<
  <<
  ⊢last⊢<<
  Cain⊢<<
  <<
  ⊢street⊢<<
  26 Scott Drive⊢<<
  <<
  ⊢city⊢<<
  Jacksonville⊢<<
  <<
  ⊢state⊢<<
  FL.⊢<<
  <<
  ⊢zip⊢<<
                                                    S: ↓ N: ↓
```

Figure 6: Secondary Merge Document

```
┌─────────────────────────────────────────────────────────────────────┐
│              SUBMIT A DOCUMENT FOR PRINTING                          │
│                                                                      │
│            Drive: B      Document: JOHNSON-harry                     │
│                                                                      │
│  Current Time is: HH/MM/SS      Delay Print until Time is: HH MM SS  │
│  Current Date is: MM/DD/YY      Delay Print until Date is: MM/DD/YYYY│
│                                                                      │
│          Print Document Statistics?                    N            │
│          Print Spooling Statistics?                    N            │
│          Delete Spooler Entry When Done?               Y            │
│          Print in Background or Foreground (B or F)?   B            │
│                                                                      │
│  Left Margin?                   000   Pause between Pages?      N   │
│  Start Print at Page Number?    001   Right Justification?      N   │
│  Stop Print at Page Number?     999   Proportional Spacing?     N   │
│  Header/Footer First Page Number? 001 Draft Print?             Y   │
│  Printer Number?                001   Default Pitch?            4   │
│  Number of Original Copies?     001   Printer Type?        EPSON   │
│  Document Page Length?          066                                 │
│                                                                      │
│                 Printer Types Available:                            │
│                                                                      │
│           (Printer types will be listed here)                       │
│           Press F10 to Continue, Press ESC to Abort                 │
│                                                                      │
│                                                    S: ↕ N: ↕        │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 7: Print Spooler Menu

I was disappointed with *Multi-Mate*'s file conversion feature. When I converted simple numerical data, the program stripped tabs without filling out the column positions with spaces. As a result, all items in the columns were misaligned after the conversion. Also, when I converted a simple document with paragraphs of text that had no tabbing or other formatting codes, the conversion program ate the last line of each page in the document. The file conversion program seems to be *MultiMate*'s weakest feature. This is an important feature for people who telecommunicate information to typesetters or branch offices. If the files were converted in a page-image format, you could use DOS 2.00 to pipe converted *MultiMate* ASCII files to the DOS sort filter and sort the files, and then convert the sorted files back to *MultiMate* format.

By entering the Recovery command in PC-DOS, you can run a file recovery program that helps restore document data that may have been lost during improper disk removal or from entering too many lines per page during editing.

You can select other utilities from *MultiMate*'s main menu. These include a document handling utility that allows you to move, copy, delete, and rename documents; a utility that lets you page through all document summary screens or search the document screens for key words or comments when you don't remember the name of the document you need and order a printed copy of the all the summary screens on file. A printer control utility lets you access a print spooler menu and change all the print document parameters. The updated parameters become the system defaults and appear whenever you go to print a document that has never been printed. Other utilities allow you to change the format line that always appears as the first format line in a new document you set up—this is the system default format and may also be recalled at anytime during editing with Ctrl-F9. And you can change the drive assignments so that *MultiMate* always accesses the system disk from a certain drive and the documents from another drive.

Documentation

The *MultiMate* user manual and on-screen help are exceptionally well designed and presented. The user manual is concise and compact. It is handsomely packaged in an easel-style 10-inch by 7½-inch binder. Tabs mark nine easy-to-locate sections within the manual. Color coding is used throughout with general comments and directions to the user printed in black, and system responses from screen displays printed in green. The first two short training sessions cover document creation, setting format lines, and entering and editing text using move, copy, delete, and insert. A third training session presents library and merge exercises. A hefty reference section presents an alphabetical listing of the functions of *MultiMate*'s program with descriptions and instructions for using them.

Pages are called up in an instant, and moves, inserts, and deletes take just a few seconds to perform.

Extensive help menus make up the on-screen aids. You can call up the main Help menu from any point in the program, in Edit mode or even from the main menu, by pressing Shift-F1. Once in the Help mode, you can press a function's access keys for a fuller description of the function. If you have forgotten the access keys, you can call up an alphabetical index of all of the functions and the corresponding keys to access them.

Sequel to a Hit

MultiMate's package provides a word processing program, library and merge features, a user manual, a monthly newsletter, and toll-free assistance from Softword's action line in Connecticut. You also get six months of enhancements, including two new releases free, regardless of whether they are released within the six months. If the package you purchase is not the most current release, Softword will give you the latest release without counting the update as one of your two free releases. In other words, they'll catch you up to the most recent release at no cost as long as your purchase date coincides with or follows the date of the most current release.

Enhancements are expected this summer and are said to include a spelling checker with automatic hyphenation, library by example (so you can add library entries to library documents without leaving the document in edit), windowing from the document in edit to other documents on file, and a "view mode" that will enable you to call up your documents

---

MultiMate uses page orientation.

---

for editing without displaying formatting symbols on screen. These enhancements will be sent at no charge to *MultiMate* owners who are under the two releases/six months contract.

A spreadsheet program and data management program that will interface with the current merge feature and provide a sorting capability are in the works and should be announced for release within six months. A synchronous communications package is currently in beta test. The communications program is designed to transmit *MultiMate* files to a mainframe for distribution to multiple work stations, and a communications program that transfers documents intact with control codes between the PC and Wang word processors is in development. All these offerings will be priced separately.

Critic's Choice
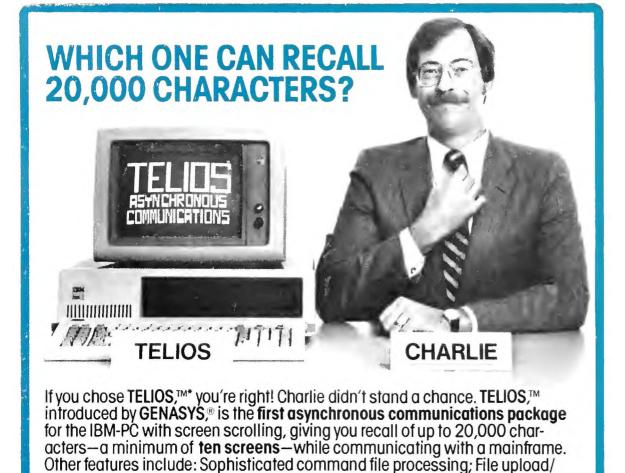
I've used Wang dedicated word processors and some of the more popular word processing programs for the PC. *MultiMate* compares very well to the Wang and is now my preference for use on the PC. Softword seems to be making progress in correcting problems with each succeeding release and enlarging the basic program to include many convenient features. Two personal computers, Corona and Victor, aimed at the PC market are also offering *MultiMate*. I tried the program on a Hyperion (an IBM PC compatible portable), and it worked well. No matter what PC or PC-compatible computer you use, *MultiMate* does a good job of living up to its promise of being friendly to the user. It does just what a word processor should do. It lets you concentrate your energy and attention on writing. ⊜

Janette Martin owns and operates a business that provides information processing services.

MultiMate
Softword Systems, Inc.
52 Oakland Ave. N
East Hartford, CT 06108
203/282-0131
List Price: $495
Requirements: 128K, two disk drives

ANNOUNCING THE END OF WORD PROCESSOR CONFUSION

WORDPLUS-PC
Professional Software Inc.
Copyright 1982

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.

Don't get a new desk just because you bought a computer!

Put Your PC
In The **Tower**
by *lifeline*

The Profit Prophet

Forecasting results in the world of finance

Steve Nelson

Predicting the future in any business is difficult because so many variables can trigger success or failure. A product such as Ashton-Tate's *The Bottom Line Strategist* offers simple solutions to complex decision-making problems and should be cautiously welcomed for its attempt to make such predictions.

The purpose of *Strategist* is to perform feasibility studies and profitability and risk analyses throughout the life cycle of a product. *Strategist* simulates a business situation, such as marketing a product, and makes projections based on a set of assumptions. It succeeds in its appointed task but not without some drawbacks.

Getting Started

Strategist first requires that you enter 31 "Key Business Assumptions" (Figure 1 shows one of four screens) from which it makes projections or business forecasts, illustrated in various reports and graphs of your choice. This menu-driven program is easy to use. The manual effectively walks you through two examples to show how *Strategist* analyzes the marketing feasibility for both a product and a service. The first example is the case of a "Small Business Bringing a New Product to Market." The second example is described as the more sophisticated case of a "New Computer-Based Transaction Service," a fancy description for a service bureau that rents out computer time.

Using these examples, the documentation explains how to enter the key business assumptions and what each one means. The consequences of changing key assumptions are demonstrated in detail; even a small change may mean the difference between financial success and failure. Data and graphs for the first example

---

The usefulness of *Strategist* is somewhat limited in its present state.

---

are also provided on disk so you can practice before trying your own application. A help screen explains each business assumption and also includes a page reference to where the information appears in the manual.

Because *Strategist* calculates very quickly, you can easily experiment with changing the data for the assumptions. If you do not understand or cannot easily obtain data required for an assumption, you can test its importance with a method called sensitivity analysis, which shows the effect of different assumptions on the results. One problem is that data entry is more difficult than necessary for some of the assumptions because

all dollar amounts are entered in thousands of dollars, meaning 50 cents is entered as .0005.

The Business Forecasts Graphics Menu (see Figure 2) displays the various projections (forecasts) along with the four graphic presentation options. Tables and graphs may be viewed on screen or printed out, with varying quality. This menu also contains a Help option that explains each projection.

Strangely enough, the Master Menu has been fleshed out with extra items usually provided only in a manual. In addition to five major Action selections, this menu includes items such as an Executive Overview that is nothing more than product advertising, a flow chart for the various business modules used in *Strategist,* and a nondisclosure agreement. Most users won't have a burning desire to read a nondisclosure agreement on screen.

Data Analysis

Strategist has quite a bit of flexibility in that it can analyze either products or services. The major shortcoming is that only one product or service can be analyzed at a time, and only one price can be calculated. Most businesses sell multiple products in different sizes or configurations and at various prices. (The manufacturer claims that a planned new version of *Strategist* will analyze multiple products.)

```
KEY BUSINESS ASSUMPTIONS

  BUSINESS GROWTH                              MARKETING AND ADVERTISING

Length of development        5.00    Saturation level of              500.
effort in months                     sales in thousand
                                     dollars per month

Number of customers           200    Marketing-advertising            1.50
at first month of                    reach (sales-response
sales                                constant)

Maximum number of            2000    Portion of sales lost           20.00
customers per month                  per month in % if
                                     marketing is stopped

Time in months to reach      5.00    Time lag between                 4.00
50% of maximum sales,                marketing expense and
starting with first month of         resulting revenue in months
sales

Number of sale               1.00
transactions per
customer per month

   P  TO PRINT   N  NEXT SCREEN   F  FORMER SCREEN   RETURN  FOR MASTER MENU
```

Figure 1: One of Four Key Business Assumption Screens

```
BUSINESS FORECASTS GRAPHICS MENU       BOTTOM LINE STRATEGIST™ © 1982

1  Number of customers               10  Contribution of depreciation to NPV

2  Number of sales                   11  NPV after tax shelter

3  Total revenues                    12  Display special   assistance

4  Marketing and advertising costs   13  Return to MASTER MENU

5  Total costs                      ┌──────────────────────────────────┐
                                    │ OPTION                           │
6  Cash flow                        │                                  │
                                    │ 1  Monthly data    4  Cumulative data │
7  NPV before tax shelter           │                                  │
                                    │ 2  Month-to-month  5  Help       │
8  Book value of assets             │    change                        │
                                    │ 3  Month-to-month                │
9  Depreciation tax shelter         │    % change                      │
                                    └──────────────────────────────────┘

                                      SELECT   Option
```

Figure 2: Business Forecasts Graphics Menu

Averages of data for more than one product can be considered, but this won't help for products that have significant differences. Although only one price can be calculated at a time, you can vary the price by adjusting for inflation. To do this, determine the inflation rate using the Consumer Price Index (or any other index) and enter this information for the inflation accounting assumption. In addition, *Strategist* analyzes only one type of asset and one depreciation rate with no provision for investment tax credits.

Although entering data is easy with *Strategist,* understanding how the program derives its projections is another matter. The appendix to the manual has a reference section that includes all the economic formulas used in developing this program. One of the main formulas *Strategist* uses is called the logistic curve, an S-shaped

☰ Review

curve used to model business growth. Another key formula, the Vidale-Wolfe model, is used to estimate marketing and advertising costs.

Unfortunately, the explanation of the theory behind these formulas is not sufficiently detailed to make them comprehensible to someone without economics training. The theory is complex enough to constitute a complete course in graduate level economics or marketing management. Instead of providing a comprehensive explanation, the manual refers you to several textbooks for additional study.

Reporting

Excellent bar graphs can be displayed on a monochrome or color monitor without graphics hardware. You can get a closer look at any part of the graph with a handy zoom feature. The effect is to magnify several times any section of the graph that you choose. Printed graphs are somewhat plainer: bar graphs on the screen become a series of dots on the printout. This was done in order to allow the use of any kind of printer. (The manufacturer claims that with version 1.1 solid bar graphs can be printed out using an Epson MX-80 or MX-100 printer.)

Any of the business forecasts can be displayed in graph form. However, some thought is required to produce useful graphs. If you select Action 8 and Option 4 from the Business Forecasts Graphics Menu, the result will be a cumulative total of the net book value of your assets at the end of each month, a meaningless amount. Why would you want a cumulative total of all your balances when only individual monthly balances are important? Although with some study of the help screens you should be able to figure out which graphs are useful, it would make more sense if the program displayed an error message before allowing you to print pointless graphs.

Month	Number of customers	Number of transactions	Cumulative transactions	Total revenues
1	0	0	0	0.000
2	0	0	0	0.000
3	0	0	0	0.000
4	0	0	0	0.000
5	0	0	0	0.000
6	0	0	0	0.000
7	200	200	200	0.000
8	323	323	523	0.000
9	500	500	1023	1.000(A)
10	732	732	1755	1.614
11	1000	1000	2755	2.500
12	1268	1268(D)	4023	3.660

Total revenues (A) = number of transactions two months previous (200) × selling price ($5)

Total costs (B) = marketing costs (C) + variable costs (D × $.50) + fixed costs ($1000)

Table 1: Two Printed Reports Combined for "Small Business Bringing a New Product to Market"

Three printed reports are available in addition to the bar graphs. Two of the reports are combined in Table 1. The third is a Profitability Analysis Summary Report, which highlights the data from the first two reports in a different format. Before printing these reports you must choose Action 3 on the Master Menu (Forecast and Analyze Profitability and Tax Shelter) to display the calculated results on screen. The calculations are so quick that the data for every 12 months prints over the previous 12 months almost faster than you can read them. You can stop the action by pressing Ctrl-S, but you have to be fast. To get a decent look at the results, you must request a hard copy of the report by selecting Action 5 (Generate Profitability Reports).

Understanding these reports requires careful consideration. First, the terms used should not be confused with normal accounting terminology. To avoid confusion of cash and accrual terms, the columns "Total Revenues" and "Total Costs" would be more accurate if relabeled as Total Cash Inflow and Total Cash Outflow.

Secondly, unless you take time to analyze them, the relationships between the forecast variables won't be clear. Table 1 combines two of the printed reports for the *Strategist* example "Bringing a New Product to Market." "Total Revenues" (A) are based on the selling price of $5 (a key business assumption for this example) multiplied by the number of transactions (200) two months previous. "Total Costs" (B) are the sum of "Marketing Costs" (C) plus variable costs ($.50, as determined by a key business assumption, multiplied by the "Number of Transactions" (D) in the following month) plus fixed costs of $1000, also a key business assumption. These calculations have to be deduced, as the manual does not explain how they were derived for the example.

In addition, the dollar amounts of cash in (total revenues) and cash out (total costs) are not adjusted for inflation (reportedly to be corrected in

Marketing costs	Total costs	Cash flow	Book value of assets	Depreciation tax shelter	NPV before tax shelter	NPV after tax shelter
0.000	4.000	-4.000	1.940	0.030	-1.983	-1.954
0.000	4.000	-4.000	3.820	0.060	-3.950	-3.861
0.000	4.000	-4.000	5.640	0.090	-5.900	-5.724
0.000	4.000	-4.000	7.400	0.120	-7.834	-7.542
0.667	4.667	-4.667	9.100	0.150	-10.071	-9.636
0.544	1.644	-1.644	8.800	0.150	-10.853	-10.276
0.809	1.970	-1.970	8.500	0.150	-11.781	-11.064
1.112	2.362	-2.362	8.200	0.150	-12.886	-12.030
1.391	2.757	-1.757	7.900	0.150	-13.720	-12.727
1.576	3.076	-1.462	7.600	0.150	-14.428	-13.298
1.640(C)	3.274(B)	-0.774	7.300	0.150	-14.841	-13.575
1.615	3.365	0.295	7.000	0.150	-14.802	-13.403

version 1.1), though such an adjustment would seem to be implied by the documentation and the fact that you're entering an inflation rate as a key assumption. Only by examining the formulas in the appendix do you discover that cash flows are adjusted for inflation solely in the Net Present Value (NPV) calculations.

The format for the printed reports shown in Table 1 should be completely redone for greater detail and readability. In its current state the format is confusing and incomplete. Presentation in financial statement format would make better sense for use by the average business person. For this reason, entering the data obtained from *Strategist* into a spreadsheet such as Lotus' *1-2-3* would be a logical next step.

A needless annoyance is the awkwardness of printing a report more than 80 columns wide. Printing such a report using an Epson MX-80 printer requires exiting the program and setting the printer to the compressed print mode before you can

restart *Strategist* to properly print the forecast report. Other programs that generate reports have a facility for turning on the compressed print mode from within the program. (The manufacturer claims that this problem will also be corrected in version 1.1.)

The usefulness of *Strategist* is somewhat limited in its present state. The concept is good but the implementation could be improved. Apparently version 1.1 will include some of these improvements. However, being able to analyze only one product is a severe restriction.

Contrary to the manufacturer's claim that anyone who deals with money can use *Strategist,* some people will find it unsuitable for their needs. The key business assumptions are all sales oriented, so it's difficult to imagine a government project manager with no product to sell making use of the package. For the owner of a small business who is without the resources for extensive market research, many of the key assumptions would have to be straight guesses, although such an owner could test the importance of each guessed assump-

tion by adding a sensitivity analysis.

The people most likely to benefit from using *Strategist* would be product managers for large consumer-oriented marketing companies. *Strategist* would also be useful for training or in the classroom. If you need quick results that predict the feasibility of selling a product or marketing a service, *Strategist* performs satisfactorily.

Steve Nelson is a computer consultant in the San Francisco area who specializes in business applications for the IBM PC.

PULL. PULL. STICK. STICK. CHANGE PERFORMANCE THAT QUICK.

What you see here is a remarkable system that will change the personality of your IBM Personal Computer. A system that makes it possible for you to use your PC to develop applications that normally require the resources of a much bigger computer. A system that quite literally transforms your computer from personal to professional. Here's how:

Easy As A,B,C

First you apply the character labels to your keyboard, then you plug in the custom ROM that will enable your PC to display these new characters. Third, you insert the disk and load the software to complete the change: APL★PLUS®/PC System from STSC.

Now, instead of limiting yourself to off-the-shelf spreadsheets, word processors, or slow program development in BASIC, you can develop custom solutions to problems that previously were beyond the scope of your PC.

The APL★PLUS/PC System is a complete APL language processor from STSC, the leading supplier of APL products and services for more than 14 years. It also includes STSC's business report formatting feature, communications capabilities, and data management features.

The APL★PLUS/PC System can inter-

face to non-APL programs and data files so you can integrate your other software packages with the APL★PLUS/PC. And APL programs developed on your PC will run on other desktop computers, minis, and mainframes that support APL. Software developers may license the APL★PLUS/PC System to develop APL applications for resale using a run-time version of the system.
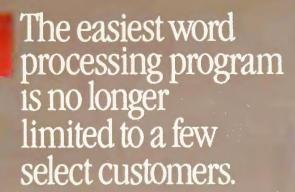
Everything You Need for Application Development

It's all here in our comprehensive package. In addition to the keycap labels, custom ROM, and software disk, you also get a reference manual, an introductory tutorial, and a widely used APL textbook. All for only $595.

The APL★PLUS/PC System requires an IBM PC or IBM PC XT with PC DOS, at least 128K RAM memory, and one floppy disk drive. To order APL for your PC, call or write STSC, Inc., 2115 East Jefferson Street, Rockville, Maryland 20852, (301) 984-5123.

stsc
A Contel Company

Reader Service #282

The easiest word processing program is no longer limited to a few select customers.

Now you can get the same Select™ program that's made powerful word processing easy for customers like Digital, Ford Motor Company, Citibank and Hughes Aircraft. In fact, Select is the easiest-to-learn, easiest-to-use word processing program. And it is now available to you, the professional user.

Only Select offers you Teach,™ an onscreen teaching program in plain English that will have you composing, formatting, editing and filing documents in 90 minutes or less. There are no lengthy manuals to read, your computer teaches you. And that's just the beginning.

Single keystroke commands speed you through a job without endless keystrokes and complicated commands. Select offers you time-saving features like Superspell™—a dictionary that automatically catches and corrects spelling errors. Mail merge/print lets you personalize form letters and compile huge mailing lists. And it's all in one complete package at one price. With Select, there's no need to return to your dealer again and again for costly add-ons.

Select is designed to run on the most popular business microcomputers from IBM, Digital, Xerox, Victor, NEC, Altos, Apple, Televideo, Texas Instruments and many more. And it's compatible with a wide variety of other software such as Multiplan, VisiCalc, and 123.

Select is easy to find, too. For the name of the dealer nearest you, call or write us today. You'll discover just how easy it is to do business as a Select customer.

Select... The information processing people.

Select Information Systems

Select Information Systems
919 Sir Francis Drake Boulevard
Kentfield, California 94904
Telephone: 415-459-4003

THE CASE OF THE MISSING WINGTIP WIDGET

IRMA and Charlie are mad for each other.

From the moment your IBM Personal Computer meets IRMA,™ you're going get better data, more quickly and efficien That's a promise.

IRMA is a Decision Support Interface a circuit board that slips into your PC and provides a direct link to the data base in your IBM mainframe computer. The connection is made via coaxial cabl to your IBM 3270 controller.

IRMA opens the 3270 door.

With IRMA, there's no more getting in line to use the 3278 terminal—your PC can now replace it. No more tieing up th big computer with a lot of "what if" ques tions. You pull what you want from the mainframe, easily and economically, in yo office, whenever you want it.

For more about IRMA, write TAC, 120 West Wieuca Rd. N.E., Atlanta, Ga 30042 or phone (800) 241-IRMA. She' an interface whose time has come.

Getting computers down to busines

TAC

PROLOK™ protection means software security.

User-transparent protection technology that *works* – right on the disk.

PROLOK protection is a tested technology that customizes a quality diskette with a unique 'fingerprint' before software is installed. (PROLOK diskettes are guaranteed to meet or exceed all ANSI standards for floppy diskettes.)

Tough to break

Bit and nibble copiers are ineffective when you utilize PROLOK diskettes. This eliminates the threat of mass by-pass or unlock schemes.

Easy to use

PROLOK protection is invisible to the legitimate purchaser. End users are not locked to a specific configuration or machine. The technology is not hardware dependent.

Protection plus

Back-up copies may be made but will only work on the PROLOK disk. Protected files may be transferred to and run from *hard disks*. Leading mass duplicators already support the PROLOK process.

Inexpensive to buy

PROLOK protection is low cost insurance for your software . . .

quantity 1 to 10,000 or more. An evaluation diskette is just $9.95 including postage and handling.

Available now

We're now shipping for IBM PC and XT, Atari, Apple and selected CP/M systems. Call or write for your PROLOK evaluation disk today:

PROLOK™

Vault Corporation
1320 S. Baldwin Ave.
Arcadia, CA 91006
(213) 574-8594

Software Protection

THE PROLOK DISK

◙ Vault Corporation

Putting Your PC on the Line

Jack Powers

Telephone computer input with voice response is no longer limited to use with big computers and even bigger budgets. Vynet's telephone interface allows you to keep your IBM PC as close as the nearest telephone.

Most people are surprised to learn that an ordinary telephone can double as an effective computer terminal if the right hardware is attached on the computer end. But tone-dial telephones have been used for years as terminals in applications such as remote order entry to large central computers.

Using telephones as terminals when the computer's output is in the form of spoken words and sentences is not difficult for people to learn. In places where tone dialing is not yet available, a small battery-powered tone keyboard (such as the Radio Shack model 43-138 for $24.95) placed over the handset's mouthpiece may be used.

More recently, electronic banking has reached out to touch the lives of many people who have never interacted directly with a computer. With a few simple instructions, bank customers can pay bills, request balances, and transfer funds between accounts from almost anywhere 24

hours a day. This idea will spread to other businesses soon; computerized mail-order houses may add a new dimension to the slogan "let your fingers do the walking."

Vynet Corporation of Los Gatos, California, is now shipping an accessory for the IBM PC called the Interactive Telephone Interface. This device enables you to use the keypad of a remote tone-dial telephone to enter data to your PC; the telephone's earpiece delivers a spoken response.

The basic Vynet PC hardware, consisting of a printed circuit card (model V101-I), is capable of both placing and answering telephone calls and producing and decoding tone signals. Calls may be originated with either tone or pulse dialing. A small plug-in module adds voice output capability (model V200-VSM) and is supplied with a 300-word vocabulary on disk. A second plug-in module adds a low-speed optional modem (model V200-LSM) that allows communication with asynchronous terminals or computers at speeds up to 300 bits per second. The card is certified for direct attachment to a standard telephone line and includes a modular telephone jack. Additional connectors are provided for speaker output from an on-card amplifier and for audio input and output to and from the telephone line. Figure 1 is a block diagram of the Interactive Telephone Interface with the voice synthesis module (but not the modem) included.

Software is supplied with the V101-I to demonstrate and test the hardware and edit raw vocabulary data into units called phrase modules. A 300-word vocabulary disk is standard; a 1300-word disk is available as an option (model V120). A custom recording service is available for special applications.

The ability to dial calls is one way in which the V101-I differs from many of its predecessors.

Vynet Applications

The Vynet telephone interface is natural for any application in which the computer must be accessible from many locations that have no special data equipment. This type of hardware is useful for situations in which the input data is mostly numeric (rather than alphabetic) and fairly fixed in format.

Remote order entry is a classic example of this type of application: traveling sales people or in some cases customers can call the computer, identify the account, and then enter part numbers and quantities.
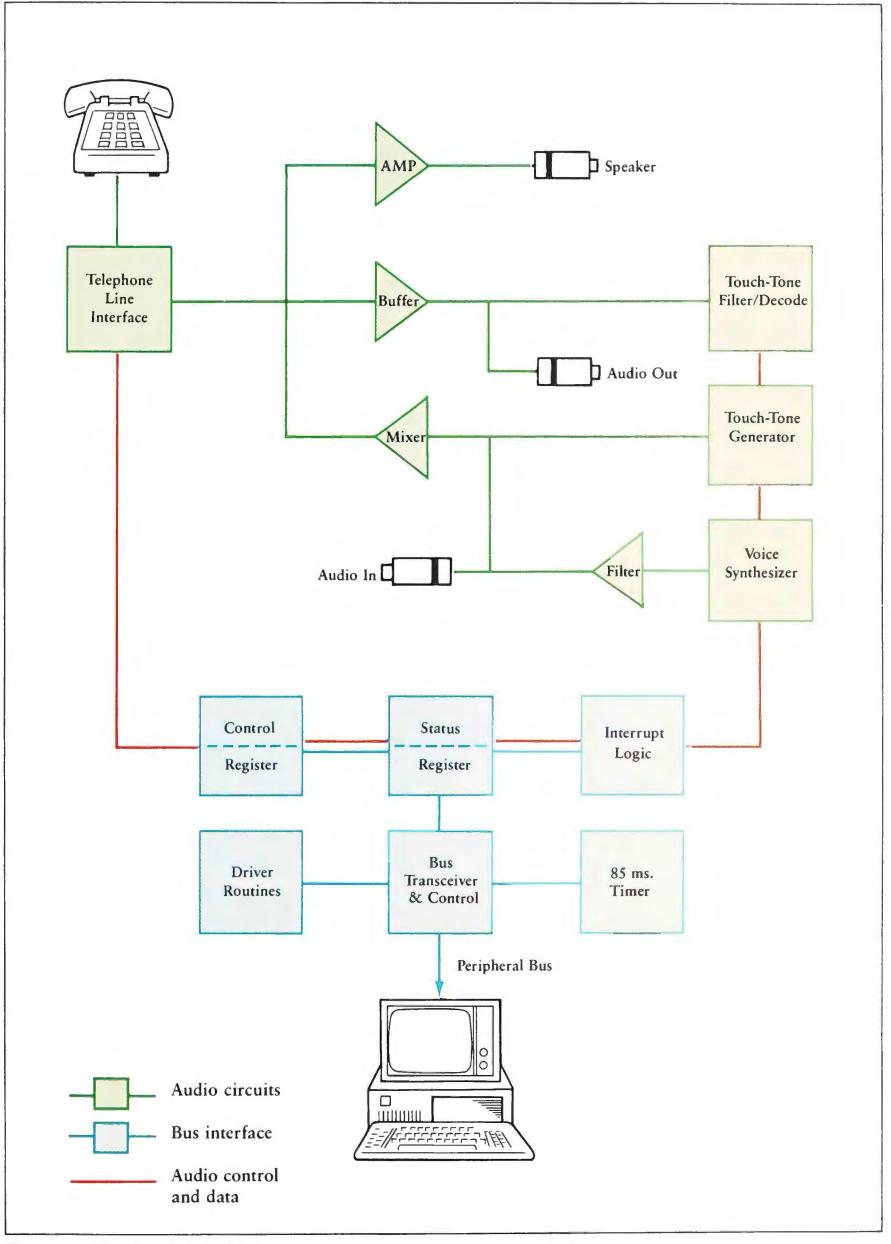
Figure 1: V101-I Hardware Block Diagram

```
1 REM LISTING 1: Vynet Demonstration Program, reproduced with permission:
4 REM
5 REM   DEFINE CONSTANTS
6 REM
10 CLEAR ,&H4000:MODULE% = &H4400
20 VIF = &H4000:GOSUB 32000
30 CH% = 0: ER% = 0
50 G$ = CHR$ (7)
54 REM
55 REM   SIGN ON
56 REM
60 CLS: KEY OFF: PRINT SPC(31)"V101-I DEMONSTRATION": PRINT : PRINT
84 REM
85 REM   LOAD MODULE & INITIALIZE
86 REM
90 BLOAD "DEMO.MOD",MODULE%
100 CALL INIT(CH%,ER%)
104 REM
105 REM   WAIT FOR PHONE TO RING
106 REM   THEN ANSWER IT
107 REM
110 PRINT "Waitin' for ring..."
111 CALL CHECKRING (CH%,RING%): IF RING% THEN 120
112 IF INKEY$ = CHR$(27) THEN 860
113 GOTO 111
120 CALL OFFHOOK (CH%,ER%)
124 REM
125 REM   LOG CALLER TO SCREEN
126 REM
130 CALER = CALER + 1: PRINT "Answered caller #"CALER
134 REM
135 REM   SPEAK GREETING
136 REM
140 DELAY% = 20: CALL DELAY(CH%,DELAY%,ER%)
150 PHRASE% = 26: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
160 PHRASE% = 2: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
170 PHRASE% = 3: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
180 DELAY% = 25: CALL DELAY(CH%,DELAY%,ER%)
190 PHRASE% = 4: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
200 DELAY% = 10: CALL DELAY(CH%,DELAY%,ER%)
204 REM
205 REM   ASK FOR PHONE NUMBER
206 REM
210 CHANCE = 0
230 PHRASE% = 5: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
240 PHRASE% = 6: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
250 PHRASE% = 8: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
260 PHRASE% = 7: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
264 REM
265 REM   WAIT FOR 10 DIGITS
266 REM   OR TIMEOUT
267 REM
270 TRY = 0:DIGIT$ = ""
280 TONE$ = SPACE$(11): LN% = LEN(TONE$) - 1
290 CALL READTONESTRING(CH%,TONE$,LN%,ER%)
294 REM
295 REM   RETRIEVE DIGITS
296 REM
310 I = 1
320 WHILE MID$(TONE$,I,1) > " "
330 DIGIT$ = DIGIT$ + MID$(TONE$,I,1): I = I + 1
```

Listing 1

```
340 WEND
354 REM
355 REM    IF TIMEOUT, ASK AGAIN
356 REM    UNTIL OUT OF CHANCES
357 REM
360 IF ER% <> &H84 THEN 400
365 PRINT "Oops! ";
370 TRY = TRY + 1: IF TRY < 2 THEN 280
380 CHANCE = CHANCE + 1: IF CHANCE < 2 THEN 230
390 IF DIGIT$ = "" THEN 620
400 PRINT "The number: "DIGIT$
404 REM
405 REM    SPEAK "YOUR NUMBER IS"
406 REM
410 DELAY% = 20: CALL DELAY(CH%,DELAY%,ER%)
430 PHRASE% = 6: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
440 PHRASE% = 9: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
450 PHRASE% = 7: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
454 REM
455 REM    SPEAK DIGITS AS WORDS
456 REM
460 FOR I = 1 TO LEN(DIGIT$)
470 IF MID$(DIGIT$,I,1) < "0" OR MID$(DIGIT$,I,1) > "9" THEN 520
474 REM
475 REM    (WITH NICE PAUSES)
476 REM
480 IF I = 4 OR I = 7 THEN DELAY% = 10: CALL DELAY(CH%,DELAY%,ER%)
484 REM
485 REM    COMPUTE PHRASE # FROM DIGIT
486 REM
490 A = ASC(MID$(DIGIT$,I,1)) - ASC("0")
500 PHRASE% = 10 + A: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
520 NEXT
534 REM
535 REM    SPEAK "TO DIAL YOUR NUMBER IN TONES, IT IS"
536 REM
540 DELAY% = 10: CALL DELAY(CH%,DELAY%,ER%)
550 PHRASE% = 23: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
560 PHRASE% = 6: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
570 PHRASE% = 24: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
580 DELAY% = 10: CALL DELAY(CH%,DELAY%,ER%)
584 REM
585 REM    REDIAL DIGIT STRING
586 REM
590 LN% = LEN(DIGIT$): CALL DIALTONESTRING(CH%,DIGIT$,LN%,ER%)
600 DELAY% = 20: CALL DELAY(CH%,DELAY%,ER%)
604 REM
605 REM    GIVE MORE INFORMATION
606 REM
620 PHRASE% = 21: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
630 PHRASE% = 2: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
640 PHRASE% = 22: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
650 PHRASE% = 14: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
660 PHRASE% = 20: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
670 PHRASE% = 18: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
680 DELAY% = 10: CALL DELAY(CH%,DELAY%,ER%)
690 PHRASE% = 13: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
700 PHRASE% = 17: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
```

(continues)

```
710 PHRASE% = 20: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
720 DELAY% = 10: CALL DELAY(CH%,DELAY%,ER%)
730 PHRASE% = 20: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
740 PHRASE% = 15: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
750 PHRASE% = 15: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
760 PHRASE% = 15: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
770 DELAY% = 10: CALL DELAY(CH%,DELAY%,ER%)
774 REM
775 REM   SAY "THANK YOU"
776 REM
780 PHRASE% = 1: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
790 DELAY% = 10: CALL DELAY(CH%,DELAY%,ER%)
794 REM
795 REM   SAY "GOODBYE"
796 REM
800 PHRASE% = 25: CALL SPEAKPHRASE(CH%,MODULE%,PHRASE%,ER%)
810 DELAY% = 25: CALL DELAY(CH%,DELAY%,ER%)
814 REM
815 REM   HANG UP THE PHONE
816 REM
820 CALL ONHOOK(CH%,ER%)
830 PRINT "Hung up."
840 PRINT
844 REM
845 REM   WAIT FOR NEXT CALLER
846 REM
850 GOTO 110
854 REM
855 REM   INTERRUPTED - EXIT TO MENU
856 REM
860 PRINT:PRINT G$"Interrupted...Back to menu"
870 RUN"DEMOMENU"
880 END
32000 BLOAD "INTERFAC.BIN",VIF
32010 CHECKSTATUS=VIF+0
32020 INIT=VIF+3
32030 OFFHOOK=VIF+6
32040 ONHOOK=VIF+9
32050 RINGOFF=VIF+12
32060 CHECKRING=VIF+15
32070 DIALTONE=VIF+18
32080 DIALPULSE=VIF+21
32090 DIALTONESTRING=VIF+24
32100 DIALPULSESTRING=VIF+27
32110 OFFDIALTONESTRING=VIF+30
32120 OFFDIALPULSESTRING=VIF+33
32130 READTONE=VIF+36
32140 READTONESTRING=VIF+39
32150 CHECKTONE=VIF+42
32160 WRITEVSP=VIF+45
32170 READVSP=VIF+48
32180 SPEAKPHRASE=VIF+51
32190 READALPHA=VIF+54
32200 READALPHASTRING=VIF+57
32210 DELAY=VIF+60
32220 INITINT=VIF+63
32230 RETURN
```

Listing 1 *(continued)*

Since most or all of the data is numeric, it suits the telephone keyboard. A limited number of spoken responses is enough to cover all the normal and error situations to be expected.

The ability to dial calls is one way in which the V101-I differs from many of its predecessors, which could only answer calls. One group of applications that immediately

---

The size of the telephone keyboard is the principal limit on the design of programs that use devices such as the V101-I.

---

comes to mind is alarm systems. A PC equipped with the V101-I could call any of a large number of possible phone numbers in response to emergency conditions, and the spoken messages resulting from those conditions could be made much more informative than a simple call for help.

Imagine, for example, a PC connected as the operator's terminals on a much larger, unattended computer system. It would receive the console output messages from the larger system, logging them on the printer and checking content for indications that human help was required. Depending on the content of the messages, the PC could call various persons with alarm or status information in a very flexible way. The computer could even call an automated paging service and "beep" the person responsible for correcting the problem.

Uses for the V101-I are certainly not limited to those in which the PC is unattended. A PC equipped with the Vynet card would make a great automatic telephone dialer with the

appropriate program, especially if your operating system supported multiple tasks. You could type CALL ACME and the PC might look up Acme's number in your personal directory, dial the cheapest long-distance service covering Acme's location, and then give it your account code and Acme's number. Meanwhile, you refresh yourself on the Acme account history by reading notes from the screen. Far out? Not really.

If you are an electronics hobbyist, you will appreciate the potential of the V101-I as the central part of a sophisticated telephone answering machine. RCA jacks for low-level audio input and output allow connection of tape recorders or other sources and/or destinations for speech information.

Limitations

The size of the telephone keyboard is the principal limit on the design of programs that use devices such as the V101-I. The standard tone keyboard includes digits 0 through 9 and two special characters marked '*' and '#'. These special characters serve well as end-of-field markers for variable-length fields (such as quantity) and as end-of-input markers to change program flow. Twelve keys are enough to handle just about all kinds of numeric data. Handling alphabetic information, however, is a real bother.

Since telephone dials have keys marked with alphabetic characters over most of the digits (the exceptions are over the 1, which is blank, and over the 0, which is marked OPER), it is possible to code alphabetic information using the keytop markings. Using two keystrokes for each letter, alphabetic data may be sent by using one keystroke to identify the key containing the letter and another to select one of the three letters printed on the key. A couple of problems remain, however: how to code Q and Z, which are missing from the telephone keyboard, and how to indicate the beginning and end of alphabetic data when it is mixed with numeric data.

While these coding problems are not insurmountable, simple and easily remembered 12-key codes for alphabetic data remain a challenge to the designer. Vynet's software package supports a code that uses three keystrokes to transmit alphabetic data: the '*' symbol indicates that the next two keystrokes are a letter, and the letters are coded as described above. Q and Z are preceded by the digit 1.

Telephones with more keys are available. Used mostly by the military, they contain an additional column of keys labeled A, B, C, and D. The V101-I can recognize these additional codes, and the Vynet software supports them; however, since such telephones are rare, it is unlikely that many programs will be designed for them.
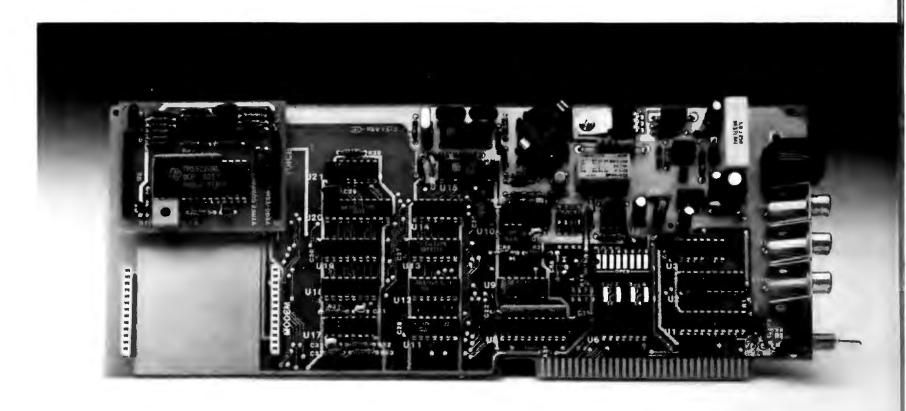
How It Works

The Vynet voice module uses integrated circuits and vocabulary data developed by Texas Instruments (TI) to produce spoken output of excellent quality. The process is called Linear Predictive Coding (LPC).

TI's voice output chips, called voice synthesis processors, rely on a model of the human speech process that allows high (by telephone standards) fidelity with a relatively small number of bits per spoken word. The process requires about 80 bytes of storage per word (about ½ second average) of vocabulary, an amount handled easily on PC-sized disks. Compared with the 8K bytes-per-second telephone standard used to digitize phone calls in the United States, the process is very efficient. The original sound source is a human in front of a microphone, and the main limitation in producing natural-sounding output is the problem of assembling separately recorded words into sentences.

Installing the V101-I

If you have ever installed a printed circuit card in a computer, you have enough experience to install the Vynet V101-I. Complete instructions supply everything but pictures. If you have an empty slot but butterflies still tickle your stomach, your dealer can

The V101-I card for the Vynet Interactive Telephone Interface

probably install the card for a small fee (perhaps smaller yet if you buy the card from him or her).

You need a modular telephone cord with male connectors at both ends. One end plugs into the V101-I connector panel (at the rear of the PC, after installation), and the other plugs into any standard modular telephone jack. These cords may be found in various lengths at hardware and electronics stores.

If your PC is full of exotic accessories, there is a possibility that the standard setup instructions won't do for you. If so, switches on the Vynet card may be used to reconfigure it to avoid such problems. You or your dealer may want to consult Vynet to resolve unusual problems.

Trying It Out

The program disk contains an AUTOEXEC file that loads the Vynet driver routines as a DOS extension and then runs a BASIC program that offers a menu of options. Among the options are demonstration programs and the Phrase Editor. Also included

on the disk are diagnostic routines and the assembler source for the drivers. BASIC code is supplied for use with the BASIC or BASICA interpreter.

Care has been taken to provide for commonly made mistakes. For example, the main BASIC program checks for the presence of the driver routines and prints an error message if they are not found. Similarly, if the driver routines find the desired interrupt vector in use, a message to that effect is printed. Precautions such as these can save you time and spare you frustration; when they are omitted, strange crashes may result.

Programming

Programming a device as flexible as this is a bit of a challenge and lots of fun. If you understand BASIC and the limitations of the telephone keyboard, you should have little trouble with it. If you are still learning, there is much to be gained from understanding the demonstration program in Listing 1. If you have progressed beyond BASIC, you will find enough reference information in the V101-I user guide to code programs for the V101-I in other languages.

The user manual includes a tutorial section on how to develop tele phone-voice applications programs i addition to providing information about their hardware and software. The program design process consists of the following steps:

The Vynet V101-I with V200-VSM is a flexible product.

Designing the application. Decide exactly what the program is to do.

Selecting the phrases. Decide whic words from the vocabulary disk are to be used and in what sequence.

Creating the phrase module. Use the provided editing program to assemble vocabulary data into files tha may be read into memory. This step may involve some experimentation a you listen to your phrases and "tweak" them to sound as natural as possible; some words are supplied with several inflections. Figure 2 il-
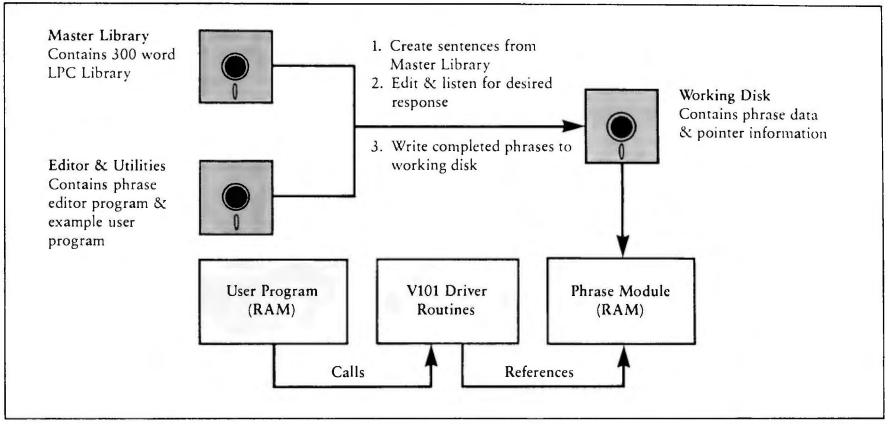
Figure 2: Phrase Module Creation

Diagram labels:
- Master Library — Contains 300 word LPC Library
- Editor & Utilities — Contains phrase editor program & example user program
- 1. Create sentences from Master Library
- 2. Edit & listen for desired response
- 3. Write completed phrases to working disk
- Working Disk — Contains phrase data & pointer information
- User Program (RAM)
- V101 Driver Routines
- Phrase Module (RAM)
- Calls
- References

lustrates this process and the way its output is used.

Coding the program. Write the instructions to implement the designated application. Control of the V101-I hardware is done using CALLs to subroutines supplied on the program disk.

The following functions are available in the driver subroutine package:

Initialize
Go "off hook"
Go "on hook"
Wait for ring, go "off hook"
Check ring status
Dial single tone digit
Dial single pulse digit
Dial tone string
Dial pulse string
Go off hook, dial tone string
Go off hook, dial pulse string
Wait for received tone
Wait for received tone string
Check tone status
Write voice data
Check voice processor status
Speak phrase
Read and decode alpha character
Read and decode alpha string
Delay
Initialize interrupt operation
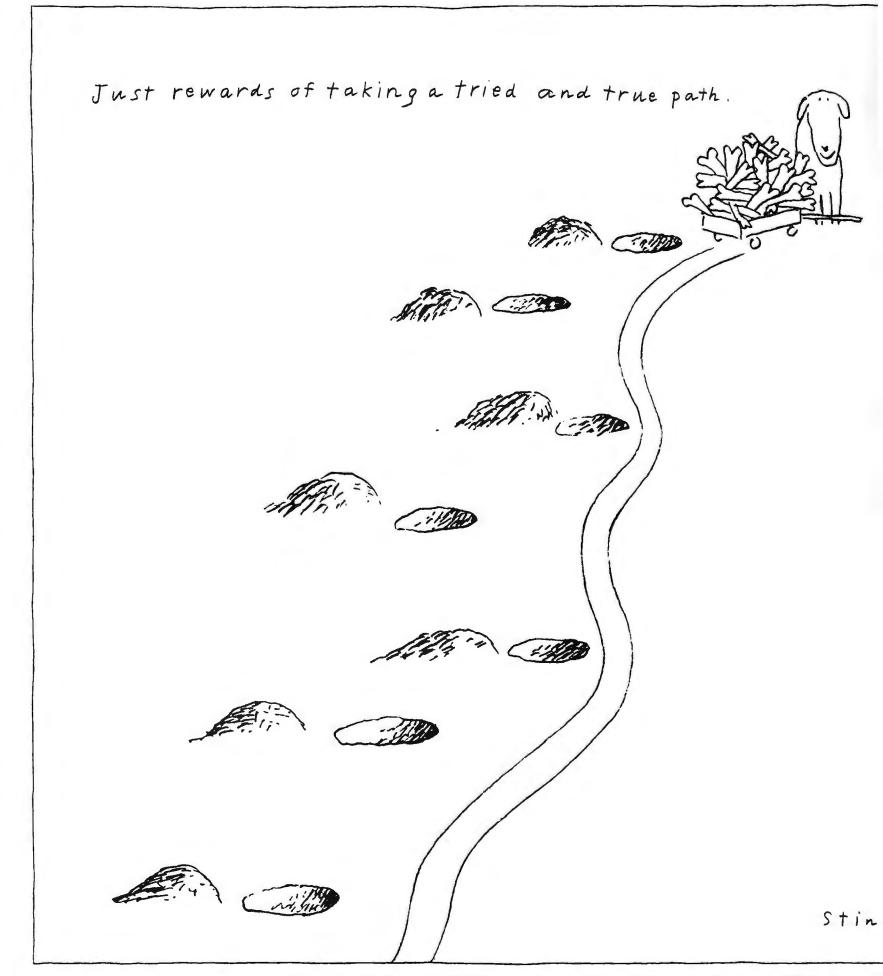
Certain operations may be carried out using combinations of the above functions. To do the equivalent of pressing the switch hook briefly during a call, for example, use the go "on hook" call, followed by the delay call, followed by the go "off hook" call.

Listing 1 reproduces the program that Vynet leaves running 24 hours per day as a "live demonstration." Reviewing it should give you an idea of the type and the amount of work involved in developing a simple but useful program to use the V101-I. You can run this program yourself to sample the quality of the speech by calling a PC at Vynet's toll-free 800/538-7002, or 408/370-9765 in California.

The Vynet V101-I with V200-VSM is a flexible product. The potential of this product is limited only by the telephone keyboard and the imagination of the programmer. It is easily installed and is supported by quality software and documentation. Read-

ers are encouraged to call the Vynet demonstration program and try it for themselves, perhaps while following the program flow presented in Listing 1, and then to think about developing a few applications of their own. ≜

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

V101-I Interactive Telephone Interface
V200-VSM Voice Synthesizer
V120-I Expansion Vocabulary
Vynet Corporation
160B Albright Way
Los Gatos, CA 95030
408/370-0555
List Price: V101-I $295, V200-VSM $149, V120-I $495
Requirements: 32K (64K recommended), one disk drive, DOS 1.10

Just rewards of taking a tried and true path.

Stin

For the name of the dealer nearest you, phone (800) 227-2400, ext. 948; in California, (800) 772-2666, ext. 948. For more informati

WordStar® is used by more people, more often, to do more things than any other word processing software.

And you'll find it'll do more for you.

The only surprise you'll get with WordStar is how much you can do with it.

Ask Arthur C. Clarke. He used WordStar to write his best selling novel, 2010: Odyssey Two.

Ask Osborne-McGraw Hill. Where the editors use it to produce all the books.

Or, for that matter, ask any of over 400,000 others who swear by WordStar's reliability when it comes to making fast work of the written page.

And no wonder.

WordStar has more work-saving features to take the time and drudgery out of revising and retyping than any other word processing software. For instance, there are production typing features to let you move columns around and merge paragraphs from different documents at the touch of a key. Along with print features like boldfacing and centering to make any late-night typist look like a pro.

But that's not to say you have to be a pro. WordStar starts off by simply giving you a choice, and then guides you with menus every step of the way. Menus adjust to your proficiency. And of course, what you see on the screen is what you get on paper.

Then as your needs grow, WordStar can grow right along with you. With options like MailMerge,® SpellStar® and StarIndex™ to help you personalize form letters, correct spelling and create indexes. And with other MicroPro products like InfoStar™ and CalcStar™ so you can automatically insert business data and financial projections into WordStar documents.

WordStar runs on almost every personal computer. Which means you don't have to go out of your way to find the word processing software that can do more for you.

Just take a walk over to your local computer store and ask for WordStar. You'll be on the right path.

WELCOME TO WORDSTAR

WORDSTAR

MicroPro®
Software that means Business

IF YOU'RE CONFUSED ABOUT BUYING A PERSONAL COMPUTER, HERE'S SOME HELP.

Computers come in two parts.

One part is the "hardware," the machinery itself. The other is the "software," which tells a 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 tells the computer what to do), it makes good sense to pick the software first.

Start by making a list of the things you want the computer to do. Possibilities include word processing, inventory control, accounting, graphics, recordkeeping—you name it, there's probably software that does it.

Next take your list into a computer store and ask the salesperson to demonstrate software that will do the things you want.

Even though you'll need a computer for the demonstration, keep in mind the computer is just a vehicle. The software is the driver. Once you've decided on software, picking the rest of the computer system will be that much easier.

The simpler the better.

Some people will tell you that software has to be complicated to be powerful. Nothing could be further from the truth.

Good personal software should be, as the computer people say, "friendly." Meaning that it helps you do what you want to do without getting in the way.

Good software keeps the complications in the computer, where

they belong. And keeps the capability at your fingertips. It's that simple.

Simply see for yourself.

You can read any number of interesting books and magazines about personal computers. You can ask your friends who have them.

Or look at all the sales literature you can get your hands on.

But as helpful as that can be, there's no substitute for a live demonstration.

When you do go shopping, we recommend you take a look at the PFS® Family of Software.

Designed the way we think a software family should be: simple, straightforward and powerful.

pfs: software

© 1982 Software Publishing Corporation

Currently there are four software packages in the family: PFS:WRITE, PFS:FILE, PFS:REPORT and PFS: GRAPH, with more on the way. Here's a little more about each of them.

PFS:WRITE. The simplest way to get your message across.

PFS:WRITE is ideal for people who want to make their writing time more productive. It displays what you write on your computer screen so you can make revisions as you compose.

With WRITE, you can correct misspellings or substitute one portion of text for another, with just a few keystrokes.

And when you're through revising, WRITE shows you "on-screen" just how your document will look when it's printed. So there are no surprises afterwards.

WRITE also works with most popular software programs, including the PFS Family of Software.

This feature allows you to add names and addresses from mailing lists to generate form letters. Or combine columns of numbers or graphs with your text.

PFS:FILE. The simplest way to get organized.

FILE is basically 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.
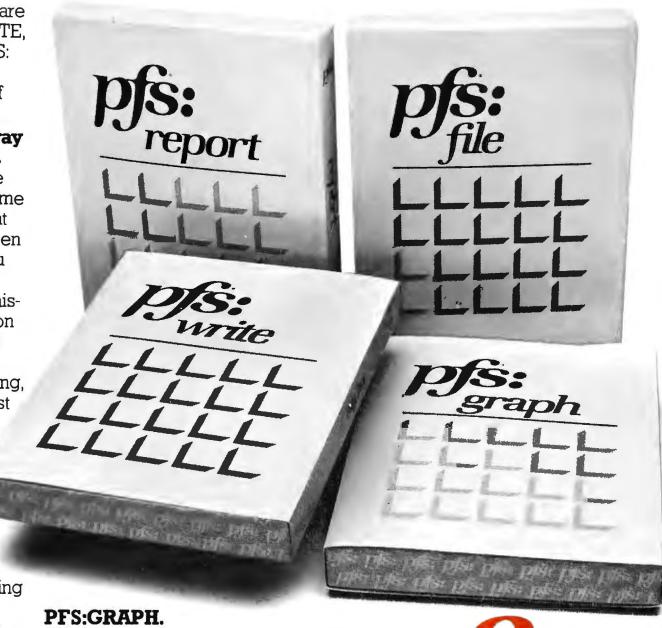
With FILE, you arrange your information on a "form" you design yourself. And when you need to track something down, FILE sorts through your records electronically. It lets you retrieve information in a variety of ways so you can be as selective as you want.

PFS:REPORT. The simplest way to sum it all up.

REPORT is a powerful analysis tool that works with FILE.

REPORT sorts through your files and retrieves the information you're looking for. Then assembles it all into one report, so you can analyze, plan and make better-informed decisions.

REPORT is also good at math. It quickly sorts through columns of numbers and performs calculations, so you won't have to.

PFS:GRAPH. The simplest way to spot trends.

GRAPH is ideally suited for professionals who need charts or graphs in a hurry.

All you do is specify the kind of graph or chart you want and enter the information. GRAPH does the rest.

GRAPH transforms columns of facts and figures into pie, line and bar charts so you can spot trends quickly and make better-informed decisions.

GRAPH works with PFS: WRITE, PFS:FILE, VisiCalc® files or data entered directly into the computer. And supports most popular printers and plotters.

Send for our Free PFS Software Catalog.

It'll tell you more about the PFS Family of Software and how to use it.

It's free. And all you have to do to get one is return the coupon below or see your participating PFS dealer.

The PFS Family of Software. We've already made computers simpler to use.

Now we're making them simpler to buy.

For What It's Worth

A review of PC-File and user-supported software

Douglas Clapp

First *PC-Talk* and then *PC-File*—two powerful programs for the IBM Personal Computer. A sophisticated communications program and a full-featured data base program. These two programs are mandatory for a vast number of PC owners. Both programs stack up against contenders that include VisiCorp, Sorcim, IBM, and Ashton-Tate. Both programs are free.

That cost again? Nothing. Zip. The programs are part of an unusual experiment in capitalism called user-supported software in which users determine the value of a product.

Program users are encouraged to copy the programs and give them to others. Got eight friends with modems? Maybe they'd like copies of *PC-Talk*. And not only can you make eight copies for your friends, but the authors encourage you to hand out copies.

Profits?

The reason for this generosity is, oddly enough, the same reason that commercial software companies charge what the market will bear—profits. But how can you profit by giving away your product? The answer is the key to the concept. Users are asked for donations. A contribution, usually $20 to $50, is suggested by the program's author. The solicitation notice accompanies each copy of the program.

PC-File is a typical example. When the program begins, a prominent notice on screen reads: "User-Supported Software. If you are using this program and find it to be of value, your contribution ($35 is suggested) will be appreciated. Jim Button, Box 5786, Bellevue, WA 98006. Regardless of whether you make a contribution, you are encouraged to copy and share this program."

Two questions come to mind. First, does Jim Button really think that anyone will send him a nickel? Second, can a free program be any good? The second question doesn't require mind reading. *PC-File* is good. It's a disk-based file management system that compares favorably with the *Visifile, Easyfile,* and most other file-management programs that satisfy a wide range of filing needs. *PC-File* offers extensive filing, searching, sorting, displaying, and report generation capabilities.

A Close Look

The package supports up to 4000 records per data base wi5th 128K, or 2000 to 3000 records if your system has 64K and you need to sort the records. Each record can hold a maximum of 41 fields with up to 65 characters per record (22 characters if more than 22 fields are in the record). Records can be sorted on a maximum of ten control fields.

Records are handled by indexed, random access files. The file data can be transported for use with *VisiCalc* or *WordStar/Mail-Merge,* or cloned. A single drive is supported although having two drives increases ease of use. Up to four physical, or electronic, RAM disks may be used.

PC-File contains all the necessary and most of the fancy features of commercial data base programs. Some or all of the qrecords can be displayed, printed, modified, found, or deleted. Reports can be created and mailing labels can be printed.

Most typical record keeping and mailing list requirements are a breeze with *PC-File.* The program is menu-driven and makes extensive use of the function keys for most operations. Prompts are clear and consistent. It's

impossible to get lost in the program, data corrections are easy, and entry is bomb-proof. The program is written in Compiled BASIC, which results in speedy sorts and searches.

Now, what does all that mean? The important concepts are record and field. A record is a collection of fields, much like a page can be thought of as a collection of lines. If you're making a mailing list, each label is a record; name is one field, address another. City and state might be one field or two. Four to eight fields should be enough for a typical mailing list record. As you can see, 4,000 records, each with up to 41 fields, will hold lots of information.

'My biggest reward is seeing my creation being used and enjoyed so much by so many.'

Control fields are those that you select to sort the data. Ten sorting fields allow for powerful sorts. Your mailing list can be first sorted alphabetically by state (if that's one of your fields). Next, within that order, they can be sorted by zip code. The third control field may be name. Make your selections, listen to your drives grind, and your data base is now sorted by state, and within that order by zip code, and within that order by name.

PC-File's use of random access, indexed files results in both speedy sorts and some inflexibility. Because the files are indexed, the actual files are never sorted. Only small pointers that identify each record are sorted. This allows fast sorts to take place entirely in main RAM memory.

The inflexibility is common to most other data base programs that use random access files. Random access files do offer more sophisticated data-handling options than sequential

files, but there's a trade-off. Random access files require you to specify the length of each field. From then on, each field must be the length specified.

PC-File and other file programs don't force you to make every field entry the same length (think about that one!), but they do require you to specify the maximum length of each field. If you use less than the maximum number of characters in a field, the program fills, or *pads,* the rest of the line with blanks.

In practice this means that you can change the name of a field but not the field's length. The moral for most data base programs is to estimate field length on the high side; one of those cities might be Albuquerque.

Enough theory. The first step in using *PC-File* is choosing or defining a data base. You're shown the names of data bases already created, possibly MAILIST and STAMPS. To keep working with one of these, just type in the name, or enter the name of a new data base. If you choose STAMPS, you're shown the main menu:

(F1)	ADD a record
(F2)	MODify a record
(F3)	DELete a record
(F4)	DISplay a record
(F5)	FINd a record
(F6)	LISt or clone
(F7)	SORt the index
(F8)	see the record LAYout
(F9)	alter a field NAMe
(F10)	END or change data base

The commands may be entered with the function keys or by typing the capitalized letters.

Commands

Let's take a quick look at some commands. If STAMPS has 30 records, you begin ADDing at number 31. The record layout is displayed, and you type in the blanks. When complete, the program asks if the information is correct before entering the record. Corrections, if necessary, are easily made.

≡ Review

One handy feature allows entering a single quote or single apostrophe after a field name. This causes the entry from the previous record to be duplicated—a time-saver when your stamp collection contains 20 stamps from Mozambique.

If you decide to MODify or DISplay a record, you'll be shown: 'KEY or #n,*,+,-,\'. Don't panic. The symbols provide an easy way to navigate within the data base.

KEY is the information in the key field of your record. When you create the record layout, you'll be asked for a key field name. This is usually the information that most uniquely defines the record. For address lists, the key field is usually NAME. If you know what's in the key field, it's easy to select a record; just type it in after the cryptic 'KEY or #n,*,+,-,\'. The symbols #n represent 'record number'. If you want the fifth record, just type #5 . Typing * brings back the record most recently retrieved, which is handy after using FINd.

'Being able to try it out first is the best possible way to buy software.'

The final three symbols, +, -, and \, bring you the next record in line, the previous record, and the last record in the file respectively.

The program excels when it's time to FINd a record. The prompt is ">xxx scans full field. (slow) 'Look for:_____'

Another choice. The first choice is a full field scan. Typing >son might return Sonny Liston, Bob Johnson, and Sung Son. In a full field scan the characters 'son' can be anywhere in the field.

Leaving off the '>' and typing son will return only Sonny Liston. That's the record you're looking for, right?

Send in the Clones

One record at a time is nice, but what about reports? *PC-File* not only lets you generate reports and mailing labels, but also allows cloning and transporting, two advanced features designed to simplify your computing.

Reports can contain all or some of the fields in all or some of the records. First, you select the fields you want in the report. For STAMPS, this may be only the fields COUNTRY and VALUE.

Maybe you'd like to narrow the report down still further? Using the operators 'less than', 'greater than', 'unequal', and 'equal', you can generate a report of stamps from Africa that have a value greater than $1,000.

Reports can be created quickly, then listed to your display screen, printer, or disk. Unless your format is for mailing labels, you'll be able to specify a report title up to 39 characters. Once created, report formats are saved on disk for later use. Eventually, each data base might have a number of different report formats, each individually named.

Cloning is a variation on report creation. Instead of creating a report, a new data base is cloned from the present one. This allows data bases to be broken up into smaller, more manageable chunks. The cloned data base may also have more fields, fewer fields, or fields in a different order. Best of all, you're given an opportunity to change the length of fields, which is a blessing if you estimated on the low side when you created the original record layout and then ran into Albuquerque.

DIFferent Data

By now, you're probably thinking, "I bet it even walks the dog". It doesn't walk the dog. But it will transport your file data into either *VisiCalc* or *WordStar/MailMerge* format, a function often preferred over dog-walking.

The transporting function isn't truly a part of *PC-File*; it's a separate program included on the *PC-File* disk. Once a data base has been created, the program name PC-EXPOR (for export) is entered from DOS.

You're shown the names of your data bases, asked for your selection, asked which drive to place the output file on, and then prompted to press V for *VisiCalc*, or W for *WordStar*.

That's all there is to it. The drives whir, and a new file is created. The file has the same name as the original data base but has a new extension: either DIF (for *VisiCalc*), or WS. The DIF file can now be used with most spreadsheets that recognize DIF, including *Multiplan* and *1-2-3*.

The WS file has various applications. The *WordStar/MailMerge* format consists of fields enclosed by quotation marks and separated by commas. Many other word processors with mass mail capabilities use the same format. Even better, the quotation mark/comma format results in an instant string data statement for BASIC programs.

Front Ending

PC-File easily lends itself to advanced applications. Data bases, once created, consist of three parts: data, header, and index. The parts are separate files manipulated by *PC-File*. The documentation explains how the actual data is laid out, information that makes possible using *PC-File* as a front-end to user-written applications.

Filing Files

The *PC-File* disk contains nine programs. The programs PC-FILE.EXE and PC-SORT.EXE do most of the heavy labor. A text file of documentation consumes about 56,000 bytes. When printed, the instructions become an 18-page, 7868-word instruction manual, complete with page numbers and a thorough table of contents.

Two short programs offer the option of either 40- or 80-column mode. Although configured for the IBM/Epson printer, another short routine, PRT.CTL, is easily modified to customize the program to recognize other printers. Here's the entire PRT.CTL file:

/80,18,/132,15,/LINES,58,/
    PAGELEN,66

9.0: PC-File Refined

As typically happens, I received an upgraded *PC-File* about a week after submitting my review of *PC-File*, version 8.7, to *PC World*.

The new current version, designated 9.0, is a major upgrade that greatly enhances the program. The new version, which now occupies both sides of a "flippy" disk (think of it as two single-sided disks) has the following features:

○ Ten programmable smart keys. Keys 0-9, when used with the Alt key, can now input preloaded data, commands, or a mixture of both. A new menu option, KEY, provides an easy way to assign to each key command or data strings of up to 75 characters.

○ The new version is fully compatible with both DOS 1.10 and DOS 2.00. Using 2.00 requires a minimum of 96K versus 64K for the previous version. 320K of disk storage (two single-sided or one double-sided) is now recommended as a minimum.

○ Background and text foreground colors may now be chosen, a feature that is sure to be appreciated by users who have color monitors.

○ Report titles may now be saved, if desired.

○ Multiple compares (up to ten) may now be made during record selection. In addition to previous selectors (<, >, <>, and =), the logical operators AND and OR are now permitted.

○ The 'Is this correct' message may now be turned off when adding or modifying records.

○ Printer-error recovery has been added.

As you might imagine, the additions result in a larger documentation file, which now fills 68,608 bytes. Four major new files are also included with 9.0: SAMPLE.BAS, FILEFIX.BAS, PC-PRINT.EXE, and PC-UTIL.EXE.

SAMPLE.BAS is a heavily commented BASIC program demonstrating the use of *PC-File* data by other programs. FILEFIX.BAS repairs damaged data bases. Exiting *PC-File* improperly by simply turning off your machine rather than exiting from the menu is the usual culprit.

The Export option is now integrated into *PC-File* and accorded a spot on the main menu. A 28,032-byte file of utilities is also accessed from the menu along with Export. The utility options are Copy data base, Rename, Delete, or Export data base. Rather than exporting to *WordStar* or *VisiCalc*, the new version allows choosing between *WordStar*, *VisiCalc*, or DIF. This insures that data may be correctly exported for use with *Multiplan*, *1-2-3*, and other new, high-powered calcs. The *Multiplan/1-2-3* connection should help sell *PC-File*. *PC-File* is now more powerful, more flexible, and easier to use. Version 9.0 is a concrete example of Jim Button's ongoing support and enhancement of an excellent product. What was previously a very desirable program is now just about mandatory for much of the PC population.

If you use *PC-File* and don't send Jim Button a check, the guilt will kill you. And it should.

Obtain PC-File 9.0 *from Jim Button, P.O. Box 5786, Bellevue, WA 98006. Contributors should send a check for $6. Send a formatted disk, a disk mailer with return postage, and a self-addressed return label (indicate single- or double-sided disk).*

The numbers represent control codes that the IBM/Epson printer recognizes. EDLIN or your favorite word processor can be used to change the numbers to make your Funky 9000 printer behave properly. LINES represents the number of lines printed per page. PAGELEN is set for a standard 8½- by 11-inch page, but it can also be changed.

PC-EXPOR.EXE, a 21,500-byte program, provides for exporting *WordStar*, *VisiCalc*, or other programs that use similar conventions.

Finally, an AUTOEXEC.BAT file is included. Copying COMMAND.COM onto the work disk creates a self-booting system.

One-disk filers can create a disk that contains only *PC-FILE*, *PC-SORT*, the desired monitor and printer control programs, and still have space for about 90K of data on a single-sided disk. That's enough room for about 750 average-sized records.

It's hard to remember, once we've gotten this far, that *PC-File* costs only $35 (if you pay for it, that is).

Back to Money

So we're left with the first question: is this guy going to make any money? Mrs. Button didn't think so. Mr. Button, however, thought it was worth a try, even if the rewards were few. "I felt that I'd be pleased if a lot of people used my program," he remembers. "And if some money did come in, it would help offset my costs."

Yes, even giving away software costs money. Button's expenses include the costs of mailers, postage,

disks, advertising (time on The Source and CompuServe), long-distance phone calls, and computer equipment repairs.

PC-File was released in August 1982. Since then, according to Button, "We've mailed out about 900 diskettes. I answer correspondence averaging 5 letters a day. Gross income from the program is running about $1,600 a month."

Button guesses that 10 percent of the program users send payment. That works out to 5000 to 10,000 copies of *PC-File* in existence.

"Believe it or not, my biggest reward is seeing my creation being used and enjoyed so much by so many," Button says. "Also, my oldest son needed a job, and I decided that I could turn the whole thing over to him once it got rolling, to help him earn money for college."

Fruitful Beginnings

The program that will surely put young Button through college began life on an Apple II. After 15 years as a systems analyst, Button decided to build his own computer. That was five years ago. The home-built computer was sold to finance an Apple, which was in turn sold to upgrade once again, this time to an IBM Personal Computer, which Button believes "has the brightest and longest future of all the personal computers now on the market."

"I programmed the data base while still on the Apple. I needed it to keep some personal records, so it was written just for my own use. However, I wrote it to be general in nature so that it might someday grow into a data base system for various uses. When I got my IBM, I expanded it greatly and started giving it out to my friends."

With exposure came feedback. Changes and additions resulted. "Finally," Button says, "my growing list of users began to encourage me to market it."

With an excellent product and impeccable credentials, Button could have taken his program to any number of established software companies. But he had a different idea. "I wanted to make the program generally available to as many people as possible," he recalls.

He had heard about Freeware from a friend who had a copy of *PC-Talk*. "While the program wasn't useful to me because I had already written my own, the concept clicked."

Freeware Connections

Although first marketed under the banner of Andrew Fluegelman's Freeware(tm), the opening *PC-A6* screen no longer carries that label. "Andrew and I are still good friends," Button explains, "It's just that it was turning into too much work for both of us. People couldn't seem to make the distinction between me as the program's author and The Headlands Press (Fluegelman's publishing house)."

Things can, indeed, become complicated when you don't have a massive ad budget telling users about your company. "Andrew got questions about my program and I got questions and requests about his," Button says. "Checks were sent to the wrong place. The work required to correct all this grew exponentially. We had to make the separation, although we realize that older copies of the documentation will probably be around for many years.

"*PC-Talk* is Andrew's program and the only official Freeware. I call *PC-File* user-supported software. I use the concept with Andrew's permission and blessing."

File Undersold

Button is sold on the user-supported software concept. "It treats people like adults," he says. "Being able to try it out first is the best possible way to buy software. The whole industry

is enriched by this concept, and Fluegelman deserves a great deal of credit for his idea.

"I'd like to see it catch on with many authors and get the price of software down to where it should be. Software vendors could sell a lot of a product for a little and make a lot. Or, they can sell a little of a product for a lot. They've chosen the latter because it's easiest."

"I'd like to see the cycle broken," Button adds. "Also, copy protection is absurd. Freeware distributors don't have to worry about pirates...in fact, the pirates are our allies! If a person isn't honest enough to pay for the program, the least he can do is give a copy to someone who is."

Many *PC-File* users are honest, as evidenced by the checks that keep filling the Button mailbox. Those checks are mailed gladly by users who tell Button that "It feels good to send you this contribution."

But why does it feel good to pay? "I think it's pride of ownership," Button says. "Second, it's the feeling of

helping an obviously worthy experiment—lowering software costs. Finally, it's the feeling of having sided with a group of people whom I consider elite—the truly honest in this world. Personal dignity and self respect are worth more than \$35 to some people."

Honesty Rewarded

There's also a more practical reason to pay: Button keeps a list of contributors and distributes new releases to contributors for \$6 and a blank disk. "*PC-File* has gone through nine releases in 7 months. Most of these have been improvements suggested by users. The users benefit instantly. They don't have to wait 1 or 2 years for a new release of a piece of software."

Users do benefit instantly. With each check Button receives, he mails the contributor a copy of the current version of *PC-File*. It sounds like good old-fashioned service, but Button merely says, "This way I know what version everyone is on."

And the checks keep coming. User-supported software, at least for Jim Button, is a success. He believed in the concept, and he believed in the honesty of PC users. That belief is still being rewarded. "The response has been gratifying," Button admits. "The biggest surprise is the extent of my fan mail. I keep a file of my letters of praise. It's very thick, and most of my fans are wildly enthusiastic." After 20 years of programming, that may be the best reward of all. ●

Douglas Clapp is a contributing editor for InfoWorld *who specializes in personal computers.*

PC-File
Jim Button
P.O. Box 5786
Bellevue, WA 98006
Suggested contribution: \$35
Requirements: 64K, one disk drive

From your mind's eye to the screen.

Bring images to life, with color, resolution, and the speed of thought.

Use CONO#GRAPH™ — the intelligent color display graphics system for your IBM PC. CONO#GRAPH delivers the performance of a professional graphics workstation for the price of a business graphics system.

The modular CONO#GRAPH system lets you start with the CONO#COLOR™ Adapter for quality color and high resolution, and later add the optional CONO#GEN™ module for increased processing power and speed.

Choose from 256 colors.

The CONO#COLOR Adapter provides a spectrum of 256 colors. Select a palette of 16 colors for simultaneous on-screen display. Modify the palette dynamically to provide instanta-neous color changes and special effects including motion.
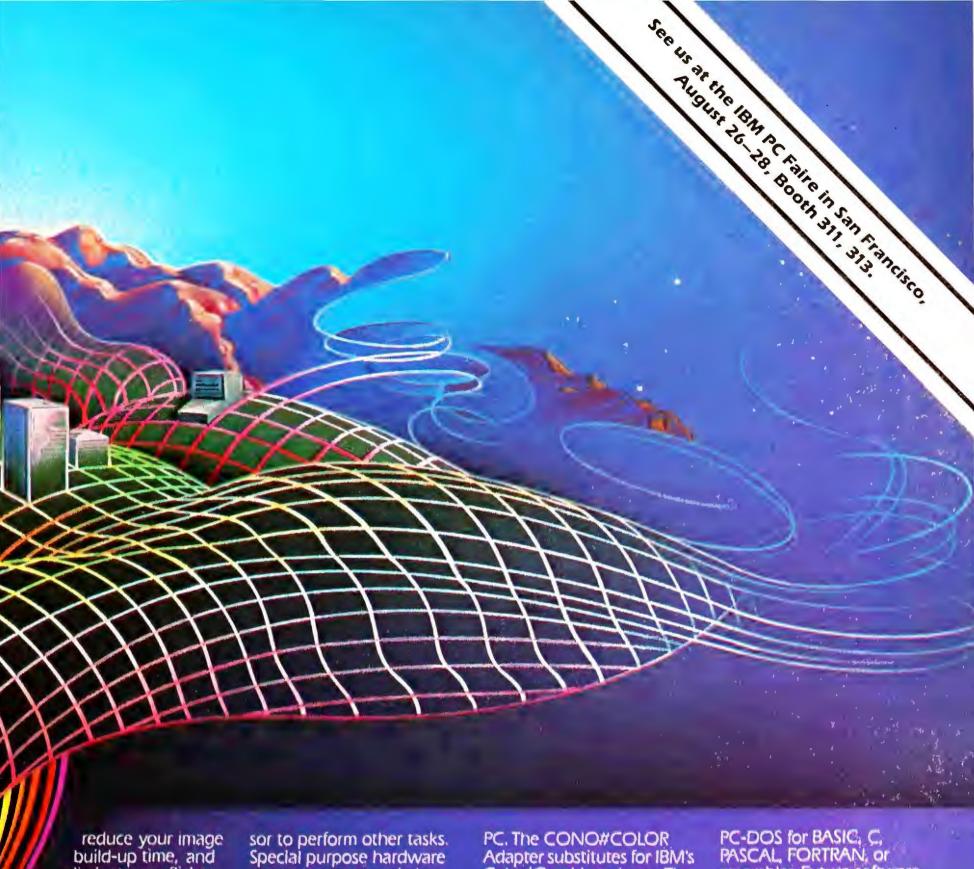
Resolution to 640 x 400.

The CONO#COLOR Adapter supports IBM-compatible resolutions of 320 x 200 and 640 x 200, plus four other modes, up to 640 x 400, each with 16 of 256 on-screen colors. And up to four selectable pages of video memory let you modify one page while another is being displayed — for special effects like animation.

The CONO#COLOR Adapter gives you more.

The CONO#COLOR Adapter's 128K bytes of high speed memory and unique design will

163

How to dress up your IBM.

Low cost data acquisition and control for the IBM Personal Computer.™

Fred Molinari, President

Data Translation is fashioning a new look in the personal computer market.

Our new single board plug-ins bring complete analog and digital I/O capability to your IBM Personal Computer.

The complete DT2801 I/O system fits on just one board. It includes A/D with programmable gain, D/A, digital I/O, and a programmable clock and has direct memory access capabilities. The DT2805 features the same functionality, with provision for low level analog input.

With power and performance to match that of the IBM PC, either board provides 12-bits of resolution with over 14kHz throughput rates under BASIC.

And whether your application is in laboratory data acquisition or in industrial process control, you will find both boards highly reliable at a very low cost.

The DT2801 and DT2805 are easy to use. Just plug either one into an IBM Personal Computer expansion slot. No need for separate housing or cables. A screw terminal panel with optional thermocouple cold junction compensation is available for connecting analog and digital input signals.

And they're easy to program. More than 30 I/O functions are accessed with just 3 commands from BASIC. Programming instructions and sample routines are detailed in the comprehensive User Manual.

Plus, as with all Data Translation products, the DT2801 and DT2805 are fully backed by our service and support team.

No other analog I/O system for the IBM Personal Computer offers such quality, power, and performance for such a reasonable price.

But, by now you probably expect that from Data Translation. We don't just follow the latest trends. We set the style.

The DT 2801 and DT 2805 are complete single board data acquisition systems for the IBM Personal Computer.

DATA TRANSLATION

A Tougher Floppy

An algorithm that could make disks more reliable

Katie Seger

Her name is Judy and she's 18 years old. She is 8½ feet tall and weighs in at slightly over 4½ tons. Judy is an Asian elephant originally from Thailand. For the past 13 years she has been a star at Marine World/Africa USA, a large animal and marine park and performing center near San Francisco. Recently Judy took some time from her busy showbiz schedule to help *PC World* test the reliability of *Clean Disk*.

Clean Disk isn't an antistatic spray, a dust-cleaning cloth, or a protective lubricant for disks. *Clean Disk* is pure software. "It is an algorithm that enhances the reliability of many storage devices—floppy disks, Winchester disks, and even [cassette] tapes," explained Peter Yianilos, president of Proximity Devices Corporation, the company that licenses *Clean Disk*. "The algorithm scrambles the data. It is basically a system that expands the data a little bit and scuffles it around so that the loss of any piece will not prevent reconstruction of the whole."

According to Yianilos, *Clean Disk*-enhanced disks can stand up to scratches, dust, time, fingerprints, water, coffee, and the thousand natural shocks that Mylar disks are heir to, and still not lose any data. With *Clean Disk* not only can the data on a damaged disk be recovered, but the *Clean Disk* code issues a warning

when the disk begins to fail. Yianilos also claims that media recorded using the *Clean Disk* code is more resilient to normal wear, tear, and aging than other recorded media. *Clean Disk* software will run on any microcomputer that uses RAM. A Proximity spokesman said that he thought the *Clean Disk* algorithm could be used with mini and mainframe computer storage devices, but the company has not fully investigated that option.

At present *Clean Disk* has been implemented on only one product, Proximity's own *Word Challenge,* a game that Yianilos admitted was introduced to show off *Clean Disk* and give Proximity's name greater recognition among dealers and distributors. The Florida-based company is a leading manufacturer of spelling checkers, which it licenses to word processing companies.

Two Implementations

Proximity expects to license *Clean Disk* in two ways. A read-only implementation is available for games and applications software. This implementation permits the licensee to record disks using the *Clean Disk* code. The software can run under operating systems such as MS-DOS, CP/M-86, and UNIX. Should damage occur to the *Clean Disk*-enhanced software, the users will be able to copy the programs to another disk. Copy-protected software is the only exception, Yianilos said.

The *Clean Disk* read-write implementation causes a modification in the operating system at the level of the logical BIOS. While still permitting the reading of non-Clean Disks, this modification creates a *Clean Disk* "environment" that formats all new disks to contain the *Clean Disk* code.

Neither implementation requires a change to the PC-DOS physical BIOS ROMs. The net increase in the size of a PC's operating system is about 4K. A 3K to 5K net increase is estimated for other microcomputer operating systems.

Clean Disk's Road Test

PC World's band of sceptics performed a series of destruction experiments on several *Word Challenge* disks in an effort to test *Clean Disk*'s error-tolerance system. Because *Word Challenge* is copy-protected, our destruction demons could test only *Clean Disk*'s durability. We could not test Proximity's data recovery claim that all information from a damaged disk can be copied to another disk without losing data.

A scratch across the Mylar didn't hurt the game's performance.

Proximity's game challenges players to form words from letters it displays in square grids. Players can set the games for 3 by 3, 4 by 4, or 5 by 5 square grids; the default setting is 4 by 4. Although letters in the grids are chosen randomly by the computer, the game has a "competition mode" that redraws the same 32,768 grid boards. *PC World* played boards 0 through 11 on every disk tested to see if the game would redraw the boards correctly. We also tested other modes and levels of the game on each damaged disk to ensure that *Word Challenge* functioned as promised.

Word Challenge's first test involved gritty and grimy fingerprints. Putting out a magazine is a dirty job, so there was no dearth of digits with which to smear the disk. Proximity claims that *Clean Disk* software can withstand damage to an area equal to the size of the floppy disk's read and write window. "In many cases you can damage a disk in several different places and still recover," Yianilos said.

We decided to take Yianilos at his word. Rotating the game disk with one hand, one of our less fastidious employees proceeded to smear the better part of both sides of the *Word Challenge* disk with her right thumb and index finger. *Clean Disk* performed admirably.

When we chose the competition mode, all 12 grids appeared in proper order, the timer was correctly synchronized, and the game continued to beat all takers. (With a lexicon of 90,000 words— about three times the vocabulary of most adults—*Word Challenge* has a definite advantage over players.)

For our next test we threw a *Word Challenge* disk into the freezer. (Doesn't everybody?) Once icicles began to form (in about three days time) the disk was removed and set out to thaw. The thawing process necessarily dampened and, to a small degree, warped the disk. Again, when we tested the disk, Proximity's product was a winner. Despite a 10-second screen stall while drawing Board 8 in the competition mode, the game continued to play as promised.

A light scratch (the boss gets mad if we deliberately ruin the read and write heads of our own disk drives) across the Mylar didn't hurt the game's performance. In the event of serious disk damage from a sharp instrument, Yianilos said that a non-copy-protected *Clean Disk* would issue a warning and allow users to copy the program to another disk using the DOS copy command.

Bring in the Secret Weapon

At this point we sought out Judy. And the ponderous pachyderm did her best to truncate the program. In fact, Judy did "trunk ate" the first disk we gave her. (We are certain that Proximity did not write the algorithm to combat an elephant's elongated incisors).

Let it never be said that *PC World* is unprepared—we had extra disks. So after Judy was done munching the Mylar, we placed another disk on the ground. Judy's trainer walked her to the disk, instructed her to to stand on it, and then had her grind it into the dusty earth.

Dust. Dirt. Tons of pressure. (Not to mention the scratches and indentations from small pebbles under Judy's foot.) How could the disk still work?

The answer: very well. A Timex watch might not have "kept on ticking" after Judy's heavy foot stomping, but the *Word Challenge* disk worked fine.

We felt discouraged and depressed. We had failed to find *Clean Disk*'s Achilles' heel. Dejectedly we returned to the *PC World* office and cogitated in the lunch room. What else was there to do but drown our sorrows in coffee....The coffee! Of course, we had forgotten that test.

Putting our one remaining unused *Word Challenge* disk in the sink, we poured the last of the coffee pot on the game. We used paper towels to blot off the excess liquid and then waited 48 hours until the disk was thoroughly dry.

Success at last! Not only did the game not work, we couldn't even get *Word Challenge* to boot up! When we told Yianilos of our nefarious exploit, he said that it was probably the heat rather than the coffee that destroyed the disk. (We who drink the brew daily beg to differ.)

Despite the caffeine hazard, *Clean Disk* did perform well in testing, but we have to admit that the *PC World* destruction experiments are not conclusive. Since *Word Challenge* is copy-protected, we could not test Proximity's guarantee that all data on a damaged disk is recoverable by copying to another disk. *Clean Disk* is still too new a product to test how it handles disk errors caused by time and aging. Ultimately, these two factors are the most important to users and are the reliability tests *Clean Disk* must pass.

Clean Disk will have to be implemented on other programs before its merits and defects can truly be judged. Until that time, *Clean Disk* has our (and Judy's) grudging respect. But we will maintain our healthy scepticism until time and the marketplace have their way with Proximity. ▆

Clean Disk
Proximity Devices Corporation
3511 N.E. 22nd Ave.
Fort Lauderdale, FL 33308
305/566-3511

HERE'S WHAT OUR NEW, 1200-BAUD, DO IT ALL, ONE STOP SHOPPING, DON'T BREAK THE BANK MODEM FOR YOUR IBM PC LOOKS LIKE:

**Introducing the PC:IntelliModem™
from Bizcomp. With your IBM PC or XT,
it looks like a big nothing.**

That's because it's *inside*. Where any modem connecting your Personal Computer to the telephone network should be. And where you won't have to worry about all those little boxes, couplers, cables and power cords getting in your way. Or being knocked off your desk.

But just because the PC:IntelliModem is out of sight, doesn't mean it'll ever be out of mind. You'll continue to be impressed with its do-it-all capabilities for years to come. Advanced data comm capabilities such as automatic dialing and auto repeat dialing, for selectively calling people or other computers from your own computerized telephone directory. Or automatic answering, so your PC can receive messages even when you're not in the office.

More than just a modem.

Even more impressive is the PC: IntelliModem's ability to *integrate both voice and data communication*. By plugging a regular handset into the back of your PC, you can

So, where is it?

now switch between talking or listening and sending or receiving data–without having to hang up, re-dial or plug and unplug a lot of cables. So making connections is now much faster and more convenient.

The PC:IntelliModem comes complete with everything you need to start communicating immediately. Besides its sophisticated Bell 212A-compatible hardware, the PC:Intelli-Modem includes a "friendly" software package with screen menus to guide you during use, plus complete written instructions for reference. And all this one-stop-shopping convenience is included in our modest price: $499. Which shouldn't break anybody's bank.

So if you're ready to turn your PC into a fast-talking data communications tool, ask your local IBM dealer about the Bizcomp PC:Intelli-Modem. It's a whole lot more than a modem. Even if it looks like a great big nothing.

PC:IntelliModem is a trademark of Business Computer Corporation. IBM is a trademark of International Business Machines Corporation.

BIZCOMP®

532 Weddell Drive
Sunnyvale, CA 94086
408/745-1616
Reader Service #24

Effortless Communication

"Modem and software $389, cane and bowler hat not included."

PC Modem Plus & IBM Personal Computer

Effortless The PC Modem Plus™ system contains everything you need to communicate with the IBM Personal Computer — modem, communications software, telephone cable and complete instructions.

Modem The modem card fits inside the PC, connects directly to the phone line and includes an additional IBM-compatible asynchronous port. The full duplex, auto-answer/auto-dial, 300 baud modem can tone or pulse dial and is compatible with most other communications software packages. Full duplex 1200 baud (212) operation is available with the addition of Ven-Tel's PC Modem Plus Speed Adapter.™

Software The full featured communications software has auto-logon and data capturing ability. You can store information from Dow Jones News/Retrieval™ or other sources on disk, exchange information with mainframes, minis or personal computers and transfer files to other Crosstalk™-compatible systems.

From Ven-Tel Inc.
Modems That Mean Business
2342 Walsh Avenue, Santa Clara, CA 95051 • (800) 538-5121 • (408)727-5721

Smarter with Age

*Like the audience it serves, Spinnaker software
gets wiser with age.*

Fred D'Ignazio

Spinnaker Software is a phenomenon
in the field of children's educational
computing. In less than one year the
company has become the dominant
and preeminent supplier of children's
software. Spinnaker's success can be
attributed to its timing (it was the
first company to recognize the huge
potential of this educational market)
and to its first-class advertising and
packaging.

When you buy a Spinnaker prod-
uct, regardless of which program it
is, the colorful advertisements and
slick, molded plastic case give you
the impression that you've bought
something special.

The Rise of Spinnaker

When Spinnaker was formed its goal
was to get its first product out the
door quickly and advertise it in a big
way. This strategy created first-stage
products that weren't as good as the
advertisements and packaging made
them appear. But as a marketing plan
it worked well—the advertisements
generated substantial product sales.
The products sold so well, in fact,
that Spinnaker pioneered a new mar-
ket in children's software, and new
companies followed its successful
example.

The success of early Spinnaker
products generated an influx of new
earnings, attention, and program-
ming talent into the young company.
Spurred on by its new resources and

The Story Machine

growing competition, Spinnaker an-
nounced products that were more
ambitious, such as *KinderComp* and
Snooper Troops. This time the prod-
ucts were as good as their advertising
and packaging made them look.

Spinnaker is now in its fourth stage
of development. People want to buy
products with the Spinnaker name,
and the best software authors in the
country want to write for Spinnaker.
Given the talent and capital at the
company's disposal, it's no wonder
that the newest products are even
better than their glossy advertise-
ments promise. And dozens of even
better Spinnaker products are on the
horizon.

Of the packages reviewed here
Story Machine from Spinnaker's first-
stage development is not as good as
its advertising makes it seem; *Face-
maker* from the second stage man-
ages to live up to its advertising
claims; and *Hey Diddle Diddle* and
*In Search of the Most Amazing
Thing,* third-stage packages, are as
good as or better than their adver-
tisements promise. Fourth-stage
products, including *Delta Drawing*
for the IBM PC, are examples of the
most recent, exciting developments in
children's software.

Story Machine

When you boot up the *Story Machine* disk, you see a story window divided into two parts. The top part contains pictures of people, creatures, and objects in the story that the child builds. The bottom part contains the four lines of story space, where the child's chosen words appear.

The child builds a story by choosing and typing in words from the story dictionary (see Table 1). Words from the dictionary can't be combined at random; they must be combined according to some of the following rules: Each sentence must begin with an article, a pronoun, or an adjective. Verbs must be in the present tense. A period or a prepositional phrase must follow a verb. Pronouns can be used only as the last noun in the subject of a sentence. Sentences must end with a period. No more than four actors (humans or creatures) should appear in a story.

Story Machine automatically erases the child's errors in spelling and grammar. Given the large number of words in the story dictionary, all sorts of story lines are possible. The child isn't just a story teller; he or she is a scriptwriter and the director of a play or movie. The computer display screen becomes the animated stage

Facemaker

where the characters can spring to life with the push of a button.

Story Machine is a good idea that is not well implemented. The fault is not so much in the program as in the primitive nature of the technology. The program's little cartoon figures are blockish, wooden, and distinctly unlifelike. They even compare poorly to the cartoons children see in comic books and on Saturday morning TV.

The program's graphics fare even worse when compared to the pictures the words might evoke in a child's

imagination. In this sense using *Story Machine* in place of a well-illustrated children's book or a good story with no pictures might have a stifling effect on the child's imagination.

The program designers didn't make use of sound and didn't personalize the stories the children create. The program would have been more interactive if names were given to the actors in the story—those from the child's own experience such as his or her own name, names of friends and family, pets, or imaginary friends. As it is the stories have a detached quality, which is the antithesis of a good children's story.

Finally, *Story Machine* is unforgivably slow. My children (aged 4 and 7) didn't make it through a single story. They grew bored watching the story window being erased and redrawn. Children's programs don't have to be blindingly fast, but they need to disguise their slowness. When a disk save or retrieve operation is involved, for example, or when a screen needs to be redrawn, the child should be kept busy. The program should provide something that the child can be thinking about or focusing on while the housekeeping is being done. Otherwise, their patience is quickly exhausted, their attention span overtaxed, and they rightfully grow bored and abandon the program.

I skipped over water
I danced over sea
And all the birds in the air
Couldn't catch me

Hey Diddle Diddle

♠ Review

A program used in a classroom can get away with this poor design, but one used in the home cannot. In school, children recognize that they must remain at their desks and that they must complete a program as part of an assignment. At home, however, children are probably using the program unsupervised or with minimal parental supervision. If the program bogs down, they don't feel compelled to stick with it.

Facemaker

Facemaker is a delightful program that will appeal to all members of the family. I have fun with it, as does my 7-year-old daughter who shows off *Facemaker* to her friends. When you boot up the program disk, the program offers three choices:

○ You can build a face. You get to choose from a menu of mouths, noses, eyes, ears, and hair. (You can later change any of the features that you chose earlier.)

○ You can animate a face you have built—make the eyes wink; make the mouth frown, smile, or cry; make the character stick out its tongue; or make its ears wiggle.

○ You can play a memory game with the face. The computer animates the face by making it wink, smile, or wiggle its ears. You try to guess the exact sequence of actions. If your guess is correct, the computer adds a new action to the sequence. The game goes on indefinitely, and the high score is displayed at the top of the screen. *Facemaker* is a program that a child can run without any prodding from adults, which makes this program even more attractive.

Hey Diddle Diddle

Officially, *Hey Diddle Diddle* is for kids aged 3 to 10. Unofficially (as with all good programs), it's for kids of any age, including kids of 34.

Hey Diddle Diddle has three modes:

Storytime. The first verse of a nursery rhyme appears, a cartoon picture appears above the verse, and finally a

In Search of the Most Amazing Thing

second verse appears to complete the rhyme.

Storybook. This is very similar to *Storytime.* The first verse of the rhyme appears, and then the cartoon picture appears, this time drawn at slow speed. To see the second verse of the rhyme, you press a joystick button or the space bar.

Rhyme Game. This is the heart of *Hey Diddle Diddle.* The first (four-line) verse appears, but the lines are all scrambled. You have to unscramble the lines to make the lines rhyme and make sense.

You can play the game by yourself or with someone else, with or without a timer. There are two levels of play: at level one you must unscramble only the first four lines of verse; at level two, you must unscramble the whole nursery rhyme—all eight lines.

Here's a sample scrambled rhyme:
The big-bellied Ben
Than fourscore men
He eat more meat
Robbin the Bobbin
With a joystick or the cursor keys you can easily move the lines around and check them to see if they are arranged correctly. If not, you must keep trying.

Once you hit on the correct order:
Robbin the Bobbin
The big-bellied Ben
He eat more meat
Than fourscore men
you press the joystick button or numeric 5 and a picture of Ben, the fat hippopotamus, appears while the computer plays a tune. When you press the button again, the second half of the rhyme appears:
He eat a cow, he eat a calf
He eat a butcher and a half
He eat a church, he eat a steeple
He eat the priest and all the people

The *Hey Diddle Diddle* program's implementation is what makes it special. The verses are fresh and unusual; the simple tunes that accompany the verses and pictures are unusual, too, sometimes to the point of being lyrical or even haunting.

The *Storytime* and *Storybook* programs should be more interactive, and the pictures should appear on screen even faster. But these are minor gripes. The Rhyme Game, the rhymes, the pictures, and the tunes make this a very good program.

The Most Amazing Thing

In Search of the Most Amazing Thing is a game for the whole family. Everybody can contribute something, and you'll need everybody before the game is over.

Articles
The
An
A

Adjectives
This
That
These
Those
Some

Pronouns
He
She
It
They

Nouns
Apple(s)
Box(es)
Boy(s)
Bumpus(es)
Cat(s)
Dog(s)
Fence(s)
Flower(s)
Girl(s)
Rock(s)
Store(s)
Tree(s)
House(s)

Possessive Pronouns
His
Her
Its
Their

Verbs
Are
Dance(s)
Eat(s)
Go(es)
Hop(s)
Is
Jump(s)
Run(s)
Sing(s)
Walk(s)
Zot(s)

Prepositions
At
By
To
For
In

Table 1: Story Dictionary Entries for the Story Machine

The Most Amazing Thing is a golden metallic ball that holds great powers and could reveal the meaning of life. Your Uncle Smoke Bailey found the Thing when he was a boy and then lost it. Now it's your turn.

Uncle Smoke will loan you his B-Liner, a cross between a hot air balloon and a dune buggy, to search for the Most Amazing Thing. You will have to pilot the B-Liner through storms and fogs, across the tar ground of the Darksome Mire, and over a desert.

Go to Uncle Smoke's apartment when you reach the underground city of Metallica. If you get there, Smoke will show you how to go to the Metallican auction to bargain with the robots. You trade chips or songs for clues on how to find the Thing. You can also bargain for popberries that you can eat and night rocks that you can convert into B-Liner fuel. Your journey will be dangerous— watch out for the loathsome, ugly mire crabs.

If you find the Thing, your job is only half done—you still have to bring it back.

And next time? Next time, the Thing will be in a new location. To find it you will have to find a whole new set of clues. But you've got lots of tools. For example, the B-Liner has an on-board computer. You can buy programs for the computer: MAP-H helps you locate huts in Darksome Mire; CULTS helps you find out facts about the different, strange and mysterious people who live in Darksome Mire; DICTO helps you translate the 25 Mire people's languages into English; MUSIX helps you compose original songs that you can use as money to buy popberries, radio-controlled pencil sharpeners, robot toothbrushes, and other interesting items you'll find at the Metallican auction; and TRAC 4 helps you do something—but what?

The B-Liner is also a tool, but to fly it you have to master the flight control panel, including the Burner switch (to make the B-Liner go up), the Drop switch (to make it go down), and the Where switch (to see where you are in Darksome Mire). There are other switches and eight displays to keep track of.

As you fly the B-Liner across the mire, you have to construct a map of the mire or you'll quickly get lost. And you need to remember which tribe of people you've encountered, so you know what you can use to barter for supplies, clues, and other information. You've got decisions to make, notes to take, and you must constantly stay alert. A huge gust of wind may come and blow you off course, your food supply might run low and you'll need to search for a popberry, or you'll run out of fuel and need to land and drill for Night Rocks. Remember to watch out for marauding vultures, robotcycles, and talking fuzzles. Above all, be on the lookout for the dreaded mire crabs. They look like rocks, but they can fly through the air. They love to chase B-Liners, and if they get close enough, they'll shoot you with a ray of blue light. One zap from the ray and you're paralyzed.

These four Spinnaker packages exemplify how far the company has come in its development. The software has grown worthwhile and strong. Whether playing with Spinnaker software or another company product, remember that children's software, like the kids it's written for, gets smarter with age. ≡

Fred D'Ignazio is the author of several computer books for young people. He is also involved in artificial intelligence and robotics research.

Spinnaker Software
215 First St.
Cambridge, MA 02142
617/868-4700
The Story Machine: $34.95
Facemaker: $34.95
Hey Diddle Diddle: $29.95
In Search of the Most Amazing
*   Thing: $39.95*

Shift into Ultradrive.

PCnet and the IBM-XT
Your Total Solution for IBM PC Local Area Networks.

IBM-PC   **IBM-PC**   **IBM-XT**   **IBM-PC**

Share Your IBM-XT Hard Disk or other Hard Disk (*)
PCnet Major Features

- **Local Area Network and Shared Resource Management**
  - Broadcast Coaxial Bus Network
  - Up to 16 PC's per shared PC Server
  - Up to 8 PC Servers
  - Network errors handled similar to DOS
  - PC to PC communications

- **Computer Vendor Independence**
  - IBM PC, IBM PC-XT
  - Compaq
  - Colby
  - Columbia
  - Corona

- ***Hard Disk Vendor Independence**
  - IBM
  - Santa Clara Systems
  - Tallgrass
  - Tecmar
  - Microcode
  - QCS
  - Datamac
  - Davong
  - Corvus

- **Remote PC Execution**
  - Background program execution at Shared PC
  - Multi-tasking use of Printers, Modems, etc...

- **IBM MS-DOS Transparency**
  - MS-DOS 1.1,2.0
  - Off the Shelf program execution over network
  - File Transfers use MS-DOS commands

- **Disk and File Sharing**
  - Public and Private Files/Volume and Disk
  - File/Record Locking and Unlocking
  - No Dedicated File Server; PC can act as File Server
  - Multiple File Servers

- **Performance**
  - Serial coaxial bus at 1 megabit up to 7000 feet
  - No significant User PC degradation

Future Features

- Networking
  - SNA, ETHERNET,X.25
- Other Computer
  - TI, Victor, Eagles
- Value Added Applications
  - DBMS

- **Ease Of Use**
  - Single PC slot for PCnet adapter card
  - Standard coax and BNC connectors
  - Automatic Load using AUTOEXEC.BAT

Reader Service #133

ORCHID
TECHNOLOGY
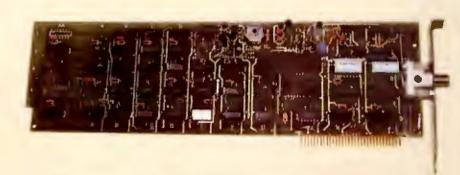
487 Sinclair Frontage Road,
Milpitas, California 95035 • (408) 942-8660

Telex-171596

When ordering, please specify both the computer/operating system and the hard disk/version. Orchid supports many different combinations and is adding new configuarations each day.

This Programming professional deserves a lot more from his personal computer.

He's earned it. As a seasoned professional, he's learned to master some of the world's most advanced programming tools. Tools specially designed to meet the everyday demands of programming experts.

But as the owner of a personal computer, he's come to expect less. Less performance. Less sophistication. And less flexibility.

Why should programming a personal computer be any different?

Prior to the announcement of micro/SPF™ development software, experienced programmers felt programming a personal computer was a lot like playing with a toy. You couldn't take it seriously.

But today, there's micro/SPF™ a solution to elementary program editing tools now offered with most micro-computers.

With micro/SPF™ you get the same procedures and commands experienced programmers are accustomed to using at work. By mimicking features found in standard SPF software, micro/SPF™ provides all the sophisticated utilities programming professionals expect.

Programming experts can take advantage of skills they've spent years perfecting.

Now, for the first time, mainframe software is available for personal computers. SPF screens are fully reproduced in logical sequence and each screen is formatted identical to those found in the SPF system.

In addition, micro/SPF™ comes equipped with the same primary and line commands, tutorial messages and program editor (with program function keys) experienced programmers are used to.
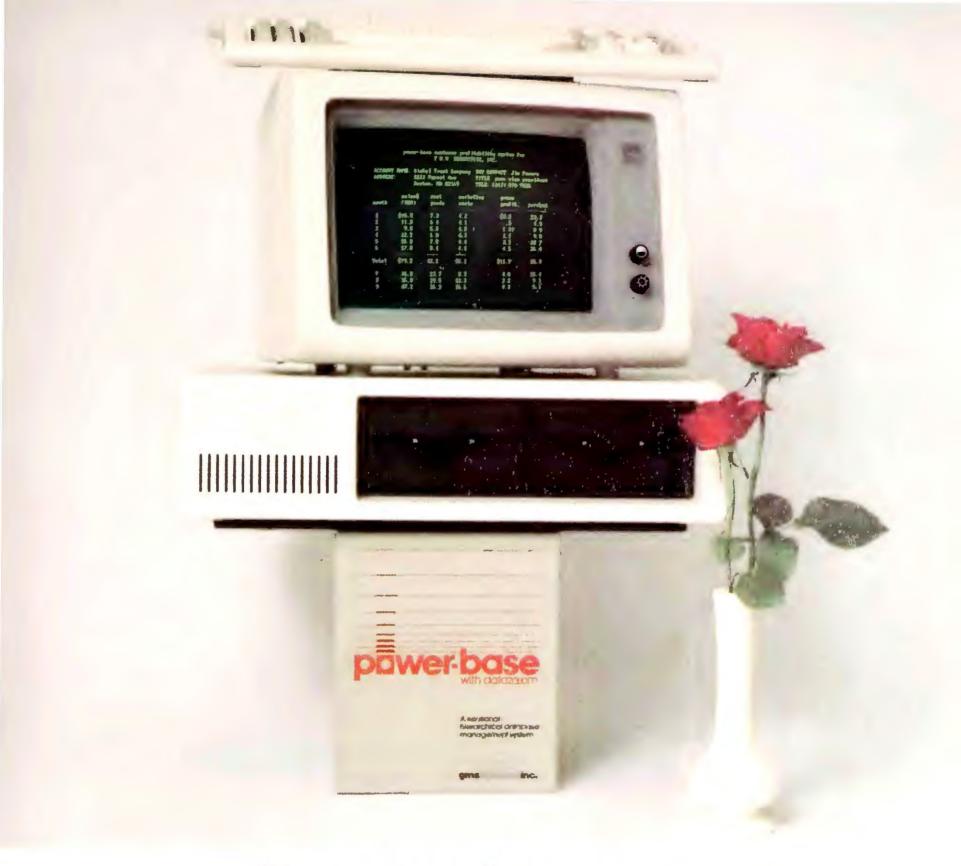
Programming professionals who've spent years perfecting the art of writing sophisticated code deserve to work with state-of-the-art tools, not toys. Find out how micro/SPF™ can help you do work-compatible programming on your personal computer today!

PHASER

When it comes to superior performance, we study our lines very carefully.

Superior printer performance is not a fluke. It evolves from analyzing printed line after printed line. Taking the time to test and retest. After 30 years of manufacturing precision parts, we know that there are no shortcuts.

And so we took the Gemini-10X and methodically put it through its 120 cps pace. We achieved a print head life of over 100 million characters with an extremely precise dot alignment creating each crisp character.

So far so good.

Next, sophisticated performance demanded versatility. A wide choice of character sets, a buffer expandable to 8K, and the ability to interface with all popular personal computers. We added macro instruction, giving Gemini-10X the capability to perform up to 16 operations with one command. We included as standard a paper feed system that has a friction and fully adjustable tractor feed. Then we even built in the dexterity to print graphics and text on the same line.

Done.

And, of course, staying the best means constant reviewing and fine-tuning. Keeping the Gemini easy to find, easy to afford and so reliable it can be warranted for up to twice as long as its major competitors.

Only the most careful engineering has built the new hard-working Gemini-10X. You'll applaud its performance.

star
micronics·inc ™

THE POWER BEHIND THE PRINTED WORD.
Computer Peripherals Division
2803 N.W. 12th Street, Dallas/Ft. Worth Airport, TX 75261

The 1-2-3 Checkbook Ledger

Andrew Fluegelman
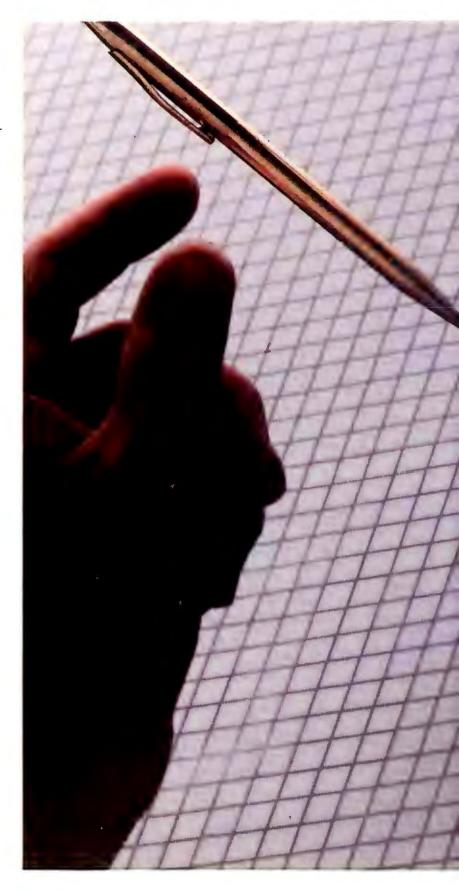
Lotus Development Corporation's 1-2-3—the versatile spreadsheet, data base, and graphing program—has already received praise from reviewers and votes of confidence from the marketplace. This tutorial shows how you can use 1-2-3 to construct a simple checkbook ledger system that provides varied, comprehensive summaries of ledger entries. It will also give you practical experience in using most of 1-2-3's data management functions.
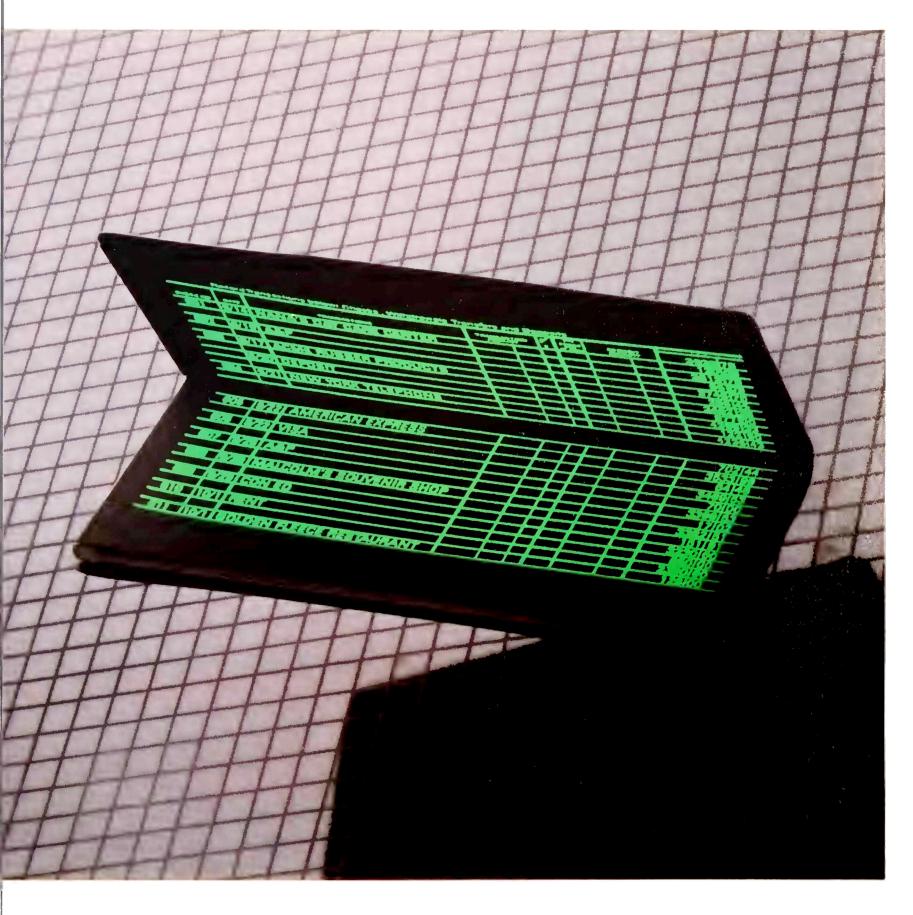
The ledger that you will be constructing is essentially an expanded register for recording checks and deposits in a personal or small business account. It can be adapted to a variety of uses. In addition to the usual check number, date, name, and amount references, the ledger allows you to categorize entries by two separate code references plus an optional memo reference. Any of these references can be used to summarize, extract, and correlate data.

The ledger consists of three parts: a Data Input section that contains the raw information, a Data Query section that permits extracts and analyses of the input data, and a Data Table that summarizes the data. Throughout this tutorial, the terms used to describe various sections of the ledger will match as closely as possible the corresponding *1-2-3* terminology.

The tutorial assumes that you are familiar with the overall *1-2-3* command structure and that you know how to move around a worksheet. The terms listed in *italics* represent *1-2-3* commands. They can be entered most easily by typing the first letter of each command word, although you can use the pointer to select the appropriate command.

The material listed in monofont represents text and values to be entered into cells or responses to prompts. All cell references will be given as capital letters followed by numbers; they can be entered either as direct references or by pointing.

```
            A         B              C              D    E    F         G

     1   ===  CHECKBOOK  LEDGER  ===
     2
     3
     4
     5   DATA INPUT
     6   =================================================================
     7     ref#      date name                    code1 code2      amt memo
     8   -----------------------------------------------------------------
     9
    10
    11
    12
    13
    14
    15
    16
    17
    18
    19
    20
```
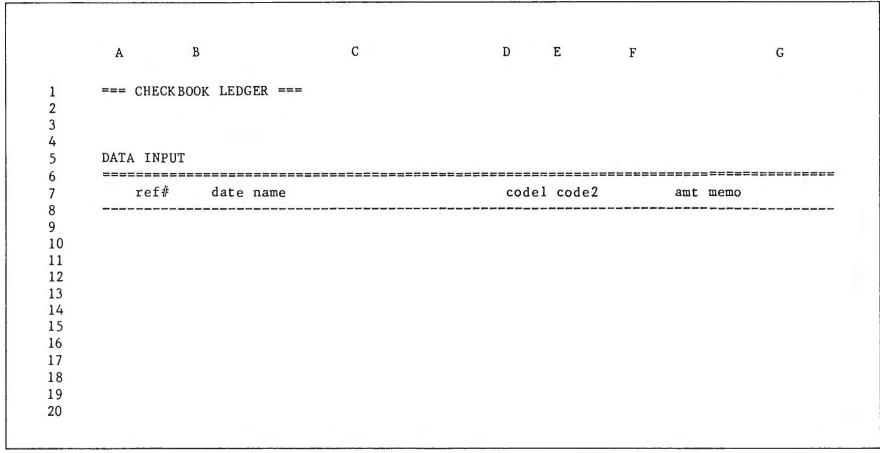
Figure 1: Data Input section


```
            A         B              C              D    E    F         G

     1   ===  CHECKBOOK  LEDGER  ===
     2
     3
     4
     5   DATA INPUT                                    SUM:    │ 0.00 │─ @SUM (F9...F500)
     6   =================================================================
     7     ref#      date name                    code1 code2      amt memo
     8   -----------------------------------------------------------------
     9
    10
    11
    12
    13
    14
    15
   500   ===  THIS IS THE LIMIT OF THE WORKSHEET FOR FORMULAS AND FORMATTING ===
   501
   502
   503
   504   /Range Format Fixed 0        /Range Name Create INPUT      /Range Name Labels Down
```
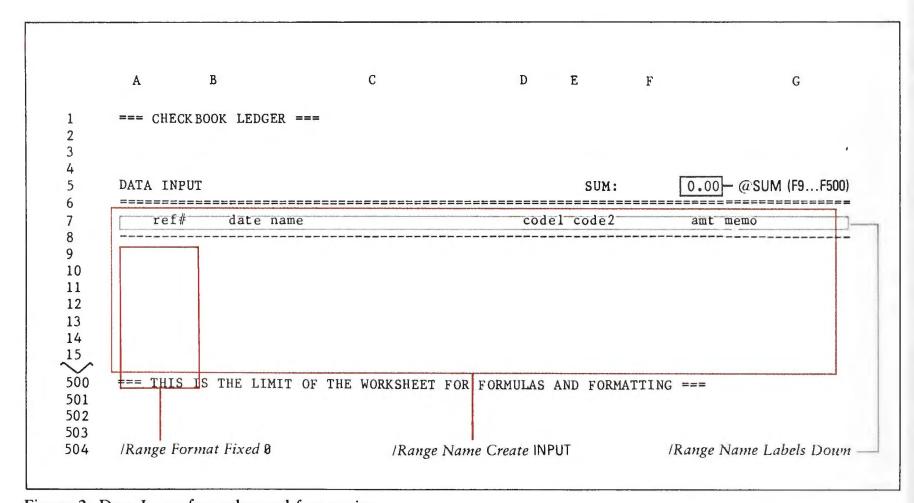
Figure 2: Data Input formulas and formatting

Data Input

The first step is building the Data Input form. Make sure you start with a clean worksheet by giving the command /Worksheet Erase Yes

In cell A1 enter = = = CHECKBOOK LEDGER = = = ·
Move down to A5 and enter DATA INPUT .

Place a repeating label of equals signs in A6 by entering \ = . Copy the contents of A6 to cells B6 through G6 with the command
/Copy A6 <ENTER> B6..G6 <ENTER>

Go to A7 and enter "ref# . (The double quotes will right align the label in the cell.)

In B7 enter "date .

In C7 enter name (C7 through E7 will be left-aligned labels).

In D7 enter code1 .

In E7 enter code2 .

In F7 enter "amt .

In G7 enter memo .

Finally, go to A8 and place a repeating label of hyphens by entering \-. Copy the contents of cell A8 to cells B8 through G8 in the same manner as with A6 above.

Now reset the width of column C to 30 characters. Go to C8 (or any cell in column C) and give the command
/Worksheet Column Set 30 <ENTER>

Using the same command sequence, reset columns D and E to a width of 6 characters each. Reset column F to 12 characters. Reset column G to 15 characters.

Your worksheet should now look like Figure 1. Columns A through F should fill the screen completely when you press <Home>, and column G should fill the screen when the pointer is moved there.

Touching Bottom

You will be entering data starting with row 9 and continuing down. At this point, you don't know how many data items you will have, but you still want to calculate a running balance of all the items and format the data. For this reason, you should set a bottom limit for the worksheet.

If you've explored the *1-2-3* worksheet, you know that it extends to row 2048. You could, therefore, have a maximum of 2037 data items, but you probably don't want to extend the worksheet that far because you might not have enough system memory to accommodate such a large worksheet. Also, the larger the worksheet, the longer the program will take to recalculate it. You should set a temporary limit for the worksheet at row 500 to avoid these problems.

Go to cell A500 and enter the label
= = = THIS IS THE LIMIT OF THE WORKSHEET FOR FORMULAS AND
  FORMATTING = = =
This label serves as a flag to indicate the bottom of the worksheet as you have set it up. If you reach this label during data entry, you'll have to reformat the worksheet and revise some of the formulas.

Formulas and Formatting

The Data Input section of the ledger contains only one formula: the sum of all check amounts.

Go to cell E5 and enter the label "SUM: .

Go to cell F5 and enter the formula @ SUM(F9..F500) . Once the formula has been entered, F5 should show the value 0 since no data is in the ledger yet.

Since most numeric data will be expressed in dollars and cents, reformat the entire worksheet to express numbers with two decimal places by giving the command
/Worksheet Global Format Fixed 2 <ENTER>

Cell F5 should now show its value as 0.00.

The 'ref#' column should express its data as integers, however, so reformat column A as fixed with no decimal places. The appropriate command is
/Range Format Fixed 0 <ENTER> A9..A500 <ENTER>

Range Names

You could start entering data in the Data Input section now, but a few more formatting conventions are required so that the other two sections of the ledger will work. These conventions involve assigning names to various parts of the Data Input section.

First, give the entire data input range the name INPUT. Go to cell A7 and give the command
/Range Name Create INPUT <ENTER> A7..G500 <ENTER>

Defining the INPUT range as starting with row 7 rather than row 9 is very important. Labels such as 'ref#', 'date', and 'name' must be part of the input range for the Data Query functions to work.

Note also that you have defined the INPUT range as extending down to row 500. If your worksheet extends beyond that row, the range INPUT will have to be redefined (along with the formula in cell F5).

Finally, giving names to the columns under each label heading will be useful later on in the tutorial. Go to cell A7 and give the command
/Range Name Labels Down A7..G7 <ENTER>
This command assigns cell A8 the name REF#, cell B8 the name DATE, C8 the name NAME, and so on. These names will be used to create formulas in the Query section of the ledger.

Figure 2 is a schematic diagram of the worksheet to this point, showing the formula, formatting, and range names. The first section of the ledger is now set up for data entry. You should always save a worksheet periodically as you are constructing it, and this would be a good time to do so. Give the command
/File Save LEDGER <ENTER>

Data

To follow the workings of the other ledger sections, we'll create a ledger for a fictitious and somewhat improbable company. To keep the model simple, we'll use three expense categories—Wages, Materials, and Promotion—and two income categories—Retail and Wholesale. These categories will be listed under the 'code1' column.

We'll also assume that the company has four products: Nuts, Bolts, Washers, and Screws. These will be listed in the 'code2' column.

Go to cell A9 and enter 101 . This column will be used to refer to check numbers and deposit references.

```
          A          B             C           D        E        F          G

1     === CHECKBOOK LEDGER ===
2
3
4
5     DATA INPUT                                      SUM:       923.23
6     =====================================================================
7         ref#     date name                   code1 code2      amt memo
8     ---------------------------------------------------------------------
9         101   8308.01 Smith                  wages nuts    -400.00
10        102   8308.01 Jones                  wages bolts   -385.00
11        103   8308.02 Green                  wages washr   -425.00
12        104   8308.03 Brown                  wages screw   -390.00
13       9001   8308.03 Acme                   whlsl bolts   1250.00
14       9002   8308.04 Union                  retl  nuts     334.14
15       9003   8308.04 Union                  retl  bolts    229.86
16       9004   8308.04 Union                  retl  screw    469.23
17        105   8308.06 Bijou                  promo screw  -1000.00
18        106   8308.06 Bijou                  promo washr   -500.00
19        107   8008.09 Consolidated           mater nuts    -800.00
20        108   8008.10 Consolidated           mater bolts   -600.00
21        109   8308.10 General                mater screw   -700.00
22        110   8308.11 Consolidated           mater washr   -200.00
23        111   8308.15 Smith                  wages bolts   -400.00
24        112   8308.15 Jones                  wages nuts    -385.00
25        113   8308.15 Green                  wages washr   -450.00
26        114   8308.15 Brown                  wages screw   -425.00
27        115   8308.16 Western                mater screw   -300.00
28       9005   8308.20 Acme                   whlsl nuts    2500.00
29       9006   8308.25 National               whlsl screw   2000.00
30       9007   8308.25 National               whlsl washr   1500.00
```

Figure 3: Data Input entries

```
          H          I             J           K      L        M          N

1                                                              QUERY
2     =====================================================================
3         ref#     date name                   code1 code2      amt memo
4
5                                                     DSUM:
6     =====================================================================
7         ref#     date name                   code1 code2      amt memo
8
9
10
11
12
13
14
15
16
17
18
19
20
```

Figure 4: Query section

In cell B9 enter 8308.01 . This number signifies the date August 1, 1983, the first two digits representing the year, the next two the month, and the decimal portion the day of the month.

Many systems are used for entering dates in computer models, and, in fact, *1-2-3* offers special functions for representing dates. The decimal number system suggested above has several advantages. First, all the dates behave logically in numerical sequence; that is, January 1, 1984 (8401.01) is greater than December 31, 1983 (8312.31). This system simplifies the process of looking for all items earlier or later than a certain date. Making use of decimal places to indicate the day of the month aids legibility. This system, however, does not permit calculating the number of days between two dates. You might want to investigate *1-2-3*'s built-in date functions for that capability, but those functions are less convenient for data entry unless you set up some keyboard macros.

After entering the date, go to cell C9 and enter Smith.
In D9 enter wages.
In E9 enter nuts.
In F9 enter -400.

Before proceeding, you need to consider a few important data entry principles. First, consistency is important in entering information in the 'ref#', 'date', and 'name' columns and crucial in the 'code1' and 'code2' columns. You should use all lowercase letters for the code references. Also, make sure that you always use the same code names, and watch out for inadvertent trailing spaces. (The program will treat 'nuts' and 'nuts ' as different entries.)

Figure 3 lists 22 sample ledger data items. Since the rest of the tutorial will make use of this data, you should enter it on your worksheet.

In this sample, expense items are listed as negative numbers. If you wanted to maintain separate ledgers for expenses and income, you could, of course, enter all amounts as positive in each ledger. Because expense and income items are mixed here, all income items have been given reference numbers starting with 9000. This method allows you to extract those items more easily later on.

The sample has not made use of the memo column (column G), but in practice this column is available for additional comments about the entries. Since this column can be used later to sort the data as well, there is an advantage in maintaining consistency, such as always using the label 'tax' for taxable items. At this point you should resave the file with the command
/File Save LEDGER <ENTER> *Replace*

The Data Query Section
Up to now the worksheet has been displaying a running balance in cell F5, but it hasn't performed any unusual tasks. *1-2-3*'s special functions will come into play as you set up the Data Query section of the worksheet.

Go to cell M1 and enter "QUERY .
Go to H2 and place a repeating label of equals signs by entering \ = . Copy the contents of H2 to I2 (the letter *I*) through N2 with the command
/Copy H2 <ENTER> I2..N2 <ENTER>
Now reproduce the labels in cells A7 through G7 in cells H3 through N3. The easiest way to do this is with the command
/Copy A7..G7 <ENTER> H3 <ENTER>
Leave row 4 blank for now. Go to cell L5 and enter the label DSUM: .
Copy the row of equals signs from row 2 to row 6 with the command
/Copy H2..N2 <ENTER> H6 <ENTER>
Copy the labels from row 3 to row 7 with the command
/Copy H3..N3 <ENTER> H7 <ENTER>

All or part of the Data Table can be extracted and included in word processing files.

Reset the column widths as you did in the Data Input section. Move the pointer to any cell in column J, and give the command
/Worksheet Column Set 30 <ENTER>
Similarly, reset columns K and L to 6 characters each, column M to 12 characters, and column N to 15 characters.

Move the pointer to cell H1. The Query section of the worksheet should now look like Figure 4.

More Names, Formats, and Formulas
Creating a few more range names will be useful. First, name the rectangle defined by cells H3 to N4 as CRITERION. The appropriate command is
/Range Name Create CRITERION <ENTER> H3..N4 <ENTER>
Name the rectangle H7 to N500 as OUTPUT with the command
/Range Name Create OUTPUT <ENTER> H7..N500 <ENTER>
Format column H to show numbers as integers with the command
/Range Format Fixed 0 <ENTER> H1..H500 <ENTER>
Format H4 to N4 as showing formulas in text format with the command
/Range Format Text H4..N4 <ENTER>
This will cause any formulas entered in these cells to be expressed in text form (rather than as calculated values).

Finally, go to cell M5 and enter the formula
@ DSUM(INPUT,5,CRITERION)

If Wishes Were Horses...

"If wishes were horses, beggars would ride," my favorite uncle used to say. One can ride a long and creative path with 1-2-3's excellent design and powerful features, but I still beg for a few improvements. Here are the top 5 items on my 1-2-3 wish list:

Automatic reformatting. When you modify the worksheet by inserting rows or columns or by copying or moving cells, 1-2-3 automatically adjusts cell references to reflect the new locations. It also will adjust the coordinates of named ranges. Unfortunately, the program does not carry over the formatting of moved cells.

For example, if you have formatted A1..E5 to display numbers to two fixed decimal places and then inserted a new row ahead of row C, the new row will carry no formatting instructions. Likewise, if you were to move A1..E5 to F11..J15, you would have to format the new locations all over again. This is very inconvenient. It would also be handy if there were a way to copy or move columns and automatically transfer the original column width settings.

Text conditions and results in formulas. 1-2-3 permits only numeric arguments to formulas. If a cell contains text, it can only return a value of 0. The result of a formula can only be a number; you cannot have a formula such as @IF(A1 = 'apple', 'fruit'), or even @IF(a1>90, 'good grade').

Microsoft's *Multiplan* not only permits formulas such as those above, it also affords a number of string processing functions that test and return specified characters within a text cell entry. Similar sophistication would greatly enhance 1-2-3's data management functions.

Abort key. Certain 1-2-3 functions take some time to execute. In the current program, there is no way to abort a function once the command has been given.

The most obvious and troublesome situation occurs when you are printing all or a portion of a worksheet. If, for example, after giving the Go command, you notice that the paper is not aligned properly, you may have to wait while several useless sheets are printed. You can force an error by turning off the printer, but it would make more sense to be able to press Esc and terminate printing on the spot.

Another example is the Data Table function described in the Checkbook Ledger tutorial. The table calculation can take several minutes if there is a lot of data and the table is extensive. If you notice a mistake once the calculations have been started, you just have to wait. Your only recourse is to reboot by pressing Ctrl-Alt-Del, thereby losing any data you haven't saved to disk.

Editing capability within data find. If you experiment with the Data Find function, you'll discover that you can move horizontally along the cells you locate, but that you cannot edit them. Your only recourse is to return to the criterion cell.

If on-the-spot editing were permitted (such as by pressing F2), the Data Find function would provide an efficient way to update or revise data entries. As implemented, its usefulness is limited to being a "look, but don't touch" function.

Formulas in data tables. I believe that this last wish actually uncovers a very obscure bug—or at least a program deficiency. If you look at the relation between the Data Query and Data Table functions of the system set up in the Checkbook Ledger tutorial, you'll see that you should be able to enter a formula such as +AMT>500 as a conditional entry in one of the row or column headings of the Data Table. You can't.

Even if a formula in the Query criterion range produces accurate results via the @DSUM function (cell M5 in the Ledger worksheet), it is not reported correctly when incorporated in the Data Table. Apparently, the formula is evaluated before the Data Table calculations begin, and the result is inserted in the Query criterion range, rather than inserting the formula in the criterion range and evaluating it for each pass of the Data Query function.

Am I being overly critical? You bet. A program as excellent as 1-2-3 can stand up to this level of nitpicking. I'm looking forward to it becoming even better.

This last formula creates a data base statistical function that evaluates the named range INPUT (A7..G500) according to the entries in the named range CRITERION (H3..N4). It calculates the sum of the input entries that are offset five columns in the input range (column F—the 'amt' column). For an explanation of all of the data base statistical functions see page 203 of the *1-2-3* manual.

Making use of decimal places to indicate the day of the month aids legibility.

If you have constructed the Query section correctly, cell M5 should show the same value as cell F5, which, according to the sample data, should be 923.23. Figure 5 shows the names, formats, and formulas for the Query section of the ledger.

Data Query Definitions
You're almost ready to take full advantage of the *1-2-3* Data Query functions, but first you have to define the Data Query input, output, and criterion ranges. This will be easy because you have laid the groundwork with the range names already created.

To define the Data Query ranges give the command:
/Data Query Input INPUT <ENTER>
This assigns the range A7..G500, which you have already named INPUT, as the Data Query input range.

You should still be in the Data Query submenu, so the following three commands need not be preceded by slashes:
Criterion CRITERION <ENTER>
assigns your named range CRITERION (H3..N4) as the Data Query criterion range.
Output OUTPUT <ENTER>
from the same Data Query submenu assigns your named range OUTPUT (H7..N500) as the Data Query output range.

You can now leave the Data Query menu with the command *Quit*. Before moving on to the next step, resave the worksheet with the command
/File Save LEDGER <ENTER> *Replace*

Data Query Find
If you're not already familiar with the operation of *1-2-3*'s Data Query functions, reading pages 194 to 203 of the *1-2-3* manual will be helpful, particularly the explanation of criteria matching, before proceeding with the tutorial. Generally, the Data Query functions permit you to select items from the input range of the ledger by entering various match criteria in the criterion range.

Suppose you want to look at all the ledger entries that pertain to 'nuts'. Go to cell L4 and enter nuts . (Make sure that the 'code2' entry is in the same form you used when inputting your data.) Notice that a new sum appears in cell M5. This reflects the operation of the data base statistical sum function and is the sum of all ledger amounts with the 'code2' reference 'nuts'.

Give the command */Data Query Find*. The screen should display the Data Input section of the ledger with the first entry highlighted. Notice that this entry has 'nuts' in the 'code2' column. -

Press <CursorDown>. The highlighted bar should jump down to the income item #9002 for Union. You can keep pressing <CursorDown> or <CursorUp> and locate all entries that list 'nuts' in the 'code2' column.

When you're finished looking at entries, press <Esc> and you'll be returned to the Query screen with the pointer at cell L4. To return to the worksheet, press <Esc> three more times or give the command *Quit*.

How about finding all the entries that pertain to both 'wages' and 'bolts'? Enter wages in cell K4 and bolts in cell L4.

The rest of the Data Query Find function has already been defined, so all you have to do is press <F7> for 'Query'. You'll see that only two items meet the double criteria. To return to the worksheet, press <Esc>.

Data Query Extract
The Data Query Extract function is more useful than Find because it lets you make separate lists of selected parts of your data. With cells K4 and L4 still containing 'wages' and 'bolts', give the command */Data Query Extract*. You should see ref# items 102 and 111 for Jones and Smith reproduced in the output section of the Query screen. The sum of the extracted amounts appears in cell M5. To return to the worksheet, give the command *Quit*.

How about an extract of all the items for Union? Erase cells K4..L4 with the command
/Range Erase K4..L4 <ENTER>
Then enter Union in cell J4.

The last Data Query function was Extract, so all you have to do is press <F7> for an extract and sum of all the Union items.

You can also enter formulas in the criterion area. For example, you can extract all items greater than $500. Erase cell J4 and go to cell M4. Enter the formula +amt>500 . (The plus sign is needed to distinguish the entry as a formula, not a label.) Press <F7> again and you'll see four items for a total of $7250.

To extract and total all the expense items, enter the formula +amt<0 in M4 and press <F7>.
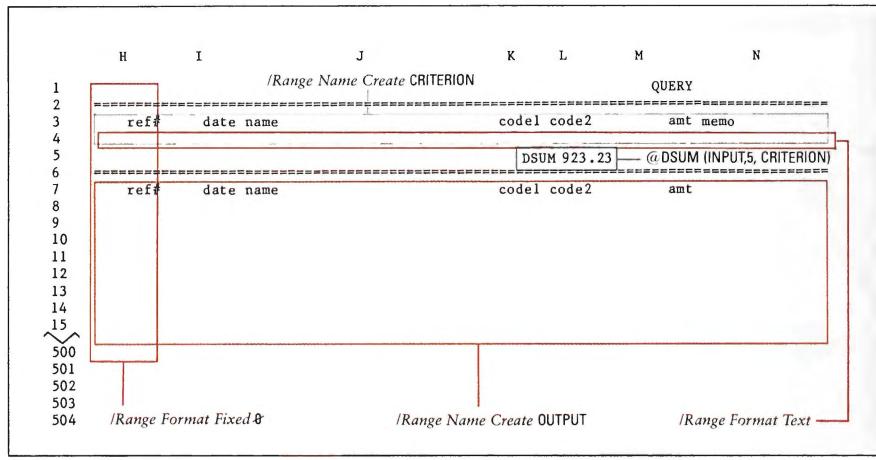
Figure 5: Query section formulas and formatting

You could also use the Extract function to check that all expense items were, in fact, entered as negative numbers. Erase cell M4, enter the formula +ref#<9000 in H4, and press <F7> again. Scan the extract to make sure that all the check references entries have negative amounts.

Consistency is important in entering information; always use the same code names.

To extract all the expense items between August 6 and August 16, leave the formula in cell H4 and enter the formula
+DATE>8308.05#AND#DATE<8308.17
in cell I4 (the letter *I*) and press <F7>.

You can further limit the scope of the extract by entering screw in cell L4.

Formulas can be entered in the criterion range because names were assigned to the columns in the Data Input section with the /*Range Labels Down* command. Consult page 197 of the *1-2-3* manual for a more detailed explanation.

Note that you can also extract entries according to what has been entered in the 'memo' column by moving over to cell N4 and entering the appropriate match criterion.

Once you have extracted entries with the Data Query Extract function, you can save those entries to separate print files, which can then easily be inserted into reports or other word processing files. The appropriate command is /*Print File.*

Constructing a Data Table
The best part of the ledger is still to come. The third section of the worksheet, the Data Table, produces summaries for all the data entries.

Before proceeding, erase whatever entries may be in cells H4 through N4.

Go to cell V1 and enter the label "TABLE2.

Go to cell O2 (the letter *o*) and place a repeating label of equals signs by entering \=.

Copy the contents of O2 to P2..V2 with the command
/*Copy* O2 <ENTER> P2..V2 <ENTER>

Go to cell O6 (the letter *o*) and enter the label "CODE1.

Now go to cell P6 and enter the label wages, once again making sure to use the same code names that appear in the rest of the worksheet.

In cell P7 enter mater.

In P8 enter promo.

In P9 enter whlsl.

In P10 enter retl.

```
              O        P        Q       R        S        T       U        V

 1                                                                        TABLE2
 2        ================================================================================
 3
 4                          CODE2
 5        $M$5──┤ 923.23 │  nuts    bolts    washr    screw            TOTALS
 6        CODE1 wages                                                 │ 0.00 │─── @SUM (Q6...T6)
 7              mater                                                   0.00
 8              promo                                                   0.00
 9              whlsl                                                   0.00     /Worksheet Copy V6
10              retl                                                    0.00     <ENTER> V7...V12
11
12        TOTALS:        │ 0.00 │  0.00    0.00    0.00                 0.00
13
14                          │                           │
15                     @SUM (Q6...Q10)        /Worksheet Copy Q12 <ENTER> R12...T12
```
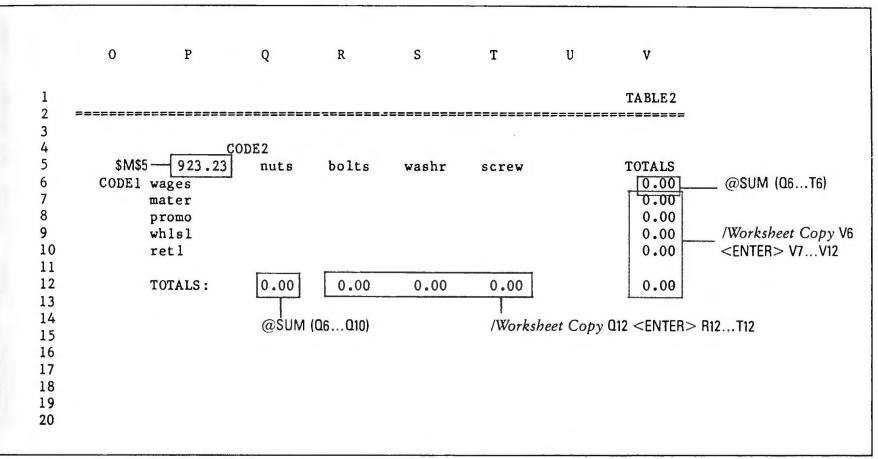
Figure 6: Table section with formulas

> You will see the results almost faster than the moves can be explained.

If you were constructing your own ledger, you would continue entering each of your 'code1' categories down column P. The forms of these entries must match exactly the way that they were used in the Data Input section of the ledger. It is also important that all of the possible 'code1' entries be included in column P.

Now go to cell Q4 and enter the label "CODE2 .
Go down to cell Q5 and enter the label "nuts .
Go over to cell R5 and enter "bolts .
Go to S5 and enter "washr .
Go to T5 and enter "screw .

Again, take care that these entries match the codes used in the Input section. Although you can enter the codes as right-aligned labels, as illustrated here, or as left-aligned labels, you must use the same spelling and capitalization, and you must be careful about inadvertent leading or trailing blank spaces.

If this were your own ledger, you would continue entering all your 'code2' entries in row 5, starting with cell Q5.

Data Table Formulas

The last step in constructing the Data Table is inserting subtotal formulas for the columns and rows.

Go to cell V5 and enter the label "TOTALS .
In cell V6 enter the formula @ SUM(Q6..T6) .
Copy the formula in cell V6 to cells V7..V10 with the command
/*Copy* V6 <ENTER> V7..V10 <ENTER>

Go to cell P12 and enter the label TOTALS: .
In cell Q12 enter the formula @ SUM(Q6..Q10) .
Copy the formula in cell Q12 to cells R12..V12 with the command
/*Copy* Q12 <ENTER> R12..V12 <ENTER>

The Data Table is almost ready. Go to cell P5 and enter the absolute reference +M5 .

The Table section of the ledger should look like the one in Figure 6. (If you have used the sample data, P5 should show the value '923.23'—the same as cells M5 and F5.)

If you haven't been saving the worksheet periodically so far, by all means do so now with the command
/*File Save* LEDGER <ENTER>

The Data Table Speaks

The next few moves will be *1-2-3* magic, and you will see the results almost faster than the moves can be explained. If you have not already done so, erase whatever entries may be in cells H4..N4.

	O	P	Q	R	S	T	U	V
1								TABLE2
2	==
3								
4			CODE2					
5		923.23	nuts	bolts	washr	screw		TOTALS
6	CODE1	wages	-785.00	-785.00	-875.00	-815.00		-3260.00
7		mater	-800.00	-600.00	-200.00	-1000.00		-2600.00
8		promo	0.00	0.00	-500.00	-1000.00		-1500.00
9		whlsl	2500.00	1250.00	1500.00	2000.00		7250.00
10		retl	334.14	229.86	0.00	469.23		1033.23
11								
12		TOTALS:	1249.14	94.86	-75.00	-345.77		923.23
13								
14								
15								
16								
17								
18								
19								
20								

Figure 7: Table section results

Move the pointer to cell P5 and give the command *Data Table 2*.

The prompt will ask for the 'Table range'. Enter P5..T10 .

The prompt will ask for 'Input cell 1'. Enter K4 .

The prompt will ask for 'Input cell 2'. Enter L4 .

You'll see the message 'WAIT' in the upper corner of the screen. In less than 17 seconds you should see the Data Table fill out with subtotals for all the combinations of 'code1' and 'code2' entries. Figure 7 illustrates the completed Data Table.

You should check the value in cell V12 with the value in cell P5. If they are not the same, you have made an error by omitting, duplicating, or misspelling one of the 'code1' or 'code2' entries in the Data Table.

You should also check the V12 value with F5. If they are not the same, your Data Table does not reflect the sum of all the entries in the Data Input section. The most likely reason for this problem is that some entries were left in cells H4..N4.

You do have the option of creating partial Data Tables, just as you performed partial Data Extracts. For example, you might want to see a Data Table for the first half of August 1983.

Go to cell I4 (the letter *I*) and enter the formula + DATE<8308.16 .

Using the cursor keys, move the pointer to cell V1 so you'll be able to see the Data Table. Since the Data Table function has already been defined, you have only to press <F8> to run the Data Table again.

The Data Table can be useful for very limited selections. For example, you can create a table that shows only the entries for 'Smith'.

Now that you know what the Data Table does, you should consult page 207 of the *1-2-3* manual for an explanation of how it is constructed and how it works. The table you have constructed in the ledger behaves as though it is entering each possible combination of 'code1' and 'code2' references in the criterion range of the Data Query section. It then reports the data base statistical sum from cell M5 in the appropriate intersection of the Data Table.

When constructing the Data Table for your own ledger, make sure that all 'code1' references are listed down column P starting with cell P6 and all 'code2' references listed along row 5 starting with cell Q5. The 'Table range' called for by the prompt should be defined by cell P5 in the upper-left corner and should include all the 'code1' and 'code2' references.

As with the Query function, all or part of the Data Table can be extracted and included in word processing files via the *Print File* command. You can also extract Table or Query listings for insertion in other worksheet files with the command *File Xtract*.

Working with the Ledger

The following are a few suggestions that can make working with the ledger a bit more efficient.

o If you start to accumulate a substantial amount of data, you'll start experiencing noticeable delays as the program recalculates for each cell entry. You should switch to manual recalculation by giving the command /Worksheet Global Recalculation Manual. The screen will indicate that manual recalculation is necessary with the notice 'CALC' in the lower portion of the screen. To recalculate manually press <F9>.

o The ledger has been set up to simplify the process

> Once you have set up the ledger, you will find many more possibilities for using *1-2-3*'s features.

---

of moving to the different sections. Press <HOME>, and the screen will show the main Data Input portion of the ledger. To get to the Query section from the Home position, press <End> followed by <CursorRight>. Pressing <End> and <CursorRight> again will take you instantly to the Data Table section. If you have not explored using <End> to move around a *1-2-3* worksheet, consult page 37 of the manual. In the checkbook ledger, the 'QUERY' and 'TABLE2' labels in cells M1 and V1 act as "stops" for the pointer.

o If you reach row 500 of the worksheet, you can extend the capacity of the ledger easily by inserting extra rows. With the pointer on row 500, the appropriate command would be

/Worksheet Insert Row A500..A *nnn* <ENTER>

where *nnn* represents the new bottom limit of the worksheet.

The Insert Row command automatically redefines the named ranges INPUT, OUTPUT, and CRITERION and readjusts the formula in cell F5. All the formulas and data base functions will therefore remain accurate.

Unfortunately, inserting rows does not automatically extend ranges that have been defined for formatting; you will have to extend the formatted ranges A9..A500 and H4..H500 to show no decimal places. (See "If Wishes Were Horses....")

o Be very careful if you want to make adjustments to the worksheet. Inserting rows within the first 10 rows of the ledger can have disastrous effects on the data base

functions and formulas, as can using the /Move command to shift sections of the ledger.

o When constructing a Data Table for your own entries, you may have difficulty keeping track of how many different 'code1' and 'code2' references you have used. You can use *1-2-3*'s Data Query Unique function to check the references. Consult page 202 of the manual. The following commands allow you to extract all the unique 'code1' references:

/Data Query Input D7..D500 <ENTER>

redefines the Data Query input range. *Unique* extracts all unique entries in the input range.

To see the 'code2' references, give the command *Input* E7..E500 and the command *Unique* once again.

If you extract any unique references, make sure that you redefine the Data Query input range with the command /Input INPUT <ENTER> , which restores the entire Data Input section as input for the Data Query functions.

More Functions

Once you have set up the ledger, you will find many more possibilities for using *1-2-3*'s features. You might want, for example, to sort the Data Input section with the names in alphabetical order. The appropriate function is Data Sort. Consult page 192 of the manual for an explanation of the Data-Range and Primary and Secondary keys. Make sure that you define the 'Data-Range' as A9..G *nnn*, with *nnn* being the last row in which there is active data.

The Data Table produced by the ledger is in perfect form for constructing graphs. Descriptions of *1-2-3*'s graphing functions begin on page 223 of the manual. They are well beyond the scope of this tutorial, but you should experiment with this intriguing set of the program's features.

The checkbook ledger system described in this tutorial is versatile and applicable to your own needs. It can also serve as a basis for adding other functions, such as error checking, lookup calculations, and reports. Readers are encouraged to build on this model and submit suggestions to *PC World* for enhancements. �570

Pick a Word, Any Word

The electronic thesaurus comes to the PC.

Eric Brown

The adjective I wanted was hovering on the edge of consciousness. The word I had just typed was a weak imitation, a Platonic shadow. I sat transfixed in front of my computer, as if ready to sneeze, but I was unable to conjure up the proper synonym. The thoughts and images that were to follow were more or less queued up in my mind, but the formation of the ideas into words was dependent on getting the initial adjective perfect.

Only one solution seemed plausible—pawing through the thesaurus. With a sigh of resignation I extricated the hefty book from a clutter of notes and disks. After several minutes of flipping pages, squinting at small type, and following blind alleys, I found the synonym I wanted. But when I turned back to the screen, I discovered that my flow of thought had been broken. I had found the word only to lose the paragraph.

After switching off the computer in disgust, I proceeded to fantasize: wouldn't it be nice if you could push a button, highlight a word, and have a list of synonyms flash onto the screen?

When I plugged the *Random House Electronic Thesaurus* into an IBM PC, I watched my fantasy come to life. Not only did the list of syn-

onyms flash immediately onto the screen, but the selected word could automatically replace the original. CP/M users have been able to enjoy the *Thesaurus* for some time, but only recently has it been made available on PC-DOS.

The *Thesaurus* has been included as a module of PeachText 5000, a new integrated business package
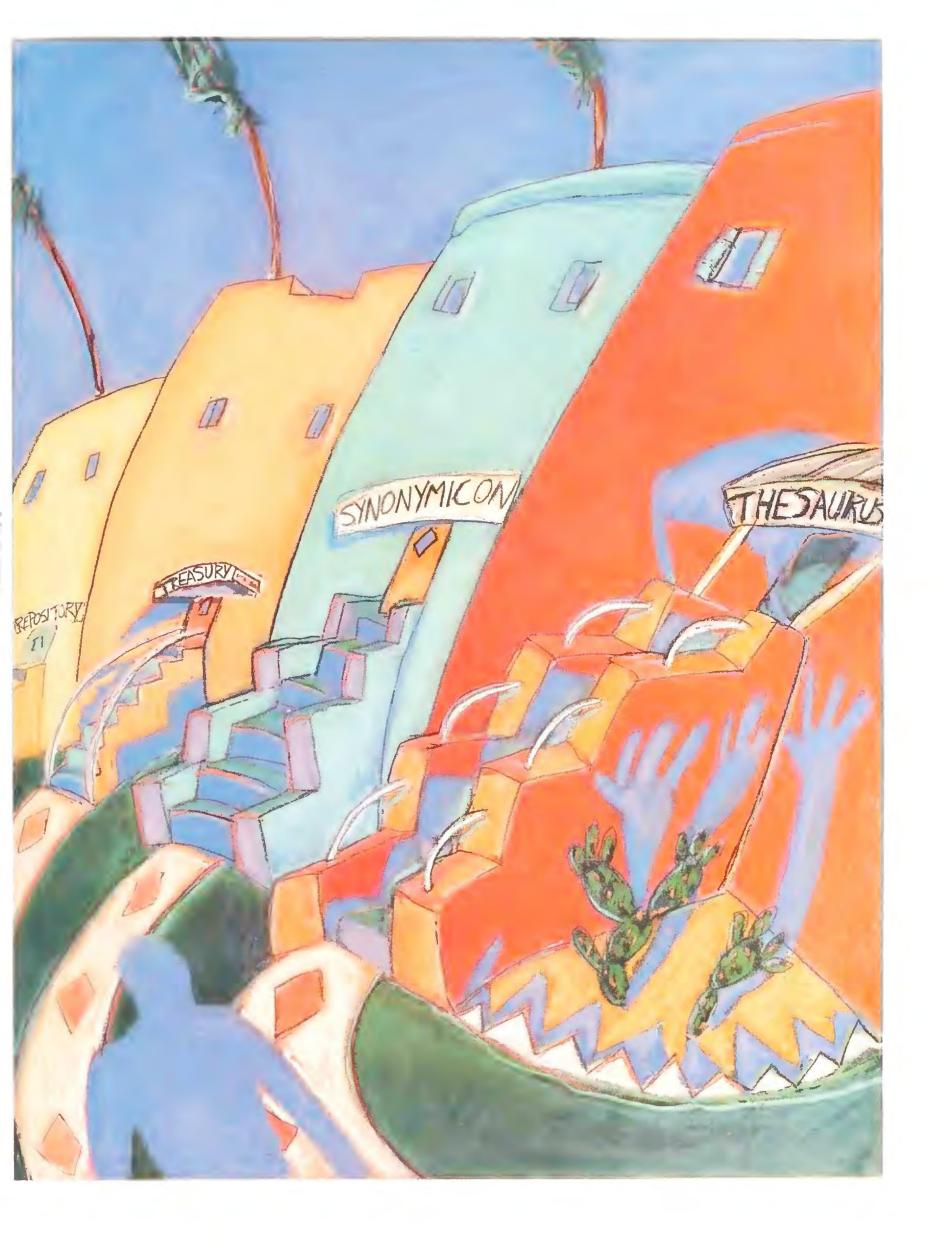
---

If no synonyms were available, or if I ended up sticking with the original, I wasted only a few seconds instead of a few minutes.

---

from Peachtree Software. Along with the *Thesaurus,* PeachText 5000 includes a word processor, a proofreader, a calc program, and a list manager. Once you have entered a PeachText data file, you can remove the word processor disk, replace it with the *Thesaurus,* and still perform all internal word processing functions. If you have a double-sided disk, you can copy both programs onto it, and the *Thesaurus* will never be more than a keystroke away.

Instant Gratification

The *Thesaurus* works fast and efficiently. To access a synonym, move the cursor to the beginning of the target word and press F10. After a lag of about 2 seconds, the lower half of the screen opens up into a window that lists the word you have highlighted alongside its synonyms (see Figure 1). Meanwhile, the upper half of the screen shows not only the target word highlighted by a blinking cursor, but also the surrounding text. Such screen formatting is helpful for deciding which synonym fits best in the context of the sentence.

If the *Thesaurus* can't find the word, it admits its shortcomings on a line that appears at the bottom of the screen. As a consolation prize, the program indicates the available key words that alphabetically precede and follow the unknown word. For instance, when searching for a synonym for *immobile,* the *Thesaurus* apologizes thus: "IMMOBILE not in thesaurus. Found IMMINENT and IMMORTAL." Sometimes the preceding or following word has a similar root that the user might be interested in pursuing. If you already know a synonym, but it isn't exactly what you want, you can type it in, highlight it, and hope to find a list of appropriate synonyms to the original.

● Hands On

When the *Thesaurus* provides a listing and you want to replace a word, use the cursor keys to move back and forth among the synonyms. Once you have highlighted the correct synonym (the word appears in brackets on screen), pressing ENTER will cause the window to disappear and the new word to substitute the old one in text. Not only does the synonym replace the target word, but it replaces it with the same punctuation as the original. All punctuation marks (except dashes) that immediately follow the target word are faithfully reinstated. The capitalization of the synonym also matches that of the target word, whether it be in all caps, initial caps, or lowercase. If none of the synonyms offered by the *Thesaurus* is an improvement over the original, pressing Esc will erase the window from the screen and return you to your last cursor position.

Once I had accustomed myself to the ambitious and complex PeachText word processor, I was ready to test the range of the *Thesaurus* word bank. I wrote a science fiction short story on PeachText and submitted it to a thorough word check. "Part One of 'Traveling Bodies'" shows some of the *Thesaurus*-inspired changes made on the opening pages of the story.

The *Thesaurus'* main value lies in its speed and ease of use. I found myself checking words that I wouldn't normally bother investigating. If no synonyms were available, or if I ended up sticking with the original, I wasted only a few seconds instead of a few minutes. On several occasions I checked a word that was functional and was surprised to find a more precise synonym. It became a game with me, and I discovered that even if a listing wasn't useful, the process of using the *Thesaurus* could be fun and educational.

The most immediate advantage of using the *Thesaurus* is that it helps you avoid repetition. Perhaps you have written the first draft of a business letter and then notice that you have used the word *accommodate*

three times in one paragraph. You could then go back with the *Thesaurus* and find the substitutions, *oblige* and *serve*, to brighten up your prose. The *Thesaurus* often acts as a memory prompt, reminding you of words that you already know but don't come to mind immediately.

Suffering with Suffixes

One of the most frustrating problems with the *Thesaurus* is that it can't recognize a plural version of a word, or any person or tense suffixes. Using a traditional book thesaurus, you could search for a synonym of the root word, find a suitable replacement, and tack on the appropriate ending when you typed it in. With the *Thesaurus*, however, the only way to find a synonym of a word ending with *s*, *ed*, or *ing* is to separate the word from its suffix by inserting a space (and perhaps add a letter to create the root word), and then to return the cursor to the beginning of the word and press F10 again. Once

---

> The *Thesaurus* can't recognize a plural version of a word, or any person or tense suffixes.

---

you select a synonym, you have to reconnect the word to the suffix.

A similar problem arises with both regular and irregular verbs in the past tense. If you want to find a better way to say *caught*, you have to type the word in its present tense *catch*, enter the *Thesaurus*, replace the word with a synonym such as *grasp*, add *ed* to create *grasped*, and finally delete the original word, *caught*.

This process became more of a problem than it at first appeared, because I usually write in the past tense, and of all parts of speech I most frequently seek synonyms for verbs.

killed our teacher who had written it. All that was left when we found his body were the bits and pieces of the program and specs that we already had, the proof that the digitalization, electronic transportation and reconstruction of matter was possible. But somebody out there had the Plan now and was now working on the Implementation, a feat the teacher neither had the money or resources to attempt.`

The indicator light on the disk drive switched off. The file had been sent.

"You all know what to do," said Mary Kay. "We'll meet again tomorrow."

The Random House Electronic Thesaurus by Peachtree Software
Copyright 1982, 1983 Peachtree Software Incorporated, an MSA Company
Copyright 1982 Random House, Inc.

[attempt]- (v.) try, undertake, essay. (n.) effort, undertaking.

Figure 1: Screendump of the Random House Electronic Thesaurus in action

Once you've been spoiled by the ease and speed of the *Thesaurus'* usual functions, this frustrating process is enough to make you want to write everything in the present tense.

No Synonyms for Love

The *Thesaurus* is based on the *Random House Pocket Thesaurus,* but it has been extensively revised for the program, eschewing such old-fashioned synonyms as the many ways to describe *pixies* and *fairies* in favor of more modern business and computer terminology. (Welcome to the new mythology!) The *Thesaurus* is capable of suggesting 26,000 synonyms, including phrases as well as single words; but because of storage limitations, the program will recognize only 4400 target words, focusing on the most commonly overused and misused words.

The following are only some of the words the *Thesaurus* will not recognize: *anarchy, chore, conscience, cop, covert, dangerous, derive, diversity, fond, gregarious, miracle, plug, ticket,* and *transgression.*
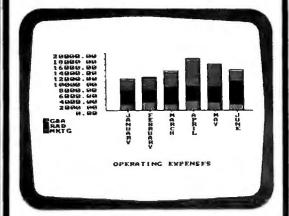
Although for the most part the *Thesaurus* provides an accurate list of synonyms, some unusual entries in the program might lead people astray. For instance, under the key word *hold,* the *Thesaurus* lists *cele-*

brate and *admit* as synonyms. Although these words might be marginally applicable in the sense of *holding* a party or *holding* an opinion, they are misleading synonyms, especially when the *Thesaurus* fails to provide the more accurate synonym, *maintain.*

Another example of faulty scholarship can be found in the synonyms for the word *prepare.* Although the *Thesaurus* lists *plan, anticipate, provide, arrange,* and *order,* it fails to mention *make* and *ready.* For the word *design,* the *Thesaurus* lists the word *purpose* as a verb. Furthermore, verb synonyms for *spot* and *love* are not included.

Although some of these problems are bugs that can be fixed in future updates, the lack of target words and comprehensive lists of synonyms is directly related to the limitation of storing such an immense program (700,000 characters) on a floppy disk. The fact that the word processor and the *Thesaurus* just barely fit onto a double-sided disk may be the greatest reason for its limited size. As it was, Dictronics Publishing, the creators of the program, used a 3-to-1 compression algorithm to attain maximum disk storage.

Part One of "Traveling Bodies"

Final Story	*Synonyms*	*Original Words*

The crooning began again at 9 o'clock, and this time my curiosity roused me to cross the dingy hotel room and open the blinds to the cold Detroit night. Through the falling snow I made out the figure of an old woman hunched over in a doorway. The hag stopped singing and glared at me through strands of white hair. I stared back and held a finger to my lips. She spat and turned away, shifting her skinny body under the pink vinyl jumpsuit that held her together. Her thin lips parted and the broken voice assailed my ears again. It was an old Beatles song my parents used to play when I was a kid.

Stir

(*v.*) move
agitate
shake
incite
instigate
rouse
stimulate
animate
urge

stirred

I let the blinds snap back and returned to my computer. My report on the Commerce Department's teleholography project was long overdue. I had researched the project as far as I could with the phony clearance the Club had forged for me, but even after 3 weeks of snooping around their secret R and D lab, which was disguised as a ghetto tenement, I was still no closer to what we were looking for than when I arrived. Detroit was turning out to be yet another blind alley.

Assault

(*n.*) attack
onslaught
combat
aggression
(*v.*) assail

assaulted

Amber waves of plasma glowed from the screen, and I could sense the silent chips within awaiting my instructions. The computer could hold 100M in bubble and was equipped with a full array of integrated software, a 10-centimeter disk drive, laser printer, built-in encryption box, video reanimation software, color graphics, and two-way video telecommunications with an optional radio transmitter. I had played with better computers, but never one that was as comfortably portable. In a matter of minutes I could pack the whole works into a slim briefcase and disappear out the door.

Fake

(*v.*) feign
falsify
(*v., n., adj.*) trick
counterfeit
(*n.*) fraud
(*n., adj.*) phony

fake

My only problem with the computer was its alleged user-friendliness. At first, the voice synthesizer eased the loneliness of the road, but soon I became bored with the computer's repetitious phraseology. One day, after the computer had repeated a particularly obvious reminder, I suppressed the voice emulator altogether and went back to talking to myself.

Relieve

(*v.*) ease
alleviate
mitigate
lessen
unburden

relieved

Final Story	Synonyms	Original Words

Glancing at the clock, I realized I was late for my daily chat with the Club. I plugged in the video interface unit, activated the encryption box, and rang up SAM in Sao Paolo. After laboring through the bulletin board's log-on sequence, the odd, shifting face of SAM appeared. His twitching mouth melted into a divine, demented smile.

"Welcome, Manny. I thought the polar caps would melt before we heard from you again."

"Well, the cap hasn't melted," I answered, "but it's quite possible it's moved to Detroit. Am I late for the meeting?"

"As usual. I'll plug you in."

As SAM slowly evanesced into a white blur, I marveled at Pinelli's video masterpiece, for SAM did not exist in physical reality, only in the limited sense of representing the computer that acted as our Club's mobile switching station, conference room, and data base. The talking head before me was only that—a talking head—for Pinelli had not had the time or the inclination to develop his entire body. Although SAM had been our electronic butler for several months now, it was still disconcerting to gaze at that not-quite-real visage and recognize something familiar. As a joke, Pinelli had created the composite from the video faces of all 16 members of the Club.

SAM disappeared and the screen abruptly broke into a grid of video insets of my fellow members, four across and four down. Some of the squares were empty, but there was Pinelli in his rumpled suit, and Carl was sitting straight in anticipation. Ruth was looking pretty beat—too much partying in London. Old Raymond was snoring, waiting for the meeting to begin. And there I was in the lower left corner. I never did much care for this particular feedback feature, the miniature mirror of oneself. Noticing how haggard I appeared, I tried to brighten my expression for the camera, which was built into the top of my monitor, but my mugging appeared ludicrous, and I gave it up. Let them see me like this, I decided. Maybe they'll take pity on me and transfer me to the Bahamas.

Synonyms

Conversation
(n.) talk
discussion
exchange
chat

Vanish
(v.) evaporate
disappear
evanesce
end
cease

Sudden
(adj.) unexpected
abrupt
unlooked-for
unforeseen
quick

Ridiculous
(adj.) absurd
preposterous
nonsensical
ludicrous
comical

Original Words

conversation

vanished

suddenly

ridiculous

⬤ Hands On

Perhaps a more comprehensive thesaurus won't be available until hard disks become more prevalent in personal computers. At that time, a program will be offered on several disks, which can then be copied onto a hard disk. Once people have grown accustomed to the luxury of immediately accessible synonyms, they're going to want more—more key words, more synonyms, maybe even the ability to access plurals, past-tense words, and homonyms. Eventually, a tree-structured program will be written, complete with indexes and subindexes, based around Peter Roget's original system of ideas rather than dictionary-style synonyms.

Indeed, Dictronics Publishing has bought the rights to the unabridged *Roget's International Thesaurus,* and the company has already written an experimental version that has been made available to a few large corporations to test on their mainframe data bases. In early 1984 Dictronics plans to release an electronic Roget's for the IBM PC XT and other computers with hard disks. The electronic Roget's promises to be at least 1 megabyte and will include subindexes and several levels of inquiry.

But one miracle at a time. Right now the *Thesaurus* is available for the PC only with the PeachText 5000 package. Random House has licensed the rights to the program to Dictronics Publishing, which has granted several sublicenses to Peachtree and other software companies, including Microsoft and MicroPro. A future PC-DOS *WordStar* version of the program is rumored to have a better screen design than the Peachtree version, the ability to enter the *Thesaurus* from any letter in a word, and an auxiliary program that allows the user to enter the *Thesaurus* from the operating system.

Despite the current version's limitations, the *Thesaurus* is still worth the price, especially when you consider that the PeachText word processor alone sells for $400 at IBM Product Centers, whereas the entire PeachText 5000 package, including

the *Thesaurus,* sells for $395 from Peachtree. If you like PeachText (a solid new entry in the word processing field), you might as well buy the entire PeachText 5000 package and enjoy the *Thesaurus* for what it is—a helpful, though incomplete word bank.

For most writers a thesaurus is a luxury to be used rarely. The brain is the best thesaurus, since it can immediately store synonyms into subcategories of context. After the brain, the next best source is a comprehensive book thesaurus. Even if you are using an electronic thesaurus, you might want to keep a book version handy to find all the possible synonyms, especially if you're searching for obscure synonyms, such as the Latin term for *bastard (nullius filius)* found in *Roget's International.*

After describing the *Thesaurus* to a fellow writer (who had already chided me for depending on a word processor), he argued, "But won't such a program promote laziness among writers? Will they still attempt to learn and memorize new words when they can merely hit a button? Why, we haven't even used up a fraction of the grey matter in our brains, and we're already 'farming out work to computers. Pretty soon they'll design a program to write for you as well." Perhaps, but I doubt such a program could do it well. The difficult part is not picking the word, but putting the words together. ⬤

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

The Random House Electronic
   Thesaurus
PeachText 5000
Peachtree Software Incorporated
3445 Peachtree Rd. NE
Atlanta, GA 30326
List Price: $395
Requires: 64K, one disk drive,
   80-column monitor

Install It Yourself

Twelve easy steps to a hard disk drive

Allen G. Taylor

Installing an add-in hard disk in the IBM Personal Computer often requires more hardware and software knowledge than the disk's installation documents provide. Typically, these documents are written for people who already know how to install a hard disk. This article is directed at the multitude of people who don't know how.

Hardware Installation

Understanding the five major components of a hard disk subsystem—disk drive, controller card, control cable, data cable, and DC power cable—helps you avoid mistakes when installing a hard disk in your PC.

The disk drive is the heart of the system. Anywhere from 5 to 20 megabytes of data can be stored on today's 5 ¼-inch hard disk drives, and those with capacities of up to 150M will be available in the coming months. The controller card provides the logic that controls the reading and writing of data on the hard disk. It plugs into the IBM system bus and is connected by two cables to the hard disk drive. The control cable has 34 conductors and carries the signals that control the selection and operation of the hard disk drive. The data cable has 20 conductors; it carries the data to be written from the controller to the disk and the data that
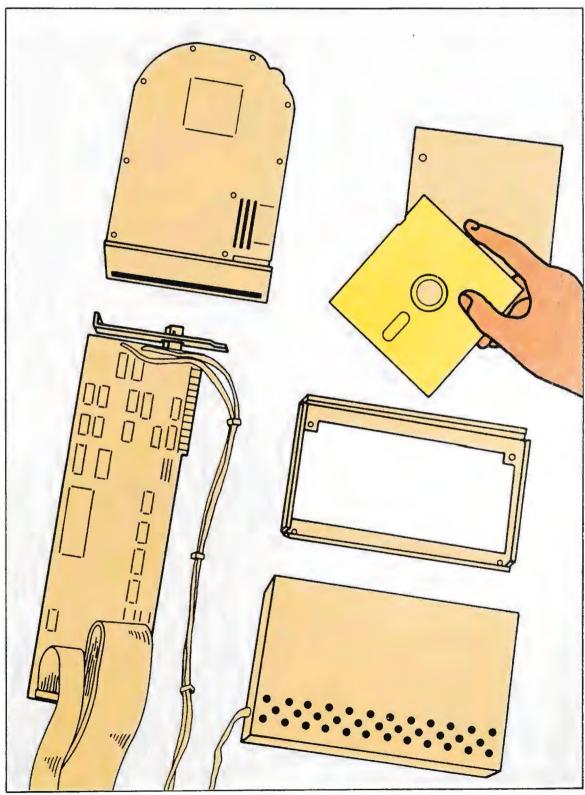
Figure 1: The add-in hard disk subsystem consists of a hard disk drive, controller card, control and data cables, external DC power supply and cable, power supply bracket, utility disk, and installation document.

has been read from the disk to the controller. Finally, the DC power cable connects an external power supply to the disk drive. An external power supply is necessary because the PC's power supply doesn't have enough current to meet the needs of the hard disk when it starts to spin (the start-up surge).

By following the 12 easy steps (Figures 1 through 12) you can familiarize yourself with the five major components of a hard disk and also install the subsystem in your computer.

Software Installation

After the physical installation of your drive is complete, the next step is to format the disk. The hard disk subsystem manufacturer provides a floppy disk that holds the utility programs and files you need to make your hard disk operational. These utilities allow you to format, verify, and initialize your new hard disk and modify PC-DOS to recognize it.

The formatting process lays down a series of tracks on the disk platters and fills them with a known data pattern. Some hard disk subsystems require that the entire disk be formatted as one volume, or logical drive. Other subsystems allow you the flexibility of partitioning the hard disk into several logical drives. Formatting the hard disk destroys any data that was on the disk. To ensure that the format operation has been performed correctly, use the manufacturer's verify operation, which accesses the tracks you created and verifies that they contain the expected pattern. If the verify operation reports an error, the hard disk may be installed incorrectly or the system may be faulty.

After the disk has been successfully verified, each volume must be initialized. The initialization operation writes a blank directory and File Allocation Table (FAT) to the system tracks of the selected volume. Once you've stored the data on your hard disk, never reinitialize it. The penalty for doing so is losing all your data.
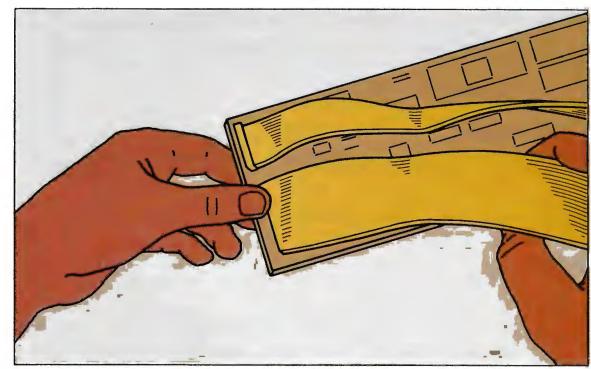
Figure 2: The control cable and the data cable plug into the controller card. Take care to orient the connectors properly.

Figure 3: Install the controller card in the PC.

Figure 4: After installing the controller card, route the signal cables around the floppy disk drive.
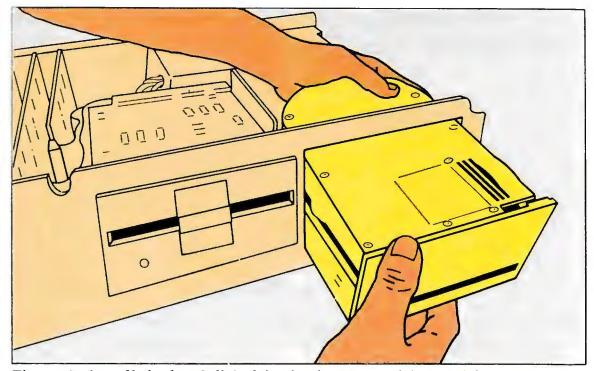
Figure 5: Install the hard disk drive in the empty drive position.
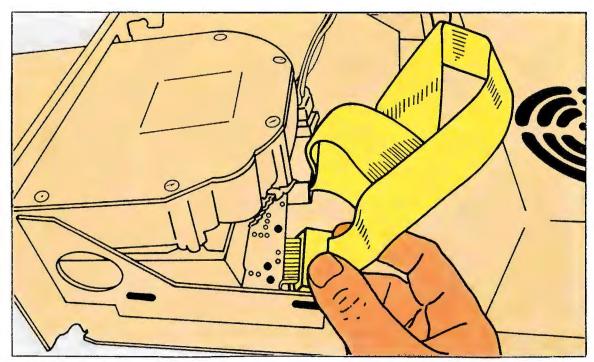
Figure 6: Connect the control, data, and DC power cables to the appropriate connectors on the hard disk drive. If the cables are installed backward (a common problem), the subsystem will not work.
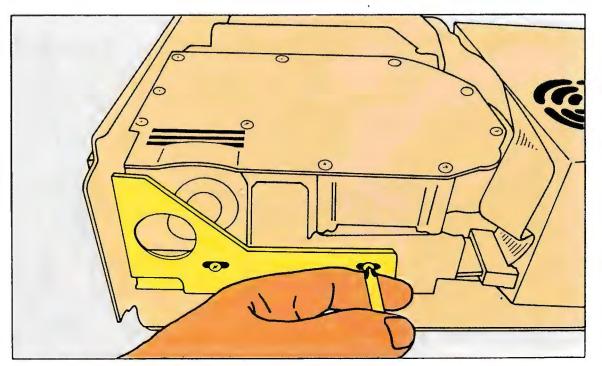
Figure 7: The hard disk drive is secured to a chassis bracket with two screws.

Modifying PC-DOS 1.10

Although PC-DOS 2.00 was designed to support a hard disk, PC-DOS 1.10 was not. The 1.10 version must be modified to use a hard disk. The required modification is the addition of an I/O driver to the basic input/output subsystem (BIOS) portion of PC-DOS. The details of this procedure vary from one subsystem manufacturer to another, but the same principles apply to all. The manufacturer's floppy utility disk contains the needed I/O driver. This file must be copied to another floppy, a system disk, that you have copied from your master PC-DOS disk. Then, with your new system disk inserted into your floppy disk drive, execute the utility that links the hard disk I/O driver into the PC-DOS system file and writes the modified PC-DOS file back to the system disk. From now on, whenever the system is booted from this system disk (or a DISKCOPY of it), the hard disk drive is configured into the system. The hard disk volumes can be accessed in exactly the same way that floppy disk drives are accessed.

Zeroing the Directories

Once these procedures are completed, the directories of the hard disk volumes you created are either empty or the data in them is garbled. If the directories are empty, all is well; proceed to copy files to your newly created hard disk volumes. If the directories are full of garbled data, however, these directories must be cleared out before you can use the associated hard disk volumes. Check each directory with the DIR command. If the directory is full of garbled data, DIR responds with a long string of 0 entries. If, for instance, volume B has this problem, clear it with these commands:

A>B: <ENTER>
B>DEL *.* <ENTER>
B> ARE YOU SURE? (Y/N) Y
    <ENTER>
B>DIR <ENTER>
B> FILE NOT FOUND
Volume B is now ready to accept
    data.

⊜ Hands On

The Installation Document

Installing a hard disk is relatively simple once you know how. Many people go through a frustrating period of trial and error, however, before they make all the physical connections correctly, format, verify, and initialize the disk, and finally create a system disk with a modified BIOS that contains the hard disk driver. If subsystem manufacturers

> If subsystem manufacturers would write more detailed installation procedures, most installation problems would disappear.

would write more detailed installation procedures, most installation problems would disappear.

In addition to a manufacturer's sets of utilities and BIOS modification, Tall Tree Systems of Los Altos, California, provides independent support for most major brands of hard disks and controllers, including Corvus, Davong, Datamac, DTC, Mountain Hardware, Santa Clara Systems, Tecmar, and Xebec. Tall Tree's *JFORMAT* provides more flexibility, features, and power than the software provided by the hard disk manufacturers. Such flexibility, however, adds complexity. Long sequences of cryptic commands must be entered during the installation. If these commands are not exact, the system will not work.

The *JFORMAT* document is not well organized and is cursory in its treatment of hard disk installation. Even experienced computer professionals have had difficulty bringing up a hard disk under *JFORMAT*
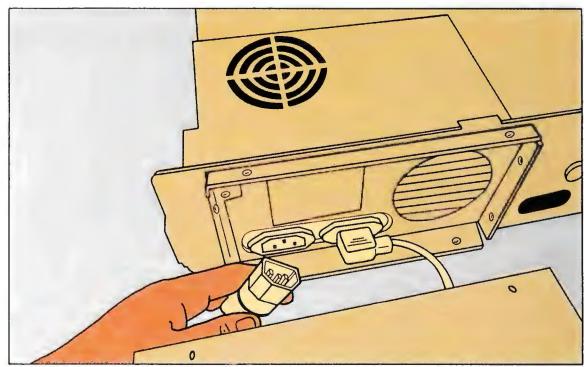
Figure 8: The external power supply is connected to the PC with a bracket. The PC's two AC receptacles are extended to the receptacles on the power supply enclosure.

Figure 9: The DC output of the external power supply is routed to the PC to power the hard disk drive.
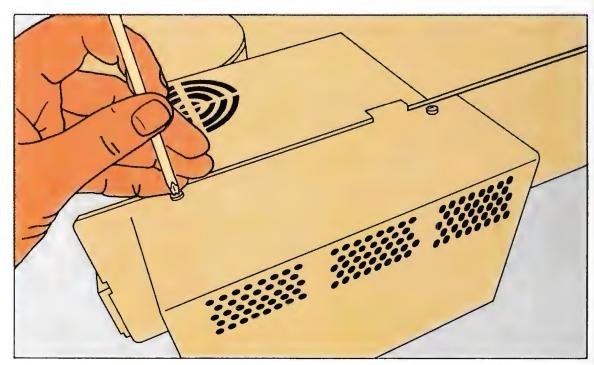
Figure 10: Secure the power supply enclosure to the mounting bracket.
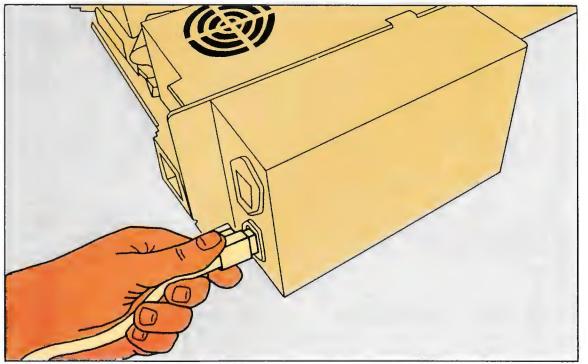
Figure 11: The AC input cord is connected to the AC receptacle on the external power supply.
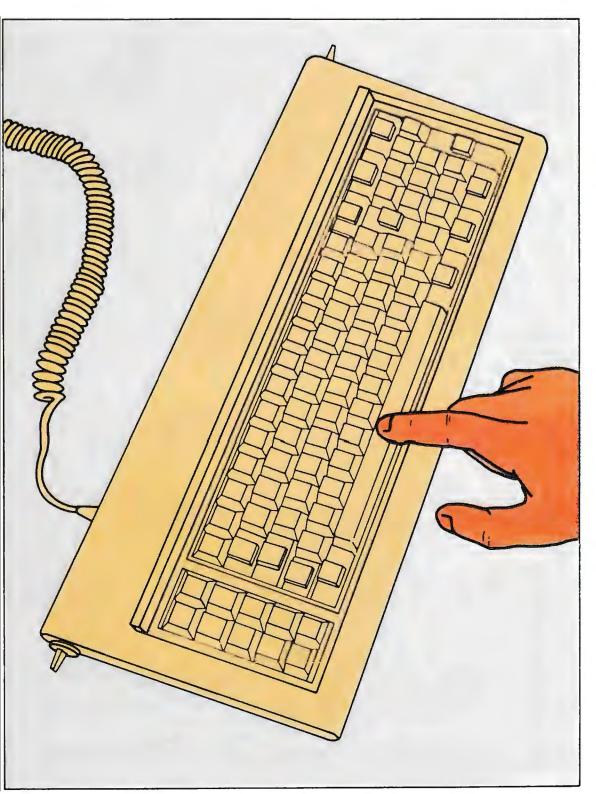
Figure 12: Once the hardware installation is complete, perform the format, verify, initialize, and BIOS modification operations.

when the only source of information was the *JFORMAT* document. Datamac, which provides *JFORMAT* (in addition to its own utility software) with its hard disk subsystems, has written an addendum to the *JFORMAT* manual that does a good job of explaining how to use *JFOR-MAT* with a hard disk. Even so, a *JFORMAT* installation remains significantly more complex than other hard disk installations such as Corona, Datamac (using the VIP utility), or Davong.

If you haven't installed a hard disk before and are reticent about trying it alone, consult an experienced professional. But if you're confident and careful, follow the steps outlined here to install your own hard disk. You'll learn even more about your PC in the process. ≜

Allen G. Taylor is president of The Business Manager, a Santa Ana, California, firm that installs integrated business applications software systems on hard disk.

PRINTS LIKE A DAISY...COSTS LIKE A MATRIX.

Integral Data Systems introduces the only low-cost dot matrix printer on the market that features Maisey™ printing. Maisey printing is a technique that allows you to produce correspondence-quality text approaching that of more expensive daisy-wheel printers, but at much faster speeds.

How fast? With Microprism Printer's™ dual speed capability, you can output at 75cps in correspondence-quality and 110cps in high-speed data mode. And it also features sharp, high-density graphics in an 84 x 84 dpi format.

You'll get cleaner, crisper output than you ever thought possible in a single pass.

Other standard features of the Microprism include proportional

spacing, text justification and, of course, software compatibility with our more expensive Prism Printer™ line.

The Microprism Printer is the perfect system mate that can handle all of your printing requirements . . . it's the best of both worlds. So if you've been waiting for the price of daisy-wheel printers to come down, or the quality of dot matrix to go up, now is the time to check out the exciting new Microprism Printer from Integral Data Systems.

Stop in at your local dealer today and ask for a demonstration. If you need the name of the dealer nearest you, call us toll-free at (800)258-1386.

Or write Integral Data Systems, Milford, NH 03055.

MICROPRISM™ Integral Data Systems, Inc.

Microprism Printer, Prism Printer and Maisey
are registered trademarks of Integral Data Systems,
Milford, NH.

How to get a fast 300% return on your IBM-PC investment.

Compared with COBOL interpreters, mbp's new COBOL Compiler runs programs four times faster. With mbp on your IBM-PC, applications that used to take four hours now take one; that's like a 300% return on investment.

How is it possible?

Interpreters translate and execute a program one statement at a time, every time the program runs. mbp's COBOL Compiler generates machine language object code, so the entire program is translated only once; it then can be executed as often as you want in a fast single step—with no retranslation.

Gibson Mix: BENCHMARK RESULTS		
Calculated S-Profile		
(Representative COBOL statement mix)		
Execution time ratio		
mbp COBOL	COBOL X	COBOL Y
1.00	4.85	7.04

And it's COBOL—

the language for commercial and administrative applications. Standardized and maintained like no other language, now COBOL brings mainframe benefits to business microcomputer users.

mbp COBOL meets ANSI '74 standard. It features a full range of utilities: 'Compiler Intelligence' automatically corrects simple syntax errors; Run-time Debug; Index Check and Array-Bound Inspection; listing options allow source and object code, map and cross-reference tracking. 500+ error messages insure user-friendliness. There is plenty of existing software, and maximum portability protects software investments.

Just $500.

Compare mbp's advantages,

then compare prices; you'll be pleasantly surprised— again. Plus, application software developers can make up to 50 run-time package copies with no royalty charge.
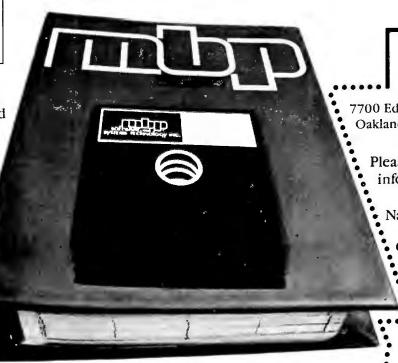
mbp has twenty-five years worldwide software experience and twelve(+) in mainframe custom COBOL implementations. The mbp COBOL Compiler makes this valuable expertise available for micro users. Take advantage of it, and start getting a 300% return on investment, today.

mbp COBOL is available now

for the IBM-PC* or any microcomputer with MS-DOS,* iRMX-86,* or CP/M-86;* soon for OASIS-16.*

*IBM-PC is an IBM TM; MS-DOS, Microsoft TM; iRMX-86, Intel TM; CP/M-86, Digital Research TM; OASIS-16, Phase One Systems TM.

IBM-PC +

mbp

7700 Edgewater Drive, Suite 360
Oakland, CA 94621   Phone 415/632-1555

Please send me complete mbp COBOL information and performance data.

Name _____

Company _____

Address _____

City _____

State _____ Zip _____

Phone # _____

OEM & distributor arrangements available.

**mbp COBOL.
300% faster—just $500.**

229

Trouble in PC CTTY

Transfer control of your PC to a remote terminal with the PC-DOS CTTY command.

Richard Steck

It was the hacker in me that contributed to my initial resistance to PC-DOS. Early DOS simply did not have the complexity and flexibility of CP/M. DOS seemed to be a watered-down version of what had become the de facto S-100 operating system standard. Five months passed after IBM's announcement of the PC before I could get myself to take the plunge. DOS 1.10 offered some improvements over 1.00, and now DOS 2.00 permits me to forget my excitement over CP/M. It should take me many months to discover and test all the features in DOS 2.00. What follows is one such encounter.

While thumbing through the advanced features section of my new PC-DOS 2.00 manual, I came upon a new command named CTTY (change console). According to the manual, CTTY "changes the standard input and output console to an auxiliary console, or restores the keyboard and screen as the standard input and output devices." The sparseness of this description prompted my curiosity to find out more.

CTTY immediately reminded me of the CP/M command STAT, which can assign the normal console to a user-defined port. This enables you to control a system through an external terminal, modem, or another system. The CP/M command is

```
STAT UC1: = CON
```

This feature is one of the pleasures of CP/M because it permits the user to take full remote control of a system even to the extent of running

---

> When used remotely, the COPY command does not accept carriage returns.

---

spreadsheets and word processing programs without any special communications software. My first question was: is the DOS CTTY command as powerful as the CP/M STAT command?

Taking Control

Before proceeding further you will need, as a minimum, the following: (1) an asynchronous communications adapter, also called a communications card or board; (2) a dumb terminal such as those made by Lear Siegler, Hazeltine, ADDS, or Televideo, or a second personal computer such as an Apple or a TRS-80 to function as a dumb terminal; (3) a

modem eliminator cable; and (4) communications software for the terminal.

Connect the remote terminal to the PC COM1: or COM2: port using the modem eliminator cable. Set the baud rate, parity, and other bit characteristics of the terminal. The defaults for the DOS MODE command (9600 baud, even parity, 7 data bits, and 1 stop bit) work just fine.

In the discussion that follows, COM1: and COM2: will be referred to as COMn:. Type the DOS MODE command at the PC as follows:

```
MODE COMn:9600
```

If all is working well, you should be able to issue a CTTY command at the PC as follows:

```
CTTY COMn
```

Once this command is given, the remote terminal should begin to function as the PC's terminal. The command works only sporadically, however. Often the RTS and DTR signals of the COMn: are not supplied with the voltages required by some modems and terminals.

A BASIC program can activate the RTS and DTR signals by issuing a command such as

```
OPEN "COM1:baudrate,parity,databits,stopbits"
    AS #1
```

An example of the command is

```
OPEN "COM1:9600,E,7,1" AS #1
```

⊜ Hands On

This activates the COM1: port and permits you to read and write data to it. When the program ends either normally or abruptly, the active COMn: files are closed and the communications ports are deactivated. In other words, there is no simple way to open a COMn: port and hold it open with BASIC. A similar problem

mands such as DIR or CHKDSK to get the idea of how this works. You can also issue the following command to return control of the console back to the PC:
CTTY CON

After CTTY transfers control to a remote terminal, nearly all DOS, EDLIN, and DEBUG commands can be used from the remote terminal. Some commands do not function

A Few Quirks
I encountered another problem in using BASIC through a remote terminal. Even when executed from a remote terminal, BASIC programs continue to display output on the PC screen. Programs can be written to route output to the remote terminal by OPENing the COMn: port and sending output directly to the port, but as soon the program ends,

```
10 '      This program fixes COM1:  by turning on RTS, DTR
20 '
30 OUT &H3F9,&HB
40 OUT &H3FB,&H1A
50 OUT &H3FC,&HB
60 OUT &H3FE,&HF0
70 SYSTEM


10 '      This program fixes COM2:  by turning on RTS, DTR
20 '
30 OUT &H2F9,&HB
40 OUT &H2FB,&H1A
50 OUT &H2FC,&HB
60 OUT &H2FE,&HF0
70 SYSTEM
```

Listing 1

occurs when you try to use the DOS 2.00 PRINT command and route output to the COM1: port; the COMN: port cannot be held open.

After some experimenting, I created the program shown in Listing 1 to open the COMn: ports and hold them open for use with the CTTY and PRINT commands. The program pokes the appropriate addresses given in the *IBM Personal Computer Technical Reference* manual.

Once the COMn: port is active, you can issue the CTTY command at the PC:
CTTY COMn:
At this point the PC keyboard and screen become inactive and a DOS prompt appears on the remote terminal. You can issue some simple com-

properly, however. For example, the familiar command
COPY CON: *filename*
(frequently used to create short text files directly from the keyboard) does not operate remotely. Instead, you must type
COPY COMn: *filename*
to get the same effect. But even this command has problems. For some reason, when used remotely, the COPY command does not accept carriage returns. All remotely entered text enters the file in a continuous line. To add to the confusion, line-feeds (Ctrl-J) are accepted. Two carriage returns in succession cause the destination file to be closed. The reverse process
COPY *filename* COMn:
works as you would expect, as does the TYPE command.

COMn: is CLOSED and the terminal is disconnected. You can run noninteractive BASIC programs through a remote terminal as long as the last statement in each program is a SYSTEM command.

Many other problems are involved in using BASIC from a remote terminal. If you need full access to your PC through a remote terminal, consider using the *Remote Access* program from Custom Software (see "The Next Best Thing to Being There," *PC World*, Vol. 1, No. 5).

A few other minor quirks should be mentioned about using a remote terminal. To stop scrolling use Ctrl-S or you will lose data. True BREAK is

```
10 ' Sets Up Hayes Smartmodem For Autoanswer
20 '
30 OPEN "COM1:300,E,7,1" AS #1
40 PRINT #1, "AT SO=1"
50 FOR I = 1 TO 2000 : NEXT I      'DELAY WINDOW
60 PRINT #1, "AT H"
70 SYSTEM
```

Listing 2

not recognized, but Ctrl-C seems to have the same effect in a BASIC program. The type-ahead buffer works erratically, which is equivalent to saying that it does not work.

Control Via Modem

If you want to control your system remotely through a modem, you will need an auto-answer modem. The Hayes Smartmodem (300 and 1200 baud) works well. To put the Smartmodem into an auto-answer

---

Uses for CTTY are limited only by your imagination and a few quirks that accompany the command.

---

state, you can run the program shown in Listing 2. After the AA indicator lights up, type CTTY COMn: and dial from a remote modem. When the DOS > prompt appears, you're in business. You can make repeat calls as long as you don't lose control of the CTTY command or lock up the system. Accessing DOS in this manner is still very primitive compared to the results achieved with the *Remote Access* program. *Remote Access* gives nearly total remote control, while CTTY gives limited control.

Of what use is the DOS CTTY command? If you need to operate your PC through a remote terminal

or a modem, CTTY can help you. CTTY gives you reliable access to a limited number of DOS functions from a remote hard-wired terminal, a computer, or a modem. You can use it to extract text files from the PC, to initiate batch jobs, and to access EDLIN or DEBUG. You can also attach an auto-answer modem and take control of your system via telephone.

Uses for CTTY are limited only by your imagination and a few quirks that accompany the command. The command does not match the performance of a program specifically designed for accessing the PC through a remote terminal. Hopefully, the next release of PC-DOS will include an improved CTTY command that lives up to its potential. ●

Richard Steck is the vice-president of management information systems for a Chicago investment firm. He is also librarian of the Association of PC Users in that area.

Remote Access
Custom Software
P.O. Box 1005
Bedford, TX 76021
817/282-7553
List Price: $89
Requirements: 64K, one disk drive, asynchronous communications adapter, modem (e.g., Hayes Smartmodem with auto-answer capability)

You Wouldn't Go to Work Without Your Pants
Why Buy an IBM-PC Without FAST FACTS

Your IBM-PC is only half-ready for work if it doesn't have FAST FACTS, the executive's filing system. FAST FACTS, you see, makes full use of the IBM-PC's capability to handle information quickly and efficiently. No matter if you're a business executive or home executive, FAST FACTS can take care of your filing needs. And with its built-in *Report Writer*, FAST FACTS, makes it a snap to summarize selected portions of your files. What's more, FAST FACTS can share information with VISICALC®, 1-2-3™ and WordStar®. It's also priced to fit easily in your computer budget.

So don't purchase an IBM-PC that's only half-ready for work. Get FAST FACTS, the latest introduction of Innovative Software, developers of proven executive businessware for the IBM-PC. (Ask your dealer about T.I.M. III and FAST GRAPHS, two other fine products from Innovative Software.)

Innovative Software® developers of practical businessware for the executive.

9300 W. 110th St., Suite 380
Overland Park, KS 66210 USA
913/383-1089 • Telex: 209542

Innovative Software's products ore available ot Computerlands®, Sears Business Centers, The Xerox Stores, Computer Morts, Entre' Computer Centers℠, CompuShops® and other quality deolers.

Reader Service #225

Win the paper chase!

Be a winner with MBA...the smart software for business
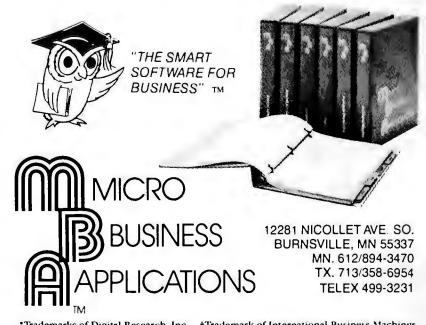
Winning in today's fast-paced business world means keeping ahead of the paperwork — the endless flow of invoices, pay checks, purchase orders, bills and payments that can bog down even the best run business. The right accounting software system can put you out front to stay — and that's just what MBA software is designed to do!

MBA is the only full-line accounting software with complete financial applications AND interfaces to the most popular database, spreadsheet and word processing packages.

MBA systems are designed to operate independently or in combination with one another. The MBA accounts receivable, accounts payable, payroll, inventory, purchase order and time accounting systems are fully integrated with the MBA general ledger accounting system through a common database. Data entered into one system transfers into all other applicable systems.

What's more, our exclusive full-screen data entry and review lets you call up full pages of information on one screen quickly, and edit and validate vital data on-line, instantly.

MBA applications are available for most 8-bit and 16-bit computers using CP/M*, MP/M*, CP/M-86*, MP/M-86*, Concurrent CP/M-86*, PC-DOS†, MS-DOS‡, MPX★, and Turbo DOS#. We also offer a toll-free 800 support line for questions and assistance.

Win the paper chase with MBA software — available at most computer and business software stores.

"THE SMART SOFTWARE FOR BUSINESS" TM

MICRO BUSINESS APPLICATIONS
TM

12281 NICOLLET AVE. SO.
BURNSVILLE, MN 55337
MN. 612/894-3470
TX. 713/358-6954
TELEX 499-3231

*Trademarks of Digital Research, Inc. †Trademark of International Business Machines
‡Trademark of Microsoft ★Micro Business Applications #Software 2000

Reader Service #279

Using an Assembler

The IBM Small Assembler and the Macro Assembler
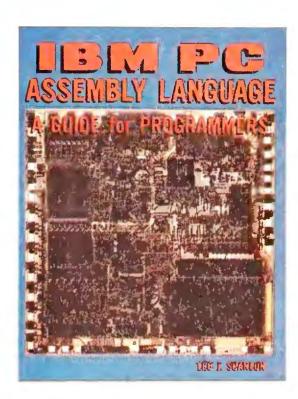
Leo J. Scanlon

The following excerpt is from the recently released book IBM PC Assembly Language: A Guide for Programmers *(Robert J. Brady Co., Bowie, Maryland, 1983), written for both beginning and experienced assembly language programmers. Chapter 2, part of which is excerpted here, discusses assemblers in general and describes two typical assemblers, the IBM* Small Assembler *and the* Macro Assembler.

Several different assemblers are available for the Personal Computer. Rather than try to describe every possible assembler that readers may use, we will concentrate on just one typical software package: IBM's *Macro Assembler,* which runs under the Disk Operating System (DOS). However, the features provided in this package should be similar to those of any other package you might own.

The *Macro Assembler* disk holds two separate assembler programs: the *Small Assembler (ASM),* designed for systems that have at least 64K of memory, and the *Macro Assembler*

Reprinted with permission of Robert J. Brady Co., Bowie, Maryland, copyright 1983, Leo J. Scanlon.

(MASM), designed for systems that have at least 96K of memory. As its name indicates, the *Macro Assembler* lets you define "macros"—instruction sequences you reference by a single word in a program—whereas the *Small Assembler* does not.

This article discusses both assemblers and identifies their differences, where applicable. But rather than attempt an exhaustive description of these two programs, we will summarize only their main features, and provide some tables for quick reference. For the full details, consult your IBM *Macro Assembler* manual.
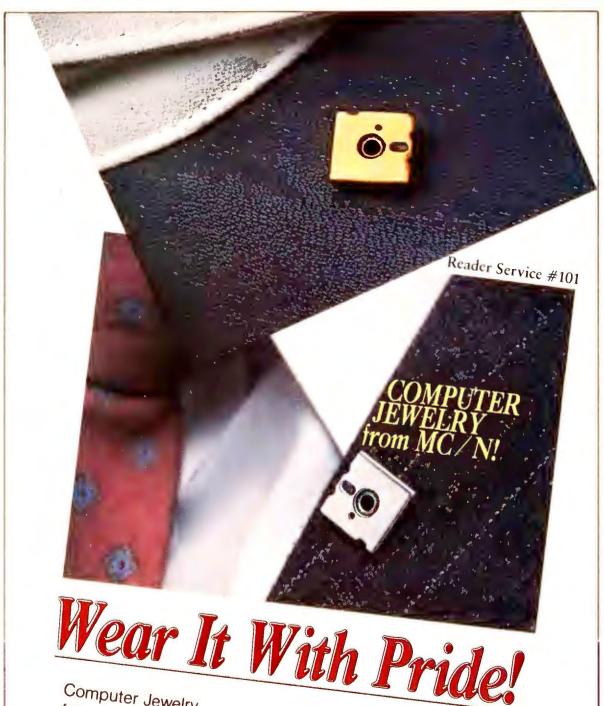
The Steps in Developing a Program
There are essentially seven steps in developing an assembly language program:

1. Define what you want the computer to do, step by step. This often requires you to draw a *flowchart,* a diagrammed "plan" of the program.

2. Write the program instructions on a piece of paper.

3. Type the written program into the computer, using the *editor* program (more on this later).

4. Assemble the program. If the assembler spots any errors, correct them with the editor, then reassemble the program.

5. Convert the assembler output to an executable *run module.*

6. Execute (run) the program.

7. Check the results of the program. If the results differ from what you expected, you must "debug" the program.

If your program is very short, or very simple, you should be able to perform most of these steps quickly and easily. But longer and more complex programs will require you to spend more time on each step; especially the initial step, defining the program.

The Editor
Step 3 refers to an *editor.* An editor is a utility program you use to enter and manipulate the "text" that constitutes your *source program.* When you run the assembler (Step 4), this source program is converted to a numeric *object program.*

⬡ Hands On

In the Personal Computer, the editor program is called EDLIN (a convoluted acronym for Line Editor), which is provided on the DOS disk.

The Assembler

EDLIN is a word processing-like program that accepts whatever you type at the keyboard, without making any judgments as to the *quality* of your work. You could type a poem, and EDLIN would accept it. You could type your shopping list, and EDLIN would accept that, too.

The computer can't directly use the information you put into EDLIN. Something must convert that information (hopefully, a program rather than a shopping list) into information the computer can understand. The "something" that makes this conversion is a program called the *assembler*.

The assembler program takes the output of EDLIN (your source program) and converts everything it can into valid instructions the 8088 can understand (Step 4). If the assembler finds anything it can't convert, it tells you with an error message. Once you have corrected all the errors the assembler has spotted, you are ready to apply the Linker.

The Linker

The IBM Disk Operating System has the ability to store a program at any convenient place in memory, which frees you from having to tell it where to put the program. To use this feature, you must convert the assembled program to a "relocatable" machine language program (Step 5), using a utility program called the Linker.

The IBM literature refers to an assembled program as an *object module* and a relocatable machine language program as a *run module*.

A Second Job for the Linker

At this point, you may wonder why the people who developed the *Macro Assembler* package didn't just make the assembler program generate a relocatable run module, thereby saving you the trouble of running a Linker program. Well, they *could* have done

that, but that approach wouldn't have allowed you to do any "linking." Clearly, this calls for more explanation.

The IBM Disk Operating System lets you build programs one section at a time, as you might build a model airplane. With this technique, you write one section of the program, assemble it into an object module, and modify it if the assembler spots any errors. Once this first module assembles without an error, you repeat the process for the second module, then for the third module (if any), and so on. Thus, you eventually wind up with two or more object modules that, in combination, do whatever you designed the program to do.

Now you can guess what the Linker's second major job is. The Linker links assembled object modules to form one large run module.

You must run the Linker for every program you write, even if it has only one object module. For programs with one module, the Linker simply makes the module relocatable. For programs with two or more modules, the Linker combines object modules, then makes the *result* relocatable.

Source Statements
Having considered the overall approach to developing a program, we can finally look at a primary step—your *source program*. A source program is a logical sequence of source *statements* designed to perform a specific task. A source statement (a line in your program) can be either an assembly language instruction or a pseudo-operation.

Assembly language instructions are symbolic representations of the 8088 microprocessor's instruction set. The *Macro Assembler* manual refers to these as "machine instructions," because they tell the "machine" (the 8088) what to do.

By contrast, *pseudo operations*— or "pseudo-ops," for short— tell the *assembler* what to do (with the instructions and data you enter).

Source statements of either kind can also include *operators*, which give the assembler information about an operand, where ambiguities exist. We discuss assembly language instructions, pseudo-ops, and operators in the sections that follow.

Constants in Source Statements
The assembler lets you enter constants in five different forms:

1. *Binary*—A sequence of 1's and 0's followed by the letter B; for example, 10111010B.

2. *Decimal*—A sequence of the digits 0 through 9, with or without the letter D; for example, 129D or 129.

3. *Hexadecimal*—A sequence of the digits 0 through 9 and the letters A through F, followed by the letter H. The first character must be one of the digits 0 through 9; for example, 0E23H.

4. *Octal*—A sequence of the digits 0 through 7, followed by either the letter O or the letter Q; for example, 1477O or 1477Q. (The octal notation is rarely used these days, so you can probably ignore it.)

5. *Character*—A string of ASCII characters, enclosed in single or double quotes; for example, 'B' or "B".

It is also possible to specify a *negative* number. If the number is a decimal value, you simply precede it with a minus sign (e.g., -10). If the number is a binary, hexadecimal, or octal value, you must enter the number in its "two's complement" form. For example, -32D, 11100000B, 0E0H, and 340Q are alternate forms of decimal -32.

Assembly Language Instructions
Each assembly language instruction in a source program is comprised of up to four *fields,* as follows:
[Label] Mnemonic [Operand] [Comment]

Of these, only the mnemonic field is always required. The label and comment fields are always optional; you may include or omit them at your discretion. The operand field only applies with instructions that re-

⏚ Hands On

quire an operand; otherwise you must omit it. (The label, operand, and comment fields are shown in brackets here to identify them as optional; *don't* type the brackets into your programs.)

You may enter these fields anywhere on a line, as long as you separate them with at least one blank space. An assembly language instruction that uses all four fields is:

GETCOUNT: MOV CX,DI ;Initialize count

Here are the details on each of the four fields in an assembly language instruction.

The Label Field
The label field assigns a symbolic *name* to the starting location of an assembly language instruction. This lets other instructions in the program reference the labeled instruction by name, rather than by its numeric location. Any assembly language instruction can be labeled, but labels usually identify the "target" of a jump or procedure (subroutine) call instruction.

A label may be up to 31 characters long and comprised of:

○ *Alphabetic letters:* A through Z (lowercase letters are automatically converted to uppercase on input)

○ *Numeric digits:* 0 through 9

○ *Special characters:* ? . @ _ $

You can start a label with any character except a digit, but if you use a period (.) in the label, it must be the first character. The symbols AH, AL, AX, BH, BL, BX, BP, CH, CL, CX, CS, DH, DL, DX, DI, DS, ES, SI, and SP are register designators known implicitly by the assembler; you can't use them as labels. You can't use assembler mnemonics as labels either.

Although you can't put a space in a label, you can get the same effect by using an underscore character (_). For example, you could write our previous sample instruction line as

GET_COUNT: MOV CX,DI ;Initialize count

Clearly, this new label (GET_COUNT) is more readable than its predecessor (GETCOUNT).

Using Colons with Labels
Note that in the preceding example, the label GET_COUNT is followed by a colon (:). This needs an explanation.

The 8088 has instructions that can make the processor jump from one place to another in a program. For example, the instruction

JMP GET_COUNT

makes the 8088 transfer control to the instruction stored at the location labeled GET_COUNT. (In the preceding example, GET_COUNT is the starting location of a MOV instruction.)

The 8088 can make this transfer in two ways:

1. If the label is in the *same* code segment as the control-transfer instruction (JMP in this case), the 8088 must only load the offset of the label into the Instruction Pointer (IP); the Code Segment (CS) register can remain as is.

2. If the label is in a *different* code segment than the transfer instruction, the 8088 must load the label's offset into IP and its segment number into CS.

The 8088 "knows" which approach to take based on whether the label has a colon suffix. If the label has a colon, the 8088 assumes it will only be referenced from within the segment. If the colon is omitted, the 8088 assumes the label will be referenced from another code segment.

Since the 8088 executes numeric machine language codes rather than symbolic instructions, how does it know whether a particular label had a colon suffix? The assembler "tells" it with a *distance attribute*.

Distance Attributes (NEAR and FAR)
When the assembler assembles a program, it examines the instruction labels and assigns one of two distance attributes to each label's location in memory. If the label has a colon suf-

fix, the assembler assigns a NEAR attribute to that location. Otherwise, if the label has no colon suffix, the assembler assigns a FAR attribute to that location. For example, the instruction

GET_COUNT: MOV CX,DI

is NEAR, whereas

GET_COUNT MOV CX,DI

is FAR.

The 8088 automatically "knows" that NEAR locations require it to change only IP whereas FAR locations require it to change both IP and CS.

If you attempt to transfer to an uncoloned instruction label in the same

---

The operand field is mandatory with some instructions and prohibited with others.

---

segment, the assembler will produce an error message. *Remember to append a colon to all labels that you reference from within the segment*—and that will apply to most labels in your programs.

The Mnemonic Field
The mnemonic field holds the two- to six-letter acronym for the microprocessor instruction. For example, MOV is the acronym for a move instruction and ADD is the acronym for an add instruction. The assembler uses an internal conversion table to translate each acronym, or *mnemonic*, in the program into its numeric equivalent.

In addition to the mnemonic, many 8088 instructions require you to specify either one or two operands. The mnemonic "tells" the assembler how many operands, and which types of operands, should be obtained from the operand field.

The Operand Field

The operand field "tells" the 8088 where to find the data to be operated on. For example, in this *move* instruction:

```
MOV CX,DX
```

the operand CX,DX tells the 8088 to copy the contents of the DX register into the CX register.

The operand field is mandatory with some instructions and prohibited with others. If present, the operand field will contain either one or two operands, separated from the mnemonic by at least one blank space. If two operands are required, they must be separated by a comma (,).

For two-operand instructions, the first operand is the *destination operand* and the second operand is the *source operand*. The source operand references the value that will be added to, subtracted from, compared to, or stored into the destination operand. (In the preceding MOV example, source operand DX is stored into destination operand CX.) For this reason, the source operand is never altered by the operation, whereas the destination operand is nearly always altered.

The Comment Field

The optional comment field is used to describe statements in the source program, thereby making the program easier to understand. When applied to a statement, you must precede a comment with a semicolon (;) and separate it from the preceding field by at least one blank space. Comments are ignored by the assembler, but are printed when you list the program.

Your comments should describe the function that is being performed, and not just restate the instruction. For example,

```
MOV CX,0 ;Clear the count register
```

is more meaningful than

```
MOV CX,0 ;Move 0 into CX
```

Stand-Alone Comments

In addition to describing individual lines in a program, comments can also be used by themselves, to introduce a program or a portion of a program (a procedure, for example). To include a stand-alone comment in a program, enter a semicolon (;) in column 1. Recognizing the semicolon as the beginning of a comment line, the assembler ignores that line.

The COMMENT pseudo-op lets you enter an entire *block* of stand-alone comments (several lines, a paragraph, or whatever) by simply enclosing it with asterisks or any other delimiter of your choice. ⊜

Leo J. Scanlon is a former technical publications manager for both Computer Automation and Rockwell International. He is the author of seven computer books.

IBM PC Assembly Language *is available from the Robert J. Brady Co. (Bowie, MD 20715) at $19.95. Source and Object Code Software, a disk containing the 40 programs listed in the book, is also available from the publisher at $35.*

Everything

is guaranteed for

246

. Star-Dot-Star

A Global Exchange of Personal Computer Discoveries

Edited by Andrew Fluegelman

As we've cautioned before, we do our best to check these items, but we can't issue warranties for reliability and, as it turns out, for originality.

We came out on the short end on both counts in *.* with our "Saving Lost Files" item (*PCW*, Vol. 1, No. 4). First, we were politely informed by Joe Rigo of NYPC, the New York IBM PC Users' Group, that the item originally appeared in his group's newsletter in an article by John Schnell.

Worse yet, we (and Mr. Schnell) discovered that the file recovery procedure has severe limitations and that it can irreparably mess up an entire disk. The full errata is reproduced below in a follow-up article by Mr. Schnell ("Notice * Notice"), which is reprinted by permission of the NYPC user group.

Meanwhile, we stress that while we do check these published items as thoroughly as possible, we must rely on readers to test and debug their routines before submitting them. We also ask that you send in only original items and identify the source of any item you enhance or modify.

Enough disclaimers for one issue. We're delighted at the response to this department and the valuable information we're able to offer, courtesy of our readers. We hope that *.* continues to make your computing more productive, educational, and fun, and that you'll contribute to the global exchange.

Notice * Notice
In the August newsletter of the NYPC user group I proposed a technique for recovering a lost file by simply repairing the directory. It was correct as far as it went, and as I said, it "seems" to work.

A big FAT (File Allocation Table) problem was brought to my attention by several people. If the erased file is longer than one sector, the FAT pointers that link the sectors for that file are all reset to zero.

When the file name is restored, the pointer in the directory entry still points to the start of the file somewhere on the disk. When an attempt is made to access the restored file, the FAT is referenced to find the position of the next sector of the file. All it finds are zeros and hangs. I failed to check the recovery process on files longer than one sector and did not turn up this problem with the FAT.

What to do? If the file is contiguous, you should be able to look at the FAT starting at the sector from the directory entry (bytes 26 and 27) and reconstruct the table. However, if the file is distributed over noncontiguous sectors, it really starts to get interesting. For information on the structure of the directory and the FAT, see the DOS 1.00 manual, pages C-1 through C-8.

John Schnell
New York, New York

Attention!
Please print this before another hard disk is inadvertently erased. DOS 2.00 fails to give you any precautions regarding the FORMAT command. It's possible for a weary user to type FORMAT without specifying drive A and in so doing erase the entire hard disk.

The following batch file will prevent this catastrophe. Since it's unlikely that any user would ever want to FORMAT any disk besides the one in the floppy drive, this procedure changes the command so that all formatting routines occur on drive A only.

First, rename FORMAT.COM to DOFORMAT.COM. Then create a batch file called FORMAT that will cause the disk in drive A to be formatted. You may also include the '/s' parameter in the DOFORMAT command to put the system files on the disk. Here's the procedure:

```
A>RENAME FORMAT.COM DOFORMAT.COM
A>COPY CON:FORMAT.BAT
DOFORMAT A:
```

Press <F6> <ENTER> to write the file to disk.

Tom Sheldon
Santa Barbara, California

WordStar and DOS 2.00
Tom Sheldon states in his informative article "MS-DOS 2.00: A Hands-On Tutorial" (*PCW*, Vol. 1, No. 3) that *WordStar* destroys the PATH command when it is loaded under DOS 2.00; the only files *WordStar* can edit when its program files are on the hard disk in the IBM PC XT are files residing in the same directory or subdirectory as the *WordStar* program files. I have found that *WordStar* does not destroy the PATH command. If you set up a PATH, boot *WordStar* and then exit to DOS, you will find that the PATH is still set. What does seem accurate, however, is that *WordStar* does not use the PATH.

If you are working on many files with *WordStar,* having to keep them all in a single directory with the *WordStar* program files is an unacceptable procedure. Equally unacceptable, because it wastes considerable amounts of disk space, is copying the *WordStar* program files into every directory where *WordStar* text files are going to reside.

Fortunately, there is an effective alternative, but you must have at least 256K of RAM in your XT and a DOS 2.00-compatible RAM disk program.

```
1400 REM    **   INPUT DATA SUBROUTINE   **
1410 GOSUB 1610
1420 CLS:LOCATE 2,5:FOR I=1 TO L:PRINT CHR$(219);:NEXT I:PRINT
1430 PRINT USING "Type & followed by an * if box is not filled.";MESSAGE$
1440 DIM S$(L):IN$=" ":FOR I=1 TO L
1450 S$(I)=INKEY$:IF S$(I)=" " GOTO 1450
1460 IF S$(I)="*" THEN BEEP:GOTO 1540
1470 V=ASC(S$(I)):IF SW=1 GOTO 1490
1480 IF SW=2 GOTO 1500 ELSE IF SW=3 GOTO 1510 ELSE 1520
1490 IF V=47 OR V<46 OR V>57 GOTO 1450 ELSE 1520
1500 IF V<48 OR V>57 GOTO 1450
1510 IF V=45 OR V>47 AND V<58 GOTO 1520 ELSE 1450
1520 LOCATE 2,I+4:PRINT S$(I):IN$=IN$+S$(I):NEXT I:BEEP
1530 ERASE S$:CLS:GOSUB 1610:SW=0:RETURN
1540 FOR J=1 TO L+1:LOCATE 2,J+4:PRINT " ":NEXT J:GOTO 1530
1600 REM·   **   EMPTY KEYBOARD BUFFER SUBROUTINE   **
1610 K$=INKEY$:IF K$<>" " GOTO 1610 ELSE REUTRN
```

Listing 1

```
260 IF LEN(NTRY$)=INLEN% THEN BEEP: GOTO 230 'ENTRY FULL?
1620 PRINT "Use ";CHR$(24);", ",",";CHR$(25);", End, or Del keys."
1642 IF ASC(K$)=27 GOTO 1810                  'ESC KEY STRUCK
1712 IF K%=83 THEN GOTO 1730                  'DEL KEY STRUCK
1730 LOCATE 24,1: BEEP: INPUT "Are You Sure ";ANS$
1732 IF ANS$ <>"y" AND ANS$<>"Y" THEN GOTO 1630
1734 LSET ITMNR$=MKI$(-1)                     'INITIALIZE RECORD
1736 LOCATE 24,1: PRINT SPACE$(40)           'BLANK THE QUESTION
4102 LOCATE 5,22: INPUT "Enter New item"; ANS$
4104 IF ANS$<>"Y" AND ANS$<>"y" THEN GOTO 1200
4106 LOCATE 5,22: PRINT SPACE$(17)           'BLANK THE QUESTION
```

Listing 2: Random access enhancement

You first create an emulated (electronic) disk, D, that has enough space to contain your *WordStar* files. *WordStar* will look for its program files on the current directory first; if it doesn't find them, it will look for them on drive A. Since the *WordStar* files will be on drive D when you finish and your current directory will be the directory where your text files reside, you must either patch WS.COM to look for its files on the emulated disk (using the *WordStar* patches given in issues 2 and 3 of *PC World*) or the command ASSIGN A = D must be included in the following batch file. The only disadvantage to using the ASSIGN command is that you lose the use of drive A. I have made the patches, and they work.

I use Tall Tree Systems' *JETDRIVE* RAM disk program, and the commands that I give here are for that program. To use the program, you must already have typed the command DEVICE = JDRIVE.BIN in a CONFIG.SYS file in the root directory of the hard disk, and the file JDRIVE.BIN must be in that directory.

Create a batch file, WD.BAT, with the commands listed below. (I call my file WD.BAT because calling it WS.BAT would result in WS.COM being called when WS is typed, and WS.COM cannot be renamed.) For maximum convenience WD.BAT should reside in a directory named in the PATH command that resides in your AUTOEXEC.BAT file, but the *WordStar* files can be anywhere (mine are in a directory called PROGRAMS), and you should substitute the PATH and the name of the directory containing your *WordStar* files for tne PROGRAMS directory in the file below.

```
COPY CON:WD.BAT <ENTER>
ECHO OFF
JBOOT 128 <ENTER>
CD\%1 <ENTER>
COPY C:\PROGRAMS\WS*.* D: <ENTER>
D:WS %2<ENTER>
<F6><ENTER>
```
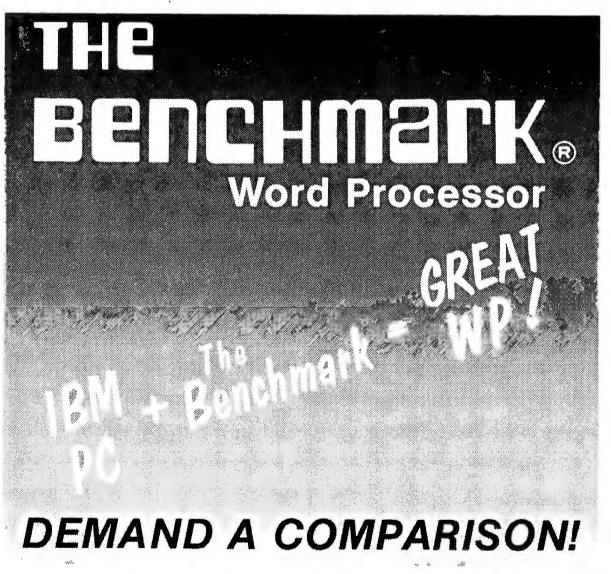
Now type WD . The XT will re-boot, creating emulated disk D. At the DOS prompt type WD again, followed by a space and the name of the directory containing the *WordStar* program files and, optionally, another space and the name of the actual file you want to work on. The XT will not reboot this time but will bring up *WordStar* (running from the emulated disk), and place you in your chosen directory. If you specified a file name, that file will be up for you to edit.

John A. Pierce
Oakland, California

Testing with Q-String

I noted with interest your item "Q-String" (*.*, PCW, Vol. 1, No. 2). I had come to the same conclusion as you regarding the use of the INPUT command for programs written for inexperienced users. Indeed, the disconcerting message 'Redo from start' prompted me to abandon INPUT altogether and use INKEY$ instead. I used a slightly different approach since I sometimes wanted decimal numbers, integers, and dates in the program I was writing. The subroutine I generated to do this is shown in Listing 1.

Before calling the subroutine, three parameters need to be specified: MESSAGE$, L, and SW. MESSAGE$ is the message printed on screen requesting the input. L is the length of the input parameter desired, and SW is 0, 1, 2, or 3, depending on whether any input character, decimal input,

integer input, or integers with hyphens (as used for dates) are desired. I do not include the ability to backspace (or erase) as in Q-String because whenever I ask for input, I display what is input and then offer the chance for a change. However, it is a simple matter to incorporate the backspace subroutine into my subroutine. In fact, I think my subroutine would be a little more friendly if I did that.

Note that the technique of a built-in switch for data type in the input subroutine is very flexible and can be modified for any special set of characters. I also place on screen a block that is the maximum length of the input permitted. I find this helpful in deciding on the input (e.g., when to use abbreviations if the input would otherwise be too long). Another feature I find useful, especially with the type-ahead keyboard buffer used by the IBM PC, is the keyboard-buffer-clearing subroutine in line 1610. The sensitivity of the PC keyboard makes it easy to input characters accidentally. Also, using an input subroutine such as the one in Listing 1 or the Q-String subroutine allows you to type input after the program has stopped looking for it, thus leaving it in the buffer for the next input request.

Robert E. Behringer

Random Access Enhancements
In Lon Poole's excellent article on random access files on the PC (*PCW*, Vol. 1, No. 2), you are given a random access program for creating a personal inventory file. If you tried the program, you may have decided that you would like to delete records from the file in addition to adding them. You may also have wanted to avoid adding new items as the pro-

gram forced you to do when you entered the item number of a new item by mistake. And perhaps you were frustrated when you ran out of space in an entry field but kept on typing anyhow.

All these problems can be solved easily with only 11 new program

statements. At the same time you can boost your ego by using the powerful Esc and Del keys on the PC keyboard. See Listing 2 for the statements you need. Try it; you'll like it!
Paul Taylor
South Bend, Indiana

•

```
100 PRINT "THIS PROGRAM DISPLAYS ALL BASIC FILES ON THE SELECTED DISK"
110 PRINT "ONE PROGRAM WILL BE IN REVERSE VIDEO. PRESS <- TO CHAIN TO IT."
120 PRINT "POSITION THE SELECTED PROGRAM WITH THE CURSOR CONTROL KEYS"
130 PRINT "PRESS E TO END, B TO SELECT DRIVE B, OR OTHER KEY TO CONTINUE"
140 K$=INPUT$(1): IF K$="E" OR K$="e" THEN END
150 IF K$="B" OR K$="b" THEN B=1
160 CLS: IF B=1 THEN FILES "B:*.BAS" ELSE FILES "*.BAS"
170 Y=1: X=0
180 COLOR 0,7
190 FOR L=1 TO 12 'HIGHLIGHTS THE PROGRAM NAME AT LOCATION Y,X
200 LOCATE Y,X+L
210 C$=CHR$(SCREEN (Y,X+L))
220 PRINT C$: F$=F$+C$
230 NEXT
240 COLOR 7,0
250 K$=INKEY$: IF LEN(K$)=0 THEN 250 ' WAIT FOR KEYSTROKE
260 IF LEN(K$)=2 THEN 300 'EXTENDED CHARACTER
270 IF ASC(K$)=13 THEN 360 'ENTER
280 IF ASC(K$)=27 THEN STOP 'ESCAPE
290 GOTO 250
300 R$=RIGHT$(K$,1): A=ASC(R$)
310 IF A=72 AND Y>1 THEN GOSUB 370: Y=Y-1: GOTO 180 'UP CURSOR
320 IF A=80 AND Y<24 THEN GOSUB 370: Y=Y+1: GOTO 180 'DOWN CURSOR
330 IF A=75 AND X>12 THEN GOSUB 370: X=X-13: GOTO 180 'LEFT CURSOR
340 IF A=77 AND X<72 THEN GOSUB 370: X=X+13: GOTO 180 'RIGHT CURSOR
350 GOTO 250
360 IF B=1 THEN CHAIN "B:"+F$ ELSE CHAIN F$
370 FOR L=1 TO 12 'REMOVES HIGHLIGHT
380 LOCATE Y,X+L: PRINT CHR$(SCREEN (Y,X+L))
390 NEXT: F$=LEFT$(F$,0)
400 RETURN
```

Listing 3

```
10 'DRAW OUTLINE OF UNITED STATES
20 'BY DAVID T KJELLQUIST
30 INPUT "INPUT SCALE 4 TO 20 ";SCALE
40 'DEFINE STRING TO DRAW MAP
50 A$="D4G1D7F2D3F5R2F2R4E1R2F3R2F3D1F1R2U1E4R2F1R4H1U1R5F1E1F1D2F3R
   2U4H2U4E3U1E1U1H2U1F1E1U3E3H1U2E3L2H2L2D3G2L2G1D1G1L2D1G2L2E1U1H1
   D1L2U3L2G1D3G1L2U4E1R2U1L5E1L2G1L2E2L5H1L19D1L2H1"
60 SCREEN 1        'SET GRAPHICS MODE
70 KEY OFF         'TURN FUNCTION KEYS OFF
80 CLS
90 DRAW "BM20,40"            'INITIAL POINT UPPER LEFT CORNER OF MAP
100 DRAW "S=SCALE;XA$;"              'DRAW MAP
```

Listing 4

BASIC Highlights

The short program in Listing 3 displays all the BASIC programs on the specified disk and highlights one. The highlight can be moved to any desired program name by the cursor keys. When the desired program is highlighted, pressing <ENTER> will cause the computer to chain to the selected program.

A. D. Scarbrough
Northridge, California

You can use a program of this type to run BASIC programs in menu fashion. Name the program MENU.BAS. Then, in each of the subprograms, have the statement CHAIN "MENU.BAS" *be the exit condition.—A.F.*

Selective Clearscreen

Several of my programs require use of interactive graphics. After drawing a graphic representation of data in the top portion of the screen, I use various subroutines to manipulate the resulting image. Since this software was written to be used by others, the various options available at any point must be displayed in a menu on the bottom lines of the screen. Frequently, the displayed menu must be erased and a new set of options displayed. The CLS command is unsuitable because of the length of time needed to redraw the graph. What I needed was an efficient way to clear a small, variable portion of the screen.

Initially, I tried writing a subroutine that would place the cursor at a particular location and then print spaces over the unwanted text using the SPC function. This was both difficult to write and not very dependable when clearing the 25th line. Because the space I wanted to clear was usually rectangular, I found that the LINE statement could be used to delete selective portions of the screen. The proper format is
LINE (x1,y1)-(x2,y2), 0, BF

The points $(x1,y1)$ and $(x2,y2)$ are the opposite corners of the rectangle to be blanked out. One character on the screen corresponds to either an 8 by 8 (high resolution) or a 4 by 8 matrix (medium resolution) with the origin (0,0) at the upper left. The letters BF cause the corners to be connected by a rectangle and to fill it in with the background color (0). Thus, the 12th and 13th lines can be erased from the middle of the screen to the right boundary in high-resolution mode using
LINE (320,88)-(639,103), 0, BF

In low resolution, only 320 pixels are in a horizontal line, so the command would be
LINE (160,88)-(319,103), 0, BF

Note that any rectangular portion of the screen, such as a single word or a vertical column of numbers, can be erased in this manner.

Stephen R. Springston
Bloomington, Indiana

ProWriter Switches

For 3 months I was frustrated in my efforts to get my ProWriter to print when I used the PrtSc key. The manufacturer, Leading Edge, finally answered my letter and told me the switch settings I could use. Perhaps you'd like to share those settings with your readers.

If you have a ProWriter, switch settings 2, 6, and 7 are closed on Switch 1, and switch setting 7 is closed on Switch 2.

Michael Trombetta
Manhasset, New York

PC Cartography

The program in Listing 4 will draw a respectable outline of the United States. Many of your readers may find this interesting.

David T. Kjellquist
Richardson, Texas

Speak Up

The tinny 2.5-inch speaker that IBM uses in the PC provides only a small voice for the PC's sound capabilities. In noisy environments the PC sounds are almost inaudible. While external speakers can be added, there is an easier remedy: the speaker can be replaced with a 3-inch variety (Radio Shack Cat. No. 40-248) placed inside the cabinet. Just follow these steps:

1. Remove the system unit cover, unscrew the speaker retaining bracket, and unplug the speaker from the connector on the system board.

2. Unsnap the PC speaker from the retaining bracket fingers and unsolder the wires from the speaker.

3. Bend out the metal fingers on the retaining bracket. Place the new speaker in the basket of the retaining bracket until the speaker magnet rests against the back of the bracket. Solder the speaker wires to the new speaker. Then use fast-curing epoxy to cement the 3-inch speaker frame to the bracket fingers.

4. Remount the bracket containing the new speaker and reconnect the speaker plug to the system board.

The difference in tone quality (especially on tones below 200 Hz) will be very noticeable, as will increased volume on all tones.

Alan Fridlund
Pleasant Hill, California

Join the *.* global exchange. We'll pay $25 to $100 for each item published. Send your personal computer discoveries to PC World, 555 De Haro St., San Francisco, CA 94107, or electronically to CompuServe 74055,412 or Source STE908.

With Chart-Master,™ creating quality graphics is as easy as apple pie.

Taxes

Administration

Profit

Cost of Goods

Marketing

R & D
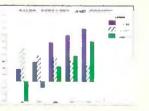
No matter how you slice them, pie charts, bar charts and scatter diagrams are a lot easier to read and understand than rows and columns of numbers.

Now you can create colorful business graphics anytime you need them, with an easy-to-use Chart-Master graphics software program. A program that works with Hewlett-Packard, Panasonic and other plotters and your IBM® personal computer.

Values printed at data points; both left and right Y-axis scales; floating legends & bars; both horizontal & vertical formats; exploded pie sections.

Just enter your data, choose a chart format, preview the chart on your screen, and Chart-Master will automatically create a beautiful, presentation-quality chart. In seconds.

There's more to Chart-Master than simplicity. Incredible power and sophistication. You can enter

data manually or automatically from Visicalc® and other programs. Print on either paper or acetate transparencies. Make your charts any size, anywhere on the page. Have your text appear in attractive print-quality type. Choose from sophisticated formats that include percentage bars, stock price (High/Low/Close) and area charts.

Power and ease-of-use. That's why Chart-Master is in daily use at major corporations like GE, Eastman Kodak, Exxon, Union Carbide, GM, AT&T, DuPont, 3M, Citibank, Motorola, Proctor & Gamble and GTE.

The retail price of Chart-Master is $375. For a complete information kit and name of your nearest dealer, contact Decision Resources, Inc., 21 Bridge Square, Westport, CT 06880. (203) 222-1974.

DecisionResources
Software Designed for Decision Makers

Visicalc is a trademark of Visicorp.
IBM is a trademark of International Business Machines Corporation.

If you've been looking for the right accounting package for your IBM, we've got the answer... ACCOUNTING PLUS PC.

Our industry acclaimed business system, Accounting Plus, is now available for your IBM personal computer. Featuring finger tip control over all important financial functions, the Accounting Plus PC System integrates General Ledger. Accounts Receivable. Accounts Payable. Inventory Control and Payroll, as well as Sales and Purchase Ordering.

Our popular menu-driven design offers user friendly, screen oriented operation that makes data handling easy.

A seven module system, Accounting Plus PC tracks, reports, and summarizes transactions faster and more accurately than all other available business accounting packages.

Accounting Plus PC includes all of the innovative features you've

come to expect from Software Dimensions: extensive error checking, password security, complete audit trail, total system integration, and high speed processing.

Now, the system that's become the industry standard for microcomputers has gone to work for IBM. Versatile. Reliable. The Leader. Offering you the best in quality business application software.

Accounting Plus PC...it's got all the answers you've been waiting for.

See your dealer for a demonstration and further information regarding the new Accounting Plus PC system from Software Dimensions Inc.

Accounting Plus™ PC. The Answers You've Been Waiting For.

Subscribe Now

Don't miss our Charter Subscription Offer:

Computing the Classics

Jonathan Littman

Behind the lush grounds of one of the most technologically advanced universities in the world, the IBM PC is quietly changing the way scholars think about computers. Stanford University has sent many technical giants out into the world, including such notable innovators as David Packard and William Hewlett. In a temporary building, virtually in the middle of a parking lot, technology is returning home like Odysseus.

It's not unusual at a major university to find people talking about their personal computers as if they were new sports cars. What is unusual at Stanford is that the people doing the talking these days are not mathematicians or engineers but humanities professors: classicists, philosophers, and dramatists. As part of a joint Stanford-IBM 2½-year study on scholarly communications, almost every professor in the humanities department is given a PC for a small fee. In this meeting of two cultures and two modes of thought, new uses for the PC are being discovered almost daily. But that is only one element of what this mass seeding may bring.

When I first saw the boxes of PCs stacked one atop another until they almost touched the ceiling, I thought how easy, how automatic this must have been at such a modern, technological university. One hundred and thirty-two humanities professors out of a total of 185 have walked home or to the office with new PCs. Almost half of those who don't have them are clamoring for the next shipment.

I soon discovered that the success of the Tiro project was almost as elusive as the meaning of its name. Tiro Project Manager Randal H. Melen is responsible for that mysterious name and is one big reason for the success of the Tiro project. He works in the Center for Information Technology (CIT) and is the programmer/consultant who has been with the project since its inception. He is the rare technical person who remains sensitive to human, often emotional considerations. Without that sensitivity

μὲν σφωίτερόν γε, θεά, ἔπος εἰρύσασθαι
λα περ θυμῷ κεχολωμένον· ὃς γὰρ ἄμεινον
εοῖς ἐπιπείθηται, μάλα τ' ἔκλυον αὐτοῦ."
ἰπὼν πάλιν ὦσε μέγα ξίφος, οὐδ' ἀπίθησε
Αθηναίης.

there probably would not be boxes of PCs stacked in this little temporary building. With a smile, Melen talks about a time when computers were not welcomed with open arms: "When we sent out the original survey to see what interest there was, the responses were not all positive. Some wrote at length about the dangers of this 'soul-destroying machine.'"

How this soul-destroying machine came to be welcomed is a study in the breakdown of traditional arguments about creative thinking and writing. It is also a story of how the seemingly opposite personality traits of humanities professors and PCs came to be intertwined in a marriage of mind and RAM. But even at a university as rich as Stanford there are technical details like finances. The money to buy over 100 PCs does not just drop out of the sky. A grant provided the original funding, and IBM helped ensure the success of the project.

Choosing the IBM PC was by no means automatic. A Pew Foundation grant was earmarked for humanities faculty members and meant to help with word processing and information handling capabilities. As Melen says, "Humanities have traditionally suffered from one of the worst ratios of faculty to secretaries. Sometimes you will find up to 25 professors with only 1 secretary. And they have also been the people for whom writing has traditionally been the most important thing. Physicists, chemists, and engineers do other things leading up to writing. A person in humanities generally sits, thinks, and writes."

When the $250,000 grant money arrived, a faculty committee was formed. They looked at three alternatives: time-sharing, word processors, and microcomputers. Melen describes the focus of the committee: "They

---

'History indicates that revolutionary advances are many times prompted by the confluence of dissimilar fields of knowledge.'

---

had to look at what their decisions would mean for the future. What would happen when new faculty arrived? Would the choices they were making now continue to provide a viable service in the future?"

The committee did not accept the traditional choices. "We had the perfect system right on campus in time-sharing. Using the mainframe text editing software and the dedicated TOPS-20 system, we could have provided excellent services for text preparation. There was good formatting, and a laser printer was even available. It was an ideal system for scholarly writing. The only

Randy Melen of Stanford's Tiro project

problem was that they would have had to pay a monthly fee, and at the end of a year and a half the grant money would have run out; subsequently they would want more service and have no money to pay the bill." Money was also the problem with word processors. As Melen notes, "You couldn't touch them for under $6000, and realistically the price was closer to between $10,000 and $12,000."

Spirit of Individuality

Choosing micros over time-sharing or word processors was not solely an economic consideration. The spirit of the Pew grant was directed toward "general information handling." Melen adds, "We felt that the micro could go beyond writing, offering some of the generality the grant was hoping to inspire. Who knows, these machines might possibly change the way professors arrange their notes, teach, and even think."

The decision to use micros was only the first of many. In the ever-changing market of personal computers, how were a bunch of humanists going to decide

which machine would provide the right bytes of RAM? Melen recalls the experience: "We could have looked at a multitude of machines, but we felt that might be a mistake. We talked to a couple of universities that had bought large quantities of micros and found out that if you give nonusers a lot of machines to look at, they can be overwhelmed by the technicalities. They generally agreed that reaching a decision would be easier if only a few machines were considered. We felt that this might be especially true with humanists. Frankly, most of these people were skeptical of anything that smacked of computers. We had to be careful to make the project as nontechnical as possible."

One of the ways that Melen did that was to limit their evaluation to the Apple II, TRS-80, and the IBM PC. Once the faculty committee had made the decision to look at these three machines, they had to coax the faculty into evaluating them. "Somehow we managed to get 30 members of the faculty to look at the machines. Most were only mildly interested and spent less than half an hour looking at the three models. Six of them, however, gave us a taste of the future. They spent 4 to 8 hours familiarizing themselves with the machines and were hooked. A couple even began writing scholarly articles," Melen relates.

The evaluation period gave the faculty committee technical as well as subjective feedback on the three machines. They found technical inadequacies in both the TRS-80 Model II and the Apple II with a Z-80 Microsoft board. But these technical reasons were not the ultimate reason for choosing the IBM model. There was a general impression that the TRS-80 was big, clumsy, and made too much noise. The Apple II seemed to have many components and gave the committee the feeling that more could go wrong with the machine. Not only did the IBM PC look professional, but it had the technical ingredients and potential for expansion that the project needed. But the final decision was subjective or, perhaps, intuitive. This diverse group of scholars felt that the PC reflected them and all they represented. Not surprisingly, by the end of the evaluation period, word had spread far beyond the original "vaguely interested" faculty group.

Before the decision was made to go with the PC, six machines (two of each model) were given "cold" to the professors. They were to receive no help from university sources. Melen comments: "I think we all had a good idea of what would happen, but it was a useful test because it reinforced how important training and support would be to the success of the project." And so, like willing guinea pigs, these six humanists took their PCs home for the summer of '82 and were left to the wilds of ComputerLands and Radio Shack stores. They didn't survive that harsh environment. This practical testing of dealer support came out with predictable results. Says Melen, "ComputerLand was abysmal, while Radio Shack was at least polite—not that they helped much."

Shelter from the Storm
When fall arrived, the committee was secure in the knowledge that dealers could not be counted on to deliver much more than the machine, and the first nails were hammered into an instructional facility: Stanford Microcomputer Instructional Lab Experiment (SMILE). At about the same time the beginnings of a different, but equally important foundation were being built.

While $250,000 is a lot of money, it is not nearly enough to buy 150 PCs, not to mention training. "We knew we needed help, so we went to the most logical source—IBM," Melen says. When negotiations with IBM began, Stanford did not have anything in particular

---

The PC makes genuinely individualized remedial work possible.

---

to offer. "Then we sent out a second group of surveys to professors asking questions such as, How do you write now? How could you use this for different applications? How would you use it in your home or office? The responses were overwhelmingly positive and offered a unique form of customer information."

IBM became even more interested when Peter Lyman, an in-residence political science professor from Michigan State University, began a study of the project. Lyman was to observe the faculty before and after the PC. Less glamorous, but equally important, was the fact that IBM was likely to get the most comprehensive product maintenance information possible. IBM recognized the high caliber of the research information and the value of the project as a whole. In December IBM and Stanford entered into a joint 2½-year study on scholarly communications with the Tiro project as part of that study. IBM gave money, equipment, and time to the project. Melen is not at liberty to say how much money IBM gave, but he says, "The project went from x to 3x."

Interestingly enough, much of the time element given by IBM has come in the form of a man who played an important role in the development of the PC—Dr. Paul Friedl, manager of exploratory systems at IBM's Palo Alto Scientific Center. Friedl feels that the Tiro project is exciting precisely because IBM doesn't know what to expect: "Tiro is unusual because our collaborations are usually done with scientific or technical departments. History indicates that revolutionary advances are many times prompted by the confluence of dissimilar fields of

knowledge. It will be exciting to observe whether Tiro will stimulate such advances when the PC enters the humanities."

With the powerful backing of IBM, Melen still had to figure out who was going to teach all those humanists how to turn on their PCs. When the first 20 machines were shipped to SMILE, it was decided that graduate students be hired and trained to teach their professors. Several good reasons prompted this slightly ironical choice. Not only would Stanford be creating in-house expertise, it would also be educating graduate students in the latest technological tools. Melen suggests another, more practical reason for having humanities grad students do the training: "The Humanities Department gets about one-tenth the grant money of the other departments, and it was nice to see some of their own flock getting fed, if even only a little."

When the graduate students were finally trained and the computers began ominously piling up, Melen was faced with yet another problem: how do you teach a bunch of humanists about computers? Peter Lyman, Tiro's resident "psychologist," phrases it another way: "This was no ordinary group; some of these people are geniuses and the rest are exceptional. And this was not the only irregular thing about the class. Many of these people had not been in classrooms for over 30 years, and it was a shock for them to be on the other side. Others had failed math and long ago disassociated themselves with anything vaguely technical."

'This grant is designed to restructure the process of producing scholarship.'

What exactly were they teaching? Melen explains that while they would have liked to offer a general intro to the PC, the funding wasn't available. They knew that they had to grab the interest of the professors before these humanists became bogged down in technicalities, so they decided to make a basic introductory *WordStar* course mandatory. They felt that this was a small guarantee that the PC wouldn't end up as the toy of a son or daughter. While some word processing programs are easier to learn, *WordStar* was chosen because it was not likely to run out of horsepower. "Our dream is that eventually the professors might wish simply to send disks to publishers, and we hope this might soon be possible with *WordStar*," Melen says.

Teaching went on at a frantic pace—several hours a day, 6 days a week. By placing a USI PI3 amber monitor next to each PC, professors could continue working on their own screen while using the instructor's screen as a reference. They even introduced a little color mnemonics by making the text one color and the menu another. At the end of each teaching week professors would take their PCs home or to the office. Before this was possible Melen and crew had to assemble machines, run diagnostics, and even send a few back to the store when occasional problems turned up. This was all done at a furious pace, with PCs coming and going at about 20 per week. They learned a great deal about what customer support really is and why vendors don't offer it. "I never realized how much it actually costs to support a product fully," says Melen. The grind continued until all 128 participants received their machines. By the way, not all 128 users are humanists; one member, Dean Wessels, is a biologist.

The PCs were not quite free. Professors have to pay anywhere from $300 to $400 per year for 3 years. Like true humanists, however, payment is based on a sliding scale. Younger, associate professors pay only $300 per year, while full professors must pay the $400. But this small fee is buying them more than just a PC. During the 3 years professors will receive free of charge: training, communications equipment, shared software developments, and complete service and maintenance. After the 3 years professors will own the machines and be responsible for maintenance. Melen, however, feels that the university may be able to provide additional support in that area.

To find out what a few of those 128 individuals were doing with their PCs I walked over with Melen to the unpretentious SMILE building. I asked him why there wasn't a smile on the front, or at least some indication of what was behind those walls. Melen says, "We want as little on-campus publicity as possible. We want to make sure that these computers are used for the humanities."

I understood his concern when we entered SMILE. Before me were 20 PCs, each with a color monitor, instructional monitors between the PCs, and several dot matrix printers. When I saw cables sticking out, I peered into a side room. SMILE Manager Ed McGuigan confirmed my suspicion that it was a Nestar PLAN 4000 Local Area Network. It is still in the testing stages, but soon they will be using it to share custom software, hard disk storage, and a letter quality printer. I followed the coaxial cable back out into the main room and met a few humanists.

Cyrillic Alphabet Anyone?
Joseph Van Campen is hardly typical of Stanford humanists. His first programming experience came in 1959 at Harvard while working on a program for Russian translation. As a professor of Slavic languages at Stanford, he has long been interested in developing programs to drill

Stanford's SMILE Center, home of Tiro

in Russian vocabulary. His tall frame was hunched over the monitor as he demonstrated the joys of a new program with more than a little excitement in his voice. The program had a byte pattern in which Van Campen placed a dot where he desired to make his own customized Cyrillic alphabet. After he finished defining one character, he said, "With this system I can check how it looks!" And sure enough, the Cyrillic letter for *B* appeared on the screen in his dictionary. "I used to have something similar running on the mainframe, but now I can adapt my programs whenever I want. With Randy's [Melen's] help we got this program running using graphics and BASIC. I know someone who was trying to do this on the Apple, and it took a year to do what we got virtually instantaneously."

Long frustrated with the slowdowns associated with mainframes, Van Campen is excited about the new opportunity for customized instruction the PC brings. He says that in the past if students were deficient in vocabulary or grammar, it was difficult to offer personalized instruction to correct those problems. Now, if students are having problems with certain words or structures, drill programs can be designed for their specific needs. The PC makes genuinely individualized remedial work possible. The students can drill until they have mastered the material and then move on to the next lesson. Van

Campen believes that the Linguistics Department will be doing similar work. "They are responsible for teaching exotic languages, and with this system they could develop any language—even an Armenian character set—in half a day."

Mind over Matter

At the other end of the room and at the other end of the spectrum is Eleanor Prosser. A professor in the Dramatics Department, Prosser admits having some difficulties in learning to cope with the machine and *WordStar*: "I went into overload....I am still a little terrified of all the minute things the program requires you to do." Despite her initial difficulties, Prosser is an example of how the PC can minimize physical disabilities. Like many Stanford professors she does tremendous amounts of research, critiques, and an occasional book. Rheumatoid arthritis was beginning to threaten the pace of her demanding schedule. To Prosser the PC is relief from painful, lengthy, and boring typing. Essentially it means an extension of her career, if not in time, at least in production. But she feels that it may do much more than in-

crease the volume of her work: "I think I will no longer have to fear writing down garbage. With this machine you can fiddle around with ideas and tidy things up later. I think it could help to free up writers block....The only danger I see is probably also one of its attributes. It is so hypnotic that you can work for hours and not notice the time."

Presently Prosser is trying to put some order in Shakespeare's metrics. She is classifying Shakespearean lines under their metric types and has identified about 12 types. She is devising a program for the PC that will allow her to list each metric type separately.

'Word processing with a PC is like hunting quail with an elephant gun. My constant fear and delight is that I know I am only scratching the surface.'

One of the Tiro project goals is to study whether the PC affects the way professors think and teach. Perhaps the best way to gauge the affect of the PC is to examine how it is being used by its most stubborn opponent. Few disciplines appear further apart than classics and computer science. Not surprisingly, when Tiro began most classicists regarded the project with suspicion. Classicist Gregson Davis comments: "I think we were all surprised about the grant. We look at things in such a dichotomized way that we think of science and humanities as disparate. Personally, I was suprised at the nature of the grant. Grants usually give you the financial means to do research or work, but this grant is designed to restructure the process of producing scholarship."

Despite the initial skeptism, Davis was pleased to see how many of his colleagues made the plunge. He says that many realized the machine's potential for making the tedious parts of their work easier; improving a text becomes a pleasure, not a burden. Despite Davis' belief that the PC will not change the scholarly process, the Classics Department is already trying to adapt the PC to its highly specific needs. "For a Greek scholar *WordStar* is useless," Davis remarks. "We need to be able to type English, switch to Greek, and continue the article with all the proper breathing and accent marks. We have an ex-physicist grad student who is trying to make our PCs capable of doing all this. It may involve hardware modifications, but he is confident that something can be worked out."

Another classicist, Jack Winkler, had a more traditional need for the PC. "The PC came along at the ideal time. I had a book to get out, and with the PC I was able to finish it in only 2 months, working 12 hours a day." What Winkler really wants, however, is a program that would be useful for a variety of scholars. " My specialty is magic and folklore. What I and others need is a way to sort out complex information, some sort of program that would allow you to put things in different fields—say metrical patterns and tropes—and have the ability to search through this information."

As far as the rest of the Classics Department goes, don't expect anything short of epic proportions. One point to consider is that virtually all ancient Greek text is on-line at several universities. Ibycus was funded by Stanford grad David Packard. Some classicists are still skeptical about accessing Homer on-line, but the day may not be far away when their PCs will be able to delve into the treasures of the ancients.

Play That Tune

One man in the Music Department is planning to use the PC, not for the music it makes, but for giving conductors and performers an idea of the different pieces they can play with various instruments. Professor Bill Ramsey has been working on this idea for over 20 years. When he first started working on the project, he was using key sort cards—sticking a needle through the card when he wanted it punched out. Ramsey says that this antiquated method was tiring if you had to do a couple thousand cards. Twenty years later Ramsey has seven micros to help with the work. He has a PC at the office and will soon have one at home.

Ramsey is developing a data base that will allow conductors to input the instruments they have for a particular performance and then receive an output of the possible choral pieces that can be played with those instruments. The listing will also indicate for which occasions the pieces are best suited. Ramsey's program even provides for the more exotic instruments such as the piccolo or an oboe da caccia as well as male, female, or mixed voices.

Ramsey doesn't know if someone in another corner of the earth is working on the same thing, but he does know that conductors all over the world have expressed great interest in his project. Ramsey thinks the greatest value of his program is that it allows you to find matches. "For example, if a conductor hires a tenor soloist (who costs twice as much as other performers), it is silly not to have him or her do two pieces. The program would enable the conductor to find all the possible pieces that can be played with this tenor soloist and the accompanying instruments."

Ramsey admits that he cannot include every piece ever written in the data base. "I have worked half my life on this project, and sometimes I fear it will be completed posthumously. If I was not selective, I don't think the

program would be manageable or useful. Right now I have about 4000 to 5000 titles, each taking up about 255 bytes. It amounts to well over a megabyte already, and I wouldn't be surprised if that number tripled." With the help of the new PCs and a couple of graduate students, Ramsey hopes one day to get the program on disk. "Ideally, it would be a stand-alone program to which conductors could add or delete any pieces they wished."

Human Gains

What is the preliminary diagnosis from Tiro's resident "psychiatrist"? The PCs appear to be doing precisely the opposite of what the skeptics warned. Instead of making professors less human, the machines are helping to encourage communication of both a scholarly and social nature. Lyman comments: "Many of these people are among the two or three in the world who are studying their particular discipline. Many have never had an occasion to discuss anything with their colleagues. Now, for the first time, they have something to discuss at department meetings."

While working on his third round of interviews, Lyman began to notice a common dream that the professors were experiencing. "The professors were dreaming about computers, especially about the memory of the computer. We traditionally think of memory in such negative terms. Language and culture often define memory as something not to be trusted. I think they are all struck by the computer's vast memory. They aren't quite sure what to make of it or what to do with it. " One of Lyman's most articulate subjects has been John Freccero, a professor in the Comparative Literature Department. Talking with Freccero, I was struck by his intuitive understanding of the PC: "What strikes me is that we have so much more equipment than we know what to do with. Word processing with a PC is like hunting quail with an elephant gun. My constant fear and delight is that I know I am only scratching the surface."

Freccero's use of the PC exemplifies how the personal computer can affect the way professors go about their work, and indicates that Tiro may be a success. "Being exposed to the way the PC functions has changed my ideas conceptually. As far as literature goes, we can take something as simple as a narrative and look at the function of the negative in telling a story such as the fall in the Bible. Basically, God says 'I am I,' one equals one, and the Devil says something like, 'Oh no you aren't!' Satan is functioning as the negative, and the whole narrative is generated by this positive/negative play-off. A biography is really no different. You start out with the same 'I am I,' and then you say, 'But I wasn't always this way,' and of course what follows is the story, 'Let me tell you about it.'

"In a general sense, all writing is elaboration, often seemingly infinite elaboration of a simple formal principle. As a technical tool the PC is designed for elaboration. I used to write very short, succinct articles that were generally unintelligible to my colleagues. Since using the PC I find myself opening up, filling in the gaps. My colleagues find me less elusive and less rhetorical, while at the same time more concrete and discursive. One colleague is afraid that the computer will take the pain and struggle out of writing." To Freccero that is not the issue: "If you want sweat you can sweat in front of the screen as well as you can in front of the typewriter or your pen. Sweat is sweat."

As a man who constantly examines the differences among languages, Freccero finds that the PC is changing the way he thinks about language: "Before computers, the behavioralists ruled the teaching of language. Their method was mimicry, imitation, but there was no accounting for creativity. With computer models you can explain creativity; you can talk about the way the computer is a nontrivial machine. A complex computer's entire workings can change with one input. That is something a behavioralist did not think man capable of.
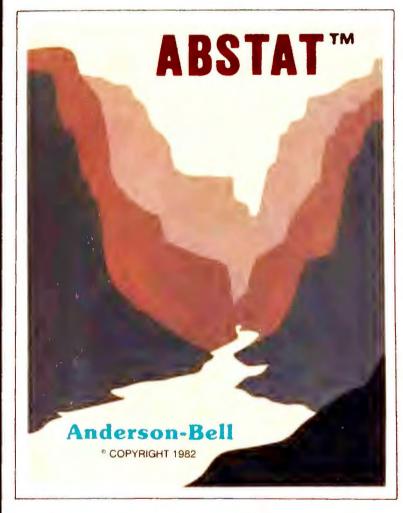
"Because of the creativity of the human mind, we have to scrap all the old, entrenched ideas about teaching language. But I think this idea may have greater social and political importance. We often think it is the politician who thinks that the mind is a trivial machine. But the politician is wrong. He thinks, 'If I pour in this

---

'Being exposed to the way the PC functions has changed my ideas conceptually.'

---

ear the usual garbage, the usual garbage will come out the other end—without thinking that the last time he said that my system changed and sent a message, Beware of garbage!'

"The computer is important simply because it makes us aware that we aren't trivial machines. I think it does that by the element of surprise—just the feeling of surprise as to the consequences of your operation and that in some way your operation has been more or less complicated than you thought, and you say huh? You are surprised in a way your pen or typewriter could never surprise you. Don't think that I don't appreciate the passivity of some of our machines. I'd be furious with my car if it suddenly became a nontrivial machine. When I turn that key I want the predicted result!

"Since I was a child I've thought about how similar our models are. Look at the the solar system and the atom: each has a center, either a sun or a nucleus. In one

⬢ Community

sense, these models are the sum total of our knowledge. What is surprising is that the computer has not really changed our models; they are still basically spatial. The whole language of files, formatting, and floppy disks is also one of space. In contrast, the computer's functioning is sequential. Most programs seem to be adapted to the way our brains remember and organize. The real breakthrough, as far as the scholar's life goes, would be to address that convention: sequence as opposed to space."

In only a few months the questions are being asked. One can only dream of what Stanford and IBM will have discovered in two years about the ultimate interface between mind and machine.

> The PCs appear to be doing precisely the opposite of what the skeptics warned. Instead of making professors less human, the machines are helping to encourage communication.
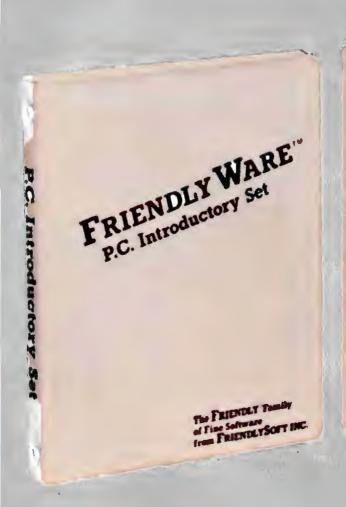
P.S. Stanford humanists were not about to contribute to the proliferation of unintelligible apellations.'Tiro was chosen because it is the name of an old Roman whose historical background seemed appropriate for the project. In the first century B.C., the Roman statesman and orator, Cicero, had a slave named Marcus Tullius Tiro who took dictation and copied manuscripts for his master. While Cicero was well known for his rhetoric, Tiro was also an accomplished rhetorician and invented one of the first forms of Latin shorthand (called *notae Tironianae*) to aid in his duties to his master. Cicero was so pleased with Tiro that he freed him in 53 B.C., a few years before his own death. Later, Tiro wrote a number of papers on grammar as well as a biography of Cicero.
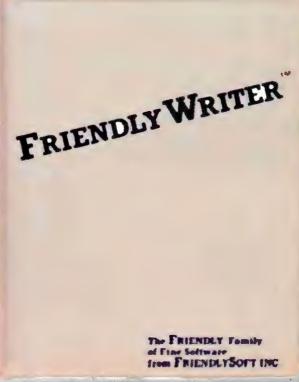
After P.C., it is anyone's guess who will be freed. ⬢
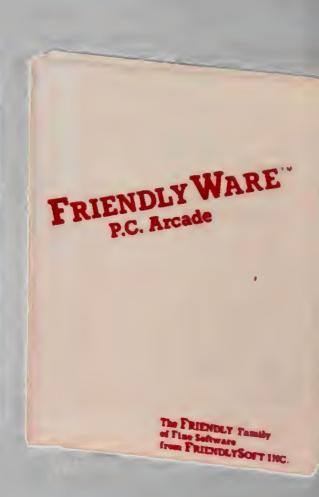
Jonathan Littman is a freelance writer who is working on a book about IBM PC communications. He also conducts training seminars on WordStar *and develops educational software.*

Let **Babytalk** do the talking.

Babytalk is an intelligent communications management interface packed with features. In fact, it's a 64K Z-80 based microcomputer that plugs into your IBM PC to manage a full range of communications:

AS A TERMINAL EMULATOR,
Babytalk emulates 3270/bisync and 3270/SNA, 2770, 2780, 3770, 3780 BATCH/BISYNC, and HASP/BISYNC and a wide range of ASYNC terminals including VT-52, VT-100, IBM 3101, and IBM 5251. It's KEYFIX utility automates your keyboard by defining function keys with any multi-keystroke sequence up to 80 characters.

AS A SUPERSMART MODEM,
Babytalk's onboard 300/600/1200 Baud auto-dial, auto-answer, direct-connect MODEM supports Bell 103, 202 and CCITT V.21 and V.23 protocol.

AS A SPOOLER,
Babytalk's serial or parallel port may be used for background print spooling, so that your IBM PC can run applications while Babytalk manages print output to either a serial or parallel printer. Babytalk also has a Realtime Clock/Calendar with battery backup for programmable message dispatching, and so that you don't have to set time/date each time your system boots.

Babytalk is from the same people who gave you Baby Blue. It's available for the IBM PC, the Texas Instruments Professional Computer, and other MS-DOS compatibles.

For more details see your computer dealer or contact Microlog at (914) 368-0353, Microlog, Inc., 222 Route 59, Suffern, NY 10901.

Only $895.

Microlog
A TU INTERNATIONAL COMPANY

There are three good reasons why we're called "one of the fastest growing software companies in the business"

FRIENDLYSOFT, INC.

ARLINGTON, TEXAS

Producers of innovative, quality software products
EXCLUSIVELY for the IBM Personal Computer

All FriendlySoft products are available through an international network of dealers including COMPUTERLAND STORES, IBM PRODUCT CENTERS, COMPU-SHOPS, ENTRE COMPUTER CENTERS and a growing list of independent software dealers.

A Great Software

FriendlyWare PC Introductory Set

VOTED THE 5TH MOST POPULAR IBM SOFTWARE ON THE MARKET IN SOFTALK MAGAZINE'S RECENT READER SURVEY.

MONEY magazine described the Intro Set as one of the two best learner programs available for microcomputers.

PC magazine said it "had to be seen to be appreciated".

According to SOFTALK, "the implementation and sophistication of the Introductory Set are superior to anything available in the public domain".

The Intro Set is a must for novice users, but it's a lot more than just a starter set. Even seasoned pros are finding things they like among the 4 demo programs, 17 games, and 8 utilities on the package.

Some are even saying that several individual programs on the set (such as the Personal Check Book on disk #3) are worth the price of the package all by themselves.

SUGGESTED RETAIL $49.95

FriendlyWare PC Arcade

They told us that IBM'ers wouldn't buy games; but our customer feedback told us otherwise.

When the first two PC ARCADE production runs sold out before they shipped, we knew our customers were right.

PC ARCADE is a solid lineup of 10 fast-action arcade games for the IBM PC.

ASCII MAN, EAGLE LANDER, STAR FIGHTER TX-16, SHOOTER, BRICK BREAKER, GORILLA GORILLA, ROBOT WAR, BUG BLASTER, HOPPER and PC DERBY.

All 10 were written in Assembly language for speed and Text Mode for use on monochrome OR color monitor.

All games feature a PAUSE BUTTON and BOSS IS COMING KEY, and all but one of the games (EAGLE LANDER) can be controlled with EITHER a joystick or the keyboard.

And best of all, you can play them forever on five rolls of quarters.

SUGGESTED RETAIL $49.95

FriendlyWriter (with FriendlySpeller)

Combine the best little letter writer you've ever learned to use in 10 minutes, with a fast and accurate spell checker that compares your letter with a 30,000+ word dictionary, and you've got one of the greatest things to happen to word processing since the INSERT and DELETE keys.

FriendlyWriter is designed specifically for the kind of word processing you need the most — the 1 to 6 page business or personal letter. And using FriendlyWriter is as easy as striking a key.

FriendlyWriter (with FriendlySpeller), the only word processor in the world with a 30,000+ word dictionary that sells for under $100.

SUGGESTED RETAIL UNDER $70.00.

B Great Prices

The days of the $495.00 "Watzitdo?" software package are over.

The same is true for $39.95 one game packages.

Software pricing is coming down out of the clouds, and today's software consumers are proving once again that the old American business ethic of "producing a quality product at a fair price" still has merit.

At FriendlySoft, our objective has always been to give you the products you want, in a format that you can use and appreciate, at a price you can live with.

So far, your response is telling us that we're on the right track.

C Great Support
THE BEST

No other software company in the world backs their products as completely and as simply as we do.

The FRIENDLYWARE "NO FINE PRINT" LIFETIME GUARANTEE states:

"If your master diskette fails due to normal use, we will replace it, AT NO COST, within 48 hours of receipt of your original master.

If your master diskette fails due to abnormal use (staple in media, food on hub ring) we will replace the programming onto your diskette within 48 hours of receipt of your original master and a blank, unformatted, diskette.

We also offer a unique 24 hour hotline, where you get quick answers, instead of taped messages.

In short, FriendlySoft is the unchallenged leader in software product support. And we intend to stay there.

WORLD CLASS PC WINNERS

Fourteen PC-compatible products take first prize in the World Class PC Contest.

The suspense is finally over. In our second issue we announced the World Class PC Contest in which readers were asked to vote for their favorite IBM PC-compatible products in each of 14 categories. The tallies are now in for the winning products that comprise the World Class PC system. Along with the winning peripherals and software the World Class system includes an IBM PC with 64K, two double-sided double-density disk drives, and a color/graphics adapter. The complete system, valued at over $14,000, will be awarded to one lucky person in a random drawing at the August 1983 IBM PC Faire in San Francisco.

A Look at the Results

Unlike *PC World*'s upcoming *Software Review* (fall 1983) and *Hardware Review* (spring 1984), which will be based on product evaluations by our readers, in this contest readers simply named the products they like best, for whatever reasons. A popularity poll such as this produces interesting results.

Several new products on the market and some that had only been demonstrated in prerelease versions at computer fairs received a surprising number of votes. IBM's fixed disk, released the month the contest was announced, came in second for hard disk storage. *Wordvision* got 3 percent of the word processing votes, although it was available only in a pioneer version at contest time. And *Phantom Disk* by Norell Data Systems wasn't yet on the market when it came in as the fourth most popular disk emulation program.

VisiCorp's *Visi/ON*, a window-oriented operating environment designed to integrate multiple software programs, received a vote of confidence, although it too was not on the market at the time of our contest. VisiCorp's marketing division obviously has its work cut out; *Visi/ON* received votes in a number of categories, including spreadsheet, word processor, communications package, data base, and keyboard enhancer. Another product that voters couldn't agree how to classify was Software Art's *TK!Solver;* we assigned it to the spreadsheet category.

The Amdek Color IV monitor was voted the most popular color monitor even though it was not PC-compatible at the time of the contest. Non-compatibility makes the Amdek ineligible, so the runner-up, the new IBM color monitor, is the winner. Promising compatibility this summer, Amdek hopes the Color IV will give IBM's monitor stiff competition in next year's contest. The Color II, second best in the Amdek line, took second place in our contest.

The reasons for a particular product's popularity are anyone's guess. We suppose that AST's *SuperDrive* was voted the most popular disk emulation program because it comes free of charge with AST's ComboPlus, the blue-ribbon combination board.

Note that *Flight Simulator* by Microsoft won by a landslide in the games category. Apparently plenty of people enjoy this program, even if they don't want to be pilots. We have listed the 31 most popular games, although twice that number received votes. Six games will be included in the World Class PC system.

Plans for Next Year

As a result of our experience with this year's contest, we've decided to make some changes next time around. For example, we'll designate

a category for utilities instead of keyboard enhancers, one that proved too narrowly defined. Voters included Qubie and Key Tronics' keyboard in this category, although it's not an exact fit. *Quickcode*, a utility for *dBASE II*, received votes as a major data base.

Next time we'll make terminal emulators a separate category. In the communications category, people voted for many emulators, such as the *Apple-PC Connection* by Alpha Software, the *SmarTerm/PC Emulator* by Persoft, and the *3101 Emulation Program* by IBM. These products probably would have gotten more votes if they hadn't been competing against *Crosstalk* and *Smartcom II*.

The distinction between a major data base and an index file data base apparently wasn't crystal clear, although most people got the idea. No one agreed on how to classify the games; almost every game received votes in all three of the original categories: strategy, adventure, and arcade. As a result we lumped all the games together.

In addition to the winning products, we thought our readers would be interested in all the products that received a significant number of votes. The tallies reflect the percentage of the total votes each product received in its category.

The Others entry in each category gives the combined percentage for all products that received one or more

Winning Products for the World Class PC Contest

Software	Product	Manufacturer	% Votes Received
Word Processing	WordStar	MicroPro International Corp. 33 San Pablo Ave. San Rafael, CA 94903 415/499-1200 List Price: $495	40%
	Volkswriter	Lifetree Software, Inc.	12%
	EasyWriter 1.10	Information Unlimited Software, Inc.	8%
	Benchmark	Metasoft Corporation	6%
	WordPlus-PC	Professional Software Inc.	6%
	Word Perfect	Satellite Software International	6%
	MultiMate	Softword Systems, Inc.	4%
	Edix + Wordix	Emerging Technology Consultants	4%
	FinalWord	Mark of the Unicorn	3%
	Wordvision	Bruce & James Program Publishers	3%
	Others		8%
			100%
Communications	Crosstalk	Microstuf 1845 The Exchange #140 Atlanta, GA 30339 404/952-0267 List Price: $195	30%
	Smartcom II	Hayes Microcomputer Products	23%
	PC-Talk	Freeware	9%
	Async Communications Support	IBM	6%
	Hostcomm	NF Systems Ltd.	5%
	PCModem	Solution Software Systems	5%
	VideoLink 88	Windmill Software Inc.	4%
	Others		18%
			100%

votes but fell below the significant cutoff point. A large Others figure indicates that a wide range of products are popular in a particular category. Conversely, a small figure, as in the spreadsheet category, reflects a narrow field of choice. It's interesting to note the wide distribution within the hard disk market. Fifteen hard disks are serious contenders in this field.

The World Class PC Contest proved so popular that we plan to make it an annual event. An important reason for holding the contest is to share the valuable opinions of our readers. Although the votes aren't necessarily an endorsement of the winning products, they do indicate which products our readers like best or use most.

But let's not forget one of the best reasons for having a contest—someone gets to win! If you submitted an entry form by the deadline, you may be the winner of the World Class PC system.

Good Luck.

	Product	Manufacturer	% Votes Received
Spreadsheet	1-2-3	Lotus Development Corp. 161 First St. Cambridge, MA 02142 617/492-7171 List Price: $495	44%
	Multiplan	Microsoft	31%
	VisiCalc	VisiCorp	14%
	SuperCalc	Sorcim Corp.	7%
	MBA	Context Management Systems	2%
	Others		2%
			100%
Data base, Major	dBase II	Ashton-Tate 10150 W. Jefferson Blvd. Culver City, CA 90230 List Price: $700	77%
	InfoStar	MicroPro	7%
	Condor	Condor Computer Corporation	4%
	The Sensible Solution	O'Hanlon Computer Systems	2%
	Quickcode	Fox & Geller, Inc.	2%
	T.I.M. III	Innovative Software	2%
	Others		6%
			100%
Data base, Index	VisiFile	VisiCorp 2895 Zanker Rd. San Jose, CA 95134 408/946-9000 List Price: $300	22%
	PFS:File	Software Publishing Corp.	15%
	Office Filer	Digital Marketing	14%
	EasyFiler	Information Unlimited Software	13%
	VisiDex	VisiCorp	6%
	Others		30%
	(continued)		100%

Software

	Product	Manufacturer	% Votes Received
Disk Emulator	SuperDrive	AST Research, Inc. 2372 Morse Ave. Irvine, CA 92714 714/540-1333 List Price: $45, free with ComboPlus board	33%
	JFormat	Tall Tree Systems	24%
	QuadRAM Drive	Quadram Corporation	10%
	Phantom Disk	Norell Data Systems	6%
	RAMCard with RAMDrive	Microsoft	5%
	SemiDisk	SemiDisk Systems	3%
	PC Accelerator	STB Systems, Inc.	3%
	Others		16%
			100%
Keyboard Enhancer	Keynote	Advanced Software Interface 2655 Campus Dr. #260 San Mateo, CA 94403 415/572-1347 List Price: $99.95	48%
	ProKey	ProSoft	36%
	Keytronics keyboard	Qubie Distributing	5%
	FunKey	Bourbaki, Inc.	4%
	KeySwap	Rickerdata	3%
	Others		4%
			100%
Games The following six games will be awarded.	Flight Simulator	Microsoft Corp. 10700 Northup Way Bellevue, WA 98004 206/828-8080 List Price: $49.95	16%
	Call to Arms	Sirius Software, Inc. 10364 Rockingham Dr. Sacramento, CA 95827 916/366-1195 List Price: $29.95	8%
	Zork I, II, III	Infocom, Inc. 55 Wheeler St. Cambridge, MA 02138 617/492-1031 List Price: $39.95 each	7%

	Product	Manufacturer	% Votes Received
Games	Executive Suite	Armonk Corp. 610 Newport Center Dr. #955 Newport Beach, CA 92660 714/760-3955 List Price: $39.95	7%
	PC Arcade	FriendlySoft, Inc. 3609 Smith-Barry Arlington, TX 76013 817/277-9378 List Price: $49.95	6%
	Cosmic Crusader	Funtastic, Inc. 512 Wilde Ave. Drexel Hill, PA 19026 215/622-5716 List Price: $38.95	5%
	Adventure	Microsoft Corp.	4%
	Snack Attack	Funtastic, Inc.	4%
	Deadline	Infocom, Inc.	4%
	Asylum	Screenplay	3%
	Aqua Run	SoftSpot Micro Systems	3%
	Temple of Apshai	EPYX	3%
	Bug Off	Bella Software	2%
	Jotto	Word Associates	2%
	PC Man	Orion Software	2%
	Millionaire	Blue Chip Software	1%
	PC Man II	Heigen Corporation	1%
	Shuttle Defender	Columbia Software	1%
	Tigers in the Snow	Strategic Simulations, Inc.	1%
	Wizardry	Sirtech	1%
	Telecomm Kriegspiel	Ladera Associates	1%
	The Warp Factor	Strategic Simulations, Inc.	1%
	Decathlon	Microsoft Corp.	1%
	Mouse Attack	Sierra Vision	1%
	Dunzhin	Screenplay	1%
	Falklands Fury	Wood & Clay	1%
	Gorgon II	Sirius Software, Inc.	1%
	Star Trek	Zeta Products	1%
	Las Vegas Blackjack	Quala	1%
	Frogger	Sierra On-Line, Inc.	1%
	Champion Blackjack	PC Software Inc.	1%
	Others		8%
			100%

(continued)

Hardware	Product	Manufacturer	% Votes Received
Hard Disk Storage, 10M–12M	12M disk/12M tape	Tallgrass Technologies Corp. 11667 W. 90th Overland Park, KS 66214 913/492-6002 List Price: $3495, IBM interface package $149, tape cartridge, $39.95	17%
	Fixed Disk	IBM	15%
	10M	Corona Data Systems	14%
	10M	Corvus Systems	13%
	12M	Davong Systems, Inc.	10%
	10M	Tecmar	5%
	10M	Genie Computer Corporation	5%
	5M removable	Tecmar	4%
	10M with tape	Prizm Computer Products, Inc.	4%
	Cyberdrive	Cybernetics, Inc.	3%
	12M	QuCeS, Inc.	2%
	5¼″ Winchester (10M and 12M)	Santa Clara Systems, Inc.	2%
	PHD	Percom Data Corporation	2%
	12M	MicroDisk	2%
	Toaster	X Comp	2%
	Others		0%
			100%
Modem	Smartmodem 1200	Hayes Microcomputer Products 5923 Peachtree Industrial Blvd. Norcross, GA 30092 404/449-8791 List Price: $699	71%
	Smartmodem 300	Hayes Microcomputer Products	10%
	PC Modem Plus	Ven-Tel Inc.	10%
	103/212 Smart-Cat	Novation, Inc.	3%
	Auto Dial	Racal-Vadic	2%
	Micro/Terminal	Microcom	1%
	Others		3%
			100%
Color Monitor	5153	IBM P.O. Box 1328-C Boca Raton, FL 33432 List Price: $680	28%
	Color II	Amdek Corporation	26%
	JC1203 RGB	NEC Home Electronics (U.S.A.)	21%
	HX-12	Princeton Graphic Systems	16%
	Quadchrome	Quadram Corporation	2%
	Others		7%
			100%

	Product	Manufacturer	% Votes Received
Printer, Letter Quality	Spinwriter 3500 Series	NEC Information Systems, Inc. 5 Militia Dr. Lexington, MA 02173 617/862-3120 List Price: $2290	39%
	Sprint 11/40 Plus	Qume Corporation	17%
	Spinwriter 7700 Series	NEC Information Systems, Inc.	16%
	Printmaster F-10	Leading Edge Products, Inc. (C. Itoh)	11%
	630 ECS	Diablo	7%
	Others		10%
			100%
Printer, Dot Matrix	FX 80	Epson America, Inc. 3415 Kashiwa St. Torrance, CA 90505 800/421-5426, 213/539-9140 CA List Price: $699	35%
	MX-100	Epson America, Inc.	20%
	Prism 132	Integral Data Systems, Inc.	8%
	Microline 93	Okidata Corporation	7%
	Prowriter 2	Leading Edge Products, Inc. (C. Itoh)	6%
	Microline 84	Okidata Corporation	5%
	Prowriter	Leading Edge Products, Inc. (C. Itoh)	5%
	PC-8023A	NEC Information Systems, Inc.	4%
	Graphics Printer	IBM	3%
	DP-9620	Anadex, Inc.	3%
	Others		4%
			100%
Combination Board	ComboPlus (256K)	AST Research, Inc. 2372 Morse Ave. Irvine, CA 92714 714/540-1333 List Price: $695	44%
	Quadboard	Quadram Corporation	22%
	Monte Carlo Card	Microcomputer Business Industries	11%
	1st Mate	Tecmar	6%
	Super RIO	STB Systems, Inc.	4%
	Others		13%
			100%

COMSHARE TARGET SOFTWARE, INC.
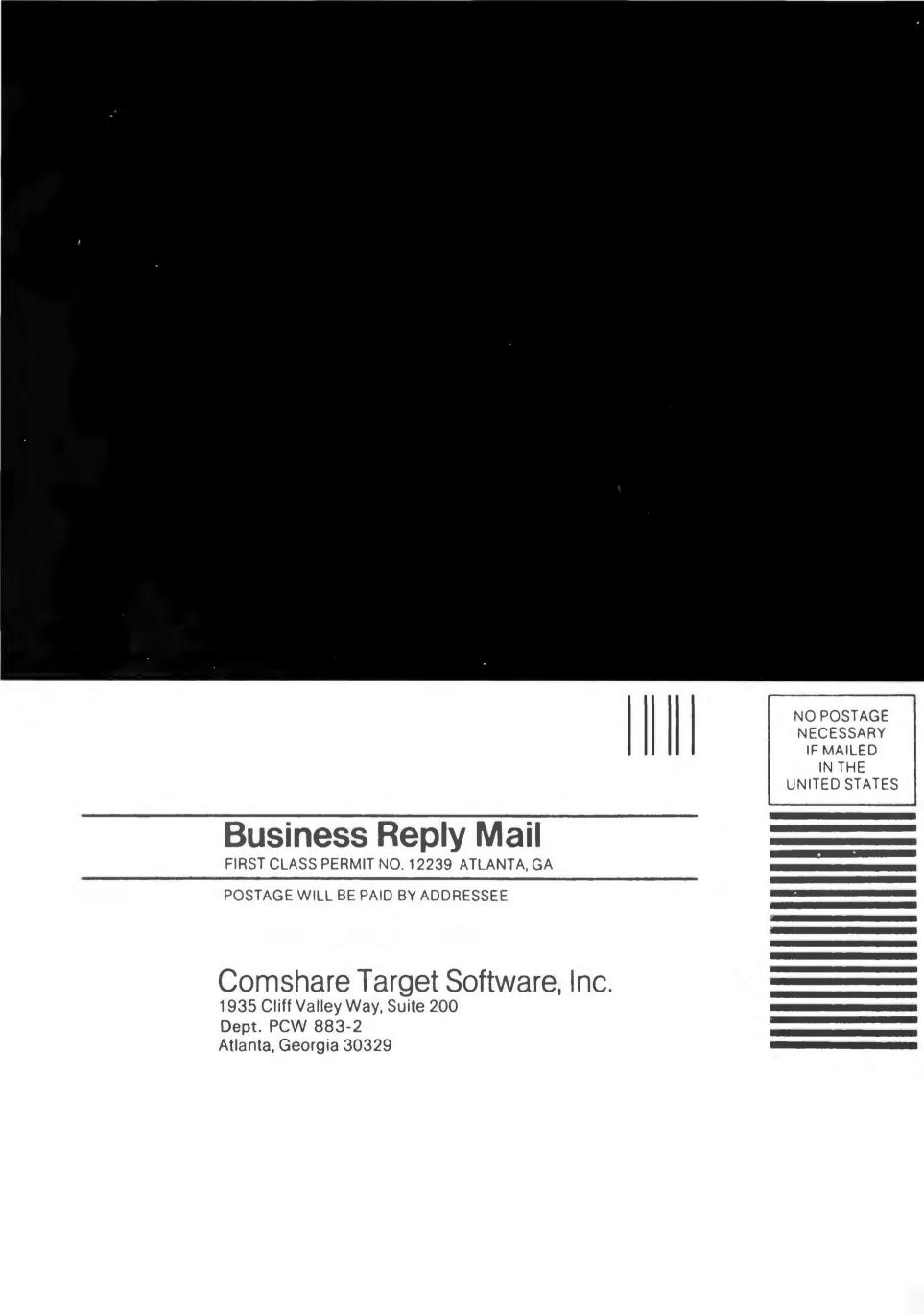
ORDER FORM

	PRICE	QUANTITY	TOTAL COST
TARGET Financial Modeling	$325		
TOTAL			
GEORGIA RESIDENTS ADD 3% STATE TAX PLUS APPROPRIATE COUNTY TAX			
SHIPPING			5.00
TOTAL			$

☐ American Express   C O.D.
☐ VISA ☐ MasterCard ☐ check enclosed

Card number _____

Expiration date _____

Signature _____

Machine Type _____

Operating System _____

Company _____

Name _____

Address _____

_____ Zip _____

Title _____ Phone _____

Money-Back Guarantee
You must be completely satisfied with TARGET Financial Modeling or return it within 30 days for a full refund. This guarantee applies only to single unit end user purchases made from Comshare or from a participating dealer before Dec 31, 1983.

Dr. Strangebyte

A new organization of computer professionals questions the increasing reliance on computers in nuclear defense systems.

Ted Nace

With the spread of personal computers into ever-increasing numbers of homes and businesses, many stereotyped images associated with computers are becoming obsolete. In the not-too-distant past anyone who wanted to try programming a computer had to plunge into the noisy, flourescent-lighted world of the computer center. To seek help one was obliged to attempt communicating with the inhabitants of this world, the "hackers" and "nerds," who

---

'The more one turns over to those machines, the more one becomes vulnerable to their fallibility.'

---

tended to speak a language that was about as comprehensible as Sanskrit.

Now that millions of ordinary Americans are learning to use IBM PCs and other personal computers, these machines are losing some of their intimidating mystery. And computer professionals are demonstrating that, contrary to their common stereotype as persons whose perspective extends little further than the final line number of their program, they

are fully capable of speaking out on important computer-related issues.

Characteristically, these professionals are using a tool of their own creation, the computer network, to communicate their concerns and organize their activities. One harrowing event illustrates the issue these computer scientists hope to bring to public attention.

Computer Cries Wolf

It is a spring night in 1980. Inside Cheyenne Mountain on the eastern slope of the Rockies a computer in the North American Aerospace Defense Command's (NORAD) missile warning system begins to malfunction, sending faulty information to the Strategic Air Command (SAC) in Omaha, Nebraska.
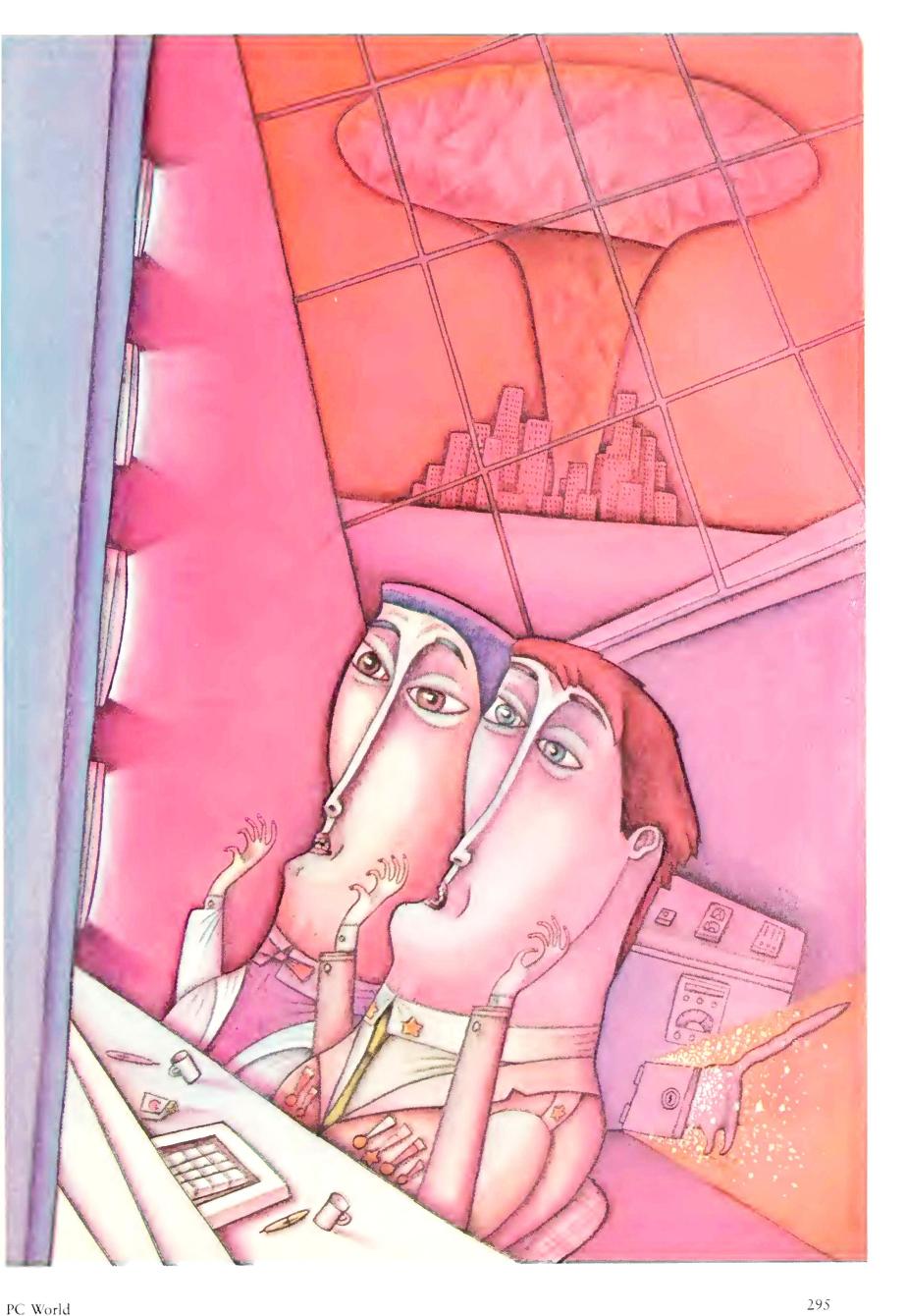
At 12:26 a.m. a SAC computer display lights up with the report that two submarine-launched missiles are headed toward the United States mainland. Seconds later the display shows an increased number of submarine launches.

These messages send nearly 100 SAC bomber crews scrambling for their jets. With their engines started, the crews wait on the runways for further orders. But now the warning message clears from the SAC display, indicating no attack after all.

SAC technicians suspect a computer malfunction. They are aware that the previous autumn a simulation tape showing a full-scale nuclear attack was accidentally connected into the warning system. They also know that other false alerts have resulted from the launching of Soviet missiles near the Kuril Islands as part of troop training and from rocket bodies falling out of low orbit; on numerous occasions satellite-borne infrared detectors have mistaken forest fires, natural gas pipeline fires, and airplane crashes for the heat signature of a missile launch.

Despite growing certainty that the alert is false, the duty officer at SAC takes the precaution of having the crews shut their engines off but remain in their planes. At this point, however, the SAC computer displays new information that contradicts its earlier warning of submarine-launched missiles. The computer's new report is that intercontinental ballistic missiles have been launched from the Soviet Union. Adding to the confusion, on the heels of this report comes word from the National Military Command Center in the Pentagon that computer displays there are indicating submarine-launched missiles.

Finally, all the command posts consult and agree that the warnings are in error. The alert is ended and

≡ Community

the SAC bomber crews return to their barracks. But the incident leads to widespread concern over the reliability of the nation's nuclear warning system, especially after another false alert three days later again sends SAC crews scrambling to prepare for takeoff.

Close Call

A Senate committee report on the incident (see "The 46¢ Breakdown") noted that because the complex series of warnings did not fit into any preconceived scenario "there seemed to be an air of confusion" even after those in charge were sure that the warnings were erroneous. For example, following confirmation by the commander of NORAD that the attacks were nonexistent, the airborne command post of the Pacific Command took off from its base in Hawaii.

Months after the incident reporters questioning Pentagon officials wondered whether the alert, if monitored by the Soviets, might have led them to activate their forces, thus setting off a cascading series of errors. In light of the known problems with the United States warning system, *New York Times* reporter Richard Halloran asked about the reliability of the Russian computers, which are some years behind ours in development. "I hope," responded one Pentagon official, "that they have as secure a system as we do, that they have the safeguards we do."

The general public did not have enough information about the 1980 false alert to judge whether it was an isolated incident or an example of general problems with the country's warning system. Some computer professionals, however, began to worry. Severo Ornstein, a computer scientist with Xerox who has helped design some of the most complex computer systems in the world, including one for the Pentagon, was among those who saw the incident as a harbinger

of more dangerous accidents. "The more one turns over to those machines," he noted recently, "the more one becomes vulnerable to their fallibility."

Out of concerns such as Ornstein's, a dialogue on nuclear issues began at Xerox's Palo Alto Research Center (PARC). This discussion soon involved scores of PARC employees, none of whom had to leave their desks in order to participate.

Terminal to Terminal

Xerox's PARC enjoys a reputation as one of the most innovative think tanks in the computer industry. It was on a visit to PARC that Apple Computer's Steve Jobs reportedly saw a demonstration of some of the advanced concepts underlying the Xerox Star work station—concepts Jobs promptly proceeded to borrow, along with the talent that developed them, to create Apple's Lisa.

Those who advocate the arms race base their premises on the reliability of their systems.

At PARC, a cluster of modern concrete buildings overlooking Silicon Valley, exchanges among employees through the facility's Ethernet electronic mail system are as commonplace as gossip around the water cooler. Depending on his or her hobbies, professional interests, or mere whim, an employee can join round-the-clock conversations on subjects as varied as bicycling, river rafting, and wine tasting, or refer to lists of want ads or available concert tickets.

The networking isn't limited to recreational purposes. Communica-

tions regarding research projects predominate on the system, of course, and the network also provides a forum for exchanges on current issues.

In the fall of 1981 a core group at PARC announced over the network the Antiwar Distribution List, which attracted 135 signers-on. For 5 months the participants exchanged information and ideas on nuclear issues through their computer terminals, without meeting face to face. Their discussions culminated in a letter signed by 150 Xerox employees requesting the corporation to consider sponsoring a television special on the arms race. The result was an hour-long NBC white paper broadcast in June 1982, "Facing Up to the Bomb."

CPSR

That summer, at a public meeting called by Stanford artificial intelligence pioneer Terry Winograd and others, computer professionals employed around the Palo Alto area formed Computer Professionals for Social Responsibility (CPSR). From the outset the organization's leaders showed a determination to fill what they saw as a dangerous void in the public dialogue on arms race issues, a gap that could only be eliminated through vigorous but thoroughly nonpartisan educational efforts by computer professionals.

The group's statement of purpose is clear: "[We] will have the greatest impact if we remember that the arms race is joined by BOTH the United States and the Soviet Union. Criticizing one while failing to cite the other for similar offenses reduces our credibility and can lead to the suggestion that we are biased or manipulated."

As the group hashed out the approaches it might take, a consensus emerged to focus exclusively on nuclear issues, following the advice of Barbara Paul of Physicians for Social Responsibility (PSR) to "find a few very simple, compelling ideas" to communicate. (One member joked later, "We were careful to pick a general enough name so that after we

The 46¢ Breakdown

According to a report by the Senate Armed Services Committee ("Recent False Alerts from the Nation's Missile Attack Warning System"), the alert of June 3, 1980 was traced by computer and communications experts to a 46 cent integrated circuit in a communications multiplexer.

The multiplexer is part of a communications system whose function is to put the output of a data analysis computer into message form for transmission from the North American Aerospace Defense Command (NORAD), located inside Cheyenne Mountain, Colorado, to the three other missile command posts: the Strategic Air Command (SAC) near Omaha, Nebraska; the National Military Command Center at the Pentagon in Washington, D.C.; and the Alternate National Military Command Center at Fort Ritchie, Maryland. Each post receives processed data from NORAD's computers as well as raw data from various infrared warning satellites and ground-based radar.

The NORAD detection devices are designed to err in the direction of oversensitivity. Set at a hair-trigger, these detectors may send warnings as a result of common atmospheric disturbances such as sun flares. Consequently, the personnel operating the warning system hold a number of "missile display conferences" each day. During a recent 18-month period, approximately 3700 such conferences were conducted. Of these, four incidents, including the June 1980 false alarm, were serious enough to bring higher level personnel—up to the chairman of the Joint Chiefs of Staff—into "threat assessment conferences."

The chip that malfunctioned on the night of June 3 caused a routine message transmitted from NORAD to the other posts to be sporadically altered. In the segment of the message that would report how many missiles had been launched, the malfunction caused a zero to be randomly replaced by the number 2.

In determining that the alert was erroneous, Air Force personnel observed that all indications of a warning came from the processed information sent out by NORAD and were not consistent with the raw data also being monitored at all posts; that the information of an attack "did not follow any logical pattern or sequence of events that would be expected from a missile launch"; and that the various posts were receiving significantly different messages.

The Armed Services Committee report concluded, "In no way can it be said that the United States was close to unleashing nuclear war" as a result of the June 3 false alert. "In a real sense the total system worked properly in that even though the mechanical electronic part produced erroneous information, the human part correctly evaluated it and prevented any irrevocable reaction."

NORAD Missile Warning System

⏚ Community

had solved the nuclear arms race we'd still be able to find something to do.")

As a model of how a group of professionals can have an effect far beyond its numbers, Physicians for Social Responsibility was a compelling example for the computer scientists who formed CPSR. One CPSR member notes, "Everyone knows that a nuclear war would kill millions of people, but for some reason they seem to take the threat more seriously when it's laid out in detail by a medical doctor."

Consequently, members of CPSR intend to draw fully on their technical expertise as they join in the national dialogue over arms policies. Lucy Suchman, an anthropologist by training, does research at PARC in-

---

> Both the United States and the Soviet Union appear to be heading toward computerizing ever greater portions of their warning systems.

---

volving human-machine interfaces, specifically, how to design machines that are entirely self-explanatory.

An officer of CPSR, Suchman points out, "Whatever technical issues there are, the moral issues are more profound. Still, it is around technical issues such as the reliability of complex computerized warning systems that critical policy debates revolve. Those who advocate the arms race base their premises on the reliability of their systems. A responsibility that comes with our profession is to point out the technological fallacies that lead to confidence in this reliability."

Humans in the Loop

In probing into the causes of past false alerts and the dangers of more serious accidents in the future, the computer professionals have come up with some surprising conclusions. For example, Dr. Alan Borning, an assistant professor of computer science at the University of Washington, says that the 1980 alert, scary as it may seem, actually illustrated some reassuring features of the current warning system. According to Borning, it was the fact that "there were humans in the loop" that made it possible for a way to be safely charted out of a disorienting flurry of sporadic false data.

What worries Borning and others is that both the United States and the Soviet Union appear to be heading toward computerizing ever greater portions of their warning systems. The reason for this trend is the increasing demands on the warning system created by faster, more accurate missiles.

Michael Shuman, a writer on nuclear issues, describes the situation that is developing: "Put yourself in the shoes of a Soviet military planner. Since the early 1960s, you have known that American intercontinental missiles can reach your cities and missiles in about 20 minutes, and that submarine-based missiles can arrive even more quickly. But now, as the United States deploys Pershing II missiles in Europe, which will be able to hit your cities in 6 minutes, you realize that you will be forced to make the most consequential decisions of your life in less than the time it takes you to smoke a cigarette or drink a cup of coffee."

Launch on Warning

Missiles like the American MX and Pershing II and the Russian SS18 are accurate enough to destroy the opposing force's missiles on the ground. In the summer of 1982 the Soviet Union warned that American plans to deploy the Pershing II in Europe would force the Soviets to move their missiles to "launch-on-warning" status. Under this strategy, missiles

would be launched upon determination by the warning system of an attack, to avoid their being destroyed in their silos.

Whether the Russians would actually adopt such a strategy is unclear, since it implies a largely, if not fully, computer-controlled warning and response system. "If they do go to launch on warning," says CPSR member John Larson, "our lives will be staked on Soviet computer reliability."

Specification Errors

The members of CPSR are unanimous in asserting that the goal of designing a completely reliable computer system is unattainable. In considering the problems that can result from reliance on computer systems, Suchman said, most people immediately think about various hardware breakdowns. Yet these potential problems are actually relatively easy to avoid through redundant design and other engineering methods. People with programming experience may mention software as a source of possible errors. But the worst problems, according to Suchman, result from neither software nor hardware, but from unanticipated circumstances in which the system works exactly as specified but "the specifications violate the intentions of the designer."

Severo Ornstein describes the following example of a specification error. He had gone to Cape Canaveral to watch the launching of a test missile equipped with an explosive charge that a ground operator could detonate if the missile happened to veer inland. When he inquired about the safety detonation package, Ornstein recalls, he was told that on a previous launch "the third stage, which was supposed to take off in the sky, inadvertently took off while the missile was sitting on the pad. It wandered off course, thrashed around, and started to head inland. The de-

Using PeaceNet

The hierarchical format of the *Communitree* software enables users of PeaceNet to add messages freely while preserving the overall organization of subject matter on the bulletin board. Typing Read Help calls up a set of instructions for using PeaceNet.

To see the main menu of the tree, type Read Conferences . This displays the names of each branch of the tree, any of which can be entered by typing Read *name of branch*. Once the user is in a branch, the program shows the names of any submessages, or "twigs."

Alternatively, typing Index Conferences displays an outline of the entire structure of branches and twigs on the tree. Major branches include About PeaceNet, a history and general description; Alert!, an update on pending action in Con-

gress pertaining to nuclear issues; Peace-Groups, a directory of organizations; Debate, pros and cons of various issues; Private, for personal messages between users of the tree; and Calendar.

A special feature allows the user to receive only those messages that have been added to the tree after a certain date. To read messages added to the tree since June 15, 1983, for example, type Read *name of branch* S 15-JUNE-83 .

The numbers of PeaceNet's two nodes are 415/896-0893, Palo Alto, California, and 415/530-7886, Oakland, California. For more information on PeaceNet, contact the Disarmament Resource Center, 942 Market St. #708, San Francisco, CA 94102, 415/495-0526.

Membership currently numbers about 400 and is open to any person concerned about the issues addressed by CPSR.

The group also continues to seek corporate assistance on educational programs similar to the NBC white paper, and members are collaborating on various bibliographies and position papers. Some of this research deals with the danger of deploying weapons that could force one or both sides toward launch on warning. Other topics include general questions of computer reliability, the use of simulations in military planning, and radiation and electromagnetic pulse effects on electronic devices.

PeaceNet

In addition, two members of CPSR serve as system operators for a bulletin board, PeaceNet, which uses the *Communitree* program and is accessible to any 300 baud modem hooked to a terminal or a personal computer (see "Using PeaceNet"). According to David Caulkins, director of advanced planning for Packet Cable, who in his spare time serves as SYSOP for the Palo Alto node of PeaceNet, the bulletin board receives 10 to 20 calls each day, some from as far away as Hawaii.

Callers may read, add to, and with permission delete messages from the bulletin board, which includes calendars of events pertaining to nuclear issues, book lists, descriptions of various organizations including CPSR, and legislative updates on nuclear issues.

Although the Berkeley and Palo Alto PeaceNet nodes are run with the assistance of CPSR members, the network itself is actually a project of the Disarmament Resource Center, a joint effort by about 25 Bay Area peace groups to provide an informational clearing house of events, research, and educational materials.

The members of PeaceNet, which consists of computer professionals and nonprofessional persons with an

---

struct package, which was supposed to take care of these troubles, was of course in the second stage, which was sitting on the pad. So when the operator pushed the button, he destroyed the second and the first stages on the pad—as well as the pad."

Such inherently unpredictable errors are familiar to engineers, programmers, and anyone else who has worked with complex systems. As a rule, the only way to discover these errors is through repeated testing of a machine or system under the actual conditions of its use. But with nuclear systems, such real-life system tests will, one hopes, never be held.

A Dangerous Mixture

On consecutive days in January 1983, CPSR members took their message, expressed succinctly in a painted sign reading "Computers and Missiles—A Dangerous Mixture," to the public at

two small demonstrations, the first at the Soviet Consulate in San Francisco and the second at the U.S. Logistics Center in San Bruno, California. "I don't think any of us were really too comfortable being in a demonstration," said Suchman. "Most of us would rather express our views through a technical paper. But we felt at the time it was necessary to do something, and I think we made our point."

Along lines more typical for a professional organization, the group has been busily engaged in recruiting members at trade fairs and elsewhere; assisting in the establishment of new chapters (now located in Boston, Seattle, Los Angeles, Berkeley, Palo Alto, Madison, and San Jose); and sponsoring debates, films, and talks, some of which have been televised.

⬭ Community

interest in personal computing, have a number of ongoing projects. These include testing data transfer protocols to enable communication among TRS-80, Apple, and IBM systems; volunteering computing services to peace groups; and assisting peace groups to acquire and set up their own systems.

War Is a Bore

As Laurie Foster, an independent computer contractor who has been involved with PeaceNet since the outset, points out, the often mundane work of setting up and augmenting a network seems far removed from the dramatic issues of accidental war and

> 'If they go to launch on warning, our lives will be staked on Soviet computer reliability.'

balance-of-terror peace that seem to be the preoccupation of both military planners and concerned observers such as CPSR. Nevertheless, she speaks with contagious enthusiasm about computer networking, with its promise of a more vigorous, participatory democracy, as an essential building block in the creation of a peaceful world.

Foster speculates that in time computerized war games, perhaps even war itself, might die a natural death as people find more interesting things to do. "What could be more boring," she asks, "than shooting 'em up over and over again?" ⬭

For more information contact Computer Professionals for Social Responsibility, P.O. Box 717, Palo Alto, CA 94301.

COHERENT™ IS SUPERIOR TO UNIX* AND IT'S AVAILABLE TODAY ON THE IBM PC.

Mark Williams Company hasn't just taken a mini-computer operating system, like UNIX, and ported it to the PC. We wrote COHERENT ourselves. We were able to bring UNIX capability to the PC with the PC in mind, making it the most efficient personal computer work station available at an unbelievable price.

For the first time you get a multi-user, multitasking operating system on your IBM PC. Because COHERENT is UNIX-compatible, UNIX software will run on the PC under COHERENT.

The software system includes a C-compiler and over 100 utilities, all for $500. Similar environments cost thousands more.

COHERENT on the IBM PC requires a hard disk and 256K memory. It's available on the IBM XT, and Tecmar, Davong and Corvus hard disks.

Available now. For additional information, call or write,

Mark Williams Company
1430 West Wrightwood, Chicago, Illinois 60614
312/472-6659

Mark Williams Company

BBS Watch

Answers to Some Common Communications Questions

Gene Plantz

I have received a lot of mail during the past few months from *BBS Watch* readers who have questions about bulletin boards and communications. In this issue I will answer some of the most commonly asked questions.

Q. Why do bulletin board systems allow only one caller at a time?

A. Mainframe computers are designed to handle concurrent processing of hundreds of programs; however, most microcomputers have operating systems (such as PC-DOS) that are designed to run only one program at a time. The term for this type of processing is *single thread*. A BBS program is written to perform certain duties: answering the phone, checking files to see if callers have left any messages on the system, writing caller messages to disk, and hanging up the phone when callers log off. If programmers try to trick PC-DOS into allowing its communications program to answer more than one phone line at a time, the operating system has a difficult time reading and writing to the disk files. Let's look at what happens when you and another caller try to hook up with a BBS simultaneously.

When you leave someone a message on a BBS, the message is assigned a number. If you and another BBS caller give the command to enter a message at the same time, both messages are assigned the same number. When this happens the message that is saved last will prevail because messages are written to the file in numbered slots, and a second message with the same number as the first writes over the original. More

sophisticated operating systems like the ones used on mainframes prevent this problem with a command that allows a file to be temporarily locked.

Some operating systems for the PC allow multiple users and multiple programs. Concurrent CP/M-86 allows one user four programs simultaneously. Multilink allows users to partition a PC's memory into eight segments and to load a different program into each segment. The QNX operating system allows up to 16

Some operating systems for the PC allow multiple users and multiple programs.

---

users and 250 programs on a single PC at the same time, although it is unlikely that one PC can take full advantage of all the programs.

At present I am rewriting my Chicago Bulletin Board software to run under QNX. With the new operating system my BBS will be able to handle three callers simultaneously.

Q. What parity settings do I need to use when I dial bulletin board systems?

A. Most BBSs that you call with an IBM PC need settings of no parity, 8 data bits, 1 stop bit, and full duplex. These settings can also be used when calling The Source, CompuServe, and other large time-sharing services. No parity and 8 data bits are mandatory if a file transfer method known

as the Modem/Xmodem protocol is used between your computer and the BBS.

If you have one of the newer, intelligent modems, your communications software can instruct the modem to adjust itself automatically to these settings. If you have a manually set modem, you may need to adjust some switches on it before making the phone call to the bulletin board system.

Q. When I call some bulletin board systems and make a connection, nothing happens. What should I do?

A. If you encounter a situation in which a BBS answers and nothing happens, try pressing ENTER a few times. Let's look at why this simple procedure usually gets you going.

When you call a BBS, the telephone is answered by the bulletin board modem. After answering, the modem signals the BBS software that a call has come in (the modem usually sends a signal called *carrier detect* to the bulletin board software). Processing should then begin. A BBS system that has a single-speed modem can begin to send messages to you as soon as the program receives the carrier detect signal. But a system that has a two-speed modem (300 or 1200 baud) must first determine the speed you are using.

Some two-speed modems send speed signals, along with the carrier detect, that allow the software to determine and set the speed automatically. But bulletin boards with other types of two-speed modems must wait for you to press the PC's ENTER key. Once ENTER is pressed,

the BBS program checks to see if the signal is 300 baud; if it isn't, the program tries again at 1200 baud.

Remember that a bulletin board's modem can answer the telephone even when the BBS software is not working. This doesn't happen often, but it is a possibility. If pressing EN-TER doesn't get any results, hang up and try phoning the bulletin board again later.

Q.   Can I use a computerized bulletin board for something other than computer-related subjects?

A.   Yes. Many bulletin boards address such topics as medicine, law, or aviation. Currently the majority of bulletin boards are computer related, but as computer use in homes and businesses grows, I am certain that we will see a greater variety of BBSs.

More and more companies are starting to use electronic mail in their daily business operations, and I foresee electronic mail via bulletin boards becoming as routine as regular mail delivery. A centrally located bulletin board system can be invaluable for a company whose employees have to travel a great deal. With such a system, employees can call into the bulletin board once a day to receive their mail and leave their messages for co-workers, both within the office building and out in the field. Portable terminals small enough to be carried in a briefcase, such as the Radio Shack Model 100, are ideal for this on-the-go information processing.

A business with several office locations might find it advantageous to operate a bulletin board system at its headquarters. Such a system could display information about work schedules, procedural changes, and supply requests, thereby reducing mailing costs and paperwork.

The phenomenal growth in personal computer sales and the reduction of modem prices mean that more people are telecommunicating.

You do not need a huge computer to run a bulletin board.

As more people use home computers as communications tools, many will attempt to run bulletin boards.

You do not need a huge computer to run a bulletin board. With one IBM PC, two floppy disk drives, 192K of memory, and a modem you can set up your own electronic mail system offering information on any subject you choose. You may be surprised at the number of people who share your interests and would like to contribute to your BBS. If you need some initial help getting your system set up, your local user group is a good place to find assistance.

Q.   I called some of the bulletin board numbers listed in your column and found that they either don't answer or are disconnected. Are the numbers correct?

A.   Although I do call all the BBS systems listed to check their status, because of our deadline schedule it is impossible to guarantee that every BBS is still operating by the time *PC World* hits the newsstands.

This brings up an interesting point about BBSs. A high percentage of systems stay on-line for only 1 or 2 months because the SYSOPs find that they don't have enough time to devote to their bulletin boards. The first 4 to 6 month period of a bulletin board's existence is the most demanding time for a SYSOP. Fixing minor program problems, finding public domain software for the bulletin board's files, answering callers' questions, and maintaining the hardware take a lot of time. After this start-up period, however, the job becomes easier because callers begin to contribute information and programs to the bulletin board.

If you find a number listed in the directory that either is disconnected or gets no answer (call on a few different days—SYSOPs are allowed vacations), I would appreciate your dropping me a line in the mail or letting me know via my Chicago BBS or electronic mail on CompuServe, The Source, or Delphi.

Send correspondence to Gene Plantz, P.O. Box 95638, Hoffman Estates, IL 60195, CompuServe EMAIL 70040,245, The Source SMAIL STG476, Delphi MAIL TDCING.

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.

213/649-1489
Culver City, California
SYSOP: George Peck
24 hrs, download & upload,
    messages

213/390-3239
Source: TCG147
Santa Monica, California
SYSOP: Marc Schoenberg
24 hrs, download & upload,
   10 M 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

312/882-4227
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

319/363-3314
Cedar Rapids, Iowa
SYSOP: Ben Blackstock
24 hrs, download & upload,
   messages, 300

415/861-5733
San Francisco, California
SYSOP: Harry Logan
Hours variable, download &
   upload, messages, 300/1200

416/499-7023
Toronto, Canada
SYSOP: Doug Peel
24hrs, download & upload,
   messages, 300/1200

608/262-4939
Madison, Wisconsin
PC Users Group
SYSOP: Read Gilgen
5 p.m. to 8 a.m. weekdays,
   5 p.m. Fri. to 8 a.m. Mon.,
   download & upload,
   messages

703/680-5220
Dale City, Virginia
Dale City Info Exchange
SYSOP: Tim Mullins
24 hrs, news, new product
   review—all PCs

BBS Watch

703/560-7803
Vienna, Virginia
ABBS with IBM PC
    Conference
24 hrs, download & upload,
    messages

703/978-0921
Fairfax, Virginia
SYSOP: Bruce Churchill
    (Hostcomm)
24 hrs, software eval/purchase
(Passwd = IBMPC)

703/978-9592
Fairfax, Virginia
SYSOP: Don Withrow
    (Hostcomm)
24 hrs, download & upload,
    tips
(Passwd = IBMPC)

716/836-6964
Buffalo, New York
SYSOP: Bob Taylor
9 p.m. to 9 a.m. Tu, W, Th, F;
6 p.m. Sat to 9 a.m. Tu;
download & upload, mes-
    sages, 300

913/842-5749
Lawrence, Kansas
24 hrs, download & upload,
    messages

919/847-4625
Raleigh, North Carolina
SYSOP: Randy Ray
Download & upload, mes-
    sages, 300/1200
(Passwd = IBMPC)

800/848-8199
CompuServe
24 hrs, download & upload,
    messages
subscribers only

BBS of the Month

This month's file transfer listings are from the San Francisco IBM PC
Bulletin Board, 415/861-5733.

FK.COM	Defines DOS function keys; use XMODEM
FK.DOC	Documentation for FK.COM
CLS.COM	Clears screen in DOS 1.1
CLOCK.COM	Puts clock on screen; mono only
TUNE.COM	Plays music from DOS
TUNE.DOC	Documentation for TUNE.COM
TUNE.HEX	Hex file of TUNE.COM
747.BAS	Flight simulator for mono screens
UNWS.EXE	UN-WordStar WordStar
UNWS.HEX	Hex file of above
MINICALC.BAS	BASIC minicalc program
MINI.DOC	Documentation for above
SLOT.BAS	BASIC slot machine fun
CATALOG.HEX	Disk catalog program
SPOOL10K.HEX	Printer spooler (10K buffer)
SPOOL10K.DOC	Printer spooler documentation
CAPSLOCK.COM	Changes Capslock status
DISKIDX.BAS	A disk indexer routine
DISKIDX.DOC	Documentation for above program
CVTHEX.BAS	Converts CVTHEX.HEX to an .exe file
CVTHEX.HEX	Very fast hex conversion program; runs from DOS
DEFKEY.HEX	Use the CVTHEX program to make this into a .com file
DEFKEY.DOC	Documentation for DEFKEY.HEX
PRINTFIX.HEX	Use CVTHEX to make a .com file; fixes device timeout errors
DISKRTN.DOC	Documentation for DISKRTN.HEX
DISKRTN.HEX	Use CVTHEX to make this into an .exe file; handy "hidefile" program
MONOCF.HEX	Use CVTHEX to make this into a .com file; puts clock in mono only
SQUISH.BAS	Removes REMs & condenses BASIC programs
DEFKEY.COM	Use XMODEM same as DEFKEY.HEX without conversion
CVTHEX.EXE	Use XMODEM same as CVTHEX.EXE without using this to convert

User Group Dispatch

SIGSTAT, the Capital PC Special Interest Group for Statistics

Harry J. Foxwell

Statistical and scientific computing has been dominated by mainframes since the first "number-cruncher," the U.S. Army's ENIAC, was used for complex artillery calculations in 1945. Even today most applications requiring extensive numeric computations are run on large, multiuser systems. But such systems are expensive and often so heavily used that submitting and running even the most routine statistical work can take several hours.

Researchers who do statistical computing are attracted to the modern microcomputer's low price and accessibility. But it remains to be

> Researchers who do statistical computing are attracted to the modern microcomputer's low price and accessibility.

seen whether micros can measure up to mainframe accuracy and performance.

Several members of the Capital PC User Group formed SIGSTAT (the Special Interest Group for Statistics) for the purpose of investigating the IBM PC's statistical potential and evaluating statistical software available for the PC.

SIGSTAT comprises several diverse groups. Members include market researchers, business managers, and statisticians in government, universities, and private industry. Each of these groups is looking for different qualities in statistical packages. Gov-

ernment statisticians from the Bureau of Labor Statistics and the Census Bureau need software that will perform complex analyses of large quantities of data. Market researchers and political pollsters want software tools for quick tabulation of smaller sets of population data. Business managers need easily understood statistical summaries of financial and economic data.

SIGSTAT attempts to address these varied interests by serving as a clearinghouse for information about statistical packages for the PC. SIGSTAT members regularly review commercial statistical software in Capital PC's newsletter, *The Monitor.* SIGSTAT is also developing guidelines for evaluating statistical software.

Mainframe Packages

Statistical programs were first developed for large computer systems capable of handling complex calculations. Statisticians, researchers, and many large businesses still rely on mainframe commercial statistical packages such as *Statistical Package for the Social Sciences (SPSS)* and *Statistical Analysis System (SAS).*

Mainframe packages are either batch or interactive. In batch systems users can request several analyses of one or more sets of data at one time. The mainframe schedules the request according to its priority and the amount of CPU time and memory required. The amount of time the mainframe takes to complete the request depends on how busy it is. Reading the data once only, batch systems can produce many analyses from a small set of instructions. This

method requires large amounts of main memory and disk storage, making implementation on microcomputers difficult.

Interactive packages perform one tabulation at a time, enabling the user to see the results almost immediately. Interactive programs usually prompt the user to input information that specifies the nature of the analysis to be performed. This method helps researchers explore data and generate tables based on preliminary analyses.

An ideal statistical package would allow for both interactive and batch processing so that users could quickly determine the general characteristics of their data and then produce multiple tabulations.

Major statistical software developers have been slow to translate their products for use on the PC. SPSS, Inc. only recently announced that its software is available for the DEC Personal Computer, and the company is planning to market an interactive data analysis package later this year for the IBM PC. SAS Institute has no plans to run its software on the PC.

Packages for the PC

Where does this leave the PC user who wants good statistical software? For those who need only interactive analysis of fairly small sets of data, there are a few usable packages. SIGSTAT recently reviewed Ecosoft's *Microstat* and Northwest Analytical's *Statpak,* currently the most popular packages for the PC. These two interactive packages do a reasonably good job of analyzing data consisting of a few hundred records, but they do not allow for batch processing and cannot easily handle larger sets of data.

Microstat is menu-controlled and therefore easy to use. *Statpak* is simply a collection of individual programs and requires more knowledge of statistics and the PC's operating system.

SIGSTAT is concerned with the quality of PC statistical software. Many commercial programs produce correct output for well-behaved data but give incorrect results (or don't operate at all) for data that is sensitive to the computer's internal representation of numbers. Statisticians have developed test data for microcomputer software to determine whether a program produces acceptable results. Gerald and Cathleen Platt, two statisticians at San Francisco State University, have developed data for testing multiple regression programs. *Microstat* and *Statpak* produced acceptable results using this test data, but some commercial packages have failed to analyze the data properly.

As the PC becomes more powerful through enhancements in main memory capacity, disk storage, and computing power, SIGSTAT expects to see more high-quality statistical software marketed. Many of these packages will use improved software development tools in conjunction with the Intel 8087 coprocessor for faster and more accurate calculations. ◒

Harry Foxwell works as a statistician for the American Chemical Society in Washington, D.C. and is chairman of Capital PC's Special Interest Group for Statistics.

SIGSTAT's Software List

The following list shows currently available statistical software and is not meant as an endorsement of any product. SIGSTAT has reviewed several of these packages in its monthly newsletter and will continue to publish information about developments in statistical computing on the IBM Personal Computer.

ABSTAT (dBASE II)
Anderson-Bell
P.O. Box 191
Cannon City, CO 81212
303/275-1661

ARA Basic Statistics
Anacapa Research Associates
4040 Grandview Blvd. #71
Los Angeles, CA 90066
213/412-8437

HAL 3001
Kellar Software
1825 Westcliff Dr.
Newport Beach, CA 92660
714/642-2380

MDCSTAT 2.0
Micro Data Collection
P.O. Box 115
Novato, CA 94947
415/883-9255

Micro-Survey
Systematica
112 Strand
London WC2R 0AA
01-836-9379

MICROSTAT
Ecosoft
P.O. Box 68602
Indianapolis, IN 46268
317/255-6476

Multiple Regression
Starware
2000 K St. NW #450
Washington, DC 20006
202/331-8833

PAIRSTAT
Davell Custom Software
P.O. Box 4162
Cleveland, TN 37311

POP-Pyramids
Demo/Graphics
P.O. Box 6446
Ithaca, NY 14850
607/272-2331

Regression I & II
Dynacomp, Inc.
1427 Monroe Ave.
Rochester, NY 14618

SL-Micro
Questionnaire Service Company
P.O. Box 23056
Lansing, MI 48909
517/641-4428

STAN
Statistical Consultants, Inc.
462 E. High St.
Lexington, KY 40508
606/252-3890

(continues)

User Group Dispatch

SIGSTAT's Software List

Stat Analysis I/Linear Regression
Spectrum Software
690 W. Fremont St.
Sunnyvale, CA 94087
408/738-4387

Stat Pak I
Transaction Systems Inc.
8708 E. 39th St.
Tulsa, OK 74145
918/663-3436

Statgraphics.PC
Statistical Graphics Corp.
P.O. Box 1558
Princeton, NJ 08540
609/924-9374

Statistical Analysis
Kern Publications
190 Duck Hill Rd.
Duxbury, MA 02332
617/934-0445

Statistician
Alpha Computer Service
P.O. Box 2517
Cypress, CA 90630
714/894-6808

Statistics 5.1
Basic Business Software
P.O. Box 26311
Las Vegas, NV 89126
702/876-9493

Statpak
Northwest Analytical
1532 S.W. Morrison St.
Portland, OR 97205
503/224-7727

Statpro
Wadsworth Electronic Publishing
  Company
20 Park Plaza
Boston, MA 02116
617/423-0420

Stats/Regress/Anova
Human Systems Dynamics
9249 Reseda Blvd. #107
Northridge, CA 91324
213/993-8536

The Survey System
Creative Research Systems
1864 Larkin St.
San Francisco, CA 94109

Survtab
Statistical Computing Consultants
9025 Andromeda Dr.
Burke, VA 22015
703/455-2379

V-Stat (VisiCalc Template)
Yucaipa Software
12343 12th St.
Yucaipa, CA 92399

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.

Alabama
Birmingham User Group
Chet Ellis
ComputerLand, 215 W. Valley Ave.
Birmingham, AL 35209
205/942-8085
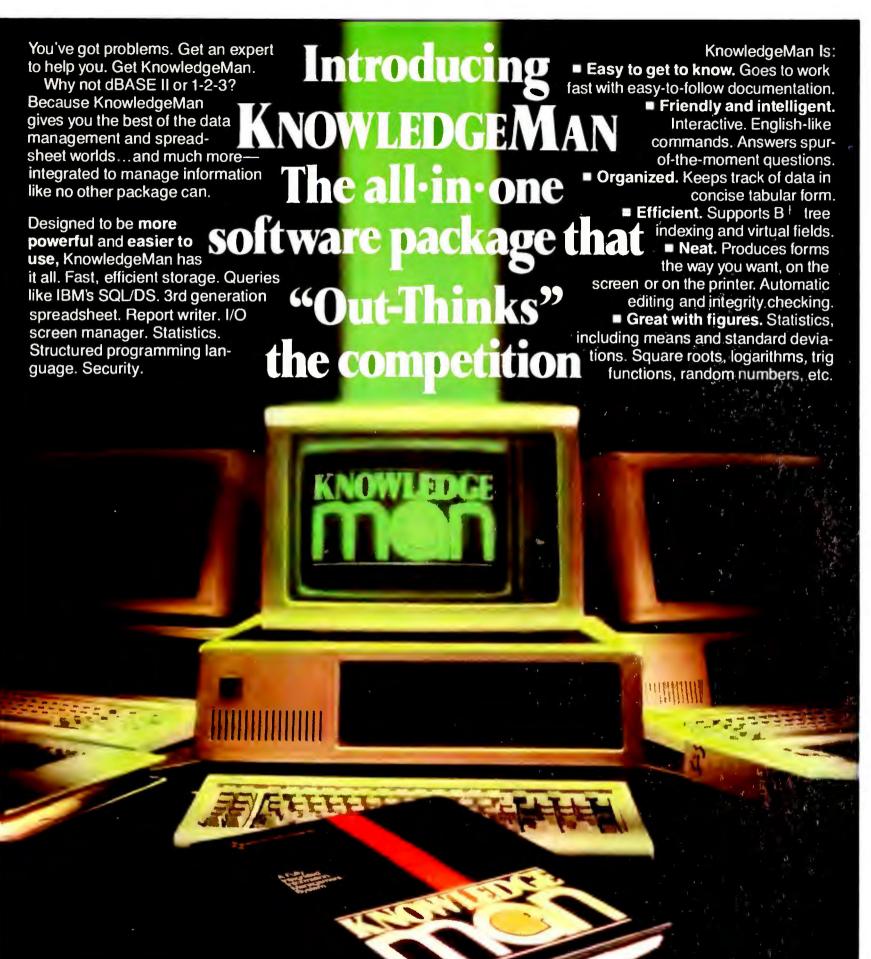
Arizona
IBM PC Idea Exchange
Lisa May
United Systems Corporation
1074 E. Sandpiper Dr.   '
Tempe, AZ 85283
602/831-9363

IBM PC User Group
Theresa Baudier
P.O. Box 1489
Tucson, AZ 85702
602/293-0611

Phoenix Personal Computer Club
Fred Lynch
P.O. Box 44218
Phoenix, AZ 85064
602/266-6634

California
Diablo Valley PC
Al Hunt
1415 Oakland Blvd. #101
Walnut Creek, CA 94596
415/687-8037

(continues)

User Group Dispatch

Greater South Bay IBM-PC Users
Group
Mike Immel
P.O. Box 665
Lomita, CA 90717
213/325-7533

IBM Users Group of California
Neil Zachary
P.O. Box 4136
Los Angeles, CA 90028
213/937-1314

IBM PC Users Group of Santa Maria
Ray Smyer
575 Ferndale Dr.
Santa Maria, CA 93455
805/937-7490

Marin-Sonoma PC Users
William O. Ward
P.O. Box 2909
San Francisco, CA 94126

Modesto-Turlock PC User Group
Liz Leedom
P.O. Box 1122
Modesto, CA 95353
209/578-2358

North Orange County IBM Club
Glenn A. Emigh
1533 Sherwood Village Circle
Placentia, CA 92670
714/996-4464

San Diego Computer Society
Tom Field
1384 Caliente Loop
Chula Vista, CA 92010
714/421-9686

San Fernando IBM PC Users Club
David Nussbaum
11558 Riverside Dr. #207
North Hollywood, CA 91602
213/985-8337

San Francisco IBM PC
Users Group
4411 Geary Blvd. #33
San Francisco, CA 94118

San Francisco PC Club
Max Brioski
1045 Balboa St.
San Francisco, CA 94118
415/386-5176

Santa Barbara City College Com-
puter Science Department
Stu Swartz
721 Cliff Dr.
Santa Barbara, CA 93109
805/966-2919

Silicon Valley Computer Society
Peter Harris
P.O. Box 60506
Sunnyvale, CA 94088
408/248-9057

Colorado
Denver User Group
Steve Leibson
4040 Greenbriar Blvd.
Boulder, CO 80303
303/494-4062

Connecticut
Central Connecticut User Group
Rich Paterson
ComputerLand, 131 S. Main
West Hartford, CT 06107
203/561-1446

IBM PC User Club of Stamford
Dave Foulger
69 River St.
New Canaan, CT 06840
203/966-9378

Southeastern Connecticut IBM PC
Users Group
Pat Ryan
78 Spring Glen Rd.
Niantic, CT 06357
203/739-4855

Delaware
PC Professional Users Group
P.O. Box 2350
Wilmington, DE 19899

District of Columbia
Capital PC
Janet Withrow
P.O. Box 3189
Gaithersburg, MD 20878
703/978-1530

IBM PC Special Interest Group
(CompuServe)
Mike Todd
4910 43rd St. NW
Washington, DC 20016
202/364-2467
CompuServe: Mike Todd,
70001,1264; Wes Meier,
70215,1017

Florida
Manasota IBM PC User's Group
Richard Reynolds
1102 Mallorca Dr.
Bradenton, FL 33529
813/792-5400

Hawaii
Hawaii IBM PC User Group
Doug Long
P.O. Box 22967
Honolulu, HI 96822
808/735-5769

Idaho
Idaho PC User Group
Bruce Burns
ComputerLand, 687 S. Capitol Blvd.
Boise, ID 83702
208/344-5545

(continues)

User Group Dispatch

Illinois
Association of PC Users
Glenn Yunashko
4727 S. Lavergne St.
Chicago, IL 60638
312 284-5872

Northern Illinois IBM PC Users
   Group
James L. Szafranski
5195 Castaway Ln.
Barrington, IL 60010
312/934-8133

Indiana
ComputerLand User Group
Susan Shields
ComputerLand
5450 N. Coldwater Rd.
Fort Wayne, IN 46825
219/483-8107

Indianapolis IBM User Group
David Reed
6704 Hoover Rd.
Indianapolis, IN 46260
317/259-7892

NEI User Group
George Gynn
9904 Goshen Rd.
Fort Wayne, IN 46818
219/693-3147

Northern Indiana IBM PC User
   Group
Dr. Terry Alley
316 N. Ironwood Dr.
South Bend, IN 46615
219/289-5506

Iowa
Cedar Falls User Group
Lee Ann Moore
Black Hawk Village Shopping Center
Cedar Falls, IA 50613
319/277-1700

IBM PC User Group
Gary Wilcox
P.O. Box 246
Des Moines, IA 50301
515/967-5880

Kansas
Kansas City IBM Users
R. Wayne Thompson
11005 W. 60th St.
Shawnee, KS 66203
913 268-7500

Topeka Library User Group
Becky Hinton
Topeka Public Library
1515 W. 10th St.
Topeka, KS 66604
913 233-2040

Wichita IBM PC Users Group
Jack Leonard
P.O. Box 18422
Wichita, KS 67218
316/681-9698, 788-3655

Kentucky
Bluegrass IBM PC Users Group
Diane Skoll
Computing Center
Room 72, McVey Hall
University of Kentucky
Lexington, KY 40506-0045
606/257-2900

Louisiana
Cajun PC Users
Sharon Denais
Oil Center Research, Inc.
P.O. Box 51871
Lafayette, LA 70505
318/232-2496

New Orleans PC Club
Walt Meyers
3517 19th St.
Metrarie, LA 70002
504/737-6318

NW Louisiana IBM PC
   User Group
William Dwinnell
1144 Hallmark Dr.
Shreveport, LA 71118
318/686-7781

Maryland
Baltimore PC
1910 Trout Farm Rd.
Jarrettsville, MD 21084

Massachusetts
IBM PC User Group
Boston Computer Society
Three Center Plaza
Boston, MA 02108
617/367-8080

Miller Microcomputer Services
61 Lakeshore Rd.
Natick, MA 01760
617/653-6136
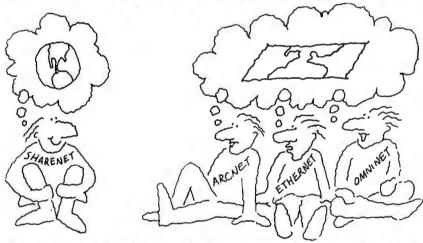
MS-DOS Users Group (SIG 86)
Joseph Boykin
47-4 Sheridan Dr.
Shrewsbury, MA 01545

Michigan
Southwestern Michigan IBM PC
   Users Group
R.K. Schmitt
2320 Crosswind Dr.
Kalamazoo, MI 49008
616/349-5381

(continues)

IN THE FLAT WORLD OF NETWORKING THERE IS A COLUMBUS.

NOVELL.

We Know How You Felt, Columbus!

In 1492 most people were saying the world was flat. They said, "You'll fall off the edge if you go too far." But that didn't stop you Columbus. You went ahead and discovered America.

Today, most people are saying, "file service...is just not feasible."* They're even saying, "operations like record locking are not available."** But that hasn't stopped Novell, either. Because we've gone ahead and discovered, designed, yes...
even built and shipped file servers that the less adventurous said couldn't be built. And our file servers are up and running all over America, (not to mention the rest of the world.)

Our Versatile Applied Server Technology (VAST) lets multiple operating systems on multiple types of personal computers share the same disk space and directories simultaneously.

And yes, all you other guys, record locking is available ...on the ShareNet/VAST system, anyway.

Discover the vast ShareNet Difference.

The trouble with the "civilized" world of networking offered by our competitors is that they are still thinking FLAT! They're still concentrating on the hardware connection instead of the software that makes

that hardware function. Just like Columbus, Novell is the ONLY company that can offer you a VAST networking difference. We're thinking round, you see.

Does choosing a network have you "on edge"?

Don't fall off the edge! If networking—we mean real local area networking of numerous PC's, running multiple operating systems without modification to "off the shelf" software, having concurrent file sharing, default file locking, extensive data security and more—sounds exciting to you, call us for a demonstration so you can discover your options. ShareNet/VAST will take you out of the "flat" bounded network world and into the boundless universe of networks that work.

Explore Novell's world!

Discover the vast ShareNet difference. You'll find out-of-this-world performance at very down-to-earth prices. ShareNet/VAST is easy to use. All you have to do is call us and we'll set sail on a course that solves your PC networking problems. Get on board with the Columbus of networking. Novell, Inc., 1170 North Industrial Park Drive, Orem, Utah 84057, 801 226-8202 • 800 453-1267

Novell—making networks work.
Our VAST difference.

*3Com Corp. in March Systems & Software, pg. 118
**3Com Corp. in March Systems & Software, pg. 119

NOVELL

User Group Dispatch

Minnesota
IBM PC Users' Group—
    Minneapolis
Peter LeNeau
P.O. Box 3163
Minneapolis, MN 55403

New Jersey
Amateur Computer Group of New
    Jersey
William S. Chin
P.O. Box 97
Iselin, NJ 08830

North Jersey IBM PC Club
Irving Lang
7 W. 45th St.
New York, NY 10036
212/869-5066

Personna Computer Association
The Int'l Association for the PC
Paul Cowan
P.O. Box 759
Point Pleasant, NJ 08742
201/840-0300

New York
Long Island Computer Association
Marvin Freifeld
3 Lindron Ave.
Smithtown, NY 11787
516/724-0574

Manhattan IBM Micro Club
Helaine Head
360 Central Park West
New York, NY 10025
212/222-9027

NYPC, The NY IBM PC Users'
    Group
Eric A. Jaffe M.D.
Cornell University Medical College
1300 York Ave.
New York, NY 10021
212/472-6140

North American Amateur Computer
    Club
Brian Glasser
P.O. Box 106 Church St. Station
New York, NY 10008
212/674-1185

PECO Club
P.O. Box 255
Garnerville, NY 10923
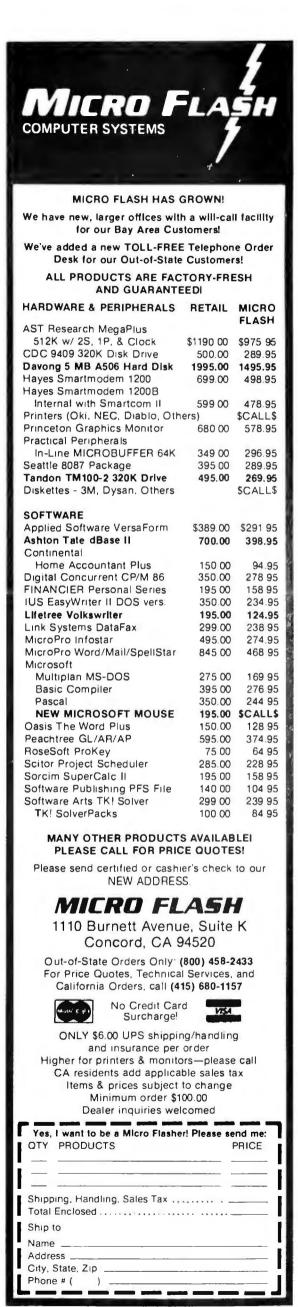
Ohio
ACORN: Greater Cincinnati IBM
    PC User's Group
Jerry Daiker
P.O. Box 3097
Cincinnati, OH 45201
513/741-8279

Akron/Canton PC Users Group
James C. Finucane
10690 Clapsaddle Ave.
Alliance, OH 44601
216/935-0252

Greater Cleveland PC Users Group
Roy McCartney
30704 Royalview Dr.
Willowick, OH 44094
216/944-5173

Oklahoma
Tri-County Tech
Tom Fowler
P.O. Box 3428
Bartlesville, OK 74005
918/333-2422

(continues)

User Group Dispatch

Oregon
Portland IBM Personal Computer
   Club
Rich Rohde
P.O. Box 2068
Beaverton, OR 97075
503/620-6862

Pennsylvania
International Personal Computer
   Owners
James B. Cookinham
P.O. Box 10426
Pittsburgh, PA 15234
412/561-1857

Philadelphia Area IBM PC User
   Group
Bennett Landsman
2041 Harbour Dr.
Palmyra, NJ 08065
609/786-1441

South Carolina
PC Users' Group
P.O. Box 2794
Columbia, SC 29202
Source: ST5033

Tennessee
IBM PC User Group
Ross Burrus
Science Applications, Inc.
Plaza Tower #801
Oak Ridge, TN 37830
615/482-6649

Texas
Basic Society, Inc.
An Int'l Users Group
Drawer 345099
Dallas, TX 75234
214/484-9900

Central Texas User Group
Charles Weller
325 Explorer
Austin, TX 78734
512/261-6566

Dallas Fort Worth User Club
Samuel P. Cook
309 Lincolnshire
Irving, TX 75061
214/253-6979

HAL-PC
Rob Taylor
P.O. Box 610001
Houston, TX 77208
713/937-1342

IBM Club
David Andrews
3110 Honey Tree Ln.
Austin, TX 78746
512/327-0029

Southwest Computer Club
Sergio H. Salazar
Ohio Medical Products
9650 Railroad Dr.
El Paso, TX 79924
915/751-0465, 757-2661 ext. 262

Southwest Personal Computer User
   Group
Ronnie Van Winkle
William G. Barker & Associates
1009 W. Randol Mill Rd. #212
Arlington, TX 76012
817/270-2760

Texas User Group
Ken Holcombe
178 Tipperary
San Antonio, TX 78223
512/333-7163

Tyler IBM Club
Fred McDowell
318 Ferrett Pl.
Tyler, TX 75702
214/595-0976

Utah
Utah Blue Chips
John Jaloszynski
P.O. Box 11901
Salt Lake City, UT 84147
801/487-5228

Utah ComputerLand
Debby Williamson
ComputerLand, 161 E. 200 South
Salt Lake City, UT 84111
801/364-4416

Virginia
Central Virginia IBM PC User's
   Group
Jim Love
P.O. Box 34446
Richmond, VA 23234
804/271-6173

IBM PC-Tidewater User Group
Vic Freeman
5237 Dundee Ln.
Virginia Beach, VA 23464

Washington
BorderLine IBM PC Users Group
Gary B. Rohrabaugh
3617 Portal Dr.
Bellingham, WA 98226
206/671-3181

PNW IBM User Group
Eileen Bagdonas
P.O. Box 3363
Bellevue, WA 98009

Wisconsin
Madison IBM-PC Users' Group
Philip J. Niehoff
P.O. Box 83
Madison, WI 53701
608/255-7641

(continues)

User Group Dispatch

Canada

IBM.PC Users Group of Winnipeg
BDI Business Development
    International
P.O. Box 5, Station A
Winnipeg, Manitoba
R3K 1Z9 Canada

Northern Alberta PC User Group
Jim Laviolette
37 Brunswick Crescent
St. Albert, Alberta
T8N 2K5 Canada
403/458-9066

Personal Computer Association
National Organization for the Users
    of the IBM PC in Canada
P.O. Box 251
Ajax, Ontario
L1S 3C3 Canada

The Personal Computer Club of
    Toronto
P.O. Box 266, Station A
Toronto, Ontario
M5W 1B2 Canada

Vancouver PC Users Group
Allan Kelly
P.O. Box 48297, Bentall 111
Vancouver, B.C.
V7X 1A1 Canada
604/271-3883

France

Mikro-Cerio
Jean Roch
134 bis, Rue Du Vieux
Pont De Sevres
Boulogne, France 92100
609.94.14

The Help Screen

PC World Offers Answers and Advice at Every Level.

Karl Koessel

This month we have several requests from users who want to refine their self-customized versions of *WordStar*, a question about the proper way to turn on the PC, and a perplexing problem of errors that occur when a correctly entered BASIC program is run.

WordStar's Data Drive

Q. I certainly appreciated Emil Flock's "WordStar Made to Order" (PC World, Vol. 1, No. 2). His was the most useful article about Word-Star I have encountered. To have to reconfigure the page lengths, page margins, etc. for every document we processed (because our printing requirements were not the default settings) had been quite an inconvenience.

The question I have is about customizing WordStar's default logged disk drive. If a drive name is not prefixed before file names, WordStar reads files from and writes files to the logged disk drive. The logged disk drive is readily changed to B with just three keystrokes (L, B, <ENTER>), but having customized WordStar with all of our other requirements, this seems an unnecessary inconvenience. I would like to know the address for setting the default for the logged disk drive.

> *Kent Pearce*
> *Lubbock, Texas*

A. *WordStar* does not have an address designating which drive is to be the default logged disk drive. The logged disk drive will be the drive named in the DOS prompt (i.e., A>, B>, or C>) at the time *WordStar* is

called. Therefore, to have *WordStar* come up with the logged disk drive you desire, the DOS prompt must be set to match the desired logged disk drive before *WordStar* is called.

More specifically, with your *Word-Star* disk in drive A and your document disk in drive B, turn on your PC, set the date and time, and when the DOS prompt A> appears, type B: <ENTER> . Now the DOS prompt will be B>. Next, type A:WS <ENTER> and *WordStar* will come up with B as the logged disk drive.

> Now that you know what keystrokes are needed, you can have the PC type them for you.

I imagine that at this point you are saying, "But this takes more keystrokes than my original complaint of having to type L, B, <ENTER>." True, but now that you know what keystrokes are needed, you can have the PC type them for you by creating a batch file. You can learn more about batch files by referring to "Batch Processing" in Chapter 3 of the DOS manual, but I'll lead you through this one.

Let's name the batch file KWS.BAT for Kent's *WordStar* batch file. First, put your *WordStar* disk in drive A, and bring up a DOS prompt (don't load *WordStar*). Now type

```
COPY CON: A:KWS.BAT <ENTER>
B: <ENTER>
A:WS <ENTER>
<Ctrl Z> <ENTER>
```

When you press the last ENTER, the batch file will be written on your *WordStar* disk. Now you need only type KWS <ENTER> to change the logged disk drive and start *WordStar*.

WordStar on Emulated Disk

Q. After reading "WordStar Made to Order" by Emil Flock (PC World, Vol. 1, No. 2) and the additional information in Steven Cook's "Word-Star Patches—P.S." (PC World, Vol. 1, No. 3), I patched WordStar to use drive C as the drive WordStar looks to for the command files (WS.COM, WSMSGS.OVR, and WSOVLY1.OVR). My drive C is an emulated disk (see "Faster than a Spinning Floppy," PC World, Vol. 1, No. 4), and, of course, to benefit from the faster speed of the emulated disk I must copy the WordStar command files listed above, as well as the document I wish to edit, from disk to the emulated disk before calling WordStar.

My word processing now moves along very fast, so quickly in fact that copying my finished documents from the emulated disk in drive C to disk in drive B at the end of the day is a relative nuisance. It seems I must manually copy each document individually, which is a pain. I would exit to DOS and use COPY C:*.* B: (copy all files on drive C to drive B) except that I do not want to waste over 90K of disk space copying the WordStar command files onto each of my document disks. Is there some way around this?

> *Terry Traylor*
> *New York, New York*

The Help Screen

A. The disk emulation program I have allows me to emulate more than one disk, so for word processing I use two emulated disks. To conserve memory, one of the emulated disks, drive C, is only 95K, just large enough to hold the three *WordStar* command files. I use the second emulated disk to hold the file(s) I am currently editing. When I am done, the command COPY D:*.* B: copies all the document files onto the disk in drive B, but not the *WordStar* command files because they are on drive C.

By the way, *PC World*, Vol. 1, No. 4, has a valuable suggestion in *Star-Dot-Star* for those of you who are using *WordStar* with emulated disks.

Control Key ASCII Values

Q. *In "WordStar Patches—P.S." (Vol. 1, No. 3) you report the very useful function key addresses together with instructions for defining up to 6 characters for each function key.*

However, I can't find the ASCII value for "control" anyplace. How can I define a function key as, for example, Ctrl-P?

Haskell A. Kaitz
East Orleans, Massachusetts

A. The code for any control key character is the ASCII value for the capital letter minus 64 (40 hex). For example, *A* is 65 (41 hex), so Ctrl-A is 1; *P* is 80 (50 hex), so Ctrl-P is 16 (10 hex). The code could also be considered a given letter's position in the alphabet, such as Ctrl-A(1), Ctrl-B(2), or Ctrl-C(3). To make things a little easier, a list of the more commonly used control character codes is shown in Table 1.

Keystroke	Decimal	Hexadecimal
Ctrl-A	1	01
Ctrl-B	2	02
Ctrl-C	3	03
Ctrl-D	4	04
Ctrl-E	5	05
Ctrl-F	6	06
Ctrl-G	7	07
Ctrl-H	8	08
Ctrl-I	9	09
Ctrl-J	10	0A
Ctrl-K	11	0B
Ctrl-L	12	0C
Ctrl-M	13	0D
Ctrl-N	14	0E
Ctrl-O	15	0F
Ctrl-P	16	10
Ctrl-Q	17	11
Ctrl-R	18	12
Ctrl-S	19	13
Ctrl-T	20	14
Ctrl-U	21	15
Ctrl-V	22	16
Ctrl-W	23	17
Ctrl-X	24	18
Ctrl-Y	25	19
Ctrl-Z	26	1A

Table 1: Commonly Used Character Control Codes

Turning On the PC

Q. *What is the correct procedure for powering up a computer, namely the IBM PC? Should you have a DOS (or other) disk installed when you turn on the power? Page 2-4 of the DOS 2.00 manual instructs you to insert the DOS disk and turn on the computer if it is not already on.*

On the other hand, Sorcim, a reputable supporter of the IBM PC, states very clearly in its Maintain *package that a problem with a bad disk may have been caused by "turning power off the disk drives before removing diskettes."*

Another company, FriendlySoft, states in its "15 Commandments of Diskette Care" that you should never turn the "computer on or off with diskette in drive" (#6).

Although a relative novice to personal computers, I have almost 30 years' experience in the electronics industry. It appears to me that there is some concern about the possibility of voltage changes during power up or power down causing a problem with

data stored on a disk. I have intu-itively turned the power on or off with the drives empty and have re-ceived criticism for not following the instructions laid down by IBM. Please give an opinion (recommenda-tion) that I might follow and others might consider.

John A. McCristall
Foster City, California

A.   Many microcomputers manufac-tured prior to the IBM Personal Computer have the disastrous prob-lem of having disk data uninten-tionally altered due to voltage changes that occur when the com-puter and its peripheral devices are powered on or off. This problem still exists with some systems.

The IBM PC does not have this problem and may be turned on or off with disks in the drive(s), provided that this practice does not become a habit transferred to systems that are not as well designed.

Three Versions of BASIC
Q.   *I was really interested in "A Snake in the Glass" by Peter Quinn (PC World, Vol. 1, No. 2). I rushed over to my computer and entered the program all nice and neat, by the book, but I have this problem. I'm just a novice at this, so maybe the mistakes are mine, but I entered the program word for word, character for character, and still I have this problem.*

The program will run up to the point where I am to enter a delay value, after which I get the error mes-sage 'Illegal function call in 290'. Line 290 reads: 290 KEY (1) ON.

Although I did not understand what the line does, I deleted it and tried running the program again. I got another error message: 'Syntax error in 310'. Line 310 reads: '310 ON KEY(11) GOSUB 450'. Remov-ing this line and running the program again yielded another syntax error, this time in line 320. Repeating the removal process yielded syntax errors in lines 330 and 340 as well. Now the program will run, but I can't con-trol it, though I win more often than I lose.

Are there any other folks with the same problem, or am I alone here in the midlands, lost and confused?
Raymond Bloxsom
Topeka, Kansas

A.   Your problem is not in the *Snake* program, but that you are using the wrong version of BASIC. IBM offers three versions of BASIC: Cassette

---

The IBM PC may be turned on or off with disks in the drive(s).

BASIC, Disk BASIC, and Advanced BASIC. Cassette BASIC is smaller (uses less memory) and less powerful than Disk BASIC, which is smaller and less powerful than Advanced BASIC.
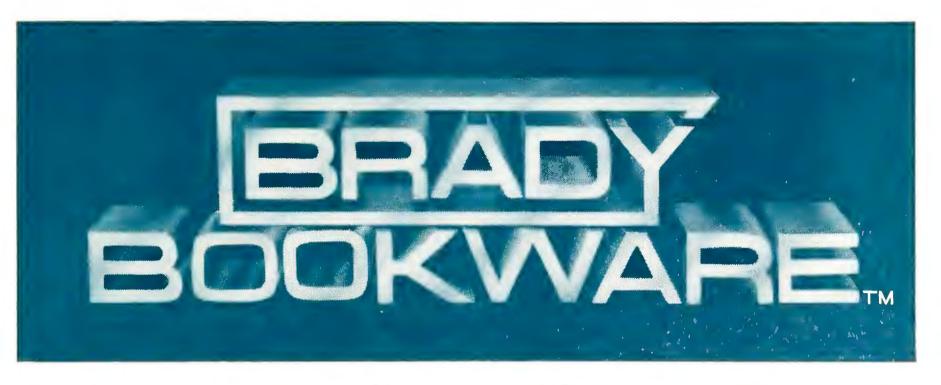
Cassette BASIC is in ROM (read only memory) chips installed inside the PC system unit. It is used by PCs that do not have disk drives and are therefore not able to use disk drives. Instead of disk drives, these PCs use a tape recorder to save and retrieve programs and data, hence the name Cassette BASIC.

Disk BASIC has all the capabilities of Cassette BASIC plus more. When you call Disk BASIC from DOS by typing the DOS command BASIC , DOS reads the file BASIC.COM from disk and adds it to Cassette BASIC. This creates a BASIC version that can use disk drives, but Disk BASIC is not able to do any of the special commands.

Advanced BASIC has all the capa-bilities of Cassette and Disk BASIC plus the special commands (called Advanced features). To call Advanced BASIC you type the DOS command BASICA (note the letter *A*). DOS responds by reading the file BASICA.COM (not BASIC.COM) and adding the instructions of this file to Cassette BASIC.

Every BASIC command, statement, function, and reserved variable is de-scribed in Chapter 4 of the IBM BASIC manual. At the beginning of each description is a small table that indicates which versions of BASIC support that particular command, statement, function, or reserved vari-able. The table lists each version of BASIC with asterisks below the name of the version(s) that support the fea-ture. Since each line you mentioned contains a statement supported by only Advanced BASIC and the pro-gram runs without those lines, it seems that you are trying to run the program under the wrong version of BASIC. A good rule to follow is to use BASICA whenever you do not know which version is correct. ▨

Do you need help with your IBM PC or compatible? Send questions to The Help Screen, PC World, *555 De Haro St., San Francisco, CA 94107.*

333

EVEN AN IBM PC® NEEDS A SAFETY NET.

Only Alloy's PC-Backup™ gives you high performance storage/retrieval, and protection – at a lower cost.
Now that the IBM PC comes with a 10 Mbyte hard disk, you need a Backup that can keep up with it. Alloy's PC-Backup is designed to do just that – and it beats flipping floppies every time.

Alloy's PC-Backup works like your business does: it is file-oriented, backing up files in an organized way. It is time and cost efficient too, because it never lets you lose important data.

Designed exclusively for the IBM PC, and small to large businesses, here are some of the features that make Alloy's PC Backup the

finest safety net PC owners could ever require:
• Winchester hard disk backup and restore
• Comprehensive menu driven software package (Alloy's industry standard Tape Interchange Package)
• High speed data transfers
• Up to 16.5 Mbytes of data per cartridge
At your ISO now for only $1,995.
Also available, Alloy's new 9-track tape drive, for mainframe compatibility.

Alloy Computer Products
100 Pennsylvania Avenue
Framingham, Mass. 01701
(617) 875-6100

IBM PC is a registered trademark of IBM Corp PC-Backup is a trademark of Alloy Computer Products

ALLOY

Computer Products

Reader Service #315

Reader Service #89

World Events

A Calendar of Regional, National, and International Events

Edited by Patricia Navone

World Events lists computer-related conferences, conventions, workshops, camps, symposiums, trade fairs, and shows. If you know of an upcoming event, we'd like to hear from you.

August 13-14
The Computer Supermarket
San Mateo County Expo Center
San Mateo, California
A microcomputer fair and flea market. New, used, and overstocked merchandise, both hardware and software.
Microshows
P.O. Box 4323
Foster City, CA 94404
415/571-8041

August 26-28
IBM PC Faire
Civic Auditorium & Brooks Hall
San Francisco
Includes a major technical conference, seminars, and tutorials, with a focus on the IBM PC market. For the business and professional user and educational computing leaders.
Computer Faire
345 Swett Rd.
Woodside, CA 94062
415/851-7077

August 30-September 1
USITA Midwestern Telecommunication Showcase
A.J. Cervantes Center
St. Louis
An exhibit of the latest in telecommunications technology. For marketing directors, manufacturers associated with interconnect companies, operating telephone companies, and common carriers.
Agnes Pavel
USTSA
333 N. Michigan Ave. #1618
Chicago, IL 60601
312/782-8597

September 9-10
PC II International Show and Conference
Skyline Hotel
Toronto, Canada
Approximately 75 exhibitors; four educational seminars daily. Plenary session for user groups.
H.F. McLelland
Personal Computer Association
P.O. Box 251
Ajax, Ontario
L1S 3C3 Canada
Telex 06-986766

September 11-14
Graph Expo '83
McCormick Place
Chicago
Trade show for printers, typesetters, and graphic artists. Includes printing equipment and supplies, computer hardware and software, and services for the graphic arts industry.
J. Roberts
Graphic Arts Show Co., Inc.
6849 Old Dominion Dr. #200
McLean, VA 22101
703/734-8285

September 13-15
Federal Computer Conference
Washington D.C. Convention Center
Aimed at managers of ADP equipment, software, and services in both the federal government and the private sector.
Phyllis Danieli
Federal Computer Conference
P.O. Box 368
Wayland, MA 01778
800/225-5926, 617/358-5181

September 13-15
Midcon/83
O'Hare Exposition Center
Rosemont, Illinois
A high-technology electronics exhibition and conference. Primarily for design, manufacturing, and test engineers.
Jeanie Oldendorph
Electronic Conventions, Inc.
8110 Airport Blvd.
Los Angeles, CA 90045
800/421-6816, 213/772-2965

September 13-15
WPOE '83
San Jose Convention Center
San Jose, California
Word processing and office environment trade show and conference. Includes software, telecommunications, small-business systems, and electronic mail.
Dixie Gurley
Cartlidge and Associates, Inc.
4030 Moorpark Ave. #205
San Jose, CA 95117
408/554-6644

September 13-15
Mini/Micro Midwest
O'Hare Exposition Center
Rosemont, Illinois
Exhibitors are manufacturers and
    suppliers of computer peripherals,
    data communications, and soft-
    ware. For system designers, inte-
    grators, assemblers, systems
    engineers, and software specialists.
Candy Kurz
Electronic Conventions, Inc.
8110 Airport Blvd.
Los Angeles, CA 90045
800/421-6816, 213/772-2965

September 15-16
2nd Annual Indiana Computer Expo
Indianapolis Convention Center
Designed for business end users.
    Mini and micro computers, soft-
    ware, word processing, graphics,
    services, and peripherals.
Trade Show Department
Ernie Kerns and Associates
2555 E. 55th Pl. #201
Indianapolis, IN 46220
317/259-8111

September 19-23
9th World Computer Congress
Palais des Congres
Paris, France
Technical programs, exhibitions, and
    seminars. Organized by The Inter-
    national Federation for Informa-
    tion Processing.
Registration Center
The Rand Corporation
1700 Main St.
Santa Monica, CA 90406

September 22-25
New York Computer Showcase Expo
New York Coliseum
A regional exposition for business,
    professional, and corporate users
    of personal computers and word
    processing systems. Features hard-
    ware, software, peripherals, media,
    supplies, and services relating to
    micro/minicomputer environments.
Peter Young
The Interface Group
300 First Ave.
Needham, MA 02194
617/449-6600

September 22-25
Detroit Computer Showcase Expo
Cobo Hall
Detroit
A regional exposition for business,
    professional, and corporate users
    of personal computer and word
    processing systems. Features hard-
    ware, software, peripherals, media,
    supplies, and services relating to
    micro/minicomputer environments.
Peter Young
The Interface Group
300 First Ave.
Needham, MA 02194
617/449-6600

September 22-25
Atlanta Computer Showcase Expo
Atlanta Apparel Mart
A regional exposition for business,
    professional, and corporate users
    of personal computer and word
    processing systems. Features hard-
    ware, software, peripherals, media,
    supplies, and services relating to
    micro/minicomputer environments.
Peter Young
The Interface Group
300 First Ave.
Needham, MA 02194
617/449-6600

September 29-October 2
Computers in Health Care '83
Red Lion Inn
Sacramento, California
A symposium and exhibition for
    health care professionals. Includes
    educational software, computer
    legal and purchasing considera-
    tions, data and word processing,
    biomedical engineering, and case
    management.
Mary Tuma McAdams or Irene Elson
Eskaton Health Corporation
1501 El Camino Ave.
Sacramento, CA 95815
916/927-3480

September 29-October 2
San Francisco
Computer Showcase Expo
Brooks Hall
San Francisco
A regional exposition for business,
    professional, and corporate users
    of personal computer and word
    processing systems. Features hard-
    ware, software, peripherals, media,
    supplies, and services relating to
    micro/minicomputer environments.
Peter Young
The Interface Group
300 First Ave.
Needham, MA 02194
617/449-6600

*Are you sponsoring an event for the
computing community? Please let us
know. Send details as far in advance
as possible to* World Events, PC
World, *555 De Haro St., San Fran-
cisco, CA 94107, CompuServe
74055,412, Source STE908.*

PC World Day on Tape

If you missed PC World Day at the West Coast Computer Faire, you're not out of luck! These five symposiums featuring 26 of the most highly respected professionals in the personal computing field were audio taped...and are available now.

The PC Phenomenon—#21–1

Listen to: David Bunnell, Publisher, PC World; Cheryl Woodard, Associate Publisher, PC World; Ronald S. Posner, Chairman, National Training Systems; Egil Juliussen, Chairman, Future Computing; and Martin Alpert, President, Tecmar

Second-Generation Software—#21–2

Listen to: Mitchell Kapor, President, Lotus Development Corp.; Jeffrey M. Harbers, Associate Manager, End-User Division, Microsoft; Gilbert H. Hoxie, President, Context Management Systems; Roy Folk, Division Marketing Manager, VisiCorp; Dr. Edward H. Currie, President, Lifeboat Associates; and Harry Miller, Associate Editor, PC World

PC Multiprocessing, Networking, and Communications—#21–3

Listen to: Drew Major, Software Systems Manager, Novell Data Systems; Steven T. Pomeroy, Product Marketing Manager, 3Com Corp.; Bruce Eisenhard, Omni Project Manager, Corvus; Harry J. Saal, President, Nestar; Knut S/C Ojermark, EDP Audit Manager, Wells Fargo Bank; and Steven Cook, Technical Editor, PC World

PC Add-ons—What Is Compatibility?—#21–4

Listen to: William H. Murto, President, COMPAQ Computer Corp.; Dr. Robert S. Harp, Chairman of the Board, Corona Data Systems; Martin Alpert, President, Tecmar; Karl Koessel, Contributing Editor, PC World; and Andrew Fluegelman, Editor, PC World

Systems Software for the PC—#21–5

Listen to: Gary Kildall, President, Digital Research; Chris Larson, Director of Marketing, Microsoft; David B. Hughes, VRI Associates; Gordon Bell, Quantum Software Systems; C.A. Irvine, Vice President of Engineering, SofTech Microsystems; and Kearney Rietmann, Associate Editor, PC World

Reader Service #82

343

346

PC World

PC World Directory

PC World Directory *is a comprehensive listing, by category, of products and services for the IBM PC, lookalikes, and compatibles. It provides rapid access to the burgeoning PC marketplace for both readers and advertisers.*

FORMAT: The standard format includes a product ID, a 300-character descriptive ad, and company name, address, and telephone number.

Advertisers may choose among categories already being used or may create their own. Display advertisers can cross-reference their current ad to the PC World Directory *for increased exposure at low cost.*

RATES: Listings are accepted for 3-time consecutive insertions at a rate of $300 ($100 per issue). Listings must be prepaid (except for established display advertisers) upon submission of ad copy. Checks, money orders, VISA, and MasterCard are acceptable.

DEADLINE: For space reservation contact a PC World Directory *sales representative at 415/861-3861. Please send copy and prepayment to* PC World Directory, 555 De Haro Street, San Francisco, CA 94107.

See you next issue!

Accessories

Computer Covers

B.L.& W. Dust Covers
Custom fit monogramable design in durable, attractive, washable poly/cotton will not crack or dry out and allows ventilation. Colors-cranberry/navy/pewter/sand. IBM PC 1pc or 2pc-$19; kybd only-$14; Prnts-$16. Other makes/models avail. Visa/MC accepted. 7-10 day delivery; toll free ordering. *B.L.& W., Box 381076, Germantown, TN 38183, 800/821-7709, 901/754-4465*

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 moneyback. (See display ad this issue.) *MC/N, Computer Jewelry, Simms Center, Box 9393, San Rafael, CA 94912, 415/453-7033*

■ **MC/N, Inc.**
COMPUTER JEWELRY

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, 800/854-2750 (Nat), 800/552-8817 (CA), or 619/460-4975*

✓ **Checks To-Go**

Tab Dividers
For DOS and BASIC manuals. Divide manuals into sections. Insert 31 pages for BASIC, 21 for DOS 1.1, 13 to upgrade to DOS 2.0. Each divider is 100 lb. cardstock w/mylar holes and tabs. Tabs printed 2 sides. $9.95 for DOS 1.1 or BASIC (ALL VERSIONS), $7.95 for DOS 2.0 upgrade. MONEY BACK guarantee. DISCOUNTS for 3 + sets. *Televox International, 66 Heather Lane #2164, Orinda, CA 94563*

Full Size Key Tops
Double the size of your return, tab, and shift keys. KEYTOPS are non-glare, dark brown and permanently stamped. They make your keys instantly recognizable reduce reaching and fatigue. No permanent modification, simply press over your existing keys. $18.95. (See display ad this issue.) *Applied Dynamics, P.O. Box 1810 Dept. PD. Cottonwood, AZ 86326, 602/634-7148*

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*

⌒ **RAMBOW**
ENTERPRISES

California

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

PC Accounting Applications
If you are putting any of your accounting onto your PC or XT, you will find our services invaluable. We can aid in the software selection and implementation; these require both computer and accounting expertise, despite what the ads say. See some of our software

evaluations in the February PC Magazine. *Knight & Company, CPA, 6644 Heartwood Dr., Oakland, CA 94611, 415/339-9036*

Sherry Knight
Certified Public Accountant

dBASE II Consultants
Fixed Price Reports from dBASE II.
• We send you a questionnaire.
• You describe your report needs.
• We give you a fixed price quote!
Specialists in order entry, repair tracking, mailing lists. *David Jenkins & Associates, 1609 Bancroft Way, Berkeley, CA 94703, 415/644-2369*
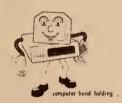
Manual Aversion?
Learn computing one-on-one at your own speed from friendly training specialists. Use your computer or ours. Also, keyboard enhancement and customization of Word-Star™ and other software. See our article, "WordStar™ Made to Order," in issue #2. *Computer Hand Holding™, 1800 Market St. #91, San Francisco, CA 94102, 415/561-9189*

IBM PC Consulting
We provide the high quality of service demanded by the business community. Our services include: system integration, training, custom programming, and support. We also

have a full line of hardware and software at discount prices. *Balo Computer Services, 4333 Price St., Los Angeles, CA 90027, 213/665-4677*

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*

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 Allen-

bach 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*

ALLENBACH
INDUSTRIES INC

Education

Learning the Keyboard
Learn to type in 10 hours with this amazing, timely course which consists of 2 one-hour audio cassettes, learning aids & a practice booklet—all prepared by a college typewriting instructor. End your "hunt & peck" typing and start to use your computer efficiently. $9.95. *Skills Update, P.O. Box 6024, Silver Spring, MD 20906, 301/598-5740*

Hardware

Add-On Boards

AST/Maynard/Quadram
• AST ComboPlus (SPC, 64k) $269. • AST MegaPlus (SC, 64k) $269. • AST I/O Plus (SC) $114. • Extra Parallel, 2nd Serial or game, $35.
• MAYNARD Disk Controller $155 - with PP add $50, SP add $70. • QUADRAM Quadboard or Quadboard II $289.
• Set of nine 64k, 200ns chips $55. *VLM Computer Electronics, 10 Park Pl., Morristown, NJ 07960, 201/267-3268*

Quadboards & Quadram Products
256K Quadboard $465 delivered! Codaram 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. *Codaram, P.O. Box 1054, Lilburn, GA 30247, 404/925-0640*

Quality Boards at Low Prices
RAM CARD 64K Expandable-256K w/parity, $149.
64K expansion kit, $79.
EPROM PROGRAMMER for most 4K to 64K 24 P10 EPROMS, $129. COMBO CARD w/parallel printer asychronous communications(RS232C) & clock calendar, $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*

Apparat,Inc.

13 Function EASIBOARD™
IBM quality plus Easitech Excellence exclusively at IBM PC dealers worldwide. Memory (64K-256K), spooler, printer and modem connections, three electronic disk, chronograph and more! No need to search for low prices. Our lowest prices are at authorized IBM PC dealers only. $325 to $595. Easiboard by Easitech. *Easitech Corporation, 2215 Perimeter Park #22, Atlanta, GA 30341, 404/452-7576*

EASITECH
CORPORATION

256K Slotless Memory
Let us install up to 256K RAM on your EXISTING SYSTEM BOARD using NO SLOTS. We improve your IBM-PC so it can address the 64K ram chips. 128K-$192, 192K-$256, 256K-$320 (expandable & warranted). DO-IT-YOURSELF KITS PC-KNB-$39.95 & PC-KPC-$59.95 64K-PUR-($5.59 each) 64K RAM chips. *Add-MEM, 22151 Redwood Rd.,Castro Valley, CA 94546, 415/886-5443*

Add-MEM

Voice Synthesizer-Game Adapt
The voice synthesis board allows your IBM PC to speak. Over 300 words of vocabulary on board with external expansion. Each board comes with a software support disk to make it easy to use in your system. Game adapter included. List price $249. VISA/MC. *Glenco Engineering, 915 E. Carpenter, Palatine, IL 60067, 312/537-4200*

Memory and Software and . . .
MTI memory cards. All are expandable (with 64K installed) and come with a 12 month warranty. 192K, $160. 256K, $180. 512K, $275. 256K versa-card (2 serial 1 parallel) $400. QNX multi-user multi-tasking operating system with C compiler, $575. No charge UPS on prepaid orders. NY residents add tax. *Strawberry Software, 769 Arnow Ave., Ste. 2A, Bronx, NY 10467, 212/547-9446*

USI MultiDisplay Card
The USI MultiDisplay card combines the functions of both the IBM Monochrome and Color/Graphics Display Adaptors and includes a paral-

lel printer adaptor. Fits the IBM PC and XT Computers. Features flicker-free scrolling and external mode select switch. Suggested retail $449. *USI International, 71 Park Lane, Brisbane, CA 94005, 415/468-4900*

Stop Waiting!
Your IBM PC will come on in 3-4 sec. or less with QUICKON, NO MATTER HOW MUCH MEMORY YOU HAVE! Easy plug-in installation; no Expansion Slot needed and no soldering required. Works in all IBM PCs EXCEPT the XT. QUICKON is only $49, postpaid (Introductory offer) NY buyers add $4.05 tax. *Security Microsystems, 16 Flagg Pl. #102W, Staten Island, NY 10304, 212/667-1019*

Cables

PC Keyboard Cable Extension
Mail order only. Cable to connect IBM PC CPU to the keyboard; nonaccordian. 10 ft. length $25. Other lengths will be priced upon request. Shielded cable also available. *Clark Systems, 389 Pheasant Run, Batesville, IN 47006, 812/934-3817*

Computer Graphics

Professional Color Workstations
High-resolution color graphics systems. Convert the IBM PC to a professional 640 x 480 16 color workstation. High-resolution board (640 x 480 x 16 color), complete graphics software (HALO),

RS 170 monitors, digitizers, plotters, application software, slide cameras, frame grabbers and more. *Media Cybernetics, Inc., 36 Columbia Ave., Tacoma 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*

LANG SYSTEMS, INC.

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 Systems w/capacities to 20Mb are available. *Apparat, Inc., 4401 S. Tamarac Pkwy., Denver, CO 80237, 303/741-1778*

Apparat,Inc.

Microcode Series 5000
Microcode Series 5000 hard disks are for IBM PC and COMPAQ portable computers. Operating system software support includes DOS 1.1, Dos 2.0 and concurrent CP/M-86. Self-documenting software provides easy installation and file backup utility. Price: $2495 for 10MB, $2995 for 15MB, and $3595 for 30MB. *Microcode, 45277 Fremont Blvd. #4, Fremont, CA 94538, 415/657-4411*

MICROCODE

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: $189 TM100-2, DS, 40T: $249 TM100-4, DS, 80T: $339 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*

Mice

Optical Mouse
Make your existing software easier to use. With our optical mouse and software, you point to commands in a pop-up menu. Instead of cursor keys, you point to where you

want to move. No hardware or software changes. Fully user customizable. Great with Lotus 1-2-3. Uses RS-232 port. $332 complete. *Mouse Systems Corp., 2336H Walsh Ave., Santa Clara, CA 95051, 408/988-0211*

Monitors

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. *Telemax, Inc., Video Marketing Division, 780 Lorraine Dr., Box 339, Warrington, PA 18976, 215/343-3000*

HI RES w/16 Colors for IBM
The only HIGH resolution 13" RGB color monitor that gives TRUE 16 colors. [TRUE BROWN] for IBM PC and APPLE II. Great for 80 COLUMN and GRAPHICS. Displays 2,000 CRISP characters. [80x25 lines]. RES; 640x400. Input level ANALOG or TTL. No adaptor req. Immediate delivery. Sug. retail: $799. NOW ONLY $599. *KSI, Kawa Systems Int'l., 450 San Antonio Rd. #31, Palo Alto, CA 94306, 415/856-0926*

Peripherals

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, $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*

Power Protection

Ramlok
Standby power supply/line voltage conditioner. Automatically switches to standby power if incorrect line voltage reaches equipment. Contents in memory are saved. Requires auto battery. Includes 10 amp battery charger, overcharge & reverse-polarity protection. *Ladco Development Co., P.O. Box 464, Olean, NY 14760, 716/372-0168*

Ladco Development Co.

Printers

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*

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*

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. Tamarac Pkwy., Denver, CO 80237, 303/741-1778*

Apparat, Inc.

Winchester Hardfile Subsystems
Tallgrass Technologies offers a family of high performance, high capacity HardFiles with formatted capacities from 6.25 Mb to 70.0 Mb. With integral streaming tape cartridge backup, the Tallgrass HardFile System has set the industry standard on Performance and reliability. From $3,095 with integral back up. *Tallgrass Technologies Corp., 11667 West 90th St., Overland Park, KS 66214, 913/492-6002*

Tallgrass Technologies Corporation

Leasing

PC & XT Rental & Leasing
Don't tie up cash! Attractive terms and flexible rates. Quick delivery anywhere in the U.S. Both configurations available. A portion of your payment can apply to purchase. Lease terms of 3 months and up. Customized leases available to fit special budget requirements. Call or write for no obligation quote. *Computer Maintenance Management Corp., Attn: Leasing Division, 12800 Industrial Park Blvd., Minneapolis, MN 55441, 612/559-7096*

Business Program Leasing
Now rent the business software you need for your IBM/PC or TI-Professional. Pay only for programs you decide to keep, and get full credit for all rental paid. No membership fee or sign-up required.

Call 1-800: 323-8064 or write for list of rental programs: Micro-Mart, Dept. PCW-7, 1131 Central Ave., Wilmette, IL 60091, 312/251-5699

Mailing Lists

IBM PC Mailing Lists
16,000 IBM PC owners mailing list available now! We are the largest dealer of microcomputer 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*

Publications

Advertising Tracking
Analysis of ad space, expenditures and market share in over 30 computer publications. Used by ad managers, pub-

lishers, space reps, media buyers. Call for complimentary newsletter. *Adtrak, Inc., 1901 Old Middlefield Way, Mountain View, CA 94043, 415/965-7473*

Retailers

California

Large Group Hardware Buys
Cost-effective multiple PC buys. CTI expertise in IBM-PC & PC Workalike machines, peripherals & sources enables us to assist you make the most cost-effective total systems buy & helps you get the most out of it after purchase. See ad this issue! *CTI-Computer Technology Innovations, 1037 North Fair Oaks Ave., Sunnyvale, CA 94086, 408/745-0180*

cti

Columbia MPC
IBM compatible, both hardware and software! Software included: CP/M-86, MS-DOS, PERFECT Writer + Speller- + Calc + Filer, Fast Graphs, BASICA, and more! STD are 2 320KB disk drives, 2 RS-232 ports, printer port, COLOR graphics board, all for $3395, PLUS a FREE RGB monitor from: *Excellonix, 7180 Woodrow Wilson Dr., L.A., CA 90068, 213/650-5754, 714/973-1939*

EXCELLONIX

New York

IBM, Columbia Systems
PGS, Amdek, Electrohome, Pi-Tech, USI, Taxan, BMC monitors. EPSON, IDS, NEC, SCM, Okidata, C.ITOH, Diablo printers. Tallgrass, Corvus, Tecmar, Davong hard disks. Xedex, Quadram, AST, Hayes, Maynard, Hercules, Seattle peripherals. Full range of software, including lots of games. *Greenwich Village Computers, 687 Broadway, New York, NY 10012, 212/254-9191, Mon.-Sat., 10-7*

Greenwich Village Computers Inc.

Texas

IBM PC-Compatible
A dealer of PC compatible hardware, software, supplies and furniture oriented for business users. Manufacturers include Okidata, NEC, PGS, VisiCorp, MicroPro, Quadram and much more. IBM trained personnel with strong business orientations are available for follow-up support after sales. *Las Colinas Computer Co., 125 E. John Carpenter Frwy. # 660, Irving, TX 75062, 214/556-2424*

Las Colinas Computer Company

Sales/Marketing

Software Marketing
We package and market software on a non-exclusive agreement basis and pay authors a royalty equal to 25% of the gross receipts. We are

looking for all types of software - business, educational, games, or whatever you think IBM PC owners will need. Call or write for information. *Stone Software Marketing, Inc., 7910 Ivanhoe Ave. # 319, La Jolla, CA 92037, 619/459-9173*

STONE

International Software Sales
French, Spanish, German versions? We adapt, translate, publish,,market, distribute and support your software for PC in Europe and South America: *Edisoft, 1925 Brickell Ave., Miami, FL 33129, 305/854-5404 or Edisoft, 11 Bis Rue Du Colisee, F-75008, Paris, France 331/504-3030 Telex: 620000F*

EDISOFT .

Software

Accounting

Long Distance Analyzer
Saves you time and money by organizing phone bills, identifying parties called, and keeping totals. Use it to cut abuse and waste, bill clients, evaluate special services, print alphabetical dictionaries and cost account by your categories. Menu-driven system can hold thousands of calls. $195. *Golden Braid Software, P.O. Box 2934, Sarasota, FL 33578, 813/371-0388*

Software Fitness Program™
30,000 users in 200 different industries are currently running these 7 interactive account applications: AR with billing & sales analysis, AP, GL, IN, payroll, job cost & order proc. MS-DOS compatible. Source code, on-line computer lessons, self-instructional manuals available. Fast installation. *Open Systems, Inc., 430 Oak Grove, Minneapolis, MN 55403, 612/870-3515*

OPEN SYSTEMS™

Personal Financial Assistant
Accounting system for personal or small-business users. Double entry accounting. Complete financial reports: Balance Sheet/Income Statement, Trial Balance, General Ledger. Up to 5 check journals automatically integrated into ledger. Complete system $100. Documentation only, $25. *L.C. Systems, P.O. Box 5360, Coralville, IA 52241, 319/354-2630*

LC Systems

Business Applications

Powerful Business Software
Order Entry Invoicing, Inventory Control, Accts. Receivable, Sales Analysis pkg. on most MS DOS Compatibles. History & forecasting graphics, multi-selective Mailing List module, call Planning & Commission Statements. $695 complete. Demo pkg. Sample data $50 refundable or

applicable toward purchase. *Distributed Computing Systems, Martha & Randolph Streets, P.O. Box 185, Lombard, IL 60148, 312/495-0121*

DISTRIBUTED COMPUTING SYSTEMS

Critical Path Scheduling
PMS-II project management system. Plan & manage any complex project — R & D, mfg, construction. 500-2500 events. Plots critical path, network, Gantt, funding. Many sorts/reports. Team with RMS-II for capacity planning and load leveling. Professional tools to cut cost and time. *AHA, Inc., P.O. Box 2003, Santa Cruz, CA 95063, 408/475-7247, 408/475-8705*

AHA

Integrated Business Software
• Manufacturing STD COST SYS: Bom-Oper RTG
  Prod Sched-Matl & Manpower Planning
  Shop Floor RPTG-Production Costing
• Business Acctg: Order Entry
  Inventory
  A/R-S/A-A/P-P/R-G/L &
  Financial Stmt
• Insurance Agy Mgt Sys...Plus
  Auto Rating
  Professional Time Mgt...
  Client Acctg.
MDS Associates, P.O. Box 108, Orchard Park, NY 14127, 716/662-6621

MYTE MYKE™

Mailman
Mailman computes postage and fees for all classes of mail and additional services provided by the US Postal Service. MAILMAN is functionally equivalent to the program found at many post offices. Why pay more for postage than you should? Why wait in line for the straight dope? *Polyglot Productions, P.O. Box 668, Cambridge, MA 02238, 617/491-3541*

Retail Sales Control
DATA*EASY can turn your IBM/PC into a cash register with our RETAIL SALES CONTROL software. This package handles inventory, commissions, customers, credit cards, sales slips and sales analysis with little effort. Options include purchase order control, invoice control and mailing labels. RETAIL SALES CONTROL is easy for employees to learn and operate. $295. *DATA*EASY*™ *Software, Data Consulting Group, 877 Bounty Dr. #EE203, Foster City, CA 94404, 415/571-8100, 415/349-4001*

Financial Planning & Analysis
Business planning, strategic planning, capital investment analysis. VENTURE contains all the logic, accounting procedures and equations. You specify your parameters and enter data. 10 reports provide a complete analysis. Consolidations, what-ifs, sensitivity analysis. 192k, 1 drive. Free brochure. $495. *Weiss Associates, Inc., 127 Michael Dr., Red Bank, NJ 07701, 201/530-9260*

Professional Time Accounting
Time Accountant is an essential timekeeping and management tool for professionals. Functions include billing preview, invoicing and reporting by individual, client, project and activity. Includes pocket calendar-time sheets, telephone support. Requires 128K RAM, two 320K drives. $395. *Time Accountant, 1230 University Dr., Menlo Park, CA 94025, 415/328-7877*

Business/Home

13 from DATA*EASY™

Project Scheduler	$35
Bar Graph Generator	$35
Telephone Directory	$35
Screen Design Aid	$35
Programmer Utilities	$50
Mail Lists & Labels	$75
Data Entry & Edit	$75
Inventory Control	$95
Mail Order Control	$95
Product Invoicing	$195
Purchase Order Ctl.	$195
Time & Material Inv.	$195
Database Control	$195

*DATA*EASY*™ *Software, Data Consulting Group, 877 Bounty Dr. #EE203, Foster City, CA 94404, 415/571-8100, 415/349-4001*

Catalogs

IBM PC Software
Looking for IBM Personal Computer Software? Write for IBM PC catalogs, $2 each. Contains descriptions and key features of leading word processing, spread sheet, data base management and other important software packages

for the IBM PC. Also software review references. Nothing like it. *UOI Company, 7716-B Balboa Blvd., Van Nuys, CA 91406, 213/785-5050*

Communications

Videolink 88
Full-featured, menu-driven communication software. Works with any 300 or 1200 BAUD modem & offers special support for the Hayes Smart Modem. Features auto single/key log-on, full up/download facilities and transmission of disk files. Data may also be sent to disk, screen or printer. *Windmill Software, Inc., 2209 Leominster Dr., Burlington, Ontario, Canada L7P 3W8, 416/336-3353*

WINDMILL SOFTWARE INC.

Lync
You can't buy a better communications program! Lync is powerful, easy to use and easy to install. Transfers ANY files between PCs or PC and CP/M systems. TERMINAL mode for connecting to databases. REMOTE mode to run your computer remotely. Free brochure. $155. *International Software Alliance, 1835 Mission Ridge Rd., Santa Barbara, CA 93103, 805/966-3077*

I.S.A.

Remote Access
Have complete use and control of an unattended IBM PC. Develop and run programs, transfer binary or ASCII files, etc. Password protection and full simulation of the IBM

keyboard. $89 with full-screen support, $50 without. Call or write for information. VISA/MC. *Custom Software, P.O. Box 1005, Bedford, TX 76021, 817/282-7553*

Relay
Compare and try RELAY. Help key, Hayes support, saves phone numbers, send spreadsheets PC to PC, Send/Rec. simultaneously, full-screen Editor, Up & Download, APL keyboard, 50-9600 baud with error checking. Don't underestimate RELAY because of its $89 price. *VMPC, 60 E42 St. New York, NY 10165, (212) 697-4747*

VMPC personal Computing

Compilers

C Compiler•Debugger
Designed around the c-systems optimized C Compiler, the c-window™ package provides source statement execution and breakpoints; variable display and alteration is accomplished using C expression syntax. A must for all C programmers. 128K, two floppy drives required. C Compiler $195, c-window $195. *c-systems, P.O. Box 3253, Fullerton, CA 92634, 714/637-5362*

8087 Support from MicroWare
Your headquarters for the 8087 and software support. Fastpak™ includes the 8087, installation instructions, one IBM Compiler or assembler library and the 87/88 GUIDE. $375. 87 FORTRAN/RTOS™ includes the Intel compilers running on our real time,

multi-tasking operating system. MicroWare-you can talk to us. *MicroWare, P.O. Box 79, Kingston, MA 02364, 617/746-7341*

MicroWare

Data Management

VersaForm
Business Form Processor uses existing or new form designs to compile/process data. Includes many data entry validation features, automatic entry filling, automatic calculations. Also formats data for output on preprinted forms. Produces analytic/management reports using record/data selection, sorting, totals/subtotals. $389. *Applied Software Technology, 14125 Capri Dr., Los Gatos, CA 95030, 408/370-2662*

Multistat
Multivariate database/statistics/report package. Up to 64 variables, 10,000 data points each, limited by disk size. Uses ASCII data files. Calculated columns, multilinear regression, plots or printer. Manual and diskette $290. Requires 128K, 80 column display, printer. *Davell Custom Software, P.O. Box 4162, Cleveland, TN 37311, 615/336-3055*

RESQ-The Ultimate DBMS
The only system that makes it fast and easy to design and create your forms and reports right on the screen! Calculates, reads, searches, sorts

faster than other systems tested; interfaces w/word processing programs. With plain English manual, help screens, and password protection. $395. *Key Software Inc., 2350 E. Devon Avenue #138, Des Plaines, IL 60018, 312/298-3610*

KEYSoftware Inc.

Development

ISAM Subroutines & Utilities
Index Sequential Access Method for the IBM PC. Process files on disk by keys with this package. Sorting capabilities built-in. Menu driven for ease of use. Improves disk utilization and storage, $39.95. Many other development tools available. Call or write for further information. *RES Consultants, 2635 Ferry Landing, Sugarland, TX 77478, 713/980-4395*

KSAM/PC
KSAM/PC allows fast access keyed/indexed files. Functions: create/open/close/position/read/read next & previous/write/rewrite/delete. Several access levels = good file security. Disk-based key storage = larger files with no data loss if system crashes. Key file build utility, tutorial program. $69.95. *Prodata Inc., 663 South Capitol Blvd., Boise, ID 83702, 208/342-6878*

PRODATA INC.

Screen Map Generation Module
Allows on line construction of screen layouts. Generated in machine level code. Map saved as disk file. Accessed by

2 lines of supplied code. Function keys used to draw, alter intensity, and reserve input fields. Line del/insert supported. Listing of reserved field locations provided. Genesis, $50. *Information Systems, 4303 Alcosta Pl., Pittsburg, CA 94565, 415/427-4381*

Metafile

The METAFILE Software System creates a development and operational environment that includes integrated facilities for high level programming, word processing, data base management, modeling, report generation and communications. Interactions can be impromptu through the keyboard or programmed. *Sensor-based Systems, Olmsted Federal Building, Chatfield, MN 55923, 507/867-4440*

Documentation

User Oriented Documentation User guides and tutorials created for micro software packages by a professional writer. User-oriented documents written to sell your software, ensure its effective use, and reduce costly customer support. IBM PC user guides a specialty. Services also provided for document design, editing, and packaging. *James E. Richardson, 442 Mariposa Ave., Sierra Madre, CA 91024, 213/355-5445*

Edit

Another Full Screen Editor A full-featured editor with FIND, CHANGE, INSERT and DELETE functions. Move copy and delete lines. Wordwrap by function key. Includes a text formatter with centering, right margin justification, several fonts and underlining. Requires: 64k, 1 disk, 80-column monitor. $29.95. *Nota Bene Software, P.O. Box 497, Glenview, IL 60028, 312/724-9442*

Educational

PC Primer

IBM PC Primer Series will teach everyone with or without computer knowledge to quickly use and get the most benefit from the PC. These CAI courses are highly interactive, friendly, and self-paced. Six modules: PC components, BASIC, DOS, computer concepts, keyboard use, diagnostics. *Computer Systems Research, Inc., 40 Darling Dr., Avon, CT 06001, 203/678-1212*

PC/Pilot

Language for education and training. By MicroPi, the source of PILOT on the other major personal computers. Meets Common PILOT standard. Extensions for color, graphics, user fonts, windows, files and video disk/tape control. Includes EZ editor. Lic: $100 single, $550 multiple. *Washington Computer Services, 3028 Silvern Lane, Bellingham, WA 98226, 206/734-8248*

The Instructor

A self-paced tutorial program that teaches first-time users how to interact with the PC. Designed to be the first serious software run by new users of all ages. Uses graphics, sound and color to create friendly interaction. See your local retailer. $44.95. *Individual Software, Inc., 24 Spinnaker Pl., Redwood City, CA 94065, 415/591-4166*

PC PAL/PC TUTOR

PC PAL intro. to IBM PC. $39.95. PC TUTOR allows the first time IBM PC user to easily learn computer concepts, PC-DOS and the care and use of the computer. PC TUTOR is simple. Just insert the plain language diskettes into the Personal Computer and learn by doing. $59.95. *Comprehensive Software, 2316 Artesia Blvd. Ste. B Redondo Beach, CA 90278, 213/318-2561*

CSR Trainer

3000 Administrative Reporting System (STARS) for administrative control on CAI course use provides for student registration, performance tracking on progress, time used, scores. Records correct and incorrect answers at detail and summary levels. Full set of reports available. *Computer Systems Research, Inc., 40 Darling Dr., Avon, CT 06001, 203/678-1212*

CSR Trainer

3000 Presentation System provides cost-effective, fast-response course presentation. Upload/Download feature allows courses using large-scale IBM IIS and courseware developed with CSR Trainer 3000 Authoring System presentation on PC. This IIS simulator offers a full CAI delivery system. *Computer Systems Research, Inc., 40 Darling Dr., Avon, CT 06001, 203/678-1212*

Professor DOS

Interactive, self-paced tutorial program designed to teach new PC users important PC concepts, including MS-DOS. Simulates MS-DOS operations, allowing you to freely experiment. Uses graphic images, sound, animation and color to help you learn smarter, faster, easier. Available at fine dealers. $59.95. *Individual Software, Inc., 24 Spinnaker Place, Redwood City, CA 94065, 415/591-4166*

CSR Trainer

3000 Authoring System. Complete CAI development tool, menu-driven, compatible large-scale IBM IIS systems. Provides rapid, low-cost, quality courseware development, minimal author training. 3 authoring levels provide user-friendly prompting for simple

to complex courseware development. *Computer Systems Research, Inc., 40 Darling Dr., Avon, CT 06001, 203/678-1212*

Filing

KWIC-REF/1
A general-purpose text filing system. It is designed to file and cross-reference documents, notes, letters and any text records. It can keep track of up to 32,000 key words and 32,000 documents. Retrieval is by key words with "and" "or" and "xor" combinations. $450. *Chen Information Systems, Inc., 1499 Bayshore Hwy. # 205, Burlingame, CA 94010, 415/692-4358*

Financial

Wall St.-Plotter
This unique stock-charting program calculates and displays hi/low, moving ave., point-figure, daily volume, and on-balance-volume charts for any security. Daily trading data are updated by user thru keyboard. $169 includes program and historical trading data for 9 stocks of user's choice. No modems are necessary. 64K min, monochrome display. *Spring Dale Software, 1507 Evesham Rd., Voorhees, NJ 08043, 609/795-1454*

Money Manager
Get more control over your money. Money Manager handles yearly incomes and expenses on a monthly basis. You can easily budget for those months certain bills need to be paid and know how much spendable income you have throughout the year. $39.95 plus postage. FREE calculator program. *People Literate Software, P.O. Box 2039, Bozeman, MT 59715, 406/586-1581*

The Purse Strings
Easy-to-use money management program features simple, fast data entry, and 52 user-defined budget categories. Balance with each check. Display/print by category, range of check numbers or months. Reconciles bank statement. Requires 64K, 1 dd, 80 col. display. $59.95 + $2 s/h. *Puyallup Valley Software, Inc., P.O. Box 1313, Puyallup, WA 98371, 206/863-4277*

Electric Ledger
Easy to use checking program for personal or small business accounts. Easy data entry, menu driven, great at tax time, searches, sorts & totals to any keyword, balances checkbook, reconciles bank statement, computes mortgage loan, compound amount & more. 2 DD, 80 col. $35. *Datacon Consulting, 2311 W. 5700 S, Roy, Utah 84067*

Itemizer
Keep track of expenses and incomes in the order you want. Any type of expense or income can be put into a separate category with comments.

Subtotals may be calculated at any time. The Itemizer makes record keeping a snap, excellent for tax itemizing. $39.95 plus postage. FREE calculator program. *People Literate Software, P.O. Box 2039, Bozeman, MT 59715, 406/586-1581*

Time Value of Money
This program evaluates the effect of time on the value of money. Present-future worth, mortgage, annuity, gradient, and balloon analyses let the user play "what if." Extensive descriptions and examples for each analysis make TVM easy to learn and use. $39.95 plus postage. Free calculator program. *People Literate Software, P.O. Box 2039, Bozeman, MT 59715, 406/586-1581*

Money Maestro
A financial record-keeping package that provides budget tracking and tax reporting. Money Maestro reports totals by category or payee, including monthly and year-to-date budgeted vs. actuals. Data files are stored in BASIC sequential format. MONEY MAESTRO requires 64K, DOS. *Innosys, 2150 Shattuck Ave. # 901, Berkeley, CA 94704, 415/843-8122*

Money Maestro™

Ultradraw™ Graphics Software
An extensive 2-D geometry creation package for engineers, architects, graphic artists & slide makers requiring precision graphics. Ultradraw™ features auto-dimensioning, variable text

hgt/wdt, grids, graphics merge, parts & symbol libraries, multiple rotate, duplicate mirror & line fonts. Retail $195. Intro. offer $149. *Ultrgraphics™ Systems, 1100 South Main, Racine, WI 53403, 414/633-7381*

Stock Options Programs
Essential programs for stock options investors. Strategy analysis in mere minutes. Spreadsheet formats for easy viewing and adjustment. Pinpoint potential profit or loss before money is actually invested. For IBM-PC, TRS-80, CP/M. Call or write for more information. Custom assignments welcome. *Star Value Software, 12218 Scribe Drive, Austin, TX 78759, 512/837-5498*

STAR VALUE SOFTWARE

Games

Air Traffic Controller
Air Traffic Controller is a real time, action filled, strategy game for the PC. You are commissioned for the safe & expedient travel of aircraft within your sector. Aircraft are scheduled for arrivals/departures at airports within your sector, other may pass through. Top 10 scores/difficulty factor. Req. 64K, 1 dd. $29.95 *Sparry Research, 16 Parklane Ave., Milford, MA 01757*

Space Miner
Take an incredible mining voyage at new levels of animation excellence & arcade excitement! Maneuver ships to grab ore w/controllable robot arm. Blast aliens w/twin missile launchers. Top 10 players; stop action; 3 play levels; J.S.

Bach; More! Req: 64K, color-card, PC-DOS, 1dd. keybrd. or joystick control. $29.95. VISA/MC. *Resolution Software, 8 Edgewood Blvd., Providence, RI, 02905, 401/461-2417*

Resolution

The Chrome Ranger
Acclaimed by owners and reviewers for quality speed, appearance, and tasteful sound. Fast-action arcade-style maze game for the IBM PC and any display. 64KB + 1 drive. Keybd. or joystick control. Selectable and progressive skill levels. $29.95, check/MC/VISA. Version 2.0 works with all PC-DOS versions. *Omniware, 8972 E. Hampden Ave., Box 32, Denver, CO 80231*

Educational Games

SpelBound
Sure to hold your child spell bound! Teaches current spelling/vocabulary homework with 13 fascinating games like hangman, word search, crossword puzzle. Parent edits data sets, codes available games. Manual and 3 disks $79. Requires 2 dd, 80- col. display, printer optional. *Davell Custom Software, P.O. Box 4162, Cleveland, TN 37311, 615/336-3055*

Genealogy

Family Reunion
Keeps track of living relatives as well as genealogical data. Produces address labels, birthday lists, pedigree charts, family group sheets and more. Includes User's manual &

sample data disk. Price $99.95. Requires DOS, 2 drives, 64K and PC printer capabilities. VISA/MC/COD/Dealers ok. Add $2.50 S & H. *Personal Software Company, P.O. Box 776, Salt Lake City, UT 84110, 801/277-3174*

Graphics

New VideoGraph Plus
A totally machine language graphic prints utility. The Prtsc key triggers automatic printing of four color shaded graphics or monochrome characters set. Create variable sizes as well as rotated and inverted images. Also prints pictures from disk files or your own programs. *Windmill Software, Inc., 2209 Leominster Dr., Burlington, Ontario, Canada L7P 3W8, 416/336-3353*

Alt-PrtSc
Language-independent graphics screen print program for IBM or EPSON MX-80 printers with GRAFTRAX option. Prints contents of graphics screen by pressing Alt-PrtSc sequence. No modifications to programs necessary. Normal PrtSc operation not affected. $24.95. *The Second Source, Inc., P.O. Box 23567, Washington, DC 20024, 703/522-8833*

P-Plot
Complete graphics for IBM DOS PASCAL & FORTRAN featuring over 30 easy to use graphics, memory, I/O, screen utilities. Beats IBM BASIC 2.0 graphics. Great for science, engineering, business graphics and sound/animation for

video games. Introductory offer $39.95(+6.5% tax CA buyers only) for diskette and manual. Manual only at $12. Checks or money order. *Livermore Associates, Box 2435, Livermore, CA 94550, 415/449-5438*

HALO-Complete Graphics Tool
HALO, OEMs choice for graphics applications under MS DOS. HALO, the ad hoc MS DOS standard. Versions for BASIC/PASCAL/"C"/MACRO Assembler & FORTRAN. Complete tool box of optimized subroutines for every graphics application. Custom installations & configurations avail. All major graphics boards supported. *Media Cybernetics, Inc., 36 Columbia Ave., Tacoma Park, MD 20912, 301/270-2272*

Home Use
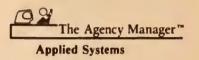
Home Finance, Games
Home Finance provides audit trail of expenditures for 1 yr. and up to 48 categories. Provides % of income spent by category. Search/edit by check no. payee or category. Price $34.95. Apparat Games Disk (64K) color or monochrome monitor. Others are Blackjack, Matches & Spiralgraph $24.95. *Apparat, Inc., 4401 S. Tamarac Pkwy., Denver, CO 80237, 303/741-1778*

Insurance

The Agency Manager™
Designed by insurance professionals for independent insurance agents, this integrated system performs Complete

Customer Acctg., General Ledger, Client Data update & retrieval (# files depends on your storage), over 100 Marketing Reports & Sales Tools, ACORD'S. Easy main menu & HELP feature. Ivans. IBM-XT, CP/M, Turbodos. *Applied Systems, Pauling Rd., Monee, IL 60449, 312/534-5575*

The Agency Manager™
Applied Systems

Investments

Technical Investor
Chart and analyze commodities or stocks. GRAPH1 ($199) plots HLC, trendline, and SYSTEM1 studies in hi-res. Manual or modem data collection. SYSTEM1 for printer ($59) has three types of moving averages, oscillators, etc. Both $229. Requires 128K 1 drive. Write for details, other software. *Dillon Gage Inc. of Chicago, 1631 W. Lunt, Chicago, IL 60626*

Languages

FORTH-32
The language for the IBM PC. Now you can program using the entire megabyte of memory. FORTH-32 Development System: $150. Package Builder Utility: $50. Floating Point and Math Library: Software $50, 8087 Hardware $50. See our display ad this issue. *Quest Research, Inc., P.O. Box 2553, Huntsville, AL 35804, 800/558-8088, 205/533-9405 (AL)*

Quest Research, Inc.

Mailing Programs

Merge 'n Print/Mail Label
Powerize your Easywriter/
Volkswriter letterwriting w/
MBS Software tools: Merge 'n
Print for automatically repeat-
ing customized form letters
(keyboard & file insertions,
etc)-$100; MBS Label Pro-
gram w/fast, 6-way sort-
ing-$95; and Data Base for
other follow-up/client
data-$225. Visa/MC/MO.
*MBS Software, 12729 NE
Hassalo St., Portland, OR
97230, 503/256-0130*

Mailtrak™
This package does it all! Mail
labels up to 4 across; phone
directories; instantly locate re-
cords by Name, Company,
City, State or Zip. Create
WordStar or EasyWriter files
for form letters. Sort & select
on all data. Tracks 2 phone
#'s, 5 user-defined profiles
plus 4 activities with dates.
$65 Visa/MC.*TCI Software,
6107 West Mill Rd., Flour-
town, PA 19031, 215/836-1406*
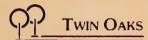
Manufacturing

Twin Oaks MRP-II
Quality Manufacturing Soft-
ware for the IBM PC. • Bills of
Material • Inventory Control •
Purchasing • Material Plan-
ning • Shop Floor Control •
Capacity Planning • Cost De-
velopment • Cost Variance •
Physical Inventory • Modular
Design • Full System Features •
Online Realtime • Accounting

Interface • Multi User Design •
128K PC DOS Hard Disk.
*Twin Oaks, 2650 Colfax Ave.
N., Minneapolis, MN 55411,
612/588-2685*

TWIN OAKS

MRP*BMS*MCS*SFC
Manufacturing systems for the
IBM PC:
• Accounting Interface
• Vendor Control System
• Full Manufacturing
  Reporting
• Multiple PC Support
• Mainframe interface
• Installation Support
*MIS Consultants, Inc., 1065
E. Hillsdale Blvd. #114,
Foster City, CA 94404,
415/345-6000*

Medical

Diet Monitor Systems
Camrass Corp. writes some of
the most advanced systems for
analyzing diets & nutrition.
All systems include extensive
data base and sophisticated
reporting capabilities. Home
diet monitor for you and your
families diet. Professional diet
system-designed for medical
uses and currently being used
by hospitals and dieticians.
VISA/MC. *Camrass Corp.,
P.O. Box 118, Boonton, NJ
07005, 201/328-8917 (24
hours)*

Threshold
Medical office management
software featuring automatic
insurance preparation w/tele-
processing to Blue Shield &
Medicare, unattended state-
ment processing, total se-
curity w/audit trails, statistical
information, complete inquiry
& management reports & on-
line help. List $5,500. *Physi-
cians Practice Management,
Inc., 1810 South Lynhurst
Ste.Q, Indianapolis, IN
46241, 317/248-0357*

Physicians Practice Management

Physician's Office System
POS/1 is a medical billing and
accounts receivable system.
POS/1 facilities: immediate ac-
cess to patient status by ac-
count number or name,
automatic RVS or ICDA codes
with manual overrides, receiv-
able aging report, track next
visit date, menu driven with
on-line help screens. $950.
*Chen Information Systems,
Inc., 1499 Bayshore Hwy.,
205, Burlingame, CA
94010, 415/692-4358*

CHEN

Operating Systems

Development System Tools
Operating System Develop-
ment Tools Universal Devel-
opment Interface and
iRMX86 implementations for
PC DOS/MS-DOS based sys-
tems. A complete family of

Development Tools. See dis-
play ad this issue. *RTCS/Real-
Time Computer Science
Corp., P.O. Box 3000-886,
Camarillo, CA 93010,
805/482-0333*

RTCS REAL-TIME COMPUTER
SCIENCE CORPORATION

Personal

PerFin
Simplify your money manage-
ment. Provides 40 user-de-
fined categories, checkbook,
budgets and reports. Handles
checks, cash and credit trans-
actions. Only $65. NUTRI-
TION/EXERCISE PROGRAM
COMING SOON. (Custom
software and consulting ser-
vices. Available for small and
large systems.) *Digital En-
gineering Group, Inc., 11999
Katy Frwy. # 150, Houston,
TX 77079, 713/531-6100*

Dear Diary™
Make your PC truly personal.
Dear Diary™ . . . is a software
program that quickly and eas-
ily puts your entries into a pri-
vate Diary file which cannot
be read without your pass-
word. Won't stop NSA or CIA
if they're interested, but will
exclude most others. $79.95.
VISA/MC. *Q'n'E Associates,
635 Bair Island, #115, Red-
wood City, CA 94063,
415/366-6062*

Publishing

Authors/Programmers
If you have a program or an idea for a program, we would like to talk to you about marketing it. We will provide as much or as little assistance necessary to get your program from wherever it is into the users' hands. Let's meet to discuss your program. Write or call us today! *Dataseek, P.O. Box 11071, Palo Alto, CA 94306, 415/325-4101*

DATASEEK

Real Estate

DSS Real Estate Analyzer
Designed for real estate professionals involved in analyzing sales or purchases of properties, syndications, or complex limited partnerships. Provides operating statements, cash flow & tax analysis, IRR, partnership investor analysis, loan and depreciation schedules. *Decision Support Systems, 3234 Prospect St. NW, Washington, DC 20007, 202/342-8172*

DSS Decision Support Systems

Sort

Opt-Tech•Sort/Merge
Extremely fast Sort/Merge program for the IBM-PC. Can sort or merge multiple files containing fixed or variable length records. Run as a DOS command or call from BASIC, plus many other features.

Compare before you buy any other. Write or call for more info. $75. *Opt-Tech Data Processing, P.O. Box 2167, Humble, TX 77347, 713/454-7428*

Statistics

Statistician's Mace
Calculates many statistics frequently used by scientists, business researchers, engineers, statisticians, and others who need to analyze survey and experiment data. Possibly the only program that performs the Hodges-Lehman aligned ranks test. Requires 128K. Introductory price $145. *Mace, Inc., 2313 Center Ave., Madison, WI 53704, 608/241-4566*

MACE/

MathTab™/MathStat™
Statistical software systems for microcomputers that support data management, documentation, descriptive statistics, crosstabs, frequency/breakdowns, regression, ANOVA, logit, probit, and much more. Can enter data from ASCII files, use direct data entry or link from a DBMS. Dealer inquiries welcomed. *Mathematica Policy Research, P.O. Box 2393, Princeton, NJ 08540, 609/799-2600*

Stock Market

Wall Street Window
Historical stock prices from the Dow Jones service.
* Retrieve historical quotes
* Automatic portfolio update
* Chart Hi-Lo-close, volume
* Chart Moving averages
* Chart Relative strength
* Chart to Epson printer
* Chart comparison of stocks
* Chart on volume
* Spreadsheet compatible
Package $395, Demo $75. *R & D Software Associates, Box 2727, Reston, VA 22090, 703/476-6597*

WALL STREET WINDOW

Stock Portfolio Reporter
Provides up to the minute information on key parts of investor's stock account. Market price updates by DOW JONES; easy link to Hayes Smartmodem. Sort by P/E, gain/loss, yield or any item in SPR's 8 useful reports. Friendly menu displays & manual. Requires 128K, 2dd. Demo disk avail. $179. VISA/MC welcome. *Micro Investment Systems, Inc., P.O. Box 8599, Atlanta, GA 30306, 404/892-3194*

MICRO INVESTMENT SYSTEMS, INC.

Market Trend Analyzer
Graph, tabulate, do moving averages and other computations using major market, technical (3 exch.), psychological and fundamental indicators. Package $300 with 3 months data. Demo/manuals

available separately with credit. Historical and update data available. 128K, 1 or 2 drives, mono/color. *Personal Equity Computing, Inc., P.O. Box 2105, Dept PCW, Ocean, NJ 07712, 800/431-6082, NYS 914/331-6663*

PEHS

Systems

Multiple Users Under PC-DOS
MultiLink turns PC-DOS into an efficient multi-user multi-tasking operating system. Additional users are supported by attaching inexpensive CRT terminals or modems to serial ports on the PC, and can run normal applications designed for PC-DOS. Includes host communications software for public dial-in. *Software Link, Inc., 6700 23-B Roswell Rd., Atlanta, GA 30328, 404/255-1254*

Tools

One-Key Step-Scroll
BASIC Programmers. This routine replaces the LIST command and steps through your programs forward, backward, or repeats the same lines. EDIT or RUN the program between steps and continue with only one key stroke. Step parameters can be

reset at any time. Includes other features. Diskette, $17. *IRC Associates, 125 Sherrfield Dr. #X9, Saginaw, MI 48603, 517/792-2156*

Trading

Legally Trade PC Software Softraders™ matches users wanting to exchange original disks and documentation. We offer unlimited trading opportunities thru worldwide network with quarterly directories & monthly updates. Call now or send system description, titles of programs you have & want plus return postage. You get results! *Softraders International, 1610 Shomaker Dr., Murphysboro, IL 62966, 618/687-4799*

Utilities

Funkey Program the function keys to suit your own needs. Funkey makes using word processing, spreadsheet and other applications programs easier and faster. Uses are limited only by the imagination. See display ad. *Bourbaki Inc., 431 Main St., Boise, ID 83702, 208/342-5849*

Alta Link Alta Link-intelligent communications package allows IBM PC to communicate with other PCs and mainframes across asynchronous telecommunications lines. Menu control using function keys. User con-

trol over-baud rate, line control, communications port. 30 user function keys. Many other functions. $97. VISA/ MC. *Alta Systems, Inc., P.O. Box 9802 #181, Austin, TX 78766, 512/836-7351*

Diskette Catalog DC keeps track of all your files on all your disks. Functions include add, alphabetize, delete, list, and search. Entries are handled by DC, not your typing. Written in machine lang. for speed, DC can hold 3000 files (w/ 96K). For PC Dos (all) 1 drive, 80 col. display, 64 K. $20 plus $1 for MC/VISA. *Creative Programs Unlimited, 16533-37th Ave. NE, Seattle, WA 98155, 206/367-7949*

PrettyPrinter for BASIC Are your BASIC programs over 100 lines long? Then you need the PrettyPrinter for BASIC. It prints BASIC programs so you can read & understand them: indented & block structured (like PASCAL), keywords in lowercase, remarks highlighted, cross reference. 64K required. Just $39 or write for details. *Personal Computer Things, Inc., P.O. Box 207-PCW, Centreville, MD 21617*

The Creator™ An amazing way you can generate word processing, mailing lists, Data Base Management, invoicing programs, and more without any programming

knowledge. Now your computer can write its own programs! All in a matter of minutes. Not only that, but a lot more can be produced as well (even program lines.) *Software Technology for Computers, 430 A Main St., Watertown, MA 02172, 617/923-4334*

Peeks 'n Pokes for the IBM PC BASIC and Pascal programmers - discover the secrets of the PC! Find out how to access and modify configuration, keyboard, disk, printer, communications, and monitor status. Perform DOS and BIOS function calls! Learn how to find more Peeks 'n Pokes. Disk (58 programs) and manual - Only $30 plus $2.50 shipping. MC/VISA accepted. *Data Base Decisions, 14 Bonnie Lane, Atlanta, GA 30328, 404/256-3860*

PC Disk ID Eliminate the need under PC-DOS 2.0, to reformat disks in order to add, change or delete volume labels. Prints sorted list of files (including hidden files) from disk directory to labels or to a listing. Also allows recovery of files erased inadvertently. Requires PC-DOS 2.0, 1 disk. $30. *ErgoSoft, P.O. Box 454, Oakhurst, NJ 07755, 201/493-8352*

ARCHIVES V Disk Backup Reduces diskette backup costs by 90 percent. The PC's built-in cassette interface can save six full diskettes on one ninety minute audio cassette.

The utilities process only required information reducing transfer time and tape usage. Specify 64K or 96K version when ordering; $39.95. *Indiana Digital Corporation, P.O. Box 3755, South Bend, IN 46619, 219/288-7280*

ARCHIVES V

Alta Systems Packages Super Zap ($47) accesses file/ absolute disk sectors. DIR-lift, sector saving, customization. PC Toolbox ($37) EDIR-formatted info about files. List-file printing, total printer control. File Utility-assign/remove "hidden" status, recovers deleted files. Comes with other utilities. VISA/MC. *Alta Systems, Inc., P.O. Box 9802 #181, Austin, TX 78766, 512/836-7351*

640K Memory Access for Old PCs You don't have to buy a new PC to access more than 544k of memory. With the SET-MEM utility, DOS recognizes up to 640k of memory on your current PC. Need to know if your programs run on small PCs? SETMEM can also reduce your DOS-recognized memory without re-setting DIP switches. $35. *Tyler Software, 233 Rodney Circle, Bryn Mawr, PA 19010, 215/525-5478 (after 6)*

PC Padlock Unique encryption scheme protects EXE-COM programs from running after unauthorized duplication. Copy programs such as COPYPC will not copy after running this

easy to use program on your products disk. Protect your software investment & valuable market place. Works with all DOS versions. $99. VISA/MC. *Glenco Engineering, 915 E. Carpenter, Palatine, IL 60067, 312/537-4200*

CATalog™ Diskette Librarian
A NECESSARY organizational tool. EASY and TIME SAVING. ADD, DELETE, EDIT, UPDATE, LIST volumes on screen, printer, or disk file in several formats. Supports user comments on volumes and files. Maintain up to 150 volumes on one 320K disk. Will run from Hard Disk. Req: 96K-DOS 2.0. Visa/MC, MO, check, COD. Only $34.95. *MultiPro, Dept. PC-1, P.O. Box 342, Saline, MI 48176, 313/429-2344*

Enhance WS
A powerful utility program which allows the user to customize WordStar. All of the function keys, the home, end and del keys can be redefined, 25 power up default parameters can be changed and the installation of special printer features: subscripts, superscripts, compressed print, etc. on any printer. *ENHANCE WS, 1020 Sagamore Parkway, West Lafayette, IN 47906, 317/463-3546*

PC File Compare
Compare disk files & get meaningful results. See the difference when a non-compare occurs. PC File Compare displays actual records that fail to compare, not just the offset into the files. Compares files of different lengths, indi-

vidual files, or allows specification of Global filename characters. $50. NJ add 6%. MC/VISA. *ErgoSoft, P.O. Box 454, Oakhurst, NJ 07755, 201/493-8352*

Industrial Strength BASIC
Line Number Remover. Unreferenced line numbers use memory & prevent full optimization. Remove unwanted line numbers with /N. Give the BASIC Compiler a chance to give you tighter, faster code. Give yourself the chance to include better error handling. Your users will thank you. $30. (Check or money order.) *Sherborn Software Systems, 226 Western Ave., Sherborn, MA 01770, 617/655-6543*

User Groups

Newsletter/Software Exchange International PC Owners Inc. This group publishes a newsletter IPCO INFO every other month and runs a software exchange. The software exchange consists of about 160 user developed programs for the PC. Membership in the US is $20/year. Send for free catalog of programs. *International PC Owners, Inc., P.O. Box 10426, Pittsburgh, PA 15234, 412/561-1857*

PC World Directory is a comprehensive listing, by category, of products and services for the IBM PC, lookalikes, and compatibles. It provides rapid access to the burgeoning PC marketplace for both readers and advertisers.

FORMAT: The standard format includes a product ID, a 300-character descriptive ad, and company name, address, and telephone number.

Advertisers may choose among categories already being used or may create their own. Display advertisers can cross-reference their current ad to the PC World Directory for increased exposure at low cost.

RATES: Listings are accepted for 3-time consecutive insertions at a rate of $300 ($100 per issue). Listings must be prepaid (except for established display advertisers) upon submission of ad copy. Checks, money orders, VISA, and MasterCard are acceptable.

DEADLINE: For space reservation contact a PC World Directory sales representative at 415/861-3861. Please send copy and prepayment to PC World Directory, 555 De Haro Street, San Francisco, CA 94107.

See you next issue!

Just Announced

The Wide World of PC Products

Edited by Anna Bunker

In the fast-paced personal computer market *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
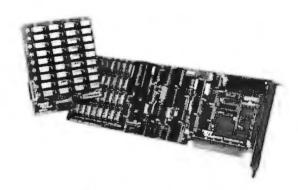
Boards

PCOX

A communications card that provides mainframe access and terminal emulation. It requires 64K and occupies any full-length slot on the IBM PC. PCOX includes two software packages that enable the PC to emulate 3278/3279 terminals and act as a professional work station, transferring files and performing diagnostic functions. The software also allows users to write unique applications to suit individual needs. PCOX accesses 3274/3276 cluster controllers via a category-A coaxial cable connection. Channel-attached 3274's and remote 3274/76's under BSC and SNA/SDLC are supported. List price: $1195. CXI, Inc., 10011 N. Foothill Blvd., Cupertino, CA 95014, 408/725-1881.

Versa-RAM PLUS II

A multifunction expansion board that provides as much as 512K of RAM and upgrades the system to interface with as many as five additional hardware peripherals. It uses any full-length slot in the IBM PC or XT. The basic board comes with 64K (upgradeable with chip sets to 256K), a clock/calendar, and clock/calendar

VersaRAM PLUS II, Memory Technologies

support and disk/spooler software. Diagnostic software specifically designed for the VersaRAM PLUS II is included.

The RAM module provides up to 256K additional RAM for a total of 512K and plugs into the basic board. The spooling printer module provides as much as 128K in buffer memory. The color/graphics adapter module is IBM color graphics compatible but cannot be used simultaneously with the RAM module.

List price: basic board $429; RAM modules, 64K $79, 128K $159, 256K $399; spooling printer module $299; color/graphics adapter module $250; async port chip set $35; parallel port chip set $30. Memory Technologies, Inc., 4343 Grand Prix Dr., Logansport, IN 46947, 219/722-1454.

Linkup

A communications board with a programmable hardware module and software options that support standard communications protocols and are able to emulate commercial mainframe terminals. It requires one full-length expansion slot.

Software emulator options include TTY with Asynchronous Block Protocol, DEC VT52/100, IBM 3101, and IBM 2780/3780. Emulators that will be available include IBM SNA/SDLC 3270, Bisync 3270, IBM 5250, Telex/TWX, and Tektronix. The package includes a 50-pin connector and two RS-232423 channels, and supports unattended operations as well as data rates up to 56 kilobytes per second.

List price: basic board with TTY and Asynchronous Block Protocol $795, each additional software option $150 to $195. Information Technologies Inc., 7850 E. Evans Rd., Scottsdale, AZ 85260, 800/431-3460, 602/998-1033.

PC Express

An integrated communications package that includes a printed circuit board, a 300 baud modem chip, , asynchronous and synchronous chips, and two supporting software packages. It requires 192K and two disk drives or a hard disk system and one expansion slot.

PC Express allows communication between micros and mainframes; electronic mail via Western Union, The Source, or CompuServe; and automated telephone management. The latter includes auto-dialing, auto-answering, and a data base directory for names, addresses, and telephone numbers.

With the directory the user can create call lists and search and sort on a number of different fields. PC Express automatically sends messages using the call lists created. One software package provides telephone management and asynchronous com-

munications supporting DEC VT-100/52 terminal emulation.

The second package provides synchronous communications and utilizes SNA to support 327X emulation. List price: complete package $1295, without SNA $895. Intelligent Technologies International Corporation, 151 University Ave., Palo Alto, CA 94301, 415/328-2411.

Irmaline protocol converter, Technical Analysis

Irmaline

A protocol converter that can be installed at a 3274 (local or remote), a 3276, or an integral terminal controller site, provided the converter uses type A terminal adapters. Irmalette or another asynchronous interface card is installed in the PC. Two dial-service modems are required, one at the converter site with Irmaline and one installed in the PC. Irmaline provides asynchronous serial data in IBM 3101 or DEC VT100 format, allowing PCs in remote locations to communicate with 3270 networks and emulate an IBM 3278 display.

Irmaline eliminates the need for long-distance telephone calls for mainframe access; the user can call the nearest controller. Networking is possible with one Irmaline and one telephone line shared by multiple PCs. And up to 32 Irmalines can be installed at one 3270 controller site. Data transfer software developed for Irma is fully compatible with the Ir-

maline-Irmalette combination. List price: Irmaline $1395, Irmalette $325. Technical Analysis Corporation, 120 W. Wieuca Rd. NE, Atlanta, GA 30042, 800/241-IRMA, 404/252-1045, Telex: 549600.

Computers

Eagle PC

An 8088-based computer that is both hardware and software compatible with the IBM PC. The Eagle PC is quiet because the computer is designed to remain sufficiently cool without a fan. The keyboard retracts into the cabinet of the system unit. The Eagle PC comes standard with high-resolution (720 by 352) graphics. Memory can be expanded to 512K on the motherboard.

The base-price version called the PC-E includes 64K and one 320K disk drive. List price: $1995. Eagle Computer, 983 University Ave., Los Gatos, CA 95030, 408/395-5005.

Eagle PC, Eagle Computer

Gavilan Mobile Computer

A 9-pound portable computer with a 5-pound detachable printer and a portable second disk drive. Features include an 8-line by 66-character bit-mapped display; a full-sized keyboard with typewriter layout and ten function keys; and a flat touch panel used for cursor control, selection criteria, and touch commands. The Gavilan has an 8088 microprocessor, an integrated 300 baud auto-dial and auto-answer modem, and an internal 3-inch floppy disk drive.

Gavilan Mobile Computer

A monitor interface and a printer interface make it possible to use a CRT and a full-sized printer. The Gavilan comes with 80K of memory (32K of which is user space) and is expandable to 128K. An additional 128K RAM is available when a second disk drive is added.

A detachable, correspondence-quality printer supports subscript, superscript, and proportional spacing and prints bidirectionally at 50 cps. Gavilan's integrated "capsule" software includes word processing, communications, mail, spreadsheet, and forms processing. Both the computer and the printer are powered by re-

chargeable battery packs. List price: computer $3995, printer $985. Gavilan Computer Corporation, P.O. Box 5004, Campbell, CA 95008, 800/528-6050 ext. 1191, 408/379-8000.

Modems

Smartmodem 1200B
with Smartcom II

An FCC-approved modem board with communications software that is functionally equivalent to the Hayes Smartmodem 1200 connected to the IBM Asynchronous Communications Adapter. The package requires a single expansion slot, 96K, and one disk drive. A telephone jack on the board permits direct connection to a telephone line with a standard telephone cable. The Smartmodem 1200B automatically dials, answers, and disconnects calls. It is compatible with Bell System 212A or Bell 103 asynchronous modems and transmits data at either 300 or 1200 bits per second.

With Smartcom II the user can match the remote computer's protocol and store the parameters in a directory for future use. Commands and data that are regularly sent to a remote computer can also be stored as macros or "communication sets" in the Communications Directory. One macro is reserved for automatic log on. Since the Smartmodem 1200B analyzes and executes ASCII character string commands, the user can write communications programs for the board. List price: $595. Hayes Microcomputer Products, Inc., 5923 Peachtree Industrial Blvd., Norcross, GA 30092, 404/449-8791.

Printers

DX-15

A compact letter quality printer that features a 2K buffer memory, two-color and bidirectional printing, and graphics capabilities. The DX-15 interface is Centronics parallel. An RS-232 option will be available during the last quarter of 1983. The printer supports boldface, super- and subscripting, automatic underline, and proportional spacing. The DX-15 prints at 13 cps and comes with a 96-character Prestige 10/12 daisy wheel. The DX-15 has a friction feed platen. Tractor and auto-cut-sheet feeds are optional. The noise level is less than 67 dBA. List price: $599. Dynax, a division of Kanematsu-Gosho USA, 5698 Bandini Blvd., Bell, CA 90201, 213/260-7121.

Miscellaneous

PC Weighmate

A scale system—including an electronic scale, an interface card, cables, and supporting software—that converts a microcomputer into an electronic postal, shipping, and counting scale for business and office use. The interface card uses one expansion slot in the system board. The scale has a weight range of $\frac{1}{32}$ ounce to 25 pounds. The software is menu driven

PC Weighmate, Micro General

and contains rate tables and zone charts for all classes of USPS domestic and international mail, Express, United Parcel Service, and Federal Express. The software also includes Rate Shopper, which compares postal rates for the same package.

With Transaction Summary the user can save all transactions to disk files for record keeping purposes. To cover postal rate changes, Micro General offers the user an insurance package for $98 that covers 18 months of rate changes. The user can choose to be notified of all rate changes and pay $30 for a new disk with rate changes. List price: $695. Micro General Corporation, 1929 S.E. Main St., Irvine, CA 92714, 714/557-3744.

Koalapad Touch Tablet, Koala Technologies

Koalapad Touch Tablet

A 4-inch-square hand-held digitizing tablet designed to allow the user to draw form patterns that immediately appear in color on the display. It requires 128K, a color/graphics adapter, a games control board, and DOS 2.00. The pad responds to any sharp object such as a finger, a pen, or a stylus. Graphics software is in-

cluded. The user can paint predefined spaces in selectable colors or crosshatch patterns.

The Touch Tablet may be used as a joystick or modified to act as a set of over 40 function keys. A programmer's guide is available for those who are interested in developing applications for the Koalapad. List price: $100, with programmer's guide $115. Koala Technologies Corporation, 4962 El Camino Real # 125, Los Altos, CA 94002, 415/964-2992.

Personal Penpad

A package that includes a digitizing writing tablet, an electronic pen, and a controller unit with an integrated Motorola 68000 microprocessor designed to allow the user to communicate with the PC using hand-printed characters. Penpad uses an RS-232 connection to the PC's serial port. It recognizes hand-printed characters through dynamic character recognition. Penpad recognizes block capitals A through Z, numeric characters 0 through 9, and 15 additional characters including the dollar sign. The user prints the data on conventional preprinted forms that are placed over the tablet. Practice and blank forms are included in the package. Users may design forms to suit individual needs.

The microprocessor in the controller converts the hand-printed data to ASCII code and sends it to the PC. The data can be sent to the computer either by character, line, or block. Penpad can be made compatible with existing PC applications with operating system patches in PC-DOS, CP/M-86, and the UCSD p-System. PC-DOS 2.00 supports Personal Penpad directly as a configuration option. Software designed specifically

for the Penpad is in the process of being developed by several software manufacturers. Penpad will initially be sold via OEMs and system houses. List price: $3500. Pencept, Inc., 39 Green St., Waltham, MA 02154, 617/893-6390.

Personal Penpad, Pencept

The Touch Pen System

A keyboard-bypass cursor-control system that includes the Touch Pen, a transparent on-screen digitizer, and the Cad Pad, an off-screen digitizer pad. The Touch Pen System is bus compatible and uses the I/O expansion slot. The system comes with an expansion board that has an Intel 8051 16-bit processor on board with an analog-to-digital converter.

The Touch Pen is an electrical conductive panel mounted behind the bezel of the CRT that stretches smoothly over the surface of the display. The panel also serves as a glare-reducing filter and a ground for surface static.

The Cad Pad can either be placed on a desk or held in one hand. It is 5½ inches square with an active area of 2½ inches square. With both the Touch Pen and the Cad Pad, the cur-

sor can be positioned by placing the stylus on screen or on the corresponding area of the pad. The cursor automatically moves to the stylus position. A two-dimensional drafting software package is available for the Touch Pen system. List price: $795 each. Sun-Flex Company Inc., 20 Pimentel Ct., Novato, CA 94947, 415/883-1221, Telex: 172-208 Sunflex NOVA.

Systems Software

Languages

PC LOGO
This LOGO for the IBM PC is based on the popular LOGOs for the Apple computer but utilizes the PC function keys and editing capacities. It requires 64K and one disk drive, is assembly coded, and has a Lisp-based design. A utilities disk is included. PC LOGO interfaces with Harvard Associates' robot turtle using the PC RS-232C port. List price: $199.95. Harvard Associates, Inc., 260 Beacon St., Somerville, MA 02143, 617/492-0660.

Operating Systems

The Quarterdeck DesQ
An overlay to PC-DOS that provides a multiwindow, multitasking operating environment and allows the user to run and integrate several commercial applications packages simultaneously. It requires 256K, a 5-megabyte Winchester disk drive, and a monochrome display.

Just Announced

Each application loaded with DesQ has its own display window. Information in one window can be transferred to another window containing a different application. For example, information can be transferred from a word processing program to a spreadsheet or a data base management system. Users can "teach" DesQ to perform recurring tasks automatically. DesQ can be used with a mouse and will be available during the last quarter of 1983. List price: $395. Quarterdeck Office Systems, 1918 Main St. #240, Santa Monica, CA 90405, 213/392-9851.

Applications Software

Communications

Omnilink

An integrated software package that allows intelligent, companywide communications among mainframes, PCs, on-line terminals, and word processors. It requires 128K, two disk drives or a hard disk system, and CICS or IMS. *Omnilink* includes On-Line's mainframe software, *Omnicom*, and PC software, *Omnimicro*. *Omnigard*, an optional security program, is also available.

Omnimicro includes built-in applications such as word processing, spreadsheets, and graphics. It also provides an applications generator that allows the user to generate applications to suit a particular need. *Omnicom* and *Omnimicro* both have a query language that turns the mainframe and the micro into compatible computers. With *Omnilink* the user can generate a custom program on a micro and then send it to the mainframe for processing. The results can then be sent back to the micro.

List price: *Omnimicro* $1800 each for 2 to 5 copies, $700 each for over 100 copies; *Omnicom* DOS $28,000, *Omnicom* OS $35,000; *Omnigard* DOS $17,000, *Omnigard* OS $23,000. On-Line Software International, Fort Lee Executive Park, Two Executive Dr., Fort Lee, NJ 07024, 800/526-0272, 201/592-0009.

Relay

A package that provides communications with PCs, mainframes, and computer service bureaus, including Dow Jones, CompuServe, and The Source. It requires 64K, one disk drive, a communications board, and a modem. *Relay* enables the user to send or receive data while printing and editing locally. It provides the ability to upload and download files and emulate an APL terminal.

Relay can send and receive data between PCs in any format, including *VisiCalc* models, spreadsheets, *WordStar* documents, and program files. *Relay*'s features include a full-screen text editor, a directory for telephone numbers and communication parameters, and a split screen for message communication between PCs. List price: $149. VM Personal Computing, 60 E. 42nd St., New York, NY 10165, 212/697-4747.

Data Management

Friday

A prestructured data management system written in the *dBASE II* application development language that is compatible with *dBASE II* but runs as a stand-alone system. It requires
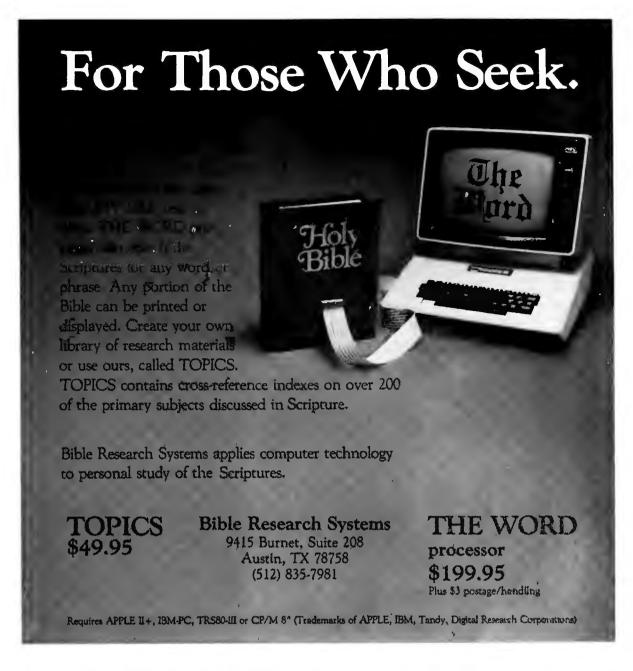
256K and two floppy disk drives or one hard disk drive. The format is predefined—a blank form with column headings that the user fills in. *Friday* is completely menu driven, and all prompts are on screen and in English. The user simply chooses a command and presses the corresponding letter.

The program's unique features include automatic copying of all information in an old file into a redesigned file and automatic updating of calculations for new data entries. With Quick Report, *Friday*'s report generator, the user has the option of using the format provided or designing a custom report. As many as 15 custom reports per file can be saved. *Friday* includes a two-level password system that allows the user to protect all or some of the files with a master password. List price: $295. Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90230, 213/204-5570, Telex: 669984 ASHT TATE LSA.

Next Step
A program that generates data base management applications and reports in Microsoft BASIC. It requires 128K and two floppy disk drives or one hard disk drive. With *Next Step* the user designs file formats by answering screen prompts. *Next Step* automatically generates the code, batch files, and individual menus for each file. Up to 15 fields per file may be designated as keys for sorting purposes. Fields can be table edited so that only certain values are accepted,

Just Announced

or range edited so that a range of values are accepted. Once the application is complete, it runs independently of *Next Step*. List price: $295. Execuware, Intercontinental Plaza #300, P.O. Box 10, 7415 Pineville-Matthews Rd., Charlotte, NC 28211, 704/541-1199.

Powerbase

A data base program with upload and download utility programs that enable it to access mainframes using appropriate communications software. It requires 128K, two floppy disk drives or one hard disk drive, and an 80-column printer. The program can handle up to 100,000 records of up to 32 fields of 80 characters each. It has search, sort, and select capabilities.

A feature called DataZoom allows the user to "zoom" in to compare different components of data in similar categories. *Powerbase* includes ready-to-run applications but also enables the user to design unique applications. The ready-to-run applications include The Manager's Daily Planner, Financial/Insurance Records Inventory, Expense Reporting, and Telephone/Mailing Directory. List price: $475. GMS Systems, Inc., 12 W. 37th St., New York, NY 10018, 212/947-3590.

Games

Space Miner

An arcade-style adventure game that utilizes the PC's 320 by 200 resolution graphics and assembly language speed to produce high-quality animation. It requires 64K and one disk drive. A joystick is optional. Players maneuver a fleet of space mining ships to collect chunks of mineral ore by activating a robot claw while aliens attack the ships at random intervals. Sound effects include a

background score by J.S. Bach. Up to ten can play. List price: $29.95. Resolution Software, 8 Edgewood Blvd., Providence, RI 02905, 401/461-2417.

Job and Industry Specific

Survey System

A package for market research professionals that facilitates the entry, editing, processing, and presentation of questionnaire data. It requires 128K and one disk drive. *Survey System* can produce cross-tabulations, scored variable tables, and camera-ready bar charts for professional presentations. It produces bar charts with solid or outlined bars instead of asterisks. The program accepts up to 1000 variables and can be customized to accept more than 1000.

Editing and manipulative capabilities include weighting questionnaires, selecting subsamples, and creating new variables. Basic statistics include chi squared and means as well as standard deviation. Tables and charts can be printed on dot matrix or letter quality printers. *Survey System* supports a number of printers, which are selected from a printer menu. If the user's printer is not supported, the manufacturer provides a customized version for all daisy wheel and most dot matrix printers. List price: $95. Creative Research Systems, 1864 Larkin St., San Francisco, CA 94109, 415/771-0912.

Spreadsheets

Multi-Tool Budget, Multi-Tool Financial Statement

Two *Multiplan* utilities that design and build *Multiplan* worksheets for budget planning and control and financial statement ratio analysis. Both require 128K and one disk drive. The

user keys in the data required by the prompts. The programs automatically format and enter the formulas. Users can choose time periods, intervals, and number of categories and subcategories to analyze and assign names appropriate to their needs. These choices result in a customized worksheet.

List price: Multi-Tool Budget $150, Multi-Tool Financial Statement $100. Microsoft Corporation, 10700 Northup Way, Bellevue, WA 98004, 206/828-8080, Telex: 328945.

VoiceDrive for ScratchPad

A combination voice recognition/ spreadsheet package that allows the user to enter spreadsheet data and/or commands vocally. The package requires 96K, one disk drive, a Tecmar voice recognition board, and a microphone. *VoiceDrive* was specifically designed to work with *ScratchPad*, SuperSoft's spreadsheet.

VoiceDrive can be used in conjunction with the keyboard. For example, the user could enter data on the keyboard and use *VoiceDrive* to issue vocal commands. With *VoiceDrive* the user trains the computer to understand the 97 *ScratchPad* commands in the user's voice, which is saved to disk.

List price: $495, bundled with Tecmar's voice recognition board $995. SuperSoft, 1713 S. Neil St., P.O. Box 1628, Champaign, IL 61820, 217/359-2112, Telex: 270365.

Just Announced uses information provided by manufacturers. It does not evaluate products or corroborate manufacturers' claims. Send a description and a photograph of your new product to Just Announced, PC World, *555 De Haro St., San Francisco, CA 94107.*

Products

PC W●RLD

Reader Inquiry Service

PC W●RLD

Name _____

Company _____

Address _____

City/State/Zip _____

Card valid through 10/29/83   (Zip code needed to insure delivery.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275
276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325
326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350

I/6

PC W●RLD

Name _____

Company _____

Address _____

City/State/Zip _____

Card valid through 10/29/83   (Zip code needed to insure delivery.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275
276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325
326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350

I/6

PC W❖RLD
Reader Inquiry Service

BUSINESS REPLY CARD

PC World
P.O. Box 13897
Philadelphia, PA 19101

BUSINESS REPLY CARD

PC World
P.O. Box 13897
Philadelphia, PA 19101

Products

Computereyes is a trademark of Caere Corporation.   IBM is a registered trademark of International Business Machines Corp.

Products

Announcing

the most sophisticated database program development tools available on any personal computer anywhere.

The Database

ACCELERATOR™

Automatic program, screen, menu, report generation.
Automatically checks, formats, documents your programs.
Now available for the IBM PC at an introductory
price of $195.   30 day money back guarantee.

Advertisers

THE DAZZLING, RICH COLORS IN THIS WORK OF ART CAN BE YOURS ...WITH NEW COLORPLUS.™

Just equip your IBM personal computer with COLORPLUS — the new color graphics adapter with the high resolution color professional use demands.

With COLORPLUS, you get the top quality graphics previously reserved for much more highly priced systems.

HOW YOU CAN GET DETAILED, ATTENTION COMMANDING COLOR GRAPHICS.

The accompanying work of computer art shows you COLORPLUS features that you can employ for your own charts, graphs and designs.

You can originate your own customized software package with up to 16 colors and up to 80 characters. Or you can acquire any of the existing software packages that take advantage of the COLORPLUS capabilities.

With custom packages, programmers will appreciate the overwrite capabilities of COLORPLUS, which allow application graphics to remain on the screen while source code is independently scrolled on the same screen.

DISCOVER THE POTENTIAL OF YOUR IBM PC! HERE'S HOW TO GET A FREE PRINT AND DEMONSTRATION.

Simply write to us at the address below. Or call toll-free 800-638-6211. We'll arrange for you to receive a FREE full-color reproduction, suitable for framing. We'll also tell you how you can get a FREE demonstration of COLORPLUS. Limit of one print per customer. Quantities are limited. Contact us today and find out how you can give your IBM PC the greatest enhancement you've ever seen.

PQF PRODUCTS™

PLANTRONICS™
Frederick Electronics

7630 Hayward Road, P.O. Box 502 Frederick, MD 21701

Reader Service #143

(About Our Gatefold)

The image inside the facing gatefold cover was created by graphic designer and illustrator Steve Campbell using an IBM PC and the Plantronics COLORPLUS card.

In creating this image, which he originally drew with colored pencil on paper, Steve set himself a challenging goal. "Most computer art I've seen is so obviously computer art— very geometric, perfect circles, perfect squares," Steve said. "I wanted to get a more organic look. In a sense I was fighting the computer, getting it to do what I wanted instead of what it's set up to do."

Although Steve found working with dots time consuming and frustrating at times, he was pleased with the results. "COLORPLUS let me achieve what I set out to accomplish. With other programs I've used, this type of picture simply would not have been possible."

For Steve, the most exciting thing about computer graphics is the luminescence of the video screen. "I enjoy working with light rather than trying to duplicate the effects of light with other materials."

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 would like to be considered for the contest, please contact our editorial department.