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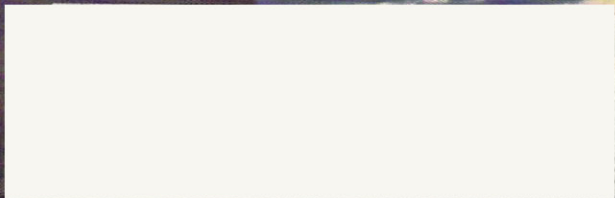
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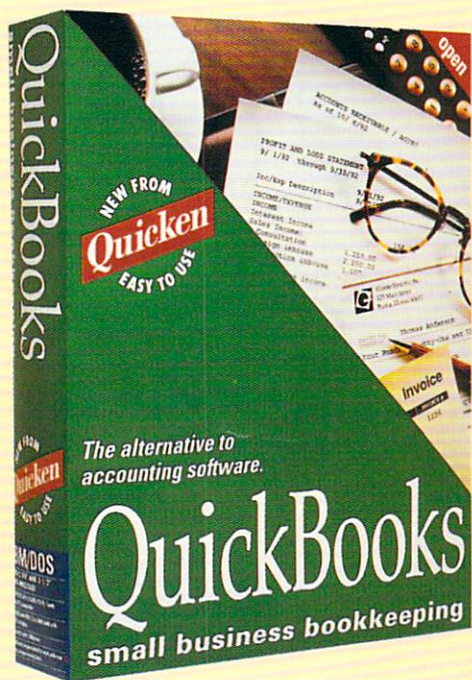
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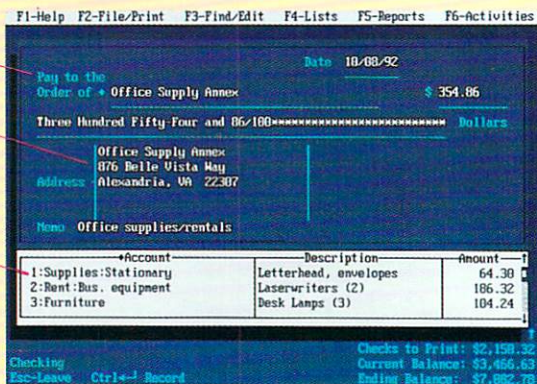


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Garden Supplies Inc.	12498	10/22/92	1,753.31	1,753.31
Garden Supplies Inc.	13546	11/ 4/92	3,825.52	3,825.52
New Leaf Landscaping	2456	10/25/92	1,865.62	1,865.62
New Leaf Landscaping	3578	11/ 8/92	158.88	158.88
New Leaf Landscaping	5685	11/ 9/92	236.35	236.35
Office Supply Annex	69699	12/16/92	856.36	8.00
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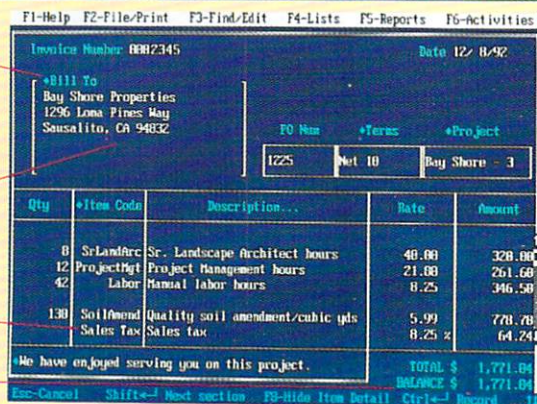
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Customer	Balance
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New Line Computers	1,800.76	900.38	450.19	225.09	112.55	56.27	28.13	14.07	3,687.37
Oak Management	810.92	405.46	202.73	101.37	50.68	25.34	12.67	6.33	1,635.40
Pemra Cinema	6,435.88	3,217.94	1,608.97	804.48	402.24	201.12	100.56	50.28	12,861.77
<b>Total</b>	<b>13,682.56</b>	<b>6,841.28</b>	<b>3,420.64</b>	<b>1,710.32</b>	<b>855.16</b>	<b>427.58</b>	<b>213.79</b>	<b>106.90</b>	<b>27,360.23</b>

**Collections Report**  
As of 12/31/92

Green Systems, Inc.

Customer	Invoice	Issued	Due	Balance Due
New Line Computers	1825	9/ 2/92	10/17/92	1,800.76
Mr. Ridge Evers (309) 676-9896 ext 124	Total New Line Computers			1,800.76
Oak Management	1886	10/ 5/92	12/ 4/92	810.92
Mr. John Driscoll (309) 673-7097 ext 234	2081	10/12/92	11/26/92	57.75
Total Oak Management			868.67	
Pemra Cinema	1841	9/17/92	11/16/92	6,435.88
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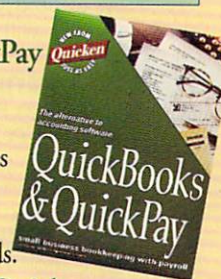
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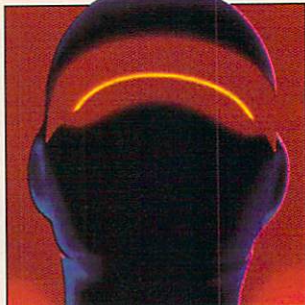
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### SEARCHSTAKES

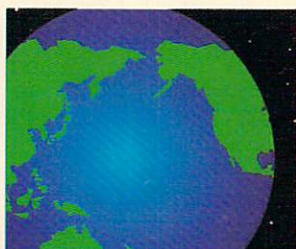
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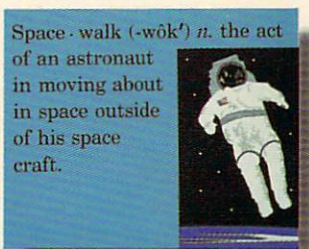
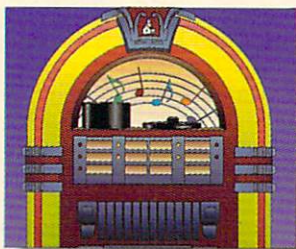




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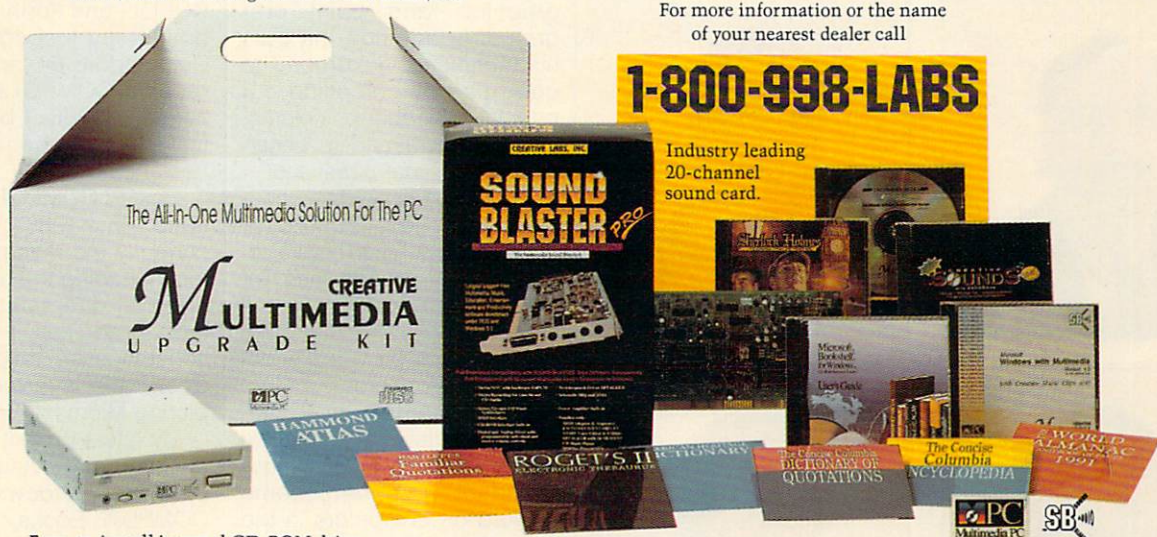
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# EDITORIAL LICENSE

Clifton Karnes

This issue of COMPUTE is one of our best yet, and while looking through it, I was impressed again by what a group effort COMPUTE is. Each magazine is the work of writers, editors, contributing editors, copy editors, designers, and production people, as well as scores of administrative, sales, subscription, and circulation personnel.

This month, I'd like to introduce you to one team from this group that has a special influence on each issue—COMPUTE's four editors.

First on the list is David English, COMPUTE's managing editor. David has B.A. and M.A. degrees in English literature and an M.A. in cinema. David bought his first computer in 1981, an Apple II, and he started reading COMPUTE, programming in BASIC and dBASE, and creating synthesized music.

When the Mac came out in 1984, David bought one and

started working with MIDI and desktop publishing. Soon after he joined COMPUTE in 1988, he dived into the PC waters, buying a laptop and, shortly after, a 386.

At COMPUTE, David plans and assigns COMPUTE's Getting Started With sections and manages reviews. He also combines his interest in film, desktop publishing, and music by writing the "Multimedia PC" column.

Robert Bixby, COMPUTE's features editor, has an M.F.A. in writing, and he's one of those unusual people who can communicate both with people—via English—and with computers—via code. In fact, he bought his first computer, a Commodore 64, to make it easier to write. Soon, however, he was bewitched by the machine and writing programs in assembly language himself.

At COMPUTE, Robert writes "Art Works," a column that focuses on desktop publishing, word processing, graphics, and paint programs. In addition, he puts his technical background to good use by compiling our popular "Feedback" column, which answers readers' general and technical questions.

In addition to his many contributions to COMPUTE, Robert has published several articles in other magazines, including *Omni*, and he's written a dozen books. His latest project is a book on WordPerfect for Windows macros.

Mike Hudnall is COMPUTE's reviews editor. Mike has a Ph.D. in English, but like many of us, he became hooked on computers in the early days. While working on his Ph.D., he took his first computer course, which used a DEC PDP-11 minicomputer. That was in 1981. Soon after, he began using a CP/M machine owned by the universi-

ty. When it came time for him to buy his own PC, he opted for a Tandy EX, an early MS-DOS machine. Before long, he combined his interest in PCs and technical writing by freelancing.

Mike joined COMPUTE in 1990. His main responsibility is managing COMPUTE's Test Lab, the section of the magazine that offers comprehensive reviews and benchmarks of selected hardware and software. Managing Test Lab demands not only a solid grasp of the cutting edge of technology but also advanced language skills. Mike has both.

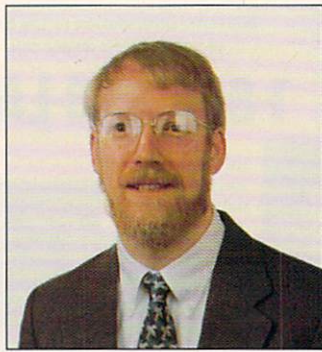
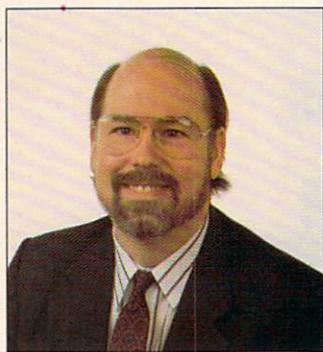
And then there's me. After completing a master's degree in music theory, I took a course in computer programming, mostly out of curiosity, and was hooked. After that, I took every computer course I could find. I've programmed mainframes, minicomputers, and micros in a variety of languages, including C, Pascal, assembly language, BASIC, COBOL, and Forth. In 1983, I bought my first computer, a Commodore 64, and started reading COMPUTE and Gazette. In 1986, I bought my first PC, and I began to write freelance articles.

I joined COMPUTE Publications in 1987 and am currently the magazine's editor, managing the magazine's editorial direction and content. In addition, I write "Editorial License" and "Point & Click," the latter column exploring Microsoft Windows.

My latest project is a book on Microsoft Windows, *101 Essential Windows Tips*, for COMPUTE Books.

So there we are. I hope you've enjoyed finding out a little about COMPUTE's editors. Next month, you'll have a chance to tell us something about yourself, by filling in our readership survey. □

**COMPUTE's editors are, from left to right, Clifton Karnes, David English, Robert Bixby, and Mike Hudnall.**





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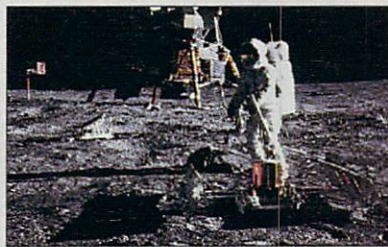
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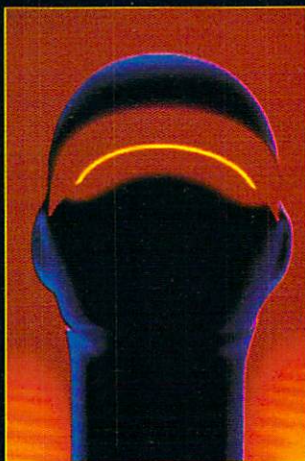






# TOP PC UTILITIES

HERE'S AN IN-DEPTH  
LOOK AT TWO CONTENDERS  
FOR THE TITLE OF  
BEST UTILITY PACKAGE:  
THE NORTON  
UTILITIES AND PC TOOLS.



BY DAN GOOKIN

**T**ry to describe what utility software is, and eventually, you'll come up with a definition for what a computer does best: It makes life easier. So anything can be defined as a utility, since a computer's job is to make life easier. Everyone can use a few PC utilities for file recovery, protection, and security—and to ease the drudgery of using DOS. Yet PC utilities began their humble lives as programmer's tools, designed to simplify repetitive tasks of the PC elite.

Everything changed in 1982 when one PC entrepreneur came up with a utility that proved useful to both programmer and user: Peter Norton developed his hallowed UERASE.COM, the Unerase program. It could actually recover a deleted file—a file that IBM, Microsoft, and everyone else claimed was long dead. Norton packaged Unerase with six other utilities (which would all seem silly by today's standards) and sold them as The Norton Utilities. Unerase helped propel Peter Norton into an almost godlike status among PC users the world over, and it legitimized the utility as a new must-have type of PC software.

Today, there are dozens of utilities on the market. Nothing is sold piecemeal anymore; nearly all the utilities are packaged in fancy boxes and work in some type of colorful, integrated, mouseable environment. PC utilities have become a necessity, a vital category of software like word processors, spreadsheets, and databases. The scope of what a PC utility is

and does is much broader than that of the simple programmer's tools of yesterday, and the power they offer is hundreds of times beyond that of a simple speaker beeper or file sorter. Utilities are valuable programs yet easy enough for every level of PC user to handle.

Presently, there are two contenders for the PC-utility crown: The Norton Utilities, still going strong after ten years, and PC Tools, Central Point Software's powerhouse utility package. There's no top dog here, so this article won't attempt to give away king-of-the-mountain robes. Instead, my purpose is to examine what each package does, discuss the latest versions, and check on the status of PC utilities some ten years after their introduction.

## Basic Features

Ideally, a computer's operating system should give you everything you need to run your computer, productivity software aside. In that respect, DOS falls short. Using DOS is like playing baseball with only three people to a team. The job of the PC utility is to fill in the gaps and let you play a fair game. In this light, you can say that PC utilities have two major purposes: doing things DOS doesn't do and doing things DOS already does, but doing them better.

The comparison chart shows a list of the features DOS provides plus the enhancements offered by the two top PC-utility packages. In addition to the Overview, the table is divided into six areas: File Management, Direc-

tory Management, Disk Control, Security, Recovery, and Productivity. How PC Tools and The Norton Utilities deal with each of these areas is covered in the next few sections.

Of course, the most "missing" features belong to DOS. It's worth noting that earlier versions of DOS had even fewer utilities (which is why DOS 5.0 is such a valuable upgrade).

## Product Overview

Overall, Norton and PC Tools stack up fairly well, with PC Tools taking a giant lead only in the productivity area. Specifically, each program has both command line and integrated environments, allowing you to operate the utilities from everything from a batch file to a cozy, colorful graphic environment you can manipulate with a mouse. Both programs have online help, and both come with a handy recovery disk you can use right away if perilous conditions prevailed before you bought the utility.

Norton falls short right away by missing several Windows-specific programs that come bundled with PC Tools. Yet, PC Tools eats up 9.5 megabytes of disk space—almost four times what Norton uses. PC Tools didn't get called the kitchen sink of utility programs by shipping on one disk.

## File Management

File management is the ability to control and manipulate files beyond the simple commands DOS offers. There are two ways to approach this. The first is in an integrat-



ed environment where files are displayed along with commands that can control them. The second is the traditional way DOS lets you work with files, via the command line.

Both DOS and PC Tools come with shell programs that assist in file manipulation. Both shells let you copy, rename, delete, and move files singularly or in groups. The shells also come with their own customizable menus, allowing you to install your own programs into the shell and use it as your base of operations for the entire time you're in DOS. In addition to file manipulation, PC Tools' PC Shell also acts as control center for the other utilities in the PC Tools arsenal.

Norton lacks a file-management shell. It does, however, sport an integrated environment. From the environment you can select utilities, read about their options, and customize a command line that the environment can execute for you. This isn't the same thing, however, as a file-management shell.

In the area of file tools, The Norton Utilities lives up to its ten-year reputation. There are programs to change the date and time of files, size up files for copying to a floppy disk, and locate and modify files anywhere on disk.

One major disappointment with both utilities is the lack of a move command, an alternative to copying and deleting files. DOS and PC Tools offer this in their shells but not as a command line utility. Norton skips over a move command completely, which I find disappointing. Mace Utilities, which isn't covered in this comparison, has an excellent move command; see "And What of Mace?"

## Directory Management

Working with directories isn't as big an area as file management. Directory management includes the ability to change directories, perhaps using some type of graphic tree structure, plus the standard MD (Make Directory) and RD (Remove Directory) commands. Extra features include pruning and grafting, or the ability to cut an entire subdirectory branch and paste it elsewhere in your hard disk system.

NCD, Norton's version of the CD command, is a powerful way to change quickly from one directory to another without having to type in complex pathnames. But that's it! Norton offers no grafting or pruning commands, no utility for moving directories, and no unremove command for a subdirectory.

For its contribution to directory management, PC Tools has a separate program (DM, the Directory Manager), and it's very slick. DM shows you your subdirectory structure in the standard

tree format, but using only directory names—no files. To the left of the display is a histogram showing you the size of the directory as compared with the size of other directories on disk. Extremely large directories are shown in red. I find this a valuable feature when working with a subdirectory structure. But on the downside, to work with files again, you have to quit DM and return to PC Shell. Moving back and forth during major disk surgery can get tiresome.

Like Norton, DM lacks an unremove directory command. But when you think about it, unremoving a directory is trivial: You can't remove a directory in the first place unless all the files in that directory have been deleted. However, having a way to get back at those files once their directory has been deleted would be a boon to overzealous pruners and grafters.

## Disk Control

The most traditional disk-control utility is a sector editor, which has been around since Peter Norton's original Disk Editor program. This type of tool allows you to manipulate information anywhere on disk. It's a fun and scary thing to do, though the practical value of sector editing is limited when you consider the range of other disk utilities available. PC Tools also sports a Disk Edit tool from within the PC Shell environment.

More important than editing disk sectors is defragmentation, or the consolidation of fragmented files that tend to accumulate on hard drives. This is perhaps the most important utility that DOS doesn't offer. PC Tools has its Compress program, and Norton has Speed Disk. However, I feel the best defragmentation program can be found in Mace Utilities, where the idea was pioneered; see "And What of Mace?"

Both packages offer a safe formatting program, which was designed to replace the old DOS FORMAT command. However, since DOS 5.0's FORMAT also saves unformat information, these utilities aren't as vital as they were before DOS 5.0.

Other interesting disk-control programs are contained in both packages, including some low-level disk utilities prompted by Steve Gibson's original SpinRite disk optimizer. However, I consider this type of interleave reset and revitalization program to be more for show than for any practical purpose. The true value of low-level revitalization is in doubt by many PC experts, and it's also next to impossible on some of the newer hard drives with IDE and SCSI interfaces.

One bonus feature PC Tools has over Norton is a complete (and powerful) backup program: CP Backup, which is also sold as a separate package. Norton's backup program, The Norton Backup, stands toe-to-toe with CP Backup, but it's only sold as a separate package.

Norton comes back punching with NDOS.COM, a replacement shell for COMMAND.COM. Based on J.P. Software's 4DOS shell, NDOS offers similar yet more powerful features ideally suited to the command line DOS user.

## Security

This is a new category of PC disk utility, something nearly as important as the data-recovery programs. Security utilities offer protection from disaster before it strikes.

The main type of security program is similar to DOS's MIRROR; it makes an image of the boot sector, FATs, and root directory and saves it elsewhere on disk. This aids in recovery from accidental reformat and allows those vital parts of the disk to be rebuilt if something goes wrong. Norton's program is named Image; PC Tools' is called Mirror. Microsoft licenses the DOS command

### AND WHAT OF MACE?

Up until a short time ago, there was a third major contender for the PC-utility crown: Mace Utilities from Fifth Generation Systems. Mace is a powerful utility package and does some things much better than either of the two top dogs. But one thing it hasn't done is compete straight across, on a feature-for-feature basis, with PC Tools or The Norton Utilities.

Mace does have its strengths; the FRAGCHK, SQZDIR, SORTDIR, and UNFRAG utilities provide the best method of defragmenting a hard drive—far superior to PC Tools' Compress or Norton's Speed-Disk. Mace's other assorted utilities are strong and have merit, so if defragmenting is all you need, then Mace Utilities makes an excellent choice. Overall, however, Mace lacks the complete bag of tricks of the other two packages.

Presently, Mace Utilities is under review by Fifth Generation Systems, which hopefully means we'll see a bigger, better, and more powerful version of the program in the future. The current version continues to sell for \$149, with various pieces of the program sold individually for less. If future versions maintain Mace's flair for methodical and thorough utilities, then it will once again compete for the top spot.

Mace Utilities—\$149  
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MIRROR from Central Point Software.

Another form of security is file encryption. Both Norton and PC Tools offer a way of taking the data in one or more files and secretly encoding it. The only way to decode the file is by using a password or code key. PC Tools takes this concept one step further and allows you to create encryption directories; all files placed in those directories are automatically encrypted, and access to the directories is only possible by password.

In the era of the computer virus, antivirus utilities are popular. Both Symantec and Central Point Software distribute their own antivirus programs. However, only PC Tools comes with a virus-scanning utility, Vdefend. While it will locate some viruses, it does little in the way of removing them (other than recommending you buy Central Point's other virus-specific software).

More important than direct virus detection, both utilities offer special disk-locking utilities that prevent unauthorized access to sensitive areas of the

disk. Norton's Disk Monitor and PC Tools' Data Monitor allow you to lock out all or some sectors of a hard drive, preventing access or just monitoring sensitive areas of the disk that shouldn't be touched. For most users, this type of protection from viruses (and other nasty programs) will be enough.

### Dr. Disaster

PC utilities were given birth by Peter Norton's Unerase program. Both utility packages—and now DOS—offer undelete and unformat commands. PC Tools has Undel, and Norton still retains Unerase after all these years (see "The Down-and-Dirty on Undeleting"). And thanks to the disk-imaging programs (Mirror and Image), recovery of a disk's boot sector, FAT, and root directory is also possible.

Both Norton and PC Tools also have unformatting utilities, which is no longer a big thing, since the UNFORMAT command is now a part of DOS's data-recovery repertoire. This is all traditional stuff—no new bugs under big rocks here. What is unique to both The Norton Utilities and PC Tools is their new array of file-recovery, deletion-prevention, disaster-prevention utilities. This is a special type of program that stores the files DOS deletes in special directories. Recovery is then 100-percent guaranteed by simply plucking the deleted file out of the special directory. The Norton Utilities uses the Erase Protect program to pull that trick; PC Tools has Disk Monitor.

Individual files can always go south, as anyone who's worked with too large a spreadsheet or database discovers. Both PC Tools and Norton offer programs to repair errant data files for 1-2-3, dBASE, and other popular formats. Both programs are called File Fix, and both will attempt to patch up the same types of files.

When bytes start fleeing from a troublesome disk, you can use PC Tools' DiskFix program to diagnose and repair the problem. The Norton Utilities uses The Norton Disk Doctor for diagnosis, as well as a wonderfully crafted (though technical) Troubleshooting Guide plus the Disk Tools utilities to eventually remedy the problem.

### Five All-Purpose Hard Disk Tools

In each package, you'll find several interesting, integrated utilities whose purposes seem to overlap. This appears to be the approach for disk utilities of the future: one piece of software that deals with several related areas of data protection, diagnosis, and recovery. Between PC Tools and The Norton Utilities, five individual programs handle those du-

ties: DiskFix, Data Monitor, Disk Monitor, Disk Doctor, and Disk Tools.

For example, PC Tools' DiskFix handles repair and disk-tuning options, while the Data Monitor program covers delete prevention, password-locking and encrypting of files in a directory, write-protecting sensitive parts of a disk, and other assorted duties.

The Norton Utilities' Disk Monitor will restrict access to sensitive areas of the disk, park your disk drive heads, and monitor other types of disk access. Disk Doctor is used to diagnose disk problems, and then Disk Tools will repair them, as well as perform other interesting duties.

I find this division of duties confusing—and not just from looking at five different programs that handle several dozen overlapping functions. A single integrated program for either PC Tools or The Norton Utilities would make more sense. Either that, or split up the duties into several dozen individual utilities. Given the bulk of PC Tools and The Norton Utilities, it would be easy to miss

### THE DOWN-AND-DIRTY ON UNDELETING

Just exactly what kind of mojo is involved with undeleting a file? What Frankenstein-like science is required to bring a dead file back to life? The secret to undeleting a file lies in DOS's laziness.

DOS deletes a file like you would remove someone's name from your address book: The person is still alive and probably lives at the same address, but your record of them is gone. DOS deletes files in a similar manner: It goes to the disk directory and replaces the first character of the filename with an I-am-deleted byte. Further, it marks the file's location on disk as available in the disk's map (or FAT). Again, only one byte is changed.

The reason why DOS deletes files this way is speed. Changing two bytes is quicker than going out to the disk and rubbing the file out. Yet the side effect of this method is that the file's contents on disk are still intact. A recovery utility needs only to change the I-am-deleted byte in the directory back to the first letter of the file's name and then change the I-am-available byte in the FAT to an I-am-occupied byte. Once that happens, the file is restored.

While the above discussion makes undeleting a file sound easy, the technomagic required is more complex. A lot of things can mess up file recovery. The most deadly event is when some other file overwrites all or part of the deleted file's data on disk. Smart recovery programs can detect this and will refuse to restore the file. However, as long as you undelete files before any other files are written to disk, you can safely recover anything.

### THE BLACK MAGIC OF UNFORMATTING A DISK

While undeleting files met with miraculous acclaim back in 1983, unformatting a disk met with stunned disbelief only a few years later. Like recovering a deleted file, restoring a freshly formatted disk seemed unbelievable. Yet with DOS's lazy FORMAT command accidentally erasing hard drives right and left, an unformat utility was sorely needed and a great success.

Unformatting a disk is possible because, as with deleting a file, DOS is rather lazy. Basically, when DOS sees a disk is already formatted, it only erases its first track and creates a new boot sector, root directory, and two disk maps (or FATs). The remainder of the disk—with its data still intact—is only verified. DOS 5.0's QuickFormat option even skips the verification stage.

An unformatting program looks for the earmarks of subdirectories on a reformatted disk. It then attempts to rebuild the root directory and FAT as it locates the files in those subdirectories. As long as the bulk of the reformatted disk's data was in subdirectories, full recovery is possible. However, any files in the root directory are generally lost.

To augment recovery, many unformatting utilities come with a disk-imaging program, such as DOS 5.0's MIRROR, PC Tools' Mirror, and Norton's Image. Those programs copy the boot sector, root directory, and FATs and place them in special image files near the end of the disk. Then, if you need to unformat a disk, the unformat utility will check for the image file hidden on the disk. If it's found, recovery is nearly instantaneous and complete.



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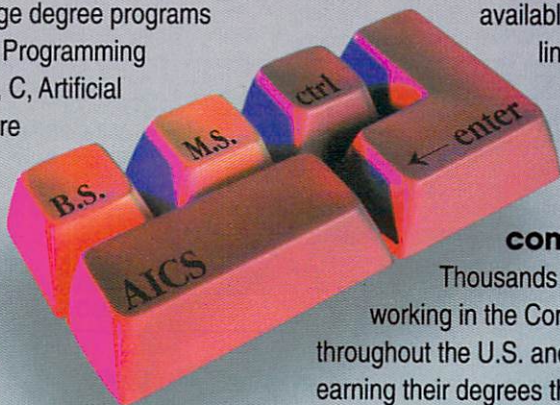
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## Productivity

Productivity utilities are almost totally the domain of PC Tools. Its PC Desktop program could stand by itself, right next to Borland's Sidekick. Yet Central Point Software has graciously included it with the PC Tools package.

PC Desktop features an appointment calendar, an autodialer, calculators, a database, notepads, and an outliner. A clipboard allows global cutting and pasting, and a general macro facility helps you customize PC Desktop.

Beyond the basic features of PC Desktop, you'll find extensive communications programs in various areas of the PC Tools program:

DeskConnect is a desktop-laptop communications program that is able to access files on one computer from another and exchange files between two computers (the second computer doesn't need to be a laptop).

Commute is a PC remote-control program, allowing you to access and use a computer at another location via modem. What you see on your screen is exactly what appears on the remote PC's screen. You can have password protection and host callback, and even monitor remote log-ins.

Modem communications and electronic mail are both features of the PC Desktop telecommunications module. Modem communications allows you to dial up any other PC connected to a modem. The electronic-mail module provides an easy link to MCI Mail, CompuServe, and EasyLink online services. You must have a compatible modem to make this possible.

PC Desktop is also capable of handling fax communications. To do this, your system must have a compatible internal fax card.

With The Norton Utilities, productivity enhancement is provided in two areas: the Batch Enhancer, which adds more power to your batch files, and The Norton Control Center, where you can monitor and adjust various hardware settings and control your DOS environment. PC Tools lacks both of these features.

On the other hand, both packages have a system information utility. It displays a profile of your PC's hardware contents, plus it does benchmark testing and a wee bit of diagnosis. It's mostly for show.

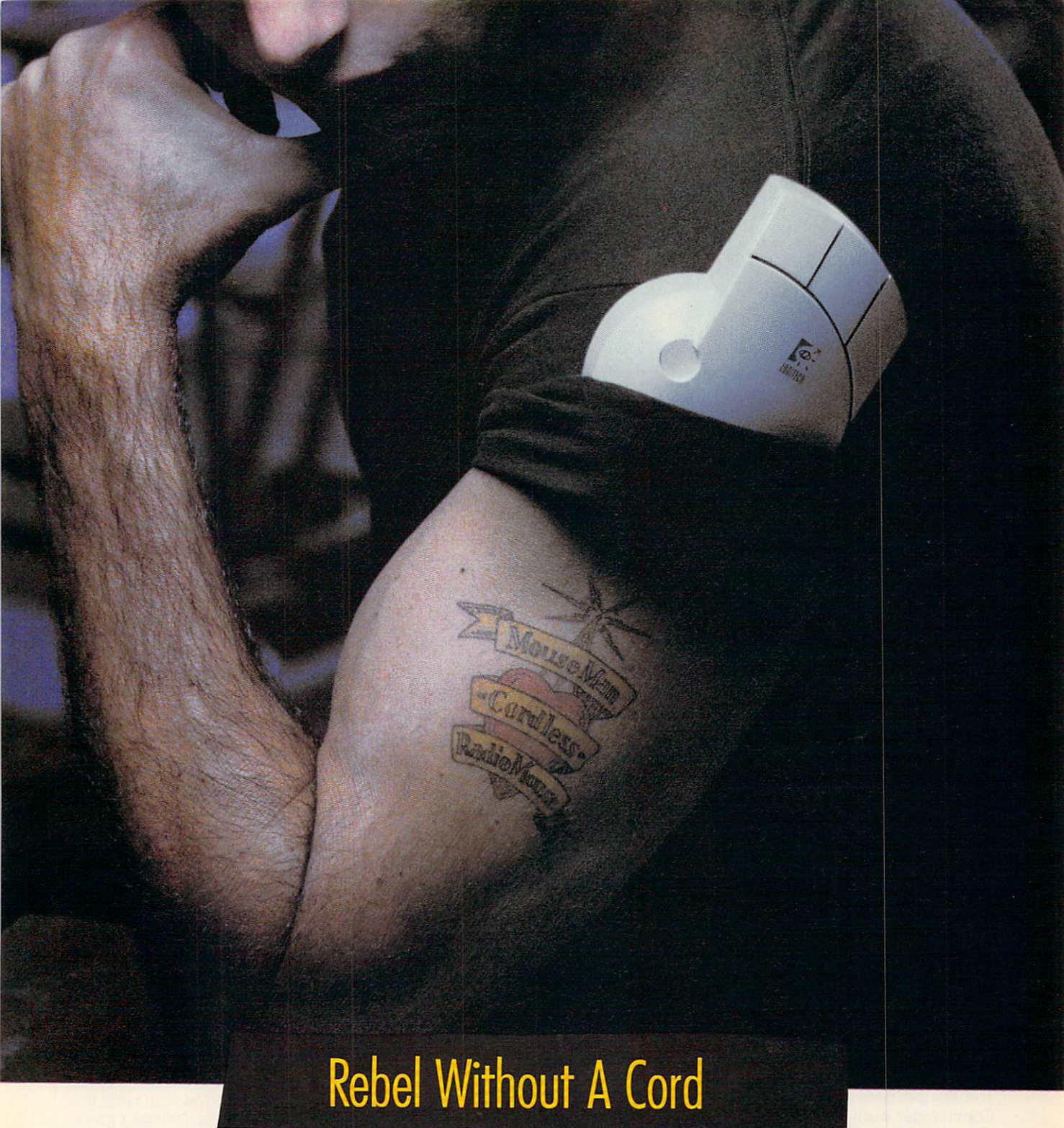
## Which Utility Do You Need?

I find it hard to argue against having PC Tools. It's actually four programs in one: a general package of utilities, a file manager, a backup program, plus

## UTILITIES COMPARISON CHART

Feature	DOS 5.0	Norton	PC Tools
<b>Overview</b>			
Command line control	Yes	Yes	Yes
Integrated environment	No	Yes	Yes
Windows-specific programs	No	No <sup>1</sup>	Yes <sup>2</sup>
Online help	Yes	Yes	Yes
Mouse support	No	Yes	Yes
Graphic look	No	Yes	Yes
Recovery disk	No	Yes	Yes
Size on disk	1.5MB	2.5MB	9.5MB
<b>File Management</b>			
Shell program	DOS Shell	— <sup>3</sup>	PC Shell
Application menu	Yes <sup>4</sup>	—	Yes
Copy/Delete/Rename	Yes	—	Yes
Move command	Shell only	—	Shell only
Date stamping	—	File Date	Yes
File attributes	ATTRIB	File Attributes	Yes
File compression	— <sup>5</sup>	—	PC Secure <sup>6</sup>
File finder (with changes)	—	File Find	— <sup>7</sup>
File locator	DIR/S	File Locate	File Find
File printing	PRINT	Line Print	Yes
File sorting	—	Directory Sort	Shell only
File sizing	—	File Size	—
File viewing	TYPE	—	View
File wiping	—	WipeInfo	Wipe
<b>Directory Management</b>			
Shell program	—	— <sup>3</sup>	DM
Change directory	CD	NCD	Shell only
Create directory	MD	—	Shell only
Prune and graft directory	—	—	Shell only
Rename directory	Shell only	—	Shell only
Remove directory	RD	—	Shell only
<b>Disk Control</b>			
Backup and archiving	BACKUP	— <sup>8</sup>	CP Backup
Command interpreter	COMMAND	NDOS	—
Defragmentation	—	Speed Disk	Compress
Disk cache	SMARTDrive	Norton Cache	—
Low-level revitalization	—	Calibrate	DiskFix
Interleave reset	—	Calibrate	DiskFix
Park program	—	Disk Monitor	Park
Safe formatting	FORMAT <sup>9</sup>	Safe Format	PC Format
Sector editing	DEBUG <sup>10</sup>	Disk Editor	Shell only
<b>Security</b>			
Boot/FAT/Root protection	MIRROR	Image	Mirror
Directory password	—	—	Data Monitor
File encryption	—	Diskreet	PC Secure
Sector protection	—	Disk Monitor	Data Monitor
Virus detection	—	— <sup>11</sup>	Vdefend
Virus removal	—	—	—
<b>Recovery</b>			
1-2-3 repair	—	File Fix	File Fix
dBASE repair	—	File Fix	File Fix
General file repair	RECOVER <sup>12</sup>	—	—
Delete prevention	MIRROR	Erase Protect	Data Monitor
Diagnostic tools	—	Disk Doctor	DiskFix
Disk repair	—	Disk Tools	DiskFix
FAT recovery	MIRROR	Disk Tools	DiskFix
Undelete	UNDELETE	Unerase	Undel
Unformat	UNFORMAT	Unformat	Unformat
Unremove directory	—	—	—
<b>Productivity</b>			
Appointment calendar	—	—	in PC Desktop
Autodialer	—	—	in PC Desktop
Batch file enhancement	—	Batch Enhancer	—





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## UTILITIES COMPARISON CHART (continued)

Feature	DOS 5.0	Norton	PC Tools
Calculator	—	—	in PC Desktop
Change hardware settings	—	Control Center	—
Clipboard	—	—	in PC Desktop
Communications	—	— <sup>13</sup>	in PC Desktop <sup>14</sup>
Database	—	—	in PC Desktop
Fax support	—	—	in PC Desktop
Macros	—	—	in PC Desktop
Notepad	—	—	in PC Desktop
Outliner	—	—	in PC Desktop
System information	—	System Information	System Information
Text locator	—	Text Search	Shell only

<sup>1</sup>The Norton Utilities does come with icons for some programs.

<sup>2</sup>Backup, Undelete, and a special control-menu program launcher.

<sup>3</sup>A separate product, The Norton Commander, contains file and directory shells.

<sup>4</sup>In DOS Shell.

<sup>5</sup>DOS has a file-expansion program, EXPAND, but no companion COMPACT utility.

<sup>6</sup>Only compresses files as they're encrypted.

<sup>7</sup>Can be done in the shell after using File Find.

<sup>8</sup>The Norton Backup is sold as a separate product.

<sup>9</sup>FORMAT automatically saves unformat information on every disk reformatted.

<sup>10</sup>DEBUG can load a sector into memory, allow you to edit that memory, and then write it back to disk. It's inelegant, but functional.

<sup>11</sup>Disk Monitor will prevent a virus from writing to some parts of a disk, but it doesn't actively scan for infection.

<sup>12</sup>RECOVER is a disaster. Though it's advertised as a file and disk repair program, I strongly advise against its use. In fact, Norton's Disk Tool will help you recover from using DOS's RECOVER command.

<sup>13</sup>The Norton Commander comes with Command Mail, a link to MCI Mail.

<sup>14</sup>PC Desktop offers extensive communications capabilities, including access to MCI Mail. Laptop/desktop and remote PC communications are also available through other PC Tools utilities.

the PC Desktop program with its productivity features.

On the downside, the program is overwhelming. I doubt if any one user will ever master the complete package, and books on PC Tools are fat and intimidating. You could make it a lifelong endeavor to say you've used everything in the package (which has often been the case with other major applications as well).

Comparatively speaking, you'd need to buy The Norton Utilities plus The Norton Backup and The Norton Commander even to start comparing the packages across the board. (This stems from Symantec's view of PC Tools as an end-user product and its outdated and stubborn insistence that end users don't buy programs.) For basic utility needs, however, Norton more than fills the bill. If you don't want the bulk of PC Tools and don't need CP Backup or the productivity utilities of PC Desktop, then The Norton Utilities is a slimmer choice.

Another basis for your decision is whether or not you feel comfortable working inside a file-management

shell. If so, then PC Tools will probably be your choice. If you prefer the DOS command line, then Norton is for you—especially given the inclusion of NDOS to replace COMMAND.COM. There's also a third option: As the scarecrow says to Dorothy in *The Wizard of Oz*, "Some people do go both ways." Personally, I use Norton on my desktop machine and PC Tools on my laptop.

Whichever utility you choose, PC utilities have grown in power and ability over the last ten years. And the bottom line is that there are plenty of options for any PC user looking to enhance DOS with some utility power. □

### PRODUCT LIST

PC Tools—\$179  
Central Point Software  
15220 NW Greenbrier Pkwy., Ste. 200  
Beaverton, OR 97006  
(503) 690-8090

The Norton Utilities—\$179  
Symantec  
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Cupertino, CA 95014  
(408) 253-9600

## DOS 5.0'S UTILITIES

What makes DOS 5.0 such a remarkable upgrade is its arsenal of new features, including MIRROR, UNDELETE, and UNFORMAT—utilities formerly available only from third parties that are now commands under DOS. With those three programs, DOS can now be both the hero and the villain.

Along with its disaster-prevention and data-recovery utilities, DOS also sports other new commands that were formerly the exclusive domain of third-party utilities.

Help! Since day one, DOS help utilities have been available, giving users online access to the DOS manual, command syntax, and options. Now that's all a part of DOS with the HELP command plus the optional / ? switch on all other major DOS commands.

The DOS Shell program gives all DOS users a comfortable, graphic, and mouseable environment in which to manipulate files and directories, work with disks, run programs from a menu, and switch between several programs stored (but not running) in memory at once. This pits DOS head-to-head with such program swappers as Software Carousel and DESQview, as well as file/shell programs like XTree and PC Tools' Shell.

The HIMEM.SYS and EMM386.SYS configuration commands—plus DEVICEHIGH and LOADHIGH—are all now a part of DOS's memory-management skills. While not as advanced as some third-party packages, DOS's memory-management drivers and commands will give 386 owners more RAM in which to run DOS programs plus control for both extended and expanded memory.

Though DOS has always come with RAM-drive software, only with version 5.0 did Microsoft start tossing in a disk cache. The SMARTDRV.SYS software gives DOS users greater ability to speed up disk operations than the old FASTOPEN command.

Extensive command line editing, history, and macros are now possible, thanks to DOSKEY.

DOS 5.0 also upgraded the version of BASIC shipped with DOS. GW-BASIC is now just a REM in the history books and has been replaced by QBASIC, an interpreted version of Microsoft's QuickBASIC compiler.

Along with QBASIC comes DOS's new EDIT program. EDIT is much better than the old EDLIN, yet interestingly, it's an element of the QBASIC program. Third-party editors are more diverse and also more compact, since running EDIT requires the 250K QBASIC.EXE program.

If DOS continues to grow at this level, future versions may contain even more diverse utilities. On the must-have list are a defragmentation utility, better backup and restore, password protection and file security, and a disk doubler or file-compacting program. With those features—and possibly more—DOS may soon become a complete operating environment.





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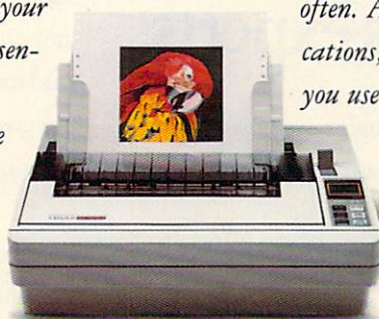
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*So take a look at Citizen's GSX-140 PLUS today. For the name of your nearest dealer, call 1-800-4-PRINTERS.*

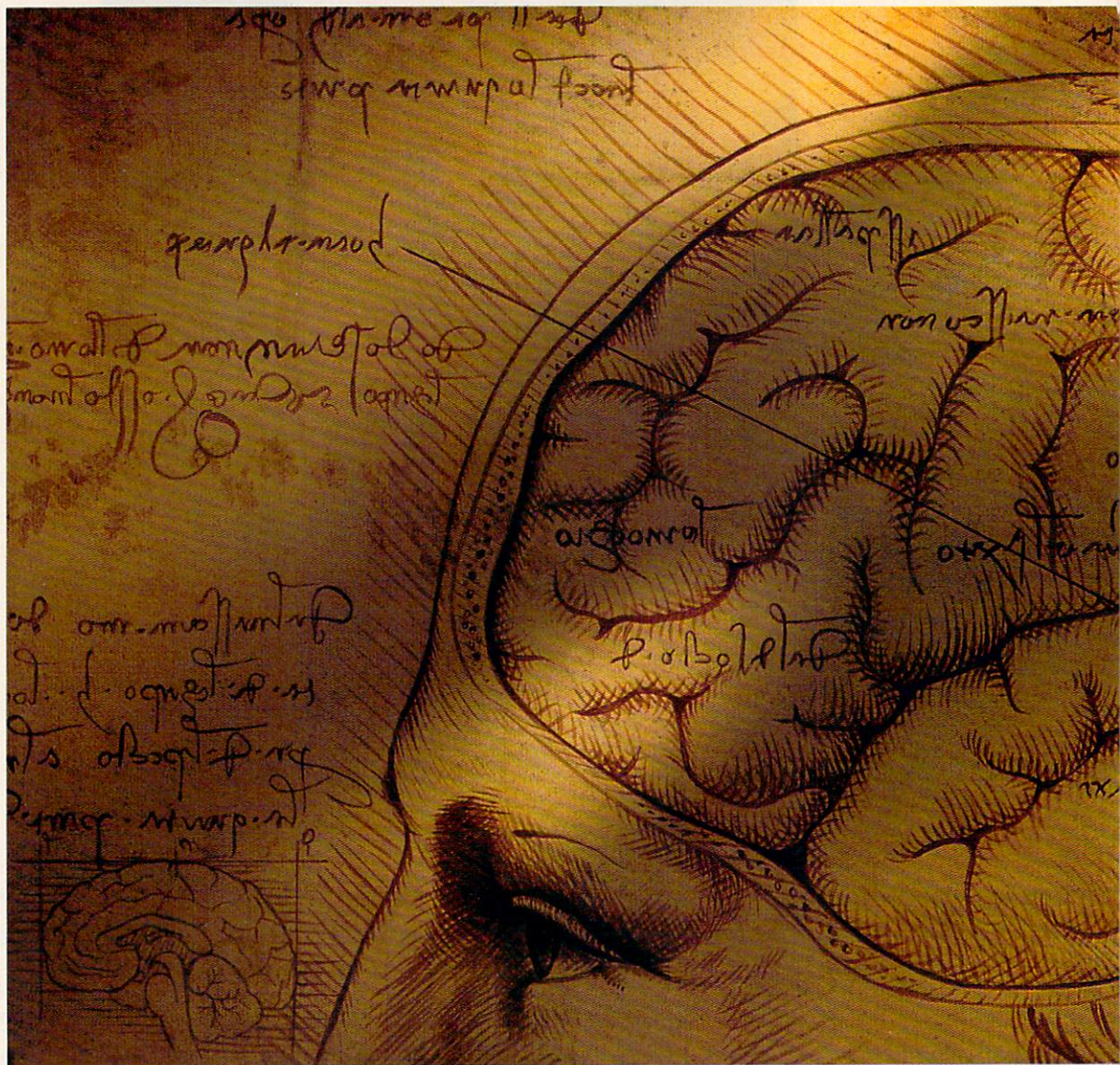


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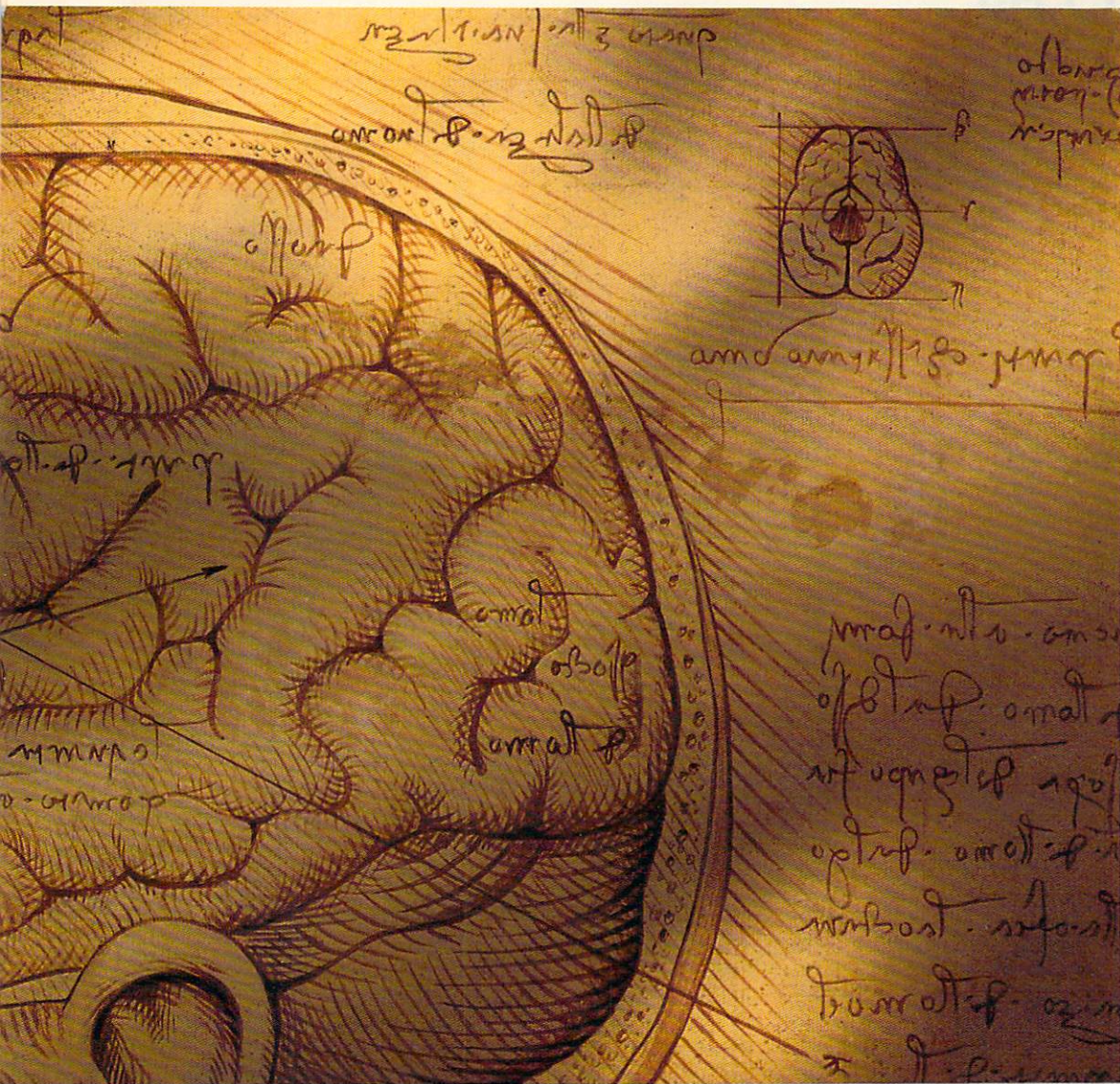
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# TEST LAB

**I**ncreasing power, decreasing size—that's the direction of today's computer industry. And for today's computer enthusiast, the trend has proved a tremendous boon to productivity and convenience. Now you can write that winning proposal while sitting on your sofa, in a plane, or by the lake. Word processing, spreadsheets, and personal information management—even in Windows—are as close as your briefcase, thanks to the lower prices and higher technology of today's notebooks. It's no wonder that portable computing, one of the fastest-growing segments of the computer market, is also one of the most rapidly changing and closely watched segments.

It should come as no surprise, then, that hardware manufacturers have scrambled to provide a line of downsized peripherals for use with your notebook. This month, Test Lab focuses on two categories of portable peripherals—printers and communication devices.

Portable printers are great for producing hardcopy at remote locations, such as a construction site or summer cabin, as well as for making last-minute changes in a document when you're on the go and don't have access to a regular printer. The four printers we cover this month offer versatility; high quality; and, of course, tremendous convenience.

The five portable communication devices examined this month really let you unleash the power of your portable, whether you're uploading and downloading files, sending electronic mail, checking news and weather with your online service, or sending and receiving faxes.

This month's Test Lab provides the facts, figures, explanations, and analysis you'll need to increase your understanding of these new technologies and make a more informed buying decision. Ready to increase your portable productivity? Then read on.

MIKE HUDNALL



**BROTHER INTERNATIONAL**  
200 Cottontail Ln.  
Somerset, NJ 08875  
(908) 356-8880  
List price: \$499.95†

## BROTHER HJ-100i

What weighs four pounds, packs easily inside an average attaché case, operates almost silently, and can produce page after page of consistently high-quality text and graphics? If you answered the Brother HJ-100i Portable Inkjet Printer, you're absolutely right.

The putty-colored portable measures a scant 12¼ inches wide by 8½ inches deep by 2 inches thick, making it the perfect traveling companion for a notebook or laptop computer. A pivoting support stand, located at the rear of the printer's case, swivels out to hold the printer in an upright position when it's in use.

A solid performer, the Brother HJ-100i prints text in either LQ or NLQ modes at a steady 83-cps rate. The difference between these two modes is the density of the printed characters and amount of ink consumed. LQ mode generates black, well-defined characters and yields about 700,000 characters per cartridge. NLQ mode produces a less dense concentration of ink, giving you a gray (rather than black) image; however, it's much more economical, yielding approximately 1,400,000 characters per cartridge.

An optional ni-cad battery pack can power this printer if you choose to use it while traveling. In more stationary environments, the included AC adapter provides the power.

Controls for the HJ-100i—the soft-touch variety—are located at the front of the printer; embedded LED indicators keep you apprised of the printer's status. An internally mounted bank of 11 DIP switches lets you change the default values of the printer, such as paper size, normal or high-density characters, and mode selection.

Installing an ink cartridge in the Brother HJ-100i is a painless procedure best described as drop and click. You simply drop the replacement cartridge into the cartridge carrier and click the locking lever forward.

Three control modes on the HJ-100i allow you to vary graphic capabilities and emulations. In Mode 1 the HJ-100i emulates the IBM X24E series of printers, Mode 2 is the native HJ-100 mode, and Mode 3 provides Epson LQ emulations. A prioritized hierarchy for each mode gives you access to various mode subsets. For example, when the HJ-100i is in Mode 3 (Epson LQ), it will emulate the Epson LQ model 510, 850, 500, 2550, or 800 in that order of priority by sensing the control signals sent by the host PC. If no LQ driver appears in your application's printer-selection menu, the HJ-100i will use Epson FX or MX draft-quality print drivers instead. This prioritized emulation scheme provides a lot of flexibility in configuring the HJ-100i for virtually any application.

Print quality of the unit is excellent. †Street prices for hardware units appearing in Test Lab are usually significantly lower than list prices.



lent in the LQ mode and very good in the NLQ mode as well. Since the print mechanism uses jets of ink deposited by a cartridge that glides from side to side along a screw-type carriage, the unit is all but silent in operation.

It's a joy to set up and use the Brother HJ-100i, thanks to a super user's manual that details everything you need (or could possibly want) to know about the printer—in English, French, and German.

Everything about the HJ-100i is top-drawer—it's attractive, quiet, quick, small, and light. In short, it's a winner.

TOM BENFORD

Circle Reader Service Number 304

## CANON BJ-10EX

Canon caused a sensation a couple of years back when it introduced the BJ-10e, an easily transportable device capable of outputting high-quality text and graphics. This mighty mite made the dream of a truly portable office a reality. Not content to rest on their laurels, the Canon folks have endeavored to make a good thing even better. And they've succeeded—the new model is called the BJ-10ex.

Cosmetically, the BJ-10ex is a dead ringer for its predecessor, with the bulk of changes confined to extended firmware (for example, more DIP switches and emulation modes) and improved electronics (with, for example, one component replacing two or three). Aside from the x at the end of the name, the BJ-10e and BJ-10ex appear identical when viewed next to each other.

The BJ-10ex is the popular notebook size (12.2 inches x 8.5 inches x 0.9 inches), and at about four pounds, it's easy to pack along in a laptop's carrying case or in an attaché. A snap-on plastic cap keeps foreign matter out of the parallel interface port, found at the right side of the machine near the front.

Using a 64-nozzle bubble-jet

**CANON U.S.A.**  
1 Canon Plaza  
Lake Success, NY 11042  
(800) 848-4123  
List price: \$499

printhead, the BJ-10ex can output text at 83 characters per second in either high-quality mode or economy mode. The difference between these two modes is the amount of ink consumed and the quality of the output. Economy mode produces a semifilled character that appears gray rather than black, while high-quality mode generates well-defined solid black output. Economy mode yields about 1.4 million characters before the cartridge is spent; high-quality mode will deliver only about half as many before you need to replace the cartridge.

Three emulations come with the BJ-10ex to facilitate configuring it to work with all major software packages. Mode 1 is the IBM X24E emulation; Mode 2 provides Canon BJ-130e emulation; and Mode 3, also called LQ mode, provides Epson LQ-510 emulation. Setting the emulation mode involves changing the settings of switches 10 and 11 in a cluster of 11 DIP switches located under the front cover of the printer. (The original BJ-10e had only 10 switches.)

This bank of DIP switches also controls other configuration parameters, including page lengths of 11 or 12 inches, normal or high-density print modes, and readying the unit to work with the optional automatic sheet feeder.

Print quality in high-quality mode is quite good regardless of which emulation you use; when you use a font package like Bitstream's Facelift for Windows, it's almost as good as the output of a laser printer. The Epson LQ



emulation provides probably the greatest versatility of the three available modes, since practically every software package sold supports the Epson standard.

An optional ni-cad battery pack is available for users who want total freedom from AC power, and there's also an optional sheet feeder which automates the printing of multipage documents.

Canon has indeed succeeded in topping its own personal best with the BJ-10ex.

TOM BENFORD

Circle Reader Service Number 305

## CITIZEN PN48

Compact. Lightweight. Indisputably portable. Undeniably a performer. The 2½-pound Citizen PN48 makes good on the promise of the mobile office. Whether in a hotel room or in the air, this printer can make your documents look almost like they came off a laser printer—it's that good. And when you're packing for that extended road trip, you can squeeze the PN48 into your briefcase next to your notebook computer—it's that small.

If you're looking for the trade-offs, the good news is that there aren't many. You won't have a sheet feeder, but the PN48 offers two paper paths (from the rear or bottom) that work smoothly with almost any kind of paper and envelopes, in widths from 3.5 inches to 10.2 inches. If you're designing last-minute changes to your presentation at 27,000 feet, the



# TEST LAB

PN48 will also handle high-quality transparencies. Loading is simple, smooth, and flawless. Paper jams just weren't a problem for me.

Print quality is a trade-off, but it's a small one. Since Canon introduced its bubble-jet portable two years ago, several manufacturers have worked to improve the print quality of portable printers. Citizen achieves very clear and distinct type with the PN48, although you may experience some slight variation in tone. Overall, however, the quality of the print so far outdistances that usually associated with portable printers as to make these slight variations negligible. If you do experience problems, experiment with different kinds of paper, as paper quality will affect print quality.

The PN48 offers IBM and Epson emulations. A Windows driver is available from Citizen's online support bulletin board system. The drop-in ink cartridges come in two varieties: a single-strike cartridge (best-quality print) that you can use only once and a multistrike cartridge (lower-quality print) that can be turned over and used again. The multistrike cartridge should be good for 100,000 characters, or between 50 and 70 ASCII pages. The single-strike cartridge yields 35,000 characters, or about 20 to 25 ASCII pages.

A rechargeable ni-cad battery

**CITIZEN AMERICA**  
P.O. Box 4003  
Santa Monica, CA 90411-4003  
(800) 477-4683  
List price: \$549 for Professional System with rechargeable battery, \$469 for Standard System without battery

provides true portability and adds little weight to the unit. Citizen claims that a full charge is enough to print about 20 to 25 double-spaced pages of text. Charging a completely empty battery takes about six hours.

The PN48 can't be considered a substitute for a desktop printer, except perhaps by executives who don't want to be seen printing documents they've prepared themselves. (In this case, Citizen's brick-size printer will easily fit into the top drawer of the desk, out of sight.) For the salesperson who needs to update and print orders and contracts while meeting with clients or for other specialized fieldworkers requiring access to a printer, the PN48 makes a lot of sense. The price, while not insubstantial, is well met by performance and reliability. When you're on the road, those are qualities that you shouldn't have to sacrifice.

PETER SCISCO

Circle Reader Service Number 306



## HAYES POCKET EDITION 2400 MODEM

A perfect addition to the portable computer user's ensemble, the Hayes Pocket Edition 2400 carries on the Hayes tradition of high-quality, industry-standard data-communications devices.

Measuring a demure  $3 \times 2 \times \frac{7}{8}$  inches, the Pocket Edition is a fully functional 2400-baud external device complete with built-in 9-pin serial cable, six-foot phone cord, and Smartcom EZ communications software. The Smartcom EZ software, a bare-bones terminal program, allows for such things as file transfers under the standard XMODEM protocol and is accessed through a friendly menu system; however, it lacks many of the features available in more sophisticated terminal packages—features like multiple-transfer protocol selections and mini-BBS functions. Because it's a genuine Hayes, however, the Pocket Edition 2400 will work with any software that supports the nearly universal Hayes AT command set.

Installing the Pocket Edition requires nothing more than plugging in the serial and phone cables and loading the Smartcom EZ software via an automated installation program. Hayes couldn't have made the installation and setup simpler than this.

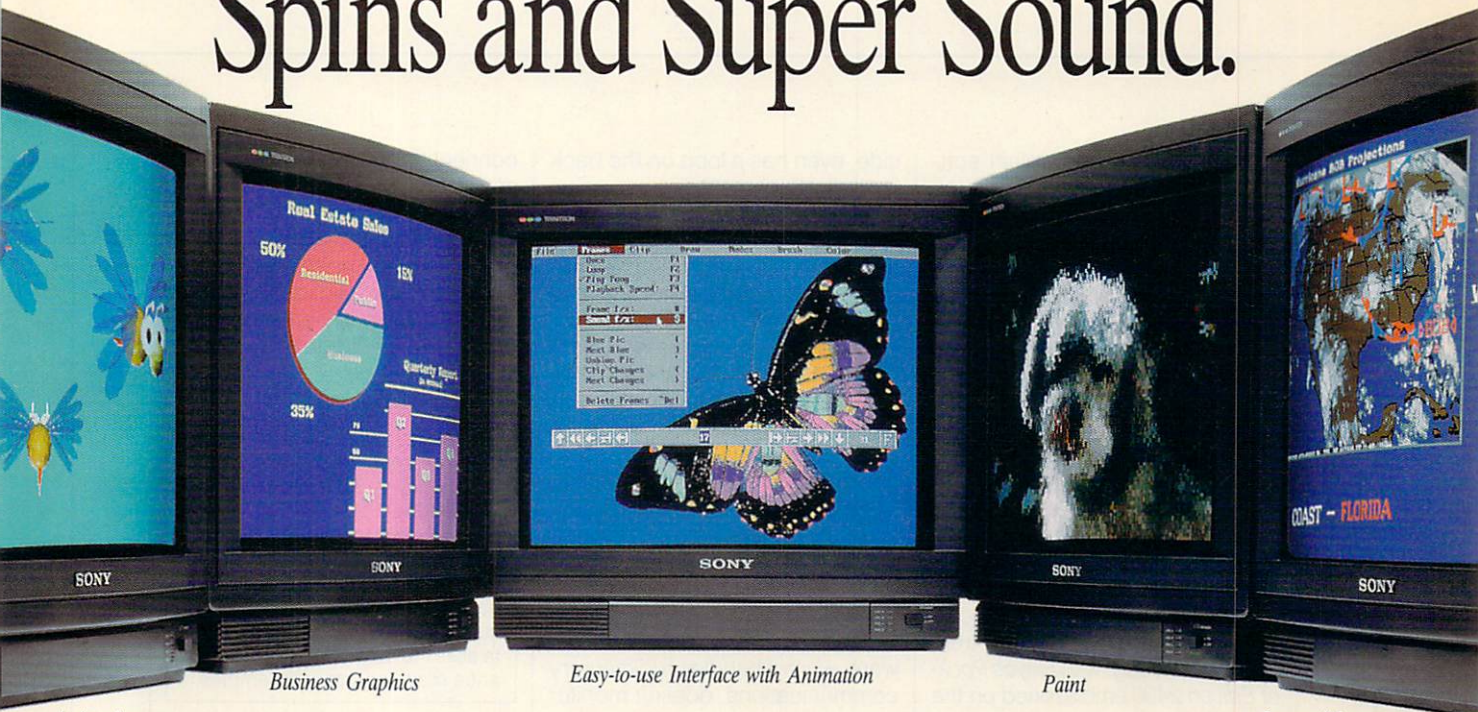
The documentation supplied with the modem is clear and simple to follow. Hayes makes no assumptions about the user's knowledge or prior experience



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PC Animate Plus was designed for simplicity. Simple to create, simple to change, and simple to use. The dropdown menus make it immediately usable. The manual was written

for quick reference. And the program's flexibility is unequalled in any resolution – forward or backward. PC Animate Plus supports the most popular sound card (Sound Blaster™ compatible), converts Autodesk .FLI files for compatibility, supports EGA, VGA, and VESA (super and ultra VGA), up to 1280 x 1024 with 256 colors, as well 32,000 color formats. And, it reads or writes GIF, PCX and TIFF picture formats.

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*Brown Wagh*

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 (408)378-3577 (fax)



# TEST LAB

with modems and terminal software, and the manual provides more than adequate handholding.

The Pocket Edition 2400 is unique in that it doesn't require a battery or AC power supply to operate like other pocket modems; it draws its operating voltage directly from the computer's +5-volt power-supply pin on the serial port. This eliminates the need to pack and carry an AC transformer or worry about whether your nine-volt battery is fresh.

The Pocket Edition 2400 is a natural traveling companion for use with portable computers, and it comes with a small zippered carrying bag for stowing it during travel. The black bag, with *Hayes Pocket Edition 2400* emblazoned on the

side, even has a loop on the back for belt attachment.

Such small size dictates eliminating some features regarded as standard on full-size modems—internal speakers and status-indicator lights, for example. Traditionally, speakers and indicators on modems allow ready access to the modem's status during transmission and provide an accurate means of error detection during problematic transfers.

A modem's speaker lets you know if a connection has been made, if a line is busy, or if you've dialed a wrong number. Without the speaker, you must rely on the terminal software. The bundled software, while it handles rudimentary communications, doesn't monitor

connection conditions as well as some third-party packages do.

Ideal for portable use and also quite serviceable for desktop users with limited space, the Hayes Pocket Edition 2400 delivers plenty of features and performance in a pint-size package.

TOM BENFORD

Circle Reader Service Number 307

All Benchmark/Performance Testing is conducted by Computer Product Testing Services (CPTS), an independent testing and evaluation laboratory based in Manasquan, New Jersey. Every effort has been made to ensure the accuracy and completeness of this data as of the date of testing. Performance may vary among samples.

## THE MODEM AND FAX TESTS

To test this month's communications devices, we used a 20-MHz 386SL notebook computer and a 25-MHz 386DX desktop computer; each was running MS-DOS 5.0.

Additional equipment for the testing included a TLS-3 line simulator, an FTS-80 modem/fax test set, and a proprietary CPTS multilevel line-noise and signal-impairment generator. To confirm and calibrate all off-hook meter readings and test levels, we used a standard AT&T 2500 touch-tone telephone set.

A 2400-bps Hayes-compatible external modem connected via the serial port served as the host modem for all modem testing. We used Procomm Plus communications software (parameters: 2400,N,8,1) and the Super Kermit file-transfer protocol to send and receive the following test files: SPALOGO.IMG (bitmap graphics; 19,592 bytes), SOFTWARE.TEX (ASCII text file; 9,728 bytes), WATERFAL.PCX (PC Paintbrush file; 39,324 bytes), MEMCHK.COM (command program; 1,266 bytes), QT.COM (command program; 512 bytes), 4000AS.TXT (ASCII alignment text file; 4,224 bytes), BUSY.EXE (executable program; 12,539 bytes), CAN.TIF (TIF scanned image file; 12,018 bytes), PRINTER.DOC (ASCII extended characters; 4,224

bytes), SAY.EXE (executable sound program; 13,393 bytes), VOICE.V3S (digital sound file; 4,224 bytes), WIND-LOGO.GEM (GEM vector graphics file; 1,156 bytes).

We sent and received the test files using "clean" simulator conditions as well as various impairment levels. To test the integrity of transfers at the end of each test cycle, we ran executable and program files and compared file sizes; text and graphics files were displayed to confirm the integrity of those transfers visually.

For all fax testing, a desktop Okidata Okifax 650 fax machine served as the host test unit. We used the manufacturer's proprietary fax software with the following test files: SPALOGO.IMG (bitmap graphics; 19,592 bytes), SOFTWARE.TEX (ASCII text file; 9,728 bytes), WATERFAL.PCX (PC Paintbrush file; 39,324 bytes), 4000AS.TXT (ASCII alignment text file; 4,224 bytes), CAN.TIF (TIF scanned image file; 12,018 bytes), PRINTER.DOC (ASCII extended characters; 4,224 bytes).

File type-transmission compatibility varies greatly from one fax product to another; hence, some products can send all of the above file types as well as additional formats while others cannot even support all of the file types listed above. All can support ASCII files, and most can

transmit PCX and TIF types at a minimum, so we've based our test file types on the most popular formats supported by the majority of products.

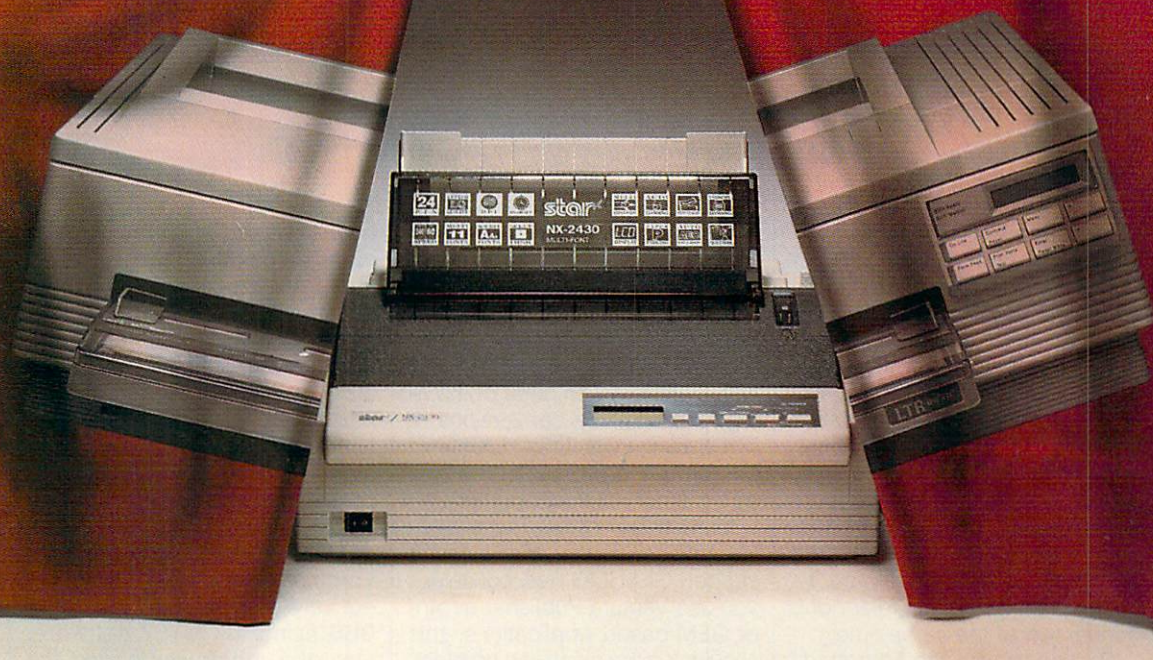
Test files were sent and received using "clean" simulator conditions as well as various impairment levels. We compared documents received at the Okifax 650 with laser-output samples of the original document files to judge the quality of the transmission and visually confirm the integrity of the file transfer. With each test device, we used the highest transfer rate available to send files to the Okifax 650, which supports 9600 bps in standard Group III mode. If the data-transfer rate had to be stepped down to 7200, 4800, or 2400 bps during the transfer process, we indicated it on our test-result data sheets.

For testing fax devices that can receive as well as send files, we used a nine-page set of laser-output samples with a cover sheet as the test medium, sending it from the Okifax 650 to the test device under clean and impaired line conditions. Received fax files were viewed on the video display between test cycles and printed using a 300-dpi HP-compatible laser printer driven by the fax software's file-printing utilities.

—TOM BENFORD, PRESIDENT  
COMPUTER PRODUCT TESTING SERVICES



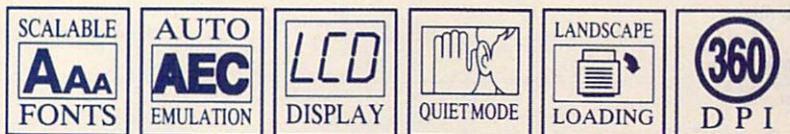
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# TEST LAB

## MEGAHERTZ P224FMV POCKET LAPTOP FAX MODEM

Combine sophisticated modem, terminal, and fax software with highly functional communications hardware, and what have you got? The Megahertz P224FMV Pocket Laptop Fax Modem system, a high-powered package that should serve any user well.

The sleek, diminutive 3¼ × 2¼ inch unit comes with several accessories, including a six-foot telephone cord, a pair of alkaline batteries, an AC power adapter, and a zippered carrying pouch. A 9-inch serial cable connects with the host PC's 9-pin serial port. The Megahertz is equipped with a single phone jack, so it's not possible to have a telephone connected at the same time.

Packaged with the Megahertz is the MTEZ terminal program and ExpressFax software. MTEZ is a surprisingly good terminal program loaded with features, lacking only in the number of protocols available for data transfers. It's rich in functionality, including full scripting capabilities, DOS gate-

**MEGAHERTZ**  
4505 S. Wasatch Blvd.  
Salt Lake City, UT 84124  
(800) LAPTOPS  
List price: \$379

way, mini-BBS utilities, and much more. Likewise, ExpressFax is one of the most comprehensive and flexible fax software programs provided with any of the units reviewed here. The program supports full memory-resident (TSR) background fax reception, so it won't interfere with other computing functions. File conversions of ASCII text, PCX, DCX, EXP, and TIF formats are provided as well as a memory-resident printer utility for routing incoming faxes to on-line printers. ExpressFax doesn't support GEM IMG files, but unless you use Ventura Publisher or other GEM-based applications, this shouldn't pose much of a problem.

Installation proved to be more challenging than expected. Initially, the unit functioned perfectly as a modem but refused to send or receive any fax transmissions. A toll-free call to Megahertz technical support revealed that the internal registers had somehow



been changed and they required manual resetting. Once I reset these, the fax sent single-page documents without incident. However, transmission of multipage documents was interrupted, and a communications error was reported after each page was sent.

Another call to tech support disclosed that the version of ExpressFax shipped with the unit wasn't the most current and that this was the root of the problem. I promptly downloaded the newest version from the Megahertz BBS using the MTEZ software. Once the update was loaded, the fax functioned without a hitch.

Using the Megahertz unit is easy, thanks to the friendly yet sophisticated software provided. In just about every respect, I found the Megahertz to be a megahit.

TOM BENFORD

Circle Reader Service Number 308

### PORTABLE PRINTER TEST RESULTS

	BROTHER HJ-100i	CANON BJ-10EX	CITIZEN PN48	STAR MICRONICS STARJET SJ-48
<b>4-page text document</b>				
Elapsed time	2 min. 57 sec.	3 min. 6 sec.	4 min. 14 sec.	3 min. 20 sec.
Output appearance	good	good	good	excellent
<b>4-page GEM Artline graphics</b>				
Elapsed time	9 min. 55 sec.	9 min. 59 sec.	18 min. 24 sec.	10 min. 27 sec.
Output appearance	good	good	good	excellent
<b>2 PerForm ruled forms</b>				
Elapsed time	6 min. 12 sec.	6 min. 10 sec.	10 min. 39 sec.	6 min. 29 sec.
Output appearance	good	good	good	excellent
<b>C.P.T.S. printer test</b>				
Elapsed time	1 min. 47 sec.	1 min. 57 sec.	4 min. 27 sec.	1 min. 57 sec.
Output appearance	good	good	good	excellent
<b>Windows font test</b>				
Elapsed time	0 min. 36 sec.	0 min. 53 sec.	1 min. 5 sec.	1 min. 5 sec.
Output appearance	good	good	good	excellent
All tests were run using the Epson emulation.				



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Bocaram 2 for PS/2's OK \$159 2MB \$219  
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### BOCA Research

BOCA Super VGA 512K \$139 1MB \$179

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Laserjet II, IID  
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### Panasonic 4420 & 4450I

1MB \$109 2MB \$129 4MB \$229  
4450 1MB \$179 4455 2MB \$269

### Epson EPL 6000 & EPL 7000

1MB \$129 2MB \$145 4MB \$235

### IBM 4019 & 4019E

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### OKI 400, 800, 820, 830, 840

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### Canon

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80387-16SX \$139 -20SX \$189  
80287-10 \$75 80287XL \$99

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286E \$159  
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# TEST LAB

## FAX AND MODEM FEATURES

	HAYES POCKET EDITION 2400 MODEM	MEGAHERTZ P224FMV POCKET LAPTOP FAX MODEM	U.S. ROBOTICS WORLDPORT 2496 FAX/DATA MODEM	ZOLTRIX POCKET 96/24 FAX MODEM	ZOLTRIX 2400P DATA MODEM
List price	\$179	\$379	\$379	\$229	\$99
Product type	modem	fax/modem	fax/modem	fax/modem	fax/modem
Maximum fax speed (in bps)	n/a	9600	9600	9600	4800
Minimum fallback (in bps)	300	300	300	300	300
Data modem capability	■	■	■	■	■
Auto fax/modem select	n/a	■	■	■	■
Fax transmit capability	n/a	■	■	■	■
Fax receive capability	n/a	■	■	■	□
Maximum modem data speed (in bps)	2400	2400	2400	2400	2400
AT command set	■	■	■	■	■
Background/operation mode	n/a	■	■	■	■
Automatic answering	n/a	■	■	■	■
Automatic dialing	n/a	□	□	□	□
Performs polling	n/a	□	□	□	□
Clean tests					
Transmit	pass	pass	pass	pass	pass
Receive	pass	pass	pass	pass	†
Impairment tests					
Transmit	pass	pass‡	pass‡	pass	pass
Receive	pass	pass	pass	pass	†
Hardware installation	simple	average	average	average	simple
Software installation	simple	average	average	simple	simple
Documentation	good	good	excellent	good	good
Overall product assessment	good	good	good	good	good

† Send-only unit.

‡ Passed all tests; will not send IMG files.

■—yes □—no

n/a—not applicable or not available

Minimum fallback is the minimum speed to which a modem or fax will fall back—that is, slow down—to match speeds with another machine or to perform extra error correction in order to check and ensure data integrity.

Polling allows a fax unit, at a deferred time, to send out form letters to a predetermined set of fax numbers. It also allows you to leave documents in your transmit queue and have them transmitted in response to a faxed request.



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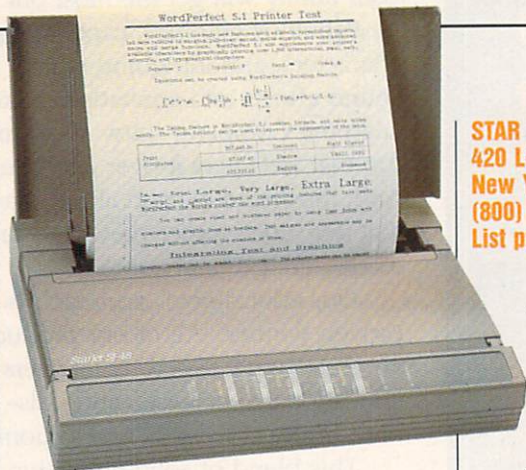


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Circle Reader Service Number 104



# TEST LAB



## STAR MICRONICS STARJET SJ-48

With clear and well-defined output (up to 360 x 360 dpi resolution) rivaling that of laser printers, nearly silent operation, and minimal maintenance requirements, the four-pound SJ-48 is equally suited to the office, the home, and the college dorm. Best of all, it costs just a little more than a 24-pin dot-matrix printer (and several hundred dollars less than a personal laser printer).

Looking for type control? The SJ-48 comes with four resident bit-mapped fonts (Roman- and Helvetica-style faces with italic for both) and a version of Bitstream's Facelift, which gives access to 13 more scalable fonts. A Windows driver also comes with the printer.

The mechanical implementation of the SJ-48 is sound, from the paper feed to the front-panel controls. The printer accepts a variety of different paper stocks, from standard copier paper to envelopes and cards. Using the front panel, you can control the font and pitch, adjust the top of form, clean the printhead, pause printing, and flush the buffer (28K maximum, with no character download).

The clearly marked front-panel display provides only auditory feedback: Instead of visual indications of your selections, you must rely on a series of beeping signals, which are described in the printer's 120-page manual.

**STAR MICRONICS AMERICA**  
420 Lexington Ave., Ste. 2702  
New York, NY 10170  
(800) 447-4700  
List price: \$499

The documentation clearly lays out the order of font selection but doesn't explain how to rotate to the top of the pitch selection list. You should print a few test pages and record the results in your manual to ensure that you're setting the correct pitch for your documents.

Two paper paths (from the rear and from the top) handle rolling and straight feeds. You should feed heavier stock (envelopes and cards, for example) from the rear with the printer on its edge (using the printer's pull-out stand for stability). Regular paper can also be fed through the rear, from the top (with the printer flat on the table), or from an optional 30-page sheet feeder.

An optional rechargeable battery (an additional 0.6 pound) can provide power for printing about 40 pages of text. The added weight is a small trade-off for the flexibility of having a truly portable printer with this kind of print quality. Print cartridges install easily and are rated at 700,000 characters. Overall, the economics of the SJ-48 compare favorably to the economics of laser printers for home offices or other businesses with moderate printing requirements (about \$0.05 per page for the SJ-48 as compared with about \$0.03 for the typical laser printer).

Designed for small workspaces, mobile executives, and home office workers needing high-quality output, the SJ-48 is all the printer many computer users will need. Versatility, desktop publishing quality, high-resolution graphics, ease of use, portability, and reliability (a two-year warranty) make this one a Star.

PETER SCISCO  
Circle Reader Service Number 309

## U.S. ROBOTICS WORLDPORT 2496 FAX/DATA MODEM

The U.S. Robotics WorldPort 2496 portable fax and data modem is well designed and full of thoughtful features that, depending on your particular needs, could make it an excellent choice for your mobile telecommunications.

The WorldPort uses a 25-pin input connector and attaches to either 9- or 25-pin serial ports on the PC via an included Y-connector cable with dual ends. The unit itself comes with an internal speaker, data-display lights, and dual phone jacks—all highly useful and desirable features.

For troubleshooting problems that often occur during the connect phase of modem use, the internal speaker is a blessing. Without the speaker to alert you to potential problems, the software must be able to report accurately the current line status, which isn't always possible. For instance, if a bulletin board system is taken offline for one reason or another, a modem without a speaker will offer a simple NO CARRIER message in most cases when the number is tried, and that same message is reported for busy signals.

Without a speaker to alert you to the condition, multiple redial attempts will be made, incurring long-distance charges and causing the BBS operator headaches from the repeated calls. With the speaker on, you can hear that there's no longer a bulletin board online at that number and can cease connect attempts.

The WorldPort has four data lights that monitor data speed, fax/error correction, carrier detection, and battery power. Display lights are a welcome feature on any pocket fax/modem, since they provide a "window" on the unit's status and operations.

The dual phone jacks built into



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# TEST LAB

## PORTABLE PRINTER FEATURES

	BROTHER HJ-100i	CANON BJ-10EX	CITIZEN PN48	STAR MICRONICS STARJET SJ-48
List price	\$499.95	\$499.00	\$469.00††	\$499.00
<b>Dimensions</b>				
Height (in inches)	1.9	1.9	2.0	1.9
Width (in inches)	12.2	12.2	11.7	12.2
Depth (in inches)	8.5	8.5	3.5	8.5
Weight (in pounds)	4.0†	4.0†	2.5†	4.0
Print mechanism	ink-jet	bubble-jet	thermal	ink-jet
Print speed (in cps)				
Draft	83	83	53	83
Letter quality	83	83	53	83
<b>Interface</b>				
Parallel	s	s	s	s
Serial	n/a	n/a	n/a	n/a
SCSI	n/a	n/a	n/a	n/a
AppleTalk	n/a	n/a	n/a	n/a
<b>Emulations</b>				
IBM ProPrinter	■	■	■	■
Epson	■	■	■	■
HP-II	□	□	□	□
HP-Plotter	□	□	□	□
Standard RAM (in kilobytes)	37††	37‡	4	28
Expansion RAM (in kilobytes)	none	none	none	none
<b>Paper feed</b>				
Tractor	□	□	□	□
Friction sheets	■	■	■	■
Sheet feeder	□	□	□	□
Trays	□	□	□	□
Roll paper	□	□	□	□
Envelopes	■	■	■	□
Transparencies	■	■	■	□
Labels	■	■	■	□
Sheet feeder option	■	■	□	■
<b>Paper output</b>				
Face up	■	■	■	■
Face down	□	□	□	□
<b>Image position</b>				
Portrait	■	■	■	■
Landscape	■	■	■	□

† Weight with battery.

†† For Standard System without battery, \$549 for Professional System with rechargeable battery.

‡ In mode 1 or mode 2, 20K in mode 3.

■—yes □—no

‡ In mode 1 or mode 2, 20K in letter quality mode.

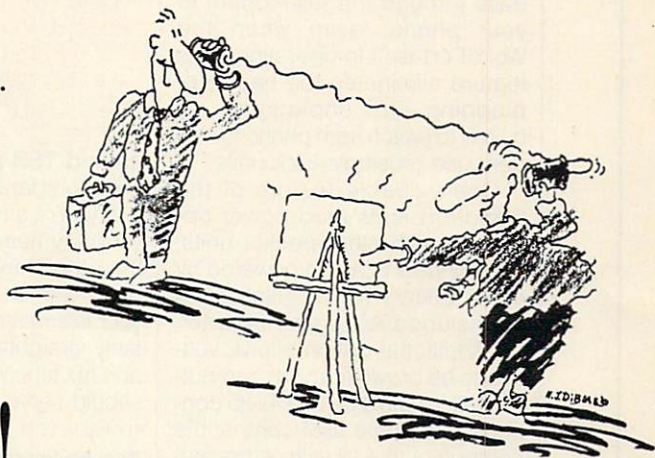
s=standard n/a=not available



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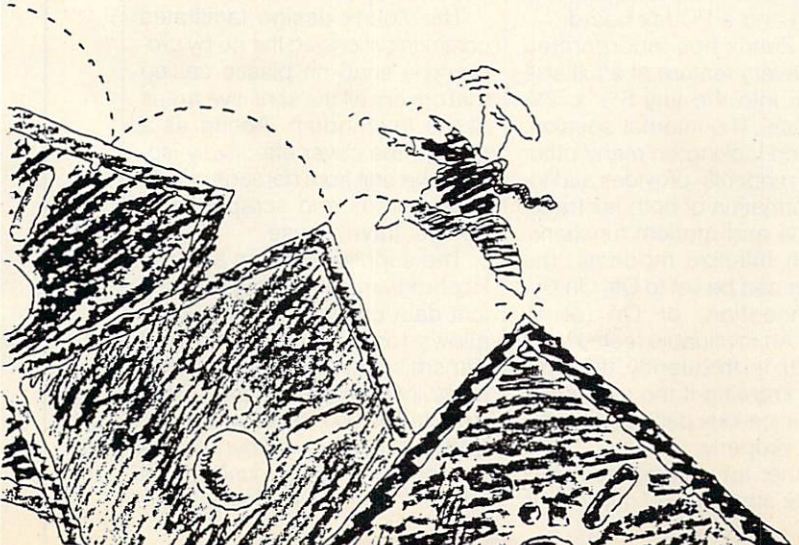


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  2. When connected, press RETURN once or twice.
  3. At *Password*, enter **CP55**
- Questions? Call 1-800-695-4005.

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Circle Reader Service Number 161



# TEST LAB

the WorldPort allow line signals to pass through the fax/modem to your phone, even when the WorldPort isn't in operation. This feature eliminates the hassle of plugging and unplugging required to switch from phone to modem use on single-jack units.

One valuable feature of the WorldPort is its third power option. As with other pocket units, the WorldPort can be powered by either battery (9-volt alkaline) or an included AC power adapter. An additional option allows voltage to be drawn from the computer itself via pin 9 of the DB-25 connector on some IBM-compatible computers. If +12 volts is present on pin 9, the internal battery (if any) is automatically disconnected, and the modem is turned on. If you have a PC that provides +12 volts to pin 9 of your 25-pin COM port (check your owner's manual), this is a very handy feature.

Whether the WorldPort meets your needs may well depend on its software. The communications software provided with the unit lacks many of the features now regarded by computer enthusiasts as standard. While this program conforms to the standard Hayes AT command set and supports XMODEM and ASCII file transfers, it lacks the faster, more efficient transfer protocols. Additionally, it doesn't support script and mini-BBS functions found on more sophisticated programs. If you want a fuller menu of features and data-transfer protocols, you'll have to purchase an additional communications software package.

The fax functions of the device are limited by the supplied software as well. The conversion process supports neither IMG nor TIF formats, which limits the software's usefulness if you have need of these types of image files. The fax-receive program, while fairly simple to use, doesn't operate in background mode. All system processing is halted while incoming fax transmissions are handled, unlike the back-

**U.S. ROBOTICS**  
8100 N. McCormick Blvd.  
Skokie, IL 60076  
(800) DIALUSR  
List price: \$379

ground TSR processing offered with comparable units.

If you're a traveling power user, you may need stronger software than the standard offerings supplied with this unit. If, however, your telecommunication needs are fairly straightforward, the modem and fax functions of the WorldPort should serve you nicely.

TOM BENFORD

Circle Reader Service Number 310

## ZOLTRIX POCKET 96/24 FAX MODEM

The combination of a 2400-baud modem and a full-function 9600-bps send/receive fax in a unit the size of a TV remote makes the Zoltrix Pocket 96/24 Fax Modem an ideal choice for laptop and notebook computer users with telecommunication needs. To go online, simply plug the included 9-pin serial cable into your computer's COM port, connect the phone cable to a jack, and load the software. This done, you have all the communication capabilities of a fully compliant Hayes-compatible modem and a PC fax board.

The Zoltrix has incorporated nearly every feature of a full-size modem into the tiny  $5\frac{1}{2} \times 2\frac{1}{4}$  inch case. The internal speaker, an option lacking on many other pocket modems, provides auditory confirmation of both fax transmissions and modem functions. As with full-size modems, the speaker can be set to Off, On Until Connection, or On (at all times). An invaluable feature, the speaker is frequently the only way of knowing if the modem or communications package is functioning properly.

Another advantage the Zoltrix has over other pocket modems is



its two phone jacks built directly into the modem's casing. One jack is used for the incoming telephone line. The other jack is used to connect a standard telephone to the modem unit for voice communication. If the phone line to the Zoltrix is frequently used for both voice and data communications, the second jack will prove to be a most worthwhile feature, since it eliminates the need to disconnect and reconnect the modem each time you wish to use the telephone.

Another attractive feature of the Zoltrix is its series of status-indicator lights, commonly found on full-size modems but a rarity on pocket-size portables. The indicators provide a quick assessment of the fax/modem's status.

The fax/modem can draw its operational power two ways. For home or office use, the Zoltrix is supplied with a nine-volt AC transformer; on the go, the fax/modem can use a standard nine-volt alkaline battery.

The Zoltrix design facilitates communications on the go by providing a snap-on plastic casing that covers all the sensitive areas of the fax/modem. Acting as a sheath, the cover effectively isolates the unit from damage due to dust, bumps and scrapes, and general travel abuse.

The supplied BitCom and BitFax programs both provide excellent data communication. BitFax allows for the conversion and transmission of all major file types, including image and TIF formats. In addition, the software supports full memory-resident fax reception in the background, which allows other tasks to be per-



formed on the computer while you receive incoming fax transmissions. The BitCom terminal software is easy to learn and provides a full range of features that will prove useful even to the most demanding modem aficionado.

The Zoltrix Pocket 96/24 Fax Modem is a well-designed and complete telecommunication package. Any laptop or notebook user in the market for a topnotch fax/modem should consider this Zoltrix.

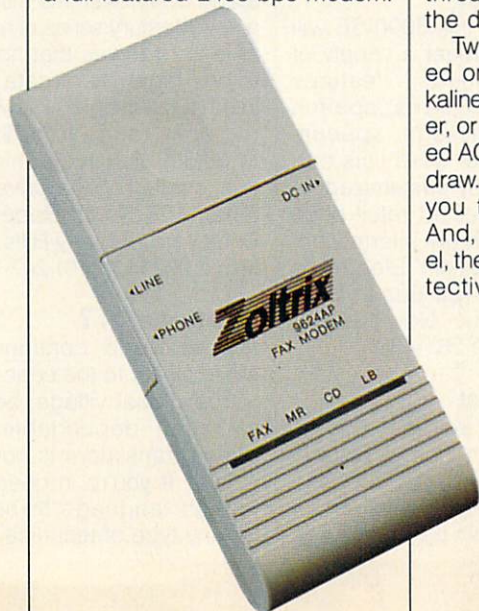
TOM BENFORD

Circle Reader Service Number 311

## ZOLTRIX 2400P DATA MODEM

While lots of notebook- and laptop-computer users need a modem and the ability to send a fax via the PC, not everyone needs (or wants) to receive a fax through a computer. Likewise, many budget-conscious users don't want to pay the price of sending faxes at 9600 bps; for these folks, a 4800-bps model at a lower price is fine. If you're one of these users, then the Zoltrix 2400P Data Modem is the device you're looking for.

The 2400P provides almost the same excellent software and hardware features found in the Zoltrix Pocket 96/24 Fax Modem, and it's a full-featured 2400-bps modem.



**ZOLTRIX**  
47517 Seabridge Dr.  
Fremont, CA 94538  
(510) 657-1188  
List price: \$99

The big difference between the two models is that the 2400P supports only 4800-bps fax transmissions and can't receive faxes at all.

The 2400P is certainly not lacking in features. A stylish dark gray case houses a trio of status-indicator lights, an internal speaker, dual phone jacks, and an external power jack. Viewing the status lights is no problem when the unit is connected to a laptop or notebook computer, but having the 5½-inch unit protruding from the back of a desktop computer makes reading the status lights a chore.

The 2400P comes equipped with its own internal speaker, which provides aural feedback of line conditions and transmission status. You'll want to consider this highly desirable feature when shopping for a fax/modem.

Because the Zoltrix 2400P comes with two phone jacks, you can use the phone without having to disconnect the modem. Leave your phone connected to the Zoltrix all the time if you like, since any phone signals can pass through the 2400P, even when the device is turned off.

Two power options are provided on the 2400P. A nine-volt alkaline battery can provide the power, or you can connect the included AC adapter for unlimited power draw. A status-indicator light alerts you to low-battery conditions. And, like the Pocket 96/24 model, the 2400P is outfitted with a protective cover that shields the

**ZOLTRIX**  
47517 Seabridge Dr.  
Fremont, CA 94538  
(510) 657-1188  
List price: \$229



unit's vulnerable areas.

A modified version of BitFax comes with the 2400P for fax transmissions at 4800 bps; this software has good features and provides excellent file support. TIF, PCX, IMG, ASCII, and several other formats are supported by the conversion software. You should pay attention to the version number, however. The review unit came with version 2.064 of BitFax. Some unresolved anomalies in this version caused problems with the review unit. (Zoltrix tech support was surprised that I'd received that software version, since it hadn't been tested yet.) The company supplied me with version 2.062, which ran without incident, and assured me it would remedy the problem with 2.064 in the very near future.

If 9600-bps send/receive pocket fax/modems seem a bit beyond your budget and you're truly wondering when you'd ever expect to receive a fax at your portable PC, perhaps the Zoltrix 2400P is the economical alternative you're looking for.

TOM BENFORD

Circle Reader Service Number 312

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# NEWS & NOTES

Jill Champion

## Election-Year Prodigy

Prodigy's new voter-education service, Political Profile, is a welcome respite from network sound bites and political commercials that offer nothing new. Prodigy's Political Profile is a comprehensive database on federal and state politics designed to encourage public political awareness and involvement and to increase voter turnout. Through Political Profile, Prodigy subscribers can access a broad range of candidate information, from incumbents' biographies and key voting records to FEC (Federal Elections Commission) data

portable electronic dictionary that contains more than 300,000 definitions; 500,000 synonyms; spelling correction for more than 110,000 words; and an electronic grammar handbook. *SE* stands for *Special Edition*: The unit has full speech capability for people with special needs, such as those who are visually impaired, blind, learning disabled, or dyslexic.

Full speech capability allows every function on the 6000-SE to be spoken out loud, and the speech rate can be adjusted to suit the needs of the listener. Words can be fully pronounced, audibly spelled letter by letter, or audibly spelled phonetically, and letters can be spoken as they are typed in. A message key allows the 6000-SE to be used as a communication tool for the blind and as a teaching tool for the learning disabled. As many as 26 messages can be entered, stored,

lular, and other phones where jacks aren't removable and from foreign countries where phone jacks differ. The CCITT- and Bell-compatible Voyager weighs only six ounces and uses a nine-volt battery for extra convenience. The suggested retail price is \$390. If you have the Hewlett-Packard 95LX palmtop computer, Com 1 will provide a free adapter that allows you to use the Voyager with it. For more information, contact Com 1 Data Communications, 5120 Avenida Encinas, Suite C, Carlsbad, California 92008; (619) 431-5606.

## Mega Hard Drives

Are you looking for extra data storage? Try megastoring your data on one of Mega Drive System's new Millennium removable hard drives. These superstorage drives for PCs, Macs, and all networked workstations hold from 52 megabytes to one gigabyte with average access times of from 9 to 12 milliseconds. Linked multiple docking bays can increase storage up to seven gigabytes of active online storage.

The Millennium drives are priced from \$1,599 to \$6,599. Mega Drive Systems also has a new Mercury series of removable hard drives that hold up to one gigabyte of data in an internal half-height slot. Mercury prices range from \$1,129 to \$6,559. For more information, contact Mega Drive Systems, 489 South Robertson Boulevard, Beverly Hills, California 90211; (310) 247-0006.

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As the world continues to move closer to the concept of a true global village, access to rapid, dependable language translators is now essential. If you're in need of a foreign language translator for any type of technical doc-

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For more information on this service, contact Prodigy Services, 445 Hamilton Avenue, White Plains, New York 10601; (800) 776-3449.

## A Special Pocket Dictionary

Kudos to Franklin Electronics for helping meet the needs of the physically challenged with its recently introduced Language Master 6000-SE, a

and spoken at any time by pressing a key.

Because the 6000-SE will be used to meet a variety of different needs, features such as font sizes, speech modes, message speeds, and personal word lists can be completely customized.

The suggested retail price is \$495. For more information, contact Franklin Electronic Publishers, 122 Burrs Road, Mount Holly, New Jersey 08060; (609) 261-4800.

## Pocket Rocket

The MV214 Voyager pocket modem from Com 1 Data is packaged with an acoustic coupler, allowing Voyager users to link from pay, hotel, cel-



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Every month, from now until November, you'll have the chance to win fabulous prizes by playing the Compute SearchStakes. And by solving a minimum of just two monthly SearchStakes, you'll be in the position to compete for the SearchStakes Grand Prize, to be featured in our upcoming December issue.

### IT'S FUN TO PLAY

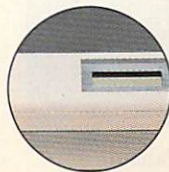
Each of the six picture disks displayed below is a portion of a photo or illustration taken from an ad in this issue. To solve the June SearchStakes, locate the ads from which

these disks were taken and note the page number for each. If the ad has no page number, simply count that page or cover as zero. Then add up all six page numbers. That is the solution to this month's SearchStakes.

### IT'S EASY TO ENTER

Once you find the solution, you may enter the June SearchStakes automatically on a touch-tone phone by calling 1-900-454-8681 (\$1.50 for the first minute, \$1.00 for each additional minute) or by mailing your answer on a 3" x 5" piece of paper, along with your name, address, and phone number to: "June Compute SearchStakes," 324 West Wendover Avenue, Suite 200, Greensboro, N.C. 27408 by 7/31/92. For more information on how you may win this month's prize, valued at \$1,500, turn to page 38.

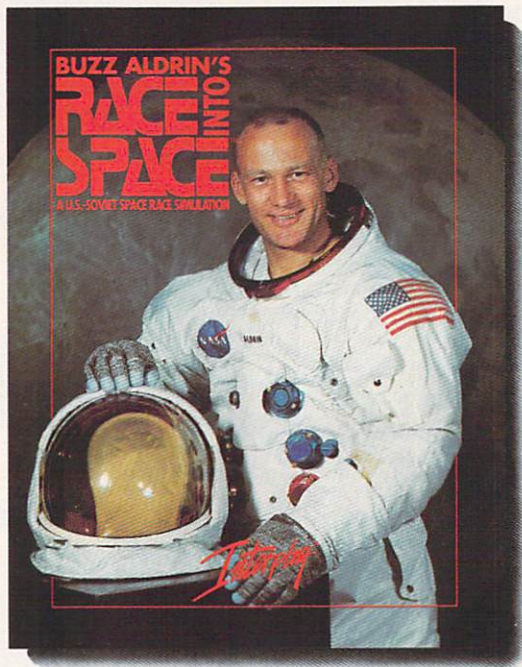
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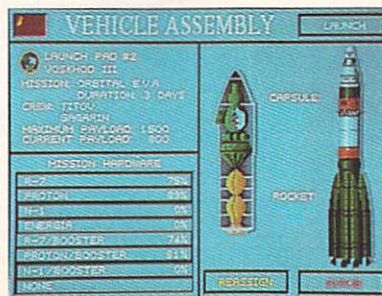
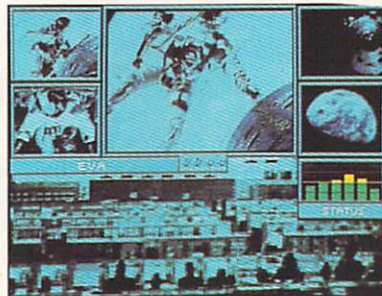
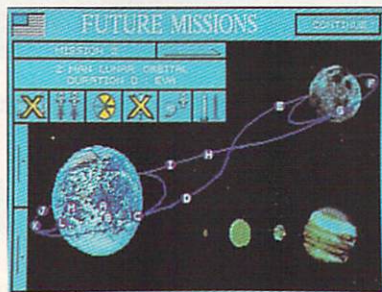
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ument, scientific paper, financial report, employee notice, contract, marketing brochure, or just business correspondence, WORDNET offers a global network of language translators and editors. The Massachusetts-based company has connections with more than 700 foreign language translators worldwide, who are available around the clock to translate, write, edit, typeset, and otherwise prepare documents for your technical, legal, marketing, and general business needs.

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For more information, contact WORDNET, 30 Nagog Park, Acton, Massachusetts 01720; (508) 264-0600.

## More Babel-ophiles

For those who want to know what's out there that's multilingual for the PC, Knowledge Computing now offers a 254-page *Multilingual PC Directory* detailing around 300 multilingual products available in more than 70 countries from more than 1000 manufacturers, publishers, and affiliates.

Profiles describe each product's main features and noteworthy multilingual or foreign language capabilities, computer requirements, languages supported, and lists of software reviews that have been published. The suggested retail price for the directory is \$34.95. For more information, contact Knowledge Computing, P.O. Box 3068, Stamford, Connecticut 06905-0068.

## Getting Better

Pixel Perfect has released a bigger, better version of Schueler's Home Medical Advisor. Version 1.2 features a friendlier interface with hypertext, hot keys, and mouse support. It has also increased the value of the product by expanding the drug file to cover more than 800 medications, including information on use, side effects, and interactions. You can search for information

by common symptoms, diseases, injuries, poisons, drugs, and tests. Also, when you register the software, you'll receive a referral database including the names of board-certified specialists in your state, listed by county. The list price of Schueler's Home Medical Advisor is \$69.95. If you would like additional information, contact Pixel Perfect, 10460 South Tropical Trail, Merritt Island, Florida 32952; (407) 777-5353.

## Writing It Right

Editors, writers, and other word crafters who hesitate to trust their writing skills completely should check out WordStar International's recent upgrade of Correct Grammar for Macintosh, Windows, and DOS text-based applications. The product's grammar has been fine-tuned for higher accuracy—especially for examining subject-verb agreement, run-on sentences, and easily confused words. You can create and add your own rules to Correct Grammar's rule base. The software's preset style guides are subject based and include business, law, advertising, and more.

The good news for publishers and other companies that rely heavily on desktop publishing and word processing programs is that all versions of the new Correct Grammar can be networked. The main program is installed on a server, while personal dictionaries and style guides can still be created on individual PCs.

The suggested retail prices are \$99.00 for Mac and DOS versions, \$119.00 for the Windows version, \$99.00 plus \$36.95 for each network node for networked versions, and \$119.00 plus \$36.95 for each network node for the Windows networked version. For more information, contact WordStar International, 201 Alameda del Prado, P. O. Box 6113, Novato, California 94948; (415) 382-8000.

## The ROM Empire

From Trantor, new CD-ROM driver software (CD295) gives IBM PS/2 Model 95 computer users broad CD-ROM support by enabling the computer to connect to more than 45 different models of CD-ROM drives—and up to seven drives at a time.

The software runs in conjunction with IBM's BIOS (Advanced BIOS) in

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## COMPUTE SEARCHSTAKES!

**No purchase or phone call required.** For automatic entry, call 1-900-454-8681 on a touch-tone phone. To enter monthly SearchStakes drawings, call from 9 A.M. EDT on 4/26/92 through midnight EST 12/31/92 to give your name, address, telephone number, the *Compute* issue date (month), and the solution for the month you select. To enter the Grand Prize drawing, call from 9:00 A.M. EST 11/1/92 through midnight EST 1/31/93 to give your name, address, telephone number, the solution to the Grand Prize SearchStakes plus the solution to any two of the previous monthly SearchStakes. The cost for the call is \$1.50 for the first minute and \$1.00 per minute thereafter; average call is estimated to be 2-3 minutes. Charges for calls to the above number will appear on your phone bill. Callers must be 18 or older. All call-in entrants will receive a \$5.00 savings coupon toward caller's choice of: (1) Kathy Keeton's newest book, *Longevity*, or (2) a two-year subscription to *Compute*. Multiple coupons may not be combined on a single book or subscription purchase. Call as often as you wish; each call is a separate entry. Call-in entry option is void in GA, LA, MN, NJ, OR, and where prohibited.

**Alternate Entry Method:** Print your name, address, and phone number on a 3" x 5" piece of paper. (1) To enter the monthly drawings, print the *Compute* issue date (month) and solution for that month on your entry and address your envelope to include the issue date (month), for example: "June *Compute* SearchStakes." (2) To enter the Grand Prize drawing, print the words "Grand Prize," the Grand Prize solution, plus the solution to any two previous monthly SearchStakes on your entry. Address your envelope: "Compute SearchStakes Grand Prize." Mail all entries, addressed as directed above, to: 324 West Wendover Avenue, Suite 200, Greensboro, N.C. 27408. Enter as often as you wish; each entry must be mailed separately. All write-in entries must be postmarked by 1/30/93 and received by 2/15/93.

**For the solution(s), complete rules, and detailed description of prizes including prize values, send a self-addressed stamped envelope to Compute SearchStakes Solutions, Dept. RRS, 1965 Broadway, NY, N.Y. 10023-5965 by 12/31/92; no return postage required for residents of VT and WA. Solutions and prize information will be provided through the issue date in which the request is received.**

Prizes/Values: Grand Prize (1), minimum value \$15,000-maximum value \$40,000. Monthly prizes (6), one for each of the following *Compute* 1992 issue dates: June, July, August, September, October, and November, minimum value \$1,500-maximum value \$7,500. Maximum total prize value: \$85,000. A description of each prize, including its approximate value, will appear in *Compute* prior to the first entry date for that prize. Prizes are not transferable or redeemable for cash. No substitution of prizes except as necessary, due to availability. Licensing, transportation, registration, and dealer charges, if applicable, are winner's responsibility. Winners may be required to pick up some prizes from the nearest dealership. Travel prizes must be from a major airport nearest winner's home and must be used within 12 months of award date. Additional restrictions may apply. Taxes are the winner's responsibility.

Open only to U.S. residents 18 and older, except employees and their families of Compute Int'l Ltd., POWER GROUP, INC., their respective subsidiaries, affiliates, and advertising agencies. All federal, state, local laws and regulations apply. Void where prohibited. This program is sponsored by Compute International Ltd., 1965 Broadway, NY, N.Y. 10023, (212) 496-6100. Monthly winners will be selected at random from among all eligible entries received by the judges by the following drawing dates: June issue-7/31/92, July issue-8/31/92, August issue-9/30/92, September issue-10/30/92, October issue-11/30/92, November issue-12/31/92. Grand Prize winner will be selected from among all eligible entries received by 2/15/93. Winners will be selected by POWER GROUP, INC., an independent judging organization whose decisions are final. Odds determined by number of entries received. Winners will be notified by mail and required to execute and return an affidavit of eligibility and release within 21 days of date on notification letter or alternates will be selected. Limit one winner per household.

This sweepstakes is subject to the Official Rules and Regulations. For a list of winners, send a self-addressed stamped envelope to: Compute SearchStakes Winners, Dept. RRW, 1965 Broadway, NY, N.Y. 10023-5965 by 3/31/93. Requests will be fulfilled after the sweepstakes ends.

## NEWS & NOTES

the Model 95 and will operate with other systems incorporating BIOS. Among the numerous CD-ROM drives supported are Apple, Chinon, Hitachi, IBM, NEC, Panasonic, Sony, Texel, and Toshiba. The suggested retail price for the CD295 software is \$59. For more information, contact Trantor Systems, 5415 Randall Place, Fremont, California 94538; (510) 770-1400.

### Getting Intuit

Who wants to pull the plug on Intuit's highly profitable check-printing business? American Check Printers, that's who.

For years Intuit has sold its popular Quicken home accounting software at a narrow profit margin, knowing its users would return with lucrative check orders. Now American Check Printers has started a service that promises to shake things up in this small but highly profitable niche.

Its product will be displayed alongside Quicken at major retailers. For a single fee of around \$20, the purchaser can order checks at a 40-50-percent discount off the price offered by Intuit. And there is an offer in the package good for a \$20 discount on the first order, making the software essentially free of cost.

You use the data-entry component to enter the information that should appear on the checks (including decorative clip art) and return the floppy disk along with a voided check to American Check Printers with an order form and a payment. Within a couple of weeks, the printed checks will be returned.

American Check Printers software and service can be used to create checks for Quicken, Quick Pay, Microsoft Money, Managing Your Money, Money Counts, Money Matters, Pacilio, Dollars and Sense, MyCheckbook, and MyBusinessCheckbook. For more information, contact American Check Printers, 171 Jefferson Drive, Menlo Park, California 94025; (415) 617-8899.

### Making Money the Old-Fashioned Way

If you think you can get rich quick, get in touch with reality. But if you want to better manage the money you have, get in touch with Reality Technologies.

Reality, publishers of the Wealth Builder and Wealth Starter series of money- and investment-management software,

will soon introduce Smart Investor by Money Magazine, an online service and software package designed to serve the specific needs of individual investors.

The problem with existing online investment services is that the information is not well organized. Often you will compare apples and oranges when it comes time to determine which investment is superior. The information downloaded from Reality's Smart Investor will be preformatted to provide the maximum usefulness to the end user. It allows you to compare investment schemes, recommends mutual funds, cautions you about investments you have already made that might soon go sour, and allows you to buy and sell stocks through low-cost brokerage firms.

For more information about this online service, contact Reality Technologies, 3624 Market Street, Philadelphia, Pennsylvania 19104; (215) 387-6055.

### Help for Loyal IBM Users

IBM now offers a four-component system known collectively as HelpWare and touted as "the most comprehensive customer satisfaction offering in the personal computing industry." The components of the system include a telephone number where users can get information about PS/2s and OS/2, a 30-day satisfaction guarantee on all PS/2 products, a training program, and a series of 800 numbers for more specific PS/2 information. It appears that IBM is no longer portraying itself as the low-cost leader and is again styling itself as the solutions company, with the main change being that it is appealing to the individual instead of the corporate account, which was once the mainstay of IBM's profit margin. To find out more about HelpWare, contact IBM, 1133 Westchester Avenue, White Plains, New York 10604; (800) 772-2227.

*Companies with items of interest suitable for "News & Notes" should send information along with a color slide or color transparency to News & Notes, Attn: Jill Champion, COMPUTE, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. Although space is limited, all items will be considered for publication.* □



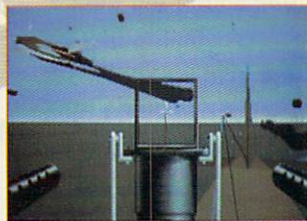
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Paradise, multi-  
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## Expert Advice

Oops! The review of Schueler's Home Medical Advisor in your April issue was of version 1.1. Version 1.2 was released in December 1991 and has addressed many of the shortcomings referred to by Mr. Anzovin's review of 1.1. We think you'll find 1.2 quite user-friendly. It brings the PC user comprehensive medical diagnostic/reference software not previously available.

PIXEL PERFECT  
MERRITT ISLAND, FL

*You're right. We mistakenly reviewed the earlier version of the program. To get the scoop on what's new in the latest version, see the article in this issue's "News & Notes."*

## A Friend Indeed

I have a friend who has an extreme vision loss due to multiple sclerosis but who loves to work with her computer. Is there a program out there to enlarge the characters on the monitor for use with WordPerfect, Lotus, and so on?

SUSAN DICK  
ROSEAU, MN

*It's worth mentioning that although many sighted people assume that visually impaired people are unable to see anything, the vast majority of legally blind people can see to some extent and only need to have enlarged type or a color adjustment to see a computer display clearly.*

*The first product that comes to mind is Eye Relief for Low-Vision Users (SkiSoft, 1644 Massachusetts Avenue, Suite 79, Lexington, Massachusetts 02173; 800-662-3622), a word processor designed for people with vision problems. It can expand the letters on the screen so that people with poor vision can see them easily. This magnification is limited to Eye Relief itself, however.*

*Telesensory (455 North Bernardo Avenue, Mountain View, California 94039; 800-227-8418) manufactures hardware and software screen enlargers that can enlarge the computer screen 2-15 times.*

*IBM has found many ways to ease computer use for the disabled. You can contact IBM's National Support Center for Persons with Disabilities at P.O. Box 2150, Atlanta, Georgia 30301-2150; (800) 426-2133. It has a TDD number as well: (800) 284-9482.*

## Prodigy Screen

In your April issue, in the article "Access and Security," Gregg Keizer made a statement that seemed to imply that Prodigy screens E-mail before it is posted. This would be a felony offense under the Electronic Communications Privacy Act of 1986. Prodigy does not screen E-mail.

STEVE HEIN  
PRODIGY SERVICES  
WHITE PLAINS, NY

*Mr. Keizer was referring in his statement to Prodigy's policy of screening public postings. He did not intend to imply that Prodigy screens E-mail, which would, as you say, be a crime. Neither Prodigy nor any other online service screens E-mail. We're sorry for any misunderstanding.*

## This Side of Paradise

I have a problem with Windows. I recently purchased an 8-bit VGA card and monitor from a friend. The VGA card didn't come with any software or instructions, yet installing it was a snap. When I try to install Windows, however, the screen goes blank after the second installation disk, and nothing happens from that point on. I tried installing Windows in CGA mode (recommended by Microsoft), and the installation was flawless. Yet when I tried

to switch to VGA mode within Windows, I wound up with a blank screen again. All my other software works fine. Any advice you can give me to solve my problem would be most appreciated. I am a new subscriber and find your magazine to be the most informative and objective on the market.

JERRY KOSSOWER  
EAST WINDSOR, NJ

*We called Paradise technical support at (800) 832-4778. Paradise is part of the same company that makes Western Digital hard disks and controllers. The technician we spoke with said that you should have no trouble as long as you're using the standard VGA driver in Windows. Specialized Windows drivers are available through the Paradise bulletin board at (714) 753-1234.*

*Next we called Microsoft technical support at (206) 637-7098. Microsoft suggested that you try reinstalling the system with the CGA driver (you can just use the setup program by typing SETUP while in the WINDOWS subdirectory to save the time and trouble of reinstalling Windows). Then start up Windows in real mode with the command WIN /R. Then make the switch to VGA within Windows. If that works, exit Windows and restart it in standard mode (assuming that you have at least an 80286 microprocessor) with WIN /S. If this runs all right, start up the system in 386-enhanced mode (assuming that you have at least an 80386 microprocessor) with WIN.*

*You might also have a conflict with your mouse driver. Try booting from a floppy without installing your mouse driver, and then install Windows. If these strategies don't work, call Microsoft. You'll need to know the make and model of your computer, how much memory you have, what other programs*



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*you're running, and what kind of processor you have before Microsoft can make any further recommendations.*

## Taking It to Task

I keep reading that you need a 386 to multitask. Is this because the 286 can't handle multitasking, or is it due to speed requirements? I also have a TVGA-8 video card. In the manual there's no address for the company. I'd like to get an 800 x 600 driver for my graphics card for Windows 3.0.

OLIVER W. HINKLEY JR.  
PAULDEN, AZ

*The capacity to multitask is built into both the 286 and the 386, though they work in slightly different ways. You can even multitask with an 8088 chip, if you're using GeoWorks Ensemble.*

*Windows 3.0 in standard mode (the most powerful mode available for a 286) can multitask Windows programs. A 386 or 386SX can operate as if it were several 8088 processors, so it can multitask DOS and Windows programs in Windows 386-enhanced mode.*

*The chip speed doesn't have anything to do with multitasking; it's all a product of the chip architecture and the code it's running. However, a slow chip running a number of programs may become unacceptably snaillike. The boosterism you see for the 386 chip is based more on its potential than its actual functionality. Even now, over ten years after its introduction, the standard 4.77-MHz 640K 8088 PC can run nearly the entire library of PC software (albeit slowly).*

*We were unable to turn up an address for the maker of TVGA. If anyone reading this can provide the address, please send it to us, and we'll forward it to Mr. Hinkley.*

## You Say EISA; I Say ISA

In searching for an i486 computer, I learned that there are two main types: EISA and ISA. What do these acronyms stand for? Which would be the most useful for general and CAD/CAE use? Additionally, the two main BIOS types seem to be Phoenix and AMI. Does it matter to the normal user which is used?

MATTHEW BOARDMAN  
CHESTER BASIN, NS, CANADA

*Actually, there are three bus choices: ISA (Industry Standard Architecture), EISA (Extended Industry Standard Architecture), and MCA (Micro Channel Architecture). ISA is the standard 16-bit bus you can find in any AT computer (XTs and PCs have an 8-bit ISA bus). The reason for the necessity of a change from ISA was that 386 and 486 computers needed a new standard bus to communicate with expansion cards 32 bits at a time. The 286 could only communicate 16 bits at a time.*

*IBM created the MCA bus to be used with its high-end PS/2 computers, hoping to establish a new standard. It also stood to make some money on the bus because it was demanding royalties from card and computer makers for using its technology. The MCA bus is also incompatible with old ISA technology. This didn't appeal to computer makers, and a coalition of manufacturers established a maverick standard called EISA, which is free for anyone to use and completely compatible with both 8- and 16-bit ISA cards.*

*Which is best? EISA is backward compatible with the ISA cards you already use and is ready to accommodate any 32-bit expansion cards that will come along in the future.*

*Phoenix and AMI (American Megatrends) BIOSs are completely mature and compatible. They're more widely used than the IBM BIOS they were built to emulate.*

*It doesn't matter to the user which BIOS is used, no matter how normal he or she is. But watch the copyright date on the BIOS chip. Some manufacturers might try to trim costs by using out-of-date BIOSs. If the copyright date is more than a couple of years old, consider another machine.*

*Readers whose letters appear in "Feedback" will receive a free COMPUTE's PC clock radio while supplies last. Do you have a question about hardware or software? Or have you discovered something that could help other PC users? If so, we want to hear from you. Write to COMPUTE's Feedback, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We regret that we cannot provide personal replies to technical questions. □*

## EDITORIAL

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# TIPS & TOOLS

Edited by Richard C. Leinecker

**A directory listing with multiple file specifications, an automatic CHDIR to a new directory, and more helpful little COM files**

## More Little Gems

I've received an incredible number of letters from readers who want more of those handy debug programs. Here are four of the most requested ones.

Make sure the DOS program called DEBUG is in your path or the current directory. In these examples, the italic text is what the computer prints; the roman text is what you should type. One way to be sure you get these programs exactly right is to have someone read the numbers to you as you type them in. Another way suggested by one of our readers is to read the numbers into a tape recorder and then play them back as you enter the code.

To start off, I've written a special directory program that takes as many command line arguments as you want (limited, of course, by DOS's 128-byte command line maximum). It lets you see a directory of several given types. If you want to see all of the EXE and COM files in the current directory, just type DIRR \*.EXE \*.COM. To see the TXT, DOC, and ASC files, type DIRR \*.TXT \*.DOC \*.ASC.

### DEBUG DIRR.COM

*File not found*

```
-e 100 ba 68 01 b4 1a cd 21 be
-e 108 80 00 ac 0a c0 74 38 ac
-e 110 3c 0d 74 33 3c 20 74 f7
-e 118 8b d6 4a ac 3c 0d 74 04
-e 120 3c 20 75 f7 ff 74 ff c6
-e 128 44 ff 00 2b c9 b4 4e cd
-e 130 21 72 0e e8 15 00 b4 4f
-e 138 cd 21 72 05 e8 0c 00 eb
-e 140 f5 8f 44 ff 4e eb c8 b4
-e 148 4c cd 21 bb 86 01 8b d3
-e 150 80 3f 00 74 03 43 eb f8
-e 158 c6 07 0d 43 c6 07 0a 43
-e 160 c6 07 24 b4 09 cd 21 c3
-RCX
CX 0000
:68
-W
Writing 0068 bytes
-Q
```

If you're anything like me, you hate typing MD NEWDIR and then CD NEWDIR. You should be able to create a directory and enter it with a single command. Now you can with MCD.COM. To use it, just type MCD NEWDIR to create and immediately enter a new directory.

### DEBUG MCD.COM

*File not found*

```
-e 100 be 80 00 ac 0a c0 74 1f
-e 108 ac 3c 0d 74 1a 3c 20 74
-e 110 f7 8b d6 4a ac 3c 0d 74
-e 118 04 3c 20 75 f7 c6 44 ff
-e 120 00 e8 07 00 e8 09 00 b4
-e 128 4c cd 21 b4 39 cd 21 c3
-e 130 b4 3b cd 21 c3
-RCX
CX 0000
:35
-W
Writing 0035 bytes
-Q
```

A lot of folks are using laptop and notebook computers these days. Since the cursor can be hard to see, it's sometimes convenient to have a large cursor. Here's a program called CSIZE.COM that'll make your cursor larger and keep it that way.

When you run CSIZE, it sets the new cursor size and stays resident in memory to make sure that your cursor size remains the way you set it. It'll occupy less than 1K of RAM once installed.

To use it, type CSIZE size. Size can be any single-digit number from 0 to 8.

### DEBUG CSIZE.COM

*File not found*

```
-e 100 be 80 00 ac 0a c0 74 6c
-e 108 ac 3c 0d 74 67 3c 20 74
-e 110 f7 4e ac 2c 30 3c 00 7c
-e 118 5b 3c 08 7f 57 0a c0 75
-e 120 05 b9 09 69 eb 07 fe c8
-e 128 b9 07 07 2a e8 89 0e 4d
-e 130 01 b8 1c 35 cd 21 89 1e
-e 138 4f 01 8c 06 51 01 ba 53
-e 140 01 b8 1c 25 cd 21 ba 20
-e 148 00 b4 31 cd 21 00 00 00
```

```
-e 150 00 00 00 1e 50 51 0e 1f
-e 158 8b 0e 4d 01 2b c0 8e d8
-e 160 39 0e 60 04 74 04 b4 01
-e 168 cd 10 59 58 1f 9c 2e ff
-e 170 1e 4f 01 cf b4 4c cd 21
-RCX
CX 0000
:78
-W
Writing 0078 bytes
-Q
```

One of the most annoying things that can happen is accidentally hitting the Caps Lock key. I never use this key, so I don't mind losing its functionality. The next program, called CAPOFF.COM, will remain memory resident and turn off the Caps Lock key if it's ever pressed. The program will occupy less than 1K of RAM.

### DEBUG CAPOFF.COM

*File not found*

```
-e 100 b8 1c 35 cd 21 89 1e 1c
-e 108 01 8c 06 1e 01 ba 20 01
-e 110 b8 1c 25 cd 21 ba 20 00
-e 118 b4 31 cd 21 00 00 00 00
-e 120 1e 50 2b c0 8e d8 80 26
-e 128 17 04 bf 58 1f 9c 2e ff
-e 130 1e 1c 01 cf
-RCX
CX 0000
:34
-W
Writing 0034 bytes
-Q
```

RICHARD C. LEINECKER  
MIAMI, FL

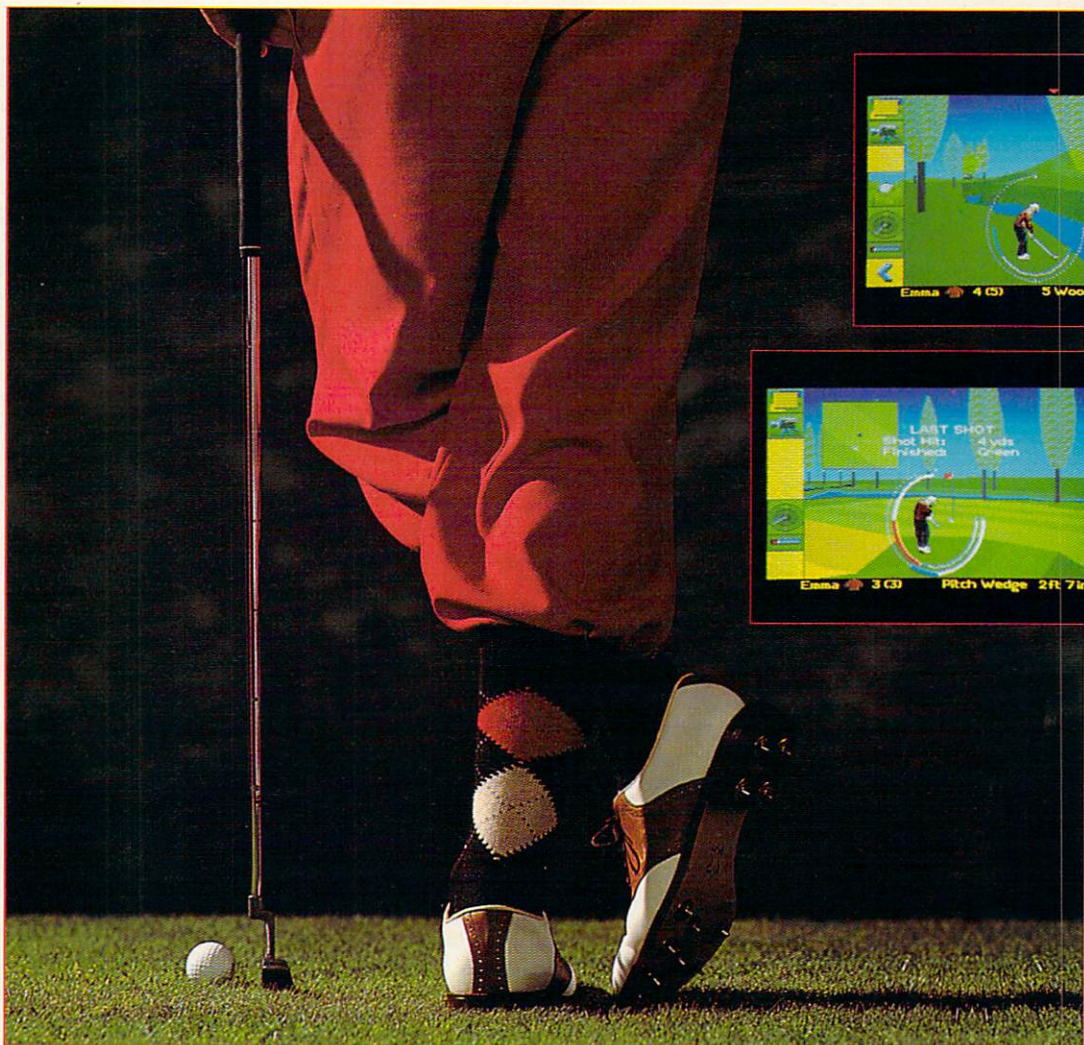
## Color Code

I often work with two documents at a time in DOS WordPerfect. When copying text from one document to another, I can make a mistake if I'm not paying close attention to which document is currently on the screen. To solve this problem, I set the second document to a different color. Then it's always obvious which document is which.

To change the color of a document from the default color, press Shift-F3 to make the



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## Super power tips for WordPerfect, DOS 5.0, dBASE, and PageMaker users

document active. Press Shift-F1 for Setup, and select item 2 for Display. On the Display menu, select item 1 for Colors/Fonts/Attributes, and on the last menu, choose item 1 for Screen Colors. Choose a foreground and background color, and press F7 to make the change permanent.

Now when you toggle between documents, the text color will change.

ROBERT JENKINS  
CENTERVILLE, GA

### Alternatives to Programs

In your December issue, the "On Disk" column contained a program called Delete Except. This program allows you to delete all files in a subdirectory except those specified on the command line. If you have MS-DOS 5.0, however, you can easily do this without a special program. This batch file shows you how.

```
@ECHO OFF
ATTRIB +H %1
DEL *.*
ATTRIB -H %1
```

Save this batch file as DELBUT.BAT somewhere in your path. To use it, just type DELBUT file mask.

In the same issue there was a program in "Tips & Tools" called DIRDIR.COM, which shows only the directories in the current directory. If you have MS-DOS 5.0, you can type DIR /AD and get the same results. The /A switch locates files with certain attributes. The D after /A tells it to include entries with the directory attribute.

VINCENT D. O'CONNOR  
BABBIT, MN

### Shelling from dBASE

If you're in dBASE and you decide to execute a DOS command, you can use the ! command at the dot prompt (such as ! DIR A:), and it works

fine. If you want to execute several DOS commands, however, this process becomes tedious. Here's a short Quick-BASIC program that lets you shell to DOS temporarily.

```
PRINT "Type EXIT to return"
PRINT "to dBASE III+."
SHELL CD\
SHELL
```

You should name this program SHELL.EXE and place it in your path. Next time you're in dBASE and want to execute several DOS commands, type ! SHELL at the dot prompt. The dBASE program will remain in memory, so you can't run programs that need a lot of memory. To return to dBASE from DOS, just type EXIT at the DOS prompt.

LEN WEAVER  
BRANTFORD, ON

### Knockout Color Separations

A goal for many desktop publishers is to save as much money as possible on preprinting costs. One way to avoid extra expense is to make sure your camera-ready art is truly camera ready by providing your printer with color separations.

But sometimes color separations alone are not enough. Depending on the colors you'll be using, your printer may require that certain colors be "knocked out."

Knockouts apply when you're printing one color over another. Often, depending on the colors involved, such as, say, black over a lighter color, you can just run one color over the other. But you can't, for example, print yellow over black, or all you'll get is a slightly yellowish shade of black. The area of black where the yellow will print over has to be knocked out—in other words, white space must be left in the black separation where the yellow ink will print.

Making color separations

with knockouts in paint and draw programs is usually relatively easy, because many programs automatically print knockouts. PageMaker allows you to print knockouts also, but not with all graphics formats. You cannot, for example, print one EPS file over another and get knockouts. You can print a PCX file over an EPS file and get knockouts, though. For knockouts in PageMaker 4.0, follow these steps.

In the Print dialog box, click on the Spot Color Overlays check box. Now select Knockouts. When you tell PageMaker to print, the program will give you separations with the colors knocked out. This will save you money on your printer's preprint setup fees; your artwork will be truly camera ready.

WILLIAM HARREL  
VENTURA, CA

### Large Directories

In WordPerfect for DOS, F5 gives you a list of files, and you can go directly to a file by pressing N and then typing in the first few letters of the filename. When you have a long list of subdirectories, however, this won't work.

Instead, type N and then / or \ followed by the first few letters of the name of the file you want to see. It sure cuts down on scrolling time.

PHIL SHAPIRO  
SAN DIEGO, CA

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*If you have an interesting tip that you think would help other PC users, send it along with your name, address, and Social Security number to COMPUTE's Tips & Tools, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. For each tip we publish, we'll pay you \$25-\$50 and send you a COMPUTE's PC clock radio while supplies last.* □



INTRODUCING

# COMPUTE NET

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Richard C. Leinecker

## TUNE IN FOR FUTURE DEVELOPMENTS

For nine months COMPUTE/NET has grown in popularity and increased its offerings. The number of people using our area has increased beyond our expectations. On GENIE we now rank 32nd on the list of computing RoundTables. America Online doesn't rank its areas, but I'd expect a similar report there. A large part of the credit goes to our loyal readers and online following. Another round of applause goes out to our parent company, General Media. It made a corporate decision to support our efforts to make our online services a success.

Our corporate philosophy embraces new technology. It's influenced heavily by our sister magazine *Omni*, which now shares the same building with us. And our president, Kathy Keeton, never misses an opportunity to develop new ideas.

But the best is yet to come. I can't say in which direction we're headed, since things are currently under development and we don't want to give away any secrets. It's fair, though, to say that you'll be pleasantly surprised at how COMPUTE/NET evolves in the next year.

I won't be on staff here at COMPUTE anymore. I'm moving on to a new adventure but will remain as a cosysop on COMPUTE/NET. I've enjoyed getting COMPUTE/NET started and watching it grow. Online services are just beginning to realize their potential. In several years they'll take a dominant role in information transmission and family entertainment and enrichment. You can still send me E-mail, but your best bet is to address the

new online manager, Troy Tucker. His GENIE address is TROYGT, and his America Online screen name is TROY GT. (Note that *TROY* is spelled with a zero instead of an *O* for his America Online screen name.)

This month on COMPUTE/NET we're featuring several terrific programs that you'll find useful. There's a disk utility called DiskTool, a system analyzer called PC Doctor, and a great game called PuzzleMaster.

DiskTool will become your friend. If you've ever erased a file by accident, then you know the agony of delete. One of DiskTool's features is a file uneraser. Unerasing a file is never guaranteed to work, but DiskTool hasn't failed me yet. It also has a built-in file and sector editor that's the best I've ever seen. And if that's not enough, you can defragment your disk drive with the optimize function.

DiskTool is a professionally written program with a terrific interface. It has pull-down menus, mouse support, the ability to change colors, and windows with scroll bars. The filename is DT26.ZIP.

PC Doctor 4.0 is an enhanced version of the same program we talked about several months ago. It's a techie's toy. It lets you explore systems and peer into areas that are mysteries to most people. You can edit any portion of memory (conventional, expanded, or extended), view the memory-resident programs and information about them, get a look at the list of installed device drivers, and lots more. I've seen commercial programs for \$80 and more that don't do as much as PC Doctor.

The program has a nice interface and is easy to use. It has pull-down menus and full mouse support. It's stored

online as PCDOC40.ZIP.

The last of our featured programs is PuzzleMaster. It's a collection of six puzzle-type games. Included are a version of Master Mind, a takeoff on Simon, a word jumble game, a slide puzzle section, a peg puzzle, and a jigsaw game. Each of the games has several variations, so you can customize each one for different skill levels or increase the challenge when you've mastered them at the easy level.

The game is controlled with a set of easy-to-use menus. Full mouse support makes control even easier. Attractive screen effects will make you want to play just to see which effect you'll get next.

Each of the six games has its own high-score list, so you can get some competition going among family members or use the program at school for some classroom fun. The filename is PZMASTER.ZIP.

There's more for BASIC programmers. We've uploaded a selection of previously published BASIC programs. Included in the archive files are the source code, a compiled program, and a documentation file. If you're just learning BASIC, these are great examples. If you're already a BASIC programmer, you'll get lots of good ideas. If you're not a programmer at all, you'll probably enjoy most of these programs anyway.

Once again, I'd like to tell you how much I've enjoyed being involved with getting COMPUTE/NET started. Online services are an exciting part of the computer industry that's due for a growth explosion. I'll be watching, and I hope you will be, too.

You can still contact me with E-mail addressed to RLEINECKER on GENIE, ID 75300,2104 on CompuServe, or screen name RICK CL on America Online. □

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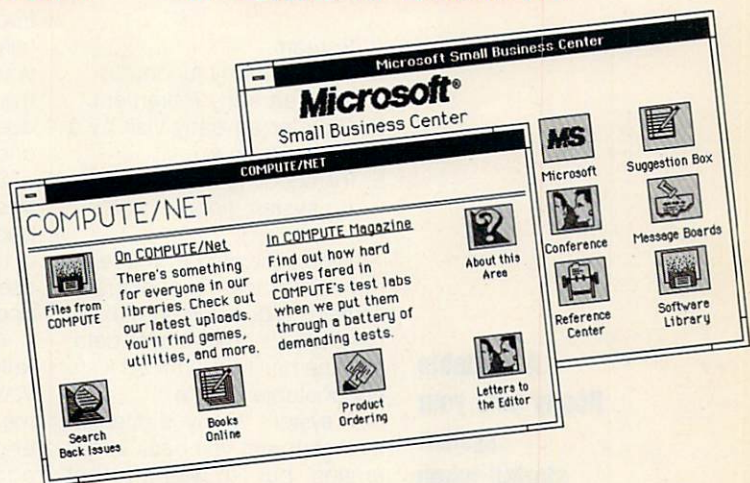
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# INTRODOS

Tony Roberts

## AVOID THE BOOT-UP BLUES

What do you do if your hard drive refuses to boot?

- A. Scream.
- B. Take an early lunch.
- C. Take an early retirement.
- D. Pray for an early visit by a computer guru.
- E. Try rebooting with your backup system floppy.

If you answered E, you're on the right track. Occasionally, something goes wrong with the hard drive's crucial boot data, and the hard drive thinks it's a nonbootable device.

A system floppy is often all it takes to get you back in operation, but I'm willing to bet you'd have trouble laying your hands on a bootable floppy in a pinch. If you do have a bootable floppy, are you sure it holds the current DOS version?

If your bootable floppy is either non-existent or outdated, take a couple of minutes to create one now using the DOS FORMAT command. Insert a new floppy in drive A: and enter `FORMAT A: /S`. This operation formats the disk and copies `COMMAND.COM` and the hidden DOS system files to it.

With your new bootable floppy you're in good shape if trouble arises, but if you want to be even better prepared, copy `SYS.COM` and `CHKDSK.EXE` to the disk along with a small text editor and as many of your favorite disk tools as will fit.

If your hard disk ever fails to perform, boot from the floppy and see if you can access the files on the hard disk. If the hard disk is accessible, switch to the C: drive and run `CHKDSK` to verify that the data on the drive is intact. If `CHKDSK` runs clean, you can then run `AUTOEXEC.BAT` and go about your normal business.

Making repairs is usually relatively easy, but the approach depends on the reason for the failure. If `COMMAND.COM` on drive C: is missing or mangled, simply copy a fresh version from your floppy disk. Be certain that the DOS versions on your hard and floppy disks are the same; `COMMAND.COM` doesn't work very well in mix-and-match mode.

Similarly, DOS's hidden files, if damaged, could prevent boot-up. To copy new versions of these files to your hard disk, use the `SYS C:` command after booting with your floppy.

Another possible reason for failure is that something in your `CONFIG.SYS` file causes the system to hang before it ever gives you control. If you've added a new driver or recently edited `CONFIG.SYS`, consider this possibility.

One way to isolate such a problem is to rebuild `CONFIG.SYS` a line at a time until you see what causes the system to stumble. In one odd case I worked on, I finally discovered that the system hung up during the load of the `ANSI.SYS` device driver. I couldn't figure out why such a ubiquitous device driver would cause a problem until I noticed that the `ANSI.SYS` file was half its normal length. Once I replaced it with a whole copy from the DOS disks, the problem was solved.

A less easily explainable problem occurs when the hard disk's boot sector suddenly goes bad. Although rare, this problem has bothered me on a few occasions. Each time I thought that an entire hard disk reformat was in the offing, but I always found an easier solution using one of the disk-repair utilities, such as Norton's Disk Doctor or PC Tools Diskfix.

The important thing is to be prepared so you can recover from trouble and be back at work with as little

difficulty as possible.

An added benefit to a bootable disk loaded with all of your favorite utilities is that it comes in handy when you need to use someone else's computer temporarily. Working on an unfamiliar system can be much friendlier if you have access to at least a few of your usual tools. So format that bootable floppy and stash it where you can always find it.

Speaking of formatting disks, those of you with MS-DOS 5.0 installed should check out the new punch that this version of `FORMAT` carries.

The nicest addition to the program, by my way of thinking, is the ease with which you can tell DOS which size disk you're formatting. If you're trying to format a 720K disk in a 1.44MB drive, you can forget the cryptic `/T:80 /N:9` string you used to use to pass along information about tracks and sectors on the target disk.

`FORMAT` now takes a `/F` switch with which you simply specify the size of the disk you're formatting. `FORMAT B: /F:720`, for example, is all it takes to format that 720K floppy in a high-density drive.

Another nice feature is that `FORMAT` uses the `MIRROR` command to save a copy of the target floppy's file allocation table. This makes unformatting possible if you suddenly realize that you had the wrong disk in the drive when you pressed the Enter key.

Also in the DOS 5.0 version of `FORMAT` is the quick format—the `/Q` switch. This option lets you reformat previously formatted media in seconds. Although this is a great timesaver, you should use this method only when working with disks that you know are good. The quick format is quick because all it does is create a new file allocation table and root directory; it doesn't scan for bad sectors. □

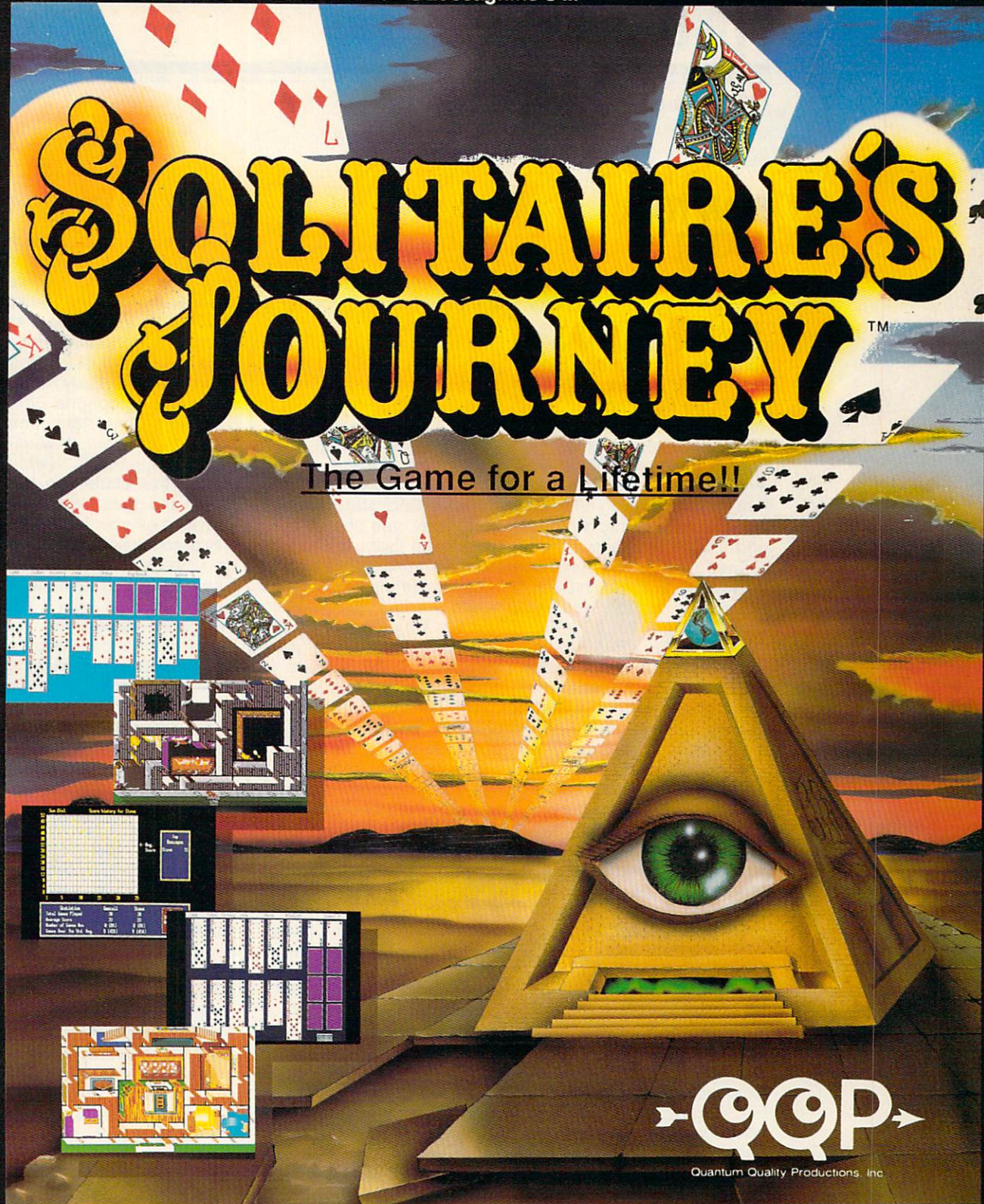
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# POINT & CLICK

Clifton Karnes

## PLAN YOUR ASCENT

I've studied time management for years, and in my quest for organization, I've used or experimented with a number of computer tools, including SideKick, PC Tools Deluxe Desktop, Active Life, PackRat, and YourWay. All these programs have their strong points, but none of them really fit me like a glove. I had a strong feeling that I could be doing better at time control and that my tools could be more effective.

Then I found Ascent (NewQuest, 2550 South Decker Lake Boulevard, Salt Lake City, Utah 84119; 800-887-1814; \$299). It's a PIM (Personal Information Manager), but it's different from the ones mentioned above. Ascent was designed by a time-management company, not a software company. NewQuest is a division of the Franklin Institute, and Ascent is a computer program based on the Franklin system and the Franklin Day Planner. This has crucial implications for the way you use Ascent, and it accounts for the program's success as a tool.

First, some background: The Franklin Institute has been doing time-management consulting for years, with a client list any company would envy. Intel, Hewlett-Packard, Apple, Merrill Lynch, and CitiCorp are just a few noteworthy Franklin graduates. Franklin developed the Day Planner (a paper-based system) to help the company's clients control their time and their lives. The important point here is that the Franklin Institute has a proven track record in teaching time management and in producing time-management tools.

The computer has obvious advantages as a time-management tool (and some disadvantages, too), so Franklin, in con-

cert with NewQuest, developed Ascent, which is a Windows-based program.

You'll realize that this product is different as soon as you open the box. Included are the software; three manuals; a Franklin Day Planner, complete with a set of forms and a storage binder; a four-cassette training seminar with a workbook; a videocassette; and a Franklin catalog.

Although almost everyone will be tempted to install the software and start using it right away, you should take the time to listen to the four tapes and use the workbook. These tapes discuss in detail how to use the Franklin system and the Day Planner. If you don't listen to the tapes, you'll only scratch the surface of what Ascent can do for you.

The Franklin Institute's approach to time management requires discipline, but it's easy to describe. You begin by defining your most important values as a human being. From these values flow your long-range goals. From these long-range goals flow intermediate goals, and from these intermediate goals you construct your daily task list. This hierarchy of values, long-range goals, intermediate goals, and daily task list is called the Productivity Pyramid, and it's at the heart of the Franklin system. If you spend the time to develop your personal Productivity Pyramid, your daily tasks will be a significant part of your long-range goals and your human values. As a consequence, you'll feel a deep satisfaction with yourself.

After listening to the tapes and getting in the Franklin groove, you'll be ready to install the software. Instead of taking the usual 5MB-10MB of hard disk space, Ascent uses less than 1.5MB. But don't be fooled by this program's modest size.

Ascent boasts an MDI-compatible interface with a toolbar sporting buttons for each of the program's modules. Most of these modules mirror elements in the Franklin Day Planner. Included are Appointment Schedule, Prioritized Daily Task List (an energized to-do list), Daily Record of Events, Telephone Book, Red Tabs (important files), Productivity Pyramid, Master Task List, Focus (which blocks the clutter on your screen and gives you all the information on your highest-priority uncompleted task), Calendar (a week-at-a-glance view), TurboFile (a free-form index), Daily Journal (for your thoughts), Quotes (for your file of inspirational quotes), and Network (for viewing other Ascent users' schedules on a network).

You can print the contents of these modules on letter-sized paper or on the special Day Planner paper provided.

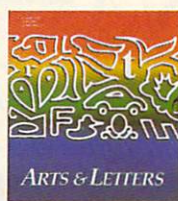
The heart of the system is the Prioritized Daily Task List module, and most of the other modules are integrated with it or support it in one way or another. In the Daily Task List, you list each task you want to complete for the day. You then assign each a priority of A (vital tasks that must be done), B (important tasks that should be done), or C (trivial tasks that could be done).

Next, you rank the tasks within each group with numbers and sort the entire list. Prioritizing, ranking, and sorting can be done by hand, or you can use special dialog boxes that make the process easy.

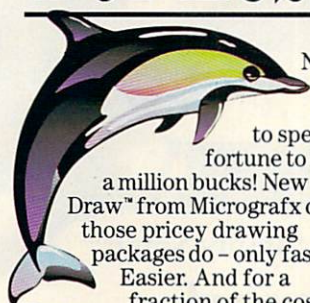
I've spent most of this page talking about the Franklin system rather than specifically about Ascent, but Ascent is more than just software. It's a powerful tool specifically designed to implement a thoughtful, flexible, and elegant time-management system. □

**Ascent is designed to implement a thoughtful, flexible, and elegant time-management system.**





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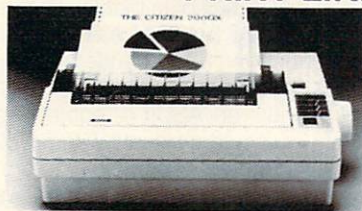
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# HARDWARE CLINIC

Mark Minasi

## HOW MODEMS WORK, PART 1

If you spend much time on computer data services such as CompuServe, GEnie, America Online, or, for that matter, any of the thousands of private bulletin board systems (BBSs), you've had to set up some kind of communications software. Are terms such as *MNP*, *XMODEM*, *YMODEM*, *V.32*, and the like confusing you? Then read on.

It may help to start the discussion with a statement of the overall purpose of communications. The point of communications is to get bytes of data from one point to another as quickly and reliably as possible, and that's where this whole mess started. So when you hear a new communications buzzword, ask, "How does this help me get data from point X to point Y?"

In the late seventies and the early eighties, the first BBSs appeared. Modems then typically transmitted at 300 bps, and the kind of data that was being transferred was usually text: either messages or text listings of BASIC programs.

In those early days, you'd transfer a file by setting your computer to capture mode, which meant that it would copy every incoming byte to a disk file. Then you'd tell the distant computer to list the file you wanted to receive, as if your only desire were to read the file as it scrolled by on the screen. The capture feature saved the file to disk as it appeared on your screen. When it was finished listing, you'd close the file, and you'd have your BASIC program transferred. There would be some extra trash above and below the file, but you'd just load the file into a text editor and trim that off.

Now and then, however, the transfer would become gar-

bled because of phone line noise. In that case, you'd see the garbled characters, and you'd tell the remote system to resend the file.

Hopefully, it would come through OK the second time. If not, you might conclude that you'd just happened to get a noisy line today, and you'd just hang up and dial again, hoping for a better connection. This was called phone line roulette.

In this case, there were error-detection and error-correction mechanisms. The detection mechanism was you, the human operator, noticing that the incoming data looked wrong. The correction mechanism was also you, requesting a resend. This crude system worked for two reasons.

First, you were transmitting at 300 bps. (Never say *baud*; no matter what you've been told, it doesn't stand for *bits per second*.) The lower the data rate, the lower the error rate. Bad bits appear on a normal phone line once in a blue moon at 300 bps; they can appear every minute or so at 9600 bps. Error correction was less necessary because errors just plain didn't occur.

Second, the kind of data that you were transmitting could stand up to an error or two—it was mainly English text. If you saw an incoming line of BASIC that read *PRONT 'Hello,'* you knew that *PRONT* was really *PRINT* garbled. The built-in predictability of English helped the error-correction process.

As time went on, 1200-bps modems became more popular. BASIC listings were replaced on bulletin boards by COM and EXE files, files that don't mean anything when viewed by the human eye.

So a BBS operator named Ward Christensen in the Chicago area invented a simple method for transferring data, a meth-

od that transfers data while simultaneously finding and correcting data garbled by transmission noise. He called the method XMODEM, and it looks something like this.

Say station S (the sender) is sending a 400-byte file to station R (the receiver). Both sides of the conversation must be running a program that manages a transfer according to the rules of the transfer. You do that whenever you tell your system to transfer with XMODEM. This insistence on both sides agreeing is the linchpin of communications protocols. Here's how the XMODEM technique works. (Because both sides are controlled by a computer, people don't have to worry about this stuff, except for issuing the commands to S and R to get going.)

First, the sender must ensure that the receiver is ready to receive the data. It does this by waiting for a particular one-byte signal from the receiver, an ASCII code 21, also known as NAK (negative acknowledgment).

There's no significance to this character—it was just picked at random. When R says NAK to S, R is saying to go ahead and start transferring. If you wanted to, you could generate a NAK from your keyboard by typing Ctrl-U.

S is going to send the data to R in 128-byte blocks. Before the 128 bytes of each block, however, it first sends an SOH (Start Of Header) signal, which is just an ASCII 1, something you could generate with a Ctrl-A. You've seen ASCII 1 before; it's the smiley face that shows up when you type a COM or EXE file to the screen.

After the SOH, S sends another byte, a block number byte. The value of the byte is 1 for the 1st block, 2 for the 2nd, and so on. As bytes can only hold values up to 255, the value wraps around after 255.

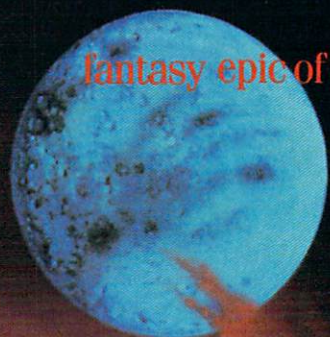
**What exactly is XMODEM, and how does it make sure that your data arrives safely?**



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Circle Reader Service Number 167



# HARDWARE CLINIC

The 256th block would be numbered 0, the 257th would be numbered 1, and so on.

For the sake of redundancy, the third byte repeats the block number—but in another way. S subtracts the block number from 255! The second block number for our first block is, then, 255 minus 1, or 254. Then S sends the 128 bytes of data. The block's almost finished, but there's one more byte to go.

Recall that the whole purpose of this exercise is to be able to detect errors. S now adds something called a checksum that will allow R to detect errors. The sender S takes all 128 bytes of the data block and treats them as if they weren't ASCII characters or binary data, but just a string of 128 numbers. It then adds up the 128 numbers to get a sum. That sum is then divided by 256. The remainder, believe it or not, is the checksum. (This

makes better sense when you do it in machine language; Ward knew what he was doing.)

Here's an example. Suppose we had a block of not 128 characters, but, for ease of use, 11 characters. Let's use my name in uppercase letters: MARK MINASI. Remember that it's 11 characters, not 10, because of the space between the first and last names. The ASCII code for M is 77, A is 65, R is 82, K is 75, a space is 32, M is 77, I is 73, N is 78, A is 65, S is 83, and I is 73. Add them up, and you get a total of 780. Divide 780 by 256, and you get 3 with a remainder of 12. So 12 is the checksum.

S has now sent the first block. It was 132 bytes long—3 bytes in the header, 128 bytes of data, and 1 byte of checksum. Now let's see what R does with the block.

First, it looks at the block number to make sure that it makes sense—if block

27 arrives right after block 10, something's wrong. Assuming there's no trouble, it next examines the 128 bytes of data, ignoring the checksum for the moment. Using the 128 bytes of data, it computes its own checksum in the same way that the sender did. Now R examines the checksum that S sent to be sure it's identical to its own.

This is the error-detection part—the checksums must be the same. If they are, R signals S that all is well by sending a single byte, an ACK character. ACK (positive acknowledgment) is ASCII code 6, or Ctrl-F. If the checksums don't match, then the error-correction part comes in, and R sends a NAK code. When S receives the negative acknowledgment, it resends the data block. R checks the resent data block, and, hopefully, all is well. If not, S just keeps resending and R just keeps NAKing until they reach max NAKs, at which point the trans-

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fer is terminated. Assuming the first block has been received correctly, S then sends the next 128 bytes of our 400-byte file. Once that's been acknowledged, there's a third block, and finally there are only 16 bytes left. The 16 bytes are filled out with either end-of-file characters or null characters and then sent. Once that has been acknowledged by R, S says, "That's all, folks," by sending an EOT (End Of Transmission) character, which is ASCII 4, or Ctrl-D. A final ACK from R ends things.

A couple of things may be nagging at you about this protocol. First, why send the block number twice, and second, why subtract from 255? The first question is easier: The block number is sent twice simply for insurance. Remember that we don't trust the phone lines. This is a fairly common practice in communications and, for that matter, in real life. If you've ever heard an announce-

ment like "Mr. Jones, Mr. Jones, please pick up the white courtesy phone" in an airport, you might ask yourself why the announcer said Mr. Jones's name twice—was he supposed to pick up the phone twice? No, of course not. The announcer just wanted to be sure that Mr. Jones heard his name.

But why subtract from 255? I thought I'd try asking the source himself, so I dropped a note on CompuServe to Ward Christensen. His answers were very helpful. "Why not?" he responded with a grin. "Actually, if a line glitch occurred that changed a particular block number to something else, there's a chance it might do two at a time." Thus, anything that affected, say, all the 1 bits would damage both copies of a block number, if both block numbers in XMODEM were equal. By subtracting from 255, there's a side effect of converting all the 1s to 0s and vice versa. Tak-

ing a binary number and converting its 1s to 0s and 0s to 1s is called taking its complement.

Ward observed that, in the case of the systematic error that always damages 0s or 1s, "the complement is not likely to get similarly zapped. Also, the block number isn't in the checksum, because I wanted it separately checkable." This provides an internal block check mechanism—but that's not the only reason for this method. Ward explained that one of the popular processors of the time was the 8080 (no, that's not the 8088; the 8080 predates the 8088 by about eight years). It had a built-in instruction that made using the complement for checking a simple matter.

That's XMODEM in some detail. We needed that detail to understand how you can speed up your file transfers without buying a new modem or new software. See you next month. □

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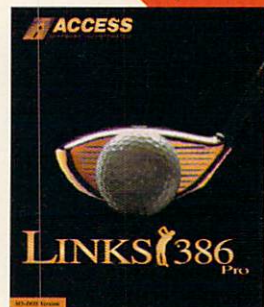
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# PROGRAMMING POWER

Tom Campbell

## PC CHARACTER ROM REVEALED

This month's program, BANNER.C, digs deep into the guts of your PC by using the character ROM to display letters eight times their normal size in text mode. It shows both an underused PC resource (the system font data) and some useful tricks of the C trade: bit-shifting operators, reading bit values, using array notation for pointers, and reading absolute addresses on the PC. (You can find the source code for BANNER.C on COMPUTE/NET on GENie or America Online.)

Banner asks you for a string of up to ten characters and a fill character. The fill character is what makes up the dots in the letter—for example, the asterisk character or one of the extended ASCII box characters. You can enter the extended ASCII characters by holding down the Alt key and pressing up to three digits, creating a number between 0 and 255. I suggest 177, 178, 219, 248, and 254. Then Banner displays the string on the center row of your screen.

Your PC video card has an 8 × 8 character set in its ROM, even though, in the case of EGAs and better, that's not the default system font. But it's there all the time to provide compatibility with earlier adapters. The dots that make up the 8 × 8 font are found at location F000:FA6E hex and are laid out in 256 sets of eight bytes each, with the first byte making up the top row of dots in each letter, the second byte making up the second row of dots, and so on. The example below shows the layout of the letter A.

The first byte, numbered 0, contains the hex value 3Eh. This makes little sense until

you view it as the binary value 01111100. Replace each of the 1s with an X, and you have the top line of the A. The next byte is hex C6h, or binary 11000110. You may notice that bit 0 is unoccupied for almost every character, as is byte 7. Bit 0 forms the space between letters—it's just an empty column formed by leaving bit 0 of each of the rows of bytes cleared to 0. An exception is the underline character, which, appropriately, goes all the way across the character matrix. And byte 7 is the space left for descenders—the tails for *g*, *j*, *p*, *q*, and *y*.

Bit		Byte
7		
6		
5		
4		
3		
2		
1		
0		
	XXXXX	0
	XX XX	1
	XX XX	2
	XXXXXXXX	3
	XX XX	4
	XX XX	5
	XX XX	6
		7

The chart above isn't quite accurate. The byte numbered 0 is actually byte 520. Remember that the uppercase A is ASCII 65. There are eight bytes of data per character. Multiply 65 by 8, and you get 520. Uppercase B is at 528, and C is 536. The formula, then, as it appears in the WriteChar() routine, is CharacterRom = CharacterRom + Letter \* 8.

CharacterRom was previously initialized and allocated at the same time—another handy C trick: char far \*CharacterRom = (void \*) 0xF000FA6E. This is identical to char far \*CharacterRom; ... CharacterRom = (void \*) 0xF000FA6E.

The previous example is clearer in this case, because we want to emphasize the nature of CharacterRom as an absolute address. The easy

part is explaining that 0xF000FA6E is hex notation for the absolute address whose *segment:offset* value is, as explained earlier, F000:FA6E. That's where the 1024 bytes of character ROM data appear. Let's dissect the rest of the line piece by piece, because much of it isn't what it seems. The char means that we will treat the address as a pointer to a character. Since a character is guaranteed by the ANSI standard to be the same size as a byte and since C lets us use array notation wherever we see a pointer, later we'll be able to calculate the location of each row of character data like this, even though CharacterRom wasn't declared as an array: Bitmap = CharacterRom[EachRow].

Let's use the top row of A, binary 01111100, as an example. The Binary numbers mirror the physical layout of bits in memory, so this loop starts at the left bit and moves right: for (EachCol=7; EachCol>=0; EachCol--).

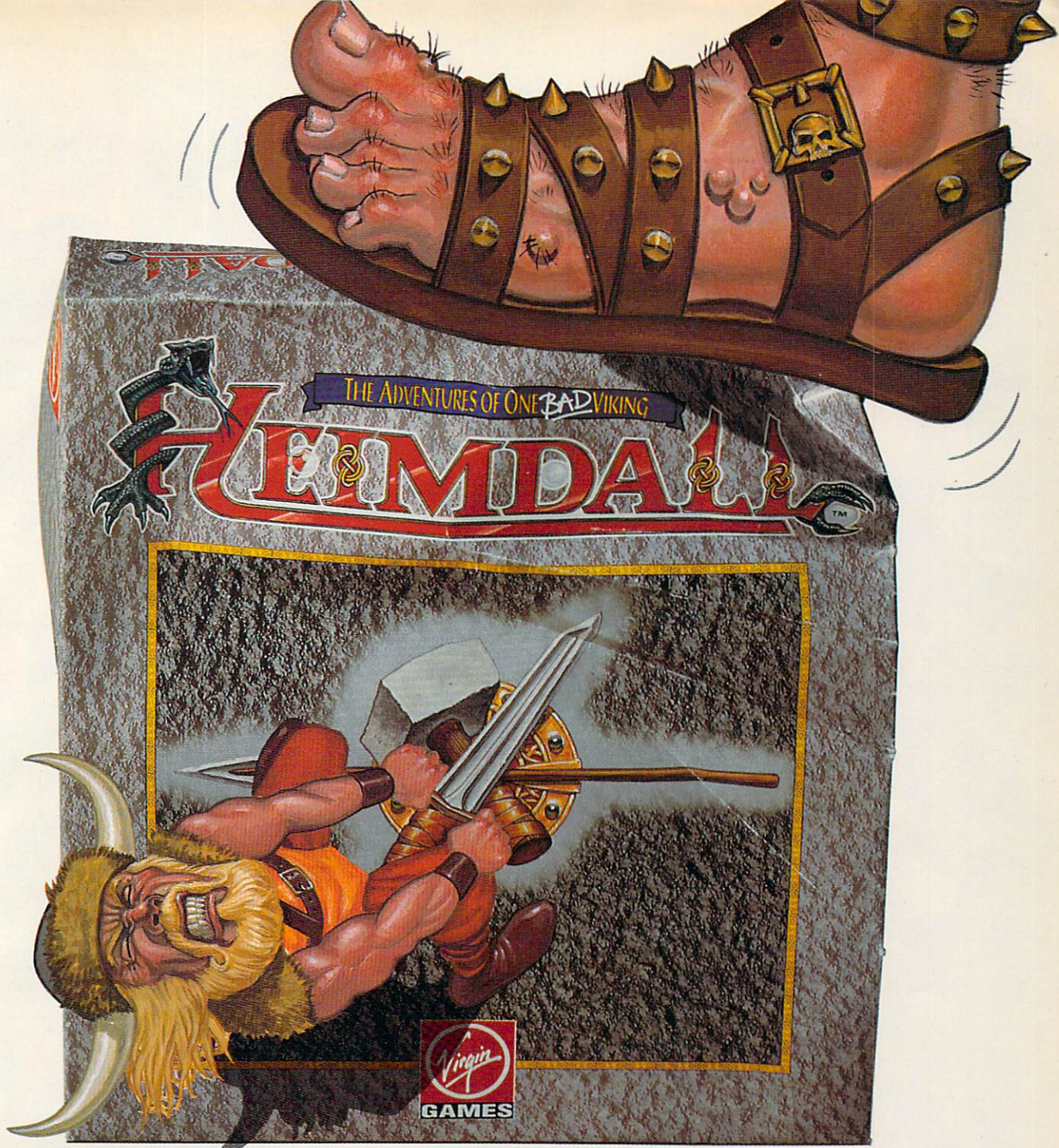
The line "if (Bitmap & 1)" is another good example of C's terseness at work, taking advantage of C's treatment of an if expression as an integer result. In Pascal, you'd use this code: IF (Bitmap AND 1) = 1 THEN.

Using the bitwise AND operator of C to see whether a bit is set makes it easier to see what's going on. If the rightmost bit of Bitmap is indeed set to 1, the cursor is positioned appropriately, and the FillChar is written directly to screen memory. If bit 0 is clear (that is, with a value of 0 instead of 1), nothing happens. Finally, the byte is pushed one bit to the right, moving bit 1 into the 0 position, 2 into the 1 position, and so on, up to bit 7.

With only a little extra work, you could beef up WriteChar() to center the text both vertically and horizontally. □

You can find the source code for BANNER.C on COMPUTE/NET on GENie or America Online.





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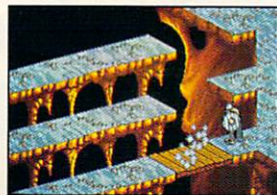
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# FECTION

ARTICLE BY  
GREGG KEIZER

STALKING THE PERFECT, AFFORDABLE  
PERSONAL PRODUCTIVITY PC



**W**orking at home is no picnic. The hours can be brutal, the alter-ego boss a demanding slave driver, and the work load sometimes erratic.

Still—and this goes for full-blown home-based businesses, moonlighters, and even anyone struggling to keep up by working extra hours at home—it's hard to beat. You can work when you work best—late at night, for instance. Office politics almost disappear. And the harder you work, the more you make (OK, maybe it doesn't always work out like that).

But any home office success is due as much to technology as to talent and perseverance. Without the gizmos and gadgets scattered around the house, you wouldn't be able to do the work you do, be as productive and profitable, or even keep tabs on your clients.

The linchpin of home office success is the personal computer. That one box provides almost all of the tools you'll need, from those that crank out correspondence or bills to the ones that manage numbers or volumes of data. It plays the role of assistant, secretary, co-worker, confidant, accountant, and half a dozen others, all without salary demands or time off.

### Begin with the Box

Because it provides so many options with so few drawbacks, it's crucial that you have the perfect personal productivity PC in front of you. Since so much depends on its ability to get jobs done, you need the best-fitting computer you can find.

But don't fall into the trap of thinking the best PC also has to be the most expensive. Far from it. You can equip your home office with an ideal PC for as little as \$1,600.

The perfect PC can begin with an almost empty box—a computer sans drives and monitor—or it can start with a basic system already configured with an adequate array of memory, disk drives, and video card. Though either opening gambit works, the trend today is for sellers to assemble a lineup of stock PCs and then let you pick. You can, of course, build the perfect PC from scratch, but the advantages are usually so inconsequential—the main one being an ability to name the brand of every component—that it's rarely worth your time.

Instead, start by buying a capable 386 IBM PC compatible, selected for low price and high power. It doesn't matter whether you buy your PC by mail order or in a retail store, a superstore, or even a discount warehouse or shopping club. Just match the computer's specifications with this list of features.

- 20-MHz 386 microprocessor
- 2MB RAM
- 100MB or larger hard drive
- 5¼- or 3½-inch high-density floppy drive
- VGA monochrome monitor and video card with 256K of video memory
- Keyboard
- MS-DOS 5.0 or DR DOS 6.0
- FCC Class B approval

Because PC prices continue to plummet—especially for machines centered on the 386—you can actually find this core computer for a little more than \$1,400. In fact, several mail-order firms break or nearly break this barrier, among them companies like In-

works just fine. More memory, a larger drive, and color VGA would be nice, especially for heavy Windows use, but what you get in this base machine can handle the bulk of your chores. Besides, you can slide past problems with some ingenious software.

A 100MB hard drive may seem on the small side, but with Stacker, an on-the-fly compression/decompression utility, you can effectively double the size of the drive (certain kinds of files compress more compactly than others). Stacker as software lists at \$149; a faster hardware/software version of Stacker (Stacker AT/16) lists for \$249.

More memory? You'll find that 2MB is enough for the basic DOS word proc-

### TEN LOW-COST PC ADD-ONS

Buying extra punch and power for the home office computer doesn't have to cost an arm and a leg. If you can stretch the budget just one more time, here's what you should consider.

1. Another megabyte of memory (maybe two). A 1MB SIMM runs in the \$50–\$60 range and is a snap—literally—to add to a system that is set up for them.

2. A mouse. Even if you don't use Windows, a mouse is a good bet. DOS software—graphics and desktop publishing, in particular—works with a mouse, too.

3. Another I/O card. Your PC probably came with two serial ports and a printer port. Another I/O board doubles the number of each—handy when you start adding devices like modems, label printers, and mice. Don't let the fact that you have four serial ports confuse you, though. Most PCs can only use two at a time. However, having four installed will allow you to leave your modem and your mouse attached all the time, even if you have to switch between them in software.

4. Another floppy drive. You'll spend less than \$70 for either a 5¼- or 3½-inch high-density drive.

5. A tower or minitower case. Most mail-order PC makers will substitute a minitower or tower case, as will shops that build

the PC to your specs. The larger case makes it easier to add drives and cards. And it can sit on the floor, out of the way.

6. A disk-compression utility. Adding something like Stacker, whether just the software or the hardware/software version, you effectively double the size of that 40MB hard drive to nearly 80MB.

7. A better keyboard. *Pathetic* is the word for the keyboards many low-cost PC manufacturers include. The OmniKey and Keytronic keyboards are among the best. The Omnikey/Ultra lists for \$129.

8. Monitor arm. For as little as \$75, you can get your monitor off the desktop and onto a swinging, mobile arm. Doing so can cut neck pain (often the result of looking down at a too-low monitor) and open up more desk space for paperwork.

9. Power control center. Slip one of these between the computer and the monitor, and you've got four or five outlets, surge protection, phone line filtering, and one-stop power-up. Curtis and TrippLite both make excellent centers that are sold direct for \$80 or so.

10. Disk cache. Another software selection to beef up your PC is a program like the \$80 PC Kwik Powerpack, which speeds up hard drive data retrieval by storing frequently accessed data in RAM.

sight, HD Computer, and FastMicro. Closer to home, most cities sport a handful of entrepreneurs who will assemble a PC like the one above for about the same price.

To be on the safe side, budget \$1,500–\$2,000 for the foundation of your perfect home office PC. That should account for shipping charges (mail order) or sales tax (local), as well as for any slight price differences if you're set on a particular model.

### What About Windows?

Just how good is this inexpensive PC? Although we've cut corners in order to cut costs, the fact is that for most home office tasks this foundation

processor, database, spreadsheet, and telecommunications applications. Multitasking—running more than one program simultaneously—is possible with in that much RAM with DESQview or GeoWorks.

Or you could opt for a task switcher instead. Software Carousel can segregate that 2MB of RAM into two or three separate and smaller work areas and then flip between applications with the press of a couple of keys. If you're sold on Windows, you'll feel cramped in two megabytes—no doubt about it—and you'll probably have to forgo its multitasking capabilities. Making this machine Windows-ready, though, will only cost you around \$100–\$120.



Though color brightens up games and educational programs and is a prerequisite for multimedia presentations and some graphics work, you won't mind the monochrome VGA monitor if your home office work revolves around words, data, and numbers. Most desktop publishing can be done without color, as well.

Of course, you can always add to this perfect PC down the road when your budget allows and your needs demand it. Snap in more memory, upgrade the video board, or replace the monitor with a color model.

## Everything Else Is Gravy

Let's say you have the essentials on your desk, and some money burning a hole in your pocket (OK, so it's not really burning, maybe just smoldering).

Customizing this rock-bottom computer to fit your business won't bust your budget, either. Depending on the specifics, you can equip this machine with the extras for as little as \$500. You just need to know the kind of work you expect to do with the computer and the options you need for that work.

A typing service or accounting practice requires a PC different from the one required by a home desktop publishing business. And a full-time at-home worker's PC should be different from the one used to telecommute to the office part of the week.

## It's What's Inside That Counts

As you're building your prospective home office PC, use this short checklist to ask some smart questions about what's inside.

- Can you easily add system RAM to the motherboard by snapping in extra SIMM chips? That's the simplest way to beef up the PC's memory. You should be able to insert at least 8MB of RAM if you're using 1MB SIMMs.
- How many slots are still empty after the necessary boards—I/O, video, and disk controller—are in place? The more expansion slots still open, the more capability you can later add to the computer. Demand three empty slots, minimum.
- How many drive bays remain vacant? Later, you may want to add another floppy or hard drive, or a CD-ROM or tape backup device. Make sure the PC has at least two empty bays, with one of those large enough for a 5¼-inch half-height drive.
- Does the computer come equipped with a cache, and if so, how large is it? Cache RAM dramatically speeds up some computer actions by acting as a buffer between the fast processor and slow RAM.
- Are the components from depend-

## THE ULTIMATE PERSONAL PRODUCTIVITY MACHINE

You get what you pay for. Although a home office computer system ripe for work can run you as little as \$1,500, you must make sacrifices to bring the cost down that far.

The ultimate home office computer is a far cry from the most affordable. It is based on a state-of-the-art microprocessor, sports megabytes of memory, and comes complete with lots of extras. Here's the current contender for the ultimate home office PC.

- 33-MHz 486DX PC in a full tower case
- 8MB RAM, with a 256K RAM cache
- 200MB hard drive
- 5¼- and 3½-inch high-density floppy drives
- Super VGA video card with 1MB of memory
- OmniKey/Ultra keyboard
- 120MB tape backup drive
- 15-inch NEC 3FGx multisync monitor
- Four serial ports and two printer ports
- Seiko Smart Label Printer Plus
- Logitech or Microsoft Mouse
- 9600-bps modem
- MS-DOS 5.0
- Scanner with OCR software
- Software, including Stacker, Software Carousel, and 386MAX memory manager

The price for such a monster is almost as overwhelming as its abilities: within a couple of hundred dollars of \$4,700.

Still, this is the home office computer that can take you through the middle of the 1990s. And such a computer may rapidly pay for itself by handing you the tools to tackle jobs formerly out of reach or by quickening the pace of your work. And finally, remember that—depending on your tax bracket, your state and local income taxes, and the income from your home office efforts—the effective price for any home office computer system may really be only 45 to 70 percent of the purchase price. If you can deduct the entire cost of the above system, for instance, it actually represents an out-of-pocket expense of somewhere between \$2,115 and \$3,290.

able, reputable manufacturers? Although personal preference plays a part here, look for recognizable names on such things as the drives, video card, and motherboard chip set.

No matter what your business needs may be, your perfect PC should be designed and built to deliver on the promise of technology—to make your time more productive and your business more profitable. From here on, we'll look at several specific personal productivity applications and talk about the hardware and expenditures it will take to assemble the optimum machines to meet their requirements.

## The Perfect Telecommuter

Still on salary, but working at home with the help of your modem and the phone lines? Lucky you—you get the benefits of both worlds.

Build the perfect telecommuting PC by starting with the basic 386 system and adding the following.

- 9600- or 2400-bps modem. Telecommuting usually depends on intensive file transfers and remote connections with the office network. A 9600-bps modem dramatically cuts the time you'll spend online in a remote connection; a 2400-bps modem, though slower, is less expensive. The Practical Peripherals Practical Modem 9600SA external modem was just slashed to \$399 list; Everex's 2400-bps internal modem, the Evercom 24, lists at \$129. Also look for 19,200-bps modems to become more common—and more economical.
- Fax board or fax modem. You'll need a fax modem to supplement the computer-to-computer connection. Intel's SatisFAXtion board lets you receive faxes in the background. New low-cost SatisFAXtion boards will be released by the time you see this.

**The bottom line.** In the end, the total cost of the perfect telecommuting PC: \$1,900–\$2,400.

## The Perfect Publisher

Your spare bedroom can be the work site that churns out company newsletters, crisp presentations and proposals, fliers and brochures, and enough other documents to paper the neighborhood. Today's technology makes it possible for one talented person to write, design, and produce camera-ready copy in a single step on one machine.

Assemble the perfect desktop publishing PC by adding the following items to the stock 386.

- Additional memory. Font- and graphic-intensive documents cry out for more RAM, so spend \$100–\$120 for another 2MB of RAM in SIMMs and snap them in yourself. Remember that if your computer isn't equipped for SIMMs or you aren't technically minded, a technician can usually do the job in a few minutes for not much more than you pay for the chips.
- Better video card. You can often increase your monitor's resolution and number of colors by either adding memory to your existing video board (this strategy isn't always easy, or possible, beyond 512K) or buying a new 1MB video board. The Diamond SpeedSTAR Plus VGA is a better-than-average VGA card that lists at only \$269.
- Scanner. You'll need a scanner to incorporate real-world images into your publishing masterpieces. A quality hand scanner, such as Logitech's Scan-



Man 256, lists at \$449. If you're scanning large images or large quantities of images, though, a flatbed scanner like The Complete Page Scanner/GS (GS stands for Gray Scale) is a much better pick. It's also more expensive at \$1,099.00.

- Full-page monitor. Squeezing desktop publishing projects onto a 14-inch monitor is only inviting headaches. You need a screen that shows a complete page. Samsung's 15-inch Hercules-compatible full-page monitor may be hard to find, but the reward is an affordable \$849 (list price) cure for the video headaches in desktop publishing.

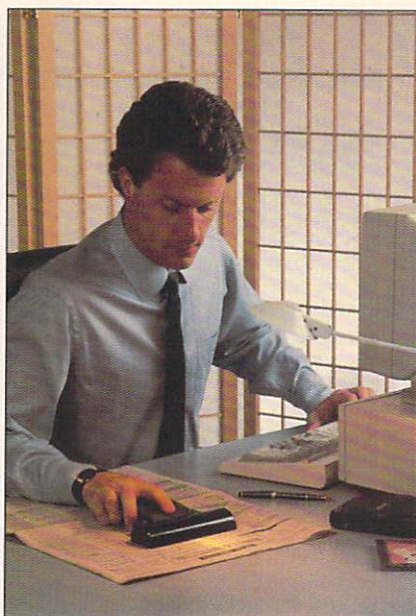
The bottom line. Total cost of the perfect publishing PC: \$2,400–\$2,900.

### The Perfect Marketer

When your business depends on selling, you need to beef up your PC's ability to take calls and punch out direct mail pieces.

Start with the standard 386SX system and add these components.

- Fax board or fax modem. You can't do business today without communicating by fax. Intel's \$499 SatisFAXtion board pulls in faxes while you work the phones. By the time this is printed, Intel will have released new versions of



Typist makes data entry simple.

the SatisFAXtion board with list prices starting at \$129 and specialty fax software for use from within Windows. The top-of-the-line model will support the new 14,400-bps fax standard.

- Label printer. Processing orders and printing labels—whether for shipments

or direct mail pieces—can try your printer's patience. Buy a label printer instead, like Seiko's Smart Label Printer Plus. This thermal printer uses one of your PC's serial ports and can even print from lists you create with your word processor or database. As of this writing, its list price is \$249.95, but discount houses may carry it for far less.

- Voice mail system. You may be able to get by with a two-line phone and an answering machine, but a voice mail system can direct messages and allow customers to leave requests in individual voice mailboxes. The Complete Answering Machine, a \$399 board, uses your PC's hard drive to store outgoing and incoming messages. If you don't want to spend money on a separate fax modem and voice mail system, take a look at The Complete Communicator, a package that brings these features together.

The bottom line. Total cost of the perfect marketing PC: \$2,300–\$2,400.

### The Perfect Writer

Wordsmiths need a customized PC, too. Whether you're pounding out the Great American Novel or bringing home the bacon with feature assignments for newspapers or magazines,

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Loveland, CO 80537  
(800) 432-5858  
(303) 669-8000

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- 2400-bps modem. Online research pays for itself in time saved and aggravation avoided. The most economical way to connect to services such as CompuServe and Dialog is with a 2400-bps modem. The Everex internal modem is a good choice.

- OCR package and scanner. Most writers live and die by clips. Ideas germinate from newspaper articles; files bulge with background pieces torn from magazines and photocopied from books. You can keep all this information digitally if you buy an optical character recognition (OCR) program and a hand scanner. Basic combination packages, such as Logitech's ScanMan 256 with Perceive OCR software, cost approximately \$550. Caere's Typist Plus Graphics, a \$595 scanner/OCR software pack, is near the top of the line. Either of these packages can be

purchased for roughly 50–60 percent of list price at discount outlets.

**The bottom line.** Total cost of the perfect writing PC: \$2,000–\$2,200.

### The Perfect Accountant

Every home office crunches numbers, even if they're only on the business's books. But for offices that specialize in accounting, figures are everything.

To construct the perfect accounting computer, include these peripherals along with the core home office PC.

- More memory. Most state-of-the-art spreadsheets, the number lover's best tools, operate under Windows. Spend \$100–\$120 on an additional 2MB of RAM for snappier performance.

- Tape backup drive. Though every hard drive should be backed up religiously, that advice goes double for critical financials. The easiest and most worry-free way to back up data is with a tape backup drive. The Colorado Jumbo 120 DJ-10, a 120MB drive, is simple to install, backs up even when you're not around, and only costs about \$250—less through mail order.

- A math coprocessor. You can significantly speed up really serious number crunching when you plug an 80387-20 math coprocessor chip into your PC's empty socket. The least expensive ones can be found for \$115–

\$120 in mail-order advertisements.

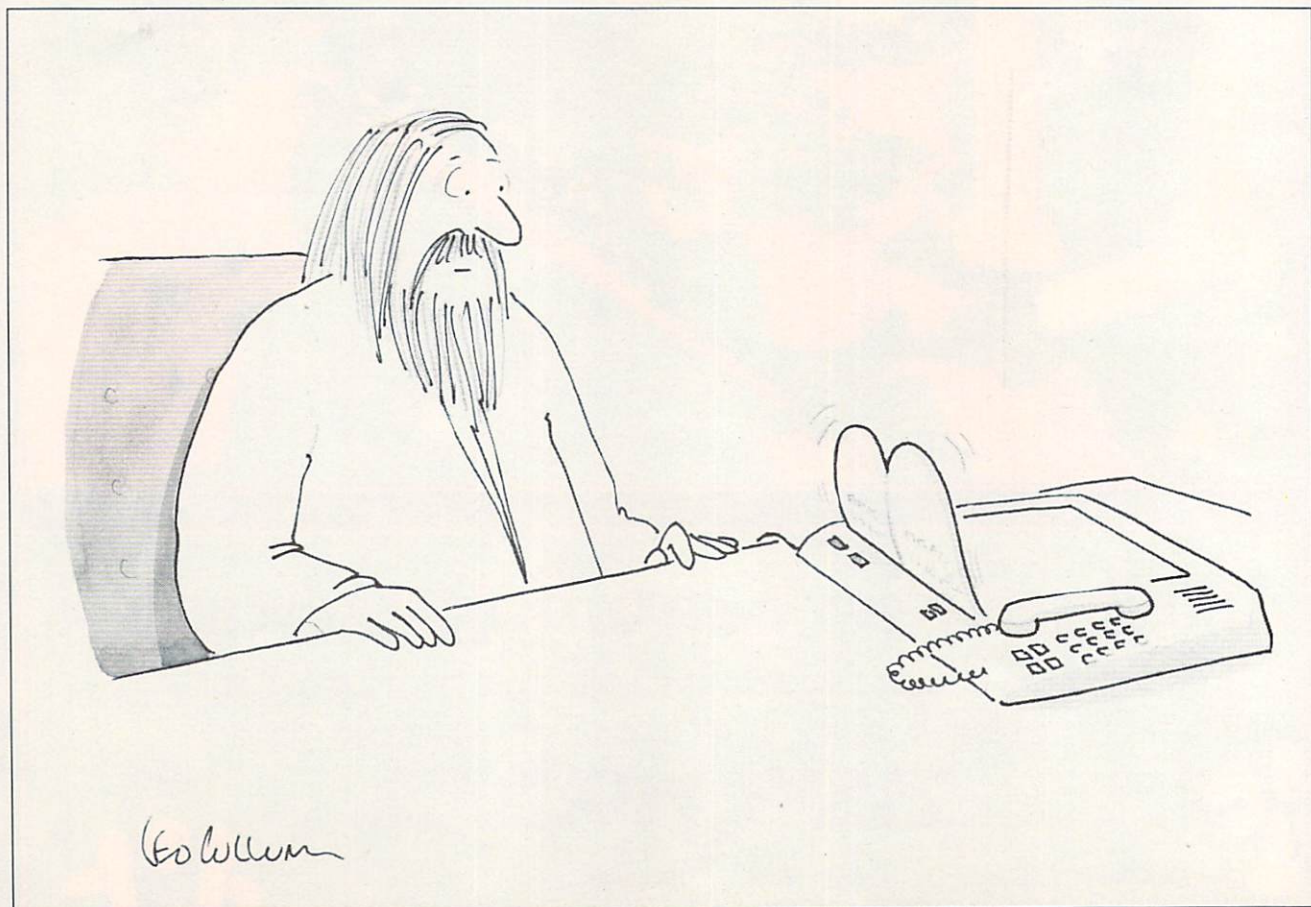
**The bottom line.** Total cost of the perfect accounting PC: \$2,000–\$2,100.

### Bringing It All Back Home

No matter what computer system you buy, two things will always be in short supply: RAM and hard disk space. If you have the funds to splurge in any area, buy a larger hard disk and more RAM. Some experts recommend that you estimate how much hard disk space you'll need and buy twice as much. But even if you do this, within a year, you'll probably wish you had more. Remember that a hard drive twice as big as the one you're considering probably costs far less than a second hard drive of the same capacity.

If you use software that accesses extended memory—Windows in particular—you'll know if you don't have enough memory. Your applications will fail for no apparent reason. If you have only 2MB of RAM, upgrading your machine to 4MB or more is a very small investment, and it can make a tremendous difference in performance.

In every business, performance is the name of the game. It saves you time and makes you money. It only costs a little more to start out with the perfect PC, but it will pay off every day in personal productivity. □





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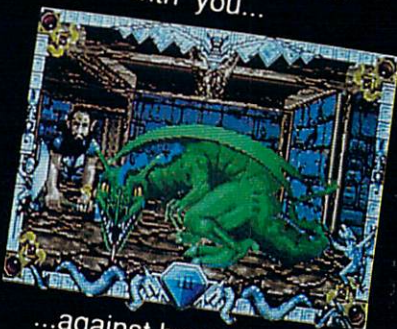
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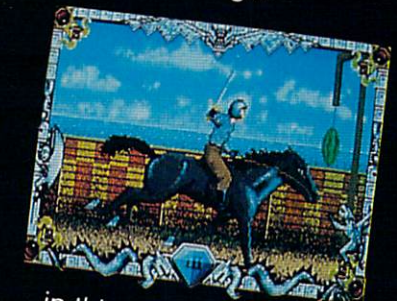
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# SHAREPAK

Bruce M. Bowden

## A HOT COLLECTION OF SUMMER SOFTWARE

This month's SharePak disk greets the lazy days of summer with three programs that make computing easier for each member of the family. COMPUTECalc is a full-function calculator available at the press of a key. The offering

are downloaded and carefully scrutinized. From these, we choose the best. This saves you, as a SharePak subscriber, enormous time and expense!

Shareware is privately written software that has been released to online services in the hope that other online subscribers will download it, find it useful, and pay a registration fee. The author, by making the software available, is saying, "Try it, and if you like it,

hand calculator, you can use COMPUTECalc to add, subtract, multiply, divide, calculate percentages, and send figures to memory to be recalled later:

COMPUTECalc is compatible with any IBM PC, XT, AT, or clone with DOS version 2.0 or higher.

### CUMBERLAND TREE

CUMBERLAND TREE is a professional-quality genealogy program packed with special features. Enter individual names, along with dates and places of birth, christening, marriage, death, and burial, and you can tie the names together automatically as both a family and extended family structure. Print out pedigree charts, descendant charts, family group sheets, individual and marriage listings, birthday and anniversary lists, and many other reports. The pop-up menus are friendly and easy to use with extensive online help.

Ease of use is a hallmark of this database. When a child is added, the father's surname is automatically entered and vice versa. (If the surname isn't correct, then you can simply overwrite it.) When a place name is entered once, it can be selected from a pop-up window forever after.

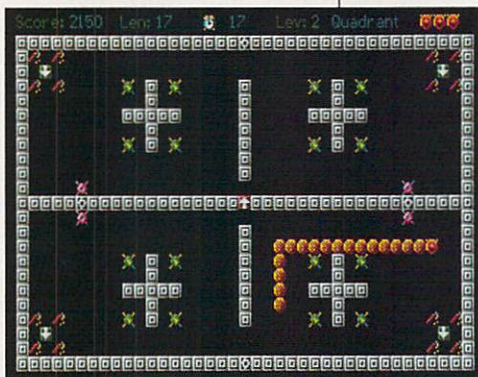
CUMBERLAND TREE runs on any IBM PC, XT, AT, PS/2, or compatible with 512K of memory.

### Squirmer 1.02C

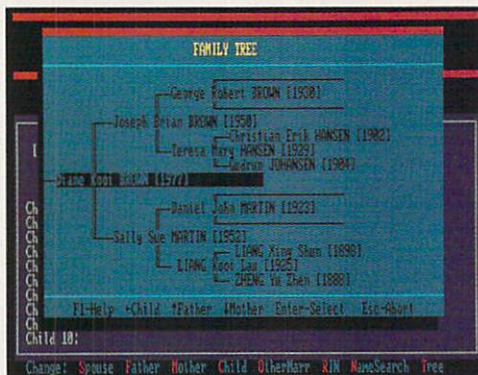
Squirmer has a voracious appetite for power pellets. He'll stop at nothing to consume everything in sight! The more he eats, the more he grows, and the more points you earn. But beware; the game is more difficult than it first appears.

Squirmer will run in CGA, EGA, or VGA on any IBM or compatible computer. □

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cool relief  
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COMPUTECalc sports such handy features as mouse support, modifiable colors, user-definable hot keys, keyboard stuffing, and a help function. The location of the calculator upon the screen can be changed by simply dragging it wherever you like.

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### Back Issues Available

**OCT 91:** NorthCAD-3D, computer-aided design; Conquest, a great Risk-type game; WAXMAN, a challenging TSR chess game; SPEAK, add speech to your computer. (#CDSK1091)

**NOV 91:** Popcorn, an arcade game with excellent graphics; Amortz, figure loan payments; CopyTree, easily backup large directories; Cunning Football, a great football simulation; Directory Enhancer, makes your directories much easier to read. (#CDSK1191)

**DEC 91:** EZ-Menu, access programs with a single keystroke; PuzzleMaster, an assortment of challenging brainteasers; PCBENCH, get a complete report on your system's performance. (#CDSK1291)

**JAN 92:** Hi-Lo Joker Poker, draw poker with a new twist; LINEWARS, an excellent modem space-combat game; ZipZap, view and modify files and disk sectors; FormGen, generate original business forms. (#CDSK0192)

**FEB 92:** CredCard, financial register for credit cards; EZ-Disklone Plus, make multiple, single-pass disk copies; PC VALET, easy shell for DOS commands; TSRMAKER, make pop-up TSR help and reminder screens. (#CDSK0292)

**APR 92:** AS-EASY-AS, full-featured professional spreadsheet program; GIFLITE, compress GIFs 40 percent; TSR Utilities, several great utilities to help you work with TSRs. (#CDSK0492)

**MAY 92:** Sharks, battle man-eating sharks to get valuables; CD Dot Challenge, the classic game computerized; RDIR, graphical charts of disk space usage; LZEXE, save disk space by compressing EXE files. (#CDSK0592)

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# PRODUCTIVITY CHOICE

*This feature-rich operating system is an attractive alternative to MS-DOS 5.0.*

Tony Roberts

## DR DOS 6.0

When it comes to choosing a DOS for their computers, most people simply take what comes bundled with their systems and look no further. Now, there's good reason to become an active participant in choosing which operating system is right for you.

DR DOS 6.0 from Digital Research is a brawny mixture of operating system and utilities that appears to stand just a shade taller than its market rival MS-DOS 5.0.

In addition to the standard menu of operating system features, DR DOS has enhancements to many commands, including options that let you customize and control your boot-up. Plus it has software for disk caching, disk optimization, and data compression.

To help those suffering from CONFIG.SYS confusion, Digital recently released an addendum to the documentation titled *Optimization and Configuration Tips*. It attempts to clarify some of the confusing points about using DR DOS and its options, especially its memory-management software. Along with the addendum, Digital sent a disk that includes updates and bug fixes for several of the system's modules.

One of my favorite DR DOS features is its bank of CONFIG.SYS commands; this makes it possible to keep several system configurations in one CONFIG.SYS file and to select the appropriate one at boot-up. The SWITCH command does this by waiting for an operator response and then branching to the selected subroutine. The TIMEOUT command makes this process even more powerful by allow-

ing the system to switch automatically to the first subroutine if no input is received within the timeout period.

Thus, you can set up a CONFIG.SYS that will boot up your defaults unattended, but if you want a special system setup, you can simply interrupt the process with a keystroke and make the appropriate selections. And if you put a question mark at the beginning of any statement in the CONFIG.SYS, DR DOS pauses and asks if you want that statement executed. TIMEOUT can be used here, too: If no response is given before the timeout period expires, the statement is ignored.

If your machine has at least a 286 processor and 1MB of memory, you can take advantage of DR DOS's extensive set of memory-management utilities. You also can load the operating system into high memory, freeing conventional memory for applications. A 386 or better machine lets you load device drivers, DOS data areas, and some of your own TSRs in-

to upper memory as well.

The controls for managing memory are somewhat complex and challenging to finetune. However, Digital seems committed to providing help in this area, having set up a download-only bulletin board and a "faxback" information facility to provide commonly requested guidance and the latest news about compatibility problems.

DR DOS also includes several disk-optimization tools. A version of the Super PC-Kwik disk cache—one of the most respected caching programs around—is part of the system.

SuperStor, a data-compression program, lets you nearly double the storage capacity of your hard disk drive. As you write data to the disk, a TSR compresses it, and then it decompresses the data as it's read back. This process consumes a bit of extra time during reading and writing, but the extra room on the hard disk may be well worth it.

The amount of space it can save depends on the type of





files your disk holds. Executable program files are the least compressible, while data files typically can be packed into smaller spaces.

Another bonus is DISKOPT, which defragments disks and sorts directories. While not as feature-laden as similar stand-alone programs, DISKOPT beats living with severe fragmentation for lack of appropriate defragging software.

DR DOS also provides the standard DOS commands; however, while they work as you'd expect, many of them also include options and switches that give you more power.

The extended directory (XDIR) and delete (XDEL) commands, for example, are likely to become two of your favorites. XDIR allows you to build directories the way you like to see them—sorted by date, extension, or attribute—much as the beefed-up MS-DOS 5.0 commands permit. However, the XDEL command extends the same powers to the delete function. With XDEL, you can delete every BAK file on your entire hard disk with the command XDEL \*.BAK /S. This utility prompts you for confirmation before it races through all of your subdirectories looking for files to erase.

DR DOS makes it easy not only to erase files but also to unerase them: An UNDELETE command and two additional levels of protection against accidental erasure are included. DISKMAP makes a copy of the current file allocation table, which can later provide valuable information to UNDELETE about where the file resided on the hard disk. As long as that space isn't occupied by another file, UNDELETE should be able to recover the deleted file.

DELWATCH provides a

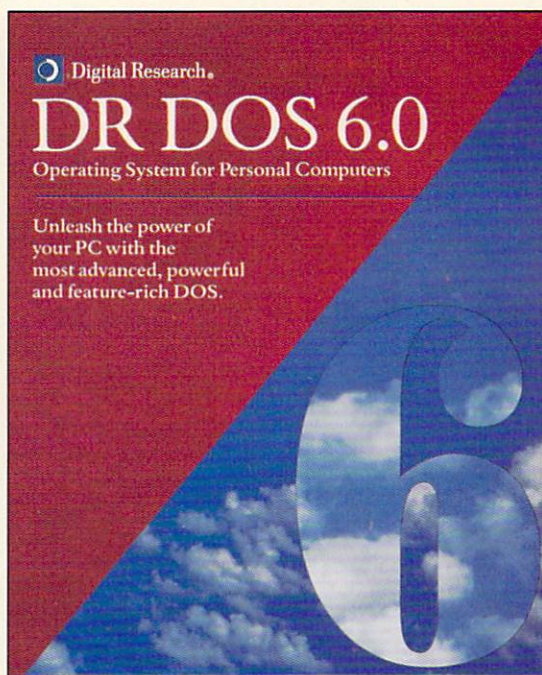
greater level of protection by hiding, rather than erasing, deleted files. When DELWATCH, which runs as a TSR, is active, it keeps track of a certain number of files (200 is the default) which it labels *pending delete*. These are files that you've deleted that are no longer visible in your directory listings. However, DELWATCH keeps these files on disk and doesn't actually delete them until it reaches its 200-file limit or disk space runs out. When either of these occurs, DELWATCH begins actual deletion, beginning with the oldest file on its list.

One rap against DR DOS 6.0 is that floppy drive access is slow. Also, there's no version of BASIC packed with it. And although DR DOS 6.0 includes ViewMAX, an icon-based graphical user interface, as GUIs go, it's hardly worth mentioning.

But there's much to make up for these few deficiencies. DR DOS 6.0's other features include MOVE, used to easily relocate files or subdirectories; TOUCH, a quick and easy file date-stamping utility; FILELINK, which permits transfer of files between two computers via their serial ports; and PASSWORD, which provides password security for files or paths. It also includes a full-screen text editor.

Most potential DR DOS users will ask about compatibility. In the past, some software manufacturers were hesitant to lend support to DR DOS. When clashes between the operating system and the software occurred, DR DOS was often blamed.

But that's changing, according to officials at Digital Research. Several computer vendors, including CompuAdd, now pack DR DOS with the sys-

The graphic features a diagonal split background of red and blue. The red section contains the text 'Digital Research.' and 'DR DOS 6.0' in large white letters, with 'Operating System for Personal Computers' below it. The blue section contains the text 'Unleash the power of your PC with the most advanced, powerful and feature-rich DOS.' and a large, stylized white number '6' with a blue outline, set against a background of white clouds.

tems they sell. The growing acceptance of DR DOS 5.0, and now DR DOS 6.0, has awakened many other vendors to the importance of making certain their products interact with this operating system.

Users of Microsoft Windows 3.0 will find that DR DOS 6.0 and Windows get along fine, but early versions of Windows 3.1 and DR DOS 6.0 met in a head-on collision. Aware of the apparent incompatibility, Digital Research has affirmed its commitment to ensuring compatibility with Windows.

All of this combines to make DR DOS an excellent alternative to MS-DOS, formerly the only game in town. So if you're in the market for a new operating system, you should definitely consider DR DOS 6.0. It performs well and offers many options that will enhance your work every time you sit down at your computer. □

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# PERSONAL PRODUCTIVITY

Daniel Janal

## PROFESSIONAL VICTIMS

My wrists hurt. My eyes throb. No, I haven't been mugged. I am a victim of my computer.

Too much Solitaire. Too much Tetris. Enough repetitive motions to cause pain. You know the kind of pain I'm talking about if you play addictive games. Those are the ones you start playing as you wait for the last calls of the day to come. Then you keep playing for another hour figuring you'll only sit in traffic if you leave. Suddenly it's 8:00. Your eyes are tearing up from continual stress and focus, but you play anyway. That's addiction.

After days, weeks, and months of repetitive activity—not just playing games but engaging in business activities as well—you could feel severe pain in your wrists, jarring strain in your eyes, or an aching soreness in your back, shoulders, or neck.

Constant work at the computer can lead to serious and permanent damage. Julia S. La-

cey spent three years studying the effects of computers and stress in the workplace, and the findings are distressing. One of the most debilitating diseases, carpal tunnel syndrome, which causes severe pain in the hands, wrists and arms, now accounts for 50 percent of all workplace illnesses, according to the Occupational Safety and Health Administration (OSHA). Five years ago the figure was only 2 percent.

Lacey's CRT Computer Wellness Survey shows 67 percent of full-time computer users have headaches, 48 percent have neck aches, and 29 percent have both backache and shoulder ache. "That's not an easy way to get work done," she says.

She advises workers to get good equipment and set it at proper heights: Monitors should be at eye level; keyboards should be placed so that your elbow forms a 90-degree angle between your shoulder and hand.

You should also take breaks every 30 minutes. "You will be healthy and pain-free only if you move about at your workstation and get away routinely for work-productivity breaks," says Lacey, who consults on ergonomics for companies and has coauthored with two doctors a book called *How to Survive Your Computer Workstation: 15 Easy Steps to Workstation Comfort*. "Every study on the human body reinforces this concept." Stretching every five or ten minutes for a few seconds will also help your body, which was not designed to sit in a chair for long periods. Taking frequent productivity breaks, such as going for mail, can help reduce stress, Lacey asserts.

Other surprising suggestions based on research make Lacey's book a must-read for designing offices in

the home or large businesses. For instance, to reduce eye-strain, she suggests that you

- Move the monitor four feet from the eye.

- Turn down the monitor light to the lowest you can see; then raise it a tad to reduce eye fatigue and stress.

- Blink, if you have strained or dry eyes. To remember this, place a note on your monitor that says, "Blink."

To reduce stress, Lacey suggests several exercises and tips, including the following:

- Glance away from the monitor often to refresh your eyes.

- Breathe deeply to lower blood pressure and provide a feeling of tranquility.

- Get away from the monitor.

"Some suggestions are contrary to long-accepted company practices," says coauthor Howard Levenson, O.D., of the Marin Optometric Group in San Rafael, California. "However, when frequently refreshed, workers feel better and are more productive. Attendance records improve, and medical claims decrease."

Proper computer use need not be expensive. Many people have reduced a wrist ache by using a foam pad that fits in front of the keyboard. You can find wrist supports in computer stores.

Lacey also cautions that problems you experience might *not* be computer related. For instance, optometrists report that 30 percent of people have visual problems that are undetected, uncorrected, or undercorrected. It's no wonder if these people blame their monitors. People who are overweight have frequent backaches. They may blame their chairs, although in reality their weight causes the pain.

Once I have done my exercises and rested my eyes, I can return from my break to play Tetris with a relaxed mind and clear eyes. □

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JUNE 19

TUESDAY

WEDNESDAY

3

193/211

10

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17

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2

STRICTLY  
*Personal*

BY ROSALIND RESNICK



92

THU

4

156/210

conference 11:45

11

163/205

18

176/196

↑  
Lectures Charlotte  
↓

25

177/169

60 Lunch with Nancy  
PRESENTER 8:30

FRIDAY

5

157/209

12

164/202

John 9:00

19

171/195

SATURDAY

6

158/208

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**Y**ou bought a computer because you thought it would help you organize your life. But now you're so busy that you scribble notes on scraps of paper and then forget where you put them. When a client calls to respond to the letter you sent him last month, you can't remember who he is or what you told him. You miss deadlines because you can't squeeze everything onto your calendar.

If these experiences sound familiar, you're not alone. Information anxiety is the scourge of the 1990s, but it's nothing that a trip to the software doctor can't cure. The prescription isn't pills; it's PIMs—Personal Information Managers.

Steve Garfein, an Irvine, California, consultant who works at home and uses a Windows-based PIM from Polaris Software, got hooked on PIMs three years ago.

"For years, I had an office manager to perform many of the functions that PackRat does," Garfein says. "I no longer have an office manager. I wouldn't know what to do with one."

Software that tracks appointments, files away addresses, and organizes the clutter that tends to pile up on every desk has come a long way since Borland International introduced Sidekick in 1984. Today, there are some 40 PIMs on the market, ranging from relatively simple programs that track birthdays and Boy Scout troop meetings to sophisticated project managers capable of handling million-dollar projects. Fully featured programs with capabilities for note taking, schedule tracking, contact management, and planning now start at under \$100.

"Word processing was the application for the 1980s," says Michael Jimmeron, a Tucson lawyer who uses PackRat. "I think that PIMs are going to be the software for the 1990s."

Here's why PIMs are so popular:

1. A PIM means never missing an appointment. PIMs can be programmed to sound an alarm or flash a message to alert you to a meeting you have to attend or a phone call you're scheduled to make. Karri Riedel, a secretarial temp in Perrysburg, Ohio, says she uses Chronologic's Instant Recall on her home computer to keep tabs on birthdays, doctors' appointments, and even her daughter's Brownie meetings.

2. A PIM means never losing a phone number. PIMs let you create an electronic database that stores a person's name, address, phone number, fax number, nickname, birthday, favorite restaurant, and other helpful tidbits. If you have a modem, you can even command the PIM to dial the phone number for you at the touch of a key.

3. A PIM means never letting a dead-

line sneak up on you. PIMs that double as project managers not only tell you when a project is due but generate detailed graphs and charts that show what you (and your colleagues) should be doing every day in order to get the job done on time. SureTrak Project Scheduler helps you see how a project is going, pinpoint trouble, and get yourself back on track. For novice project managers, On Target has a scheduling assistant that guides you through the planning process.

4. A PIM means never losing an important file, or even an unimportant one. PIMs excel at sifting through electronic data to find the item you're looking for. Most word processors lack such powerful search features, forcing you to hack your way through a thicket of DOS filenames. Info Select, for example, lets you retrieve files by simply typing the letter *G* (for *get*) plus the first two or three letters of the topic you're searching for. PIMs can also keep tabs on papers stashed in your filing cabinet. Garfein says he logs all his paper files by keyword so he won't have to search for them manually.

5. A PIM means never retyping anything. Most PIMs let you export data to word processors, spreadsheets, and other programs. PackRat, for example, offers a dynamic data exchange (DDE) macro that lets you effortlessly plug information into Microsoft Word for Windows, Excel, and Ami Pro. Garfein says he uses PackRat before meeting with a client to ferret out pertinent information. Then he dumps the data into his word processor, prints it out, and files it in his Day-Timer. "PackRat helps me focus on that client as if he were my only client," Garfein says.

6. A PIM means never looking like an amateur. PIMs not only help you get your own affairs in order, but many of them also have powerful report-generating features that show the world you're organized, too. That's important if you need to make business presentations or print out data in a form your colleagues can understand. Symantec's GrandView, for example, lets you turn rough outlines into well-organized plans, proposals, reports, and even Harvard Graphics slides.

7. A PIM means never having to read between the lines. Unlike paper calendars and schedulers, PIMs give you lots of space to enter information about important events. Info Select, for example, can accommodate as many as 10 million characters per database. Instant Recall lets you type up to 30 pages per entry. "I can't see myself going back to a manual calendar," says Riedel, who uses Instant Recall.

8. A PIM means never having to

make a list. Because PIMs let you build your own database of people, events, and topics, they're useful for market research and customer mailings. Lotus Agenda even has an information-sifting feature that lets you gather information from external sources such as CD-ROM, electronic mail, and online databases and sort it by company, topic, or publication.

9. A PIM means never having to throw anything away. Because PIMs store information electronically, there's never a need to clean out the file cabinet only to find out two days later that you threw out the one piece of information you really needed. Charles Olsen, a Dickinson, Texas, mainframe computer operator, says he's using Agenda to store notes for a science fiction novel he's working on. He uses one Agenda view (or category) to store several detailed items about helicopter specs.

10. A PIM means never losing those little pieces of paper. When PIMs like Instant Recall, Info Select, and Sidekick are run memory resident, you can pop up an electronic notepad, write a note, and retrieve the information later. PackRat offers the same convenience for Windows users. "I'd write things down on a little piece of paper; then, six months later, I'd find the piece of paper and have to call and apologize," Olsen says. "With Instant Recall, I can keep the promises I've made."

There's only one good reason not to get a PIM: if you find the idea of becoming efficient terrifying.

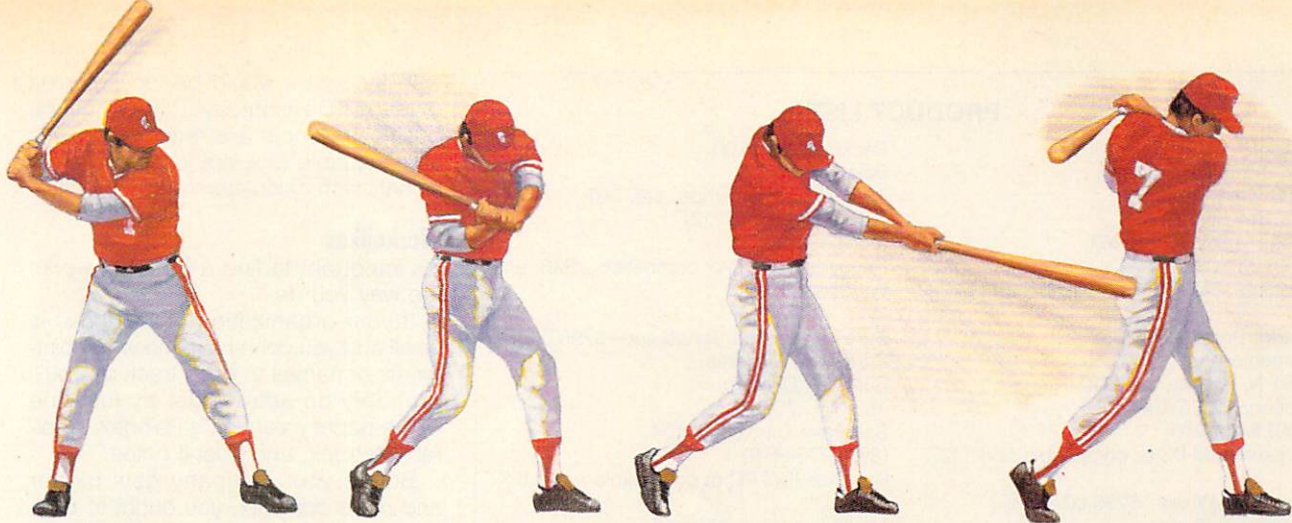
## Organization Tools

Unlike software that helps you write letters and crunch numbers, personal information management software doesn't fall into one neat category.

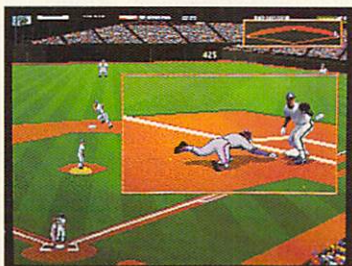
Some programs, such as Micro Logic's Info Select 2.0 and Chronologic's Instant Recall 1.2, track everything from the names of contacts to birthdays. Others, like Symantec's On Target and Time Line 5.0 and Primavera Systems' SureTrak 2.0, are actually specialized project managers capable of managing not only your own information and appointments but also those of your entire department or company.

General-purpose PIMs are ideal for lawyers, accountants, and other people who sell their time and bill by the hour. Some PIMs can time client phone calls to the nearest second. PIMs are also good for people who sell products or information and need fast facts at their fingertips. Project-management software, by contrast, is better suited to event planners, advertising executives, software developers, and other people who manage projects that take more than a couple of

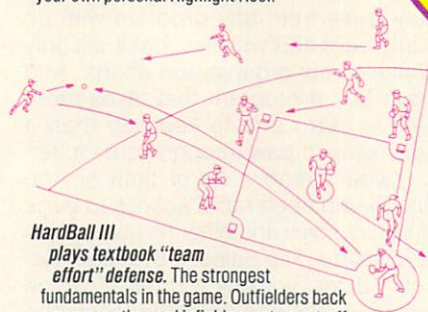




▲ *HardBall III* takes a full cut at major league realism. A power line-up that includes printable stats, standings and box scores; the ability to import data from *HardBall II*™, *Earl Weaver II*™ and *Tony LaRussa*™; plus a Team & Player Editor that allows you to alter everything from team logos to a player's ability.



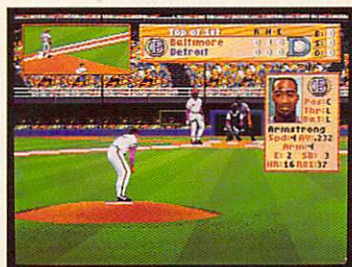
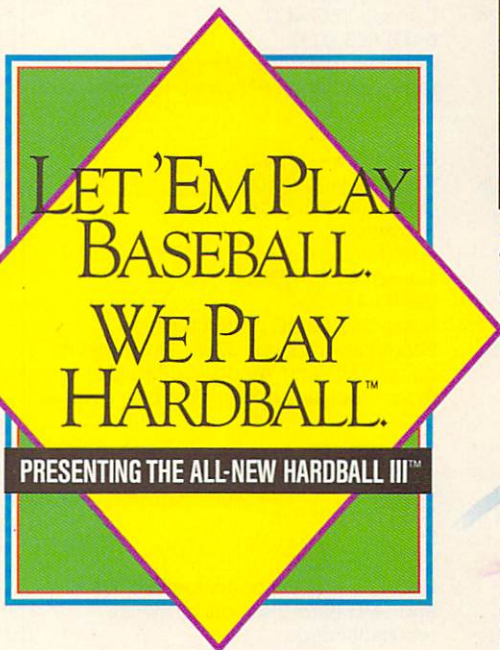
▲ *HardBall III* zooms in on the bang-bang plays. Five camera angles cover the entire ballpark. Watch instant replays and save the best for your own personal Highlight Reel.



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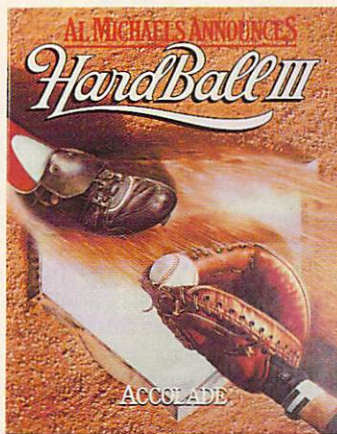
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## PRODUCT LIST

Sidekick—\$99.95  
Borland International  
1800 Green Hills Rd.  
P.O. Box 660001  
Scotts Valley, CA 95067  
(800) 331-0877  
Requires IBM PC or compatible and 512K.

Instant Recall—\$99.95  
Chronologic  
5151 N. Oracle, Ste. 210  
Tucson, AZ 85704  
(800) 848-4970  
Requires IBM PC or compatible and 512K.

Who-What-When—\$295.00  
Chronos Software  
555 Deharo St., Ste. 240  
San Francisco, CA 94107  
(415) 206-0580  
Requires IBM PC or compatible and 512K.

Agenda—\$395.00  
Lotus Development  
55 Cambridge Pkwy.  
Cambridge, MA 02142  
(800) 343-5414  
Requires IBM PC or compatible and 640K.

Info Select—\$149.00  
Micro Logic  
P.O. Box 70  
Hackensack, NJ 07602  
(800) 342-5930  
Requires IBM PC or compatible and 256K.

Microsoft Project—\$695.00  
Microsoft  
One Microsoft Way  
Redmond, WA 98052-6399  
(800) 426-9400  
Requires IBM PC or compatible, 2MB  
(80386 CPU and 3MB recommended),  
and Windows (DOS version also available).

Ascend—\$299.00  
NewQuest  
2550 South Decker Lake Blvd.  
Salt Lake City, UT 84119  
(800) 887-1814  
Requires IBM PC or compatible, 1MB, and  
Windows.

PackRat—\$395.00  
Polaris Software  
17150 Via Del Campo, Ste. 307  
San Diego, CA 92127  
(800) 338-5943  
Requires IBM PC or compatible, 1MB, and  
Windows.

SureTrak Project Scheduler—\$795.00  
Primavera Systems  
SureTrak Division  
1574 W 1700 S  
Salt Lake City, UT 84104  
(801) 973-9610  
Requires IBM PC or compatible and 640K.

Maximizer Lite—\$79.95  
Richmond Software  
6400 Roberts St., Ste. 420  
Burnaby, BC  
Canada V5G 4C9  
(800) 663-2030  
Requires IBM PC or compatible and 512K  
(advanced and LAN versions also avail-  
able).

GrandView—\$295.00  
On Target—\$399.00  
Time Line—\$699.00  
Symantec  
10201 Torre Ave.  
Cupertino, CA 95014  
(800) 441-7234  
Requires IBM PC or compatible;  
GrandView requires 320K; On Target re-  
quires 1MB and Windows (2MB and  
mouse recommended); Time Line requires  
640K.

Texim Project—\$1,295.00  
Texim  
833 Portland Ave.  
St. Paul, MN 55104  
(612) 290-9627  
Requires IBM PC or compatible, 640K,  
and 3MB hard disk space; mouse  
recommended.

who thought it would be too complex to learn," Davison says. "Now general business people are recognizing this as a valuable tool, not just the professionals with calculators on their belts."

### Workalikes

It's important to find a PIM that works the way you do.

If your organization or business is small and you don't have many appointments or names to keep track of, you'll probably be able to get by just fine with a paper calendar, a Rolodex, a spiral notebook, and Post-it notes.

But as your company gets bigger and more complex, you ought to consider an electronic organizer to manage your data and your time. Marketers, journalists, public relations people, event coordinators, and scout troop leaders can all benefit from PIMs. Lawyers can use PIMs to track filing dates; doctors can use PIMs to schedule patients.

Once you've decided to buy a PIM, figure out which aspect of your business is disorganized and buy a program to solve your specific problem. The PIM should let you take notes, manage customer contacts, track your schedule, and plan activities. Look for a program that can perform quick searches to isolate individual notes.

At the same time, it's a good idea to stay away from any program with so many bells and whistles that it will only confuse your organization efforts. And don't buy a program that takes more time to learn and to keep up than it now takes to paw through your clutter.

If you spend a lot of time on the phone and need rapid access to large stacks of notes and other text-based data, consider Info Select 2.0, Instant Recall 1.2, or Sidekick 2.0, all of which are TSRs that pop up at the touch of a key. For Windows users, PackRat 4.0 is a PIM created to take advantage of Windows' powerful linking features.

Agenda 2.0 is a powerful tool for people who need to organize and cross-reference large amounts of text-based data. Who-What-When 2.2 is ideal for tracking appointments. GrandView 2.0 is best if you prefer to manage your information by outlining. Also take a look at Ascend, a PIM created by the Franklin Institute (covered in the "Point & Click" column in this issue).

It's also important to remember that whichever PIM you buy, it's only as useful as the data you put into it.

"I think there's this voodoo that's supposed to occur when you get organized electronically," Tarter says. "A disorganized person isn't going to get organized just by installing a PIM on his computer." But a little organizational effort goes a lot further when a PIM is involved. □

days and involve a team of people. Some examples of project-management software are Microsoft Project, Time Line, and Texim Project. They help a manager—or a team of managers—keep track of a project.

"A PIM tracks your time hour by hour: Meet Bill, paper due—that kind of stuff," says Scott Davison, marketing manager for Symantec's project-management group. "Project-management software lets you build a fairly complex model to track your projects. Instead of just getting a snapshot of what's going on, you see that Task A can't start until Task B is finished."

If this makes project-management software sound a little daunting, in

some respects it is. Time Line, a corporate favorite, has helped major defense contractors keep tabs on multimillion-dollar projects. Time Line also helps managers keep track of things like tasks split between two employees when one of them goes on vacation.

Even so, project-management software isn't just for Fortune 500 companies, Davison says. To target smaller businesses, Symantec recently introduced On Target, a simplified project-management program that runs in Microsoft's Windows environment.

"What we realized was that there was a large audience of middle managers and small-business people who could benefit from this technology but



# ART WORKS

Robert Bixby

## THE NEW VECTOR

It wasn't so long ago that the only option for vector drawing on the PC was Micrografx PC Draw. Then it was big news when Adobe created the PC illustration and design niche by porting Illustrator from the Macintosh to the PC. The big news was followed by a small thud, unfortunately. So much had to be left behind that Illustrator's giant leap turned out to be a baby step for mankind. Adobe Illustrator, though still available, was soon buried by the currently reigning big three—CorelDRAW!, Micrografx Designer, and Computer Support's Arts & Letters.

The competition has been fierce in this arena, with the ante being raised first by one's hotshot programmers and then by another's, with massive clip art files, followed by massive typeface libraries, followed by ever more bizarre means of manipulating the drawing (perspective, warping, and extruding routines), followed finally by charting. Watching them slug it out makes me marvel that all three are still standing. But what's really amazing is that new kids keep appearing, ready to join the fray.

The first newcomer to appear on my desk was Harvard Draw from Software Publishing. It features layers, which are like acetate sheets laid over the drawing surface. Layers allow you to construct a multiple-level drawing, and they keep distinct systems separate in mechanical drawings. It could generate multiple copies of an object in a circular pattern or in perfectly placed columns and rows.

An onscreen help line provides the options available as each icon in the toolbox is selected. This will be appreciated by beginners, and it's easy to turn it off so veteran

Harvard Draw artists won't have to look at it anymore.

Harvard Draw features auto-trace and many of the drawing features familiar in illustration/design software, but it also has some innovations that will force the past masters to run to catch up. One of the innovations in this product is its scripting language, which allows you to write and edit drawings with a text editor. Simply copy the text file into the Windows Clipboard from a text editor while Harvard Draw is running, and the commands you've specified (with commands like `opendraw`; `set fillnone`; `set-outlinecmyk`

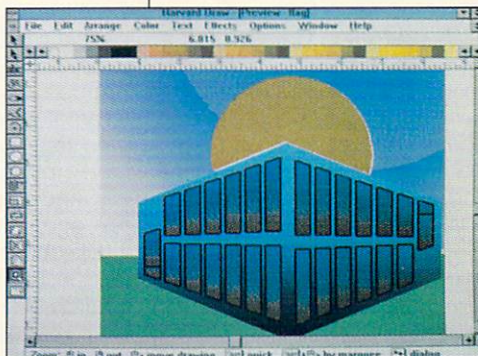
`0,0,0,100`) will be carried out. Harvard Draw also allows you to fit text to more than one curve, group and combine objects, cut holes in objects, paste copies of an object to a path, blend shapes and colors, perform unusual gradient fills (the motifs include such exotica as a 12-pointed star), mix color on a CMYK or an RGB model, fill an open path, automatically generate regular polygons, choose from a 16-level undo, get context-sensitive help, and more.

Soon after my encounter with Harvard Draw, I received a telephone call from a publicist about a product called Professional Draw (from Gold Disk, the preeminent professional software developer for the Amiga).

As of this writing, Professional Draw is still in beta, with some functions unimplemented, so I can't comment on its trace engine, for example. However, Professional Draw is not arriving without a

track record. It's the prime choice for vector drawing and illustration/design software on the Amiga. Its arrival is a little like that of Adobe Illustrator—we wait with bated breath to see to what degree we can make a PC with Windows perform like an Amiga. Making it behave like a Macintosh proved beyond the powers of Adobe's best programmers.

Gold Disk has the benefit of arriving on the scene with many of the problems already solved. I am pleased to report that Professional Draw is very intuitive, jackrabbit fast, and not bug-ridden, which is high



**Harvard Draw and Professional Draw could teach the established illustration leaders a few lessons in speed and convenience.**

praise indeed for beta software. Whether Gold Disk can pack in enough features to make it stand out from the crowd remains to be seen.

Suddenly a new area of competition has opened up at the affordable end of the spectrum. I received Picture Wizard and Arts & Letters Apprentice the other day from Computer Support, both scaled-down versions of Arts & Letters Graphic Editor, loaded with clip art and designed to make it easy to construct art projects. The name and the package of Picture Wizard suggest that it's aimed at young people. Meanwhile, Micrografx has introduced a new graphics package called Micrografx Windows Draw. I hope to compare these new packages in an upcoming column. □



# MULTIMEDIA PC

David English

## SOUND BLASTER TURNS PRO

When the Multimedia PC (MPC) specifications were announced back in November 1990, Microsoft recommended that developers use the Sound Blaster, the only existing sound card that came close to matching the MPC specs.

In fact, it seemed at the time that Microsoft had simply taken the Sound Blaster specs and added an audio mixer so that software could adjust the various audio levels—FM music, microphone input, line-in, CD-audio, and digital sampled sound.

A year later, Creative Labs and its distributor, Brown-Wagh Publishing, started shipping an upgraded version of the Sound Blaster: Sound Blaster Pro (Brown-Wagh Publishing, 160 Knowles Drive, Los Gatos, California 95030; 408-378-3838; \$299.95). It adds the audio mixer necessary to meet the MPC standard fully, as well as a second Sound Blaster on the same card and a CD-ROM interface.

The Sound Blaster Pro has

two FM chips that provide as many as 22 simultaneous synthesizer-type voices (the Sound Blaster has only one FM chip for 11 simultaneous voices). It also has two ADCs (Analog-to-Digital Converters) and two DACs (Digital-to-Analog Converters) that let you record and play back realistic-sounding voice and sound effects in stereo. (The Sound Blaster has only one ADC and one DAC for mono recording and playback.)

The CD-ROM interface isn't a SCSI interface, so you're limited in the number of CD-ROM drives you can use with the Pro. It currently works with the Creative Labs SCD-521, Matsushita CR-521, and Panasonic LK-MC-521 series drives. All three are available as either internal or external drives. I tried the Creative Labs SCD-521B internal drive with the Pro, and it appears to be both fast and reliable.

Like the original Sound Blaster, the Pro includes a volume control, MIDI interface/joystick port, microphone input, line-in, and line-out on the back of the card. Although the MIDI kit is optional with the Sound Blaster, it's included in the Sound Blaster Pro package.

The Pro also comes with a full array of software. Voice Editor II supports stereo recording and file compression, as well as audio input from a microphone, CD audio, or a file. The graphics-based waveform display lets you cut and paste, zoom, and loop your sound segments. You can also add echo and reverb digitally.

The CD Player program turns your CD-ROM drive into a software-controlled audio-CD player. The program's control screen uses the familiar cassette recorder layout, making it easy to play, pause, stop, rewind, fast forward, change track, and change volume.

SBTalker takes any ASCII text file and converts it to spoken words. (Like most algorithmic text-to-speech converters, though, it sometimes mispronounces the words.)

The FM Intelligent Organ program turns your computer into a stereo organ. It features a learning mode and offers automatic accompaniments and rhythms. It can also work with a MIDI keyboard through the Pro's MIDI interface.

With MMplay, you can synchronize Sound Blaster audio files with Autodesk Animator animation files to create simple multimedia presentations on your PC.

And two Windows programs, Jukebox and SBMixer, let you play MIDI files and adjust the various levels of the Pro's audio sources from within Windows.

If you're interested in turning your PC into an MPC, you can also buy the Sound Blaster Pro as part of an official MPC upgrade kit. The kit consists of the Pro sound card, a compatible internal CD-ROM drive, and five CD-ROM titles, including Microsoft Bookshelf and Windows With Multimedia—all for just \$849.95.

So how does the Sound Blaster Pro sound? The sound quality of any 8-bit sound card, including the Sound Blaster Pro, is roughly equivalent to that of an FM radio—orders of magnitude better than the PC's usual beeps and boops.

If you want true CD-audio quality sound from your PC, you'll have to spring for one of the upcoming 16-bit stereo sound cards, such as the \$995 MultiSound card from Turtle Beach Systems.

For most of us, an 8-bit card is all we really need. Hook your Sound Blaster Pro to a decent pair of speakers or headphones, and you'll be ready to experience the many sounds of multimedia. □

**With the Sound Blaster Pro, you can turn your PC into a multimedia workstation.**







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# DISCOVERY CHOICE

*This fun-filled game will get you ready to teach the local word bully a thing or two.*

David Sears

## SUPER SOLVERS SPELLBOUND!

For those of us born without a knack for spelling, weekly grammar-school spelling bees always inspired a certain degree of terror. Misspelling a word in the first round happened more often than anyone would like to admit. Or worse, poor spellers would somehow survive the initial barrage of common words only to face a word like *sobriquet*. Meanwhile, the class word bully, who could spell *peripatetic* while performing handsprings, claimed the gold star by correctly spelling *nutmeg*. Where was justice?

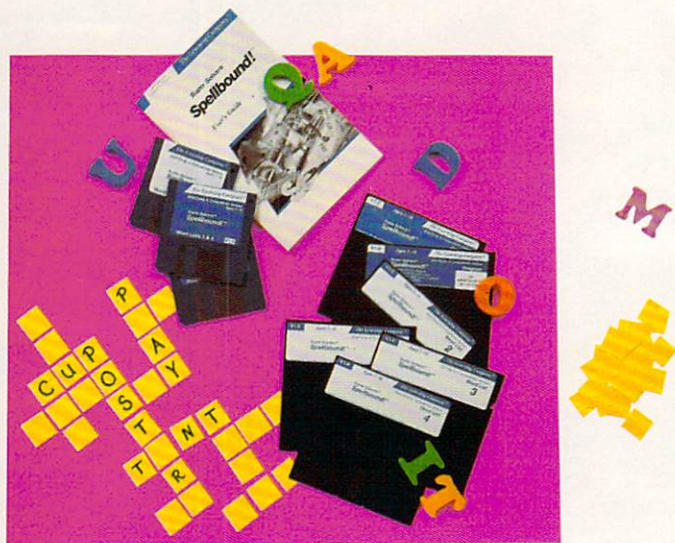
Must our children endure the horror and embarrassment we fell victim to? Not now: Super Solvers Spellbound! makes it fun to learn how to spell.

The Learning Company brings in the familiar, whimsical characters of Super Solvers to put even the most reluctant young students on the path to better spelling.

The story begins with a challenge: Morty Maxwell wants to prove that he's not only the Master of Mischief but the world's best speller as well. No self-respecting Super Solver will stand idly by and allow this to happen, despite the fact that not every Super Solver is a terrific speller.

Thanks to the Spellbinder (a notebook-sized computer), beating Morty at this game will take only a few fun-filled hours of playing with words. To win, you must triumph not only at local spelling competitions but at statewide bees as well. The final test takes place in Washington, D.C.—an auspicious location for Morty's downfall.

Even players at the young end of Spellbound!'s 7- to 12-



year-old target audience will have little trouble getting started. A short command at the DOS prompt invokes the program. With a mouse driver in place, you can initiate most actions within the game via simple pointing and clicking. Parents might wish to encourage heavier reliance on the keyboard, however, where the arrow and Enter keys, along with the space bar, serve just as well as the mouse.

Spellbound! increases typing efficiency, and while the emphasis remains on spelling, this adventure can't help but familiarize keyboard neophytes with the rudiments of text entry.

In the Spellbinder is a trio of spelling exercises disguised as puzzles. Word Search resembles the popular diversion of the same name often found in newspapers. You must find a number of words hidden in a grid filled with random letters. The difference between other word finds and Word Search is, of course, the ulterior motive. Super Solvers search for words that later will appear in the spelling bee.

And in preparation for this upcoming test, you must not only find the word but also select its constituent letters in the proper order. The Spellbinder doesn't permit you to select letters indiscriminately; *elves* must be culled from the grid sequentially, beginning with *e*. Starting with *s* or *v*, even if all the other required letters are eventually selected, doesn't merit a correct answer.

Word Search can put together challenging puzzles. With the user-selected word lists as its database, it will scatter words upside down, diagonally, backward, and in a delightful serpentine manner. Kids will love to follow the word *microprocessor*, to name one, as it snakes down and across the grid. Sound a bit tricky for your seven-year-old? Don't worry; the advanced puzzles appear only late in the game, just before the final spelling bee. By then your Super Solver will gamely tackle any puzzle.

The next activity, Flash Card, brings you face to face with Morty. Each flash card boldly displays Morty's mug—



further incentive for a Super Solver to spell each word correctly. Press the space bar or click on Flash to display a word briefly; then attempt to spell it. The Spellbinder doesn't give up on kids who can't spell the word the first time; it gives them three chances before moving on to the next word.

Already the most demanding of the three preparatory activities offered by the Spellbinder, Flash Card increases in difficulty as you approach your goal of competing in the Washington, D.C., spelling bee. Not only do you have to spell flashed words correctly, but you also have to unscramble these same words in order to earn further point bonuses.

If you don't recall the flashed words from the beginning of the activity, unscrambling them can prove frustrating. The Spellbinder helps out here by allowing several attempts at unscrambling each word; the Flash Card screen displays any letters that are placed correctly, leaving gaps where incorrect letters are chosen. All in all, it's not a bad compromise, and kids will probably feel the most pride for successfully completing this activity.

Criss Cross brings to mind crossword puzzles, but instead of presenting clues, this activity supplies all the words needed. The task is to fit words of varying lengths into a framework of boxes, one letter per box. Through the process of elimination, you can quickly bring this activity to an end.

As with the other puzzles, later levels can bring greater complexity in Criss Cross. However, when words of the same length appear on the list, trial and error will yield the unique

solution in just a few minutes.

After participating in all three activities and earning sufficient points to qualify for the next spelling bee, Super Solvers head for the real competition. There, Spellbound! shines brightest. Besides the rich 256-color VGA graphics that give you plenty to look at, clear digitized speech on the PC makes the program truly remarkable. The warm, feminine voice of the officiator welcomes the contestants, utters words of praise, and most strikingly, regularly speaks aloud many of the words that Super Solvers have studied.

While many PC owners, all too familiar with the raspy static that often passes for digitized speech in otherwise respectable games, would just as soon ignore optional vocals, this aspect of Spellbound! deserves attention. Any fear of missing a word simply because it's unintelligible to the human ear fades quickly; this digitized vocabulary ranks among the best.

PC speaker quality may vary, but a sound card promises consistent and superb results for digitized speech playback. If you don't have a sound card, you might want to consider The Learning Company's Family Sound Value Pack, which consists of an Ad Lib card and a copy of Spellbound! and sells for only \$119.95. Spoken words are interspersed among the majority of flashed words, often to good effect.

What if, despite all your preparation for the spelling bee, you don't take first place? Then head back to the activities of the Spellbinder, of course, for more practice. Spellbound! never penalizes players for trying, and this no-lose at-

mosphere will do timid kids far more good than the public humiliation of a real spelling bee.

Preset lists cover general topics as well as troublesome word types such as homonyms and palindromes. In addition, you may fill up to 100 special lists with words of your own choosing, thereby customizing the program to focus on problem words or this week's spelling list.

So with a minimum of effort and a good deal of fun, Spellbound! can turn every Super Solver into a spelling heavyweight. And who wouldn't like to teach the local word bully a lesson or two? Spellbound!'s remarkable union of updated learning activities with outstanding sound makes this software a great equalizer where words are concerned. □

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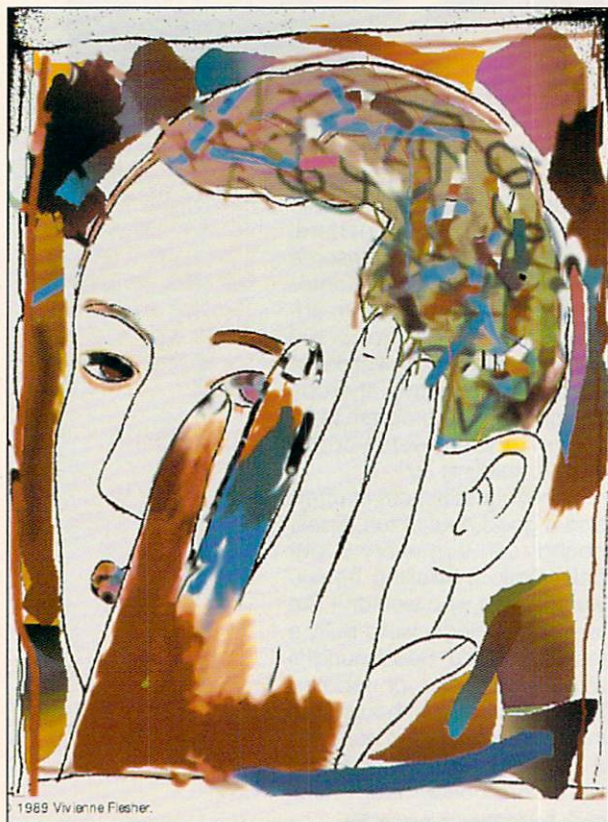
Steven Anzovin

## STATE OF THE ART

The rapprochement between IBM and Apple made big news a while back, and many observers believed that Apple got the best of that deal. But PC users, and especially PC artists, may be the biggest winners in this new world order.

One of the things that Macs have had for years now, and even Amigas are getting, is what's known as true color (also referred to by the number of bits it takes to describe the color of a pixel on the screen—for instance, 24-bit color). That's the ability to work with 16.7 million colors on the screen at the same time to create lifelike graphics and photorealistic images. True color makes standard 256-color VGA look like a cheap cartoon. Can you get true color out of a stock 386? Not with-

**Let your true colors come shining through. New PC graphics programs make the most of an almost infinite palette.**



out spending \$1,000–\$2,000 on an adapter. How many PC programs can take advantage of true color? A handful, most in poky Windows versions.

But the least expensive color Macintosh, the Mac LC, is capable of putting 32,000 colors onscreen without any additional hardware (this is called high color by marketing types). A few high-color boards are appearing for the PC. And there are about 300 Mac programs that can handle true color with ease. Take painting programs, for example. King of the hill is Adobe PhotoShop (Adobe Systems, 1585 Charleston Road, P.O. Box 7900, Mountain View, California 94039; 415-961-4400; \$899.95), eventually to be available for suitably equipped PCs. PhotoShop, the program that wins the most popularity contests among Mac artists, can do prodigious feats of true-color photo retouching.

PhotoShop is not an inexpensive program. But if you think all Mac software is just as exorbitantly priced—and it often is—check out Expert Color Paint (available from TigerSoftware, 800 SW 37th Avenue, Coral Gables, Florida 33134; 800-666-2562, \$35). This true-color paint program has maybe 60 percent of Adobe PhotoShop's functionality for one-sixteenth the street price. Combine Expert Color Paint with a Mac LC, and you have a graphics workstation capable of high color that costs less than any equivalent 386 solution.

Lots of artists trained in paints, watercolors, and other traditional art media—it's probably accurate now to say old-fashioned art media—won't use computers for graphics work because paint program tools are too different from the brush and canvas they're used to. And who can blame them? Graphics programs are universally unable to take ad-

vantage of the fluid arm-eye skills of a trained painter or draftsman. Now, a new Mac program called Painter from Fractal Designs (510 Lighthouse, Suite 5, Pacific Grove, California 93950; 408-655-8800; \$299) offers a pretty good simulation of traditional tools. You can choose a "paper" or "canvas" background for your paintings and then select from a variety of "brushes," "pastels," "crayons," and so on. As you paint, the brush actually gives the effect of being a real brush painting on real paper of a particular roughness and color. When you use a pressure-sensitive graphics tablet, Painter's brushes and chalks can even respond to delicate changes in pressure. A version of Painter has just been released for Windows.

The Mac even makes room for oddball efforts. A case in point is TextureSynth (from Pantechon, P.O. Box 738, Santa Cruz, California 95061; 408-427-1687; \$149), the most addictive graphics program I've ever seen for any machine. You guessed it—TextureSynth is a synthesizer for rolling your own custom textures for desktop publishing backgrounds, 3-D texture maps, and startup-screen wallpaper. It works much like a sound synthesizer—just change the settings on the control panel to make new visual textures, which appear in an image window. In true color, TextureSynth can generate thousands of different textures. Part of the pleasure of this program is getting completely lost in jungles of bizarre texture effects—waves of blue fur, maniacally busy vermilion stucco, or the pattern of sunlight glinting off lime Jell-O. I found using TextureSynth to be like a flashback to the Age of Aquarius. Maybe the IBM-Apple alliance will result in a new Summer of Love for PC artists. □

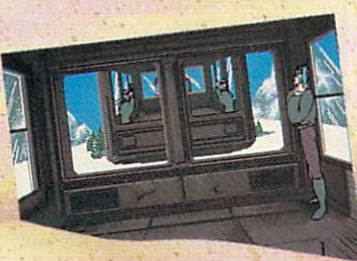


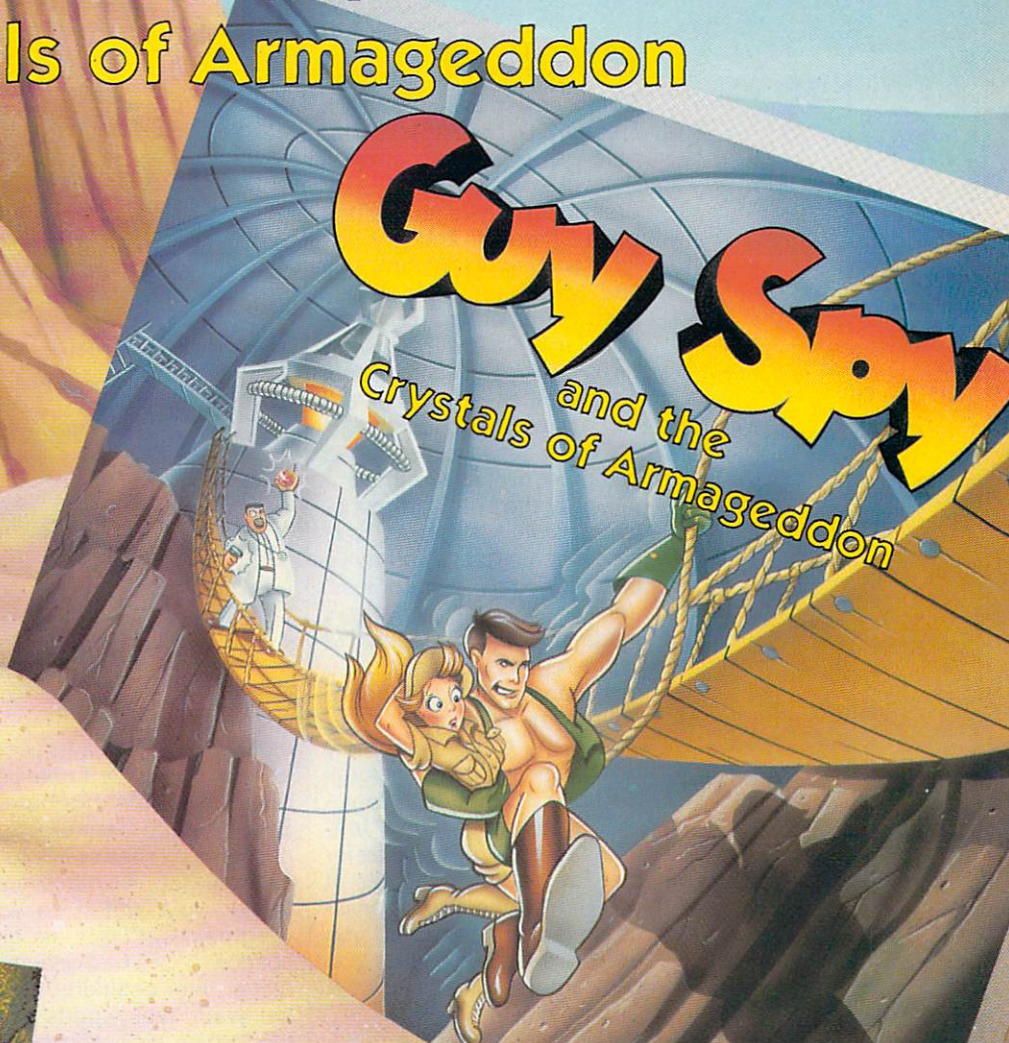


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# ENTERTAINMENT CHOICE

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Peter Olafson

## FALCON 3.0

Consider, if you will, the hills of Falcon 3.0: gentle rises and falls, soft curves, slopes. From close up, you get the impression of a mild haze at the point where hill and sky collide, and from a height, you see the shadows that hills cast. Never before has there been a flight simulator that gives the ground such texture. It's of a piece—a fabric—and you can almost touch it.

Even the least experienced computer pilot knows that traditionally the hills and mountains in flight simulators barely have been hills at all. They've been pyramids, more or less, and despite the advances made in recent years, they're still pyramids. But Falcon 3.0 has changed that; in it there's not a pyramid in sight.

And the ground is simply one of a host of never-befores in Falcon 3.0, Spectrum HoloByte's next-generation, feature-packed flight simulator for the IBM and compatibles. If you aren't in the armed services (and perhaps even if you are), this is as close as you can come to flying the Falcon. And it's close.

This high-end, vastly expanded version of the simulator Spectrum released for the IBM and the Macintosh in late 1987 places you in control of a little more than your trusty F-16. You have a whole squadron of 18 fighters; a pool of pilots to fly them; three vast, detailed environments to fly them in; and an array of stunning enhancements.

Flying Falcon 3.0 on a fast machine is an utterly beguiling experience. Each outing begins with a near-full-motion video sequence (which can be toggled off) before a free-fall plummet into the cockpit (a de-



vised nod to F/A-Interceptor and its cousin Jetfighter series). Take off from a base in Saudi Arabia, Central America, or Israel. Then switch to an external view, flick on the autopilot, and watch as your wing men—at first pale blue shadows in the background—move into position. Watch them radio their reports (or listen to their digitized voices if your sound card has the right stuff), and issue as many as 12 different commands back to them. Once the fight is joined, you'll almost be able to smell their panic in a jam, their satisfaction with a victory.

It's a strange kind of role-playing—with a very personal edge—but I could get used to it in a hurry. On a heavily cached 33-MHz 486, Falcon 3.0 is smoother than smooth; it has an almost liquid flow. And when I hooked up the high-fidelity flight model for machines supplied with a math

coprocessor, well, the game just about took off.

Combat is a vivid, almost shocking experience. We're always reminded that this is war. Shot-down planes erupt in flames and leave little bits of themselves behind. Demolished tanks give up columns of smoke. Impacts on the surface give off circular shock waves that bring back memories of smart-bomb attacks in Iraq during Operation Desert Storm. And when you watch your plane go in, there's a tangible impression of impact.

On an escort mission over Central America, my wing leader was hit by a missile. I had little warning and no second chance. With the jet on fire and out of control, I switched to one of the external views and sat back to watch it go in. But I wasn't expecting what happened. POW! All I could see was fire and more fire. It felt as if someone had given



me a little psychic shove. But it didn't last: I wanted to watch my remaining wing man try to complete the mission—and see how the air strike went.

One of the real delights in Falcon 3.0 is the campaign game, in which your success or failure has a distinct impact on how the battle proceeds. (If the mission doesn't come off, the tank unit you attack will survive to fight another day.)

Flying is the heart and soul of Falcon 3.0, but there's a lot more, all easily reached via mouse from the War Room screen. It's definitely one of the most agreeable option screens around, too. Catch the looping video of combat footage in the tiny black-and-white screen in the corner. The War Room screen will transport you to elegant, simple screens for setting the realism level and system options. These are the Red Flag module, which is a combination trainer and mission-design utility; a replay mode with a VCR-style interface; and a communications screen for setting up same-side or opposing play via direct link, modem, or Novell-compatible local area network.

Suppose you don't want to bother with all this and just want to fly? You can. Remember that tiny black-and-white video screen? Click on it, and you bounce straight into the cockpit and fly almost arcadelike with an infinite supply of ammunition and some nice fat targets close by. There's even a high-score table to boost egos.

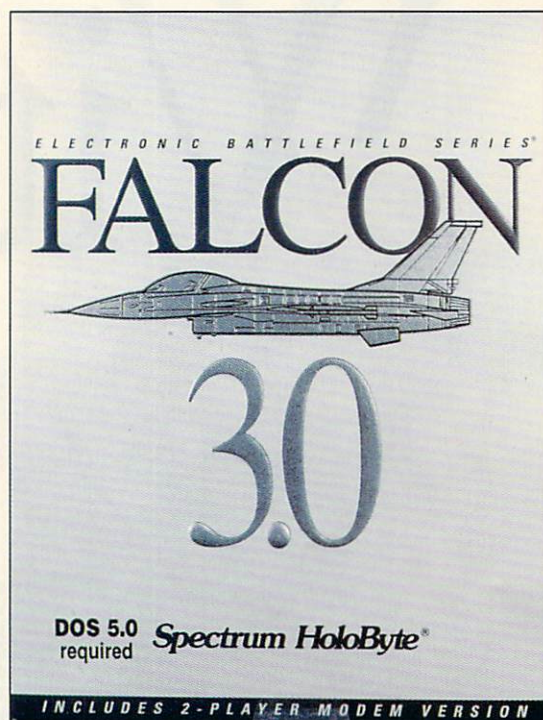
The manual is a book—342 clear and comprehensive pages. (Thank goodness for the index!) Anything I didn't understand initially about Falcon 3.0, I understood after a while with this little doorstop.

Bear in mind that you'll need a lot of oomph in the specs department to accommodate all this good stuff. Falcon 3.0 is of a new breed of high-end games, and it's bound to leave some unhappy people coughing in its smoke.

For starters, it requires 614,400 bytes of free memory (and hence DOS 5.0 loaded in high memory) and 11MB on your hard disk. (If you can't cough up the former, the program comes with five batch files that will help you create the appropriate boot disk.) While it will run under that operating system on 12-MHz or faster 286 machines with 1MB of RAM and VGA, a 20-MHz 386 with 2MB is recommended. The program is designed for optimal performance on a 25-MHz or faster 386.

Now, Falcon 3.0 isn't without its problems. I've seen a good many complaints about bugs in the original December release. (I've been using upgrades almost since day one, so I haven't experienced any bugs firsthand.) But Spectrum HoloByte fairly flew into action to repair the problems. Within days of the program's release, patches began to appear on electronic bulletin boards. The most current version at this writing (late January) is 3.0A. It fixes keyboard-response problems that occurred on some machines; improves joystick calibration, the communications mode, and enemy artificial intelligence; fixes sound and Red Flag problems; and addresses a host of lesser snafus.

If I have complaints about Falcon 3.0A, they're about the little things that keep a great program from being perfect. Three theaters of conflict seem a mite small for a flight



sim of this size—especially since two of these scenarios (Panama and Israel) are strictly fictional. (The planned Operation: Flying Tiger Campaign disk adds Korea, Japan, and the Philippine theaters.) There's a handy quick-reference card, but a keyboard overlay with the 100-plus commands would've been even nicer. I'd also have liked an *Are you sure?* requester on the War Room screen to prevent accidental drops to DOS when brushing the Esc key. (And yet, when I want to quit, Falcon 3.0 drops to DOS more slowly than any other program I've ever seen.) But these are all minor when you consider the things Falcon 3.0 brings us.

Like those hills. Ah, yes—those beautiful hills. There's gold in those hills. □

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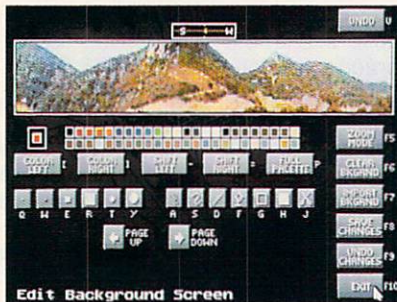
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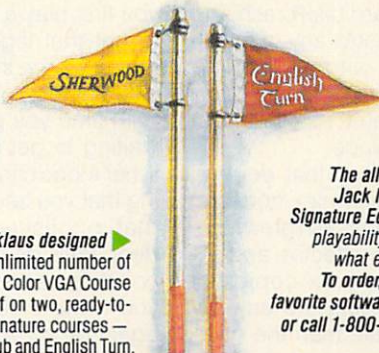


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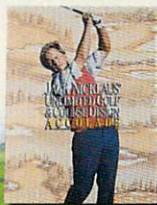


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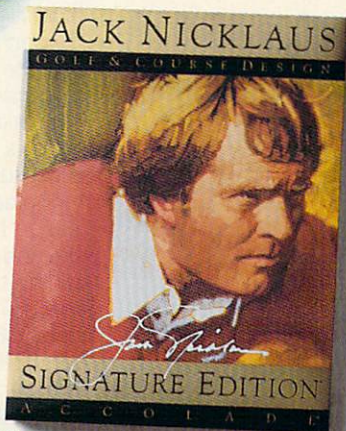
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# GAMEPLAY

Orson Scott Card

## THE GRIPES OF WRATH

Every now and then, instead of dealing with one of the Grand Themes of the Art of Computer Game Design, I like to devote a column to gripes.

**Copy protection.** Copy protection is both annoying and necessary. Game theft really is a problem, especially when a game is new. And yet the schemes used to keep us from pirating are sometimes truly awful. Fortunately, the key-disk scheme seems to have van-

**Railroad Tycoon teaches you more than railroading. Even its copy-protection scheme is educational.**



ished, though in some games its vestiges linger.

I don't know whether Sierra On-Line has stopped having its games check for a change in location on the hard disk. (If there is a change, the game will assume it has been illegally copied and won't run.) The reason I don't know is that after I had a hard disk crash and couldn't reinstall any of my Sierra games without sending for new disks, I decided to forget it. I haven't installed a Sierra game since.

The schemes that depend on reading complex codes in black ink on purplish brown paper are both ineffective and annoying. My Xerox copies of the code sheets are actually more readable than the originals, which proves that the scheme is useless. Photocopy-

ing code sheets is as easy as copying a game program.

Code wheels make me crazy. I can never find them, since I always put them away in a place where I'll be sure to find them next time, but it's never the same place twice.

The best copy-protection scheme is low price, of course. That's why people don't photocopy my novels—the copy costs would be greater than the cost of a new book off the shelf. But the next best scheme is the one that Railroad Tycoon uses. The game makes you identify a picture of

a locomotive and pick its name from a list. At first this requires you to have the thick manual with you whenever you play. But the more you play it, the more familiar you become with all the locomotives so that, eventual-

ly, you can get past the copy-protection test without the manual. What a great idea! When you become really familiar with the game, you can *earn* the right to get rid of the code sheet because the code is real information that you learn by playing the game.

**Startup screens.** OK, when you first play a game, it's nice to get that logo identification and enhance the name recognition of the publisher. But the 50th time you play the game, waiting to get rid of the publisher's logo can be so maddening that you begin to associate that publisher's name with deep feelings of loathing. And no title screen is so pretty that you want to see it again and again (and again).

Of course, the worst offender in this regard is Microsoft

with its infuriating Windows startup logo display. Good thing the company didn't do that with MS-DOS in the first place, or we'd all be using Macs by now.

This applies also to repetitive messages that display for a fixed length of time. When you know what the message is going to be, why must it stay on the screen for seconds? Going from level to level in Rattler Race, for instance, always involves an annoying wait.

And please! Enough with requiring us to respond with meaningless clicks in Windows games. Why is it that at the beginning of every Tetris for Windows game I must click on OK to prove I've read the title screen? Having to do this is as bad as getting the endless Prodigy messages that require me to press Esc in order to get on with whatever I'm trying to do.

**Option shortages.** Is it laziness, or is there a Philosophy of Limited Choices that I haven't heard about? I can't understand why Tetris for Windows, for instance, doesn't allow you to clear the vanity board without reinstalling the game. (The secret: When you first install the game, copy the file TETRIS.HST to a file named something like TETORIG.HST. Then when you want to clear the vanity board, copy TETORIG.HST back on top of TETRIS.HST, and you'll have the original clean board again.) Fortunately, Super Tetris solved this problem.

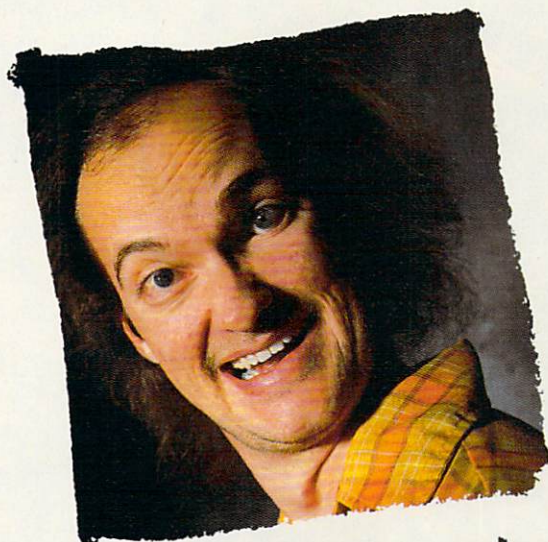
Why is it that some games still don't give you the option of loading a saved game from inside the program, instead of making you go back and start the whole game over again?

Let me just point out that I never get this annoyed with games that I'm not playing over and over again. I only gripe about games I love. I want to like them better! □





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THE WHOLE WORLD IN A PC: SIMULATION SOFTWARE PUSHES THE COMPUTER TO ITS LIMITS—AND THEN REMOVES THE LIMITS.

# SIMEVERYTHING

BY GREGG KEIZER

**D**ecaying cities or humanity's march through time. Click. Crowded ant tunnels or the emptiness of the solar system. Click, click. Military machines or billion-dollar spaceships. Click, click, click.

Your computer's keyboard is the ultimate remote control. It lets you change the channels on your PC as you mesmerize yourself with a seemingly unlimited number of opportunities for learning and fun. Personal computers model an amazing number of situations and scenarios, mimicking the real world while keeping it safely at arm's length. The dirt, danger, violence, and complexity that make the world so untidy can be distilled into an onscreen representation that—if all goes right—*seems* like reality.

Simulations have been around a lot longer than the computer on your desktop, of course. They didn't just spring up like Athena from the brow of Zeus. Over a hundred years ago, German generals worked through *kriegsspiels*, or war games, to plan campaigns and fine-tune strategies. In this century, universities modeled businesses with pencil and paper, while fledgling pilots tested their wings in crude flight trainers that were pitched and rolled by men standing outside the simulated cockpit.

However, simulations and games based on simulations have proved to be one of the most explosive areas of growth in PC software, seemingly independent of recession or boom and bust in the rest of the computer and software market. The PC's high power and low price have made mimicry on such a scale possible.

In the real world, simulations do everything from predicting hurricanes to helping physicists puzzle out the earliest moments of the universe. Simulations are no less diverse in the world of electronic entertainment.

Sid Meier's *Civilization* walks you through the history of a world you've never known. Starting with a band of nomads searching for a place to settle down, you guide your people in a race for knowledge, power, technology, and territory. *Civilization* has all the trappings of a simulation—decisions, realistic environment, and interlocking complexity—but it's as much a game as anything. That doesn't matter, because in PC simulations the end almost always justifies the means. And *Civilization* ends right, leaving you with the feeling that you've just witnessed the development of a people in the process of forming a dynamic (and sometimes extremely dangerous) culture.



SimAnt is a simulation on a microscopic scale. With a fairly firm foot in science, SimAnt sends you back in time—to about 1955—when every boy had a plastic ant farm.

Tunnels fill with ants and ant eggs. Enemies battle it out for turf on a *Honey, I Shrunk the Kids*-sized stage, and a house awaits the inevitable invasion of the black ants you control. SimAnt is a truer simulation, in that it lets you run things you have no real business running. Real ants may do little more than carom off each other, or worse, curl up into tiny commas and die, but the electronic ants in SimAnt do your bidding every time.

Falcon 3.0, a mechanical simulation, is even more traditional in its approach. Where Civilization compresses centuries and SimAnt expands tiny insects, Falcon 3.0 condenses intricate machinery worth millions of dollars into something civilians can play with. Packed with a mind-boggling array of simulated controls, Falcon 3.0 lets you fly an F-16 jet fighter against enemy aircraft in a missile-launching, radar-tracking, electronic-warfare feeding frenzy. Easily one of the most comprehensive and complicated simulations around, Falcon 3.0 also taxes the hardware like few others: If you don't have at least a 20-MHz 386 with a couple of megabytes of RAM, don't bother showing up.

A home PC brute of two years ago—a 12-MHz 286 computer with VGA, maybe a 40MB hard disk—simply can't cut it with today's top simulations. To run at full speed, simulations demand a fast PC, preferably a 486 or a 386 with a math coprocessor chip. Simulations test the PC like few other packages—databases, spreadsheets, Windows, and CAD software included.

Future simulations will undoubtedly demand more than today's PC can provide. "It's hard to see how you could simulate the earth in a much more realistic model [than SimEarth] and still stay on the PC," says Tom Ligon, president of ARC Software and the creator of Dance of the Planets, a majestic solar-system simulator. "In a way, its gameness reflects the fact that the technology is limited."

In two years, 486-equipped computers will be as common in the house as 386SX machines are now. The power hungry will run chips like Intel's 80586, or perhaps a superfast RISC chip.

### Sim It All

"You can simulate anything," says SimCity and SimEarth creator Will Wright. "[It's] a matter of semantics. But as we come to understand a system, we're beginning to understand the processes of a system."

### MAN THE RAMPARTS! THE BARBARIANS ARE HERE!

Is the personal computer the only place to play with these imitations of reality? Can the PC lay sole claim to simulations? Hardly.

Though PCs have long cornered the simulation market, threats from the barbarians of electronic entertainment—videogame machines—may soon break that stranglehold. SimCity, one of the most highly acclaimed simulations of the last five years, is now available on the Super Nintendo Entertainment System (SNES), Nintendo's 16-bit game machine. Falcon, a video derivative of Falcon 3.0, is also available on the SNES. Railroad Tycoon, the railroad empire-building simulation, will be soon. And Koei, a maker of Japanese, Chinese, and European political and military simulations, has long produced versions for the cruder 8-bit Nintendo game deck.

The appeal of videogame systems lies in their low cost and ease of use. For a tenth of the price of a personal computer and with virtually no installation or compatibility headaches, videogame machines let you play from the comfort of the den couch or the living room carpet.

With such advanced (and faster) videogame systems as the Sega Genesis and the SNES, and with larger-capacity game cartridges—some that sport several megabits of chip memory—simulations can now be played on the television, not just the computer screen.

"It's actually a combination of marketing and technology," says Will Wright. "A lot of the higher-end systems are being sold to 20-year-olds," a population typically more interested in simulations, while younger players have been the traditional market for videogame machines.

PCs have the sim market pretty much to themselves—today. In the not-so-distant future, though, they'll be forced to share the simulation spotlight.

Near-future desktop PC simulations will take on the task of simulating a larger number of such systems—whether natural or manmade—as well as explore their hidden processes in a deeper, richer way.

At the Winter Consumer Electronics Show in Las Vegas, where designers strutted their latest stuff, several simulations stood out as ones to watch in 1992. Dynamix, the Oregon arm of Sierra and creator of Red Baron, a World War I air-combat simulator, has taken its flight-modeling and graphics techniques to the Second World War in Aces of the Pacific. Flying any of over two dozen Japanese and American aircraft, you battle from carriers and land-based airfields, re-creating historical missions—including the dramatic assassination raid that downed Admiral Yamamoto—and try to survive through brutal aerial campaigns.

Electronic Arts' as-yet-tentatively-titled Michael Jordan's Flight Simulator takes a page from simulations as it reproduces the grace of professional basketball with a three-dimensional perspective that will leave you awe-struck. Some may call it a sports game, but many will see it as the simulator it really is.

Interplay's Buzz Aldrin's Race into Space lets you guide the American or Russian space program in a two-decade dash to the moon. Using more than a hint of multimedia, Race into Space asks you to make decisions on rocket development, astronaut selection, and mission control. For those of us who grew up watching rockets rise into the Florida sky, this simulation promises a nostalgic look at the past and an intriguing what-if construction kit.

### Two on the Edge

"I'd really like to see software like Dance of the Planets that goes outside, something that's not self-contained, that doesn't go away when you turn off the PC," says Tom Ligon.

What Ligon dreams of—a simulation that continues to intrigue its users long after the screen goes dark—is but one example of how designers look at their craft and where they'd like to take desktop simulations.

"Two areas that appeal to me a lot are simulating space missions and neural networks," Ligon muses. "You'd learn a lot about neural networks and train them, but it wouldn't be a game. And I'd like to deal with the earth, even down to earth science or life science. It would take a lot of creativity to make something that has merit yet can run on the PC, but I think it's worth doing."

Will Wright wants to delve even deeper into evolutionary and biological simulations, past the premise of SimEarth. "I find myself repeatedly attracted to evolution. Number one, because of the result and number two, because of the application to other tasks. The techniques could be harnessed to make your software evolve, for example, and I find myself pushing toward education—getting people excited about things, experimenting and exploring on their own."

And what of the charms of multimedia and videogames being applied to simulations? Wright thinks that videogame simulations are an attractive possibility, now that "the hardware is finally in place." Multimedia, says Ligon, may be a different story. "I don't think that's going to be competitive in the next five years because of the initial [development] expense."

Maybe neither is necessary to shift simulations into high gear. When you can simulate nearly everything now, why wait for the future? □



# 64/128 VIEW

*Gazette needs 64 and 128 programs every month. If you are a programmer, here are some tips that can help you make a sale.*

Tom Netsel

**G**azette wants to buy your 64 and 128 programs. Sell just one program, and you can easily recoup the cost of your entire computer system.

We rely on our readers for the programs we need each month to fill Gazette and Gazette Disk. Here are some tips on what we want and ways to make it easier for you to make a sale.

Send your program and documentation on a disk. Save each twice, in case one gets damaged. Send a printout of your documentation and a short cover letter explaining what your program does and how to run it. Enclose a daytime telephone number. Don't send a printout of your program listing. Send postage if you want your material returned.

To increase your chances of making a sale, do all you can to make it easy for us to use and understand your program. I've rejected programs because authors have made my job tougher.

Here's what we like to see in a submission. First of all, use the correct address. Don't delay things by writing to a post office box number we haven't used in years. Send programs to Gazette Submissions Reviewer, COMPUTE, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

Deadlines, interruptions, and weak coffee can put me in a bad mood at submission meetings. Imagine that I've a stack of programs to get through, and I've just opened yours. You've got 60 seconds to impress me.

You'll be off to a good start with that note that explains what your program

does and how to run it. If there are numerous files, backups, and demos on your disk, I can get very annoyed deciphering cryptic filenames, trying to decide which file to load first.

If we've had your package open for more than a minute and we still don't know what it's supposed to do, we'll do one of two things. We'll either reject the program outright or toss it back in the pile until next month. In the latter case, we don't totally reject it, but we're not jumping to buy it either. This bumping process can go on for months.

With your letter, send a printout of your documentation. Here's where you can really boost your chances for a sale. Write in the style we use in the magazine! Explain what your program does, why it might be useful or entertaining, and whether it's in BASIC or machine language. Then explain how to use the program. Many authors fail to do this.

It's very important that you send documentation on disk as well as paper. Save it as a PETSCII, ASCII, or SpeedScript-compatible file. DO NOT USE GEOS! I load your documentation into my 128, edit it, convert it to ASCII, and upload it to an IBM for additional editing and typesetting. Retyping your documentation wastes time. If I have a program whose instructions need minor editing and one that requires hours of work, guess which one I'll buy?

Finally, tell us about yourself: your occupation, age, hobbies, and so on. We like to publish a little information about our authors. □

## GAZETTE

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If you send a game or utility to Gazette, follow these tips to boost your chances for a sale.  
By Tom Netsel.

### FEEDBACK G-2

Questions and comments from our readers.

### RELATIVELY SIMPLE G-6

Many programmers shy away from using relative files, but let's take another look at these black sheep of the file family.  
By Jayson Johnson.

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Tie Break, Calc II, and Bad Blood.

### BEGINNER BASIC G-18

Turn keyboard characters into movable sprites.  
By Larry Cotton.

### MACHINE LANGUAGE G-20

Use a rotating buffer to determine a program's starting address and more.  
By Jim Butterfield.

### WORLD VIEW G-21

Czechoslovakia loves its Commies, but politics has nothing to do with it.  
By Emil Heyrovsky.

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GEOS graphics require a good management system.  
By Steve Vander Ark.

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Here's a handy list of POKEs, WAITs, and SYS calls.  
By Randy Thompson.

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## Address Correction

In "Commodore Clips" (February/March 1992) we listed the wrong post office box number for Clip Art Cupboard. The correct address is P.O. Box 317774, Cincinnati, Ohio 45231. We regret the error.

## Amortization Table

I have been trying in vain to get hold of a program that will list amortization tables with an option of payments every two weeks. Can anyone help me?

MARGIT DES LAURIERS  
SANDSPIT, BC  
CANADA

In the May issue, Larry Cotton presented an amortization program in his "Beginner BASIC" column that displays payments on a monthly or yearly basis. For payments other than monthly, however, you might try the following program. It asks for the amount borrowed and the number of payments per year. If you wish to make payments every two weeks, enter 26 at the second prompt. It will then request the annual interest rate and the duration of the loan in years.

The program will calculate the payment you must make for each period and then print a table showing the breakdown of interest and principal on each payment and the remaining balance. At the end of a year, it will print a total of the principal and interest paid. The program will pause and wait for you to press any key before printing the next year's schedule of payments.

```
RM 50 K$="PRESS ANY KEY
      {SPACE}TO CONTINUE
      "
GR 100 PRINT"{CLR}
SE 110 DEF FNA(X)=INT(X*
      100+.5)/100
BJ 120 INPUT"AMOUNT BORR
      OWED";E
MB 130 INPUT"NUMBER OF P
```

```
      AYMENTS PER YEAR"
      ;N
AM 140 INPUT"ANNUAL INTE
      REST RATE";I:I=I/
      100
AB 150 INPUT"DURATION IN
      YEARS";D
CQ 160 R=(I*E/N)/(1-1/(I
      /N+1)↑(N*D))
AC 170 PRINT
JX 180 PRINT"YOUR PERIOD
      IC PAYMENT WILL B
      E $";FNA(R)
BE 190 PRINTK$
QX 195 GET W$:IF W$=""TH
      EN 195
HD 200 PRINT
AF 210 AT=0:A2=0:EN=E:RT
      =0:IT=0:B=0:D1=N
KJ 220 IF INT(D)>=1THEN2
      40
AJ 230 B=B+1
JD 240 FORB=1TO INT(D)
RK 250 PRINT CHR$(147)"
      {DOWN}AMORTIZATIO
      N SCHEDULE";TAB(2
      5);" YEAR #";B
PF 260 PRINT:PRINT" # "TA
      B(5)" INTEREST"TAB
      (17)"PRINCIPAL";
JK 270 PRINT TAB(31)"BAL
      ANCE":PRINT
PM 280 FORB1=1TOD1
JA 290 IV=FNA(EN)*I/N
CJ 300 RT=RT+1:A=R-IV:AT
      =AT+A:EN=E-AT
FS 310 IFRT<N*DTHEN330
DX 320 R=R+EN:A=A+EN:AT=
      AT+EN:EN=0
HE 330 I2=I2+IV:IT=IT+IV
      :A2=A2+A
AJ 340 A2=INT(A2*100+.5)
      /100
MX 350 PRINTB1;TAB(4);FN
      A(IV);TAB(16);FNA
      (A);
XQ 360 PRINT TAB(30);FNA
      (EN)
KK 370 NEXT
FD 380 IF RT<>N*DTHEN400
SF 390 PRINT:PRINT"LAST
      {SPACE}PAYMENT";F
      NA(R):PRINT
RP 400 PRINT:PRINT"FOR T
      HE CURRENT YEAR Y
      OU PAID"
DB 410 PRINT"$";FNA(IT);
      "IN INTEREST "
HH 420 PRINT"AND $";FNA(
      A2);"IN PRINCIPAL
      "
FP 430 IF B=D OR B>D THE
      N 540
CM 440 PRINT:PRINTK$
SF 450 GET W$:IF W$=""TH
      EN 450
SP 460 PRINTCHR$(147)
KG 470 IT=0:A2=0
PA 480 NEXT
BM 490 B=B-1
FP 500 IF D=BTHEN540
HR 510 D1=((D-INT(D))*12
```

```
      )/12*N
CM 520 B=B+1
RF 530 GOTO 250
GP 540 PRINTK$
ER 550 GET W$:IF W$=""TH
      EN 550
EK 560 END
```

## Genealogy Programs

I am looking for a family tree program for my 64. Can you help?

FREDERICK J. CARLETON  
METAIRIE, LA

We published "Climbing Your Family Tree" in the February 1991 issue of COMPUTE in which the author described several programs available for the 64 that let users enter family data. You might want to contact the following companies about their genealogy programs. Here's a list of the ones mentioned in the article.

Family—\$34.95

PFA  
8600 Old Spanish Tr., Ste. 79  
Tucson, AZ 85710  
(800) 366-1372

PED C and FGS—\$39.95

BYTEWARE  
906 West 6th Ave.  
Monmouth, IL 61462  
(309) 734-7096

Arbor-Aide—\$34.95

SOFTWARE SOLUTIONS  
7378 Zurawski Ct.  
Custer, WI 54423  
(715) 592-3594

Family Roots—\$225.00

QUINSEPT  
P.O. Box 216  
Lexington, MA 02173  
(800) 637-7668

## Keyboard Wanted

The time has come for me to locate a new detached keyboard for my 128D. Perhaps one of your readers may have one for sale.

STEPHEN VAN EGMOND  
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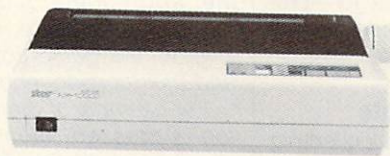
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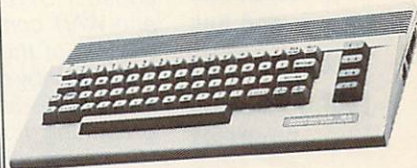
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## Cursor SYS for 128

SYS 52591 will turn on a cursor on the 128 in 80-column mode. But what is the SYS number to release the cursor?

ROBERT NELLIST  
BROCKPORT, NY

*A SYS to address 52591 (\$CD6F) will turn the cursor on in either 40- or 80-column display mode. To disable the cursor in either mode, enter SYS 52639 (\$CD9F).*

*If you do any programming in 64 mode, you might be interested in reading Randy Thompson's "Programmer's Page" this month. His column contains a handy reference table for 64 programmers that lists dozens of interesting and unusual SYS calls, POKES, and WAIT commands.*

*Most of these items were submitted by our readers. We encourage—and pay for—programming tips used on the "Programmer's Page."*

## Sports Card Update

I have just started collecting trading cards, so Kevin Davis's Sports Card Collector (November 1991) is a blessing. One thing that I felt was missing was an indication of when you had last updated the prices. So I added the following to the program, and it works great.

```
195 PRINT"([12 SPACES]UPDATE:
";DAS
390 INPUT#8,YT:INPUT#8,DAS:
INPUT#8,GC
615 INPUT"({8}ENTER DATE:
MO. DA. YR.{whl}";DAS
1240 PRINT#8,YT:PRINT#8,DAS:
PRINT#8,GC
```

DOUGLAS JEFFERY  
TELKWA, BC  
CANADA

## Writing Games

I am writing a game on my 64 in BASIC. It's getting a little complicated, and I'm beginning to think that maybe I

should be writing it in machine language. How can I have a sound track running, sprites moving, and the computer awaiting input all at the same time?

BRYAN PEASE  
LIVERPOOL, NY

*Computer games may seem to do many things at once, but they're actually doing only one thing at a time. Computers follow instructions sequentially. A system that does several different things at once is possible, but you would need more than one computer or microprocessor (each operating sequentially). To give your program the appearance of simultaneous action, you need to plan. Separate the actions into subroutines. IF-THEN can decide whether or not you want to gosub to the appropriate routine. It might help to write, in plain English, the game conditions and their consequences.*

*For example, if the fire button is pressed, then launch missile and set missile flag. If the joystick moves, then move ship sprite. If one second has passed, then play another note of the song. If the missile flag is set, then move missile sprite again. Repeat the above loop.*

*First, you check for the joystick button. If it's pressed, then gosub to the appropriate routine. If it's not, forget about launching the missile until the next time through the loop. Once you've launched the missile, you want it to continue moving, which is the reason for the missile flag. Whether or not the button was down, you next peek the joystick to see if the player wants to move and update the ship's position. Third, you check the jiffy clock by reading variable TI or TIS\$ to see how much time has gone by. If a second (or whatever time*

*period you've chosen) has passed, play the next note of the song.*

*Next, move the missile sprite if the flag is set, and go back. The program loops around, checking the joystick twice, checking the time, checking a variable, and taking any necessary action.*

*The computer works quickly, so individual actions seem to happen simultaneously.*

*To convert the above outline into a playable game, you'd need a few more subroutines. One would check the collision register in case the missile has hit something. Another would erase the sprite and reset the flag as soon as the missile has reached the top of the screen. And, of course, you'd have to translate the outline into BASIC code.*

*There's another technique that's even closer to simultaneous action, but it requires from an intermediate to an advanced knowledge of machine language. Sixty times a second the computer stops what it's doing and takes some time to redraw the image on the screen. The main program is being constantly interrupted. Using a wedge, you can divert the interrupt to your own machine language program, which could play music, move sprites, or whatever you choose. Such interrupt-driven routines are sometimes difficult to implement, but they can be very effective.*

*Do you have a question or problem? Have you discovered something that could help other 64/128 users? Do you have a comment about something you've read in Gazette? We want to hear from you. Send your questions and comments to Gazette Feedback, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. □*

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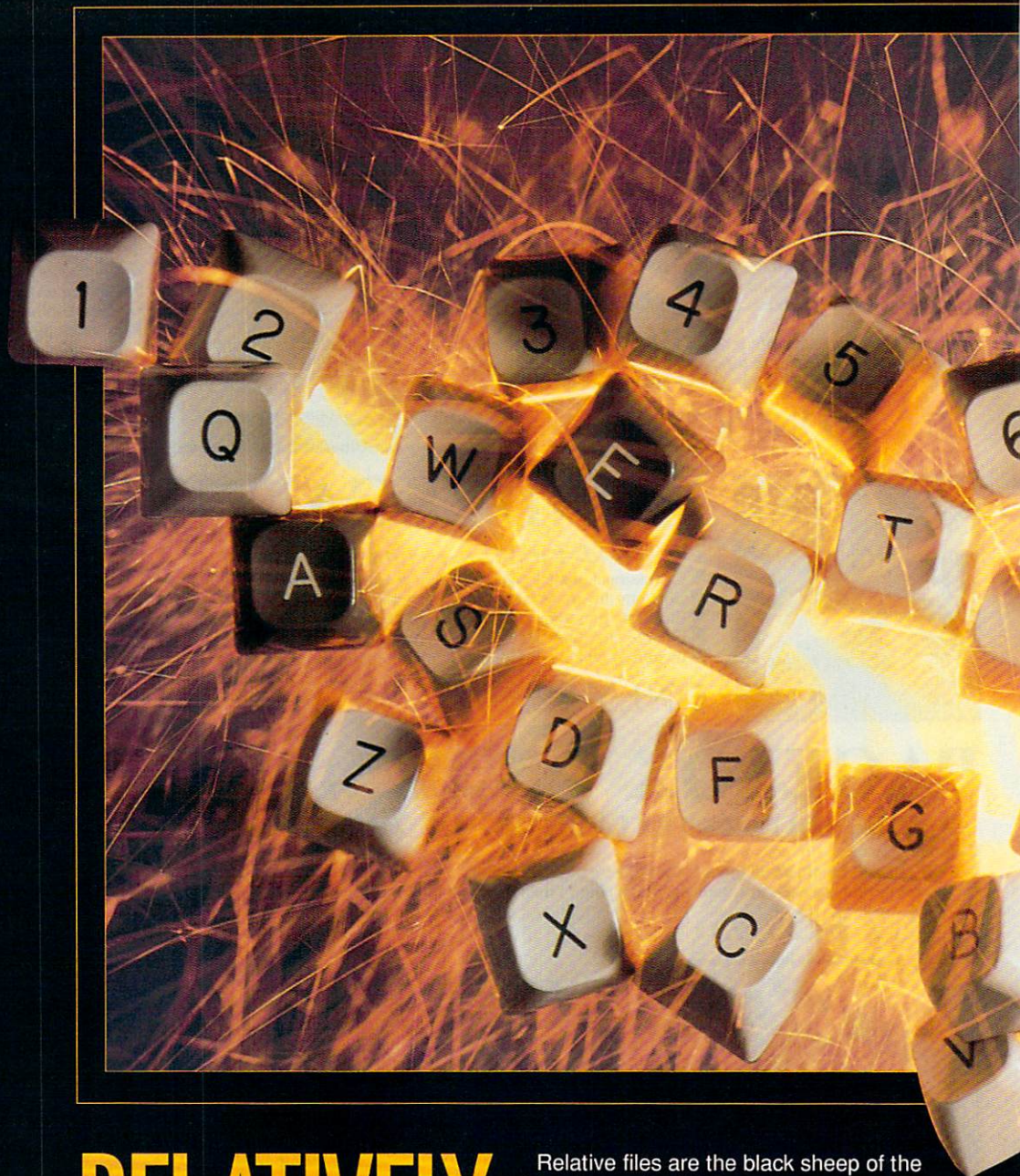
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# RELATIVELY SIMPLE

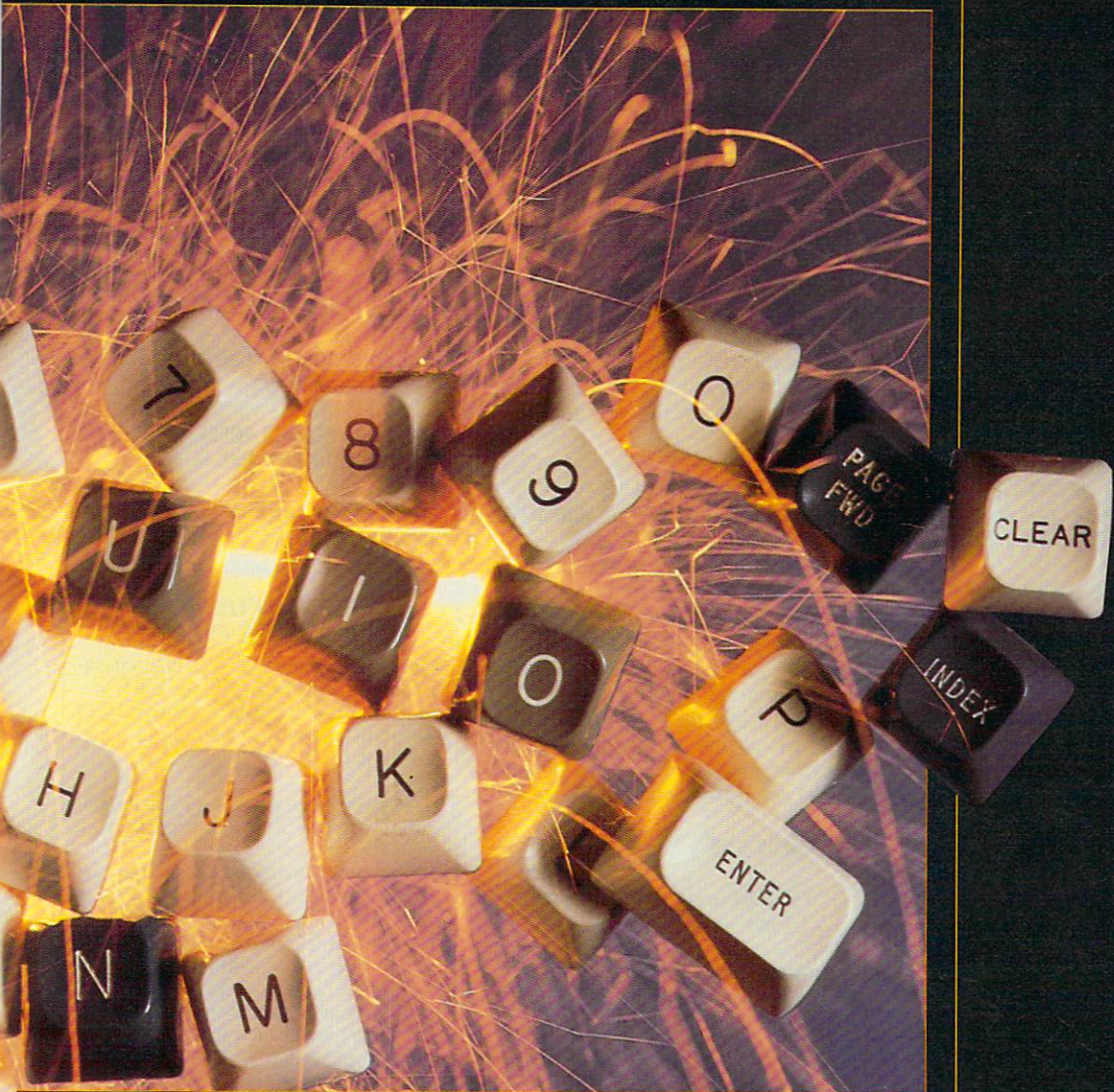
PROGRAMMERS  
OFTEN SHY AWAY FROM  
RELATIVE FILES, BUT  
MAYBE IT'S TIME TO TAKE  
ANOTHER LOOK  
AT THIS ALTERNATE METHOD  
OF DATA STORAGE.

BY JAYSON JOHNSON

Relative files are the black sheep of the data storage family. Programmers may try them once, have a few problems, and then give up on them. Then they spread the word to their friends to stay away from relative files. The reputation spreads. Unlike sequential files, relative files get no respect, but maybe it's time for a change.

Relative files do have good points and advantages. For one thing, they offer far more speed and efficiency than other methods of data storage. Since they can access data without reading through every file that precedes the desired information, relative files offer almost random access. If you have a large sequential file, you must first load the entire file into the computer's memory for processing. Then to retrieve data, you may have to read every file before you find the information you want. With sequential files, if you want a





piece of information that's stored in record number 100, you'll have to plow through records 1-99 first.

Suppose you have a CD collection of 500 titles and you want to catalogue it on index cards. If you put the titles in alphabetical order and read them as a sequential file reads data, you'd have to flip through the whole stack before you came to anything by ZZ Top or Pia Zadora.

With relative files, you can go directly to the data you want and read only that data. Just as with index cards, you can home in on the information you want without starting from the beginning and flipping sequentially through every file.

Since a relative file program uses only enough memory to read desired data, very little computer memory is actually used at one time. A small program can access 163K of information that could be stored on a single-sided disk.

### Follow the Rules

Creating and using relative files is fairly easy, providing you follow a few simple rules. First, let's get some terminology straight. With relative files, information is stored in records, and each record contains various fields. In the following example, we'll create a mailing list. This whole list is our file. Each person on our list will be a record, and the various pieces of data about each person will be our fields.

For example, each record on our list will contain a person's first and last names, street address or post office box number, city, state, ZIP or postal code, and telephone number. These are the fields we'll set up for each record. We'll begin by calculating the total size of each record. This is done by adding the number of characters in each field. With our mailing list, we'll estimate how many characters each field should contain.



Field#	Field name	Number of Characters
1	Last name	15
2	First name	15
3	Address1	20
4	Address2	20
5	Address3	20
6	State	10
7	Zip Code	09
8	Phone #	12
<b>Total</b>		<b>121</b>

The record size for this file would be 121. Since the PRINT# statement used with relative files adds a carriage return to the end of each string, you should add one extra character to each field. So make it 129. If you try to write 15 characters plus a CHR\$(13) (carriage return) to a record set up for 15, you'd get an ERROR 51, OVERFLOW IN RECORD.

DOS uses a single ASCII character to represent the record length. This means that the largest single record could be 254 characters. This is very important to remember. If you want more information stored in each record, you'll have to split them in two. For example, a 500-character record could be split into two 250-character records. You could use odd and even numbers to identify each data pair.

The largest number of records you can have is 65,535, but you'll never use this many because of space limitations on a floppy disk. A freshly formatted disk should show 644 blocks free. Blocks, or sectors, are the areas on a disk that can hold up to 256 characters of information. DOS uses 2 of these characters, so that leaves 254 bytes available for data.

Relative files use side sectors as an index to keep track of which sectors contain data. Each side sector has room for 120 two-block pointers that let DOS quickly locate the various blocks assigned to the file.

As many as six side sectors can be assigned to a file since each can deal with 120 disk sectors (not records) for a total of 720, more than the number of blocks on a disk. Filling a 664-block disk would use 6 blocks for side sectors, leaving 658 blocks for data. Each block can hold 254 characters, giving you 167,132 characters in the largest possible relative file. You can split this up any way that is convenient for your data. You could have 1671 records of 100 characters each or 658 records of 254 characters each.

### Create a File

We have to create a file before records can be stored or read. This is done by opening a data channel with the de-

sired filename and record length. You should note that DOS won't let you create relative files with record lengths of 42, 58, or 63. These numbers represent ASCII values that have special meaning to DOS. The format for creating a relative file is as follows.

**OPEN file#, device#, channel#, "file-name,L," + CHR\$(record length)**

Let's start writing a program and call our file MAILLIST. We previously counted the number of characters we'd need in each record and decided on 129. Type in the following OPEN command, but don't run the program until we complete it.

**1000 REM OPEN MAILLIST FILE  
1005 OPEN 1,8,2,"MAILLIST,L,"+CHR\$(129)**

Remember not to run it yet. It's now possible for us to put information into the file. In DOS, there's no command to check the number of records in a relative file; however, it's possible to store this number manually within the first record. Let's do this by positioning the record pointer to the first record and storing the number 1. To do this, we must open the command channel.

**1010 OPEN 15,8,15**

The POSITION command for record 1, position 1 is

**1015 PRINT#15,"P"+CHR\$(2)+CHR\$(1)+CHR\$(0)+CHR\$(1)**

The P is our pointer, and it tells the drive to look for a certain record. In CHR\$(2) above, 2 is the channel we opened when we created the file in line 1005 (OPEN1,8,2). Next, put the number 1 into the record, because all we have now is one record in our file.

**1020 PRINT#1,1**

Print to the file number we assigned when we opened the file. (Remember OPEN 1,8,2.) Then, close the file and the command channel, and the file is ready to use.

**1030 CLOSE1:CLOSE15**

Run the program now, and a file called "MAILLIST" will be created and placed in the disk's directory.

### Writing and Reading

To read from or write to any record in our file, we open two channels, the DOS command channel and a file channel. Now we can position the record pointer to any record and field in the

file with the DOS POSITION command.

**PRINT#15,"P"+CHR\$(channel number)+CHR\$(rec# lo)+CHR\$(rec# hi)+CHR\$(position within record)**

Notice that in the above line there are two characters that represent the record number (rec# lo and rec# hi). The formula for calculating these two numbers is as follows.

**RECORD # = REC HI \* 256 + REC LO**

The record number can also be determined in other ways.

**REC HI = INT(RECORD #/256)  
REC LO = RECORD # - REC HI\*256**

Translated, the command sequence would be as follows. (You don't have to

### TIPS ON USING RELATIVE FILES

Relative files are good ways to store data for quick and easy access, but many programmers avoid using them. Here are a few things to remember to avoid problems.

1. Always initialize the disk drive at the beginning of your program to reset all drive channels.
2. Always set the file pointer to the first byte in a record. The last parameter in the P command should be CHR\$(1).
3. Never write an empty string to the disk. This will cause the disk drive to lock in a continuous loop.
4. Never leave a file open after entering or editing data. Be sure to open, read/write, and close the file in the same command sequence.

If you attempt to create a file that's too large for the space remaining on your disk, you'll get ERROR 52, FILE TOO LARGE. If you plan to store a lot of data, it's a good idea to devote a whole disk to a relative file.

Here's a short BASIC program to determine the maximum number of records you can have on a disk. To use the program, you must know how many free blocks remain on your disk and the total number of characters allotted for each record.

```

10 INPUT"NUMBER OF FREE BLOCKS ON DISK";FB
20 INPUT"TOTAL CHARACTERS IN RECORD";RL: IF RL<1 OR RL>254 THEN 20
30 IF RL=42 OR RL=58 OR RL=63 THEN PRINT"DO NOT USE";RL;"CHARACTERS":GOTO 20
40 SS%=(FB/120)+.99:BA=FB-SS%
50 RP=(INT(BA*254/RL):IF RP<65536 THEN RP=65536
60 PRINT"THERE'S SPACE FOR";RP;"RECORDS"

```



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enter NEW before typing this next section. It and the remainder of the code are meant to be added to the previous program lines.)

```

10 OPEN15,8,15
15 OPEN1,8,2,"MAILLIST": REM WE ARE
  OPENING, NOT CREATING THE FILE
40 R = 1: P = 1: REM RECORD NUMBER 1
  POSITION 1
45 GOSUB 500
90 CLOSE1: CLOSE15: END
500 REM POSITION RECORD POINTER
510 RC = R + 1: REM ADD 1 TO RECORD
  (REC1 IS ALREADY USED TO HOLD FILE
  LENGTH)
520 RH% = RC/256: RL = RC-RH% * 256:
  REM TWO-BYTE ADDRESS; RH% IS AN
  INTEGER
530 PRINT#15,"P" + CHR$(2) + CHR$(RL) +
  CHR$(RH%) + CHR$(P)
540 RETURN
999 END

```

Don't run the program yet.

### Record Contents

Each record is actually a string of information in itself. To read each field separately, we must calculate where it begins within the record. Here are the record sizes we established earlier. We can use these figures to determine

where to look for each field.

Last name	1-15
First name	16-30
Address1	31-50
Address2	51-70
Address3	71-90
State	91-100
Zip Code	101-109
Phone #	110-121

Now let's make a list of pointers for each field.

```

5000 DATA 1, LNAME, 16, FNAME, 31, AD1,
  51, AD2, 71, AD3, 91, STATE, 101, ZIP,
  110, PHNO

```

As you can see, this translates into Last name at position 1, First name at position 16, Address1 at position 31, and so on.

### Writing Data

Let's enter some information into a sample record. As we do, we'll write over line 45 in the earlier subroutine.

```

35 REM STORE RECORD
45 F$(1)="JOHN": F$(2)="DOE"
50 F$(3)="15 HOLLYWOOD AVENUE"
55 F$(4)="(SPACE)"
60 F$(5)="HOLLYWOOD"

```

```

65 F$(6)="CALIF."
70 F$(7)="90135"
75 F$(8)="555-964-6652"
80 RESTORE: REM RESET DATA POINTER
85 FORLP=1TO8: READP,X$: GOSUB500:
  PRINT#1, F$(LP): NEXTLP

```

When you have this final block of code entered, you may run the program typed in so far. You may also want to save it to disk.

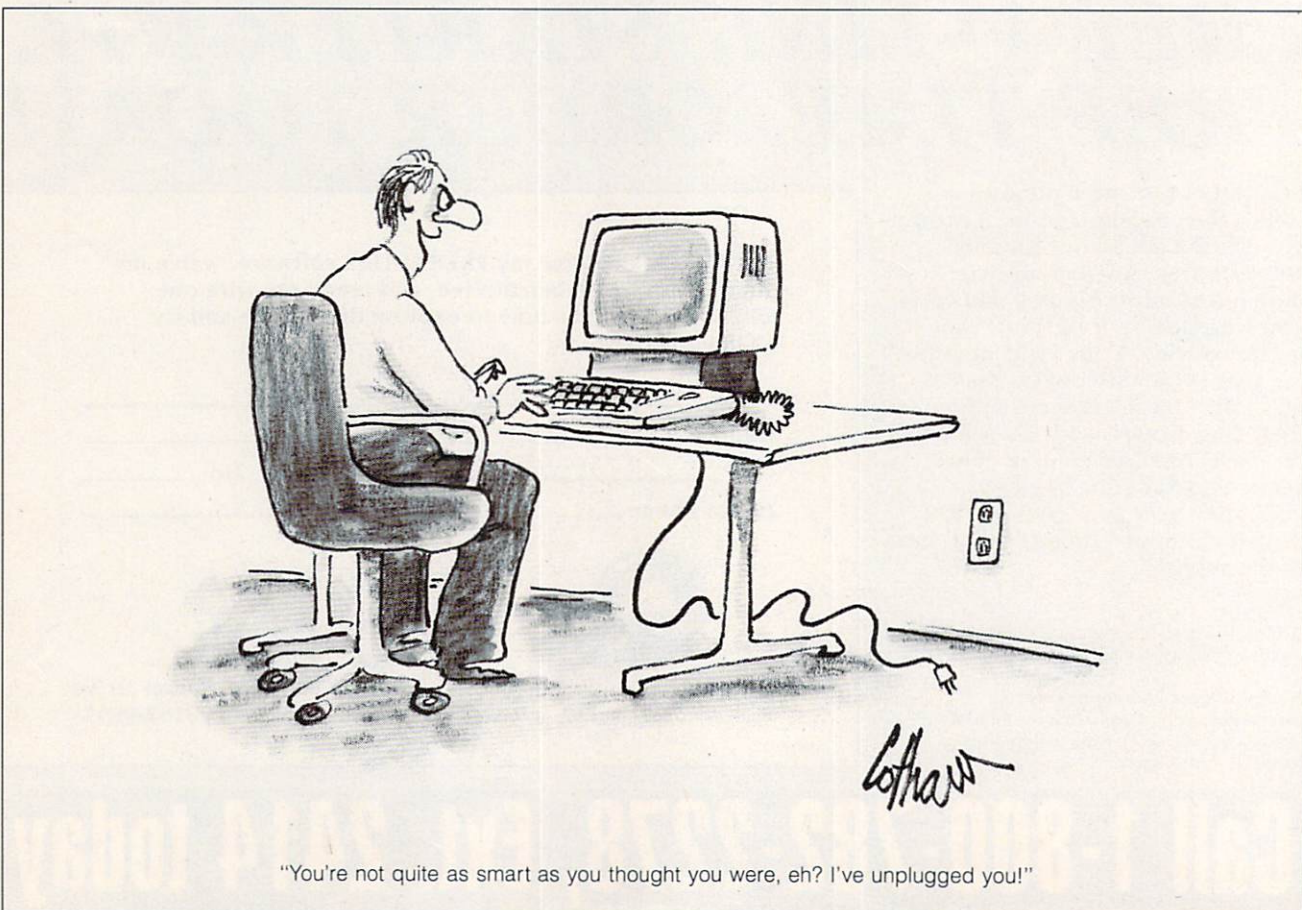
### Reading Data

Reading information is just the opposite. You set the pointer and use INPUT# to read the information instead of PRINT#, which is used to write it.

```

20 GOT0100
100 REM READ RECORD
110 R=1: REM RECORD 1
115 RESTORE: RESET BASIC DATA POINTER
120 FORLP=1TO8: READP,X$: GOSUB500:
  INPUT#1,F$(LP): NEXTLP
125 CLOSE1: CLOSE15
130 PRINT"LAST NAME: ";F$(1)
135 PRINT"FIRST NAME: ";F$(2)
140 PRINT"ADDRESS: "
145 PRINTF$(3)
150 PRINTF$(4)
155 PRINTF$(5);", ";F$(6),F$(7)
160 PRINT"PHONE#: ";F$(8)
175 END

```





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## TIE BREAK

Tennis anyone? You don't have to be a top seed tennis professional at Wimbledon to enjoy playing DigiTek Software's Tie Break. This computerized tennis game is for tennis lovers of all levels.

Tie Break offers three modes of play: world tournament, tournament, and training. World tournament is for those who want a real challenge. Here, you select up to 16 players (human or computer), and you must defeat all of them to win the championship. You then select the world tournament that you want to enter. These vary in level of difficulty and include Wimbledon, the French Open, the Masters, the U.S. Open, the Davis Cup, and the Australian Open. For extra realism, each player is assigned a racket of a certain tension and weight.

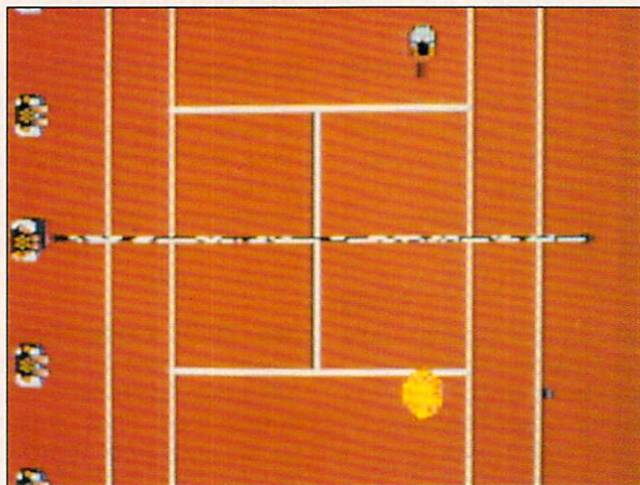
Perhaps you don't feel ready for world tournament play just yet. If you just want to compete against a few of your friends, select tournament play. Once again, each player is assigned racket weight and tension. You also select the surface type and color that you want to play on. Court types vary in difficulty since the ball may move faster or bounce differently on certain surfaces. For example, the ball will move faster on an asphalt or a PVC court than it will on clay.

Let's say that you haven't played for a while and are a little rusty. If you feel like practicing either before entering a world tournament or playing against your best friend who happens to be a tennis pro, then select training. Here, you can practice with a variety of computer players of varying skill levels.

If your friend wants to practice as well, you both can

play against each other or play doubles with two computer players. (To play against a friend, one person must use the joystick, and the other must use the 64's arrow keys and space bar to control the onscreen players.) This training mode also will let you experiment with dif-

Tie Break is easy to learn. In no time, you'll have a racket in your hand, be ready to compete in a world tournament, or be ready to play against the computer in the training mode. The level of difficulty depends on such factors as the number of players you must beat in a tourna-



*This player on a clay court has just hit a high lob to his singles opponent in Tie Break, DigiTek's new tennis game.*

ferent rackets and surfaces. Being able to practice with other players is a nice feature of this game, since some of the other computerized tennis games let you practice only by hitting balls tossed by a ball machine.

No matter what mode you select, you don't have to worry about moving your player to the appropriate court position to hit the ball. Tie Break automatically positions the player for return shots. You simply decide how you're going to complete your return shot. Some of the options are volley, lob, slice, topspin, and smash. The computer will decide if your shot will be forehand or backhand. You control your shot's speed, direction, type, and length. It's also possible to pause during the action or slow the game down.

The manual provides you with enough information to get you started quickly. All types of shots are explained in enough detail so that you'll soon learn how to perform each one. There are even diagrams to show you in more detail exactly how to hit certain shots. The manual also includes useful information on how to use trick shots to defeat an opponent.

Tie Break's graphics and sound effects are great on the 64. You watch the

games as though you were looking down from above. You see the ball, players, court, and net in a three-dimensional view. You can hear the sound each time someone hits the ball or the ball bounces off the court. Tie Break lets you know visually when the ball hits the net or is out of bounds. You can see just what type of shots the players are taking, and the scores appear on the screen after each point is scored.

Overall, Tie Break is fun and challenging, and it'll give you hours of entertainment. So if tennis is your racket, I think you'll love playing this game, especially if the weather is too nasty to go outside on the courts. Bring the true-to-life action and excitement of tennis to your 64 and give this game your best shot. See you at Wimbledon!

CHRIS SAUCIER

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I'll have to admit that, at first glance, I wasn't impressed. I mean—a spreadsheet is a spreadsheet. They're made up of letters along the left side of the screen that identify rows and numbers run-



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ning across the top that identify columns. The intersection where a row and column meet is called a cell, and Calc II has plenty of those. In fact, it has 240 rows and 240 columns. A 64 doesn't have enough memory to use that many cells, but it does have room for about 20K of data. The actual number of free bytes remaining is displayed at the top of the Calc II screen.

I'm going to assume that everyone knows what a spreadsheet is and jump right into Calc II's strong points and improvements over its earlier version. One feature that's almost worth the price alone is Calc II's ability to split the screen into two, three, or four windows. This lets you see one part of the sheet while working in another section.

Many times I've been entering data in a budget with dates running across the top of the page and with income and expense categories running down the left. Things are fine as long as all the information is on one screen. By the time you've entered enough data to scroll across and down the page, however, you can no longer see the dates and the categories. After a while, you have to scroll back to the beginning to make sure you're entering data in the correct cells.

With Calc II you don't have this problem. You can open a couple of windows, lock the categories and dates in place, and then move anywhere on the sheet and still be sure you're not entering November's electric bill in the cell reserved for December's rent payment. You can divide the screen into any size windows you like.

Printing can also be a problem if your spreadsheet is larger than your printer can

handle. Calc II automatically splits at the end of a page, printing the rightmost sections on later pages. Other spreadsheets may wrap and print on the next line, destroying the row and column order. You can print just a portion of the sheet if you don't need all of it. You can also use embedded printer codes in Calc II to utilize your printer's compressed print modes.

Once you have data entered, you can manipulate it with Calc II's sorting routine. You can sort in ascending or descending order by row or column. This is the only area where I experienced any difficulty. I entered a group of names running down the page in a column. When I defined this block of data and asked the program to sort the column in ascending order, nothing happened. After several unsuccessful attempts, I asked it to sort the row, and then it worked. The same held true with data across the page. I call that a row, but the sort routine apparently considers that a column. Numbers sort with no problem, but text sorts according to word length unless cells are left-justified.

Data in cells can be justified left, right, or center, depending on your preference. Columns can be adjusted globally or individually to fit data of any width, from 3 to 38 characters. Other options include number of decimal places, auto or manual calculate, tape or disk, device number for printing, and screen and text colors. You can make these changes manually after a spreadsheet loads, but Calc II provides a separate program that lets you customize the program to fit your preferences. Then, anytime you run Calc II, it'll default to your cus-

tomized choices.

Another program that comes with Calc II is a merger program. Use it to combine different spreadsheet templates onto one larger spreadsheet. The resulting file can be a merger of any number of previously saved templates. Text and formulas must use different cells, however, or the second spreadsheet will overwrite those cells already in memory.

Speaking of templates, Calc II provides about 40 of them that are ready to load and run. Some of them help you calculate break-even points, business budgets, depreciation, loans, mortgages, standard deviations, and future worth of investments. Others will help balance your checkbook, keep a grade book, write sales slips, and figure factorials. One will even take room measurements and calculate how much wallpaper, paint, or carpeting you'll need for the job.

Several of the templates have borders and lines to set off data. In the past, I had to be content with a series of equal signs or dashes to create such effects. With Calc II, however, it's possible to use many of the Commodore keyboard graphics to create design elements that make your spreadsheet easier to read and more appealing to the eye.

Calc II treats mathematical calculations in the same fashion as Commodore BASIC, so you shouldn't have any problems entering your own formulas. It even accepts the Boolean operators And, Or, and Not.

Calc II also has a number of powerful built-in functions that can make your calculating chores easier. In addition to the usual Sums, Square Roots, Tangents, and Loga-

rithms—functions found in most spreadsheets—Calc II offers Rnd for random numbers, Peek to return a value of a memory byte, and Exp for exponents. Additional functions include Average, Minimum and Maximum values, and Number of Items in a block of data. Lookup and Index are functions used to find data in tables. Fix truncates remainders in calculations, and Round rounds the value up or down. An If function lets you make a choice between two options. How to use these and other functions is carefully explained in the manual.

A spreadsheet is a very powerful yet flexible tool that lets you perform a wide range of mathematical calculations. It's a productivity package you'll use again and again. If you don't have a spreadsheet, I recommend that you get one. Once you decide to get one, I heartily recommend Calc II.

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## REVIEWS

blood here. Your goal is to bring peace to the Plains and prevent war between the mutant races and the humans who want to control and enslave them.

You start *Bad Blood* in the mutant town of Mardok. After watching an introduction, you choose a character for the game. The choices are Varigg, Jakka, and Dekker. Varigg is a green male, full mutant. Jakka is a female mutant, almost human except for her eye blasts. Dekker is a male human. All the characters have qualities that make them attractive alter egos. Their weaknesses make the game a different challenge with each character.

*Bad Blood* takes place on the Plains, a land laid to waste long ago by a nuclear bomb. The inhabitants managed to survive, but not without mutations. The humans tried to ignore the mutants and enslaved them. As time wore on, the mutants rebelled and formed their own communities. In addition to mountains and open spaces, the Plains consists of mutant towns Mardok, Okkarn, Nivvik, and Kitrum; human cities Xantium and Yvrium; and a dangerous shell of a city called Zero City.

*Bad Blood's* game screen features an overhead view of your character's surroundings in a mock television cabinet. Below this window on the left is a list of five commands; a jar of brown fluid on the right marks the character's life level. The commands are Inventory, Examine, Use, Talk, and Options (Pause game, Save game, Load game, and Music on/off). To play *Bad Blood*, move the character around in the top window with joystick or keyboard and select commands with the joystick button or space bar. The first three commands bring up an inventory window for further choices.

It's necessary to carry on a lot of conversations with people you meet in *Bad Blood*. They'll provide clues and other necessary information. Selecting the Use command brings up another menu with options to chat, ask a character about a specific topic from another list, or say goodbye.

Finally, in combat, you use a weapon or bare hands to attack by pressing the joystick button or space bar. That's all there is to *Bad Blood*. You'll be playing the game in no time.

*Bad Blood* possesses the right difficulty for beginners, and seasoned adventurers will enjoy the atmosphere of the game and the strange characters. The well-written manual details the history of the Plains and also explains the slang of the region, such as *tuff* (warrior or soldier), *hume* (human), and *mute*

(mutant). It's a fresh perspective to see the entire game on one scale, as is not the case in a lot of other role-playing games. You only see the interiors of buildings when you enter the doors. *Bad Blood* takes advantage of its game world and contains a lot of interesting mutants, not all of whom are friendly. Just remember to watch out for the reptilian Kejek creatures; they capture other mutants as slaves for the humans in exchange for big rewards.

The graphics in *Bad Blood* are top-notch. The overhead view is particularly impressive because of the detail it provides. Scrolling is smooth and fast. The only time the game halts and accesses the disk is when you enter a building or move into a new area of the Plains. Fortunately, this access time is short. *Bad Blood's* graphics bring the mutants to life and offer a rich environment for exploration. The catchy music is constant throughout the game and adds a lot to the enjoyment. Sound effects are not as prevalent.

*Bad Blood* is a fine example of how much more enjoyable a game can be with a simple control system. *Bad Blood's* interesting land and inhabitants make this game an ideal choice for adventure fans.

RUSS CECCOLA

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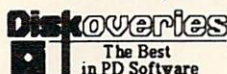
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# BEGINNER BASIC

Larry Cotton

## ALPHABET SPRITES

Let's transfer data from the 64's built-in character set to an interesting sprite format.

Lines 10-110 contain familiar sprite code, except for constant definitions in lines 50 and 60, which we'll look at in a moment. Line 120 begins a FOR-NEXT loop to copy three groups of character data.

Lines 130 and 170 access

```
RJ 10 PRINTCHR$(147):POK
E646,7{10 SPACES}
JD 20 PRINTTAB(10)"PLEAS
E WAIT 3 SEC.
RC 30 V=53248:REM 1ST SP
R CTRL REGISTER
HD 40 POKEV+21,0:REM TUR
N SPR 1 OFF
HG 50 X$="ABCDEFGHIJKLMN
OPQRSTUVWXYZ":REM
{SPACE}SEE LINE 33
0
RA 60 S=6656:E=8:REM SEE
LINE 140
BD 70 POKE2040,192:REM P
OINT TO DATA
PC 80 REM POKEV+23,1:POK
EV+29,1:REM ENLARG
E
EP 90 POKEV+39,7:REM YEL
LOW SPRITE
PX 100 X=160:Y=130:POKEV
,X:POKEV+1,Y:REM
{SPACE}LOCATE
HM 110 FORB=12288TO12350
:POKEB,0:NEXT:B=1
2288:REM CLEAR SP
RITE DATA AREA
FG 120 FORG=1TO3:GOSUB32
0
SM 130 POKE56334,0:POKE1
,51:REM KBD OFF
DR 140 FORI=0TO21STEP3:Z
=(T+S)*E:POKEB+I,
PEEK(Z+A):REM COP
Y CHARACTER DATA
XK 150 A=A+1:NEXT:A=0:B=
B+1
GA 160 NEXT:B=B+21:GOTO1
20
SB 170 POKE1,55:POKE5633
4,1:REM KBD ON
AM 180 PRINTCHR$(147)
FB 190 POKE214,9:PRINT:P
OKE211,17:PRINT"
{3 SPACES}SS":REM
3 SPACES BEFORE
{SPACE}SS
MQ 200 POKE214,10:PRINT:
POKE211,17:PRINT"
{3 SPACES}SOR":RE
M 3 SPACES BEFORE
SOR
XB 210 POKE214,11:PRINT:
```

```
POKE211,17:PRINT"
KEYS"
XB 220 POKEV+21,1:REM SP
RITE ON
AA 230 KB=197:SH=653:NK=
64:MX=255
CG 240 K=PEEK(KB)+PEEK(S
H):IFK=NKTHEN240
MB 250 IFK=7THENY=Y+1
SE 260 IFK=8THENY=Y-1
SC 270 IFK=2THENX=X+1
CB 280 IFK=3THENX=X-1
EQ 290 X1=INT(X/MX):X2=X
-X1*MX
QF 300 POKEV,X2:POKEV+16
,X1:POKEV+1,Y:REM
MOVE SPRITE
KG 310 GOTO240
JE 320 READA$:IFA$="*"TH
EN170
HP 330 FORT=1TO26:IFA$=M
IDS(X$,T,1)THENRE
TURN
FG 340 NEXT
HD 350 DATA P,R,E,C,U,R,
*
```

the character ROM located from 53256 through 53463. POKE 56334,0 turns off the keyboard, while POKE 1,51 switches the character ROM in. When the copying is complete, the two memory registers must be restored to normal with POKE 1,55 and POKE 56334,1. The order of poking in line 170 must be reversed from that of line 130.

Between lines 130 and 170, the ROM-to-sprite data copying occurs. We set up the sprite's shape data in memory registers 12288 through 12350; B is 12288. Recall that each sprite shape is defined by 63 bytes (three columns of 21 bytes). The first letter whose 8 bytes of data we'll transfer will appear in the upper left corner of the sprite, controlled by addresses 12288, 12291, 12294, and so on.

A FOR-NEXT loop from 0 to 21 in line 140 begins copying the eight bytes of character data. STEP 3 ensures that the data bytes fall under each other in the sprite so the character will be readable. Z is the ROM location of the character data. Its value is calculated by adding constant S and variable T and then multiplying by con-

stant E. (S and E are defined in line 60.) T comes from a subroutine in lines 320-350, which is called from line 120. Let's look at that subroutine.

A\$ is a letter of the alphabet. X\$ (the alphabet, defined in line 50) is scanned for a match. T indicates A\$'s place in the alphabet. Thus, if A\$ is the letter C, T will equal 3. The subroutine returns control to line 130. T is then added to S in line 140, which determines Z's value—the place to begin peeking for character data.

In line 140, the first time through the loop, B is poked with whatever's in Z. However, line 150 increments A (which starts as 0) by 1, so the next time through the loop, B+3 is poked with whatever's in Z+1. Thus, as the sprite data registers are increased by three, the character data registers are increased by one.

After the loop is finished in line 150, A is reset to 0, and B is increased by 1. The next two characters will be placed to the right of the first one in the sprite; the FOR-NEXT loop is finished in line 160. Finally, B is increased by 21, and another loop begins in line 120. This places three more characters under the first three.

Lines 180-310 print a message and illustrate a sprite-moving technique via the cursor keys. Line 230 looks at memory locations 197 and 653, which track keyboard presses. The sum of their peeked values equals 7, 8, 2, or 3, corresponding to down, up, right, and left cursor movements. Line 290 converts the sprite's horizontal position to pokable values for the two horizontal-position memory registers 53248 and 53264. Line 300 does the actual poking.

Experiment by deleting the first REM in line 80 and the printing in lines 190-210. Try other values for S in line 60, X\$ in line 50, and 26 in line 330. □

Here's an interesting way to turn keyboard characters into sprites, and move them about with cursor keys.



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# MACHINE LANGUAGE

Jim Butterfield

## ROTATING BUFFERS

You may recall an earlier expedition into hexadecimal number printing. In this column, we'll expand on that subject.

Here's what this program will do. The user names a program file. Our program examines that file and reports two things: the load address and whether or not the last three bytes of the file are 0. The load address of a program gives you a hint as to whether this is a normal program (generated with a SAVE command) or an unusual one that will need to be brought in with a LOAD "filename",8,1 command. Normal load addresses vary from computer to computer, but these addresses almost always end with hexadecimal digits 01.

If the load address ends with digits 01, our program will read the rest of the file to catch the last three bytes. If each of the three are 0, the program will print ALL BASIC.

For example, a program with a load address of \$0801 that ends with three binary 0s is more than likely a BASIC language program that was probably saved on a64. That means it can be loaded with the normal ,8 extension.

The program must read all the bytes of the file in order to catch the last three, but it doesn't need to save all those bytes that it encounters first. A buffer large enough to hold three bytes is all that's required. As the data bytes come from the file, they'll be stored in one of these three addresses. A pointer will move across the three locations, looping around as needed. In other words, we have a rotary buffer. When we finally see the END OF FILE signal, the contents of those three locations will be the pieces of informa-

tion that we want to know.

The BASIC program first pokes the machine language code in place. Then it asks for a filename and opens logical file 1. The machine language program is called in to do the main job. When control returns to BASIC, the file is closed, and the program is finished.

Note that the file is opened and closed from BASIC. Although we could do the same job from machine language, we'd save little time or memory. It's nice to have BASIC on hand for such jobs. On other computers, BASIC wouldn't be there, and you'd lose this easy and flexible option. Since it's built into the Commodores, why not use it?

The machine language program is situated at addresses \$2000 to \$2081. When called, it connects to logical file 1 and reads the first two bytes into addresses \$2200 and \$2201. Those bytes are converted to hexadecimal and printed.

At address \$2021 we check to see that the last two digits of the load address are 01. To do this, simply examine the contents of \$2200. If you don't find value 1 there, skip to the end of the program.

Our rotary pointer is held in X; the value is temporarily stored in location \$2202 when we read in a new byte from the file. The data byte is stored in one of three locations in the range \$2203 to \$2205.

```
2027 8E 02 22 STX $2202
202A 20 E4 FF JSR $FFE4
202D AE 02 22 LDX $2202
2030 9D 03 22 STA $2203,X
2033 E8      INX
2034 E0 03   CPX #$03
2036 D0 02   BNE $203A
2038 A2 00   LDX #$00
203A A5 90   LDA $90
203C F0 E9   BEQ $2027
```

Note that ST, the status byte, is at \$90 for Commodore computers from the VIC-20 on.

For early PET/CBM machines, substitute address \$96.

Once the file is completely read, it's easy to examine the three bytes of the buffer to see if they're all 0.

If the file does end with three 0 bytes, the program prints its ALL BASIC message. The loop to do this is at locations \$204B to \$2057.

The machine language program disconnects from the file by calling Kernal subroutine \$FFCC, prints a Return, and then passes control back to BASIC.

Full coding isn't given here, but you can disassemble it to see the details. Note the changes for older PETs on lines 110 and 270.

```
10 DATA 162,1,32,198,255,32,
20 DATA 228,255,141,0,34,32
30 DATA 228,255,141,1,34,169
40 DATA 36,32,210,255,162,1
50 DATA 189,0,34,32,96,32
60 DATA 202,16,247,174,0,34
70 DATA 202,208,49,142,2,34,
80 DATA 32,228,255,174,2,34
90 DATA 157,3,34,232,224,3
100 DATA 208,2,162,0,165
110 DATA 144:REM 150 FOR PET
120 DATA 240,233,169,0,162,2
130 DATA 29,3,34,202,16,250
140 DATA 170,208,13,162,0
150 DATA 189,119,32,32,210
160 DATA 255,232,224,11,208
170 DATA 245,32,204,255
180 DATA 169,13,76,210,255
190 DATA 72,74,74,74,74,32
200 DATA 107,32,104,41,15
210 DATA 120,248,24,105,144
220 DATA 105,64,216,88,76,210
230 DATA 255,32,65,76,76,32
240 DATA 66,65,83,73,67,13
250 FOR J=8192 TO 8321:READ X
260 POKE J,X:T=T+X:NEXT J
270 IF T<>14512 THEN STOP:
    REM 14518 FOR PET
300 INPUT "NAME OF PROGRAM FILE";F$
310 OPEN 15,8,15:OPEN 1,8,3,F$
330 INPUT#15,E,E$,E1,E2
340 IF E<>0 THEN PRINT
    E;E$;E1;E2:END
350 SYS 8192
360 CLOSE 1
```

Here's a method to determine a program's starting address and whether it's a BASIC or a machine language program.



# WORLD VIEW

Emil Heyrovsky

## VIEW FROM CZECHOSLOVAKIA

Don't worry if you hear us talking favorably about Commies in Czechoslovakia these days. The Communist party hasn't ruled in our country since November 1989. When we talk about Commies now, we're talking about our Commodore computers.

Czechoslovakia is a free country in the heart of Europe; its population slightly exceeds 15 million. It's a mountainous country with a colorful history.

Now back to the Commies. Thanks to the Communist regime, the value of the Czechoslovak crown has fallen drastically in comparison to its pre-World War II value. The present exchange rate is about 30 crowns to the U.S. dollar.

Now hold your breath. The average monthly salary of a Czechoslovak citizen today is 2,700 crowns. That's about \$90. During the Communist rule, a 64 was available only through special shops for almost 10,000 crowns (\$330). A 1541 disk drive unit cost about the same amount.

At that time, though, the average salary was much lower, and the exchange rate was absurd. The only rational way to get a computer was to import it from Germany or another West European country. Thanks to bureaucratic Communist formalities, this was never an easy process. Nowadays, a 64 costs about 5000 crowns (\$165). Since it's now easy to travel throughout Europe and the formalities are minimal, most people prefer to buy their 64s in Germany.

Compared with other 8-bit-ers, 64s are probably the most widespread machines here; Sinclair Spectrums formerly held that distinction. There are also some Atari, Sord, and Sharp computers

around. As for 16-bit machines, the Amiga 500 is very popular, as is the Atari line. IBM compatibles are purchased by business people, but Apples and Macs are seldom seen.

Commodore software isn't available in stores here. As far as I know, there has never been any means of buying software for our beloved computers. As a result, 90 percent of all programs around here are pirated.

Here's another reason why pirating is so widespread: A standard game costs about 750 crowns (\$25), which is about one-third of an average monthly salary. Only a madman would consider buying software at that price. All over Europe there are teams of software crackers providing copies of pirated software, and programs without copy protection spread quickly.

The most common way to get software on disk or tape, which is still popular here, is to swap programs with your friends. Another method is to pick up a bunch of disks or a couple of tapes and head for a Commodore club. There are two of them here in Prague, and trading is popular. Members might swap Bard's Tale 3 for Last Ninja 3 or Boulder Dash for Maniac Mansion, or possibly buy a 1541 brochure. One club publishes instruction manuals for programs and peripherals as well as for computers. The club is combined with an Amiga group, which has a bad effect on weaker individuals, who, instead of squeezing bytes out of their 64s, bounce off to Amigaland.

Club meetings usually take place twice a month in a rented hall. Some tables are put together to form a counter for selling books and brochures; other tables are used for trading and copying. Copying is performed on 64s or 128s with

disk drive units or Datasette tape recorders, which often have some kind of homemade adapter for smooth copying. Members or visitors bring equipment from home, since the club doesn't provide computers. Once a month, lectures on computer topics are held. Most of the people you meet at a club are young.

I've noticed recently that the number of Commodore owners is slowly decreasing. I'll try to explain why. The 64 and 128 are generally considered to be affordable game machines. A person who wants to do word processing or some other "serious" application thinks of buying an IBM or compatible. Amigas are bought by wealthier game players (or serious users). Because some people have never learned to use their Commies fully, they don't think much of them, and they want to get rid of them.

Modems are almost unknown here. This is due partly to our rotting telecommunication system and also to public ignorance of electronic bulletin boards and E-mail. Moreover, long-distance calls are extremely expensive. Just a normal chat with an overseas friend can swallow and digest your salary in a jiffy.

Many new computer magazines are showing up on our newsstands, but several of them are just translations of German or other imported publications. Unfortunately, we don't get COMPUTE, and there isn't a good magazine available here that's dedicated to the 8-bit Commodores. That's too bad because, as I said, many Commodore owners in Czechoslovakia often never really learn what great machines they have.

---

Emil Heyrovsky lives in Prague. He is the coauthor of Padlock (January 1992). □

**The 64 and 128 remain popular in Czechoslovakia, along with tape drives, user groups—and software pirates.**



## GRAPHIC SCRAPS

Since desktop publishing and writing are what I do most with GEOS, I collect graphics, along with utilities to handle them as efficiently as possible. In earlier columns I've mentioned some of the better sources for GEOS graphics—Lamb Art & Design, for example—and suggested ways to convert graphic images from other formats into GEOS.

After you've collected all these terrific graphics, you still have to get them into your documents. Back in the August 1991 column I mentioned Scrap It, a utility which clips photo scraps out of geoPaint documents. Since many collections of artwork for GEOS come in that form, Scrap It is essential. Other collections come in prepared photo albums, such as the clip art files from Susan Lamb (3575 East County 18th Street, Yuma, Arizona 85365) and those from GeoWorks itself (GEOS Clip Art Disk, 2150 Shattuck Avenue, Berkeley, California 94704). Graphics have to make it into photo scrap form, if they're going to be of any use, because photo scraps are the way GEOS moves images between applications.

A photo scrap is simply a small chunk of bitmap, the dot pattern that makes up a graphic image. The GEOS operating system tags photo scraps as system files and handles them in a special way. You can't rename a photo scrap, for example, since applications are designed to look for the filename PHOTO SCRAP when you select a tool to import a graphic into your document. There can be only one such file with that filename on any given disk at a time. Photo albums are collections of such scraps, and the key to using photo scraps efficiently is to handle albums efficiently.

The primary tool for handling photo albums is the photo manager desk accessory (currently in version 2.1, which works in 40- and 80-column modes). Since the photo manager can access any of the photo albums on the disk, you use it to find the image you want and copy or cut it into an individual scrap. That scrap can then be imported using the Edit menu functions.

So far that's basic GEOS operation, and you've likely mastered it already. But the more graphics you collect, the more you wish for a way to access and organize them better. The photo manager performs its job admirably, but it can't access scraps on another drive. This means your photo albums, which are tremendous disk-space eaters, must be specially prepared for each project, with only the images you'll require, or copied in and out as needed. But then if you want to create an album of only the clips you're likely to need, there's no easy way to move them from one album to another without opening and closing each album to make a transfer.

Now if you've read this column before, you know that I only pose dilemmas if I have a solution in mind. In the case of photo scraps, there are several excellent utilities available which can make all this shuffling of graphics a breeze. The program AlbumCopy by Michael Myers presents you with a control panel which allows you to select source and destination albums and then flip through the clips to choose which ones you'd like to transfer. It can't get much easier than that! To download it from Q-Link, request ALBUMCOPY, which was uploaded by GeoLib PH.

This utility is also handy for reducing the size of any over-size photo albums you've creat-

ed with earlier versions of GEOS that the GEOS 2.0 photo manager can't handle. This happens because the version 2.0 albums hold only half as many clips as those of the older model—60 as compared to 120. If you'd rather just revert to the old version so you can work with the old photo manager, get a copy of Album Reverter, written by Joe Buckley (ALBREV.SFX on Q-Link, uploaded by Red Storm). This utility reverses the update process that the new photo manager automatically performs when you try to open an older-style album.

But the single most helpful program you can get for using photo scraps comes in two incarnations, one a desk accessory and the other an application. Scrapgrab, the desk accessory version, lets you select a photo from an album or a scrap on a disk in a different drive. The application version, identical except that it handles larger scraps, is called Photograb. To download from Q-Link, look for SCRAPGRAB and PHOTOGRAB. GeoLib PH uploaded both of these.

With these utilities you can finally keep your photo collection where it belongs—on a graphics collection disk—and access your clip art when you need it from within geoPublish or other applications without those albums taking up every inch of disk space on your main work disk. The addition of these two files will let you effortlessly use your clip art, not be strapped down by it.

Imagine a disk of photo albums, all sorted into categories, which you can access, browse through, and select from at will as you geoPublish along. You'll never again have to drop out of your document to track down a graphic when you keep your graphics on a library disk and Scrapgrab on your work disk. □

**The more graphics you collect, the more you wish for a way to access and organize them better.**



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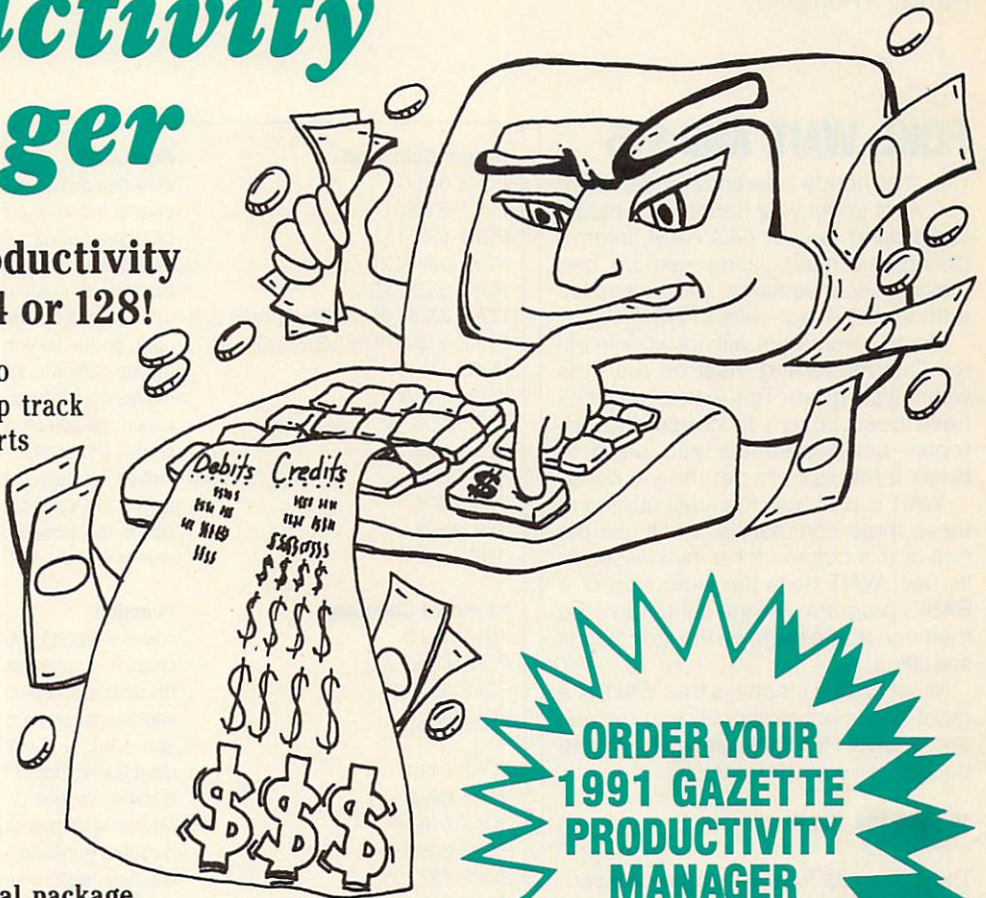
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# PROGRAMMER'S PAGE

Randy Thompson

## POKE, WAIT, AND SYS

Use this handy reference sheet when you want to get your hands dirty mucking around in your 64's RAM, interrogating and manipulating memory, and making unconventional (and often unauthorized) direct calls to ROM.

Some commands will not work in immediate mode and must be run from within a program. Tips with an asterisk have been known to cause side effects—but sometimes you need to break a few rules to get the job done.

WAIT is probably the least utilized of these three commands, so I'll use the rest of this column for a mini lesson in its use. WAIT halts the execution of a BASIC program until the contents of the memory address meet the conditions specified.

What all this means is that WAIT is a great statement to simplify key fetches and delays. Here are a few ways it can be used in your programs.

### 10 WAIT 198,15:GET AS

This line waits for a key to be pressed.

### 10 WAIT 197,63:KEY=PEEK(197)

### 20 WAIT 197,64

Line 10 waits for a key to be pressed, and line 20 waits for it to be released.

### 10 WAIT 653,1

### 20 WAIT 643,1,1

Line 10 waits for Shift to be pressed, and line 20 waits for it to be released. Change the 1 in each line to 2, and the program waits for the press and release of the Commodore key. Substitute a 4 to wait for the Ctrl key.

Contributors to this list of coding voodoo are Michael Hall of De Soto, Texas; Jerry Krebs of Taylor, Texas; Stacy Olivas of Graham, Washington; and Helen Roth of Los Angeles, California.

"Programmer's Page" is interested in your programming tips and tricks. Send them to Programmer's Page, COMPUTE's Gazette, 324 West Wender Avenue, Suite 200, Greensboro, North Carolina 27408. We'll pay \$25-\$50 for each tip we publish. □

### Screen Command

POKE 646,C  
POKE 53280,C  
POKE 53281,C  
POKE 53272,21  
POKE 53272,23  
POKE 53265,PEEK(53265) AND 239  
POKE 53265,PEEK(53265) OR 16  
POKE 211,C  
POKE 214,R  
SYS 59296  
SYS 58726  
SYS 59516  
SYS 59626  
SYS 59848  
SYS 59749

### Keyboard Command

POKE 198,0  
POKE 650,128  
POKE 650,127  
POKE 650,0  
  
POKE 649,1  
POKE 649,0  
POKE 649,10  
POKE 808,239  
POKE 792,193  
POKE 808,234  
POKE 808,237:POKE 792,71  
WAIT 653,1  
WAIT 653,2  
WAIT 653,4

### BASIC Command

POKE 818,32  
POKE 818,237  
POKE 775,200  
POKE 775,167  
POKE 774,0  
POKE 774,24  
POKE 204,0  
POKE 204,255  
POKE 19,65  
POKE 19,0

### System Command

SYS 58266  
SYS 65126  
SYS 64738

### Miscellaneous Command

POKE 56325,R  
POKE 54296,15:POKE 54296,0  
WAIT 56320,16,16  
WAIT 56321,16,16  
SYS 62913

### Function

changes cursor color (0-15)  
changes border color (0-15)  
changes background color (0-15)  
switches to uppercase mode  
switches to lowercase mode  
turns off the screen display  
turns on the screen display  
moves cursor to specified column (0-79)  
moves cursor to specified row (0-24)  
clears the screen and prints READY  
homes the cursor  
moves the cursor down  
scrolls the screen up  
scrolls the screen down\*  
inserts a line

### Function

clears keyboard buffer  
enables autorepeat for all keys  
disables autorepeat for all keys  
enables autorepeat for only the cursor keys, space bar, and Inst/Del key (computer's default)  
disables keyboard buffer  
disables keyboard  
returns keyboard to normal  
disables Run/Stop key\*  
disables Restore key  
disables Run/Stop-Restore and LIST\*  
reenables Run/Stop-Restore and LIST  
waits for Shift to be pressed  
waits for Commodore key to be pressed  
waits for Ctrl to be pressed

### Function

disables SAVE  
enables SAVE  
disables LIST  
enables LIST  
prevents line numbers from listing  
resurrects lines numbers  
turns on cursor during GET\*  
turns off cursor during GET  
turns off question mark during INPUT\*  
turns on question mark during INPUT

### Function

prints startup message and erases BASIC program  
warm reboot (erases screen)  
cold reboot (erases program)

### Function

changes cursor blink rate (0-255, 58 is normal)  
makes a click sound  
waits for fire button of joystick in port 2 to be pressed  
waits for fire button of joystick in port 1 to be pressed  
prints the name of the latest loaded or opened file



# PROGRAMS

## FILE LOGGER

By Roger Bachelder

File Logger is a short two-part program that will list all the files that you have on a disk. It presents you with the disk's BAM title, the disk ID, and each file's starting track and sector. File Logger's unique feature is that it also gives you each file's starting and ending address.

### Typing It In

The first part of File Logger is written entirely in BASIC. To help avoid typing errors, use The Automatic Proofreader to enter the program. See "Typing Aids" elsewhere in this section. After entering the first part of the program, be sure to save it to disk before exiting.

The second part of File Logger is written in machine language. Use MLX, our machine language entry program, to type it in. Again, see "Typing Aids." When MLX prompts, respond with the following values.

Starting address: 6AA0

Ending address: 6E07

Save this machine language program as LOG.ML on the same disk as the BASIC program. File Logger will automatically load and run LOG.ML, so be sure to save it with this filename.

### Reading Disks

After the program runs, you'll see a menu giving you the option to LOG DISK or EXIT TO BASIC. Insert the disk you want to check and enter 1. You'll then be asked whether or not you want the output sent to a printer.

File Logger will then read the directory and present you with the disk name, ID, file type, track, sector, and blocks. It will then ask you if you want to see the starting and ending addresses. It prints this information in hexadecimal notation.

## FILE LOGGER

```
HE 10 IFPEEK(830)=1THEN720
CQ 15 IFPEEK(27296)<>169THENLO
AD"LOG.ML",8,1
QJ 17 POKE808,225:POKE146,0
XS 20 POKE 53281,6:POKE53280,6
:CLR
JR 25 DIMF$(100):TP$(0)="XXX":
TP$(2)="PRG":TP$(1)="SEQ
"
```

```
HG 30 TP$(3)="USR":TP$(4)="REL
"
QD 40 H$="0123456789ABCDEF"
RH 50 PRINTCHR$(142);"{CLR}
{DOWN}{BLK} (C) 1992 COM
PUTE PUBLICATIONS INTL L
TD"
RA 51 PRINT"{10 SPACES}ALL RIG
HTS RESERVED"
JE 55 PRINT"{DOWN}{WHT}
{9 SPACES}F I L E
{3 SPACES}L O G G E R"
DH 60 PRINT"{3 SPACES}{35 T}"
DQ 80 PRINT"{DOWN}{28 SPACES}"
AJ 90 PRINT"{3 DOWN} 1 --
{YEL}LOG DISK"
CD 100 PRINT"{DOWN}{WHT} 2 --
{SPACE}{YEL}EXIT TO BAS
IC"
PH 120 PRINT"{2 DOWN}{WHT}PLEA
SE SELECT (1 - 2);":PO
KE204,0
FX 130 GETA$
QG 140 IFA$="1"THEN180
KP 150 IFA$="2"THENPOKE204,1:P
RINTA$:END
KR 170 GOTO130
QK 180 PRINT"{CLR}{5 DOWN}
{WHT} SEND OUTPUT TO PR
INTER (Y/N);":POKE204,
0
QE 190 GETA$
RE 200 IFA$="Y"THENPOKE204,1:P
RINTA$:Z=4:GOTO230
PQ 210 IFA$="N"THENPOKE204,1:P
RINTA$:Z=3:GOTO230
RD 220 GOTO190
MR 230 PRINT"{CLR}{4 DOWN}
{WHT}LOOKING AT DIRECTO
RY...";BM$="":OPEN15,8
,15,"I":OPEN3,8,3,"$"
DK 240 CLOSE4:OPEN4,Z:DN=Z-3:T
B=10*DN
CE 250 FORX=1TO142:GET#3,A$:NE
XT:PRINT".";
ES 260 FORX=1TO16:GET#3,B$:BM$
=BM$+B$:NEXT:PRINT".";
KX 270 GET#3,A$,A$:GET#3,I1$,I
2$
EP 275 IFZ=4THENPRINT#4,CHR$(1
3);CHR$(13)
CC 280 PRINT"{CLR}";:PRINT#4,T
AB(TB);"{8 SPACES}BAM T
ITLE{13 SPACES}ID"
CA 290 IFZ=3THENPRINT"{WHT}
{8 SPACES}{24 T}"
GG 295 IFZ=4THENPRINT#4,TAB(TB
);"{8 SPACES}-----
"
RF 300 ID$=I1$+I2$:PRINT"{WHT}
";:PRINT#4,TAB(TB);"
{8 SPACES}";:PRINT#4,BM
$;"{6 SPACES}";ID$
FJ 305 IFZ=4THENPRINT#4,CHR$(1
3);CHR$(13)
GP 310 PRINT"{2 DOWN}{WHT}";:P
RINT#4,TAB(TB);"
{3 SPACES}TRK SEC BLKS
{4 SPACES}FILENAME
{5 SPACES}TYPE"
KA 320 IFZ=3THENPRINT"{WHT}
{3 SPACES}{33 T}"
SP 325 IFZ=4THENPRINT#4,TAB(TB
);"{3 SPACES}-----
"
BG 330 FORJ=1TO92:GET#3,A$:NEX
TJ
BS 340 M=M+1:GET#3,K$,T$,S$:IF
S$=""THENSS=CHR$(0)
PJ 350 F$="":FORJ=1TO16:GET#3,
A$:F$=F$+A$:NEXTJ
MR 360 FORJ=1TO10:GET#3,A$:NEX
TJ
JH 370 L=0:IFA$<>""THENL=ASC(A
$)
DX 380 PRINT#4,TAB(TB);"
{3 SPACES}";:PRINT"
{WHT}";
KR 390 L$=RIGHT$(STR$(L),2):IF
LEFT$(L$,1)=" "THENL$="
"+RIGHT$(L$,1)
BP 400 IFASC(T$+CHR$(0))=0THEN
IFL=0THEN560
KH 410 T$=RIGHT$(STR$(ASC(T$))
,2):IFLEFT$(T$,1)=" "TH
ENT$="0"+RIGHT$(T$,1)
GK 420 S$=RIGHT$(STR$(ASC(S$))
,2):IFLEFT$(S$,1)=" "TH
ENS$="0"+RIGHT$(S$,1)
AH 430 K=ASC(K$+CHR$(0))-128
EQ 440 IFK<10RK>5THENK=0
SP 450 PRINT#4,T$;"{2 SPACES}"
;:PRINT"{WHT}";
SP 460 PRINT#4,S$;"{2 SPACES}"
;:PRINT"{WHT}";
BS 470 PRINT#4,L$;"{3 SPACES}"
;:PRINT"{WHT}";
BH 480 K$=TP$(K):PRINT#4,F$;"
{SPACE}";:PRINT"{WHT}";
DE 490 IFK=0THENPRINT"{WHT}";
EA 500 PRINT#4,K$:IFK>2THEN52
0
QJ 510 F$(Q)=F$:Q=Q+1
PM 520 GET#3,A$:IFM<8THENGET#3
,A$,A$:GOTO540
EQ 530 M=0
RC 540 IFST=0THEN340
CS 550 CLOSE3
ES 560 PRINT:PRINT"{DOWN}{YEL}
DISPLAY {WHT}START
{YEL}& {WHT}END {YEL}AD
DRESSES ({WHT}Y{YEL}/
{WHT}N{YEL}) {WHT}";:PO
KE204,0
PQ 570 GETA$
MJ 580 IFA$="Y"THENPOKE204,1:P
RINTA$:GOTO610
PJ 590 IFA$="N"THENPOKE204,1:P
RINTA$:POKE830,0:GOSUB9
00:RUN
CP 600 GOTO570
JX 610 SYS27296
XP 620 PRINT#4,CHR$(13);CHR$(1
3):PRINT"{CLR}"
HA 630 CLOSE3:X=-1
```



# PROGRAMS

```

AX 640 PRINT "{WHT}";:PRINT#4,T
AB(TB);"{5 SPACES}FILEN
AME{9 SPACES}START
{3 SPACES}END"
CK 645 IFZ=4THENPRINT#4,TAB(TB
);"{5 SPACES}-----
-----"
CA 650 IFZ=3THENPRINT "{WHT}
{5 SPACES}{29 T}"
FE 660 X=X+1:IFFS(X)=" "THENPOK
E830,0:GOSUB900:RUN
RC 670 PRINT "{WHT}";:PRINT#4,T
AB(TB);"{5 SPACES}";FS(
X);" ";
DC 680 FORV=16TO1STEP-1:P$=MID
$(F$(X),V,1)
PC 690 IFP$=CHR$(160)THENNEXTV
KH 700 F$=LEFT$(F$(X),V)
JF 710 POKE830,1:LOADFS,8,1
GP 720 A=PEEK(828):B=PEEK(829)
AH 730 PRINT "{WHT}";:GOSUB780
XC 740 PRINT#4,"{2 SPACES}";
JH 750 A=PEEK(175):B=PEEK(174)
EF 760 PRINT "{WHT}";:GOSUB780
SB 770 PRINT#4:GOTO660
FP 780 PRINT#4,"$";:W=A:GOSUB7
90:W=B:GOSUB790:RETURN
XP 790 J=INT(W/16):I=W-J*16
XA 800 A$=MID$(H$,J+1,1):B$=MI
D$(H$,I+1,1)
XA 810 PRINT#4,A$;B$;:RETURN
PJ 900 PRINT:PRINT
PC 905 PRINT "{HOME}{23 DOWN}
{BLU}{7 SPACES}PRESS AN
Y KEY TO CONTINUE"
SB 910 FORDE=1TO100:GETA$:IFA$
<>" "THEN950
KP 920 NEXT
ME 930 PRINT "{HOME}{23 DOWN}
{WHT}{7 SPACES}PRESS AN
Y KEY TO CONTINUE"
CH 940 FORDE=1TO100:GETA$:IFA$
<>" "THEN950
FR 945 NEXT
GF 946 GOTO905
CD 950 RETURN

```

## LOG.ML

```

6AA0:A9 C0 8D 30 03 A9 6A 8D 50
6AA8:31 03 60 00 00 A9 A5 8D 62
6AB0:30 03 A9 F4 8D 31 03 60 7A
6AB8:00 8C 3C 03 8E 3D 03 60 38
6AC0:85 93 A8 D0 13 8C EF 6D 77
6AC8:B1 BB C9 24 F0 0A A6 BA 98
6AD0:E0 08 90 04 E0 0C 90 05 C7
6AD8:A5 93 4C A5 F4 B1 BB 99 C8
6AE0:F0 6D C8 C9 3A D0 03 8C E6
6AE8:EF 6D C4 B7 90 EF 8C EE 71
6AF0:6D 20 AF F5 A5 11 8D 12 78
6AF8:6C AD 00 DD 8D 13 6C AD 8C
6B00:15 D0 8D 14 6C A9 59 A0 E5
6B08:6C 85 AE 84 AF A9 00 A0 59
6B10:03 8D EF 6C 8C 10 6C A9 9B
6B18:57 20 E7 6B A0 00 B1 AE 6D
6B20:20 A8 FF C8 C0 20 90 F6 5C
6B28:20 AE FF 18 98 65 AE 85 79
6B30:AE 90 03 E6 AF 18 98 6D CD
6B38:0F 6C 8D 0F 6C 90 03 EE EE

```

```

6B40:10 6C C9 A7 AD 10 6C E9 5E
6B48:04 90 CC A9 02 A0 03 8D 9F
6B50:0F 6C 8C 10 6C A9 45 20 11
6B58:E7 6B 20 AE FF 78 AD 00 2A
6B60:DD 29 03 85 11 09 20 8D A3
6B68:00 DD 2C 00 DD 70 FB 18 FC
6B70:AD 11 D0 29 07 69 2F 8D D8
6B78:24 6C A9 00 8D 15 D0 85 99
6B80:AF 20 15 6C AC 00 6E 30 13
6B88:3C F0 05 A9 FF 8D 01 6E 9B
6B90:A2 01 A5 AF D0 17 AE 02 EA
6B98:6E AC 03 6E 20 B9 6A A5 7B
6BA0:B9 D0 04 A6 C3 A4 C4 86 34
6BA8:AE 84 AF A2 03 A0 00 E8 9B
6BB0:BD 00 6E B1 AE E6 AE D0 8E
6BB8:02 E6 AF EC 01 6E 90 EF E1
6BC0:AD 00 6E D0 BC 20 D4 6B C4
6BC8:98 30 06 A6 AE A4 AF 18 A2
6BD0:60 4C 30 F5 AD 12 6C 85 64
6BD8:11 AD 13 6C 8D 00 DD AD A2
6BE0:14 6C 8D 15 D0 58 60 8D 16
6BE8:0E 6C A5 BA 20 B1 FF 24 2E
6BF0:90 30 13 A9 FF 20 93 FF C0
6BF8:A0 00 B9 0C 6C 20 A8 FF 4D
6C00:C8 C0 06 90 F5 60 20 D4 7D
6C08:6B 4C 07 F7 4D 2D 45 02 B5
6C10:03 20 00 97 00 2C 00 DD 7A
6C18:50 FB A0 00 38 A6 11 EA 95
6C20:AD 12 D0 E9 32 90 04 29 12
6C28:07 F0 F5 8E 00 DD 8A 09 FD
6C30:20 AA EA EA 24 80 AD 00 4E
6C38:DD 4A 4A EA 4D 00 DD 4A FA
6C40:4A EA EA EA 4D 00 DD 4A 75
6C48:4A 45 11 4D 00 DD 8E 00 23
6C50:D0 EA 99 00 6E C8 D0 C4 03
6C58:60 F0 3F A9 08 8D 00 18 AE
6C60:A2 01 A5 22 D0 02 A9 12 95
6C68:85 06 86 07 A9 B0 20 25 3C
6C70:03 A9 E0 20 25 03 C9 02 1E
6C78:B0 F2 8D 00 18 60 A2 00 9F
6C80:86 F9 8D 98 02 9D 5B 02 95
6C88:4C C6 D5 85 06 86 07 18 BC
6C90:68 69 01 8D 76 03 68 8D 0F
6C98:77 03 A5 06 20 D1 03 A9 FA
6CA0:06 85 31 20 0A F5 50 FE CD
6CA8:B8 AD 01 1C 91 30 C8 D0 DA
6CB0:F5 A0 BA 50 FE B8 AD 01 40
6CB8:1C 99 00 01 C8 D0 F4 20 A9
6CC0:E0 F8 20 E9 F5 C5 3A F0 17
6CC8:05 A9 05 4C 69 F9 4C 1E DD
6CD0:04 0F 07 0D 05 0B 03 09 84
6CD8:01 0E 06 0C 04 0A 02 08 8B
6CE0:00 20 C5 03 A0 00 B9 00 23
6CE8:06 4A 4A 4A 4A 48 B9 00 2C
6CF0:06 29 0F AA BD 78 03 AA 24
6CF8:A9 01 8D 00 18 2C 00 18 22
6D00:D0 FB 8E 00 18 8A 0A 29 3C
6D08:0F 8D 00 18 68 AA BD 78 31
6D10:03 8D 00 18 6A 29 0F EA 4F
6D18:8D 00 18 C8 D0 C8 A9 08 4E
6D20:8D 00 18 4D 00 1C 8D 00 25
6D28:1C 60 38 85 06 E5 22 F0 85
6D30:41 49 FF 18 69 01 0A AE 91
6D38:00 1C A8 30 03 CA 88 2C B2
6D40:E8 C8 8A 29 03 85 44 AD 0A
6D48:00 1C 29 FC 05 44 8D 00 73
6D50:1C A9 8F 8D 05 18 2C 05 54
6D58:18 30 2F 9B 8D 09 A5 06 93
6D60:85 22 20 4B F2 85 43 AD 21
6D68:00 1C 29 9F 1D 1A 04 8D 50

```

```

6D70:00 1C 60 00 20 40 60 A9 CA
6D78:12 A2 01 20 32 03 30 5A 7F
6D80:A9 02 85 0A A8 B9 00 06 34
6D88:29 87 C9 82 D0 21 AE 96 3A
6D90:04 BD 97 04 D9 03 06 F0 E7
6D98:08 C9 2A F0 23 C9 3F D0 CD
6DA0:0E C8 E8 EC 95 04 90 E9 68
6DA8:A9 A0 D9 03 06 F0 11 18 1A
6DB0:A5 0A 69 20 90 CC AE 01 26
6DB8:06 AD 00 06 D0 BD F0 1A DB
6DC0:A4 0A C8 8C 50 01 D0 03 7D
6DC8:20 88 03 BE 01 06 B9 00 B5
6DD0:06 F0 11 30 0F 20 32 03 70
6DD8:10 EE 8C 50 01 A9 FF 8D 4A
6DE0:00 06 30 E4 A9 12 20 D1 39
6DE8:03 A9 01 4C 69 F9 08 00 D7
6DF0:31 39 39 31 20 4C 4F 47 05
6DF8:2D 4D 2F 4C A0 A0 A0 A0 D1
6E00:F6 00 00 00 00 00 00 00 58

```

Roger Bachelder does his program-  
ming in Salem, Oregon.

## DEMO MAKER

By Danny English

Creating a colorful, eye-catching demon-  
stration can be a difficult task, but it's a  
snap with Demo Maker. You can create  
and edit rasters, text, scrolling effects,  
and many other options with the touch of  
a key. When you save your finished demo  
on disk, it can be loaded and run like  
a BASIC program.

You can use Demo Maker as a loader  
with instructions to load and execute an-  
other program, or you can use it to make  
an exciting title to your own creation. The  
vivid raster display will add luster to the  
dullest program.

### Typing It In

Demo Maker consists of two programs.  
The first part is written entirely in ma-  
chine language. You must enter this pro-  
gram with MLX, our machine language  
entry program. See "Typing Aids" else-  
where in this section. When MLX  
prompts you, respond with the values  
given below.

Starting address: 3F7B

Ending address: 4A7A

When you've finished typing, be sure  
to save the program to disk with the  
name DEMO.CODE. The second part  
of Demo Maker will load this program  
by that name.

Demo Maker's editor is written en-  
tirely in BASIC. To help avoid typing er-



rors, use The Automatic Proofreader to enter this program. See "Typing Aids" again.

### Raster Magic

When both programs are saved on disk, load the BASIC Demo Maker and type RUN. The demo code will be loaded, followed by the menu screen.

Creating a demo with the editor is very simple. Use the cursor keys to move the pointer up and down the options. To change colors, move the pointer to the color you wish to change and press the + or - keys. The colors will cycle forward or backward to the color you desire.

The raster colors are all coded by shades. For example, shades of red include brown, pink, and orange. Shades of yellow are actually a rainbow of colors. For effect, the large scrolling raster is split in half, allowing two shades to be seen at once.

### Text Options

The demo screen has a scrolling text display in the lower screen, fading or flashing text in the middle, and large title text at the top. There are options on the menu to edit all of these. To select one of the options, move the pointer and press Return.

Because of the way the text is stored, a special text-entry routine is used that doesn't allow you to use the cursor keys. You simply type from left to right, however, and the cursor will wrap around normally. The Delete key does work in its normal fashion. Press Return when you've finished entering, and the text will be stored in the demo.

The large title letters were created using a special character set. This character set doesn't contain punctuation marks or numbers; therefore, use only letters A to Z when entering the title.

In the center of the screen is a large section of text that's fading or flashing. The menu has options to control the color and speed of the fading. Notice that the top and bottom lines of this text appear on rasters in the demo. The color of these lines is specified in the menu by the text on raster color.

### Saving the Demo

You can preview your demo at any time by pressing the space bar. Press-

ing the space bar again will return to the menu. When the demo looks the way you want it, move the pointer to the save option and press Return. You'll then be asked if it should boot another file. If you enter Y, you'll be prompted for the filename and SYS address if it's a machine language program. If you enter N, the program will tell the demo to return to BASIC after viewing.

The next prompt is the filename for the actual demo. Saving the program takes more than a minute, but then it can be loaded and run like a BASIC program. If the demo is to boot another file, be sure to save it on the same disk. After watching the demo, press the space bar to continue.

Feel free to experiment with color combinations and creative text displays. Whether you're making the title to a game or just an attractive display, Demo Maker will amaze you.

### DEMO.CODE ← should be 0B

```

3F7B:00 0B 08 0A 00 9E 32 30 6D
3F83:36 34 00 00 00 49 00 8C DB
3F8B:EA EA EA EA EA EA EA EA EA
3F93:EA EA EA EA EA EA EA EA EA 12
3F9B:EA EA EA EA EA EA EA EA EA 1A
3FA3:18 A9 78 85 FB 69 85 85 16
3FAB:25 A9 0A 85 FC 69 08 85 E3
3FB3:26 18 A9 00 65 FB 85 27 CD
3FBB:A9 40 65 FC 85 28 A2 FF AD
3FC3:A0 00 8C FE CF 8C FF CF 94
3FCB:F0 04 B1 25 91 27 C6 25 28
3FD3:E4 25 D0 02 C6 26 C6 27 CB
3FDB:E4 27 D0 02 C6 28 C6 FB 31
3FE3:E4 FB D0 E6 C6 FC E4 FC 4D
3FEB:D0 E0 A5 28 C9 A0 B0 0A 7E
3FF3:85 34 85 38 A5 27 85 33 7E
3FFB:85 37 4C B2 46 20 20 20 D2
4003:20 20 20 20 20 20 20 20 83
400B:20 20 20 20 20 20 20 20 8B
4013:20 20 20 20 20 20 20 20 93
401B:20 20 20 20 20 20 20 20 9B
4023:20 20 20 20 20 20 05 01 4E
402B:13 19 20 14 0F 20 03 15 D4
4033:13 14 0F 0D 09 1A 05 20 CF
403B:09 0E 14 0F 20 19 0F 15 CF
4043:12 20 0F 17 0E 20 04 05 26
404B:0D 0F 21 21 20 20 20 20 2E
4053:20 20 20 20 20 20 20 D3
405B:20 20 20 20 20 20 20 DB
4063:20 20 20 20 20 20 20 E3
406B:20 20 20 20 20 20 20 EB
4073:20 20 20 20 20 20 2A FD
407B:20 12 01 13 14 05 12 20 DA
4083:03 0F 0C 0F 12 13 20 20 F8
408B:20 20 20 20 2A 20 14 05 29
4093:18 14 20 03 0F 0C 0F 12 32
409B:13 20 20 20 20 20 20 20 95
40A3:20 20 20 20 20 20 20 20 24
40AB:20 20 20 20 20 20 20 20 2C

```

```

40B3:20 20 20 20 20 20 20 20 34
40BB:20 20 20 20 20 20 20 20 3C
40C3:20 20 20 20 20 20 20 2A 4E
40CB:20 06 01 04 09 0E 07 20 EC
40D3:14 05 18 14 20 20 20 20 C5
40DB:20 20 20 2A 20 14 09 7D
40E3:14 0C 05 20 0C 05 14 14 C4
40EB:05 12 13 20 20 20 20 20 B9
40F3:20 20 20 20 20 20 20 20 74
40FB:20 20 20 20 20 20 20 20 7C
4103:20 20 20 20 20 20 20 20 85
410B:20 20 20 20 20 20 20 20 8D
4113:20 20 20 20 20 20 2A 9F
411B:20 14 05 18 14 20 13 03 1F
4123:12 0F 0C 0C 13 20 20 20 2E
412B:20 20 20 2A 20 01 0E AD
4133:09 0D 01 14 09 0F 0E 20 9F
413B:20 20 20 20 20 20 20 20 BD
4143:20 20 20 20 20 20 20 20 C5
414B:20 20 20 20 20 20 20 20 CD
4153:20 20 20 20 20 20 20 20 D5
415B:20 20 20 20 20 20 20 20 DD
4163:20 20 20 20 20 20 15 13 C2
416B:05 20 01 13 20 01 20 04 13
4173:09 13 10 0C 01 19 2C 20 E6
417B:0F 12 20 02 0F 0F 14 20 2B
4183:01 0E 0F 14 08 05 12 20 C5
418B:06 09 0C 05 20 20 20 20 07
4193:20 20 20 20 20 20 20 20 16
419B:20 20 20 20 20 20 20 20 1E
41A3:20 20 20 20 20 20 20 20 26
41AB:20 20 20 20 20 20 20 20 2E
41B3:20 20 20 20 20 20 20 20 36
41BB:20 20 20 20 20 20 20 20 3E
41C3:20 20 20 10 12 05 13 13 41
41CB:20 13 10 01 03 05 20 20 C1
41D3:20 20 20 20 20 20 20 20 56
41DB:20 20 20 20 20 20 14 08 2E
41E3:05 20 03 0F 0D 10 15 14 29
41EB:05 20 04 05 0D 0F 20 0D BB
41F3:01 0B 05 12 20 09 13 20 E6
41FB:0E 0F 17 20 02 0C 01 13 83
4203:14 09 0E 07 20 01 03 12 23
420B:0F 13 13 20 19 0F 15 12 81
4213:20 13 03 12 05 05 0E 2E 74
421B:2E 2E 20 19 0F 15 20 03 E7
4223:01 0E 20 03 15 13 14 0F 0C
422B:0D 09 1A 05 20 14 08 09 76
4233:13 20 04 05 0D 0F 20 09 08
423B:0E 14 0F 20 19 0F 15 12 F0
4243:20 0F 17 0E 20 17 09 14 E2
424B:08 20 14 08 05 20 13 09 B6
4253:0D 10 0C 05 20 0D 05 0E 81
425B:15 2D 04 12 09 16 05 0E 10
4263:20 05 04 09 14 0F 12 2E 79
426B:20 20 05 04 09 14 20 03 C4
4273:0F 0C 0F 12 13 2C 20 14 23
427B:05 18 14 2C 20 14 09 14 45
4283:0C 05 13 2C 20 06 01 04 93
428B:09 0E 07 2C 20 01 0E 04 E0
4293:20 0D 0F 12 05 21 20 20 7B
429B:14 08 05 20 04 01 1A 1A 41
42A3:0C 09 0E 07 20 12 01 13 01
42AB:14 05 12 20 04 09 13 10 3A
42B3:0C 01 19 20 03 01 0E 20 FB
42BB:02 05 20 15 13 05 04 20 AC
42C3:01 13 20 01 20 04 05 0D C9
42CB:0F 2C 20 0F 12 20 05 16 09
42D3:05 0E 20 01 20 02 0F 0F A8
42DB:14 20 14 0F 20 01 0E 0F 16

```



# PROGRAMS

```

42E3:14 08 05 12 20 06 09 0C 6D 4513:F0 F0 F0 F8 00 7F 70 70 4F 4743:4C BC FE 8D 20 D0 8D 21 60
42EB:05 2E 20 20 14 08 05 20 6F 451B:70 70 7F FF 00 E0 E0 E0 10 474B:D0 60 A9 C8 8D 16 D0 A9 2C
42F3:10 0F 13 13 09 02 09 0C 46 4523:70 78 3F 0F 00 70 70 70 EF 4753:15 8D 18 D0 60 0A 0A 0A 29
42FB:09 14 09 05 13 20 01 12 A8 452B:70 70 7F FF 00 7F 78 78 61 475B:08 08 08 02 02 02 00 00 29
4303:05 20 05 0E 04 0C 05 13 03 4533:78 78 7F FF 00 7F 78 78 6F 4763:00 0B 0B 0B 0C 0C 0C 0F 7E
430B:13 21 20 20 15 0E 0C 05 67 453B:78 78 78 FC 00 E0 E0 E0 25 476B:0F 0F 01 01 01 01 01 01 84
4313:01 13 08 20 14 08 05 20 CC 4543:70 78 3F 0F 00 7F 78 78 64 4773:0F 0F 0F 0F 0C 0C 00 00 80
431B:07 12 01 10 08 09 03 20 55 454B:78 78 78 FC 00 03 03 03 24 477B:00 09 09 09 0C 02 02 00 80 22
4323:10 0F 17 05 12 20 0F 06 DD 4553:03 03 03 1F 00 00 F8 70 D4 4783:08 08 0A 0A 0A 00 06 0E 64
432B:20 19 0F 15 12 20 36 34 EC 455B:70 78 3F 1F 00 7F 79 78 7F 478B:03 01 01 03 0E 06 00 0B BF
4333:2E 2E 2E 20 2A 2A 20 14 72 4563:78 78 78 FC 00 78 78 78 72 4793:0C 0F 01 01 0F 0C 0B 00 DA
433B:08 05 20 03 0F 0D 10 15 1D 456B:78 78 7F FF 00 70 70 70 53 479B:00 00 05 02 00 01 01 00 F0
4343:14 05 20 04 05 0D 0F 20 F3 4573:70 70 70 F8 00 70 70 70 03 47A3:00 05 20 20 20 57 45 4C AE
434B:0D 01 0B 05 12 20 2A 2A D9 457B:70 70 70 F8 00 E0 E0 E0 1E 47AB:43 4F 4D 45 20 54 4F 20 BE
4353:20 20 02 19 20 04 01 0E E4 4583:70 78 3F 0F 00 7F 70 70 8C 47B3:54 48 45 20 20 20 20 43 2E
435B:0E 19 20 05 0E 07 0C 09 31 458B:70 70 70 F8 00 E1 E1 E0 34 47BB:4F 4D 50 55 54 45 20 44 E0
4363:13 08 20 20 20 20 20 20 5D 4593:70 78 3F 0F 00 7F 71 70 9E 47C3:45 4D 4F 20 4D 41 4B 45 7F
436B:20 20 20 20 00 00 07 0F 2D 459B:70 70 70 F8 00 03 00 00 24 47CB:52 20 C2 C4 CE CD 47 AD 1A
4373:1F 3C 78 F0 F0 00 FF 7F BD 45A3:F8 78 3F 0F 00 03 03 03 B6 47D3:CD 47 C9 BF F0 01 60 A9 46
437B:70 70 70 70 7F 00 0F 3F C4 45AB:03 03 03 07 00 70 70 70 5C 47DB:C7 8D CD 47 A0 00 B9 71 C9
4383:78 70 E0 E0 E0 00 FF 7F 13 45B3:70 38 3F 0F 00 0E 0E 07 B8 47E3:07 99 70 07 C8 C0 27 D0 43
438B:70 70 70 70 70 00 FF 7F 7E 45BB:07 03 03 01 00 73 77 7F 37 47EB:F5 A0 00 B1 FE C9 00 D0 A8
4393:78 78 78 78 7F 00 FF 7F 86 45C3:7E 7C 78 F0 00 03 07 0E F2 47F3:09 A9 E0 85 FE A9 41 85 8C
439B:78 78 78 78 7F 00 0F 3F 6C 45CB:1C 38 70 F8 00 03 03 03 25 47FB:FF 60 8D 97 07 A5 FE 18 B2
43A3:78 70 E0 E0 E0 00 FC 78 26 45D3:03 03 03 07 00 07 0F 1E C9 4803:69 01 85 FE A5 FF 69 00 29
43AB:78 78 78 78 7F 00 1F 03 60 45DB:3C 78 FF FF 00 1E FE FE 18 480B:85 FF 60 A2 00 A0 00 B9 D0
43B3:03 03 03 03 03 03 00 2B 45E3:1E 1E 1E 3E 00 FC 1E 0E EA 4813:A5 47 C9 20 D0 05 E8 E8 D8
43BB:00 00 00 00 00 00 FC 78 B4 45EB:0E 3E FC F0 00 00 00 00 BB 481B:4C 38 48 38 E9 40 9D 50 48
43C3:78 78 78 79 7F 00 FC 78 B9 45F3:1C 3C F8 E0 00 0E 0E 0E 2B 4823:04 18 69 40 9D 51 04 18 3F
43CB:78 78 78 78 78 00 F0 78 61 45FB:0E 1C FC F0 00 F0 10 00 27 482B:69 40 9D 78 04 18 69 40 4F
43D3:7C 7E 77 73 71 00 F0 78 44 4603:00 02 FE FE 00 E0 20 00 A3 4833:9D 79 04 E8 E8 C8 C0 14 FF
43DB:7C 7E 77 73 71 00 0F 3F 4F 460B:00 00 00 00 00 7E 7E 0E 9C 483B:D0 D5 A2 00 A0 00 B9 B9 30
43E3:78 70 E0 E0 E0 00 FF 7F 73 4613:1C 3C F8 E0 00 FC 3C 3C 92 4843:47 C9 20 D0 05 E8 E8 4C E4
43EB:70 70 70 70 7F 00 0F 3F 35 461B:3C 3C 3C 7E 00 C0 C0 C0 89 484B:67 48 38 E9 40 9D A0 04 05
43F3:78 70 E0 E0 E0 00 FF 7F 83 4623:0C C0 C0 F8 00 78 78 78 33 4853:18 69 40 9D A1 04 18 69 E2
43FB:70 70 70 70 7F 00 0F 3F 45 462B:78 F0 F0 E0 00 80 C0 E0 C0 485B:40 9D C8 04 18 69 40 9D 51
4403:78 70 78 3E 0F 00 FF FF 4F 4633:70 38 1C 3E 00 00 00 00 6D 4863:C9 04 E8 E8 C8 C0 14 D0 C7
440B:83 03 03 03 03 00 F8 70 21 463B:00 08 F8 F8 00 1C 1C 1C 3D 486B:D5 60 A0 E0 99 70 DB C8 22
4413:70 70 70 70 70 00 F8 70 EA 4643:1C 1C 1C 3E 00 FC 7C 3C 75 4873:C0 28 D0 F8 60 A0 00 99 37
441B:70 38 38 1C 1C 00 F8 70 F5 464B:1C 1C 1C 3E 00 0E 0E 0E B6 487B:50 D8 C8 C0 A0 D0 F8 60 2A
4423:70 70 70 71 00 F8 70 03 4653:1C 3C F8 E0 00 E0 00 00 AD 4883:A0 00 99 68 D9 99 F8 D9 1F
442B:38 1C 0E 07 03 00 F8 70 83 465B:00 00 00 00 00 0E 8E EE 2C 488B:C8 C0 FF D0 F5 60 A0 00 30
4433:38 1C 0E 07 03 00 FF FF 29 4663:7C 3C FC E6 00 E0 C0 E0 31 4893:99 40 D9 99 F8 DA C8 C0 5B
443B:80 00 00 01 03 00 C0 E0 8E 466B:70 38 1C 3E 00 F0 78 1C 76 489B:28 D0 F5 60 EE F0 CF AD C1
4443:F0 78 3C 1E 1E 00 E0 F8 77 4673:1C 3C F8 E0 00 80 80 80 CD 48A3:F0 CF CD 9D 47 B0 17 AC 0C
444B:3E 0E 0E 1C F8 00 C0 F8 3C 467B:80 80 80 C0 00 1C 1C 1C 49 48AB:F1 CF B9 91 47 20 83 48 83
4453:3C 1C 0E 00 00 00 F0 FC DF 4683:1C 38 F8 E0 00 E0 E0 C0 5F 48B3:AD F1 CF C9 0F B0 01 60 AB
445B:1C 0E 0E 0E 0E 00 FE FE 85 468B:C0 80 80 00 00 9C DC FC D1 48BB:A9 00 8D F1 CF 60 EE F1 C1
4463:02 00 00 10 F0 00 FE FE 72 4693:FC 7C 3C 1E 00 80 C0 E0 8B 48C3:CF A9 00 8D F0 CF 60 AD B4
446B:02 00 00 20 E0 00 C0 F8 78 469B:70 38 1C 3E 00 80 80 80 59 48CB:A1 47 C9 01 F0 01 60 EE 83
4473:3C 1C 00 00 00 00 7E 3C 5A 46A3:80 80 80 C0 00 80 00 00 AE 48D3:F3 CF AD F3 CF C9 03 B0 A3
447B:3C 3C 3C 3C FC 00 F8 C0 17 46AB:00 02 FE FE 00 02 97 4C 0C 48DB:01 60 A9 00 8D F3 CF AD C3
4483:C0 C0 C0 C0 C0 00 FE 78 3D 46B3:A0 49 A9 01 8D 19 D0 A9 44 48E3:F2 CF C9 01 F0 16 CE CE 77
448B:78 78 78 78 78 00 3E 1C 61 46BB:1D 8D 18 D0 AD CE 47 8D 0F 48EB:47 AD CE 47 C9 BF F0 01 0A
4493:38 70 E0 C0 80 00 00 80 46C3:16 D0 A9 00 20 46 47 8A 16 48F3:60 A9 C0 8D CE 47 A9 01 F7
449B:00 00 00 00 00 00 1E 3C 9C 46CB:A2 3C B9 58 47 EC 12 D0 58 48FB:8D F2 CF 60 EE CE 47 AD FE
44A3:7C FC DC 9C 1C 00 1E 1C 48 46D3:D0 FB 20 46 47 E8 C8 C0 60 4903:CE 47 C9 C8 F0 01 60 A9 8A
44AB:1C 1C 1C 9C DC 00 C0 F8 F7 46DB:30 D0 EF AD A2 47 20 46 46 490B:C7 8D CE 47 A9 00 8D F2 8E
44B3:3C 1C 0E 0E 0E 00 E0 F8 2F 46E3:47 20 4D 47 A0 00 A2 70 F4 4913:CF 60 A0 00 B9 70 43 99 69
44BB:3C 1C 1C 3C F8 00 C0 F8 F2 46EB:B9 88 47 EC 12 D0 D0 FB A0 491B:08 30 B9 40 44 99 08 32 C3
44C3:3C 1C 0E 0E 0E 00 E0 F8 3F 46F3:20 46 47 E8 C8 C0 09 D0 C5 4923:B9 10 45 99 08 34 B9 E0 3E
44CB:3C 1C 1C 3C F8 00 E0 F8 43 46FB:EF AD A3 47 20 46 47 20 9D 492B:45 99 08 36 C8 C0 D0 D0 E6
44D3:3C 3E 00 00 C0 00 FE FE 0D 4703:4D 47 A0 00 A2 CA B9 88 5A 4933:E3 A0 00 A0 00 99 00 31 12
44DB:82 80 80 80 80 00 3E 1C 7A 470B:47 EC 12 D0 D0 FB 20 46 C4 493B:C8 C0 08 D9 F8 60 AD 11 26
44E3:1C 1C 1C 1C 1C 00 3E 1C 40 4713:47 E8 C8 C0 09 D0 EF AD BD 4943:D0 29 7F 8D 11 D0 A9 7F EF
44EB:1C 38 38 70 70 00 3E 1C BA 471B:CD 47 8D 16 D0 AD A4 47 43 494B:8D 0D DC A0 46 A2 B5 8E 44
44F3:1C 1C 1C 1C 1C 00 3E 1C 50 4723:20 46 47 AE 58 47 A0 01 49 4953:14 03 8C 15 03 A9 81 8D E2
44FB:38 70 E0 C0 80 00 3E 1C 81 472B:B9 58 47 99 57 47 C8 C0 59 495B:1A D0 60 78 A9 F0 8D 1A 09
4503:38 70 E0 C0 80 00 FE FE EE 4733:30 D0 F5 8E 87 47 AD 0D 77 4963:D0 A9 31 8D 14 03 A9 EA B2
450B:3C 78 F0 E0 C0 F0 FF FF C7 473B:DC 29 01 F0 03 4C 31 EA 48 496B:8D 15 03 A9 81 8D 0D DC 3E

```



```

4973:20 A3 FD 20 5B FF 58 A9 F5
497B:00 20 46 47 4C 4D 47 A9 23
4983:02 8D FF CF A2 00 CA D0 F2
498B:FD CE FF CF D0 F8 60 A0 99
4993:00 B9 29 4A 99 A7 02 C8 96
499B:C0 50 D0 F5 60 20 15 49 13
49A3:A9 01 8D 86 02 A9 93 20 63
49AB:D2 FF A9 08 20 D2 FF A9 53
49B3:00 8D 15 D0 A0 00 B9 00 D1
49BB:40 99 40 05 B9 EF 40 99 D4
49C3:2F 06 C8 C0 EF D0 EF 20 57
49CB:41 49 20 0E 48 AD 9F 47 B5
49D3:20 78 48 A9 00 20 83 48 08
49DB:AD A0 47 20 6D 48 AD 9E DE
49E3:47 20 91 48 A0 41 A2 E0 09
49EB:86 FE 84 FF A9 00 8D F0 6B
49F3:CF 8D F1 CF 8D F2 CF 8D 72
49FB:F3 CF 20 82 49 20 CF 47 5A
4A03:20 9F 48 20 CA 48 A5 C5 23
4A0B:C9 3C D0 EE 20 5E 49 A9 53
4A13:93 20 D2 FF A9 00 85 C6 F2
4A1B:AD 29 4A C9 02 D0 01 60 6C
4A23:20 92 49 4C B8 02 02 2A 56
4A2B:2A 2A 2A 2A 2A 2A 2A 2A BF
4A33:2A 2A 2A 2A 2A 2A 2A 2A 4F
4A3B:00 8D 86 02 A9 10 A2 A8 9F
4A43:A0 02 20 BD FF A9 00 A2 D1
4A4B:08 A0 01 20 BA FF 20 D5 1A
4A53:FF AD 29 4A C9 01 F0 03 54
4A5B:4C 00 C0 A9 52 8D 77 02 82
4A63:A9 55 8D 78 02 A9 4E 8D 3C
4A6B:79 02 A9 0D 8D 7A 02 A9 47
4A73:04 85 C6 60 00 00 00 00 4A

```

## DEMO MAKER

```

BA 10 REM COPYRIGHT 1992 COMPU
TE PUBLICATIONS INTL LTD
- ALL RIGHTS RESERVED
SA 20 IF A=0 THEN A=1:LOAD"DEM
O.CODE",8,1
HD 30 DIM C$(15),V(9),R(4)
SS 40 FOR X=0 TO 15:READ A$:C$(
X)=A$:NEXT
CG 50 FOR X=0 TO 9:READ A:V(X)
=A:NEXT
PD 60 FOR X=0 TO 44:READ A:POK
E X+32768,A:NEXT
AA 70 R(0)=1:R(1)=2:R(2)=5:R(3
)=6:R(4)=7
RF 80 T$="YES":S=1185:K$="A":X
=0
KS 90 B$="{WHT}-----
-----"
RD 100 POKE53272,23:POKE53281,
0:POKE53280,11
PH 110 PRINT"{CLR}{DOWN}{7}
{10 SPACES}** DEMO MAKE
R **"
QE 120 PRINT"{2 DOWN}
{3 SPACES}{WHT}TITLE LE
TTERS{2 SPACES}COLOR:
{6}"C$(V(0))
AE 130 PRINT"{3 SPACES}{WHT}SC
ROLLING TEXT COLOR: {6}
"C$(V(1))
CE 140 PRINT"{3 SPACES}{WHT}TE
XT ON RASTER COLOR: {6}

```

```

"CS(V(2))
CE 150 PRINT"{3 SPACES}{YEL}MI
D BACKGROUND COLOR: {7}
"CS(V(3))
HD 160 PRINT"{3 SPACES}{YEL}LO
W BACKGROUND COLOR: {7}
"CS(V(4))
DX 170 PRINT"{3 SPACES}{GRN}MA
IN RASTER{2 SPACES}PART
1: {3}"C$(V(5))" SHADE
S"
FJ 180 PRINT"{3 SPACES}{GRN}MA
IN RASTER{2 SPACES}PART
2: {3}"C$(V(6))" SHADE
S"
DG 190 PRINT"{3 SPACES}{GRN}SM
ALL RASTER COLORS:
{PUR}"C$(V(7))" SHADES"
SG 200 PRINT"{3 SPACES}{GRN}MI
DDLE FADER COLORS:
{PUR}"C$(V(8))" SHADES"
QR 210 PRINT"{3 SPACES}{CYN}FA
DER SPEED (0 TO 10):
{PUR}"V(9)
PF 220 PRINT"{3 SPACES}{YEL}AN
IMATE TITLE: {6}"T$
AX 230 PRINT"{3 SPACES}{WHT}EN
TER TITLE TEXT"
XE 240 PRINT"{3 SPACES}ENTER S
CROLLING TEXT"
PD 250 PRINT"{3 SPACES}ENTER M
IDDLE TEXT"
SP 260 PRINT"{3 SPACES}{CYN}SA
VE THE DEMO"
RJ 270 PRINT"{2 DOWN}{6}
{4 SPACES}PRESS SPACE T
O PREVIEW THE DEMO"
BJ 280 SC=S+X*40:POKE SC,62:PO
KESC+54272,1
FD 290 GET C$:IFC$="{DOWN}" AN
D X<14 THEN POKESC,32:X
=X+1
SE 300 IFC$="{UP}"AND X>0 THEN
POKESC,32:X=X-1
GC 310 IF C$ <> "+" THEN 350
FJ 320 IF X<=4 THEN IF V(X)<15
THEN V(X)=V(X)+1:GOTO1
00
DS 330 IF X=9 THEN IF V(X)<10
{SPACE}THEN V(X)=V(X)+1
:GOTO100
DJ 340 IF X<=8 THEN IF V(X)<7
{SPACE}THEN 480
EP 350 IF C$ <> "-" THEN 390
AE 360 IF X<=4 THEN IF V(X)>0
{SPACE}THEN V(X)=V(X)-1
:GOTO100
RA 370 IF X=9 THEN IF V(X)>0 T
HEN V(X)=V(X)-1:GOTO100
XG 380 IF X<=8 THEN IF V(X)>1
{SPACE}THEN 500
JA 390 IF X=10 AND C$=CHR$(13)
THEN 460
HP 400 IF X=11 AND C$=CHR$(13)
THEN 770
FB 410 IF X=12 AND C$=CHR$(13)
THEN 640
GF 420 IF X=13 AND C$=CHR$(13)

```

```

THEN 700
BS 430 IF X=14 AND C$=CHR$(13)
THEN 1100
FP 440 IF C$=" " THEN POKE 189
85,2:GOSUB 940:SYS 1809
8:GOTO 100
XC 450 GOTO 280
RG 460 IFT$="YES" THEN T$="NO"
:GOTO100
FF 470 IFT$="NO" THEN T$="YES"
:GOTO100
SH 480 V(X)=V(X)+1:IF V(X)=3TH
ENV(X)=5
XA 490 GOTO100
KE 500 V(X)=V(X)-1:IF V(X)=4TH
ENV(X)=2
MA 510 GOTO100
PJ 520 REM * TEXT INPUT *
EQ 530 M=0
XS 540 PRINT"{RVS}{WHT} {OFF}"
;
KF 550 GET C$:IFC$=""THEN550
EJ 560 PRINT"{LEFT} {LEFT}";:I
FC$=CHR$(13)THEN RETURN
SB 570 IFC$<>CHR$(20)THEN610
XM 580 IF M=0THEN540
QR 590 M=M-1:PRINT"{LEFT}
{LEFT}";:IFM<1THEN530
RM 600 GOTO540
DE 610 IF C$="{F1}"THEN RETURN
MR 620 IFM>=LE OR (C$<"ORC$>
"Z") THEN540
GJ 630 M=M+1:PRINTC$;:GOTO540
HH 640 REM * SCROLLING TEXT *
JF 650 PRINT CHR$(147)B$"
{10 DOWN}B$"{YEL}
{DOWN}ENTER THE SCROLL
{SPACE}TEXT NOW."
HX 660 PRINT"{DOWN}PRESS <RETU
RN> TO STORE,{2 SPACES}
<F1> TO ABORT{HOME}
{WHT}{DOWN}";
SP 670 FOR Y=16864 TO 17263:PO
KE Y-15800,PEEK(Y):NEXT
:LE=398:GOSUB 520
PX 680 IF C$<>"{F1}"THEN FOR Y
=1064 TO 1463:POKE Y+15
800,PEEK(Y):POKE Y,42:N
EXT
FQ 690 GOTO100
AX 700 REM * MIDDLE TEXT *
MB 710 PRINT CHR$(147)B$"
{12 DOWN}B$"{YEL}
{DOWN}ENTER THE MIDDLE
{SPACE}TEXT NOW.
{2 SPACES}FIRST AND
PR 720 PRINT"LAST LINES ARE TE
XT ON RASTERS."
AD 730 PRINT"{DOWN}PRESS <RETU
RN> TO STORE,{2 SPACES}
<F1> TO ABORT{HOME}
{WHT}{DOWN}";
PF 740 FOR Y=16384 TO 16863:PO
KE Y-15320,PEEK(Y):NEXT
:LE=479:GOSUB 520
FE 750 IF C$<>"{F1}"THEN FOR Y
=1064 TO 1543:POKE Y+15
320,PEEK(Y):POKE Y,42:N

```



```

EXT Y
PB 760 GOTO100
RX 770 REM * TITLE *
CR 780 PRINT CHR$(147)BS"
      {2 DOWN}BS"{YEL}{DOWN}
      ENTER THE TITLE LETTERS
      NOW."
XD 790 POKE1084,45:POKE1124,45
KX 800 PRINT"{DOWN}18 LETTERS
      {SPACE}PER LINE (SPACES
      INCLUDED)"
QD 810 PRINT"NO PUNCTUATION IS
      ALLOWED IN TITLE."
HH 820 PRINT"{DOWN}PRESS <RETU
      RN> AT END OF EACH LINE
      "
XS 830 FOR Y=18341 TO 18360:P=
      Y-17277:V=PEEK(Y):IF V<
      >32 THEN V=V-64
GK 840 POKEP,V:NEXT
PQ 850 FOR Y=18361 TO 18380:P=
      Y-17257:V=PEEK(Y):IF V<
      >32 THEN V=V-64
SS 860 POKEP,V:NEXT
GE 870 PRINT"{HOME}{WHT}{DOWN}
      ";:LE=19:GOSUB520
JJ 880 PRINT:LE=19:GOSUB520
PB 890 FOR Y=1064 TO 1083:P=Y+
      17277:V=PEEK(Y):IF V<>3
      2 THEN V=V+64
QD 900 POKEP,V:POKE Y,42:NEXT
KC 910 FOR Y=1104 TO 1122:P=Y+
      17257:V=PEEK(Y):IF V<>3
      2 THEN V=V+64
ER 920 POKEP,V:POKE Y,42:NEXT
BM 930 GOTO100
PQ 940 REM * CUSTOMIZER *
HP 950 PRINT"{CLR}"
PP 960 AD=18333:POKE AD,V(9):P
      OKE AD+1,V(2):POKE AD+2
      ,V(0):POKE AD+3,V(1)
BG 970 POKE AD+4,0:IF T$="YES"
      THEN POKE AD+4,1
PQ 980 POKE AD+6,V(3):POKE AD+
      7,V(4)
BP 990 REM * RASTERCOL *
FK 1000 Y=32768:FOR T=0 TO 3:I
      F R(T)<>V(7) THEN Y=Y+
      9:NEXT
XC 1010 A=18312:GOSUB1090
SR 1020 Y=32768:FOR T=0 TO 3:I
      F R(T)<>V(8) THEN Y=Y+
      9:NEXT
EB 1030 A=18321:GOSUB1090
HM 1040 Y=32768:FOR T=0 TO 3:I
      F R(T)<>V(5) THEN Y=Y+
      9:NEXT
MR 1050 A=18264:FOR T=Y TO Y+7
      :FOR U=0 TO 2:POKE A,P
      EEK(T):A=A+1:NEXT U:NE
      XT T
AS 1060 Y=32768:FOR T=0 TO 3:I
      F R(T)<>V(6) THEN Y=Y+
      9:NEXT
AP 1070 A=18288:FOR T=Y TO Y+7
      :FOR U=0 TO 2:POKE A,P
      EEK(T):A=A+1:NEXT U:NE
      XT T

```

```

XF 1080 RETURN
AB 1090 FOR T=Y TO Y+9:POKE A,
      PEEK(T):A=A+1:NEXT:RET
      URN
QE 1100 REM{2 SPACES}* SAVE *
KJ 1110 GOSUB 940:INPUT"{CLR}
      {WHT}{DOWN}SHOULD DEMO
      BOOT ANOTHER FILE? Y
      {3 LEFT}";AS
AB 1120 IF AS="N" THEN POKE 18
      985,2:GOTO 1200
EX 1130 PRINT"{CLR}{2 DOWN}BS
      "{YEL}ENTER THE NAME O
      F FILE TO BOOT"
CF 1140 PRINT"(TYPE '*' AT END
      OF NAME){HOME}":POKE1
      080,45:LE=15:GOSUB520
XM 1150 FOR Y=1064 TO 1079:A=Y
      +17922:V=PEEK(Y):IF V
      {SPACE}> 0 AND V < 27
      {SPACE}THEN V=V+64
AQ 1160 POKE A,V:NEXT:PRINT
XF 1170 INPUT"{4 DOWN}{CYN}ENT
      ER SYS (RETURN=BASIC)"
      ;SY
DD 1180 IF SY=0 THEN POKE18985
      ,1:GOTO 1200
SC 1190 POKE 18985,0:H=INT(SY/
      256):L=SY-256*H:POKE 1
      9036,L:POKE 19037,H
MF 1200 INPUT"{CLR}{2 DOWN}
      {WHT}FILENAME OF DEMO"
      ;FS
PK 1210 PRINT"{2 DOWN}{GRN}SA
      VING DEMO...";
BG 1220 OPEN2,8,2,"0":"+FS+",P,
      W"
XH 1230 PRINT#2, CHR$(1);CHR$(
      8);
HB 1240 FOR J=16252 TO 19064:P
      RINT#2,CHR$(PEEK(J));
CS 1250 IF ST > 0 THEN PRINT"
      {SPACE}ERROR DURING SA
      VE":PRINT#2:CLOSE2:END
      NEXT:CLOSE2:PRINT" NO
      {SPACE}ERRORS":END
PG 1260
AM 1270 DATA BLACK,WHITE,RED,C
      YAN,PURPLE,GREEN,BLUE,
      YELLOW
HA 1280 DATA ORANGE,BROWN,LT R
      ED,DK GRAY,MED GRAY,LT
      GREEN,LT BLUE,LT GRAY
JP 1290 DATA 0,1,11,0,5,1,2,6,
      1,5
BK 1300 DATA 0,11,12,15,1,1,15
      ,12,11
SF 1310 DATA 0,9,2,8,10,10,8,2
      ,9
KF 1320 DATA 0,5,3,13,1,1,13,3
      ,5
XD 1330 DATA 0,6,14,3,1,1,3,14
      ,6
FF 1340 DATA 10,7,13,3,14,3,13
      ,7,10

```

Danny English is a frequent contributor who lives in Moreno Valley, California.

## F/X PLOT 128

By Kevin Davis

At one time or another, any student of mathematics has had to deal with coordinate plane graphing. Graphing calculators have been recognized by educators as helpful tools for understanding graphs, but these calculators can cost up to \$300.

While programs such as Arbplot exist for Apple and IBM computers, few are available for 8-bit Commodores. F/X Plot 128 tries to change this. The program itself was designed using the popular TI-81 as a benchmark. It's a menu-driven, user-friendly, colorful program designed to make good use of the 128's high-resolution graphics in 40-column mode.

### Entering the Program

F/X Plot 128 consists of a main program and a sprite. The main program is written in BASIC 7.0 and should be entered with The Automatic Proofreader to avoid typing errors. See "Typing Aids" elsewhere in this section.

The sprite data used to create an on-screen pointer or tracer is written in machine language. Enter it with MLX, our machine language entry program. See "Typing Aids" again. When MLX prompts, respond with the following values.

Starting address: 0E00

Ending address: 0E3F

Be sure to save the program as F/X PLOT.SPR on the same disk as the main program. The main program loads this data when it runs.

When you first run F/X Plot, the top of the screen will be jumbled. Clear the screen from the Options menu, press Run/Stop-Restore, and then run the program again. This process is required only when you first run the program.

From then on, you'll see a screen divided into quarters with a menu at the bottom. The program is completely menu driven. First, let's look at the Options menu. Press 4.

With this menu, you'll be presented with five numbered options. Press the number in front of the one you want.

**Simultaneous/Sequence** F/X Plot can hold formulas for up to four graphs.



Simultaneous will graph all selected formulas at the same time. Sequence graphs them one at a time. Always select Sequence when you have only one formula to graph. (Sequence is also a little faster in this case.)

**Enable/Disable Formulas** You can toggle here to enable or disable certain formulas. Only the enabled ones, denoted by their numbers appearing in reverse mode, will be graphed.

**Clear Graphics Screen** This will clear the graphics screen and return you to the Main menu.

**Set Tracer Speed** This option allows you to set the speed at which the tracer moves. A smaller number will move more slowly but will be more accurate. Three is the default.

**Connected/Dotted** This works in a fashion similar to the Enable/Disable toggle. The formulas set to Connected will draw a line between each plotted point. Experimentation with the program will give you an idea of when it's a good idea to set formulas to Connected. Connected formulas are in reverse.

Use the Esc key to move from the Options screen to the Main menu. Here are the Main menu options.

**Set Range** Set the X-Minimum (the least x value graphed), X-Maximum (the greatest x value graphed), Y-Minimum, and Y-Maximum. Defaults are -10 to 10 on both axes. The resolution (scaling) of the graph is determined by the distance between the maximum and minimum values. In other words, a range of -1 to 1 will appear much closer in (like a zoom lens) and have a higher resolution than -100 to 100. For trigonometric graphs, use plus or minus 3.14 as pi and plus or minus 6.28 as two pi.

**Tracer** The Tracer requires a joystick in port 2. When you choose this, you'll see the range values and a gray device somewhat like cross hairs in the upper left corner of the screen. Its speed is controlled from the Options menu. You're shown the x-coordinate and y-coordinate of the cross hairs as they

move around the screen. This option can be helpful in evaluating certain points along the graph.

In order to zoom into a section of the graph, move to the upper left corner of the rectangular section you want to zoom into and press and release the fire button. There will be a bell tone and a brief pause. Then move the cross hairs to the lower right corner and do likewise. This process sets the next range of values. Use the Esc key to exit, select Clear from the Options menu, and choose Graph from the Main menu to proceed.

**Graph** This is the most important, and easiest, function of F/X Plot. It graphs the enabled functions on the screen. Each function is graphed in its corresponding color as shown in the Enable/Disable menu. As each point is graphed, its x and y values are printed at the bottom of the screen. The coordinates of the last five points graphed are visible at the bottom of the screen. To pause the graphing, use the No Scroll key.

If the program attempts to graph a value that BASIC cannot handle (such as the point on an asymptote in a trigonometric function), a bell tone will sound, and that point won't be graphed. An error-trapping routine prevents the program from stopping. It'll just move on to the next value.

### Plotting Functions

F/X Plot comes with four formulas already entered, but, naturally, you'll want to enter your own. These are stored as DEF DN statements in lines 60-90. The BASIC DEF FN command, however, cannot be implemented from program mode. In order to set or change the formulas, you must exit the program by pressing the Run/Stop-Restore keys simultaneously. Type LIST 60-90 and press Return.

Then use the cursor keys to edit each line with the formula of your choice for FN(A), FN(B), FN(C), and FN(D). Remember to press Return after entering your formulas. Then run the program again.

All formulas must be entered using BASIC's normal mathematical commands. These include SIN, COS, LOG, TAN, ABS, and operators +, -, \*, and /.

Anyone who has ever done any programming should be familiar with these operators and their use. New users may want to check the appendix dealing with mathematical commands in the *128 System Guide* for the proper format.

### Helpful Hints

While the program can graph only four functions at once, the graphics screen isn't erased when you stop the program. If you want to graph more than four formulas, graph the first four, exit the program, change the formulas, run the program again, and graph the second group. The graphs will overlap as long as you make sure that the ranges are the same.

Don't wait until the night before your big geometry examination to learn how to use F/X Plot 128! It's a powerful and versatile program that can be utilized fully only by thorough use and repeated experimentation.

While the theory is untested, I'd imagine that any program that captures the hi-res split screen and sends it to a printer could be used to make hardcopies of any graphs you create.

### F/X PLOT 128

```
RP 5 REM COPYRIGHT 1992 COMPUT
E PUBLICATIONS INTL LTD
{2 SPACES}ALL RIGHTS RESE
RVED
HX 10 CLR:XM=-10:XX=10:YM=-10:
YX=10:SP=3:EA=1:EB=1:EC=
1:ED=1:TRAP 1890
SA 20 DIMJA(8):DIMJB(8):FORKQ=
1TO8:READJA(KQ):NEXT
RK 30 BLOAD("F/X PLOT.SPR")
PJ 40 FOR KQ=1TO8:READJB(KQ):N
EXT
MA 50 POKE53280,0:POKE53281,0
AQ 60 DEF FN A(X)=X↑2
PF 70 DEF FN B(X)=X+4
EJ 80 DEF FN C(X)=((SIN(X)))
QK 90 DEF FN D(X)=(-1*(SQR(X))
)
MA 100 GRAPHIC 4,0
MM 110 REM DRAW ZEROS
KS 120 IF XM<0 AND XX>0 THEN X
Z=1
RP 130 IF YM<0 AND YX>0 THEN Y
Z=1
RR 150 GOSUB 840
FR 160 SLEEP1:GOTO890
MB 200 GOSUB 770
CG 210 IF XZ<>1 THEN 270
SM 220 REM DRAW X-ZERO
DG 230 AM=ABS(XM):XL=AM/XR
```



# PROGRAMS

```

DA 240 XL=160*XL
BE 250 COLOR 1,16
GG 260 DRAW 1,XL,0 TO XL,159
FH 270 IF YZ<>1 THEN 320
KR 280 YQ=ABS(YM):YU=YQ/YR
JK 290 YL=160*YU:YL=160-YL
HB 300 IF YL>160 OR YL<0 THEN
{SPACE}320
DB 310 COLOR2,16:DRAW1,0,YLTO1
59,YL
EG 320 REM PLOT
EE 330 XS=XR/160:YS=YR/160
MH 340 UX=0:UY=0
FD 350 FOR TT=0TO159
JJ 360 IF EA=0 THEN 460
JX 370 XA=FNA((XM+(TT*XS)))
BA 380 PRINT"{CYN}X="((XM+(TT*
XS)))TAB(20)"Y="XA
RK 390 IF XA>YX OR XA<YM THEN
{SPACE}450
XX 400 QP=YX-XA:FP=QP/YR:CP=16
0*FP
EK 410 COLOR 1,4
BD 420 DRAW 1,TT,CP
RH 430 IF TT=0 OR CA<>1 THEN45
0
AS 440 DRAW1,TT,CP TO IA,PA:IA
=TT:PA=CP
KF 450 IF SS=1 THEN NEXT TT
AB 460 IF EB=0 THEN 570
PH 470 IF SS=1 THEN UX=0:UY=0:
FOR TT=0 TO 159
MH 480 XB=FNB((XM+(TT*XS)))
SS 490 PRINT"{GRN}X="((XM+(TT*
XS)))TAB(20)"Y="XB
MD 500 IF XB>YX OR XB<YM THEN
{SPACE}560
JH 510 QP=YX-XB:FP=QP/YR:CP=16
0*FP
SB 520 COLOR1,6
AJ 530 DRAW 1,TT,CP
EM 540 IF TT=0 OR CB<>1 THEN56
0
RR 550 DRAW1,TT,CP TO IB,PB:IB
=TT:PB=CP
SS 560 IF SS=1 THEN NEXT TT
KJ 570 IF EC=0 THEN 660
KS 580 IF SS=1 THEN UX=0:UY=0:
FORTT=0TO159
PX 590 XC=FNC((XM+(TT*XS)))
DB 600 PRINT"{YEL}X="((XM+(TT*
XS)))TAB(20)"Y="XC
HM 610 IF XC>YX OR XC<YM THEN
{SPACE}650
EF 620 QP=YX-XC:FP=QP/YR:CP=16
0*FP:COLOR1,8:DRAW1,TT,
CP
AA 630 IF TT=0 OR CC<>1 THEN65
0
G 640 DRAW1,TT,CP TO IC,PC:IC
=TT:PC=CP
GB 650 IF SS=1 THEN NEXT TT
KR 660 IF ED=0 THEN 740
GD 670 IF SS=1 THEN UX=0:UY=0:
FORTT=0TO159
PF 680 XD=FND((XM+(TT*XS)))
SR 690 PRINT"{3}X="((XM+(TT*XS
)))TAB(20)"Y="XD
FD 700 IF XD>YX OR XD<YM THEN
{SPACE}740
DF 710 QP=YX-XD:FP=QP/YR:CP=16
0*FP:COLOR1,11:DRAW1,TT
,CP
XB 720 IF TT=0 OR CQ<>1 THEN74
0
JC 730 DRAW1,TT,CP TO ID,PD:ID
=TT:PD=CP
AE 740 IF EA=1 OR EB=1 OR EC=1
OR ED=1 OR SS=0 THEN N
EXT TT
AP 750 IF EA=0 AND EB=0 AND EC
=0 AND ED=0 THEN 760
EJ 760 GOTO890
BC 770 IF XX<=0 AND XM<=0 THEN
XR=ABS(XM)-ABS(XX)
BF 780 IF XX>0 AND XM<0 THEN X
R=ABS(XM)+ABS(XX)
MG 790 IF XM>0 THEN XR=XX-XM
AM 800 IF YX<=0 AND YM<=0 THEN
YR=ABS(YM)-ABS(YX)
HR 810 IF YX>0 AND YM<0 THEN Y
R=ABS(YM)+ABS(YX)
AD 820 IF YM>0 THEN YR=YX-YM
GP 830 RETURN
FP 840 REM PIC
FE 850 PRINT"{CLR}{20 DOWN}";
XP 860 PRINT"{YEL}{40 @}"
DJ 870 PRINT"{YEL}{16 @}{3}F
{CYN}/{7}X {6}PLOT{YEL}
{16 @}"
CX 880 RETURN
BD 890 GOSUB840:PRINT" {6}
{RVS}{H}1{N}{OFF} SET R
ANGE VALS{2 SPACES}
{RVS}{H}2{N}{OFF} USE T
RACER"
AH 900 PRINT" {RVS}{H}3{N}
{OFF} GRAPH FUNCTION
{2 SPACES}{RVS}{H}4{N}
{OFF} OPTIONS"
DB 910 GETKEY GK$:GK=VAL(GK$):
IF GK>4 OR GK<1 THEN 91
0
RG 920 ON GK GOTO 930,1450,170
,990
PG 930 REM SET VALUES
MX 940 INPUT"{CLR}{20 DOWN}X-M
INIMUM [XMIN]";XM
KB 950 INPUT"X-MAXIMUM [XMAX]"
;XX
MD 960 INPUT"Y-MINIMUM [YMIN]"
;YM
QG 970 INPUT"Y-MAXIMUM [YMAX]"
;YX
GM 980 PRINT"{CLR}":GOTO890
PD 990 REM OPTIONS MENU
MJ 1000 PRINT"{CLR}{19 DOWN}
{8 SPACES}{7}
{20 SPACES}"
QP 1010 PRINT"{RVS}{H}1{N}
{OFF} SIMULTANEOUS/SEQ
UENCE{3 SPACES}{3}OPTI
ONS{7}"
XM 1020 PRINT"{RVS}{H}2{N}
{OFF} ENABLE/DISABLE F
ORMULAS{3 SPACES}{3}ME
NU{7}{2 SPACES}"
HX 1030 PRINT"{RVS}{H}3{N}
{OFF} CLEAR GRAPHIC SC
REEN"
EF 1040 PRINT"{RVS}{H}4{N}
{OFF} SET TRACER SPEED
"
GM 1050 PRINT"{RVS}{H}5{N}
{OFF} CONNECT/DOTTED";
XX 1060 GETKEY GK$:IFGK$=CHR$(
27) THEN 890
PK 1070 GK=VAL(GK$):IF GK>5ORG
K<1THEN1060
BS 1080 ON GK GOTO 1090,1160,1
370,1400,1690
RB 1090 PRINT"{CLR}{20 DOWN}
{GRN}1] SEQUENCE (GRAP
HED IN ORDER)"
PR 1100 PRINT"2] SIMULTANEOUS
{SPACE}(GRAPHED AT SAM
E TIME)"
SS 1110 GETKEY GK$:GK=VAL(GK$)
:IFGK=1THENSS=1
GQ 1120 IF GK=2 THEN SS=0
CF 1130 IF GK$=CHR$(27) THEN 8
90
FP 1140 IF SS<0ORSS>1THEN1110
HM 1150 GOTO890
MR 1160 PRINT"{CLR}{20 DOWN}
{1}PRESS FORMULA TO EN
ABLE (HI-LIGHTED)"
JS 1170 PRINT"OR DISABLE.
{RVS}RETURN{OFF} EXITS
."
KH 1180 IF EA=1THENPRINT"{7}
{RVS}{G}1{N}{OFF}";GO
TO1200
JA 1190 IF EA<>1 THEN PRINT"
{7} 1 ";
EX 1200 IF EB=1THENPRINT"{GRN}
{RVS}{H}2{N}{OFF}";GO
TO1220
PP 1210 IF EB<>1 THEN PRINT"
{GRN} 2 ";
RS 1220 IF EC=1THENPRINT"{YEL}
{RVS}{H}3{N}{OFF}";GO
TO1240
KH 1230 IF EC<>1 THEN PRINT"
{YEL} 3 ";
PQ 1240 IF ED=1THENPRINT"{3}
{RVS}{H}4{N}{OFF}";GO
TO1260
CQ 1250 IF ED<>1 THEN PRINT"
{3} 4 ";
QX 1260 GETKEY CD$:IFCD$=CHR$(
13)THEN890
JR 1270 CD=VAL(CD$):IFCD>4ORCD
<1THEN1260
BB 1280 IF CD=1 AND EA=0 THEN
{SPACE}EA=1:GOTO1300
EP 1290 IF CD=1 AND EA=1 THEN
{SPACE}EA=0
BG 1300 IF CD=2 AND EB=0 THEN
{SPACE}EB=1:GOTO1320
KE 1310 IF CD=2 AND EB=1 THEN
{SPACE}EB=0
SB 1320 IF CD=3 AND EC=0 THEN
{SPACE}EC=1:GOTO1340

```



```

DA 1330 IF CD=3 AND EC=1 THEN
{SPACE}EC=0
PJ 1340 IF CD=4 AND ED=0 THEN
{SPACE}ED=1:GOTO1360
RX 1350 IF CD=4 AND ED=1 THEN
{SPACE}ED=0
JS 1360 PRINT"{UP}":GOTO 1180
FP 1370 PRINT"{CLR}{22 DOWN}
{WHT}CLEAR SCREEN: ARE
YOU SURE?"
SC 1380 GETKEY YN$:IF YN$="Y" T
HENGGRAPHIC4,1
GM 1390 GOTO 890
CG 1400 PRINT"{CLR}{21 DOWN}
{PUR}"
CM 1410 PRINT"CURRENT SPEED:
{WHT}"SP:PRINT"{PUR}EN
TER NEW VALUE [1-5]"
CD 1420 GETKEY SP$:IF SP$=CHR$(
27) THEN890
KH 1430 SP=VAL(SP$):IF SP<10RS
P>5 THEN1420
RQ 1440 GOTO890
PR 1450 REM TARGET-SCAN
EC 1460 ZX=XM:ZY=YX
DM 1470 PX=17:PY=-209:PN=0
SX 1480 PRINT"{CLR}{33 DOWN}"
FK 1490 PRINT"{YEL}X-MIN:"XM"
TAB(20)"X-MAX:"XX:PRIN
T"Y-MIN:"YM"TAB(20)"Y
-MAX:"YX
HE 1500 SPRITE1,1,2,0
RK 1510 MOVSPR1,PX,PY
KD 1520 GOSUB770
BC 1530 XS=XR/160:YS=YR/160
PQ 1540 JS=0:JS=JOY(2)
DH 1550 IF JS>128 THEN1540
XP 1560 IF JS=128 THEN 1660
PM 1570 PX=PX+(JA(JS)*SP):PY=P
Y+(JB(JS)*SP)
KD 1580 MOVSPR1,PX,PY
GD 1590 ZX=XM+(.5*((PX-17)*XS)
):ZY=YX-((PY+209)*YS)
CM 1600 PRINT"{6}{HOME}
{21 DOWN}X="ZX"TAB(20)
)"Y="ZY)
KF 1610 GETXS:IFXS=CHR$(27)THE
NGOTO1630
QB 1620 JS=0:GOTO1540
GJ 1630 SPRITE1,0
CP 1640 GOTO890
MD 1650 DATA 0,1,1,1,0,-1,-1,-
1,-1,-1,0,1,1,1,0,-1
FQ 1660 PN=PN+1:IF PN=1 THEN A
X=ZX:AY=ZY:PRINT CHR$(
7):SLEEP1:GOTO1540
AA 1670 IF PN=2 THEN BX=ZX:BY=
ZY:PRINT CHR$(7):XM=AX
:XX=BX:YX=AY:YM=BY:GOT
O1540
FQ 1680 GOTO1540
CS 1690 PRINT"{CLR}{20 DOWN}
{PUR}SELECT DOTTED OR
{SPACE}CONNECTED /
{RVS}RETURN{OFF}"
DD 1700 IF CA=1 THENPRINT"{7}
{RVS}{H}1{N}{OFF}";:GO
TO1720

```

```

QD 1710 IF CA<>1 THEN PRINT"
{7} 1 ";
GX 1720 IF CB=1 THENPRINT"{GRN}
{RVS}{H}2{N}{OFF}";:GO
TO1740
HP 1730 IF CB<>1 THEN PRINT"
{GRN} 2 ";
KS 1740 IF CC=1 THENPRINT"{YEL}
{RVS}{H}3{N}{OFF}";:GO
TO1760
BE 1750 IF CC<>1 THEN PRINT"
{YEL} 3 ";
HF 1760 IF CQ=1 THENPRINT"{3}
{RVS}{H}4{N}{OFF}";:GO
TO1780
XH 1770 IF CQ<>1 THEN PRINT"
{3} 4 ";
FG 1780 GETKEY SQ$:IFSQ$=CHR$(
13) THEN890
HC 1790 SQ=VAL(SQ$):IFSQ>4ORSQ
<1 THEN1780
MG 1800 IF SQ=1 AND CA=0 THEN
{SPACE}CA=1:GOTO1820
FD 1810 IF SQ=1 AND CA=1 THEN
{SPACE}CA=0
XB 1820 IF SQ=2 AND CB=0 THEN
{SPACE}CB=1:GOTO1840
DS 1830 IF SQ=2 AND CB=1 THEN
{SPACE}CB=0
AK 1840 IF SQ=3 AND CC=0 THEN
{SPACE}CC=1:GOTO1860
JF 1850 IF SQ=3 AND CC=1 THEN
{SPACE}CC=0
JC 1860 IF SQ=4 AND CQ=0 THEN
{SPACE}CQ=1:GOTO1880
GG 1870 IF SQ=4 AND CQ=1 THEN
{SPACE}CQ=0
AR 1880 PRINT"{UP}":GOTO 1700
ER 1890 REM ERROR TRAP ROUTINE
XA 1900 IF ER=11 OR ER=14 OR E
R=20 OR ER=10 OR ER=15
THEN PRINT"{G}";:RESU
ME NEXT
HH 1910 PRINT"PROGRAMMING ERRO
R:"
AC 1920 PRINT"{RVS}";:PRINTERR
S(ER);:PRINT"{OFF}"
AX 1930 PRINT"{8}IN LINE"EL
CK 1940 END

```

### F/X PLOT.SPR

```

0E00:02 00 00 0A 80 00 28 A0 B2
0E08:00 A0 28 00 28 A0 00 0A 1F
0E10:80 00 02 00 00 00 00 00 AC
0E18:00 00 00 00 00 00 00 00 34
0E20:00 00 00 00 00 00 00 00 3C
0E28:00 00 00 00 00 00 00 00 44
0E30:00 00 00 00 00 00 00 00 4C
0E38:00 00 00 00 00 00 00 00 54

```

Kevin Davis is the author of Sport Card Collector (November 1991). F/X Plot 128 helped him survive honors geometry this year at Trinity Preparatory School in Winter Park, Florida.

## SPRINT III

By Farid Ahmad

Commodore BASIC isn't exactly known for its speed. It's not the language itself that's at fault, however; it's the way the computer implements the language. BASIC is interpreted. Most faster languages are compiled.

Before a computer can execute any program, the commands must be converted into the machine language of the computer. Every time a statement in an interpreted language is run, the computer must translate it. This slows execution considerably. A compiler, however, translates the entire program before it runs. This boosts execution speed.

Sprint III is a BASIC compiler that supports a subset of BASIC statements available to the 64. Earlier versions of the program were published in January 1986 and January 1988. Sprint II added several features to its original version, but there was still room for improvement.

### Entering the Program

Sprint III is written entirely in machine language. To enter it, use MLX, our machine language entry program. See "Typing Aids" elsewhere in this section. When MLX prompts, respond with the following values.

Starting address: 0801

Ending address: 1D40

Be sure to save a copy of Sprint III before exiting MLX.

### Using the Program

A typical session with Sprint III might start with the following commands.

LOAD "Sprint III",8,1

NEW

SYS32768

At this point your screen will turn black and BASIC pointers will be adjusted. You'll also see a SYNTAX ERROR message, which you should ignore, and a READY prompt. Now you can load a BASIC program or start to write one from scratch. You may run your program at any time for testing. When you are ready to compile it, use either the SYS32768,E or SYS32768,F command. These and other Sprint III commands



are explained below. When the compilation finishes, you can run your compiled program or save it as usual.

If you want to make some corrections or modifications to your program, use the SYS32768,L command to load your BASIC program from the RAM disk. After it's edited, the program can be compiled as before.

## Commands

All Sprint III commands consist of a SYS statement followed by a comma and a single letter. The following commands are available.

**SYS32768,F** Saves the BASIC program to the RAM disk and then compiles it. The entire source program is listed during compilation. It also locks the RAM disk.

**SYS32768,E** Same as above except that Sprint lists only lines containing an error.

**SYS32768,L** Loads your source program after a compile operation. Unlocks the RAM disk.

**SYS32768,U** Unlocks the RAM disk.

## A Better Way

One of the advantages of using Sprint II was speed. You could save the source code on disk; run Sprint II; and get a compiled program in memory, ready to run. However, if you wanted to make corrections or modifications to your program, you had to load the source code, modify it, save it back to disk, and compile again. Since a program almost never works perfectly without a debugging session, this procedure soon became tedious.

There's a better way. Sprint III turns Sprint into a RAM-based compiler. Now, when you compile your program, the source code is saved to a RAM disk and is compiled from there. When compilation is finished, you have two versions of your program in memory: the compiled program in the normal BASIC working area and the source program in the RAM disk.

Suppose Sprint III has reported some errors during compilation or you simply want to make some modifications. You issue the load command to

the RAM disk, and within seconds, your BASIC source program is back, ready for editing and recompiling.

## Speed

Apart from the convenience of not having to save and load repeatedly, Sprint III also reduces compilation time by more than half. For even faster compiling, you're given the option of listing the entire BASIC program during compilation or listing only those lines that contain an error. If you choose the error-only option, time for compiling is reduced to less than one-fourth that of Sprint II.

## Other Options

A list pause has been provided. When a BASIC program is being listed to the screen during compilation, hold down any control key to freeze the display. This is useful for writing down any errors reported by Sprint III.

One potential mistake that can occur when using Sprint III is the one of accidentally compiling a program that's already compiled. Suppose that you want to load the source program but give the compile command by mistake. The BASIC program in the RAM disk would be overwritten by the compiled program, and you'd lose your source code. To prevent this, the RAM disk is automatically locked after each compilation. This prevents you from using the compile command. It'll be unlocked automatically when you load your source program, or you can use the unlock command if you wish to start a new program.

## Expressions

Sprint III works much the same as BASIC, but as with Sprint II there are some differences you should keep in mind when programming.

Strings are limited to ten characters unless specified otherwise. If you want to include more characters, dimension the string as if it were an array.

In numeric expressions, parentheses aren't allowed. Unlike interpreted BASIC, expressions are evaluated strictly from left to right; there's no operator precedence. To get around this, you must break up the expression into several smaller expressions and then put the results back together. For example,

the following expression:

$$\text{SUM} = A + X*Y + B + I*J$$

becomes

$$\begin{aligned} Q1 &= X*Y; Q2 = I*J; \\ \text{SUM} &= A + Q1 + B + Q2. \end{aligned}$$

You may get a NOT SUPPORTED error message if the statement is legal in Commodore BASIC but illegal in Sprint III. You may get a SYNTAX ERROR message if a keyword is misspelled or extra parentheses are used.

## Memory Organization

Memory locations \$A000-\$C7FF and \$E000-\$FFFF are used by the RAM disk. Since this is an 18K area of memory, the BASIC program must fit within this length. You'll be warned if you exceed this limit. A full 30K, however, is available for the compiled program. Also, if you run your BASIC source program for testing, a full 30K of working area is available for strings, variables, and so on. It's only the BASIC program text that shouldn't exceed 18K.

Sprint III is designed to stay resident in memory while you edit your BASIC programs. Therefore, it moves down the top of the BASIC area pointer to protect itself. To set this pointer, you can either use a Sprint III command before running a BASIC program or use SYS32768 without a letter. The second method will produce a SYNTAX ERROR message, but the pointer will be adjusted. Also, when the pointer is set, the list pause will become available for BASIC editing.

## Updates from Sprint II

Programmers who may have disassembled Sprint II may be interested in the following changes.

The address \$8000 now jumps to \$AB00 where the new routines reside. The interface routine sets some pointers and also the colors. It then looks for a comma followed by a letter. If a valid command is found, the appropriate routines are called to move programs to or from the RAM disk.

In Sprint II, addresses \$825E and \$80A2 called a subroutine to initialize the disk file. They now call a new short



routine at \$802B which initializes the new input from the RAM disk routine.

The area \$8C0D-\$8C45 contained calls to a Kernal routine to get a byte from disk. These calls have been changed so that the new input from the RAM disk routine is called at \$8815.

The instruction at \$C800 has been changed from LDA#\$C0 to LDA#\$C8. As a result, Sprint now uses the memory area \$C800 onward for line number storage.

When the E command is used, the JSR\$8AAC instruction at \$82B6 address is bypassed, preventing each line from being listed. Also the instruction at \$8A85 is changed from JSR\$888C to JSR\$8850. Address \$8850 contains a short routine to print the current line.

When Sprint III is used for the first time, it places the list freeze subroutine at \$CFEC-\$CFFF. I use Sprint III with a multifunction cartridge that causes problems if the freeze routine is placed between \$8000 and \$A000.

### SPRINT III

```

0801:0B 08 70 17 9E 32 34 30 6E
0809:37 00 00 00 20 20 20 96
0811:20 20 20 20 20 A0 C4 B9 06
0819:3C 08 99 F8 00 B9 FD 08 F6
0821:99 33 03 88 D0 F1 A0 09 4C
0829:B9 0C 08 99 FF 03 88 D0 A1
0831:F7 A9 D1 85 2D A9 24 85 18
0839:2E 4C 00 01 16 60 06 D1 93
0841:24 B8 1B B9 6E 09 99 E8 44
0849:07 C8 D0 F7 EE 02 01 EE 19
0851:05 01 C6 F9 D0 ED A2 03 23
0859:20 34 03 F0 33 C9 07 D0 95
0861:16 A2 01 20 34 03 D0 0A A0
0869:A2 04 20 34 03 18 69 07 65
0871:10 05 A2 0A 20 34 03 85 1D
0879:A8 A5 A7 85 A9 A5 FE 85 FB
0881:F7 A5 FF 85 F8 20 6C 03 73
0889:A5 F8 85 FF A5 F7 85 FE 72
0891:E8 20 34 03 D0 1E A2 08 21
0899:20 34 03 A0 02 84 A8 85 2A
08A1:A6 18 A5 FC 65 A6 85 F7 58
08A9:A5 FD 65 A7 85 F8 20 6C EF
08B1:03 4C 13 01 E8 20 34 03 FB
08B9:D0 1C A0 03 84 A8 E8 20 36
08C1:34 03 F0 08 A2 08 20 34 F4
08C9:03 4C 5C 01 A2 08 20 34 C7
08D1:03 E6 A7 4C 5C 01 E8 20 AF
08D9:34 03 D0 0A E8 20 34 03 B2
08E1:18 69 04 A8 D0 D6 E8 20 37
08E9:34 03 D0 0A A2 02 20 34 21
08F1:03 18 69 06 D0 ED A2 08 A2
08F9:20 34 03 D0 E6 A9 00 85 F7
0901:A7 A4 FB F0 0C 06 FA 2A 37
0909:26 A7 C6 FB CA D0 F2 A8 D8

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0911:60 48 B1 FE 85 FA A9 08 FE
0919:85 FB 68 A4 FE D0 02 C6 4A
0921:FF C6 FE C0 E7 D0 DE A4 B5
0929:FF C0 07 D0 D8 A9 37 85 BA
0931:01 58 4C 00 80 A4 A8 F0 3C
0939:22 A5 F7 38 E5 A8 B0 03 7E
0941:C6 F8 38 85 F7 A5 FC E5 8A
0949:A8 B0 02 C6 FD 85 FC B1 3A
0951:F7 88 91 FC 98 D0 F8 C4 42
0959:A9 F0 0A B1 F7 C6 FD C6 76
0961:F8 C6 A9 10 EC 60 78 E6 98
0969:01 4C 16 08 60 00 4C 00 ED
0971:9A EA 9D C6 3A A9 3A 69 02
0979:09 E3 27 A9 81 CA 12 A9 8D
0981:FE 85 42 19 43 D6 C0 44 89
0989:34 7C 4C 4F 55 CF C1 18 D8
0991:8D 32 88 A9 A0 8D 33 88 CC
0999:60 A9 38 8D 51 EE 8E E5 6F
09A1:60 AD 3A 00 E4 E0 99 EE 63
09A9:6A 88 4C 57 CF 86 E3 3A AC
09B1:34 3B 84 F7 A9 08 85 F8 2E
09B9:A9 EE E0 85 83 92 B9 11 BB
09C1:70 3C 0B 2A 1C BB 82 48 3C
09C9:C9 97 50 44 02 C9 D5 90 68
09D1:E9 A9 FF 85 F9 87 D3 A9 DA
09D9:8B FA 85 07 82 31 2E 8D 54
09E1:FF 7D 94 AF 80 18 85 1F 6F
09E9:3B 12 38 A9 C8 85 39 EC 7B
09F1:A1 20 76 81 85 07 30 82 EE
09F9:A5 17 2A E6 17 E6 54 18 6D
0A01:34 B3 40 38 67 16 38 A5 51
0A09:38 E0 C9 0C 38 9C 5E 39 95
0A11:C0 00 03 04 7A 80 01 04 02
0A19:D3 86 2B 05 86 82 25 1F 16
0A21:C9 83 D0 5C 58 DF 44 D0 76
0A29:0C E6 44 5C 2D E3 0B 40 9A
0A31:69 01 E7 06 4F 62 0C 42 F5
0A39:CB 70 C6 0C 3C C0 4E 46 B0
0A41:ED 09 60 A6 34 D0 12 AC BA
0A49:74 68 6C 4F E2 66 0F 81 84
0A51:60 B9 01 04 C6 10 F2 30 F0
0A59:66 0E 0E 4E 70 06 F7 85 DB
0A61:42 DC 85 43 22 21 09 8C E6
0A69:84 22 26 6F CE 81 50 62 83
0A71:C9 8F 95 11 D2 08 25 4D 60
0A79:38 9F 01 1F D0 02 B0 47 DA
0A81:20 F4 81 87 4F 40 06 C0 D3
0A89:0F 49 CE 0F 31 9A 43 1D D9
0A91:05 1E DE 08 0C 72 12 F9 54
0A99:72 60 0C 85 F9 AD 26 FA A6
0AA1:E9 00 85 FA F7 00 6A C8 68
0AA9:BD D1 98 90 E8 44 68 16 6C
0AB1:F5 B0 03 67 BE 81 07 F4 C2
0AB9:07 A5 80 4B B0 F0 12 06 F2
0AC1:8C 97 07 A0 02 E0 6A 8B E0
0AC9:10 A8 06 6D 8E 29 81 73 37
0AD1:95 08 A6 0A C9 22 C1 05 87
0AD9:17 A2 37 D0 F1 84 70 00 98
0AE1:89 A9 30 1A C8 8A 91 06 66
0AE9:A4 0F 60 D0 60 66 21 10 1C
0AF1:14 02 42 60 A9 0A 60 20 35
0AF9:A5 1F 94 91 74 91 28 DE 6D
0B01:80 21 A2 E0 30 0E 44 2F 73
0B09:D1 F2 69 1A A5 13 85 0C 24
0B11:A4 02 B8 09 03 06 2D 81 AD
0B19:0C 60 E6 3A F2 03 D0 A5 B8
0B21:06 38 E5 19 17 20 46 85 E1
0B29:19 A5 07 E5 1A 18 85 2D DD
0B31:85 80 D1 81 8D 3D 08 53 41
0B39:8D 3E 08 A9 04 D1 F9 2B C7

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0B41:80 20 10 8C E0 00 0C BE 48
0B49:4C 00 4A 25 AC 52 1A 10 14
0B51:70 08 11 72 08 F7 72 08 F7
0B59:40 01 2C A5 2C E0 ED 2C 9C
0B61:E6 EC 2D 36 71 45 C7 86 E5
0B69:94 15 60 92 16 3A 83 C0 A5
0B71:E0 13 41 60 14 1E 11 85 AB
0B79:D0 DE F0 A9 E0 12 90 05 DD
0B81:A9 09 88 F1 15 00 8A 0A A6
0B89:AA A9 A7 A9 B1 01 0D DD 78
0B91:C8 BD DC 82 80 D5 33 60 61
0B99:A2 07 D0 E8 F0 7E 86 F9 F3
0BA1:86 05 0E 5E 85 C2 83 AE D0
0BA9:85 CF 83 CD 84 C8 8F 84 07 36
0BB1:88 D0 84 49 85 C9 83 C2 82
0BB9:87 E0 B8 E0 45 87 4E 85 5B
0BC1:20 7C 34 09 94 C1 A6 F8 10
0BC9:11 F7 90 73 1A C5 18 D0 98
0BD1:06 55 C5 17 B0 33 41 C0 FF
0BD9:82 F7 40 08 F8 72 08 32 8B
0BE1:3C 13 19 85 14 C7 0A A0 CA
0BE9:02 28 80 60 E1 A5 19 A5 9E
0BF1:96 19 A3 1A 4C 0E 83 A9 FA
0BF9:05 56 F3 0F 20 CC 8A 01 E1
0C01:40 08 A9 1A BA FF A2 7F AC
0C09:C0 FD 3D 95 00 2A 7F 10 B9
0C11:02 2D 32 2E A5 F9 8D 1B E9
0C19:08 A5 FA 8D 1F 08 6C 02 CA
0C21:A0 A5 2E F0 12 6E 3D B2 3F
0C29:80 04 F7 0C 01 6C 02 13 13
0C31:C6 2E D0 EA 5C 60 17 E1 75
0C39:30 18 4C 13 00 F1 18 69 8B
0C41:02 04 38 4D C0 8E 60 48 80
0C49:34 01 2C 90 DA 18 60 B6 F8
0C51:B9 0C 05 68 68 27 5D 08 40
0C59:90 84 D1 0F 2C 00 85 FD 70
0C61:A9 B2 7C 09 01 18 3C F0 EC
0C69:C2 A5 33 48 BE FD 43 C0 78
0C71:2F 0C 47 40 E8 27 04 A9 A6
0C79:8D D0 0F B6 50 48 31 22 02
0C81:8A C2 9D 85 40 4F A7 05 2F
0C89:61 50 70 9C 08 39 2A EA A2
0C91:28 11 1C A5 40 5E BE 09 E1
0C99:A5 FD 2E FC E2 7E 68 31 AC
0CA1:F8 8B A5 3F 0E C5 A9 BD 71
0CA9:65 18 02 02 8E 58 E6 E1 60
0CBL:C1 9D D8 C3 9D 08 23 1D D9
0CB9:E0 40 D0 15 4C 14 C6 13 11
0CC1:AB 4C 48 84 E6 2E 98 4E 83
0CC9:02 41 9E DC E8 E0 09 D0 82
0CD1:F5 DC 84 40 58 18 F7 26 9E
0CD9:C2 10 A8 81 A9 A7 32 C8 9D
0CE1:0C A9 89 7B CD 0E B9 06 73
0CE9:D0 F6 88 04 60 92 69 A9 43
0CF1:4C 2C 27 52 08 BC CC 46 58
0CF9:0F F0 01 93 83 B0 53 C9 7E
0D01:65 2A A9 C0 85 2B 58 57 7A
0D09:41 18 13 C8 14 08 C5 14 19
0D11:F0 1C 95 10 18 69 02 85 4E
0D19:2A FA 71 2B A5 2B C5 39 86
0D21:58 6D 2A C5 38 90 DA C2 E0
0D29:4E 42 57 D1 1D 19 38 E9 AA
0D31:04 85 19 B0 02 C6 1A A5 E1
0D39:F7 58 4E 90 F8 43 90 13 41
0D41:43 A5 14 91 19 50 16 C4 FC
0D49:C8 B1 05 A3 30 3E 03 D0 60
0D51:07 A5 02 75 2E A9 60 50 19
0D59:B8 41 0E 36 84 A1 1D C7 F1
0D61:17 B0 12 12 20 6F CE 3B 2E
0D69:58 4E 00 14 3C 27 40 8E 12

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# PROGRAMS

0D71:92	94	26	E7	0E	2D	80	E1	45	0FA1:DE	89	EC	89	02	8A	10	8A	AC	11D1:A6	23	82	84	82	A0	48	73	43
0D79:81	3F	D1	00	1E	F0	0F	C6	F7	0FA9:24	8A	36	8A	49	DA	03	8A	32	11D9:90	AD	82	41	00	3A	4C	80	16
0D81:3F	CC	89	69	1C	B2	A9	01	36	0FB1:5D	8A	2C	16	F3	E0	28	41	BC	11E1:8B	46	90	A1	96	20	0A	19	E9
0D89:85	FD	4C	7A	FF	07	01	BB	F0	0FB9:07	1C	25	60	C8	68	0D	34	43	11E9:04	19	27	A3	8B	34	06	84	31
0D91:D5	68	DE	82	85	95	0D	28	79	0FC1:7F	D2	C2	63	57	41	B6	4B	5B	11F1:98	40	91	F7	E6	F7	44	C2	84
0D99:AF	85	BC	BA	60	E5	0F	30	19	0FC9:C4	B3	08	D9	B0	2B	88	E2	FB	11F9:08	F8	A5	F8	C9	C0	36	AF	10
0DA1:0B	80	C2	83	CA	68	84	17	0A	0FD1:42	C1	91	84	0B	9C	48	22	79	1201:F7	01	B0	03	A4	0F	41	23	AE
0DA9:0B	2E	C9	3B	F0	37	5A	AE	7C	0FD9:6C	63	61	31	67	21	0E	79	9B	1209:0D	89	01	18	B6	01	C3	1E	17
0DB1:26	C9	A3	F0	39	C9	A6	F0	04	0FE1:E0	20	32	2E	2E	46	0C	B8	FC	1211:AC	03	91	FB	A2	18	1A	10	F7
0DB9:45	E2	DF	80	51	61	A5	3F	CD	0FE9:00	DD	0D	46	9F	2C	50	01	D4	1219:80	8A	8D	1B	AA	F0	1D	23	F9
0DC1:D0	0D	2B	25	D9	72	72	80	3D	0FF1:6D	44	2E	8A	12	91	05	D0	F7	1221:C8	10	31	85	11	A8	20	0F	A6
0DC9:72	86	5D	36	B3	F3	78	DD	0A	0FF9:C8	F8	D8	3A	20	20	B3	29	8B	1229:15	88	B5	25	0A	9D	28	15	2F
0DD1:61	04	D3	D8	D0	B8	D0	33	E3	1001:D6	53	55	50	50	30	73	C3	FE	1231:E8	E0	50	B0	0B	90	EF	86	18
0DD9:3C	6D	34	0F	D9	63	86	A9	F1	1009:79	44	27	4B	45	9A	33	3C	07	1239:0E	E2	3B	45	34	AC	80	05	33
0DE1:80	9E	0F	75	60	64	9C	59	44	1011:76	EA	46	55	4E	43	64	DB	69	1241:20	8C	8E	2E	A1	90	81	28	07
0DE9:34	7B	80	0E	05	83	CD	C9	89	1019:E0	D9	20	2D	93	1C	68	82	57	1249:40	A4	32	C4	0E	B0	1D	77	2E
0DF1:3A	F0	C9	4C	E1	85	C3	F5	06	1021:2D	60	42	6B	CE	40	53	59	A7	1251:02	8D	6C	C8	48	27	04	45	20
0DF9:00	1C	09	88	4C	29	80	29	F5	1029:85	42	41	58	88	06	FC	22	C2	1259:34	85	34	61	55	01	04	B3	FF
0E01:20	ED	0F	22	B0	C3	2B	D0	68	1031:81	4E	59	43	27	19	6C	90	0C	1261:F0	E6	84	32	84	16	10	03	0B
0E09:83	51	B8	09	C3	AB	E0	A4	16	1039:4C	45	47	63	AB	54	39	E0	F1	1269:62	19	2C	F3	E2	90	88	C3	F7
0E11:6C	D0	13	1C	4C	1B	0B	71	12	1041:91	4D	A9	20	55	AA	C2	00	8F	1271:06	1C	86	70	00	8A	84	26	D0
0E19:E0	A9	D0	16	DB	0D	C0	CD	ED	1049:4E	45	58	F0	57	49	80	90	6D	1279:A4	31	72	C7	85	32	C8	84	12
0E21:86	A5	F8	B4	20	F7	38	0A	AF	1051:4F	55	28	46	4F	3E	00	54	9F	1281:31	A8	B9	FF	01	85	33	A4	C8
0E29:05	77	4C	B3	91	41	90	01	1E	1059:59	50	90	0D	3C	0A	13	54	A1	1289:86	60	85	35	30	5D	09	10	F5
0E31:43	50	0C	02	22	D0	DF	82	3B	1061:43	48	00	0D	5E	28	8C	22	11	1291:82	80	09	C5	35	F0	0A	8D	A3
0E39:C2	0D	46	3F	84	1B	82	A2	EE	1069:41	54	49	C7	20	41	42	63	D2	1299:CB	F7	19	03	04	45	34	D0	63
0E41:00	79	1F	18	10	07	C3	E3	29	1071:45	54	45	44	A6	55	E1	51	D5	12A1:F2	E6	31	BB	72	08	06	5B	F5
0E49:01	7A	01	D0	E9	A2	08	D4	70	1079:4D	4D	41	62	13	50	41	77	B5	12A9:61	41	68	18	36	2C	3A	9A	CE
0E51:A1	CA	D0	FA	60	84	2A	90	B4	1081:E9	00	48	8F	D8	C0	00	E0	43	12B1:64	30	90	01	60	40	22	03	81
0E59:1C	54	84	21	30	AA	76	2E	82	1089:DC	A1	02	2E	43	4F	94	0F	33	12B9:00	85	36	6E	05	5E	60	A3	F2
0E61:C5	14	D0	04	E4	13	F0	10	25	1091:00	99	86	20	49	2F	4F	D2	63	12C1:33	C9	AB	13	E6	36	A2	44	32
0E69:76	78	86	4C	02	AB	61	00	F5	1099:52	52	84	A4	22	2A	2A	2A	8A	12C9:82	32	85	37	97	95	2F	29	7A
0E71:41	2A	73	3B	2B	70	22	0B	45	10A1:37	44	45	56	49	43	45	20	7E	12D1:CF	85	16	A5	1D	15	21	15	F0
0E79:83	43	E4	17	85	3D	AC	8A	3B	10A9:4E	4F	54	61	3C	52	45	53	6E	12D9:20	0A	26	50	15	00	4C	A5	41
0E81:8C	C5	82	26	58	1E	9A	A6	1F	10B1:45	4E	54	0D	00	4D	49	53	7E	12E1:15	65	07	06	13	26	14	A5	2A
0E89:7B	48	20	66	8E	89	39	46	33	10B9:06	B9	4E	47	20	45	51	55	97	12E9:13	65	16	D3	70	10	40	14	49
0E91:8A	96	8C	5C	23	63	91	17	D0	10C1:41	4C	20	53	49	47	4E	00	D2	12F1:6E	6A	CE	F0	0B	A5	32	C5	F0
0E99:4B	20	AF	95	07	56	5F	8D	90	10C9:A2	FA	9A	48	A9	40	85	12	3D	12F9:37	32	F8	00	90	A5	36	F0	DD
0EA1:BD	B1	60	67	0F	11	04	F0	41	10D1:82	77	0A	31	C1	6C	20	AC	12	1301:0D	D3	38	E5	13	C0	10	61	25
0EA9:39	04	19	7D	07	A9	4C	0B	E0	10D9:8A	A9	64	02	50	88	68	5A	26	1309:E5	14	96	0E	60	85	6C	10	DC
0EB1:CE	CD	E0	B4	19	8C	9C	0C	50	10E1:2F	20	D4	A0	A9	3A	96	75	1F	1311:23	20	0A	30	94	00	90	09	E3
0EB9:33	41	F8	4C	FA	86	60	A5	FB	10E9:C1	0A	49	D8	A5	49	61	82	BB	1319:85	41	E8	18	84	00	ED	C9	FD
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0F01:02	86	B8	86	A1	0E	22	84	4F	1131:E6	20	3A	52	C6	CC	9B	D2	AE	1361:0F	85	20	C5	1D	D0	28	E3	31
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0F19:49	2F	14	08	C9	72	05	A9	76	1149:8B	D8	0A	06	30	56	00	A9	8D	1379:76	07	DD	D1	98	D0	07	E8	74
0F21:E0	8D	33	88	AD	0C	A0	A2	83	1151:22	EB	A5	C8	C4	0E	90	DF	20	1381:E4	1D	90	F3	C7	63	A5	20	E9
0F29:37	86	01	AE	6B	88	58	47	05	1159:0D	54	1A	98	89	C2	38	E9	95	1389:A8	79	D0	02	E6	23	4C	A1	9A
0F31:9D	2E	20	E2	EC	43	0B	0F	75	1161:7F	AA	33	B6	FF	CA	F0	08	D4	1391:8D	4D	0B	EC	81	A0	3F	6D	7C
0F39:84	8C	97	00	47	60	A2	7F	30	1169:3C	C8	10	FA	30	F5	C8	B9	32	1399:6C	B0	25	2B	AF	19	C9	C4	B3
0F41:B5	00	9D	00	7F	CA	10	F8	2E	1171:9E	A0	30	06	E3	07	4C	40	85	13A1:F0	15	C9	C7	90	04	C9	CB	2F
0F49:4C	0A	80	86	73	B0	89	00	F9	1179:8B	29	7F	ED	85	22	56	80	5C	13A9:90	0D	41	73	6B	B0	11	4A	45
0F51:01	37	A9	08	6B	A2	00	BD	17	1181:81	82	83	85	86	87	88	89	BA	13B1:19	D0	08	72	1D	E6	3F	4C	10
0F59:00	02	D1	AE	35	E4	0E																				



1401:E0	09	25	0A	1B	0A	31	0A	8E	1631:0A	42	0A	38	0A	4C	0A	54	A1	1861:00	F0	05	D6	F8	26	EC	67	7D
1409:45	0A	3B	0A	4F	0A	D2	8D	34	1639:DD	0C	B4	D0	22	20	59	10	4F	1869:30	25	08	C3	25	0E	C3	02	23
1411:20	00	11	52	C9	AB	F0	01	70	1641:5D	91	A5	D8	D6	20	A1	A2	DF	1871:05	04	5E	10	C0	05	79	83	82
1419:25	54	01	2C	A1	24	01	3D	A8	1649:49	C8	13	21	A9	A0	A8	08	E9	1879:11	38	30	11	20	88	0B	A5	36
1421:86	3E	E7	9A	30	E3	9A	E1	EA	1651:A5	14	AA	94	4C	BD	92	C9	3C	1881:03	C5	05	56	AF	02	C5	04	BF
1429:71	94	E1	CB	83	99	E1	24	92	1659:80	90	06	20	A7	8F	4C	77	38	1889:60	38	60	AE	30	EF	A9	01	84
1431:30	62	E6	18	69	01	A6	3E	43	1661:91	20	C3	8C	B0	AA	37	00	3E	1891:18	52	03	FF	31	D8	E0	02	73
1439:B5	2C	84	84	8C	D0	27	D7	ED	1669:3C	34	20	47	8D	A5	1E	C9	42	1899:85	03	60	2F	13	E6	EA	D0	27
1441:07	20	F1	A5	3D	F0	B6	34	DC	1671:20	F0	05	A9	10	4C	70	8A	42	18A1:EF	AB	98	E7	90	E5	B0	DC	A0
1449:DC	A0	C9	F0	C9	20	3A	2B	BE	1679:A9	AD	48	EF	20	03	8C	E6	FA	18A9:37	21	B0	DB	90	D2	CE	89	88
1451:D8	20	B9	B2	14	5B	8F	20	9D	1681:13	6B	85	14	D0	B7	BB	8B	6C	18B1:D1	D0	C8	F9	12	E2	90	C7	BC
1459:CD	30	22	0E	F3	0D	A9	BD	7E	1689:A2	A1	04	A9	9A	34	91	6A	BD	18B9:B0	BE	20	01	09	20	ED	09	B3
1461:2F	8F	22	40	C0	B1	94	01	44	1691:A5	33	F0	0D	C9	22	F0	09	0E	18C1:F0	B6	90	B4	B0	B9	A5	05	32
1469:20	2E	72	20	9B	8E	36	20	21	1699:9D	E2	37	70	E8	D0	EF	86	2C	18C9:85	17	4C	3D	09	A5	17	30	1D
1471:DD	8C	6A	A1	01	63	35	0A	1D	16A1:1D	20	4D	8C	A5	06	D0	F1	AF	18D1:03	4C	4F	0A	4C	45	20	FC	D5
1479:E8	B4	77	E4	F4	AA	CA	61	C9	16A9:1A	A5	07	85	23	A4	3D	22	CD	18D9:00	2C	A2	BB	05	08	C9	E0	E1
1481:51	1B	40	00	F0	0E	C9	10	84	16B1:C9	30	D0	21	AC	41	C5	1D	0E	18E1:02	01	19	09	85	0F	77	79	D7
1489:D0	BC	11	02	1C	AC	41	C3	65	16B9:D0	18	49	90	13	C8	B1	87	2D	18E9:98	02	03	34	00	85	0E	C4	81
1491:4C	6E	8F	A2	00	DD	54	8B	43	16C1:14	A0	FF	C8	C4	1D	F0	18	41	18F1:0F	F0	3E	B9	02	DC	C9	2D	8D
1499:F0	0A	E8	E0	1F	90	F6	A3	B4	16C9:B1	13	D9	D1	98	F0	F4	A9	08	18F9:8A	58	E6	0E	D0	30	C9	30	4E
14A1:9F	03	E0	12	AD	60	0E	C0	63	16D1:30	29	F0	18	69	04	65	22	0C	1901:90	2F	C9	3A	B0	2B	E9	2F	59
14A9:C8	02	8A	E9	12	0A	0A	CD	72	16D9:85	22	90	CC	E6	23	D0	C8	5E	1909:9D	C7	B5	03	85	C0	61	05	07
14B1:D2	82	0F	BD	D1	8F	48	4C	4B	16E1:60	20	5A	91	A6	FC	A5	29	48	1911:08	0A	26	54	05	02	F2	00	E9
14B9:74	91	00	0F	80	02	08	ED	7B	16E9:D0	0C	BD	DE	E1	85	5F	D8	E0	1919:8C	75	03	95	03	16	02	36	53
14C1:8F	EA	8F	1B	90	B7	90	3B	CF	16F1:DF	59	C8	BD	E0	92	20	2C	17	1921:03	B5	02	65	0D	95	02	90	2C
14C9:90	59	90	7F	90	D9	90	FA	A2	16F9:BD	E1	92	4C	E3	8B	A8	08	3B	1929:02	F6	03	C8	D0	BE	A5	0E	E1
14D1:A0	0E	01	59	00	1D	07	5D	63	1701:C0	08	06	40	9E	0C	10	0C	A7	1931:F0	03	32	78	9E	60	01	00	E2
14D9:0C	CE	42	E1	70	BD	12	90	51	1709:16	0C	2B	0C	31	0C	0B	08	43	1939:0A	00	64	00	E8	86	9F	27	C4
14E1:18	69	03	F7	50	13	CE	50	0D	1711:0A	00	9E	32	30	36	31	00	F7	1941:20	E6	0A	A6	28	66	A1	5C	63
14E9:86	08	4D	08	68	08	76	08	D9	1719:00	00	C0	FD	DA	0E	D4	8D	85	1949:B4	A9	7E	2C	A9	7F	8D	47	80
14F1:5A	08	1E	F7	08	44	4A	A0	13	1721:0F	90	04	80	AD	12	D4	68	4A	1951:0B	38	E9	76	80	50	0B	F7	76
14F9:63	70	E3	6B	23	2E	23	2C	67	1729:0F	30	C4	33	AE	02	91	33	8A	1959:1C	BD	0C	F1	03	84	82	10	E8
1501:4C	D5	4B	09	3A	2E	A6	28	C0	1731:00	98	40	A5	03	C9	7E	F3	18	1961:42	2C	2D	45	B1	D8	3F	6C	95
1509:BD	54	90	7C	2D	01	55	90	A9	1739:18	C9	00	90	E9	20	E2	0B	8F	1969:80	A2	05	0D	EC	DD	A4	DD	B8
1511:D6	47	69	0A	6C	17	00	85	8B	1741:4C	FF	60	F1	CC	38	F5	41	35	1971:42	2A	D0	05	C8	DD	40	0E	06
1519:29	61	94	1B	5B	28	39	76	D8	1749:7C	F5	EC	A4	05	02	A7	10	25	1979:90	13	88	A9	FD	CF	32	00	F7
1521:89	C8	2A	92	84	2D	7B	2A	AA	1751:1E	BA	A0	D1	B0	A1	C3	14	16	1981:22	03	FD	D0	0A	85	03	E6	A5
1529:09	72	6E	EA	F8	02	6C	40	D9	1759:88	84	8C	E0	0B	D3	1F	95	08	1989:00	D0	DF	E3	3F	45	42	C9	0E
1531:04	18	2D	40	8D	D0	10	00	DC	1761:E2	61	83	20	02	AD	1B	D4	9D	1991:00	D0	04	A5	0C	6D	A5	0D	41
1539:E4	3C	7E	E4	50	14	AA	00	2B	1769:33	A4	18	DD	40	D0	05	B5	40	1999:09	30	99	A5	7D	E6	0C	CA	54
1541:5D	87	01	4A	08	85	72	34	30	1771:02	D0	01	60	B5	03	30	09	1E	19A1:5D	BF	84	00	60	46	3C	32	C9
1549:08	18	65	29	32	43	EA	A6	D7	1779:40	6E	99	A9	01	B5	A9	FF	63	19A9:28	1E	14	0A	A2	06	A5	D3	E6
1551:39	81	46	F8	07	0A	A9	E6	6B	1781:59	65	03	8C	8B	B2	78	2E	25	19B1:DD	85	74	05	90	06	CA	F6	3C
1559:5C	C2	E9	3D	7F	0A	39	7F	89	1789:2E	7E	7C	2E	32	80	E0	22	58	19B9:4C	B3	0B	BD	52	0B	85	02	08
1561:19	20	1F	1E	31	19	1C	04	10	1791:8D	CA	08	FA	02	FE	08	B1	01	19C1:20	2E	01	AE	D3	AA	E0	00	A5
1569:39	1C	75	94	64	A4	54	78	06	1799:06	BB	13	7F	A1	84	09	60	A5	19C9:F0	BA	03	25	CA	10	F4	79	CF
1571:C8	6C	88	24	C2	02	5C	4C	91	17A1:86	06	84	07	28	78	C4	AB	ED	19D1:85	5F	96	59	5C	85	E4	FF	C9
1579:44	C8	AE	85	72	A5	32	85	3A	17A9:CC	08	88	29	91	06	A0	26	EF	19D9:F0	05	8D	A1	7F	E6	08	10	E0
1581:41	60	A9	02	85	28	A4	0C	E5	17B1:F4	98	A8	A7	A4	08	2A	0A	B3	19E1:B8	F0	0A	A9	3E	9A	12	A9	BA
1589:E6	AA	80	0D	05	20	C9	4D	32	17B9:69	5E	8A	A6	E8	C8	D0	F2	EE	19E9:20	54	56	85	20	CF	FF	C9	6E
1591:23	68	20	05	A9	8E	20	18	9B	17C1:84	C0	92	03	E2	0A	78	0C	21	19F1:D0	F0	06	06	F0	8B	42	A9	EB
1599:58	8F	8C	4A	4A	41	85	32	9E	17C9:61	06	08	1C	09	C9	A2	FF	A1	19F9:C0	A9	0D	4C	30	20	6C	02	3A
15A1:A5	72	85	33	19	FC	0D	A9	9F	17D1:E8	30	EE	13	E4	09	F0	0F	CB	1A01:00	A4	12	7D	81	06	F0	07	85
15A9:FD	20	E0	11	14	E0	D0	20	ED	17D9:C0	26	7E	DD	90	F0	EF	01	C8	1A09:9D	7B	C8	91	18	F5	86	08	CA
15B1:D0	08	40	A9	A5	02	4D	8D	46	17E1:7D	BD	00	7F	85	60	35	F8	47	1A11:23	D0	0E	A8	06	48	C8	B1	EB
15B9:48	1A	A9	2C	A0	1C	14	A9	CD	17E9:00	8D	14	95	03	A5	08	F0	07	1A19:10	CA	07	38	10	A0	00	84	F3
15C1:12	F2	A8	28	2C	A9	F3	24	5D	17F1:03	AD	00	7E	95	02	E4	0D	80	1A21:12	56	6E	85	10	41	C9	09	3C
15C9:A4	8C	88	A3	13	E1	4C	68	D5	17F9:04	D2	02	CB	10	65	03	55	4D	1A29:11	4C	DD	0B	A2	00	E4	08	4C
15D1:8A	8A	A4	62	20	48	94	0A	F3	1801:51	38	EE	9C	15	86	C5	59	37	1A31:F0	09	BD	00	7E	9A	57	10	F4
15D9:6B	5D	C9	AC	90	09	15	01	E8	1809:71	BB	F1	0B	21	3E	85	50	2D	1A39:E8	D0	F3	0E	A1	85	14	A5	66
15E1:CD	07	46	B3	C9	AA	90	4C	1F	1811:A1	93	90	0D	F5	18	65	40	F4	1A41:03	85	15	60	0E	04	85	02	25
15E9:CC	48	E9	A9	F0	07	68	89	62	1819:47	65	3B	47	A5	E6	93	C8	D7	1A49:70	C0							



# PROGRAMS

```

1A91:28 C3 61 4C C0 0B 01 60 50
1A99:20 BA FF F6 64 A5 C3 2A 67
1AA1:01 C4 48 A5 2B 94 A5 2C 0E
1AA9:A0 05 A9 C3 A6 2D A4 2E 42
1AB1:20 D8 E1 3B 85 C4 68 85 B1
1AB9:C3 6A B7 FF 8D 35 97 60 32
1AC1:20 D0 20 5C 32 41 36 01 08
1AC9:AC 33 97 20 BC 18 31 97 56
1AD1:A6 2B A4 2C 20 D5 FF 86 5A
1AD9:2D 84 2E 4C C6 97 AD 34 74
1AE1:97 A2 D5 A0 97 4C BD FF B8
1AE9:A9 00 20 42 07 9F 68 68 0B
1AF1:4C 59 A6 A9 C0 4C 90 FF 6A
1AF9:00 FF FF C0 7C 7F FE 4C 66
1B01:53 44 AF B2 E5 43 E9 D2 F5
1B09:83 64 C9 43 E2 C4 03 E1 99
1B11:0E 82 8D 00 BA BA BA AD 84
1B19:0C D0 20 A2 00 BD E9 9B 1E
1B21:9D EC CF E8 E0 0F D0 F5 C4
1B29:81 EE 12 58 0F E9 EE 0E AF
1B31:5D AC EC 8D 26 46 CF 8D 2F
1B39:27 60 79 06 22 93 50 23 CD
1B41:53 14 20 D0 8D 21 D0 B5 7F
1B49:35 86 02 15 79 37 A9 80 C9
1B51:85 38 EB C9 4C F0 32 C9 C6
1B59:46 F0 09 C9 45 F0 0F C9 82
1B61:55 F0 1E D3 74 C6 67 82 8F
1B69:A9 8C 8D 86 8A 20 B2 9A 86
1B71:AD 4C 4E D0 03 44 0F 45 F4
1B79:77 71 59 88 50 3D 01 8D 82
1B81:82 6F 9B 4C 8D 9A 20 73 97
1B89:0C DE AD 21 3D CD 42 F0 DB
1B91:04 B0 0E 90 0F AD 04 9C 94
1B99:CD 45 66 F0 0A B0 02 90 8B
1BA1:D4 02 42 0A 0A 01 01 E1 E3
1BA9:01 33 10 AD 11 9C F0 45 2C
1BB1:13 4E 19 DA F0 08 19 CA 7A
1BB9:09 21 FF 10 8E 4F 1C 8E 36
1BC1:02 79 38 27 1A 8E 0A A9 99
1BC9:03 8D 0A 4F 1B 08 8D 0B 3A
1BD1:9C 20 91 9A C9 01 E2 84 D6
1BD9:33 0D 61 85 87 8D 82 08 F0
1BE1:C2 8D 83 08 38 A5 2D E9 6A
1BE9:62 2D 90 8D 08 A5 2E E9 A4
1BF1:07 14 4A 8D 35 4C 40 37 65
1BF9:E2 03 91 05 47 B7 16 43 6D
1C01:97 11 A9 15 97 57 E1 01 AE
1C09:8D 14 97 97 E2 3B 9B AD 62
1C11:12 59 00 08 AD 13 9C 8D A9
1C19:78 AD 20 39 11 AD 55 4E C8
1C21:0C A9 42 E7 73 60 AD 0C 15
1C29:1F 2D AD 0D 81 C1 2E 78 AA
1C31:A9 35 A0 08 B8 C0 85 05 F8
1C39:A9 08 08 86 A9 A0 D0 0D 30
1C41:A8 B1 05 91 03 38 CE 0F 51
1C49:01 27 1B CE 10 9C D0 16 C6
1C51:A9 37 85 01 58 A9 1E 85 18
1C59:03 A9 9C 85 04 20 F5 9B 91
1C61:A9 00 8D 11 9C 60 C0 C1 DA
1C69:27 0E E6 04 E6 06 A5 06 76
1C71:C9 C8 D0 04 A9 E0 85 06 FC
1C79:4C B0 9B 08 48 AD 8D 02 0E
1C81:D0 FB 68 28 4C CA F1 A0 C2
1C89:00 A9 0D 10 E1 0D B1 03 78
1C91:F0 07 20 D2 FF C8 4C FC ED
1C99:9B 60 29 23 28 23 9A 3E 50
1CA1:90 11 00 00 40 08 53 41 70
1CA9:56 5D 00 11 82 20 52 88 48 52
1CB1:86 0B 2C 00 4F 20 0E 59 E5
1CB9:4E 47 10 49 12 53 35 C7 91

```

```

1CC1:42 85 07 20 57 48 9F 5D D7
1CC9:3F 00 12 4C 4F 43 4B 01 C7
1CD1:87 21 21 00 93 57 45 4C 0B
1CD9:02 DE 52 68 54 4F 50 2E 4A
1CE1:2E 11 11 12 80 06 DD 49 D9
1CE9:92 75 0D 22 1E 19 3C 20 7A
1CF1:45 53 40 2E 42 41 53 49 93
1CF9:43 20 43 C0 3B 50 49 4C 4A
1D01:45 70 46 4F 52 20 54 48 BB
1D09:45 20 36 34 C0 B8 55 50 DB
1D11:44 41 54 45 09 5F 46 52 41
1D19:4F 4D 20 53 50 00 67 4E 27
1D21:54 20 49 49 20 42 59 20 28
1D29:46 41 52 49 44 20 41 48 23
1D31:4D 41 44 0D 0D 00 70 C1 C6
1D39:0F 64 04 EA EA EA 00 00 46

```

Farid Ahmad programs his 64 in Islamabad, Pakistan.

## PAD DESIGN

By Robert C. Marcus

Impedance matching is an important concept in radio and electronics work. To get the maximum power from your ham radio to your antenna, for example, you'll have to match the impedance of your antenna to the impedance of your transmitter.

If you want a filter to pass a desired band of frequencies, you'll have to make sure the input and output impedances of the filter match those of your input and output circuits.

If you want to get the most power out of a stereo speaker, then the speaker impedance must match the output impedance of your amplifier.

If you're a ham radio operator or an electronics hobbyist, these are just a few of the times when you might find it necessary to design an attenuator network, or what's generally referred to as a pad.

Whether you want to insert additional attenuation or merely match impedances, the math that's involved can be intimidating. That's where Pad Design can help. It does all the number crunching necessary to calculate the resistive elements necessary to meet the design requirements that you specify.

The program is set up to deal with unbalanced T and Pi networks, but it can also deal with balanced H and O networks. The minimum-loss pad for impedance matching is included as well.

In many applications, it's possible to use commercial standard-value resistors. Their low cost and availability are trade-offs for a slight compromise in the attenuation and impedances being matched.

The advantage of using Pad Design is that it lets you try out various standard values to produce a network that is closest to the design criteria.

Pad Design is written entirely in BASIC. To help avoid typing errors, enter it with The Automatic Proofreader. See "Typing Aids" elsewhere in this section.

## Using the Program

When the program is run, you can choose the type of network to be used: T, H, Pi, O, or MIN-LOSS. Pad Design then prompts for the input and output impedances that will be used, and if the network is a T/H or Pi/O, the insertion loss in decibels is asked for. The program then displays the network and gives the values required for the resistive arms.

At this point you may select to end the program, return to the menu, or changes resistors to obtain the best choice of standard values.

If you decide to make changes to the resistors, you'll be prompted for new values. The program limits the deviation of value to plus or minus 20 percent of the actual design value; this is more than adequate when you are using standard resistors whose values may vary by 10 percent. For more precise values, 5- or 1-percent resistors would be items of choice. If the original design value is to be retained for a particular resistor, just press Return.

After you make your changes, the network is displayed again. This time it lists two sets of impedances. The first gives the value of Z<sub>I</sub>, which results from the new R values when Z<sub>O</sub> terminates in the originally specified impedance. The second value gives Z<sub>O</sub> as it appears when Z<sub>I</sub> terminates in its specified impedance. The insertion loss—calculated with the existing changes—is displayed as well.

## Balanced Networks

When dealing with balanced networks, remember that the value of the series arm or arms is halved. Since the values given and entered are on a single-unit basis, you'll have to multiply by two when choosing standard values.

## Decimal Places

The calculated values for resistors and impedances are rounded off at two dec-



imal places for values below 1 ohm and one decimal place for values between 1 and 1000 ohms. Attenuation values are rounded off at two decimal places.

Should you wish to set your own values for resistors and impedances, you can alter the multiplier. The multiplier is the function FNPM(x), which is defined in line 110. It is, in effect, powers of 10 used with the INT() function to set the number of decimal places, such as  $INT(FNPM(n)*n+.5)/FNPM(n)$  where n is a floating point number.

The function can be interpreted as  $FNPM(x)=10^{(BASE-(x<LL+(x>HL))}$ .

Base is the number of places that are to be rounded: 1 sets one decimal place, 2 sets two decimal places, and so on. LL is the lower limit. Below this value the number of places increases by one over the base number. HL is the high limit at which the number of places decreases by one from the base.

To sum up our application, there's one decimal place (base) between 1 (LL) and 1000 (HL), there are two decimal places below 1, and there are no decimal places for 1000 and over.

Programmers using this method for rounding off floating point numbers should note that making the base a negative number produces rounding to tenths, hundredths, and so on.

## PAD DESIGN

```

BA 10 REM COPYRIGHT 1992 COMP
TE PUBLICATIONS INTL LTD
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KQ 100 REM ***{2 SPACES}INITIA
LIZE{2 SPACES}***
PB 110 HD$="{RVS}{10 SPACES}PA
D DESIGN{9 SPACES}":DEF
FNPM(X)=10↑(1-(X<1)+(X>
1000))
CM 120 CC$(1)=" ":CC$(2)="
{CYN}RESULTS WITH NEW '
R' VALUES{7}"
DP 130 LO$(1)="INSERTION LOSS"
:LO$(2)="MINIMUM-LOSS"
FE 140 AN$(1)="T OR H ":AN$(2)
="↑ OR O ":AN$(3)="MIN-
LOSS"
DE 150 POKE783,PEEK(783)AND254
:POKE53281,0:POKE53280,
0
JE 160 REM ***{2 SPACES}MAIN M
ENU{2 SPACES}***
AC 170 PRINT"{CLR}";:FORI=1TO4
0:PRINT"{RVS} ";:NEXT

```

```

RS 180 PRINT"{HOME}"TAB(5)HD$
KJ 190 RO=3:CO=5:GOSUB1150:PRI
NT"SELECT:":CO=10:FORI=
1TO3
PQ 200 RO=RO+2:GOSUB1150:PRINT
I" - "AN$(I):NEXT
JG 210 INPUT"{DOWN}CHOICE:";P$
:IFP$<"1"ORP$>"3"THEN21
0
JG 220 PH=1
PC 230 INPUT"{DOWN}ENTER INPUT
{2 SPACES}IMPEDANCE";ZI
:IFZI=0 THENGOSUB1260:G
OTO230
GH 240 INPUT"ENTER OUTPUT IMPE
DANCE";ZO:IFZO=0THENGOS
UB1260:GOTO240
HM 250 IFP$="3"ANDZO=ZITHENPRI
NT"{DOWN}{RVS}MIN-LOSS
{SPACE}IS TO MATCH Z'S"
:GOTO1210
KS 260 IFP$="3"THEN300
SS 270 INPUT"ENTER ATTENUATION
IN DB.";AT
BQ 280 IFAT=0THEN1250
BP 290 N=EXP(LOG(10)*AT/10)
MJ 300 ONVAL(P$)GOTO310,440,57
0
RB 310 REM ***{2 SPACES}CALC F
OR T OR H{3 SPACES}***
FQ 320 R3=2*SQR(ZI*ZO*N)/(N-1)
FS 330 R1=ZI*(N+1)/(N-1)-R3:R1
=INT(FNPM(R1)*R1+.5)/FN
PM(R1)
DA 340 R2=ZO*(N+1)/(N-1)-R3:R2
=INT(FNPM(R2)*R2+.5)/FN
PM(R2)
KQ 350 R3=INT(FNPM(R3)*R3+.5)/
FNPM(R3)
FK 360 IFSGN(R2)=-1THEN1230
JP 370 RA=R1:RB=R2:RC=R3
HA 380 GOTO690
HM 390 ZA=(ZO+R2)*R3/(ZO+R2+R3
)+.5)/FNPM(ZA)
SF 400 ZB=(ZI+R1)*R3/(ZI+R1+R3
)+R2:ZB=INT(FNPM(ZB)*ZB
+.5)/FNPM(ZB)
KX 410 VL=1/((ZO+R2)*R3/((ZO+R
2+R3)*ZA)*ZO/(ZO+R2))
GJ 420 AT=INT(100*(20*LOG(VL)/
LOG(10)-10*LOG(ZA/ZO)/L
OG(10))+.5)/100
SD 430 GOTO690
HD 440 REM ***{2 SPACES}CALC F
OR ' OR O{3 SPACES}***
GR 450 R3=(N-1)/2*SQR(ZI*ZO/N)
PB 460 R1=1/(1/ZI*(N+1)/(N-1)-
(1/R3)):R1=INT(FNPM(R1)
*R1+.5)/FNPM(R1)
AX 470 R2=1/(1/ZO*(N+1)/(N-1)-
(1/R3)):R2=INT(FNPM(R2)
*R2+.5)/FNPM(R2)
CE 480 R3=INT(FNPM(R3)*R3+.5)/
FNPM(R3)
AB 490 IFSGN(R1)=-1THEN1230
RD 500 RA=R1:RB=R2:RC=R3
DH 510 GOTO870
XX 520 OZ=ZO*R2/(ZO+R2):IZ=ZI*
R1/(ZI+R1)
XP 530 ZA=(OZ+R3)*R1/(OZ+R1+R3
):ZA=INT(FNPM(ZA)*ZA+.5
)/FNPM(ZA)
BS 540 ZB=(IZ+R3)*R2/(IZ+R2+R3
):ZB=INT(FNPM(ZB)*ZB+.5
)/FNPM(ZB)
FX 550 AT=INT(100*(20*LOG((OZ+
R3)/OZ)/LOG(10)-10*LOG(
ZA/ZO)/LOG(10))+.5)/100
HP 560 GOTO870
XD 570 REM ***{2 SPACES}CALC F
OR MIN-LOSS{2 SPACES}**
*
EP 580 IFZO>ZITHENZ=ZI:ZI=ZO:Z
O=Z
PA 590 R3=ZO/SQR(1-(ZO/ZI)):R3
=INT(FNPM(R3)*R3+.5)/FN
PM(R3)
DM 600 R1=ZI*SQR(1-(ZO/ZI)):R1
=INT(FNPM(R1)*R1+.5)/FN
PM(R1)
XG 610 ZA=ZI
MP 620 RA=R1:RB=R2:RC=R3
XS 630 GOTO660
GH 640 ZA=ZO*R3/(ZO+R3)+R1:ZA=
INT(FNPM(ZA)*ZA+.5)/FN
PM(ZA)
BD 650 ZB=(ZI+R1)*R3/(ZI+R1+R3
):ZB=INT(FNPM(ZB)*ZB+.5
)/FNPM(ZB)
MX 660 VL=ZA/(ZO*R3/(ZO+R3))
XJ 670 AT=INT(100*(20*LOG(VL)/
LOG(10)-10*LOG(ZA/ZO)/L
OG(10))+.5)/100
XR 680 GOTO1000
MA 690 REM ***{2 SPACES}DISPLA
Y T NETWORK{2 SPACES}**
*
HD 700 PRINT"{CLR}"HD$
{2 SPACES}"AN$(1)
MK 710 PRINTTAB(5)CC$(PH)
SQ 720 PRINTTAB(49)"CCCC{RVS}
{WHT}{3 SPACES}{7}{OFF}
CC{R}CC{RVS}{WHT}
{3 SPACES}{7}{OFF}CCC"
PF 730 PRINTTAB(10)"{8 SPACES}
B"
MR 740 PRINTTAB(10)"{3 SPACES}
R1{3 SPACES}{RVS}{WHT}
{SPACE}{7}{OFF}
{4 SPACES}R2"
ME 750 PRINTTAB(10)"{8 SPACES}
+{RVS}{WHT} {7}{OFF} R3"
HP 760 PRINTTAB(10)"{8 SPACES}
{RVS}{WHT} {7}{OFF}"
KP 770 PRINTTAB(10)"{3 SPACES}
{WHT}{3 @}{7}{2 SPACES}
B{2 SPACES}{WHT}{3 @}
{7}"
GS 780 PRINTTAB(9)"CCCCCCCC
{E}CCCCCCCC"
XJ 790 PRINTTAB(10)"{3 SPACES}
{WHT}{T}{T}{7}
{5 SPACES}{WHT}{T}{T}
{7}"
SM 800 PRINT"{3 DOWN}↑ NOTE: I

```



# PROGRAMS

```

F BALANCED H THEN R1 &
{SPACE}R2"
AQ 810 PRINT"{8 SPACES}ARE HAL
VED."
AJ 820 PRINT"{DOWN}R1="R1TAB(1
5)"R2="R2TAB(30)"R3="R3
XQ 830 RO=5:CO=3:GOSUB1150:IFP
H=1THENPRINT"ZI"ZITAB(3
0)"ZO"ZO:GOTO850
FB 840 PRINT"ZI{CYN}"ZATAB(30)
"{7}ZO"ZO:RO=7:GOSUB115
0:PRINT"{2 SPACES}"ZITA
B(30)"{2 SPACES}{CYN}"Z
B"{7}"
XF 850 RO=11:CO=10:GOSUB1150:P
RINTLOS(INT(VAL(P$)/2+.
5));AT"DB"
HR 860 GOTO1160
KA 870 REM ***{2 SPACES}DISPLA
Y ↑ NETWORK{2 SPACES}**
*
CB 880 PRINT"{CLR}"HD$"
{2 SPACES}"AN$(2)
SF 890 PRINTTAB(5)CC$(PH)
KB 900 PRINTTAB(50)"CCCC{R}CC
{RVS}{WHT}{3 SPACES}
{OFF}{7}CC{R}CCCC"
KH 910 PRINTTAB(10)"{5 SPACES}
B{7 SPACES}B"
XH 920 PRINTTAB(10)"{5 SPACES}
{RVS}{WHT}{OFF}{7}
{3 SPACES}R3{2 SPACES}
{RVS}{WHT}{OFF}{7}"
BX 930 PRINTTAB(10)"{5 SPACES}
{RVS}{WHT}{OFF}{7} R1
{4 SPACES}{RVS}{WHT}
{OFF}{7} R2"
AG 940 PRINTTAB(10)"{5 SPACES}
{RVS}{WHT}{OFF}{7}
{7 SPACES}{RVS}{WHT}
{OFF}{7}"
MD 950 PRINTTAB(10)"{5 SPACES}
B{2 SPACES}{WHT}{3 @}
{7}{2 SPACES}B"
SD 960 PRINTTAB(10)"CCCC{E}CC
CCCC{E}CCCC"
MK 970 PRINTTAB(10)"{8 SPACES}
{WHT}{T}↑{T}{7}"
CJ 980 PRINT"{3 DOWN}↑ NOTE: I
F BALANCED O THEN R3 IS
HALVED"
CF 990 GOTO820
SD 1000 REM ***{2 SPACES}DISPL
AY MIN-LOSS{2 SPACES}*
**
AC 1010 PRINT"{CLR}"HD$"
{2 SPACES}"AN$(3)
QC 1020 PRINTTAB(5)CC$(PH)
PJ 1030 PRINTTAB(49)"CCCC{RVS}
{WHT}{3 SPACES}{7}
{OFF}CC{R}CCCCCCCC"
MH 1040 PRINTTAB(10)"
{8 SPACES}B"
RG 1050 PRINTTAB(10)"
{3 SPACES}R1{3 SPACES}
{RVS}{WHT}{7}{OFF}"
ES 1060 PRINTTAB(10)"
{8 SPACES}{RVS}{WHT}

```

```

{7}{OFF} R3"
FS 1070 PRINTTAB(10)"
{8 SPACES}{RVS}{WHT}
{7}{OFF}"
FJ 1080 PRINTTAB(10)"
{3 SPACES}{WHT}{3 @}
{7}{2 SPACES}B"
QS 1090 PRINTTAB(9)"CCCCCCCC
{E}CCCCCCCC"
CD 1100 PRINTTAB(10)"
{3 SPACES}{WHT}{T}↑{T}
{7}"
BM 1110 PRINT"{3 DOWN}↑ NOTE:
{SPACE}IF BALANCED THE
N R1 IS HALVED."
SD 1120 PRINT"DOWN}R1="R1TAB(
30)"R3="R3
KE 1130 GOTO830
KS 1140 REM *** SUB-RTES ***
PQ 1150 POKE781,RO:POKE782,CO:
SYS65520:RETURN
SH 1160 RO=22:CO=0:GOSUB1150:P
RINT"{CYN}1-ENTER NEW
{SPACE}R VALUES
{4 SPACES}2-MENU
{4 SPACES}3-QUIT{7}"
CK 1170 GETA$:IFA$<"1"ANDA$<
"2"ANDA$<"3"THEN1170
RM 1180 IFA$="2"THEN160
XR 1190 IFA$="3"THENPRINT"
{CLR}":POKE53281,6:POK
E53280,14:END
AJ 1200 PRINT"{CLR}":GOSUB1270
:ONVAL(P$)GOTO390,520,
640
AA 1210 PRINT"DOWN}{CYN}HIT S
HIFT TO REDO{7}":WAIT6
53,1:GOTO160
KH 1220 PRINT"{RVS}VALUE ENTER
ED IS > OR < THAN 20%
{SPACE}OF":PRINTTAB(10
)R:RETURN
AD 1230 PRINT"DOWN}{RVS}THE I
NSERTION LOSS IS < MIN
.LOSS -"
MK 1240 PRINT"{5 SPACES}{RVS}R
EDO OR CHOOSE MIN.LOSS
":GOTO1210
RR 1250 PRINT"DOWN}{RVS} SOME
INSERTION LOSS MUST E
XIST":GOTO1210
JK 1260 PRINT"DOWN}{RVS} SOME
IMPEDANCE MUST EXIST
{SPACE}OF":RETURN
HP 1270 REM *** GET NEW R VALU
ES ***
MP 1280 RO=4:CO=5:GOSUB1150:PR
INT"{CYN}{RVS}RETURN
{OFF} ONLY FOR ORIGINA
L R VALUE{7}{DOWN}"
RK 1290 PH=2:R1$=""R2$=""R3$
=""
CR 1300 INPUT"ENTER NEW R1 VAL
UE";R1$:R1=VAL(R1$):IF
R1$=""THENR1=RA:GOTO13
20
DK 1310 IFABS(VAL(R1$)-RA)>.2*
RATHENR=RA:R1$=""GOSU

```

```

B1220:GOTO1300
KG 1320 IFP$="3"THEN1350
CA 1330 INPUT"ENTER NEW R2 VAL
UE";R2$:R2=VAL(R2$):IF
R2$=""THENR2=RB:GOTO13
50
SG 1340 IFABS(VAL(R2$)-RB)>.2*
RBTHENR=RB:R2$=""GOSU
B1220:GOTO1330
SS 1350 INPUT"ENTER NEW R3 VAL
UE";R3$:R3=VAL(R3$):IF
R3$=""THENR3=RC:GOTO13
70
XA 1360 IFABS(VAL(R3$)-RC)>.2*
RCTHENR=RC:R3$=""GOSU
B1220:GOTO1350
JR 1370 IFR1=RAANDR2=RBANDR3=R
CTHENPH=1
JG 1380 RETURN

```

Robert C. Marcus lives in St. Thomas, Ontario, Canada. He's the author of CoilCalc (June 1991). □

## TYPING AIDS

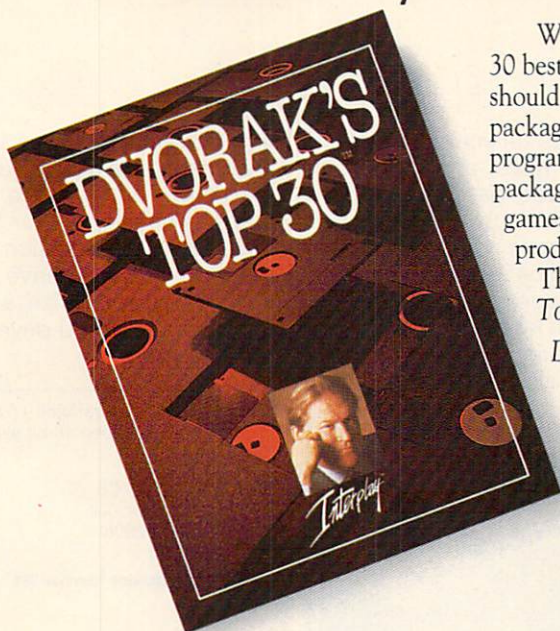
MLX, our machine language entry program for the 64 and 128, and The Automatic Proofreader are utilities that help you type in Gazette programs without making mistakes. To make room for more programs, we no longer include these labor-saving utilities in every issue, but they can be found on each Gazette Disk and are printed in all issues of Gazette through June 1990.

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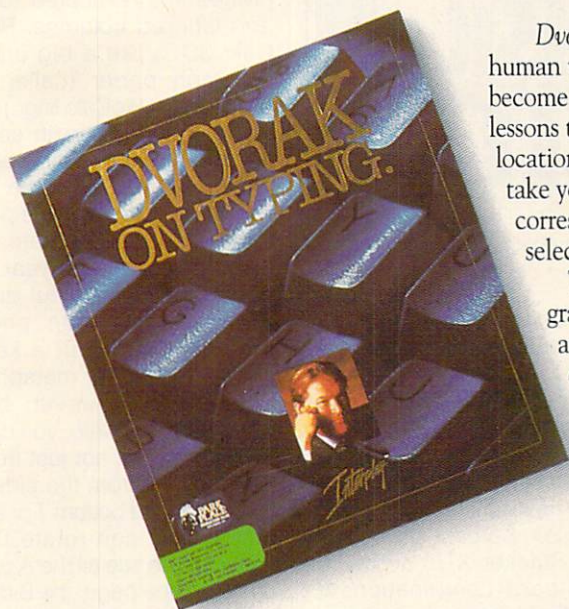
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## STACKER AT/16

I should admit up front that I'm highly prejudiced about this product. I've already called Stacker 1.0 one of the all-time great software programs. Now Stacker 2.0 and Stacker AT/16 come along with even more features. I'll try to restrain myself, but I'm likely to gush with superlatives.

Stacker compresses the data on your hard drive, giving you—on average—twice the available storage space. If you have a crammed 20MB hard drive, Stacker could turn it into a more roomy 40MB drive. Once you install the software, it works in the background. You basically set it and forget it.

Stac Electronics currently offers four different Stacker products: Stacker 2.0 (the software-only version, \$149), Stacker XT/8 (Stacker 2.0 with an 8-bit coprocessor card, \$199), Stacker AT/16 (Stacker 2.0 with a 16-bit coprocessor card, \$249), and Stacker MC/16 (Stacker 2.0 with a microchannel 16-bit coprocessor card, \$299). The software-only version is perfect for laptops. The notebook computer I'm writing on right now has a 60MB drive that Stacker 2.0 has converted to a 110MB drive. But don't just take my word for it; both Central Point Software and Symantec license the Stacker software compression technology for their best-selling backup programs: PC Tools Backup and Norton Backup.

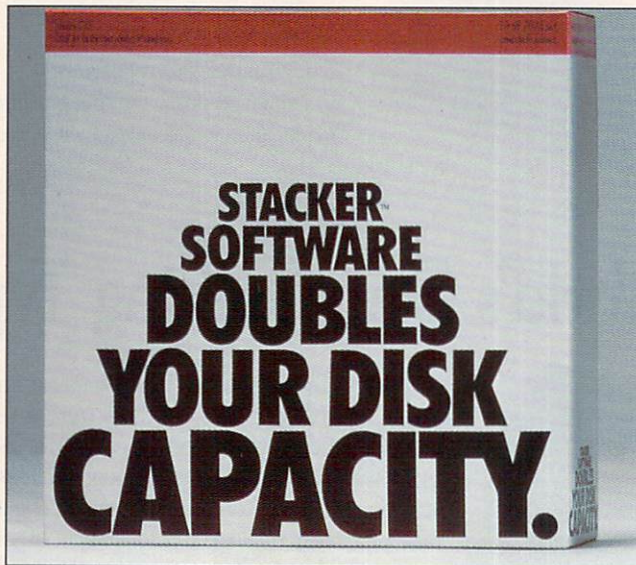
So why use Stacker with a coprocessor card if the software works so well by itself? The card offers significantly faster performance. On my 20-MHz 80386 computer, the software-only version caused the hard drive to run about 35 percent slower than it did before it was com-

pressed, while Stacker AT/16 caused the hard drive to run only about 5 percent slower. The card also offers a slightly better compression ratio. On the same 386, Stacker AT/16 achieved a 2.1 : 1 ratio compared to Stacker 2.0's 1.9 : 1 ratio. In addition, the card has no jump-

depends on your computer. If you have a lot of compressed files on your hard drive, such as ZIP or GIF files, your compression ratio could be well below the 2 : 1 average—making Stacker much less of a bargain. And while my 386 ran just 35 percent slower with the Stacker

your current hard drive, but it will essentially double any hard drive you buy in the future. If you have a 10- or 12-MHz 286, the decision is tougher, as you'll have to choose between size and speed for your hard drive.

DAVID ENGLISH



*Stacker's compression capabilities can double the size of some hard drives, but it also slows some down considerably.*

ers, switches, or interrupts to worry about—like the software, you basically set it and forget it.

The AT/16 card uses a new compression chip that runs 39 percent faster than the chip used by the Stacker 1.0 8-bit card. And the new Stacker 2.0 software is as much as 30 percent faster than version 1.0, can take up as little as 14K of conventional memory (or can be loaded into high memory with DOS 5.0 or a memory manager program), includes a special disk-optimizing program (regular defragmentation programs won't work), and can compress floppies, RAM disks, and Bernoulli disks, as well as hard drives.

Is Stacker for you? It de-

2.0 software and a mere 5 percent slower with the Stacker AT/16 software-and-card combination, a much slower XT compatible with a 68-ms hard drive could run as much as 500 percent slower with the Stacker 2.0 software and 200 percent slower with the Stacker XT/8 software-and-card combination. To continue the comparisons, you can expect a 10-MHz 286 computer to run about 400 percent slower with Stacker 2.0 and about 50 percent slower with Stacker AT/16. Clearly, the faster the processor, the faster Stacker can compress and decompress your files.

If you have a 386 or 486, Stacker AT/16 is a no-brainer. Not only will it compress

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## PROCALC 3D

Most spreadsheets are like one big sheet of graph paper divided into numbered rows and lettered columns. ProCalc 3D is like a big cube of graph paper (called a workcube in ProCalc lingo) divided into pages, with each page a separate worksheet.

Each worksheet in a workcube can detail the performance of a corporate division or profits in a year or any other meaningful division, and you can page through these with a keystroke. The paper metaphor ends there, however, because with ProCalc, you can view your data not just from the front but from the sides, back, top, and bottom. For example, you can rotate the workcube to see all the A columns on one page, the B columns on the next, and so on.

This is easier to see than to describe, but it does work. You'll have to stretch your mind to grasp working with data in three dimensions instead of the usual two, but if you can, you can do things that are difficult or impossible with an ordinary spreadsheet. It does take some thought to design worksheet pages that provide co-



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## Test your longevity potential.

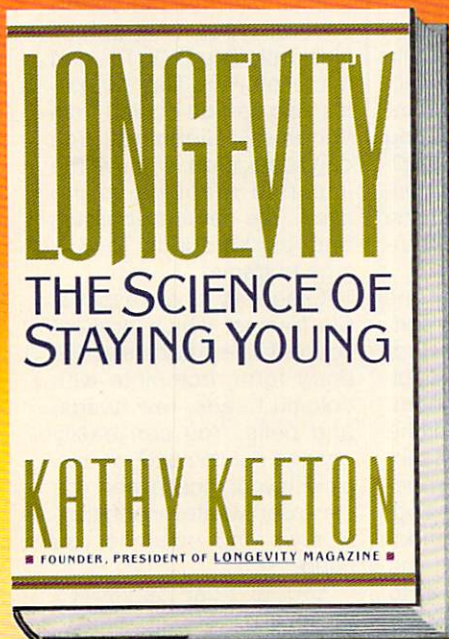
In chapter 7 of *LONGEVITY* you'll find a series of self-administered tests. In just a few minutes they'll tell you how your *biological* age compares to your *chronological* age by checking your reaction time, skin tone, visual capacity, lifestyle and stress type. No matter how young you think you are, the results may surprise you. And your detailed answers will pinpoint problem areas and suggest ways to change your habits and develop the healthier lifestyle that will add vital, productive, fun-filled years to your life.

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herent information when viewed from various angles. Your best bet is to settle on a layout for the first page and stick to it on every page, although you don't have to.

Being able to examine any slice of data at any time is a real boon for preparing reports that have to provide multiple views of data. For example, you could create two charts, one showing yearly profits by department and a second showing profits in January over a five-year period, simply by changing your view of the cube and making a chart from the selected columns or rows.

Does ProCalc have sufficient capacity to handle those really big jobs? You have access to 512 rows, 512 columns, and 512 pages, yielding 134 million cells. That ought to be enough for any spreadsheet-modeling job short of tracking the federal government. There are also more than 100 built-in math, trig, and statistical functions. Formulas can work on any range or block of cells, even across pages. ProCalc has its own command language, and it can import Lotus files. Several types of charts can be generated from specified cells.

Error tracking is an important concern for any spreadsheet, especially one as potentially data-dense as ProCalc. The program has two audit modes: Trace, which highlights all formulas that apply to the current cell, and Map, which shows a compressed view of the current page with each cell pictured as a symbol that tells you what kind of data it contains. Unfortunately, while in an audit mode, you can't print an error report or have ProCalc change a range of cells.

The screenshot shows a spreadsheet window titled 'Import MoneyCounts data'. The menu bar includes 'Cell', 'Block', 'Slice', 'MarkCube', 'File', 'Print', 'Graph', 'Data', 'Macro', 'OpSys', and 'Quit'. A secondary menu bar has 'Retrieve', 'Save', 'Directory', 'Files', 'Combine', 'Extract', 'Import', 'Export', and 'Link'. The spreadsheet itself has a menu bar with '1-2-3', 'dBase', 'dIF', 'ASCII', and 'MoneyCounts'. The data table is as follows:

		\$400.00	\$1000.00
Util (Jan)	\$54.00	\$50.00	\$62.00
Auto (Jan)	\$160.00	\$170.00	\$180.00
Food (Jan)	\$250.00	\$260.00	\$274.00
Total (Jan)	\$772.00	\$874.00	\$916.00

At the bottom of the window, a status bar reads: '1=Help 2=Edit 3=Block 4=Absolute 5=GoTo 6=Search 7=Load 8=Save 9=Recalc 10=Cra'.

*Expand your spreadsheet consciousness with ProCalc, which allows you to view a spreadsheet as a multisided cube.*

ProCalc is certainly a solid implementation—at a good price. If you routinely need to manipulate many related data sets and your company doesn't force you to use Lotus 1-2-3, take a serious look at ProCalc.

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## JUSTWRITE 1.0

Until recently, it would've been easier to convince Bill Gates to sweep floors at IBM than it would've been to find an inexpensive Windows-compatible word processor. Luckily, word processor price wars have been raging, with major titles like Microsoft's Word for Windows (WinWord) being discounted from an appalling \$495.00 to a more palatable \$129.95. The catch? To get these low prices, you must be "upgrading" from another word processor.

If you can get the \$129

price on WinWord, Ami Pro, or another high-end package, by all means do so. But if you're not on the upgrade track or if you're looking for a Windows word processor that won't bury you in a lot of fancy features you can't use, you might want to take a gander at Symantec's JustWrite.

Amazingly, JustWrite looks and acts a lot like WinWord. It features a toolbar and ruler similar to WinWord's ribbon and ruler, and while JustWrite lacks macro capabilities, it does include a full-featured spelling checker and thesaurus. The spelling checker boasts a 100,000-word dictionary, making it only slightly smaller than the 130,000-word dictionary included with WinWord.

JustWrite's toolbar icons provide access to many text-formatting functions, including font and font size, text color, text attributes (bold, italic, underline, and strike through), superscript and subscript, justification, line spacing, and paragraph spacing. Any of these icons can be added to or deleted from the toolbar, customizing it to match your needs perfectly.

JustWrite can handle many document layouts, including single- and multiple-column (up to eight columns), as well as documents that mix graphics and text. To help with the page-layout chores, you can create a style library containing frequently applied styles for text elements like titles, subheads, and body text. In addition, you can create section libraries, which define the format of a specific portion of a document, and document libraries, which store document formats.

Moreover, JustWrite has the ability to import and export several text formats, including WordPerfect and WinWord. To handle these types of documents, you don't need to use a special import function. JustWrite imports them automatically.

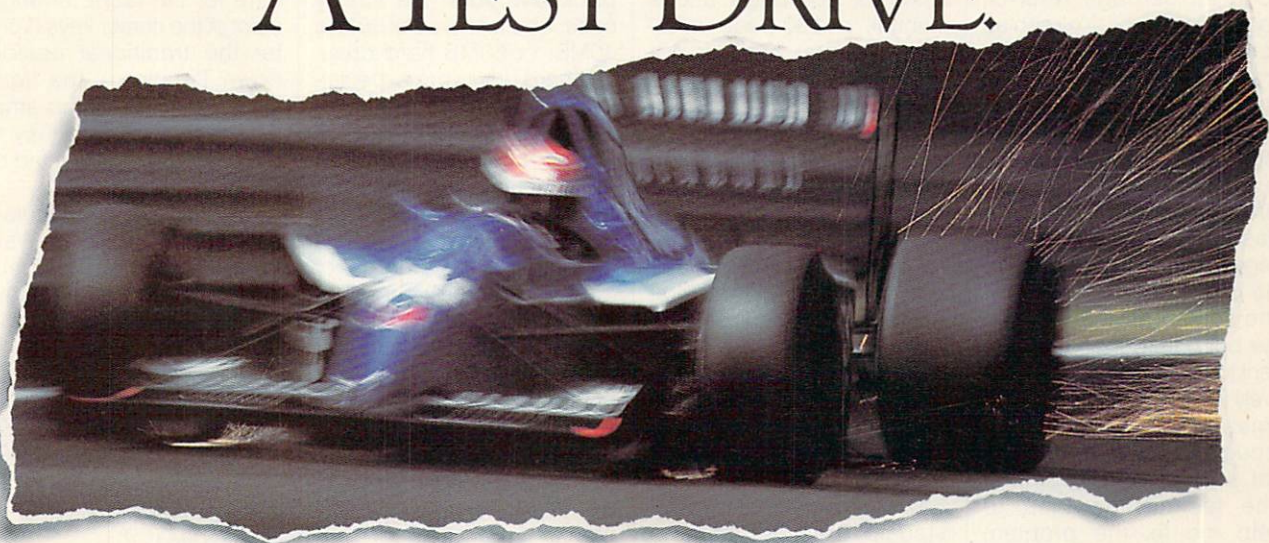
Fairly sophisticated documents can be created with JustWrite, using text, table, and graphic frames. Text frames allow you to create horizontal or vertical text banners and other special text elements, while graphic frames allow you to import several types of graphics files, including PCX, TIF, and Microsoft Paint files. Graphics also can be copied from Windows' clipboard. You can scale, crop, or move the imported graphics as desired. You can add borders and backgrounds to any type of frame.

Especially nice are the table frames, which present you with a spreadsheet-like entry form, complete with column heads, row heads, and cells. You can easily change column and row sizes with your mouse, and you can insert whatever additional rows and columns you need.

Your text can be viewed in "proof" or "detailed"



# FIRST WE GAVE OVER 1 MILLION PEOPLE A TEST DRIVE.



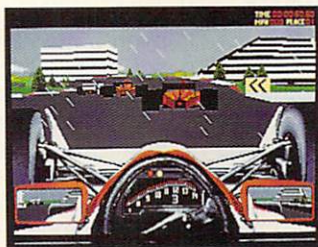
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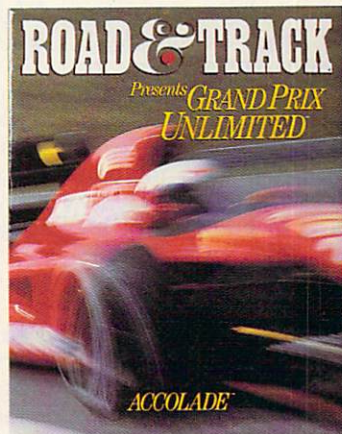
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mode, the latter of which displays invisible characters, such as carriage returns, spaces, and tabs. You can also view your document in several sizes, including normal, enlarged, reduced, and full page. The full-page view is the closest JustWrite comes to a print-preview mode. Unfortunately, on my system, I was unable to get the full-page representation to resemble closely the final output. The screen always showed the body text about 25 percent too narrow, with a deceptively wide right margin. (Documents printed fine.) Although Symantec's technical support was excellent (the technicians tried to help me fix the problem over the phone; when that didn't work, they sent out a new set of disks), I was never able to get this feature to work properly.

JustWrite supports Windows' Dynamic Data Exchange (DDE), so you can insert data from other applications, such as a spreadsheet chart, and be assured of the data's staying updated. In addition, JustWrite can handle mail merges, using ASCII, Q & A 3.0, or dBASE III/IV files as the source for the name and address data. It also can easily handle your outlining chores with its built-in outliner. You can even use JustWrite to create a table of contents or an index.

JustWrite isn't perfect. The spelling checker, for instance, takes an annoyingly long time to suggest spellings for suspect words. WinWord is more than twice as fast. Also, you can get a word count only by doing a complete spelling check, which will disappoint professional writers who need to keep close tabs on the size of their documents.

JustWrite's documentation comprises three volumes: a 200-page user's manual, a 290-page reference manual, and a 10-page quick-reference guide. Each volume is well organized and generally well written. Few users will have difficulty installing or using the product.

In spite of a few minor flaws, JustWrite is an excellent choice for a first Windows word processor. While professional writers may want to look elsewhere, general users will find almost everything they need to produce attractive and well-designed documents. With a street price of \$140 to \$160, it's hard to go wrong with JustWrite.

CLAYTON WALNUM

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## ACERANYWARE 1120NX

With the recent flood of notebook computers, it's harder than ever to find a genuinely unique notebook. The AcerAnyWare 1120NX isn't dramatically different, but it does have a number of small, well-planned features that make it stand out from the crowd.

The first thing you notice is the AnyWare's large VGA screen; it's a full ten inches measured diagonally. The screen isn't as bright as many I've seen, but the size more than makes up for any lack of intensity.

The AnyWare comes with a 20-MHz 386SX processor

(which is pretty much the norm these days for a notebook computer); a sturdy case; and a choice of 20MB, 40MB, or 60MB hard drive. The hard drives are especially fast; the average seek time for the 60MB drive we tested was just under 14 milliseconds. The unit uses two batteries which change over automatically, giving it a combined battery life of more than three hours. The twin battery system has the added benefit of letting you trim the AnyWare's 7.4 pounds by 12 ounces when you carry a single battery.

The unit really shines in the area of expandability. Besides the usual VGA, serial, and parallel ports, it has ports for a second serial device, an external floppy drive, an external keyboard/keypad, and a three-slot expansion chassis. While the unit comes with just 1MB of RAM, you can bring it up to 5MB with user-installable DRAM cards. You can upgrade the BIOS with a similar user-installable card.

No matter how well a company designs a laptop, it's even better when you can set it up just the way *you* want it. The AnyWare has the best setup program I've seen. You can configure the second serial port for an external serial device, for a built-in modem, or as a non-working port in order to extend the life of your batteries. You can set the unit to boot from C:, to boot from A:, or to automatically look for A: and then C:. You can even create two sets of power-saving options to shut down the LCD backlight and hard drive and activate the doze and sleep modes. It's easy to switch between your favorite power-saving battery configuration and an optimized

AC-power setup.

On the downside, I didn't care for the lazy-L arrangement of the cursor keys (I prefer the traditional upside-down T pattern), the right-hand Shift key is too small and therefore too easy to miss, and the unit is a tad on the heavy side.

The many small advantages to the AcerAnyWare 1120NX, when taken together, add up to a very attractive notebook computer.

DAVID ENGLISH

AcerAnyWare 1120NX with 3MB RAM, 60MB hard drive, and 2400-bps modem—\$3,395

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## SOFTWARE BRIDGE

Moving text between word processing packages consumes time and sometimes seems next to impossible because of embedded controls, wildly different print and layout settings, and proprietary languages. At such times, a good document converter proves vital. Perhaps the best known of such converters, Systems Compatibility's Software Bridge, now goes where no word processing conversion package has gone before, adding translation facilities for 12 spreadsheet and nine database formats (including Excel, Lotus 1-2-3, Quattro Pro, dBASE, and FoxBase).

Function keys handle the transfer of rows, columns, and isolated data. I tried Software Bridge on 13 programs that managed the change-over successfully. Note that these new conversions are strictly one-way—into word processing formats. While



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It's your first day at Department P, Moscow KGB and you can't help but think that whoever arranged for your transfer here either has a strange sense of humor or hates your guts.

Despite all the upheaval in the Soviet government in recent years, the KGB, or Committee for State Security, is still the most feared and pervasive intelligence-gathering network in the world. Only now the KGB itself is under secret surveillance - by you!

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### FEATURES:

- \* Movie-like storyline filled with surprising twists and intrigue
- \* Intuitive Icon-based Interface - that means no more wading through menu after menu
- \* VCR-style "REWIND" option for keeping track of important clues and information

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Schlitzberg

Депутатов



some other programs bidirectionally translate between a much broader range of software, they require considerably more input and knowledge from the user.

Little of this is necessary for Software Bridge, whose primary asset remains its ease of use as it hides translation complexity from the user. Identical font mapping during conversions occurs automatically where formats permit, and the program supports substitute fonts. If you want to see your files before translating them, just indicate their directory; as you scroll through the available file list on the left, they're displayed automatically in their native formats on the right. You can process one file or several, though you're limited to a single format conversion (WordPerfect 5.1 to XyWrite, for instance) per round.

If you need to perform format conversions, Systems Compatibility has a bridge for you. Supporting 60 formats in all, Software Bridge comes strongly recommended.

BARRY BRENEAL

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## QUICKAUTHOR

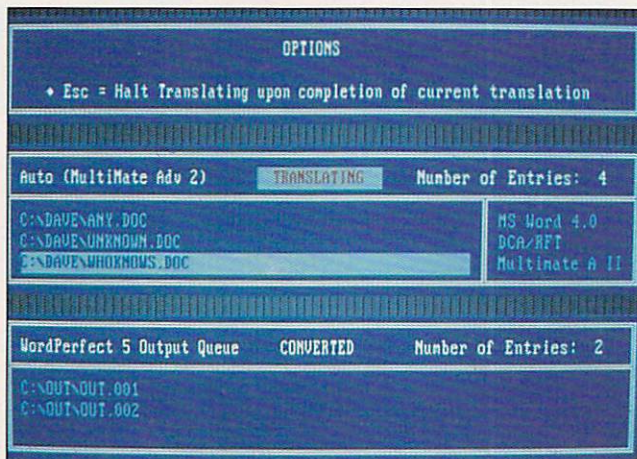
An application development environment for nonprogrammers? You bet. That's the promise of QuickAuthor. With it, you can create stand-alone applications like tutorials, software demos, online help systems, and hypertext systems.

QuickAuthor does have a few limitations. Its applications can use only character-based displays, and they re-

ceive all input from the keyboard. But until the GUI revolution, almost every DOS program shared these properties. QuickAuthor has only one significant limitation. It can only display information, not process it. You can't write a sort routine using QuickAuthor, for example.

full-featured editor, which can create, modify, and store any type of character-mode screen, whether you design or copy it.

Next, you must specify how to move between screens. Essentially, you tell QuickAuthor, "If you're at screen X and the user presses



Software Bridge, which can translate many spreadsheets and database formats, moves info from spreadsheets to word processors.

Still, it has myriad uses.

For instance, how about implementing an online employee handbook? Maintaining it on a local area network would make it continuously available to all users, and it could be updated without huge printing costs.

QuickAuthor makes designing applications a snap. There are two steps: creating the screens that the user will see when running the application and telling QuickAuthor how to move between them. Applications may contain up to 800 screens, so there are few jobs too large for QuickAuthor to handle.

QuickAuthor contains two screen-design utilities. First, it includes a screen-capture utility, which copies any character-mode screen displayed in another program, such as in a word processor or spreadsheet. Second, it includes a

key Y, display screen Z." When finished, simply save the application as an EXE file. It will not require QuickAuthor or any other support files to run, and you may freely distribute it, paying no royalties of any kind. Use of images from other software, however, is an issue to be resolved between you and the copyright holders.

QuickAuthor's power, simplicity, and almost unlimited number of uses make it an excellent program. The program can be a valuable addition to any user's set of tools.

RICHARD RAPP

IBM PC and compatibles, 640K RAM—\$129

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Circle Reader Service Number 366

## AVERY PERSONAL LABEL PRINTER

The Avery Personal Label Printer is a secretary's dream. If you're not actually a secretary but you only function as one for your family or some charitable organization, you'll still love this machine.

In my experience, professional-looking printed labels are almost more trouble than they're worth. Setting up those labels (which almost always come off inside the printer) and getting them to print at the right place (before you use up all you have) add up to one big headache. If I only have one label to print, it's often handwritten. Save a headache, sacrifice an impression. But at last there is a low-cost solution to this dilemma: the Avery Personal Label Printer! This little machine (only six inches tall and four inches wide), along with its accompanying software, takes the hassle out of labels. It takes only 3½ seconds to produce laser-printed labels with a 137-dpi resolution. That makes for good-looking labels! It's so easy to use that you couldn't get it to jam even if you tried to operate it before that first jolt of morning java. You stick the labels on the spindle, drop the spindle in the machine, and stick the end of the labels in the only possible place to put it. The machine feeds itself. There are only two buttons: power and form feed.

Another groundbreaking simplification by the folks at Avery is the software included in this package: Label Pro and Personal Label Printer. Label Pro lets you design labels and store the formats to use time and time again.



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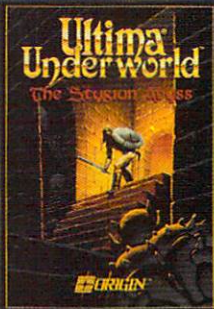
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## REVIEWS

It's just detailed enough to give you all the choices you need (scalable fonts, the ability to add PCX clip art or other graphics, and templates for all types of Avery labels) and simple enough to use within ten minutes of booting it up. Personal Label Printer is a hot-key program that lets you print a label from wherever you are in your computer files. Let's say you're typing a letter in WordPerfect or XyWrite and you want to print a label. Just hit the hot key to activate the program, highlight the address, and print. To add icing to the cake, both of these programs give you the option of printing a postal bar code or code 39 on your label.

This is a first-class printer, and it does a first-class job. Paper-shuffling office work is time-consuming enough; anything that makes it simpler rates high in my book. The world needs more simple ideas that work well; it's the simplicity of this machine and these programs that makes me a fan.

DANA STOLL

Avery Personal Label Printer—\$279.95

EVERY-DENNISON  
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Covina, CA 91724-3624  
(818) 915-3851

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## CONAN THE CIMMERIAN

Thirsting for vengeance? Perhaps you should try venting your spleen with Conan the Cimmerian, an adventure game in which you assume the role of a fantasy hero.

When the game begins, Conan, your alter ego and the game's namesake, is a young blacksmith. He finds his town overrun by the evil forces of Thoth Amon, high priest of the snake god Set. Conan's village is raided, and his wife is brutally killed. Conan seeks vengeance: the death of the evil high priest.

Virgin has brought Robert E. Howard's popular hero to the microcomputer with this new adaptation of the game engine used in Excalibur. The four levels of play include a top view world map, an oblique top view city map, a dungeon map, and interior side view scenes. The top view world map and the side view interior scenes are similar to the earlier Virgin efforts of Spirit and Vengeance of Excalibur.

Mouse, keyboard, and joystick work smoothly to control Conan's movement and combat, except when Conan gets stuck on buildings or on the inhabitants who walk the street. When Conan contacts inhabitants, an interior scene pops

up for conversation or combat. Conversation is brief and is terminated quickly unless you bribe for more information. Conan needs to break into homes and steal gold to buy training and equipment. Thievery gets Conan thrown into jail, where all his hard-earned gold—but no equipment—is taken.

Combat and exploration are in real-time, and many of the inhabitants are tougher and faster than Conan. The world of Conan is a very lethal place. As Conan, you'll need all your wits and reflexes in order to survive. You'll need to take notes on conversations and map your surroundings (the game has no automapping). In order to compensate for the difficulty of the game, Conan is reincarnated automatically when he dies.

Whether you're simply a fan of Conan, an adventure gamer who appreciates arcade action, or a bloodthirsty brute looking for a socially acceptable outlet for your aggression, Conan the Cimmerian could be the game for you.

ALFRED C. GIOVETTI

IBM PC and compatibles; 640K RAM; EGA, MCGA, VGA, or Tandy; 10-MHz processor recommended; hard drive recommended; Microsoft-compatible mouse recommended; joystick optional—\$49.99

VIRGIN GAMES  
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Irvine, CA 92714  
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## HOWTEK PERSONAL COLOR SCANNER

I'm not an expert desktop publisher, a great computer artist, or even a seasoned scanner user. But this flatbed scanner made me look like all three. After I spent several days with it, the sky opened up, and creating professional-quality scanned color images became second nature to me.

The scanner fit on my desk with room to spare. It measures about 12 x 20 inches. A long cable was provided to connect the scanner to the card installed in my computer. Although the card has jumper settings so you can work around equipment conflicts, I didn't need to. Everything worked properly when I first fired it up.

I had my choice of eight software packages and chose Tempra Pro, since I'd used it before. I'm not sure if my results would've differed with a different program, but Tempra Pro worked well. It was fairly easy to figure out without the manual. That's good, because when I did read the manual for advice on the finer points I found it to be poorly written and incomplete. For example, it gave information about how



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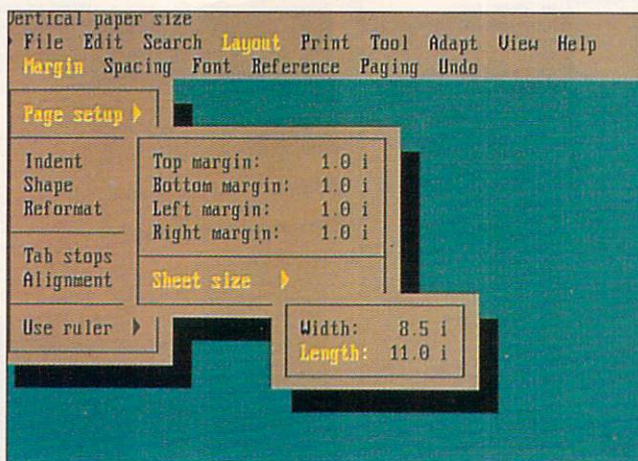
to add more light to an image but not why you might want to make such a change. Nor were there any tips on how you could maximize Tempra to get the best picture. That's not the Howtek folks' fault. The manual concerning the hardware was complete, clear, and easy to read.

There aren't many adjustments you can make. That's good for someone like me. The areas I focused on included the color saturation for red, green, and blue; overall light exposure; scan area; and sharpness. Soon I got a feel for which settings were best for different kinds of images. I found it easier and easier to get close on the first scan.

Tempra saves in just about every kind of file format you can imagine, but I was only interested in PCX and GIF. The saved files loaded easily into other programs, a welcome situation after the file-incompatibility problems I've had with some software.

I scanned about 50 official NASA photos and transparencies, among other things. Not only did the scanner work remarkably well with transparencies, but the quality was astounding in 640 x 480 VGA with 256 colors. I went down to 320 x 200 VGA with 256 colors to see how it did. Considering the low resolution, it wasn't bad.

All of these images can be found on COMPUTE/NET on GENIE and America Online. If you want to see for yourself what this scanner can do, log on to GENIE or America Online and use the keyword COMPUTE to find COMPUTE/NET. Then, call up a directory of the COMPUTE's Art Gallery section of our software library. Download several images and use



*Improved menus are one of many reasons why PC-Write Standard Level 2.0 remains a wonder of a word-processing package.*

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## PC-WRITE STANDARD LEVEL 2.0

In an era in which WordPerfect straddles the world like the Colossus at Rhodes, you might wonder why other word-processing companies even make the effort. To its credit, Quicksoft has steadily made the effort since 1983, maintaining PC-Write's position as probably the best piece of word-processing shareware available. Loyal users of PC-Write can now celebrate Quicksoft's re-

lease of PC-Write Standard Level 2.0, a word processor that preserves most of its earlier incarnations' familiar features while adding enough new goodies to make this one definitely worth checking out.

PC-Write Standard is a shareware product rich in the features that most people expect in a retail word-processing package: easy-to-learn editing commands, automatic spell checking, plentiful help screens, easily changed document format, a variety of fonts and effects, word counting, automatic pagination, and the like. You'll also appreciate such attractions as automatic placement and numbering of footnotes and endnotes, as well as file merging for personalized form letters, invoices, and mailing labels. Veteran users of PC-Write are already familiar with these features and will find that the essential commands haven't changed in Standard Level 2.0. But they'll be delighted by its addition of pull-down menus which duplicate—and in some cases speed up—the familiar PC-Write keystroke commands. Such

things as margins, spacing, and fonts (a lot of the old Alt-G commands that required recourse to the manual or the help screens) are now quickly altered via the menus. In fact, one of PC-Write's strongest features is its ease of adaptability. Although during installation you're asked to choose which of the three levels you'd like to use (Core, Basic, or Standard), the levels can be changed at any time. Within each level, you can readily choose or reject individual features to configure PC-Write to your particular needs.

Quicksoft knows PC-Write isn't the only word processor you'll deal with. Older versions of PC-Write allowed you to convert files to and from WordStar format; in PC-Write Standard Level 2.0, conversion to and from WordPerfect is available, as is conversion from PC-Write's own earlier versions or any other ASCII file or word processor that supports IBM's Document Content Architecture. The company wants to make sure that you know how to use the program: Besides the PC-Write Tutorial printed out during the installation process, an online tutorial is available, along with a large number of detailed help screens. Registered users of PC-Write will receive the booklet Getting Started, a primer in PC-Write's basic functions, as well as the Reference Manual, which describes how to use all of the program's features. (Warning: Beware of a frustration-causing misprint in step 3 of "Merging" on page 78; the S doesn't belong in the sequence.) Also available to registered users is Quicksoft's helpful technical support line. As a further inducement to do the right thing and register your copy, Quick-



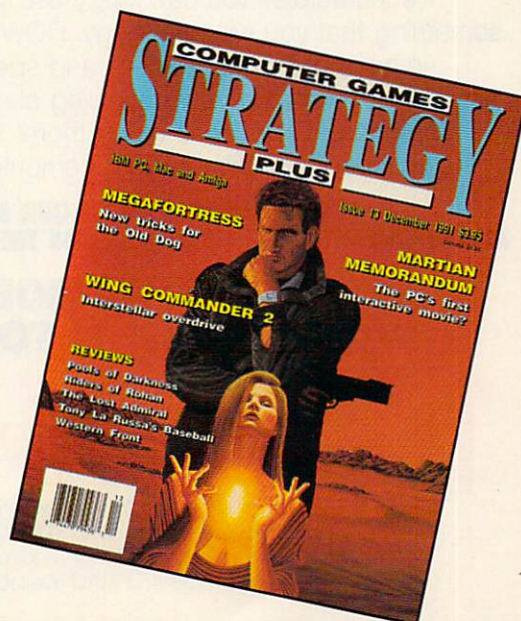
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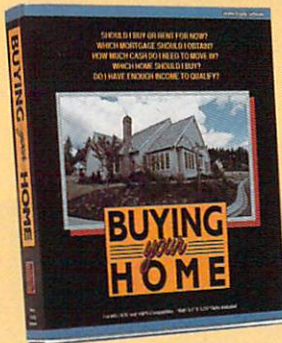
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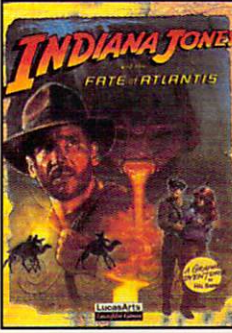
It's both. With the TEFAX RA-2125, Relisys has captured the best of two worlds. You get the convenience of a full-featured fax machine, eliminating the need to buy a scanner and a fax/modem board that must be installed inside your PC. But you don't lose the flexibility in editing and printing faxes that a fax/modem board provides. Plus it's easy to install, with the machine connecting to your PC's serial port via a cable included in the package.

Although the TEFAX RA-2125 doesn't completely eliminate physical bulk the way a fax/modem board does, it's still a relatively compact machine. It's also powerful. Even if you don't use the AutoFax software, the TEFAX RA-2125 can still store 100 quick-dial phone numbers and 10 one-button numbers, transmit and receive ready-to-go faxes, send faxes automatically at specified times, poll one or more other machines for faxes needed, and copy documents instantly.

Entering a phone list and other information can be awfully time-consuming on the TEFAX RA-2125, but the AutoFax

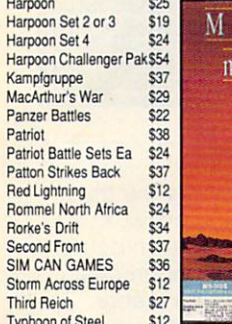


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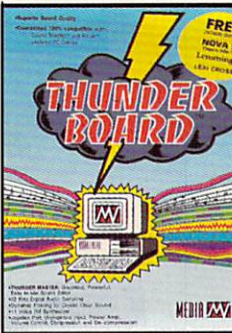
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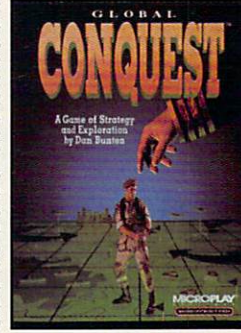
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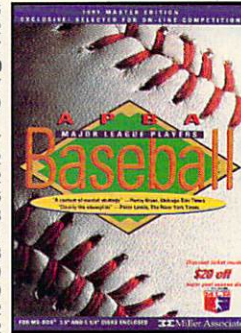
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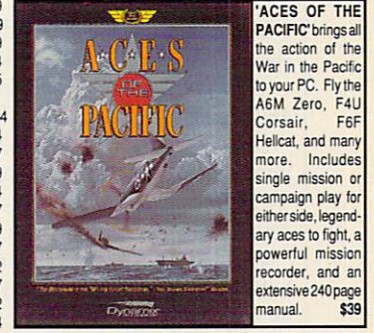
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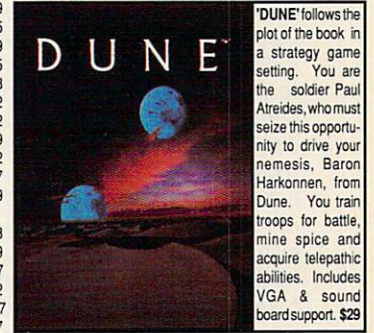
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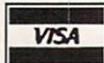
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software helps—in this area as well as others. While not quite as clear and user-friendly as some fax/modem software—there are many different layers, with varying complementary features accessible only at certain levels—AutoFax is a relatively straightforward, efficient communications tool. You need a mouse to take full advantage of its editing capabilities, though.

By choosing items in a series of submenus of a main menu that always stays at the top of the AutoFax screen, you can create your own fax phone book, make a cover sheet, and profoundly alter documents or graphics files by changing their size, position, or contents. AutoFax allows you to print out faxes on either your computer's printer or the fax machine itself and to receive incoming faxes on the machine, your computer's hard drive, or both. You view the faxes on a rectangular box that pops up in the middle of

the screen. Since the box is wider horizontally than vertically, it can be hard getting a clear idea of what a fax looks like as a whole without making a printout, even after using a helpful scaling function to reduce or enlarge it. The manuals for both the hardware and software offer clear guidance, though the booklet for the TEFAX RA-2125 lacks an index and the AutoFax manual has no troubleshooting guide.

If you need more than either a fax machine or a fax/modem board has to offer, the Relisys TEFAX RA-2125 may be what you're looking for. It puts both technologies together in one concentrated, versatile package.

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It's touted as "the straight answer to scanning," a description that's right on the money. SCAN:ALIGN is a devilishly simple device that makes hand scanning a fast and efficient operation rather than the tedious and frustrating task it usually is when attempted freehand.

The SCAN:ALIGN unit is a plastic scanning "table" measuring about 20 inches long and 10 inches wide. The base table has a grid imprinted on it for aligning the material to be scanned. The document to be scanned is placed under a clear acetate sheet covering the grid table. A second sheet of rigid plastic with the center removed acts as the scanner "track" and is hinged to the bottom plastic table with the acetate sheet sandwiched in between.

Plastic templates which accommodate more than 25 of the most popular hand scanners are provided. These tem-

plates glide along the track like a sled between two rails. The scanner fits into the opening of the appropriate template, which keeps it aligned. The result is a truly ingenious solution that dramatically increases the accuracy of hand scanning.

Using SCAN:ALIGN could not be simpler. The text or art to be scanned is placed on the table and aligned using the handy silk-screened grid markings. Next, the protective acetate sheet is placed over the material to protect it and keep it from shifting position. The track is lowered over the acetate, and the correct scanner template is placed between the two side rails of the track. Then the scanner is placed into the template's receiver opening, and you're ready to scan—that's all there is to it.

I found SCAN:ALIGN to be a terrific aid when scanning text material for OCR (Optical Character Recognition) purposes. Additionally,



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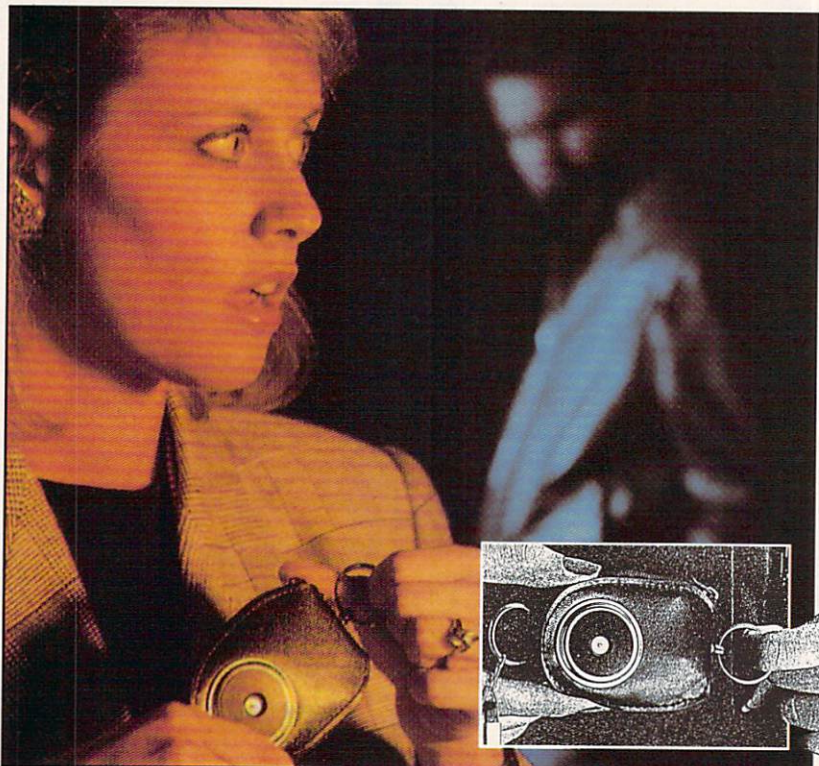
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Scanning photos and line art is also much faster and easier with SCAN:ALIGN, since it makes it possible to do straight, accurate scans the first time. Cleanup of errant pixels is also greatly reduced, so you'll save lots of time in prepping your scanned art for use in desktop publishing or other applications.

SCAN:ALIGN is a must-have accessory for anyone who uses a hand scanner. It's a great tool that actually lives up to its manufacturer's hype.

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## THE MAXIMIZER AND MAXIMIZER LITE

They may sound like new brands of malt liquor, but The Maximizer and Maximizer Lite are actually very similar variations on the theme of powerful contact-management software. As you might expect, Maximizer Lite is a stripped-down version of The Maximizer, though the two programs operate identically up to a point.

At its most basic level, contact-management software serves as a meta-Rolodex for your PC, with some word processing, electronic communications, and automated calendar functions frequently tossed in for good measure. In addition to keeping track of names and addresses for your clients or business contacts, The Maximizer also allows you to keep up with their birthdays and hobbies, the dates you last talked to them, and how soon you need to make contact again. If you have a Hayes-compatible modem, it dials their numbers for you. The Maximizer prints out letters—individually or personalized in bulk—to people you need to stay in touch with, and it makes a note of both the date and subject of every letter you send. The program has a pop-up calculator, an elementary ledger program, and a feature called MaxMerge for people who need to move their databases around, as from a desktop PC to a



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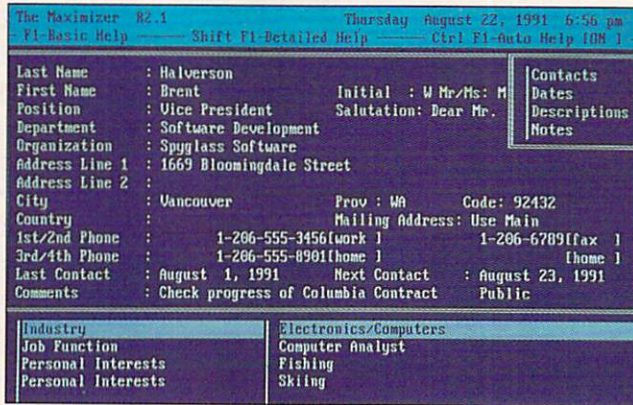
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laptop. All of its features work well, offering no unpleasant surprises either in setup or execution.

This is highly specialized software, geared toward people who have ongoing, complex relationships with many clients. The Maximizer does so much that it's hard to keep up with it all—and hard to remember which sublevel of a sublevel holds a given tidbit of information once you remember to look for it. Navigating The Maximizer necessitates wandering through a maze of choice-filled menus, each of which opens onto another choice-filled menu. You can do a lot with the program, but in the process you have to remember a lot of not-always-obvious keystrokes and



The Maximizer and Maximizer Lite are variations on a powerful—and complex—contact-management software theme.

consult help screens, a quick reference guide, or the manual quite a bit. With so many options, the macro feature offers little relief unless you're using The Maximizer for a very

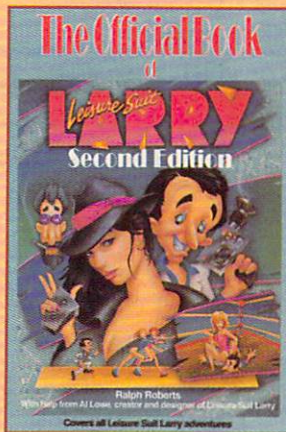
narrow range of uses.

Complexity almost invariably goes hand in hand with greater power. But Maximizer Lite, which reduces the complexity to a modest ex-

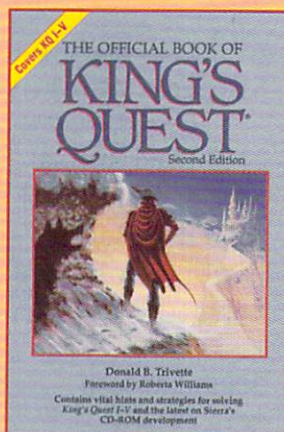
tent, retains a surprising amount of The Maximizer's considerable power. The main losses are the personal records feature available in The Maximizer, which includes the income and expense ledger and a diary feature for keeping track of notes. But PC owners without a hard drive gain the ability to run the program on two floppies, and Maximizer Lite also comes with a fine program to print out client information in the form of a phone book, on labels, or on actual Rolodex cards.

Tastes great? Less filling? Let's just say that each has its own attributes, along with a few drawbacks. If you need the kind of features the Maximizer programs offer,

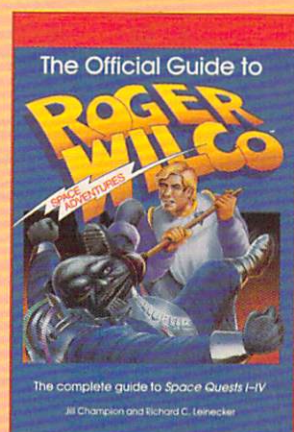
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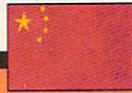
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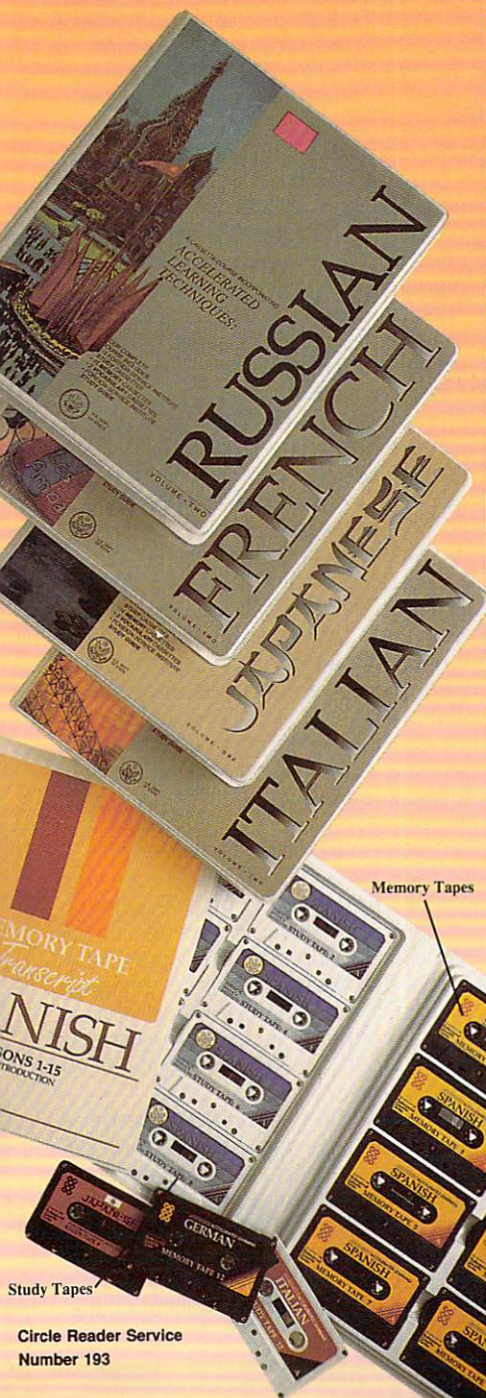
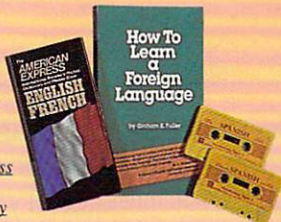
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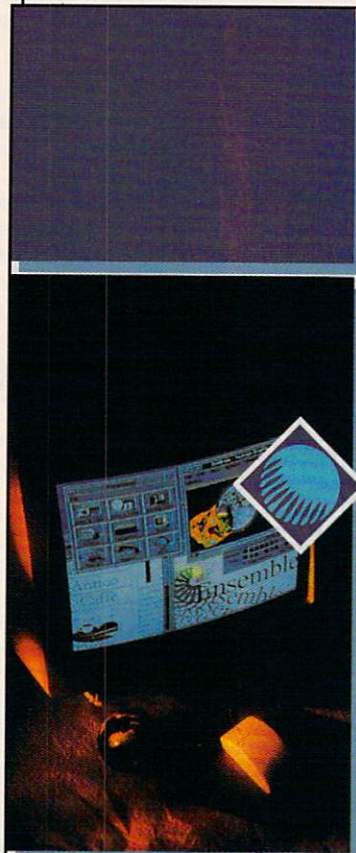
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there's plenty of potential in either as long as you're willing to take the time and effort necessary to tap into it.

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Circle Reader Service Number 373

## ON THE GOFAX

It sounds strange: faxing documents using neither a fax machine nor a fax/modem board, just a modem. But if you've got the necessary hardware, On the GoFAX makes faxing documents a snap anywhere you can connect your modem to a phone line, whether it's your office or a hotel room.

Though designed for use on the road from a laptop or notebook computer, the program could even serve as a send-only substitute for a fax machine or fax/modem board from your desktop PC. The cost of faxing those pages, though, would add up to the cost of a send-and-receive board in a hurry. At current rates, it costs \$3 to fax one page and \$2 for each page thereafter. Local fax stations probably run a bit cheaper. Still, On the GoFAX might come in very handy at odd hours or in unfamiliar places, and your call to the service bureau that does the actual faxing is toll-free.

After a setup procedure in which you assign a credit card number (a password safeguards against fax-charge theft), On the GoFAX presents a menu. Changing the standard information that goes out on each of your fax pages won't pose major difficulties, and creating fax documents with the rudimentary text editor doesn't demand much finesse.

This virtual facsimile machine can also transmit text files in ASCII from your own word processing program, graphics files, and multiple versions of the same file to different recipients. My only real complaint is with the annoying screen blips and silly sound effects that accompany incorrect keystrokes and the conclusions of various GoFAX procedures.

Whether On the GoFAX looks like a bargain largely depends on how desperately you need to fax something at any given moment. For everyday use, the service seems prohibitively expensive, but the software itself does not. As an insurance policy for those times when you may need late-night or on-the-



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Circle Reader Service Number 374

## DISCXCHANGE

Daunted by the prospect of installing a hard drive? Interpreter simplifies the process with DiscXchange, an externally mounted hard drive complete with software that assigns drive letters and does your formatting for you.

The unit has several interesting features. It hooks up to your computer through the standard IBM parallel (printer) port. The disks aren't built in but are contained within roughly 5¼-inch square x ½-inch thick removable cartridges. You can change 44MB or 88MB cartridges as easily as you might change floppy disks. Though it requires a 120-volt power outlet, the unit itself is easily transportable, weighing seven pounds and measuring 6½ x 2½ x 14 inches. It even has a carrying handle.

The DiscXchange driver software automatically assigns device letters which fall beyond those of the computer system to which the unit is connected. The driver software is completely transparent—use these drives like any other drives in your system, because all the DOS commands and routines apply. Disk access is reasonably fast—as much as 127 KBps, with an average seek time of 20 ms. Add to this self-diagnostics, built-in defect management, and automatic error correction, and



Let the software do the hard part for you with DiscXchange, an externally mounted hard drive that's fast and easy to use.

you have a unit that's a real contender!

Unfortunately, getting started can be a problem. I used an XT-compatible desktop clone on my first attempt to install DiscXchange. The software provided (in both 5¼- and 3½-inch low-density floppy disk formats) contains a TSR routine, DX44, which automatically assigns drive letters to DiscXchange that follow those of the host computer's resident drives. My XT has the equivalent of six drives, A–F, two of which are hard drive partitions. When the DX44 program was first run, a message appeared indicating that a communications problem existed, something possibly related to my parallel port. But the DiscXchange active light came on during all this, causing me to suspect that the real problem was an unformatted hard disk cartridge.

Because of this suspicion, I loaded another file from the installation disk, SQPREP, to do formatting. (There are two low-density installation disks provided for both 3½- and 5¼-inch disk drives.) A message ap-

peared on the screen asking for the non-SCSI drive count. It wasn't asking how many hard drives I had, but whether my partitions would count as one or two hard drives. To play it safe, I decided to use my XT-compatible laptop, which has two floppy drives and no hard drives. After loading the installation program and then the formatting file SQPREP, I chose the No Non-SCSI Drives option and followed the default selections. The 88MB cartridge was correctly formatted with three partitions—two of 32MB and one of 24MB. The drive letters became C, D, and E, as was appropriate for my two-drive unit.

Reattaching DiscXchange to my desktop, I loaded the driver software. Magic! Not only was DiscXchange recognized and accessible, but the drive letters were automatically assigned after the letters already in use. I now had a G, an H, and an I drive—just what I was supposed to have. Because operation of the DX44 driver is completely transparent to the user, copying files to DiscXchange and running soft-

ware is a completely natural process with no hitches at all.

I'd love to have a DiscXchange unit to keep. It's fast, easy to use, reliable, and convenient.

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DiscXchange—\$1,595 for 88MB version, \$1,294 for 44MB version

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## THE SECRET CODES OF C.Y.P.H.E.R.: OPERATION WILDLIFE

I thought it strange that an undercover agent drove a pickup truck. Now, after he's abandoned me in front of a dilapidated feed store on this deserted street, I'm wondering whether he's a double agent. No matter. All I can do is go into the store. With a little luck I'll find another agent who'll take me to headquarters. Inside, the woman behind the counter gives me a mean stare, then nods toward some shelves filled with jars and boxes. I swallow hard and step toward the shelves. They slide apart, revealing a narrow hallway. My heart races. I remember the pickup truck and fight my instinct to ditch this dive. I've begun this mission, and I have to see it through. I brace myself and step into the hallway. Ahead I see flashing lights. Gadzooks! It's the sign-in computer for Operation Wildlife!

This is where Tanager Software leaves you in its new educational game, The Secret Codes of C.Y.P.H.E.R.: Operation Wildlife. You're a secret



# Pacific Islands

THE SEQUEL TO TEAM YANKEE

The year is 1995 ...

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*Pacific Islands is a hectic race against time.*

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- Non-linear gameplay allows you to attack each island in many different ways.
- Call up artillery and lay minefields.

### Tank Battles

- Test your mettle in this campaign of over 25 interlinked scenarios.
- Liberate villages, destroy ammunition dumps, disrupt jungle supply lines, defend bridges.
- Infra-red imaging, laser range-finding, TOW missiles and DPICM artillery back-up.

Use your strategy skills to effectively fund your campaign.

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### Communications Facilities

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### Unrivaled 3D

- Fast action, 3D real-time tank simulation using Empire's unique bit-mapped technology.
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- You must destroy all communications facilities as swiftly as possible. The longer you take, the more information the enemy have about your position and strength.



- Cope with multiple objectives - can you destroy an airfield, support a convoy, and make a reconnaissance within 40 minutes?
- Purchase all your equipment.
- Is there enough time and money to repair your damaged tracks and give the crews some rest?



- T72s, BMPs, Hughes 500 Helicopters and SA9 Gaskins.
- Eight different types of fighting vehicles modelled so that you even see the rivets!
- M1 Abrams, M2 Bradleys, M113 APCs, ITVs.





agent, and your mission is to decipher messages for clients. Along the way, you learn about mammals as you collect pieces of code. The fun part is unscrambling the code, especially if you use an alternate alphabet. I like decoding in American Sign Language, but you may find Braille, Morse code, semaphore, or Greek more fun—and English more manageable.

A lot of thought and planning went into Operation Wildlife, evident in its terrific artwork and tiny details. It's delightful: You use a code name, doorknobs turn, sound effects are catchy and appropriate, and mammals are positioned in their correct habitats. A bonus feature lets you send messages to other players, so you can carry on conversations with friends who've signed into the game. Your message is encoded, and your friend has to unscramble it. It's fun to leave silly and sometimes cryptic notes.

You select your client from an extensive list detailing each client's bio. It includes Ruth the Snoop, a gossip columnist who seeks exclusives; Dr. Celeste Lal, an astronomer who's secretly studying a quadrant of the galaxy; Heidi N. Tzeeck, an animal tracker who's looking for a lost wolf; and Murray Sackum, a coach whose team is a shoo-in for the Super Bowl. This motley crowd's bound to have someone who piques your interest.

You learn the names of Indian tribes, constellations, trees, and a host of other subjects that serve as the street names where you meet contacts. Successfully identify a mammal from your contacts' clues, and you receive a bit of coded message. Collect all the pieces, and you're ready to decipher.



This wildlife park in *The Secret Codes of C.Y.P.H.E.R.: Operation Wildlife* features 87 mammals in their natural habitats.

As you play, you also learn all sorts of information—habitat, range, size, winter color, and so on—about a seemingly endless number of mammals. And don't think this game is just for kids: It includes a tapir, a sugar glider, and other animals most people haven't seen or heard much about. Need help? Tap *FunCyclopedia*, located on your watch. It's just what you'd guess: an abbreviated encyclopedia full of fun facts about mammals.

Unscramble the puzzle, and your client replies with a message, which in turn elicits a response that you have to collect and decipher. So it goes until you've received all the transmissions and the case is closed.

Although it'd be great to see the animals animated, there's little to complain about in Operation Wildlife. It's a fun way to spend a rainy day and a great way to learn about animals. I'd tell you more, but I think I see Eagle behind that cypress on your right, and I've been waiting for her for an hour . . . something about a scandal involving Mike Robe and the park's water supply.

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## THE LOST ADMIRAL

The Lost Admiral really sizzles in fulfilling its claim to be "the strategy and tactics game of the decade." It makes no claims to realism, but it's still impressive.

The beauty of the game is in its strategy. Every ship has its advantage and its disadvantage, which makes for a very balanced game. The carriers have no planes, and the submerged stealth submarines can be seen by PT boats and destroyers. Carriers can reveal the location of the enemy. Transports can't harm PT boats, subs, or other combat vessels, and they must be in a port for a full turn to accumulate points and win the game. Even if you destroy the entire enemy fleet, you still lose if your trans-

ports aren't docked.

The artificial intelligence algorithms take into account limited or unlimited fuel and ammo, movement and combat weather effects, and the ability to randomize or set home port cities.

The Lost Admiral has a variety of options for the campaign and 11 difficulty levels. Nine basic scenarios, as well as one randomized scenario, provide enough variety and consistency for many hours of play.

Unfortunately, the game lacks a scenario editor for allowing the player to set parameters of intelligence and play conditions. Also, you can't save the game in the middle of a battle and return to try alternative solutions. The game has no replay or VCR function to review your errors and triumphs.

You may be put off by the game's lack of realism, but I feel that this increases the emphasis on strategy and the balance of the game. The game's best attributes are its fun and playability.

The Lost Admiral is no hard-core war game, nor is it a simulator. The game designer claims that the game is more of a cross between chess and a traditional war game. This is an abstract strategy game. The overall result is that The Lost Admiral is fun to play and contains enough optional features to keep most war gamers and other gamers happy playing the game for years.

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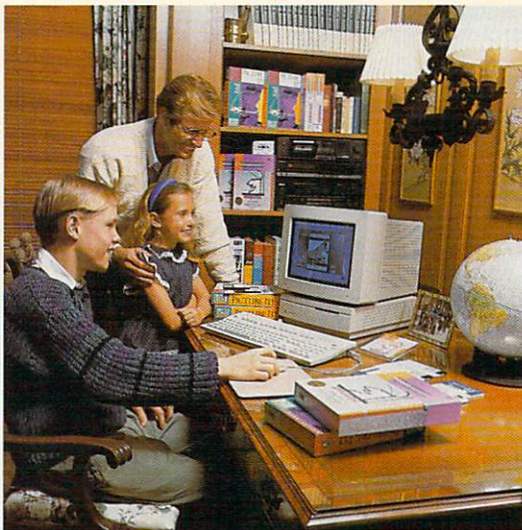
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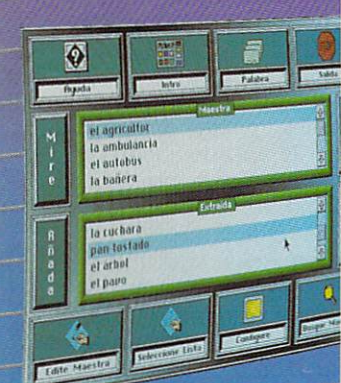
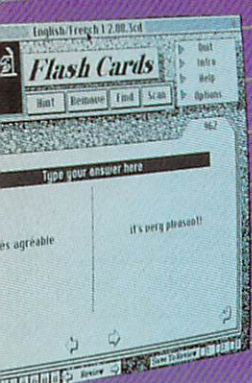
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## DESKTOP PUBLISHING BY DESIGN, VENTURA PUBLISHER EDITION

I bought this book, for about \$25, a year ago in a previous edition for PageMaker. Even though I didn't have PageMaker, I gladly bought the book because I discovered, after checking every bookstore in town, that it was the only book on design that I could find.

Design is in the neglected corner of desktop publishing. Perhaps it's intentionally neglected because, with all the technological advances in desktop publishing, about the only way to tell a professional from an amateur publisher is by his or her grasp of design concepts. Like an alchemist from the Middle Ages, a designer's most precious possessions are the secrets left out of procedural notebooks. After all, where would we be if *anyone* could turn dross into gold?

One answer is that we would be surrounded by gold, which is not the way I would describe the situation in desktop publishing today. There's a lot of dross around, and precious little gold. The only thing that's changed since "Lasercrud" (an article in a desktop publishing magazine decrying the terrible look of homemade documents) is that a lot more people have laser printers and an even smaller proportion have any idea how to use them. Hence, more crud.

The fact is that the only way to really learn design is by doing it and by learning to look at designs critically. *Desktop Publishing by Design* takes the approach of

providing dozens of pictures of exemplary design, completely documented with explanations of why the designs work and how to generalize the ideas you see illustrated. Then there is a section on Ventura Publisher in which you are led through the creation of the layout for various kinds of publications.

Although there are subtle differences in the two editions of *Desktop Publishing by Design*, the principal difference between the two is the 103-page section on Ventura Publisher projects. If you're already very familiar with Ventura and, like me, you bought the original edition of the book to learn design, there is no overpowering reason to buy the new edition. Furthermore, the new edition only talks about the GEM version of Ventura. Windows isn't even mentioned. For this reason, the book works better as a text on design than as an introduction to Ventura Publisher, even if you're completely new to Ventura Publisher for Windows or the Macintosh version.

Something else is missing, too. I love to read *Ad Week's* sister publication, *Marketing Week*, because it takes a critical look at real advertising (in print and on television). I have learned much from its discussion of unsuccessful ads (poor integration of graphics with text is the most common failing, with illegible or unreadable text following close behind). I wish the authors of this book had brought in a section—even a brief one—on layouts that don't work and layouts that almost work. I would have enjoyed watching a makeover in progress. After all, if you're a beginning designer, you'll most often find yourself fixing up your

own mistakes, trying to get disparate parts of layouts to work (or at least live) together. A section on makeovers would have been more useful than yet another introduction to Ventura Publisher.

All this aside, however, *Desktop Publishing by Design* is an unparalleled introduction to the field that will be useful to any beginning designer or desktop publisher.

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The plot sickens as your alter ego, a gummy (the English worker lampooned by Monty Python), loses four pieces of his brain, which merrily hop away. You pursue the brain pieces as a gummy, a fish with a human head, a foot that behaves like a pogo stick, and a bird. In a trip through a landscape inspired by trouper Terry Gilliam, you collect eggs, sausage, beans, and Spam. You're not completely de-

fenseless. You can pilot your gummy around exploding kittens and upper-class twits or throw fish at them to uncover the objects mentioned above and destroy cheese, which also removes points from your score.

Your score starts at 99,999,999 points, and you lose points as you play the game. For every 10,000,000 lost points, you get another life. Throwing fish at silly places also causes you to lose points. If you lose enough points, you'll obtain nine lives, which will regenerate indefinitely, making your gummy invincible.

There's no save-game feature, and non-IBM versions have on-disk copy protection that may damage the disk if you attempt to copy it. Having to identify smelly cheeses from the documentation is an additional and appropriate copy-protection scheme.

The Official Hungarian Phrase Book [*sic*] comes with the game and is composed of 44 pages of hilarious Monty Python-like humor, some of which is copied from the original show. The book is much better than the game itself.

The game is quite difficult, with nothing distinctive beyond the Monty Python theme. It makes me wonder why there's no infinite lives switch for us Monty Python fans over 30 who wish to wax nostalgic but who don't have the arcade reflexes of a 12-year-old.

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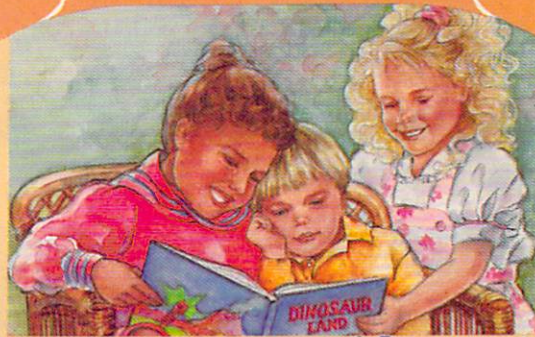
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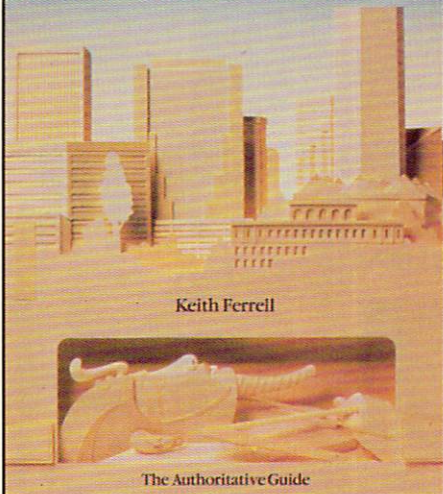
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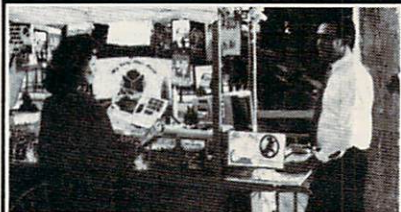
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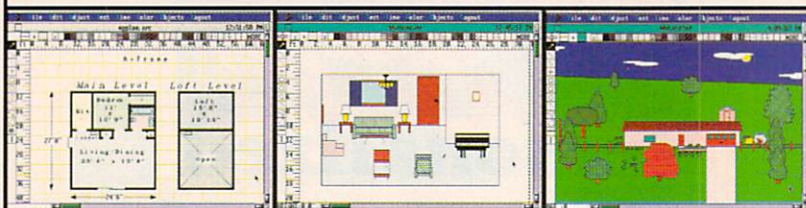


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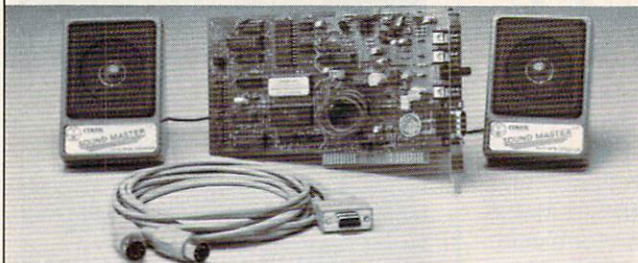
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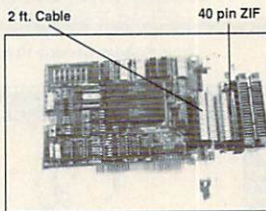
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# NEWS BITS

Jill Champion

## Bills Plus

Southwestern Bell may be on to a future trend: In a four-month test run, the phone company is billing a portion of its business customers via floppy disk or modem rather than the U.S. Postal Service. Bills are uploaded and analyzed on the customer's PC using special software developed by Southwestern Bell.

Advantages of the electronic Bill Plus system encompass everything from tracking all your employees' phone usage patterns to detecting fraud on the telephone bill. Paying the bill, however, is still up to the customer.

## Great New BODs

Books on disk (BODs), a relatively new concept that so far has been the exclusive domain of CD-ROM owners, have made the jump to Macintosh format, thanks to Voyager Software. The publisher recently released electronic versions of the New York Times bestseller *Jurassic Park*, by Michael Crichton; *The Complete Annotated Alice*, by Martin Gardner; and *Hitchhiker's Guide to the Galaxy*, a four-volume series by Douglas Adams. Titles in progress include *Baddash*, by Susan Faludi, and *Gone to Soldiers*, by Marge Piercy.

More than mere text, BODs let you see and hear what you're reading through pictures and sound effects. Voyager eventually plans to publish PC versions of BODs. In the meantime, be on the lookout for a Voyager toolkit for publishers and authors who want to create their own electronic books.

Speaking of books on disk, the Bureau of Electronic Publishing, which publishes BOD titles for CD-ROM, announced its "Top Drawer" compilation of the ten best-selling CD-ROMs for the last

quarter of 1991. Beginning with the top seller, they are Grolier's Electronic Encyclopedia (Grolier Electronic Publishing), Magazine Rack (Information Access), U.S. History on CD-ROM (Bureau Development), Mammals (IBM/National Geographic), Microsoft Bookshelf (Microsoft), Birds of America (CMC Research), Monarch Notes (Simon & Schuster/BDI), World Atlas (Software Toolworks), Reference Library (Software Toolworks), and Bible Library (Ellis Enterprises). The list is based on end-user dealer and distributor sales compiled by the Bureau of Electronic Publishing.

## In the Chips

Watch for emerging beefed-up 386-chip clones with on-board math coprocessors that will narrow the gap between the 386 and the 486.

## Coming Soon

Tandy is opening its Computer City SuperCenter stores in ten new U.S. locations: St. Louis; Baltimore; Seattle; Miami; Las Vegas; Dallas; Tampa; El Paso; Rochester, New York; and Arlington, Texas. If you're computer shopping overseas, be sure to check out the new store in Copenhagen, Denmark—Europe's first Computer City SuperCenter store.

## Reach Out and Train Someone

The folks who claim to be "the right choice" in long-distance calling could also be the right choice for software training. AT&T, in the software-training business for seven years now, has expanded its Professional Development Centers to 19 cities across the country.

These PDCs offer intensive, concept-based training for both business and home users of major software products: Windows, Word for Win-

dows, PageMaker, Excel, Symphony, and Quattro Pro, to name a few (and there are a slew of others, as well as introductory PC courses available). Plans are to expand the PDCs into every major U.S. city by 1993. Anyone can obtain information and register for classes at any Professional Development Center location by calling (800) 858-7434, ext. 7000.

## Requiem for Michelangelo

March 6, birthday of the brilliant Renaissance man Michelangelo, came and went this year without much destruction in the United States. Thanks to the mass media's coverage of the Michelangelo virus that was set to strike and the diligent practice of safe computing (that's not just a buzzword), most computer users in the States who *might* have been vulnerable to the attack were able to protect their computers from the dreaded virus before it was able to wreak havoc.

AntiVirusPlus, CLEAN-UP, Flu-Shot+, PC-cillin, Virex-PC, VIRUSCAN, and Vi-Spy are just a sampling of the scads of antivirus "inoculators" available that helped render Michelangelo nothing more than another infectious also-ran.

## And Finally . . .

Speaking of safe practices, *Online Access*, a magazine for online service subscribers, reports that "electronic sex" is a growing network phenomenon. "Consenting adults are using their PCs to explore alternate lifestyles with complete anonymity, becoming intimate with total strangers in their own homes, having relationships without commitment, and even finding real mates." Check out the August issue of COMPUTE for more information on meeting compatible people online. □

Meeting significant others online, dodging Michelangelo, learning the ropes from AT&T, opening superstores, watching for superchips, and more



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D. Which online service(s) do you use?  CompuServe  GEnie  America Online  Prodigy

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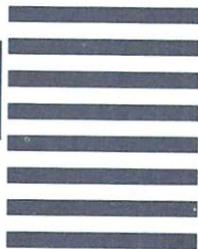
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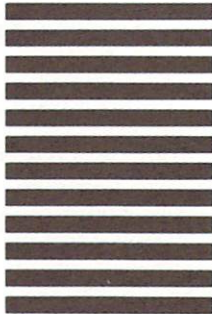
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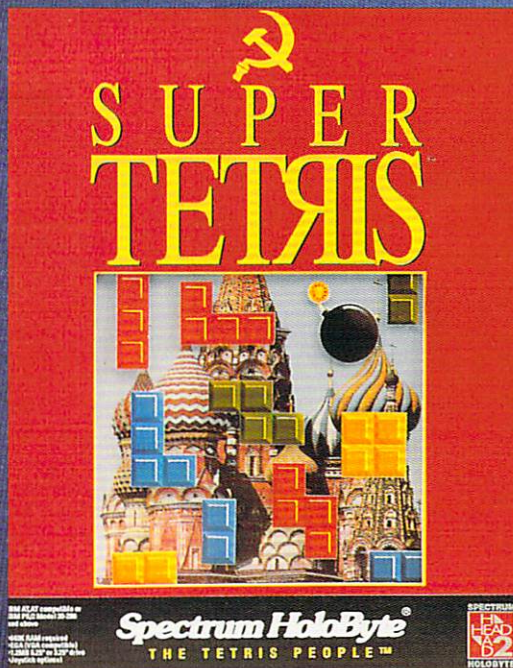
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