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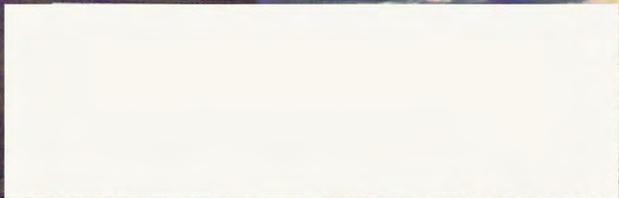
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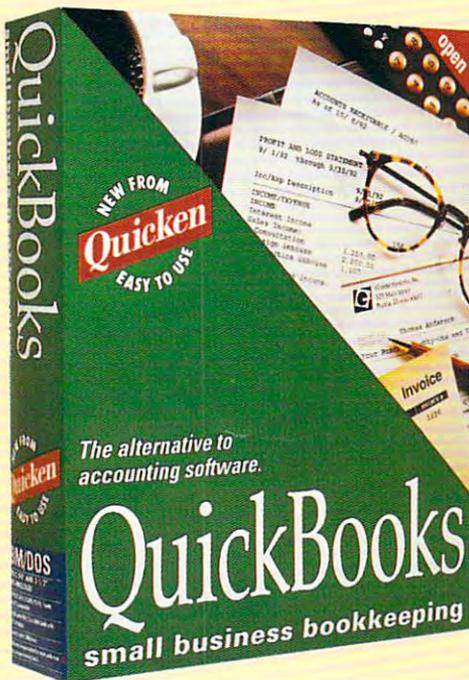
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F1-Help F2-File/Print F3-Find/Edit F4-Lists F5-Reports F6-Activities

The screenshot shows a "Pay to the" form. At the top, it says "Date 10/08/92" and "Pay to the Order of + Office Supply Annex" with a total amount of "354.86". Below this, it lists the address: "Office Supply Annex, 876 Belle Vista Way, Alexandria, VA 22307". The memo is "Office supplies/rentals". A table lists the account assignments: 1:Supplies:Stationary (Letterhead, envelopes) for 64.30, 2:Rent:Bus. equipment (Lasewriters (2)) for 186.32, and 3:Furniture (Desk Lamps (3)) for 104.24. At the bottom, it shows "Checking" as the account type and a "Total Balance" of \$7,692.78.

Choose whom to pay and when.

Choose Bills to Pay

Vendor	Invoice	Pay Date	Balance	Payment
Chicago Tools & Gags	856	11/11/92	682.32	588.90
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	158.00	158.00
New Leaf Landscaping	5685	11/ 9/92	236.35	236.35
Office Supply Annex	69699	12/16/92	856.36	8.00
Pine Lumber Yard	8976	11/16/92	745.32	8.00
Speedy Printing	5692	10/19/92	42.31	42.31
Checking Balance \$8,561.83			TOTAL	7,573.11

Esc-Cancel F9-Pay in full/don't pay Ctrl+J Done

Just select the bills you want to pay from this list.

Payments to the same vendor can be combined.

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Totals how much you owe.

Invoice customers in minutes.

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Pick here:

Customer List

Customer	Balance
Bay Shore Properties	1,771.04
Bayshore Book Book	500.75
Bayshore National Bank	0.00
BaySoft, Inc.	0.00
Catering By Stephanie	0.00

It's entered here.

Sales tax is calculated for you.

The math is done for you.

F1-Help F2-File/Print F3-Find/Edit F4-Lists F5-Reports F6-Activities

The screenshot shows an "Invoice Number" form for invoice 8882345, dated 12/ 8/92. It is billed to "Bay Shore Properties, 1236 Loma Pines Way, Sausalito, CA 94932". The form includes fields for TO Num (1225), #Items (Net 10), and #Project (Bay Shore - 3). A table lists items: 8 Sr.Landarc (Sr. Landscape Architect hours) for 48.00, 12 ProjectMgt (Project Management hours) for 21.00, 42 Labor (Manual labor hours) for 8.25, 130 Soilamend (Quality soil amendment/cubic yds) for 5.99, and Sales Tax for 8.25. The total is \$1,771.04. A note at the bottom says "We have enjoyed serving you on this project." and shows a "TOTAL \$ 1,771.04" and "BALANCE \$ 1,771.04".

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Customer	1-30	31-60	61-90	91-120	121-150	151-180	181-210	211-240	241-270	271-300	Total
Green Systems, Inc.	1,000.00	2,000.00	3,000.00	4,000.00	5,000.00	6,000.00	7,000.00	8,000.00	9,000.00	10,000.00	60,000.00
...
Total	10,000.00	20,000.00	30,000.00	40,000.00	50,000.00	60,000.00	70,000.00	80,000.00	90,000.00	100,000.00	600,000.00

Collections Report
As of 12/31/92

Green Systems, Inc.

Customer	Invoice	Issued	Due	Balance Due
New Line Computers Mr. Ridge Evers (309) 676-9896 ext 124	1825	9/ 2/92	10/17/92	1,888.76
Total New Line Computers				1,888.76
Oak Management Mr. John Driscoll (309) 673-7897 ext 234	1886	10/ 5/92	12/ 4/92	810.92
2081	10/12/92	11/26/92	57.75	
Total Oak Management				868.67
Perris Cinema Mr. Garry Pasowitz (309) 673-9056 ext	1841	9/17/92	11/16/92	6,435.88

Green Systems, Inc.-Receivables
Esc-Create Ctrl-N Home:iza FI-Help Ctrl-P Print

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QuickBooks DacEasy Pacioli
Source: Merrill Research & Associates

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- Cash flow forecast
- Payroll report
- Budget report
- Other reports
 - Summary report
 - Transaction report
 - Itemized income and expenses
 - Project or Job report

Profit & Loss
1/1/92-12/31/92

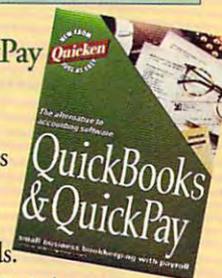
Balance Sheet
12/31/92

Sales Report
1/1/92-12/31/92

Cash Flow Forecast
1/1/92-4/30/93

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COMPUTE

VOLUME 14, NO. 5, ISSUE 141

JUNE 1992

FEATURES

6

TOP PC UTILITIES

By Dan Gookin

The Norton Utilities and PC Tools go head to head.

18

TEST LAB

Edited by Mike Hudnall
Portable printers, modems, and faxes for the road.

62

QUEST FOR PERFECTION

By Gregg Keizer

Design the perfect machine for your application.

76

STRICTLY PERSONAL

By Rosalind Resnick
How to hold your life together with PIMs.

94

SIMEVERYTHING

By Gregg Keizer

The hottest PC games.

COLUMNS

4

EDITORIAL LICENSE

By Clifton Karnes
COMPUTE's editors.

34

NEWS & NOTES

By Jill Champion
Top computer news.

40

FEEDBACK

Answers to tough questions.

44

TIPS & TOOLS

Edited by

Richard C. Leinecker
Tips from our readers.

48

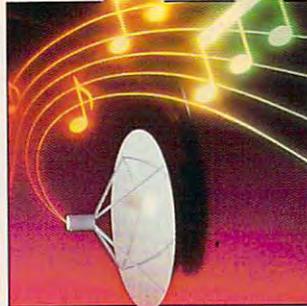
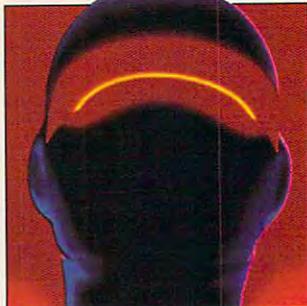
COMPUTE/NET

By Richard C. Leinecker
What's new online.

50

INTRODOS

By Tony Roberts
Make an emergency floppy.



Cover photo by Michel Tcherevkoff

52

POINT & CLICK

By Clifton Karnes
High-powered Ascend.

56

HARDWARE CLINIC

By Mark Minasi

How exactly does XMODEM ensure your data arrives safely?

60

PROGRAMMING POWER

By Tom Campbell

The PC's character ROM.

70

SHAREPAK

By Bruce M. Bowden
Shareware treasures.

136

NEWS BITS

By Jill Champion
Top stories at press time.

DEPARTMENTS

72

PRODUCTIVITY CHOICE

By Tony Roberts
DR DOS 6.0.

74

PERSONAL PRODUCTIVITY

By Daniel Janal
Combating computer stress.

81

ART WORKS

By Robert Bixby
New illustration software.

82

MULTIMEDIA PC

By David English
Sound Blaster Pro.

84

DISCOVERY CHOICE

By David Sears
Super Solvers Spellbound!

86

PATHWAYS

By Steven Anzovin
Let your colors shine.

88

ENTERTAINMENT CHOICE

By Peter Olafson
Falcon 3.0.

92

GAMEPLAY

By Orson Scott Card
Copy protection.

REVIEWS

98

Stacker AT/16,
ProCalc 3D,
JustWrite 1.0,
AcerAnyWare 1120NX,
Software Bridge,
QuickAuthor,
Avery Personal Label Printer,
Conan the Cimmerian,
Howtek Personal Color
Scanner,
PC-Write Standard Level 2.0,
Relisys TEFAX RA-2125,
SCAN:ALIGN,
The Maximizer,
Maximizer Lite,
On the GoFAX,
DiscXchange,
The Secret Codes of
C.Y.P.H.E.R.: Operation
Wildlife,
The Lost Admiral,
Desktop Publishing by
Design, and
Monty Python's Flying
Circus.

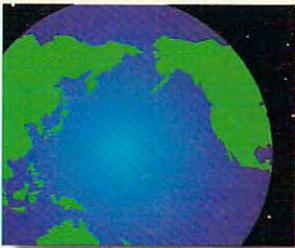
SEARCHSTAKES

See page 35.

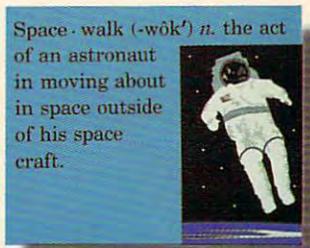
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EDITORIAL LICENSE

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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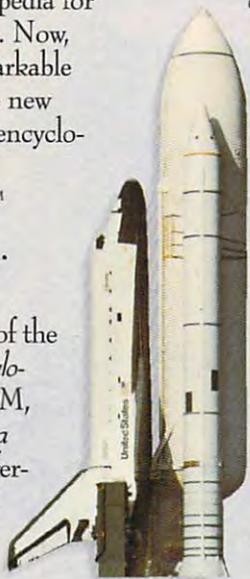


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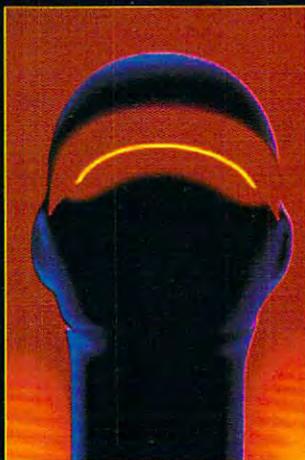
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TOP PC UTILITIES

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

Try 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.

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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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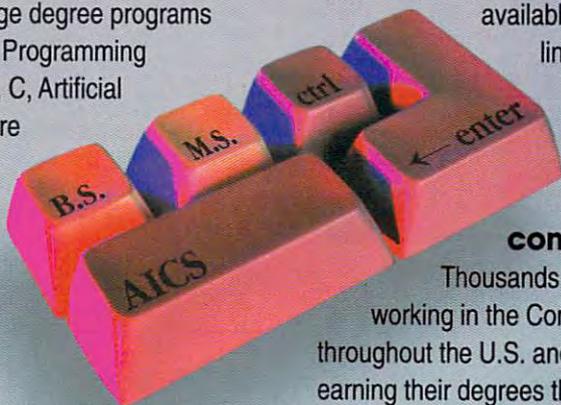
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the valuable features offered in these handy little programs, so a new approach is bound to benefit all users.

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.

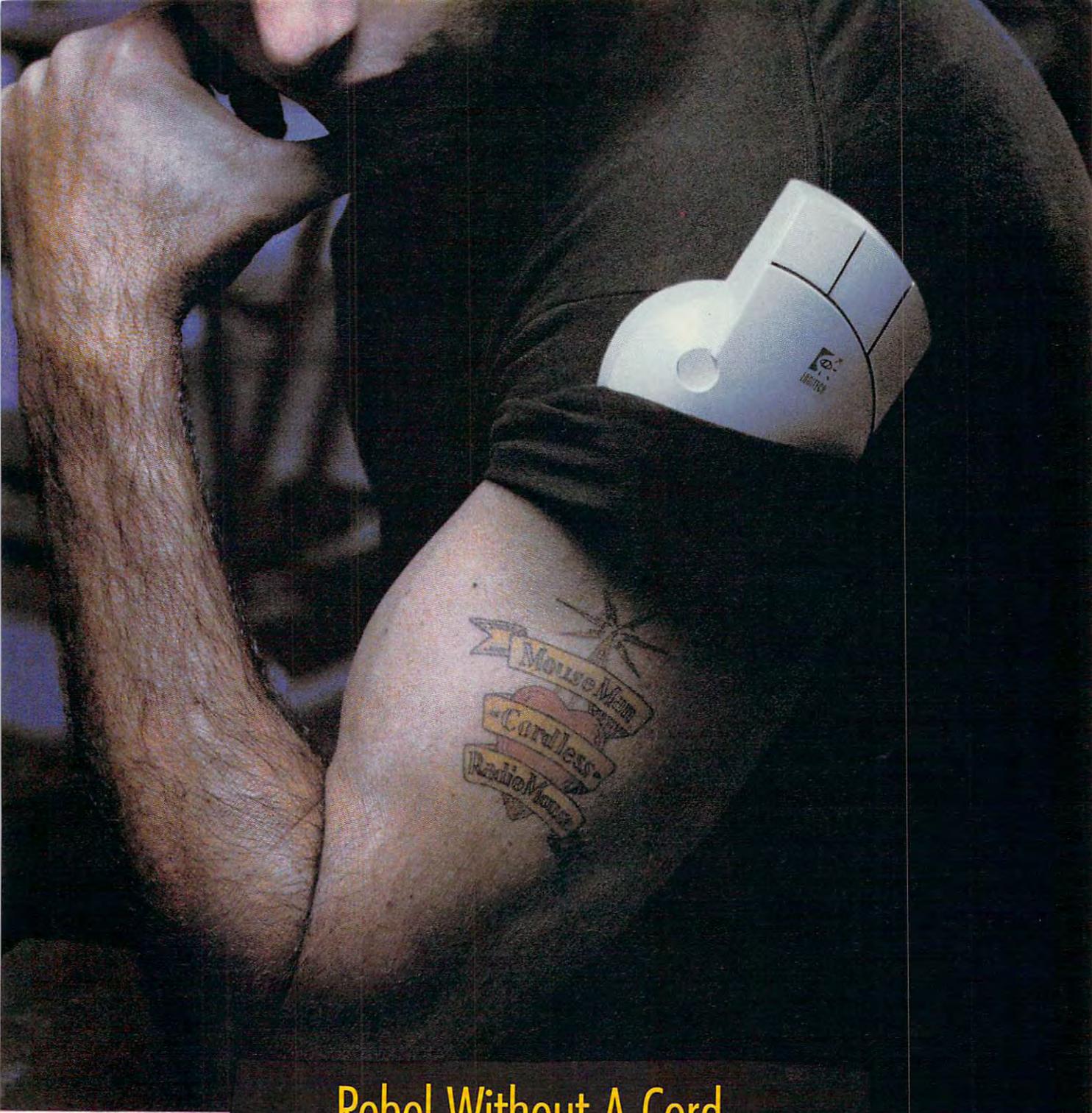
On the other hand, both packages have a system information utility. It displays a profile of your PC's hardware contents, plus it does benchmark testing and a wee bit of diagnosis. It's mostly for show.

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
Overview			
Command line control	Yes	Yes	Yes
Integrated environment	No	Yes	Yes
Windows-specific programs	No	No ¹	Yes ²
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
File Management			
Shell program	DOS Shell	— ³	PC Shell
Application menu	Yes ⁴	—	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	— ⁵	—	PC Secure ⁶
File finder (with changes)	—	File Find	— ⁷
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
Directory Management			
Shell program	—	— ³	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
Disk Control			
Backup and archiving	BACKUP	— ⁸	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 ⁹	Safe Format	PC Format
Sector editing	DEBUG ¹⁰	Disk Editor	Shell only
Security			
Boot/FAT/Root protection	MIRROR	Image	Mirror
Directory password	—	—	Data Monitor
File encryption	—	Diskreet	PC Secure
Sector protection	—	Disk Monitor	Data Monitor
Virus detection	—	— ¹¹	Vdefend
Virus removal	—	—	—
Recovery			
1-2-3 repair	—	File Fix	File Fix
dBASE repair	—	File Fix	File Fix
General file repair	RECOVER ¹²	—	—
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	—	—	—
Productivity			
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	—	— ¹³	in PC Desktop ¹⁴
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

- ¹The Norton Utilities does come with icons for some programs.
- ²Backup, Undelete, and a special control-menu program launcher.
- ³A separate product, The Norton Commander, contains file and directory shells.
- ⁴In DOS Shell.
- ⁵DOS has a file-expansion program, EXPAND, but no companion COMPACT utility.
- ⁶Only compresses files as they're encrypted.
- ⁷Can be done in the shell after using File Find.
- ⁸The Norton Backup is sold as a separate product.
- ⁹FORMAT automatically saves unformat information on every disk reformatted.
- ¹⁰DEBUG can load a sector into memory, allow you to edit that memory, and then write it back to disk. It's inelegant, but functional.
- ¹¹Disk Monitor will prevent a virus from writing to some parts of a disk, but it doesn't actively scan for infection.
- ¹²RECOVER 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.
- ¹³The Norton Commander comes with Command Mail, a link to MCI Mail.
- ¹⁴PC 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
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The Norton Utilities—\$179
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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 on-line 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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Increasing 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 excel-

†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



HAYES MICROCOMPUTER PRODUCTS

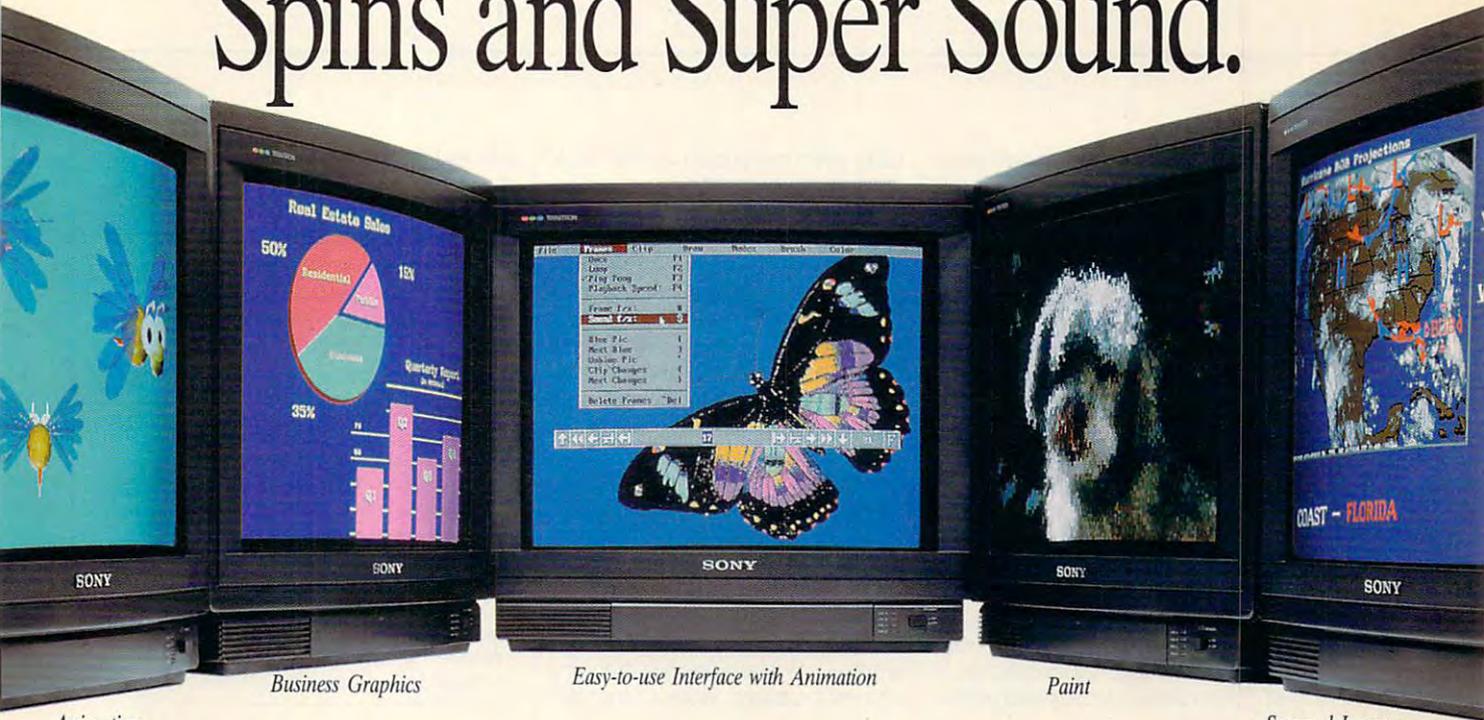
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Flexibility Matches Power.

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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Special effects – color, pixel, palette, frame, and sound – turn your PC into a complete art and

animation department. Give 2D the look of 3D. Move images over easily defined paths. Change colors and apply textures as the image moves. Alter your image with effects like shatter, defocus, ripple and more.

There you have it. PC Animate Plus. It's practical and affordable. Plus, it's great fun.



Brown Wagh

160 Knowles Drive, Los Gatos, CA 95030
 (800)451-0900 (outside CA)
 (408)378-3838 (inside CA)
 (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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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
4-page text document				
Elapsed time	2 min. 57 sec.	3 min. 6 sec.	4 min. 14 sec.	3 min. 20 sec.
Output appearance	good	good	good	excellent
4-page GEM Artline graphics				
Elapsed time	9 min. 55 sec.	9 min. 59 sec.	18 min. 24 sec.	10 min. 27 sec.
Output appearance	good	good	good	excellent
2 PerForm ruled forms				
Elapsed time	6 min. 12 sec.	6 min. 10 sec.	10 min. 39 sec.	6 min. 29 sec.
Output appearance	good	good	good	excellent
C.P.T.S. printer test				
Elapsed time	1 min. 47 sec.	1 min. 57 sec.	4 min. 27 sec.	1 min. 57 sec.
Output appearance	good	good	good	excellent
Windows font test				
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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4450 1MB \$179 4455 2MB \$269

Epson EPL 6000 & EPL 7000

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IBM 4019 & 4019E

4MB \$115 2MB \$139 3.5MB \$199

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LBP 4 2MB \$209 LBP 8 2MB \$119

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Compaq Deskpro 286, Portable III, HP
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Tustin, CA 92680 ☐ Phone: 714/258-2018 Fax: 714/258-2818
Hours M - F 6:30 - 5:00 SAT 8:00 - 2:00 PST



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.

Shhh!

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they're
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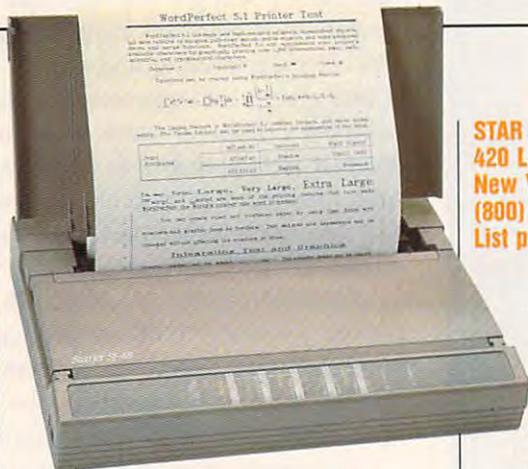
If you can't find our products at your local dealer, call us and ask about our limited time
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Call 1-800-852-2255!
www.commodore.ca
Circle Reader Service Number 104

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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Circle Reader Service Number 201

www.commodore.ca

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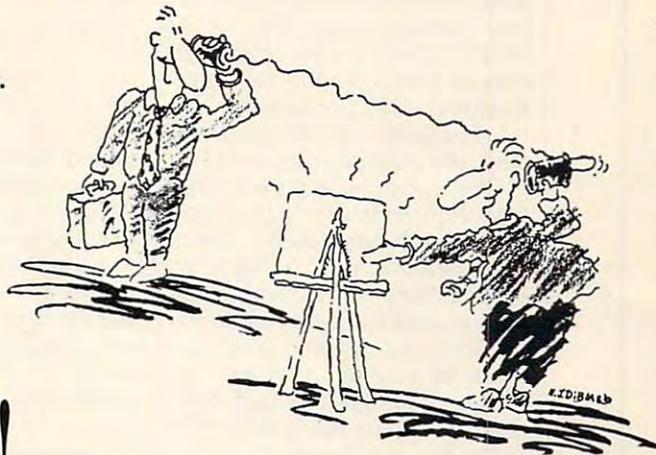
PORTABLE PRINTER FEATURES

	BROTHER HJ-100i	CANON BJ-10EX	CITIZEN PN48	STAR MICRONICS STARJET SJ-48
List price	\$499.95	\$499.00	\$469.00††	\$499.00
Dimensions				
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
Interface				
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
Emulations				
IBM ProPrinter	■	■	■	■
Epson	■	■	■	■
HP-II	□	□	□	□
HP-Plotter	□	□	□	□
Standard RAM (in kilobytes)	37††	37‡	4	28
Expansion RAM (in kilobytes)	none	none	none	none
Paper feed				
Tractor	□	□	□	□
Friction sheets	■	■	■	■
Sheet feeder	□	□	□	□
Trays	□	□	□	□
Roll paper	□	□	□	□
Envelopes	■	■	■	□
Transparencies	■	■	■	□
Labels	■	■	■	□
Sheet feeder option	■	■	□	■
Paper output				
Face up	■	■	■	■
Face down	□	□	□	□
Image position				
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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20 hours for only \$20, for all the services you want!**

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1. Via modem, dial 1-800-365-4636.
 2. When connected, press RETURN once or twice.
 3. At *Password*, enter **CP55**
- Questions? Call 1-800-695-4005.

Rates apply for evening and weekend access from within the mainland US. There is a one-time enrollment fee of \$19 when you join the 20/20 Advantage Plan. Further details are provided during the online registration.

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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 5½ × 2¼ 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.

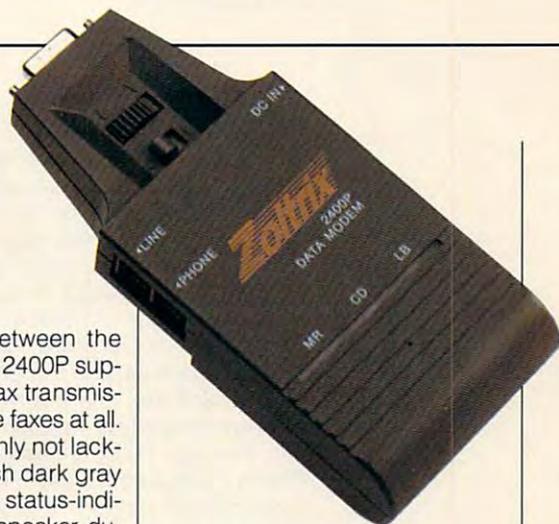
The 2400P is certainly not lacking in features. A stylish dark gray case houses a trio of status-indicator lights, an internal speaker, dual phone jacks, and an external power jack. Viewing the status lights is no problem when the unit is connected to a laptop or notebook computer, but having the 5½-inch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

NEXT MONTH:
WINDOWS
WORD
PROCESSORS

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,

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.

Parlez-vous... ?

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-

The Language Master 6000-SE, Franklin Electronics' special-edition English-language resource, has full speech capabilities to help those with special needs.



on presidential and congressional candidates' campaign contributions. Information is also available on the state level. For an extra \$2.50, subscribers can write directly to their congressional representatives through the service. Letters will be printed out and then delivered to Capitol Hill offices.

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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IT'S GRAND TO WIN

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

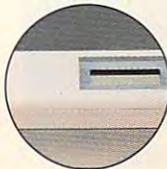
Each of the six picture disks displayed below is a portion of a photo or illustration taken from an ad in this issue. To solve the June SearchStakes, locate the ads from which

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

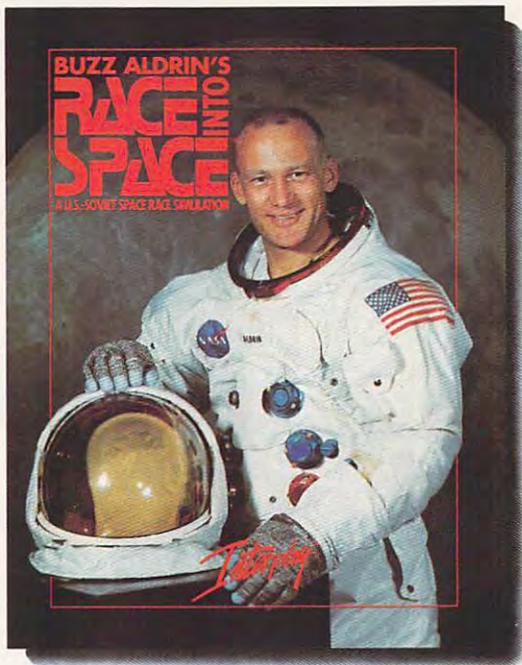
Once you find the solution, you may enter the June SearchStakes automatically on a touch-tone phone by calling 1-900-454-8681 (\$1.50 for the first minute, \$1.00 for each additional minute) or by mailing your answer on a 3" x 5" piece of paper, along with your name, address, and phone number to: "June 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.

Citizen printers. *Compute* magazine. Enter early... and enter often!



“We choose to go to the moon...”
 —John F. Kennedy

“Likely to set a standard for multimedia entertainment products.”
 —Computer Gaming World



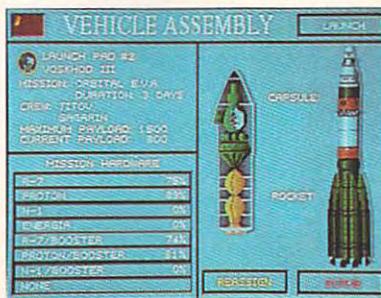
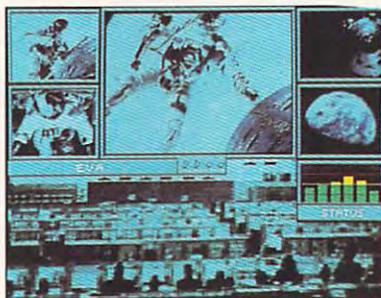
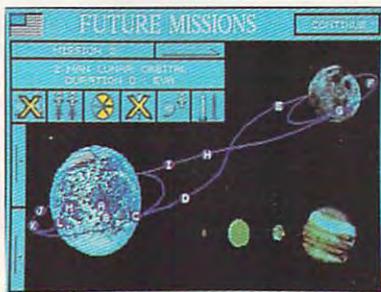
BUZZ ALDRIN'S RACE INTO SPACE
 A U.S.-SOVIET SPACE RACE SIMULATION

Three... two... one... LIFT-OFF! The roar of the giant Saturn V engines becomes deafening as the gleaming rocket clears the launch tower. Within minutes it has enough velocity to reach orbit. America's space program is heading to the moon! But for two years the Russians have been working on a larger, more powerful rocket. Could they be secretly planning a mission this year to land men on the moon? Will they get there first?

Buzz Aldrin's Race Into Space™, is a computer simulation of man's greatest adventure, the race to the moon. It recreates all the excitement of every space mission using digitized footage from lift-offs, space walks, lunar landings and splashdowns.

As Space Director, you have at your disposal the entire space inventories of both the U.S.A. and U.S.S.R., and can plan and direct every conceivable space mission: sub-orbitals; orbital manned and unmanned; duration records; lunar flybys; lem tests; lunar passes; lunar orbits; lunar landings; and even emergency space rescues!

You get to recruit and train over 140 astronauts and cosmonauts and determine which ones have the “right stuff”. You determine which space hardware to research and develop and then you actually schedule and launch individual space missions.



Buzz Aldrin's Race Into Space™ offers twenty different approaches to the moon. Do you follow history or do you cut your own path to glory? Will the United States land on the moon first? Or will the Russians continue to dominate space and plant the red flag on lunar soil first?

Do You Have The Right Stuff?

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 - Hundreds of historical photos and digitized animations
 - Twenty varied approaches to land on the moon
 - Play the U.S. or Soviets
 - Recruit, train, and assign over 140 astronauts
 - Rescue stranded astronauts
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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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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.

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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. RRV, 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, Paciolli, 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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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. □

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TIPS & TOOLS

Edited by Richard C. Leinecker

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 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

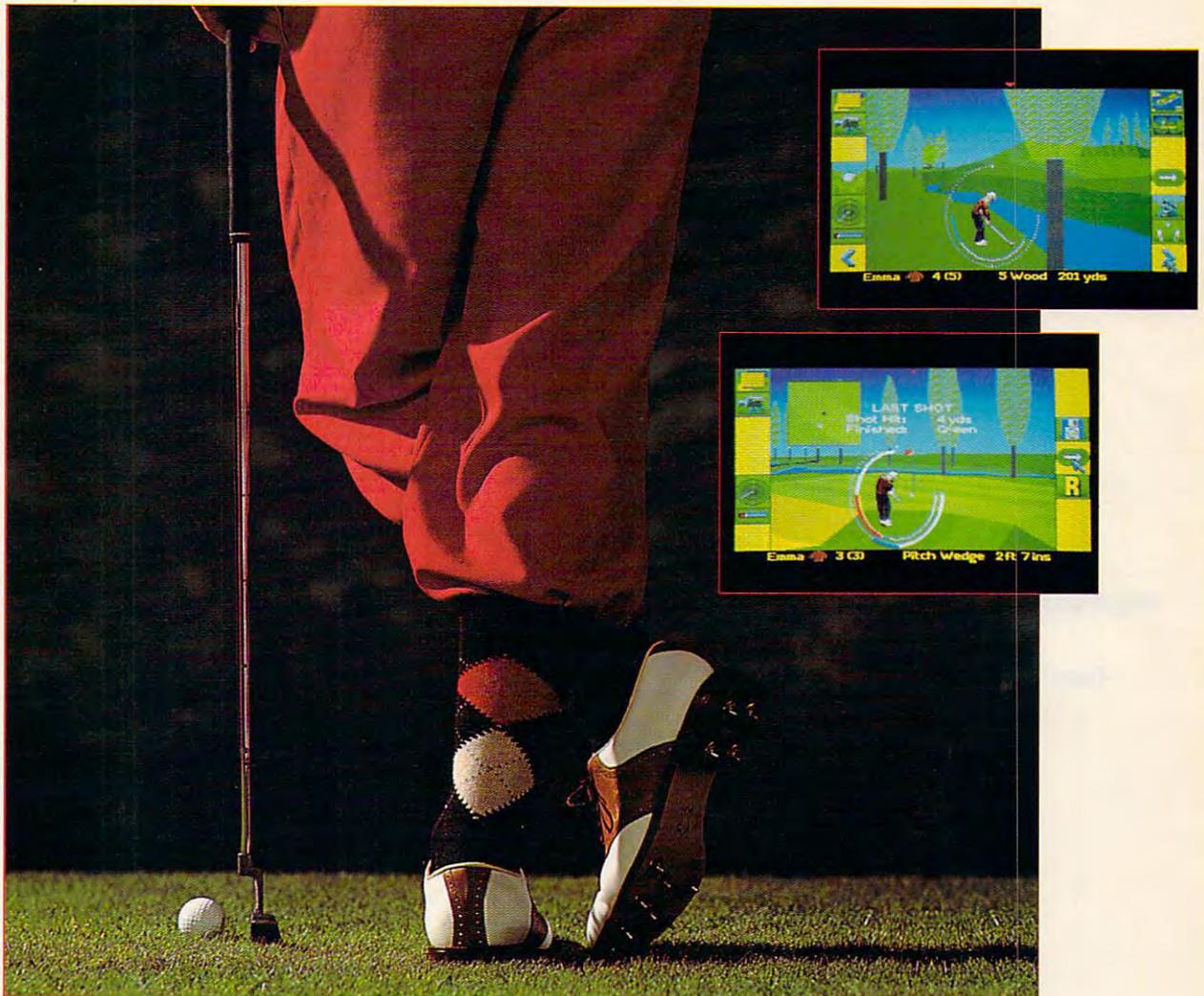
Color Code

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

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

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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 set-up 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

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

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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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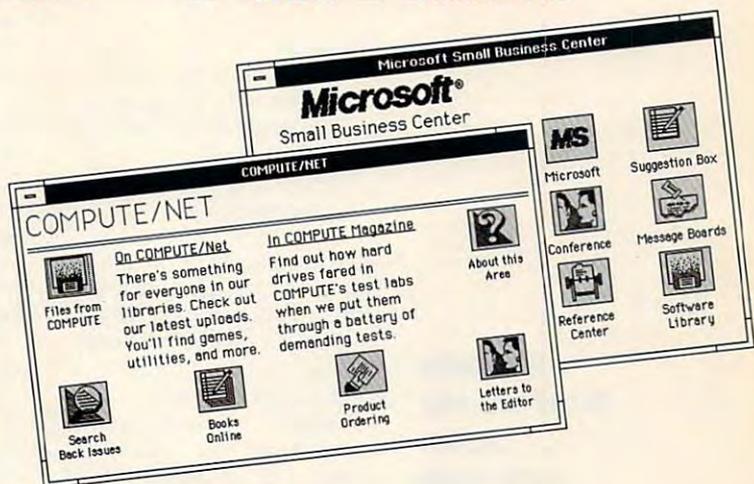
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INTRODOS

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.

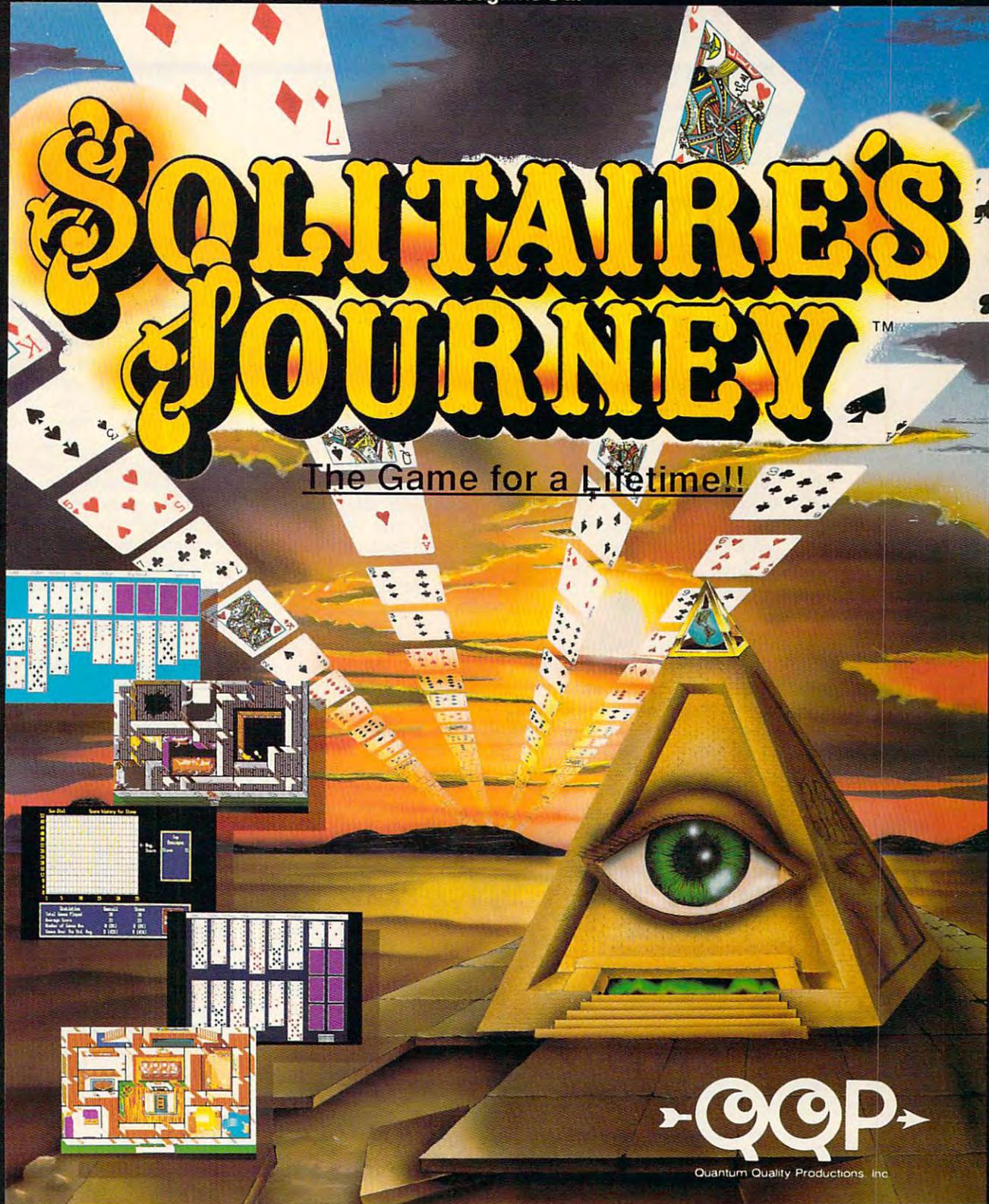
Also in the DOS 5.0 version of `FORMAT` is the quick format—the `/Q` switch. This option lets you reformat previously formatted media in seconds. Although this is a great timesaver, you should use this method only when working with disks that you know are good. The quick format is quick because all it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

A bootable floppy gets your system started when your hard disk is stalled.

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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).

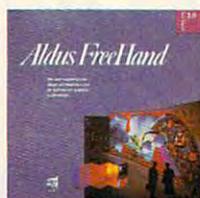
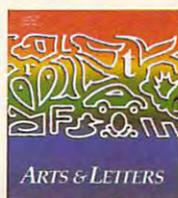
You can print the contents of these modules on letter-sized paper or on the special Day Planner paper provided.

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).

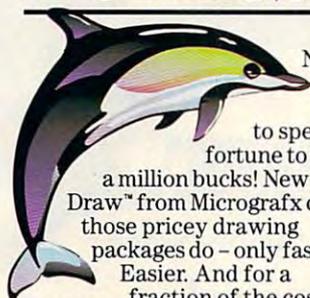
Next, you rank the tasks within each group with numbers and sort the entire list. Prioritizing, ranking, and sorting can be done by hand, or you can use special dialog boxes that make the process easy.

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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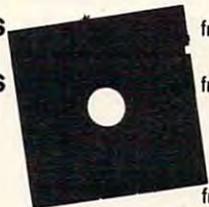
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HARDWARE CLINIC

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.

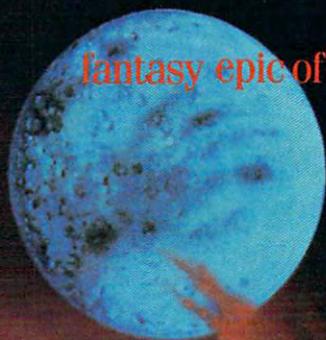
After the *SOH*, S sends another byte, a block number byte. The value of the byte is 1 for the 1st block, 2 for the 2nd, and so on. As bytes can only hold values up to 255, the value wraps around after 255.

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

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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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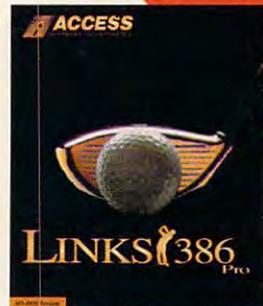
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Tom Campbell

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].

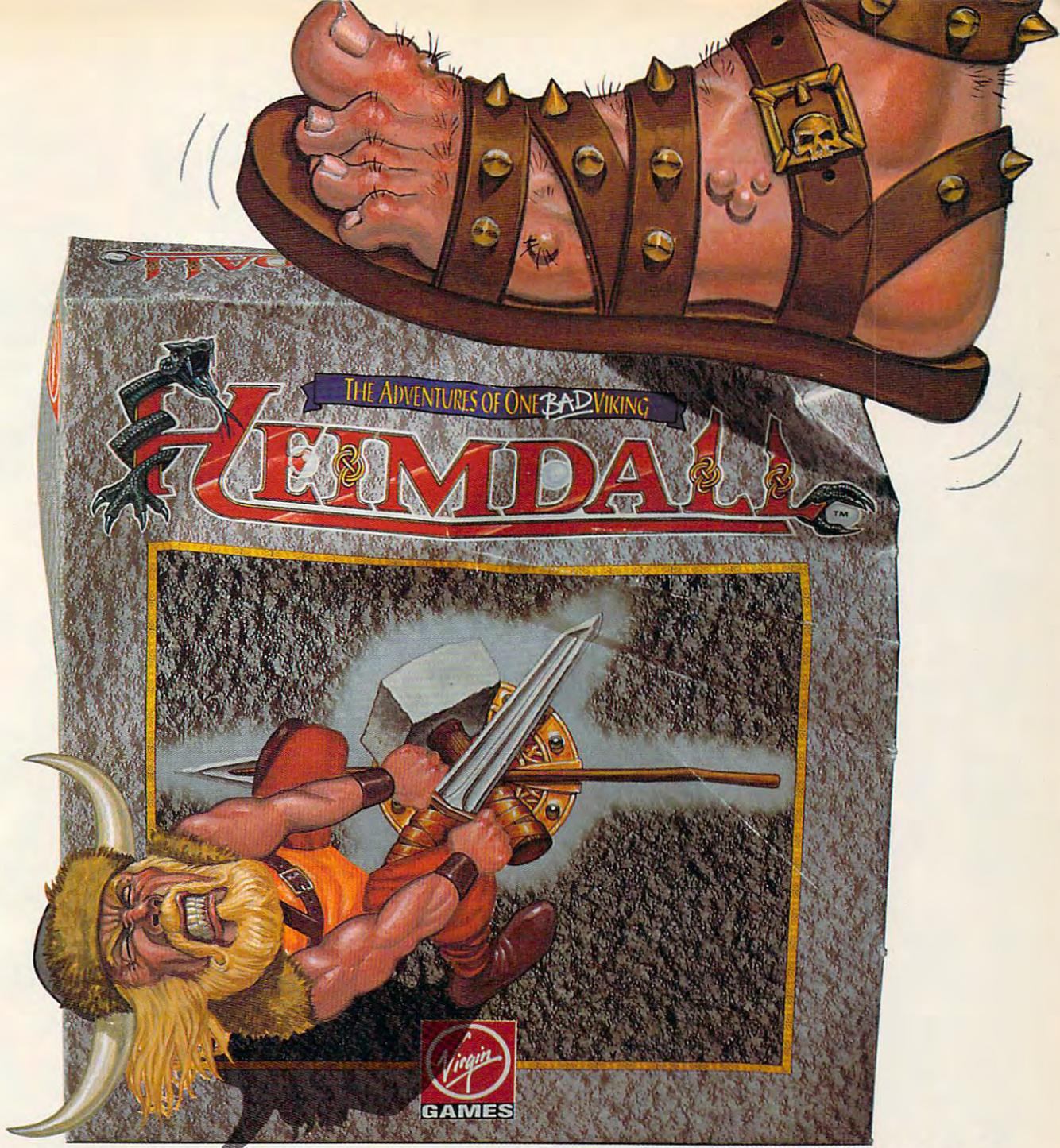
Let's use the top row of A, binary 01111100, as an example. The Binary numbers mirror the physical layout of bits in memory, so this loop starts at the left bit and moves right: for (EachCol=7; EachCol>=0; EachCol--).

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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STALKING THE PERFECT, AFFORDABLE
PERSONAL PRODUCTIVITY PC

Working 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 desk 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.

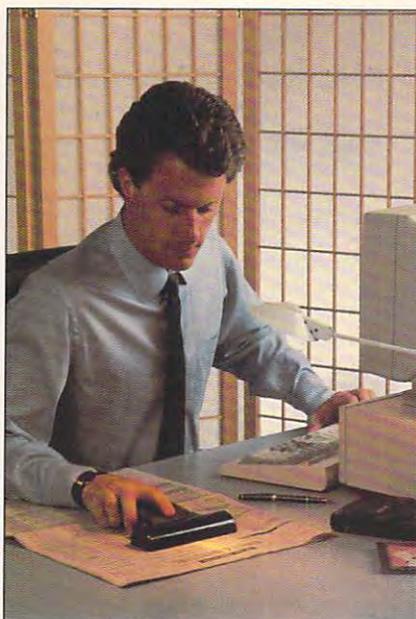
The bottom line. Total cost of the perfect publishing PC: \$2,400-\$2,900.

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.

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OmniKey/Ultra—\$129.00

Northgate Computer Systems
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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.

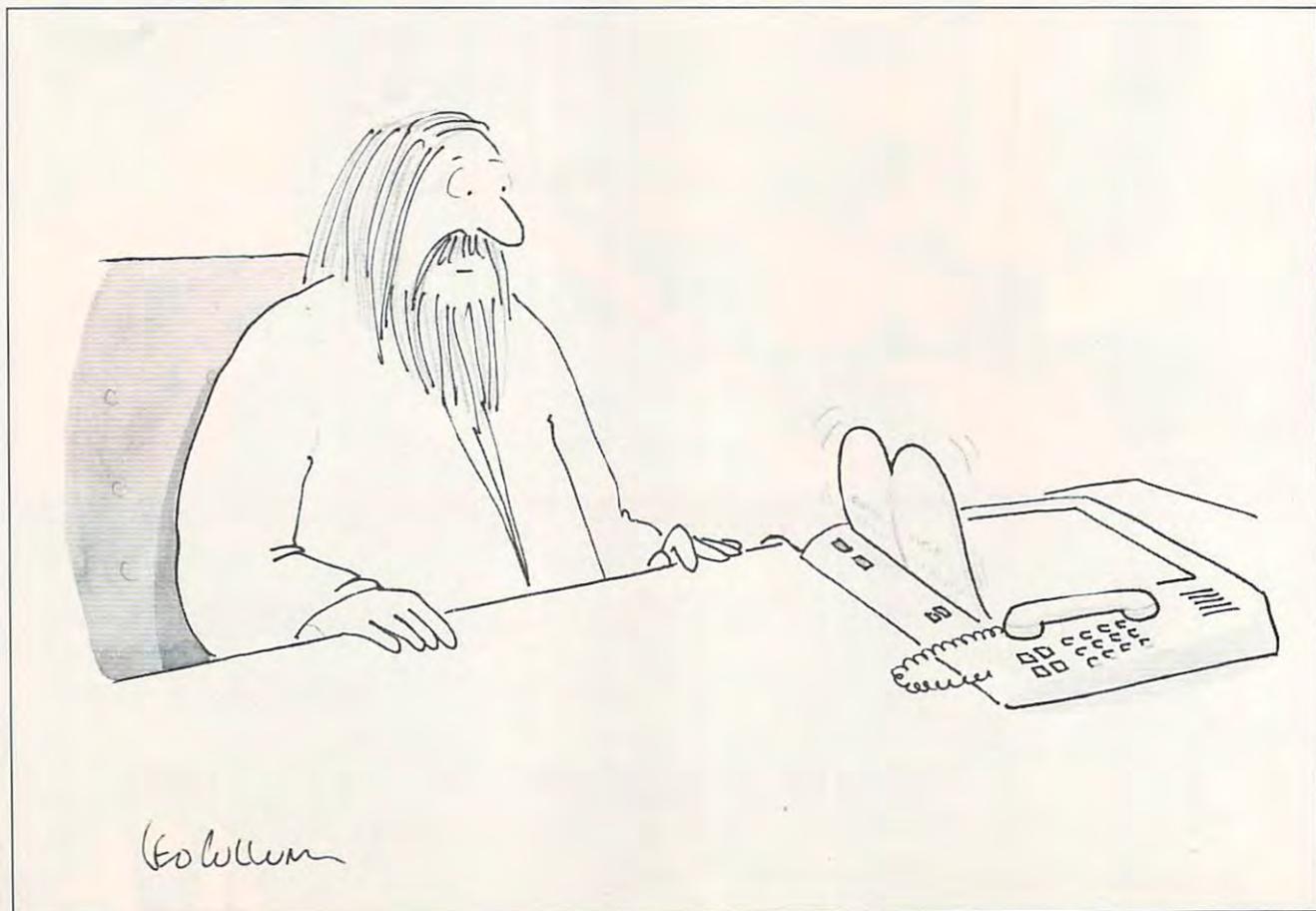
The bottom line. Total cost of the perfect accounting PC: \$2,000–\$2,100.

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.

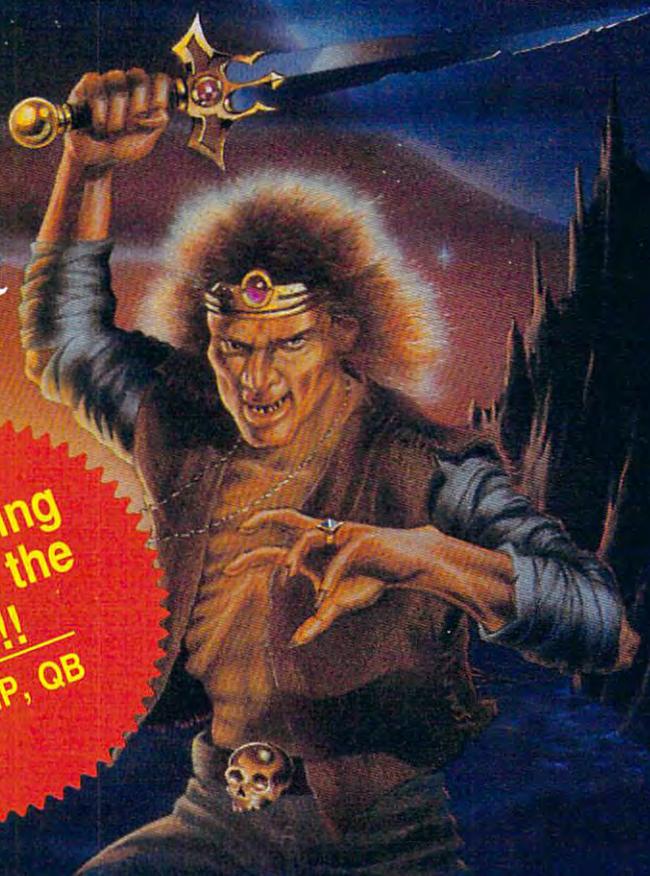
In every business, performance is the name of the game. It saves you time and makes you money. It only costs a little more to start out with the perfect PC, but it will pay off every day in personal productivity. □



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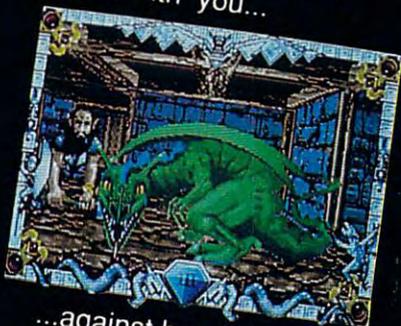
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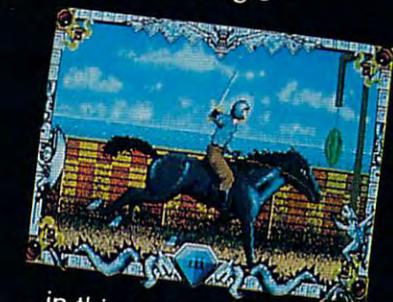
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SHAREPAK

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.

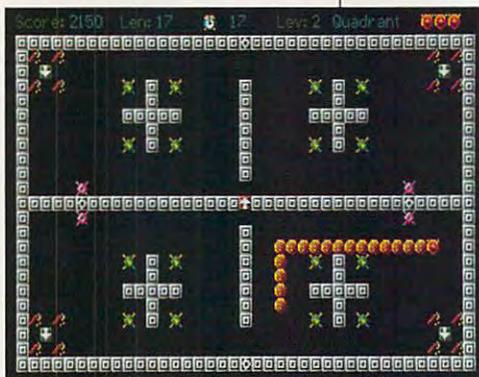
CUMBERLAND TREE runs on any IBM PC, XT, AT, PS/2, or compatible with 512K of memory.

Squirmer 1.02C

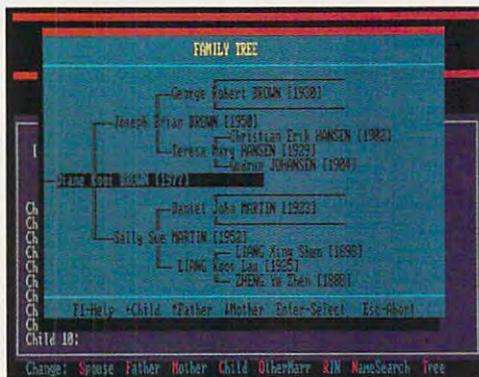
Squirmer has a voracious appetite for power pellets. He'll stop at nothing to consume everything in sight! The more he eats, the more he grows, and the more points you earn. But beware; the game is more difficult than it first appears.

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

June's
SharePak offers
cool relief
from hot computer
chores.



Squirmer tries to satisfy his munchies.



Do family histories with CUMBERLAND TREE.

CUMBERLAND TREE is a high-quality database that lets you trace your genealogy in style. And Squirmer challenges your reflexes and your quick thinking.

COMPUTE's monthly SharePak disk gives you the best of PC shareware and freeware. Each month, hundreds of titles

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.

Just as with a standard

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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)

COMPUTE's SharePak disk contains the best of shareware—handpicked and tested by our staff—to complement this month's focus. You'll sample entertainment, learning, and home office software at a great savings. Each SharePak disk includes two to five programs plus complete documentation for one low price:

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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

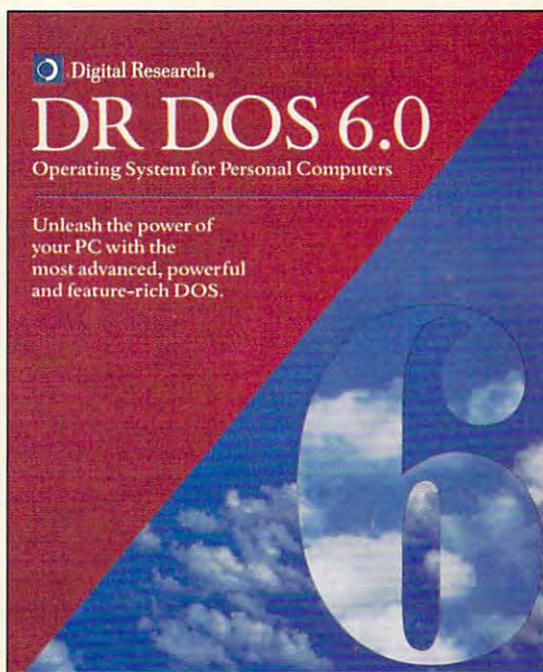
greater level of protection by hiding, rather than erasing, deleted files. When DELWATCH, which runs as a TSR, is active, it keeps track of a certain number of files (200 is the default) which it labels *pending delete*. These are files that you've deleted that are no longer visible in your directory 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-



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. □

Relaxation, exercise, and timely breaks are key to more productive work, less discomfort, and higher scores.



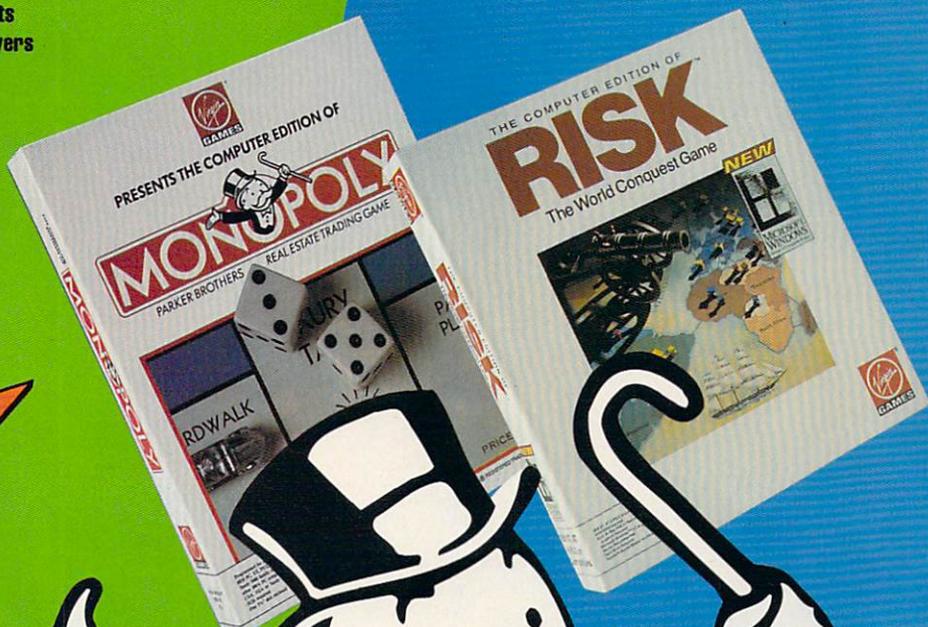
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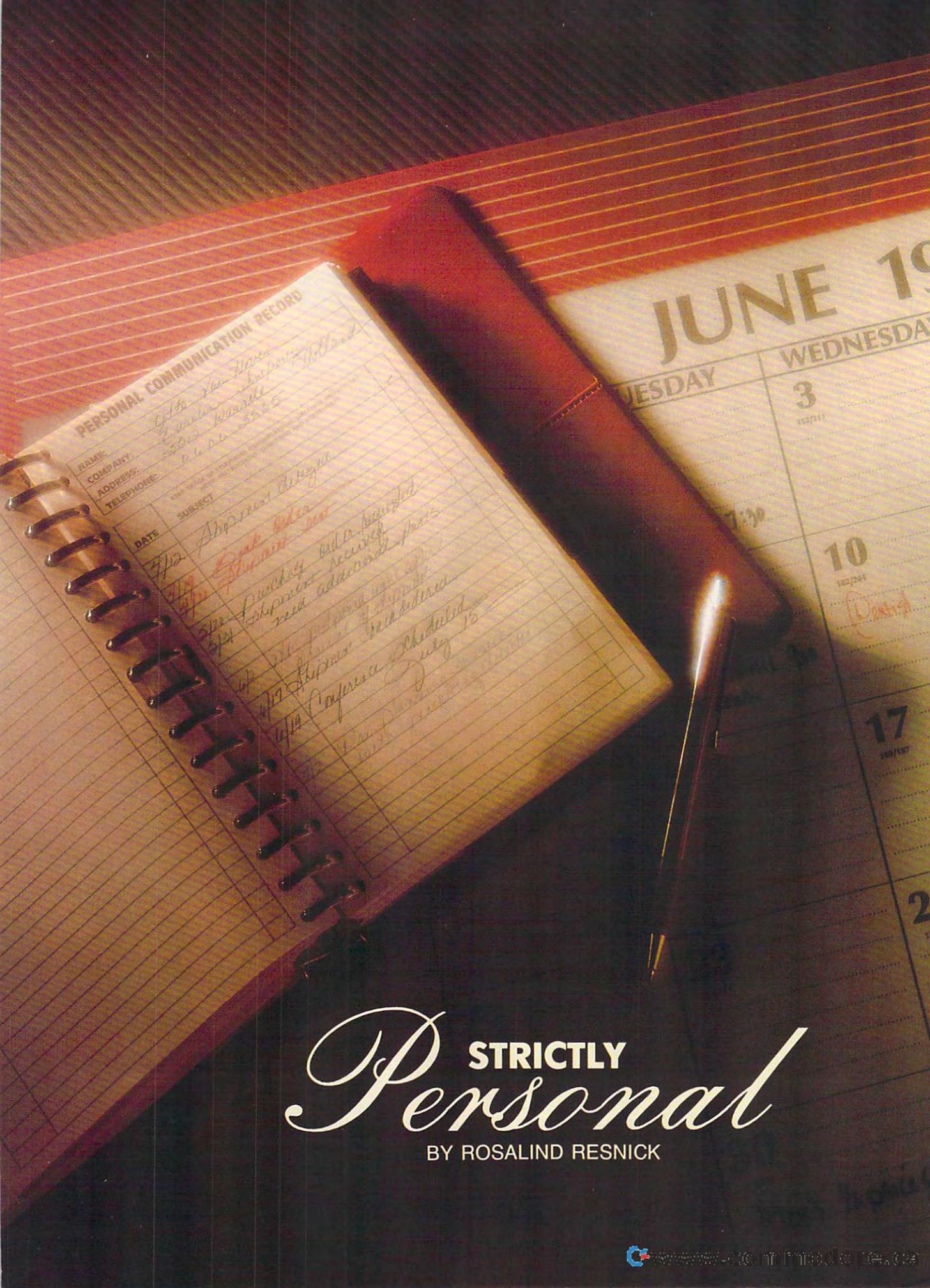
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PERSONAL COMMUNICATION RECORD

NAME
COMPANY
ADDRESS
TELEPHONE

4/16 Mr. Hoover
2000...
3300...
616... 3355

DATE

4/12 Important message

4/13 Shipments not

4/14 Shipments will be brought

4/17 Shipments received

4/19 Conference scheduled

JUNE 19

TUESDAY

WEDNESDAY

3

1972/1

10

1972/4

David

17

1971/7

2

STRICTLY
Personal

BY ROSALIND RESNICK

92

THU

4

156/214

conference 11:45

11

163/208

18

176/196

↑
Leah & Charlotte
↓

25

177/169

no lunch with
Mindy
PRESENTED 8:30

FRIDAY

5

187/209

12

164/202

John 9:00

19

171/195

SATURDAY

6

158/208

13

165/201

20

172/194

writing
workshop →

INDEX REFERENCE

A-Z U-V-W

NUMERICAL O-P-Q

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JUNE 1992

You 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 Jimmerson, 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

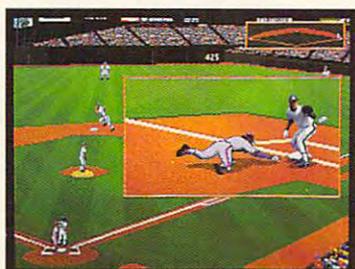
Unlike software that helps you write letters and crunch numbers, personal information management software doesn't fall into one neat category.

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.

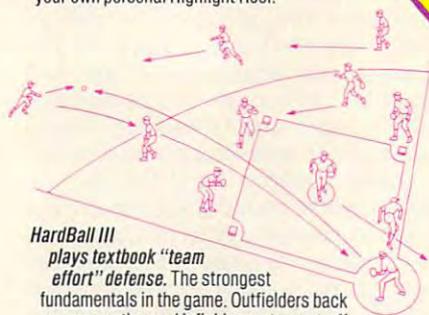
General-purpose PIMs are ideal for lawyers, accountants, and other people who sell their time and bill by the hour. Some PIMs can time client phone calls to the nearest second. PIMs are also good for people who sell products or information and need fast facts at their fingertips. Project-management software, 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.



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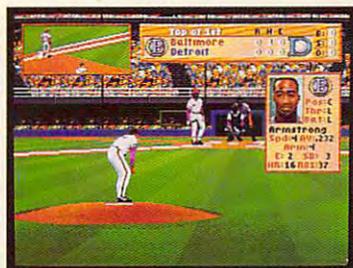
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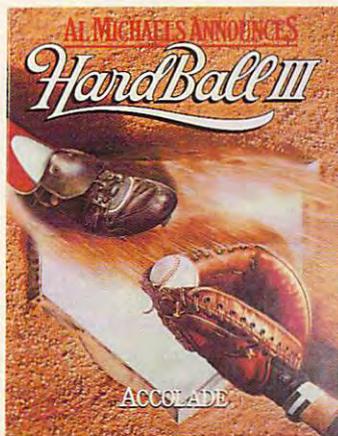
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who thought it would be too complex to learn," Davison says. "Now general business people are recognizing this as a valuable tool, not just the professionals with calculators on their belts."

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-outlineecmyk`

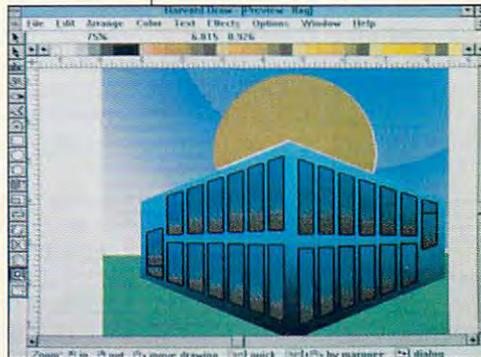
`0,0,0,100`) will be carried out. Harvard Draw also allows you to fit text to more than one curve, group and combine objects, cut holes in objects, paste copies of an object to a path, blend shapes and colors, perform unusual gradient fills (the motifs include such exotica as a 12-pointed star), mix 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. □

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. □

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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-

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

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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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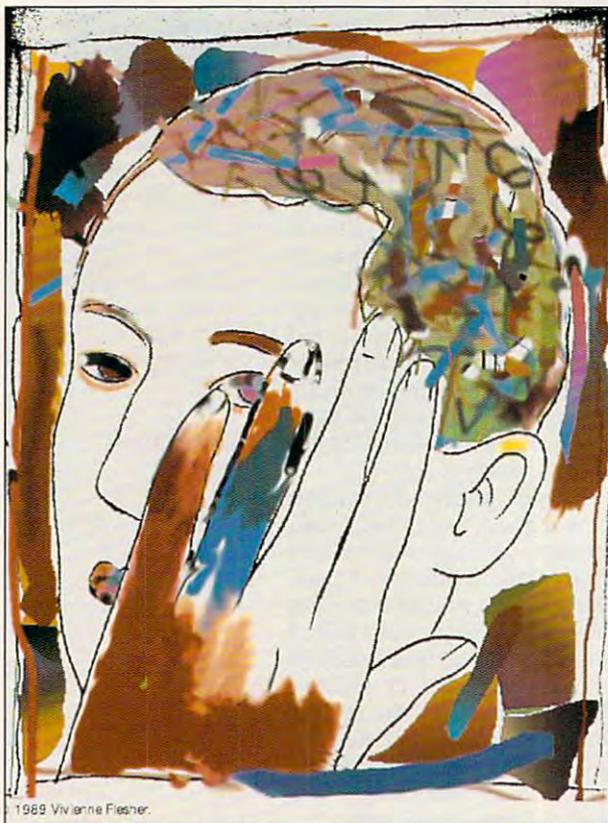
Steven Anzovin

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.



© 1989 Vivianne Fleisher.

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.

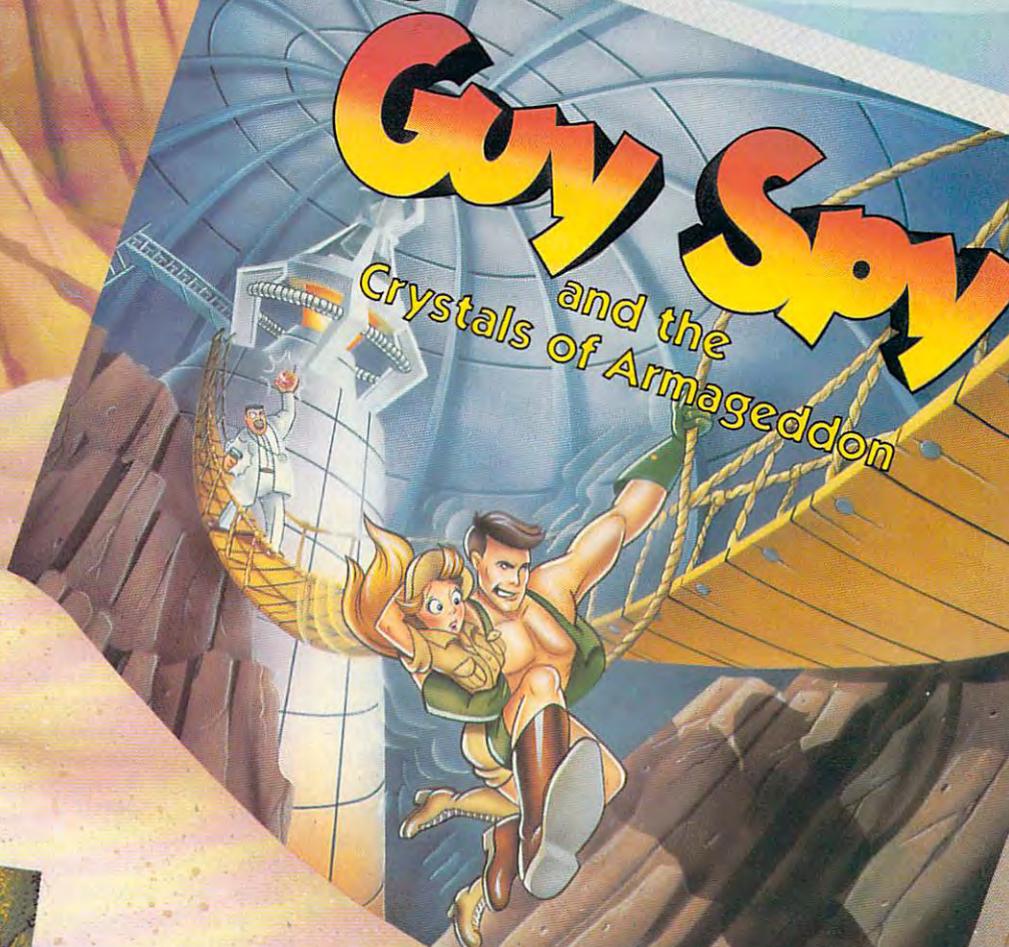
The Mac even makes room for oddball efforts. A case in point is TextureSynth (from Pantechon, P.O. Box 738, Santa Cruz, California 95061; 408-427-1687; \$149), the most addictive graphics program I've ever seen for any machine. You guessed it—TextureSynth is a synthesizer for rolling your own custom 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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and the Crystals of Armageddon

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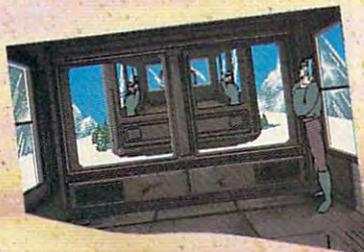
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FALCON 3.0

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 turn 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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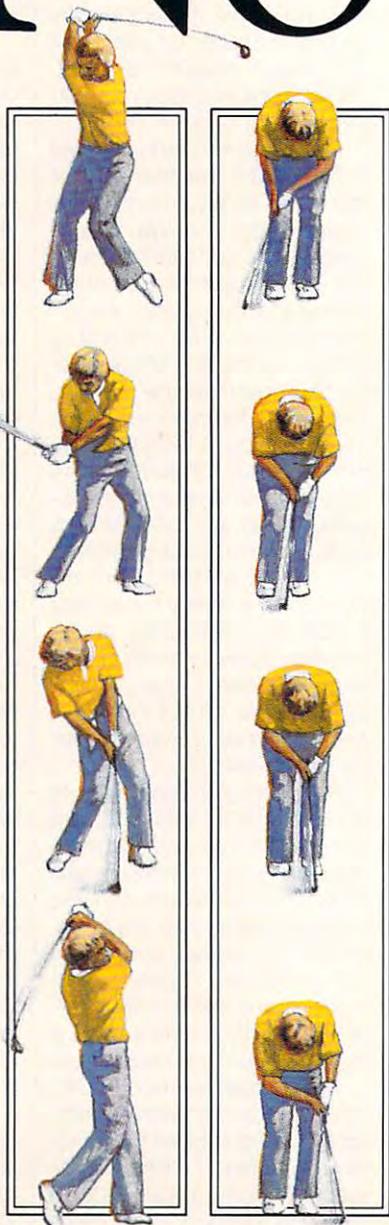
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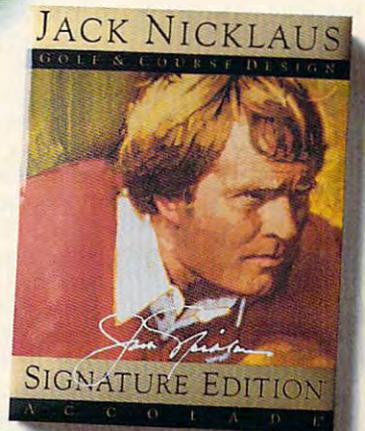
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GAMEPLAY

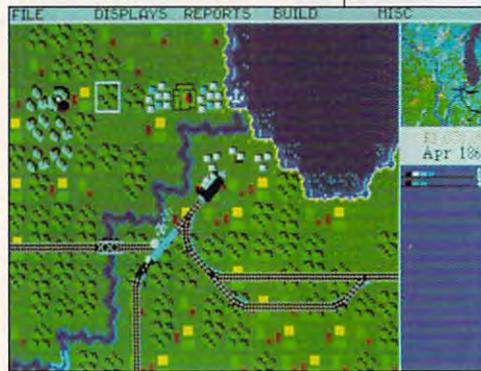
Orson Scott Card

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.

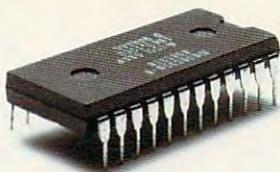
This applies also to repetitive messages that display for a fixed length of time. When you know what the message is going to be, why must it stay on the screen for seconds? Going from level to level in Rattler Race, for instance, always involves an annoying wait.

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.

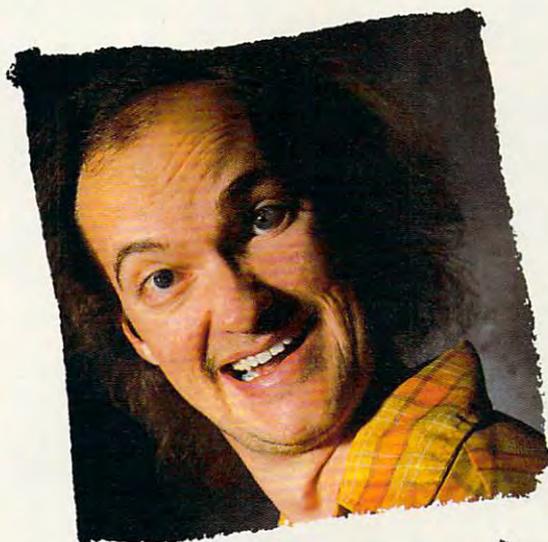
Option shortages. Is it laziness, or is there a Philosophy of Limited Choices that I haven't heard about? I can't understand why Tetris for Windows, for instance, doesn't allow you to clear the vanity board without reinstalling the game. (The secret: When you first install the game, copy the file TETRIS.HST 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

Decaying 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 space-ships. 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

Gazette 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

64/128 VIEW

G-1

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.

REVIEWS

G-12

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.

GEOS

G-22

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

PROGRAMMER'S PAGE

G-24

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

PROGRAMS

File Logger	G-25
Demo Maker	G-26
F/X Plot 128	G-30
Sprint III	G-33
Pad Design	G-38

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
```

```
      AYPMENTS 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
360 FRONT RD.
LASALLE, ON
CANADA N9J 1Z5

Questions
and answers about
amortization
tables, genealogy
programs
for the 64/128,
and more