

80 micro

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JULY 1986
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A CWC/I PUBLICATION

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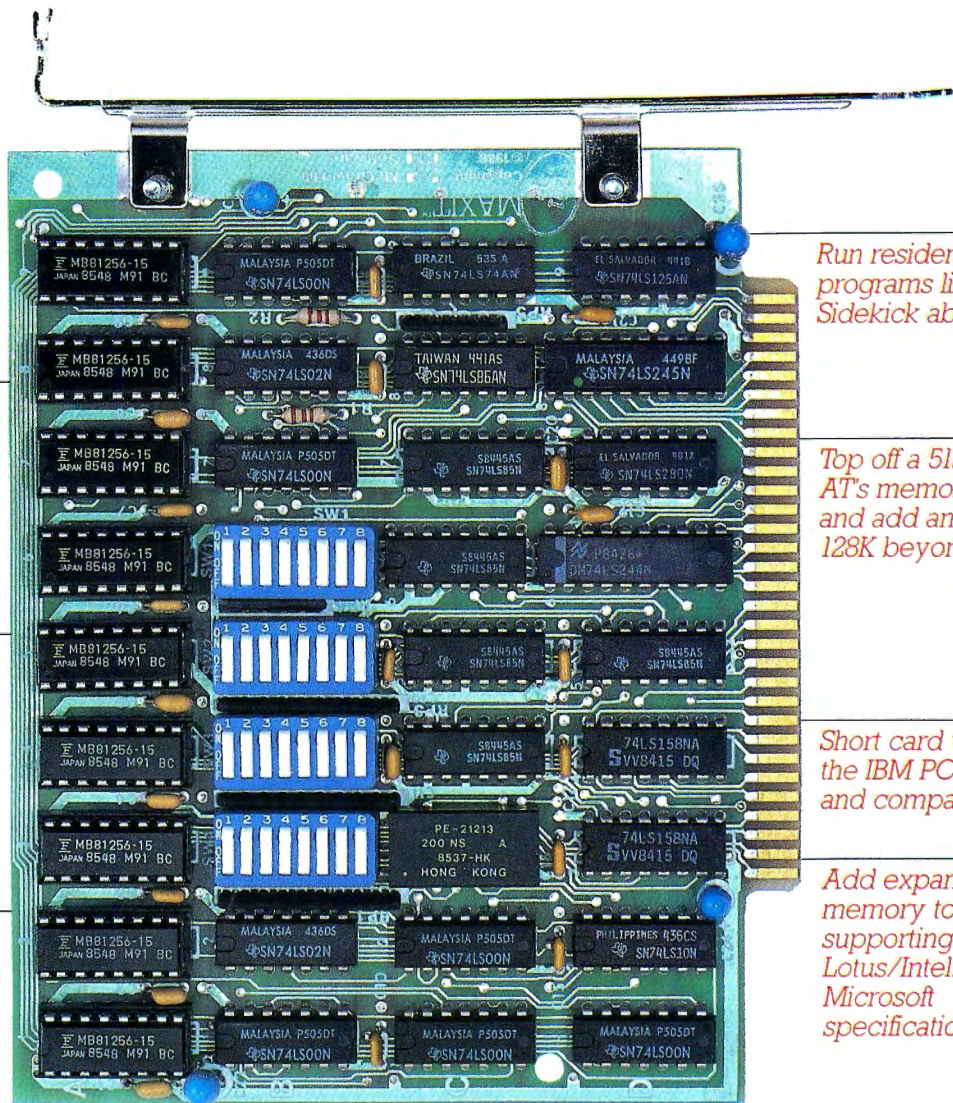
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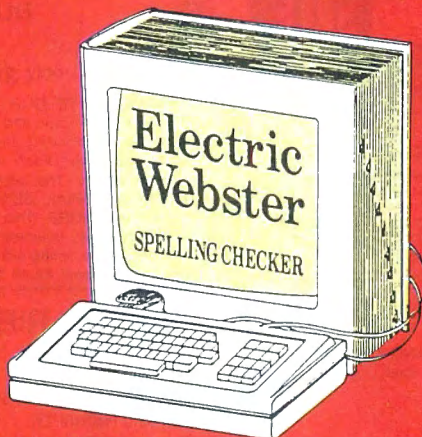
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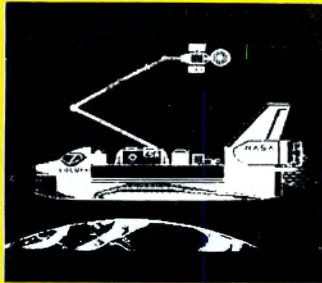
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PowerSoft NewsFlash #9

Summertime fun

with Leo Christopherson



Welcome back to our monthly *Newsflash*. This month we're going to have some fun! How do you have fun in the summer with computers? GAMES, of course! NO, we're not getting in the game business or changing what we're doing at PowerSoft, but we lucked across Leo Christopherson one day and thought this would be great for those who can't find his games anymore. These are super games that you and your family will enjoy by "The Walt Disney of the TRS-80". We present to you, "*Leo's Greatest Hits*".

We are very proud to have assembled this very classic game collection. Old-timers know his name instantly. For those who don't know Leo, his games set a pace that other authors had to follow. Leo was the first programmer to utilize string-packing to create not only truly animated graphics (that even blink at you), but he also created the standard for *SOUND*, spreading to two and three part harmony on some games. Lastly, they exhibit a terrific sense of humor. If you remember the enjoyment that any of these brought you, buy this disk. You'll show off your computer to all your friends with these! *If you don't have any great games, this is the disk to get!* Buy this for yourself or as a gift! Put some fun and laughs back in your TRS-80!

Originally, the games sold for \$14.95 each. Unfortunately, they disappeared - doomed to extinction - when the TRS-80 game market went cold around 1982/83. We thought of the newer people who missed them the first time around, as well as those who remember, but don't have them. These are definitely quality CLASSICS that should be part of every TRS-80 collection and not forgotten. We now offer them together for the very first time in this Collector's Edition at only \$19.95 complete. Use the cassette output cable and any mini-amp for sound. Sound is not possible on the 4P.

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ANDROID NIM (Living animated graphics with sound)

The classic animated game that set the pace that all others would have to follow. It appears that there are living, breathing creatures in your computer who will keep you laughing for hours, especially when they chatter at each other while you're trying to make your move! They stare right at you and blink! They also shake their head if they disagree with your requested move. Many comical moments, plus a great game of logic.

DUELING DROIDS (Animated sword fighting with 16 song soundtrack)

Those same great little guys from ANDROID NIM are back! This time they're waving light-sabers and are entering a fencing contest. You control one of them and guide him through training and then competition that gets fiercer as it goes. There are sixteen different songs in this game that are played at different times depending on progress.

DANCING DEMON (Fully animated tap-dancing side-show with music)

This is perhaps the most comprehensive, fun, and comical program of the lot, and one that will entertain you and your family for months on end. It features one of Leo's comical characters, but this guy tap-dances! There are four song and dance routines included, but the best part is you can easily compose and save your own songs and dance routines to disk! Easy and fun for the whole family! Your kids will have a great time with this one, and it teaches coordination between the notes and the steps. Soft shoe is possible and demonstrated on the TRS-80 to the tune of "AINT SHE SWEET?!"

SNAKE EGGS (Animated graphics with sound and table-talk)

Leo's comical version of "21", except this involves two snakes that roll eggs (yes, eggs) a certain distance for points. Trouble is, they like to argue, and sometimes "get tired" because you've been playing too long without giving them a break. Amazing!

BEEWARY! (Fully animated graphics with sound and burps)

The old game of spider and the fly - except you're the fly (or bee in this case)! The object is to hang above the spider until you can buzz down and sting him in the right spot. Trouble is, he keeps jumping at you. On top of that, you're getting tired! Lots of humorous comments from the spider. Sometimes he doesn't think you taste very good.

THE BATTLE OF LIFE (Animated life and death cycles with sound)

Based on *Conway's Game of Life*, except that it uses Leo's fabulous animated characters. Place your guys around the screen, and then let them battle it out for supremacy, based on strengths, weaknesses, closeness to other groups, etc. It actually creates a mini-universe of creatures that battle it out for space as they populate and breed or die out generation by generation. Very educational and competitive too.



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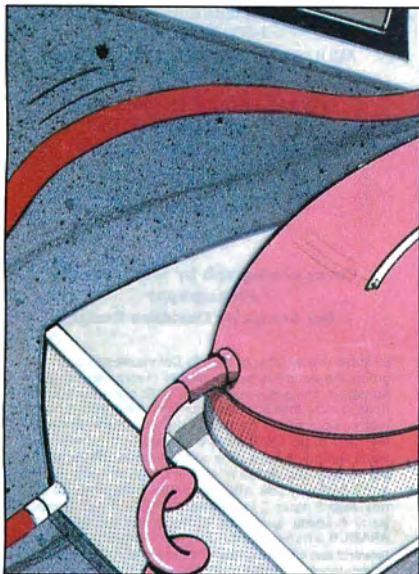
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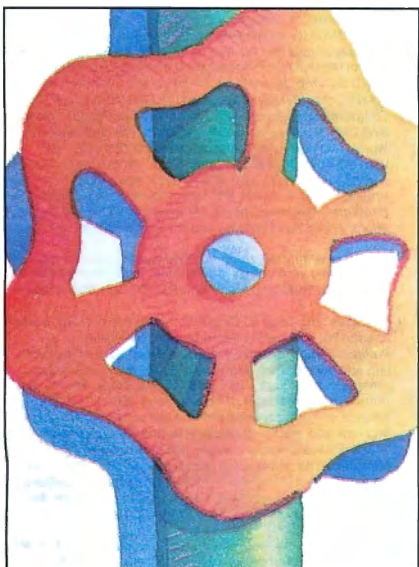
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Binary AND and OR get your programs running in cycles. (All systems)

To simplify proofreading and debugging, many 80 Micro Basic listings include a checksum value for each program line. For information on typing in listings containing checksums, see *How to Use 80 Micro Program Listings* on p. 112.

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LOAD 80

Load 80 gathers together selected programs from this issue of *80 Micro* and puts them on a magnetic medium for your convenience. It is available on tape or disk, and runs on the Models I, III, and 4.

Load 80 programs are ready to run, and can save you hours of time typing in and debugging listings. Load 80 also gives you access to Assembly-language programs if you don't have an editor/assembler. And, it helps you build a substantial software library.

Using Load 80 is simple. If you own a tape system, load the Load 80 tape as per the instructions provided. If you own a Model I or III disk system, you boot the

Load 80 disk and transfer the files to a TRSDOS system disk according to simple on-screen directions. If you own a Model 4, copy the Model 4 programs from the Load 80 disk to your TRSDOS 6.x disk using the COPY command.

Not all programs will run on your system. Some Model III programs, for instance, will run on the Model 4 in the Model III mode, but not in the Model 4 mode. You should check the system requirements box that accompanies the article to find out what system configuration individual programs require.

If you have any questions about the programs, call Keith Johnson at 603-924-9471. Yearly subscriptions to Load 80 are \$199.97 for disk, or \$99.97 for cassette. Individual loaders are available on disk for \$21.47 or on cassette for \$11.47, including postage. To place a subscription order, or to ask questions about your subscription, please call us toll free at 1-800-343-0728 between 9 a.m. and 5 p.m. Or, you can write to Load 80, 80 Pine St., Peterborough, NH 03458.

Directory

Command Interpreter

Article: Working Within the System (p. 52).

System: Model 4, 16K RAM; TRSDOS 6.2.

Create a Unix-like interface for the Model 4 with a TRSDOS extended command interpreter. Language: Assembly. Cassette filespec: ECI (CMD). Disk filespec: ECI/CMD.

Time Keeper

Article: High Time (p. 65). System: Model 4, 64K RAM; TRSDOS 6.2; EDAS editor/assembler.

Install an independent elapsed-time clock in the Model 4. Language: Assembly. Cassette filespec: ETIMER (CMD). Disk filespecs: ETIMER/CMD, ETIMER/SRC.

File Utilities

Article: Go Wild (p. 72). System: Model III, 32K RAM; TRSDOS 1.3; Apparat editor/assembler.

Three wildcard utilities that copy, delete, and set attributes for TRSDOS 1.3 disk files. Language: Assembly. Cassette filespecs: WILDCO (SRC), WILDCO (CMD), WILDKI

(CMD), WILDAT (CMD), PASSOF (CMD).

Disk filespecs: WILDCOPY/SRC, WILDCOPY/CMD, WILDKILL/CMD, WILDATTR/CMD, PASSOFF/CMD.

Debugging Tips

Article: The Next Step (p. 98). System: Models I, III, and 4, 32K RAM; EDAS editor/assembler.

Tools and techniques to help you speed up the debugging process.

Language: Assembly.

Cassette filespec: HIGHME (ASM).

Disk filespecs: HIGHMEM/SRC, HIGHMEM/CMD, ASSMBL/JCL.

Checksum

Article: How to use *80 Micro* Program Listings (p. 112). System: Models I, III, and 4, 32K RAM.

Each line of most *80 Micro* Basic programs contains a checksum, which is equal to the sum of the ASCII values in that line.

Use our checksum program to check the listings you type in against the original program. Language: Disk Basic. Cassette filespec: B.

Disk filespec: CHECKSUM/BAS.

BAS = Basic SRC, ASM = source code CMD = object code JCL = job-control language file

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Woof!

Prior to IBM's April announcement of the PC Convertible, Tandy officials repeatedly denied plans to market an MS-DOS laptop. But now that IBM has put its imprimatur on the laptop genre, and assuming that the market doesn't go completely in the dumper, a compatible is a logical move for Tandy.

Can Tandy give us a significantly enhanced and less expensive product? Without a doubt, yes—the Convertible is an outrageous rip-off, and one that Tandy should have no trouble besting in both price and features.

If the PCjr was a dog, then the Convertible is one with fleas, halitosis, and only three legs. It uses 3½-inch drives, but has no port to let you use external 5¼-inch drives (to say nothing of a hard disk). It doesn't come with a serial port. And finally, it is incompatible with IBM's desktop machines.

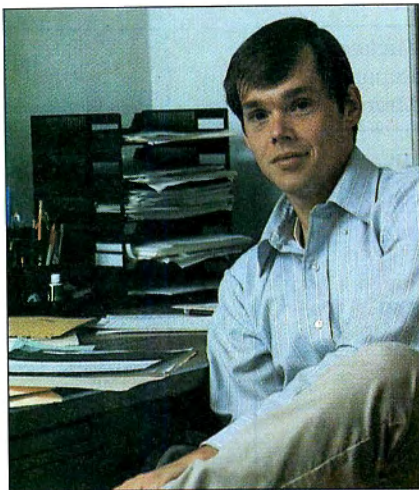
So you want to swap data and programs between the two? Here's what you're going to have to do:

You'll most likely need to spend \$395 on an external 3½-inch drive for your PC desktop. This will let you copy data and some programs from your 5¼-inch drives.

Of course, if you want to copy data from your Convertible to another desktop—say, that of a client you're visiting—the other computer will need a microfloppy drive, too. Unless you want to carry yours around with you. Or buy the serial/parallel adapter, an RS-232 cable, a null-modem adapter, and a telecommunications package, and port the stuff directly.

Data is one thing, but what about programs? Don't hold your breath. For starters, you won't be able to transfer copy-protected software. For finishers, some software won't run on the Convertible anyway—IBM made changes to the ROM BIOS that render the machine partly incompatible with IBM's other PCs. The only solution is to buy a completely new set of your software library in 3½-inch format. While many companies will sell 3½-inch versions of their software as upgrades, the process is still going to cost you time and money.

Finally, the price on this thing is ridiculous. The computer comes with 256K and two drives for \$1,975. The internal modem is \$450, the CRT display adapter \$325, and the serial/parallel adapter \$195. Add it up and you've spent \$2,945—and that's with no DOS, soft-



ware, external monitor, or battery charger. Think about it—the modem alone costs more than an entire Model 100.

In short, IBM is selling you half a machine—one that, as configured, cannot communicate with the rest of the world—for almost \$2,000. The rest you'll have to buy extra.

The only parallel I can think of off-hand is if Sony tried to market a \$1,000 receiver whose turntable, tape deck, CD, and speaker jacks were extra. The company would be laughed right out of the industry. But we're talking IBM here, so analysts and the press are dutifully examining the Convertible as a serious piece of hardware, giving it credit and credibility where little are deserved.

When will this industry grow up? Weren't the PCjr, Tandy 2000, and Apple III lessons enough?

Land of Opportunity

But this is America, land of opportunity, and one man's misfortune is another's boon. Tandy capitalized on the PCjr's failure with its Model 1000, and, if the company's executives are smart, can repeat the performance with its 1000P.

My ideal 1000P is a combination of the Models 100 and 1000. It brings together the simplicity of the former with the MS-DOS compatibility of the latter. Here are some of the features it should include:

Easy access. The machine should be able to easily communicate with MS-DOS desktop computers. This means that it either has to have 5¼-inch drives, or 3½-inch drives and a bus for external drives. A built-in serial port for direct file-transfer wouldn't hurt, either.

Compatibility. An incompatible MS-DOS machine is ludicrous. An MS-DOS portable must be able to run software off the shelf. Forcing software developers to release special versions of their products is silly and wasteful.

Built-in software. The concept has worked with Tandy's other portables, so why not use it again? ROM-based software saves the user the aggravation of toting around a lot of disks if he doesn't want to. It gets the new user up and running with minimum sweat. And a telecommunications program guarantees an ability to communicate with the outside world. This software doesn't have to be anything special—a version of DeskMate will do just fine.

Built-in modem. Again, a simple 300-baud model like the Model 100's would be enough.

Built-in ports. The 1000P should come with at least one parallel and one serial port.

A better screen. The Convertible's LCD is lousy. Isn't it time manufacturers stopped touting crummy screens like those on the Tandy 600 and IBM Convertible as readable? Ten years from now we'll look at these laughable displays and marvel that we didn't all go blind. Good LCDs do exist; Zenith, for one, proved it with the Z-171's blue backlit screen.

A better price. This should be the easiest trick of all. Price the above-described machine the same as the basic PC Convertible and you're already way ahead on features. Lop a few hundred bucks off and it runs circles around the IBM.

One fantasy. The above suggestions are based on what I reasonably expect from Tandy, a company not known for a lot of risk taking. My fantasy machine would also have one other optional feature—a CD-ROM drive. Such a system would let scientists, engineers, doctors, and other professionals carry around a magnet-, weather-, and coffee-proof 500-megabyte data base on a single disc. A portable CD-ROM system is a little ahead of its time, but in another year or so somebody's going to do it.

Tandy has already succeeded in the MS-DOS and laptop markets. Hence, the MS-DOS laptop market seems tailor-made for the company's strengths. The Convertible's glaring inadequacies should only make the job easier. ■

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JUNE, 1985
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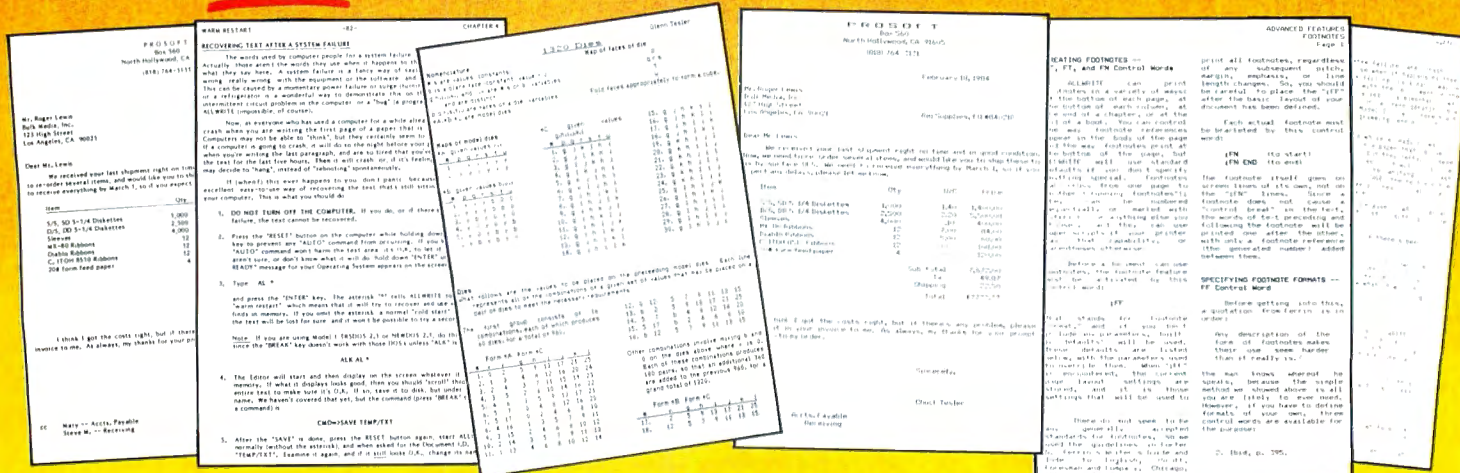
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We are proud to offer you the one Word Processor that will satisfy all your writing needs: ALLWRITE. It sets new standards for text editing and printing, and will give new life to your TRS-80. Let us tell you why...

In an attempt to push the public into expensive 16-bit computers, many manufacturers have been saying that the TRS-80 is obsolete. The truth is that the software, not the hardware, makes the difference. And the best word processor of all is now available *only* on the humble TRS-80, not on those expensive 16-bit machines!

ALLWRITE will save you time and let you produce the highest-quality, most professional-looking letters, term papers, and reports available on a micro-computer.

Allwrite Can Save You Time!

Reads a 25,000 character file (10 printed pages) from disk in SIX SECONDS... does a global search-and-replace in FOUR SECONDS... outruns even the fastest popular micro-printer.

ALLWRITE'S Screen Handling Makes Word Processing Easier Than Ever

Change text width at any time; wide lines shift left and right as you type. ALLWRITE preserves double-blanks between sentences, uses the entire screen for text, and displays a complete Status Screen at the touch of a key. Scroll by line, partial screen, full screen, to top or end of file, or to any marked point. Move cursor by character, word, tab, line, or screen.

You can set and change on-screen tabs and store them on disk. The print-time tabbing features are incredibly versatile: they allow left, right, and centered tabs, and even line up your decimal points.

ALLWRITE shows you where you forgot to turn off underlining, boldface, italics, or double-width. Special on-screen Preview feature shows page breaks and page layouts... including underlining and boldface. In "Summary" mode, ALLWRITE quickly flags formatting errors

without wasting time printing all the text. These standard features make document preparation faster and easier than ever!

State-Of-The-Art File Handling

There is no upper-limit on document size with ALLWRITE, because it chains files *backwards* as well as forwards, even across diskettes. Switch from one chained file to another in less than six seconds by pressing two keys. Select portions of other files for inclusion at print time... great for stock paragraphs.

ALLWRITE salvages text from bad disks! If a sector goes bad, you won't lose the entire file, because it

TAKES FULL ADVANTAGE OF YOUR MODEL 4.

The model 4 version of ALLWRITE uses the entire 80-by-24 screen. On a 64K machine, you can edit over 34,000 characters of text. On a 128K machine, you can edit THREE FILES AT THE SAME TIME! The second and third files can be over 32,600 characters each, for a total of almost 100,000 characters of text in memory.

will skip bad sectors, read the rest of the file, and then show you where the lost text belongs. This advanced error recovery turns a disaster into a feeling of profound relief.

User-Definable Soft Keys Reduce Typing Time

You can store 22 phrases or commands at a time into "soft-keys," then press just two keys to retrieve them. This makes frequently-used phrases and formatting controls a snap to use. You can store these definitions on disk and build a library of hundreds of pre-programmed keys to fit every one of your applications.

Our specially-designed templates fit right on your keyboard to let you see your settings at all times. Each template is also a Reference ("Cue") Card, so it is always right in front of you when you need it, without using up valuable screen space.

ALLWRITE Is Easy To Learn

ALLWRITE's commands and control keys are easy to remember because they use the first letters of common English words: 'CE' stands for 'Center,' 'Search' and 'Replace' do just that, and so forth. The on-line HELP menu offers over fifty screens of topics.

ALLWRITE's superb documentation will get you started quickly. Portions of it are designed for beginners, with every feature clearly explained in step-by-step tutorial style. Since you won't always be a beginner, other parts of the book offer advanced topics. There is a cross-reference summary chapter, a 14-page comprehensive index, and a detailed Table of Contents. We've been developing computer programs and manuals for over 23 years, and understand the importance of good documentation.

ALLWRITE works with all major DOS's on Models 1, 3, and 4/4P.

PROSOFT'S On-Going Customer Support

Perhaps the best reason of all for having ALLWRITE is the continuing support we offer you: friendly, expert, direct support that is unsurpassed in the micro-computer industry.

Note to students: with its Footnote, Table of Contents and Index features, ALLWRITE is ideal for your reports and Term papers.

Note to teachers: ALLWRITE makes it very easy to generate multiple-choice exams and answer keys. Ask for free instructions when ordering.

"ALLWRITE is a professional system that sets a new standard in word processing. It's powerful and easy to learn and use."

80 MICRO, Nov., 1984

Customer Comments

"This is the best software package I have ever received... superb, easy to use, fast, and has more features than the business word-processor at the office." (E.R.L.)

"Your company and products have to be one of the strongest factors I can think of for keeping me with the TRS-80!" (J.R.H.)

"NEWSSCRIPT is the Cadillac of word processors. ALLWRITE is the Mercedes Benz!" (B.E.)

"... a very readable manual." (D.S.)

BENEFITS OF OWNING

★ ★ ALLWRITE ★ ★

If Word Processing is important to you, PROSOFT's ALLWRITE is the best choice you can make. The clean, professional appearance it adds to your letters and reports will make an excellent impression on people. We will be happy to send you free print samples so that you can see for yourself how good ALLWRITE will make you look.

You probably know that quality word processors for CP/M and the IBM-PC sell for \$300-500, and they don't have ALLWRITE's capabilities or speed... or PROSOFT's proven, ongoing support. Now, for a fraction of the cost of a new computer, you can have the most complete word processor of all. And you won't have the headaches of starting all over again with a new, different computer.

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ALLWRITE comes with just about every useful word processing feature... standard. Here are some highlights: excellent right-justified proportional printing on most printers having that ability; powerful Form Letter and Mailing Label preparation; Instant counts of words, characters, lines, changes; block Move, Copy, Delete, Putfile, Getfile, and List; delete by character, word, line, sentence, paragraph, or block; insert and one-key insert; great RS-232 printer support; accepts all 256 ASCII codes from keyboard; intermix pitches on same line (printer-dependent); 1.5 line spacing, 6, 7, 8, 12 lines per inch (printer-dependent); does multiple-columns on all printers; perfect alignment of hanging indents; variables, logic statements, conditional printing; wildcard Directories; integrated with Electric Webster and DOTWRITER for Models I, III, and 4 (these are sold separately); "Legal" line numbering; paragraph, list, and figure numbering; supports most popular printers (all "printer drivers" included); compatible with high-memory drivers; fully explains all DOS and ALLWRITE error messages; wildcard search-replace; tabs, search-replace, other settings remembered across files; word reversal; up to nine levels of boldface; flexible page titles; footnotes at bottom of page or end of document; Table of Contents and Index generation; and PROSOFT's unmatched text formatting and printing capabilities.

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Tandy Cheated the 4D

No one can say Tandy didn't give the Model 4 line another chance in 1985 with the 4D. But I don't think they tried hard enough.

The Model 4D is a victim of poor marketing. Tandy knew it had to expand the Model 4's user base; the machine's greatest asset was its use of the CP/M operating system, and even the casual user knows what CP/M is. Yet the few advertisements Tandy placed for the 4D ignored this asset, instead emphasizing the lamentable DeskMate package. The TRS-80 should have been marketed as a low-cost CP/M computer that happens to have a healthy TRSDOS library.

The Express Order Software catalog was a step in the right direction, but it didn't go far enough. The TRSDOS selection wasn't fully described, and not one CP/M application was made available. Few people I've spoken to know that the Model 4 can run WordStar, Multiplan, and dBase II.

Why buy a 4D when you can get a 1000? Because an equivalent 1000 (two drives, monochrome monitor, RS-232 serial port) costs \$1,450. I got my 4D through an *80 Micro* advertiser for \$839.

I hope you and your advertisers continue to support this fine machine.

Jeff Joseph
Minot, ND

Selling Batteries 101

Robert J. Gosnell brought out an important point in the May Input section: The real reason for Tandy's decline is its lack of qualified retail personnel.

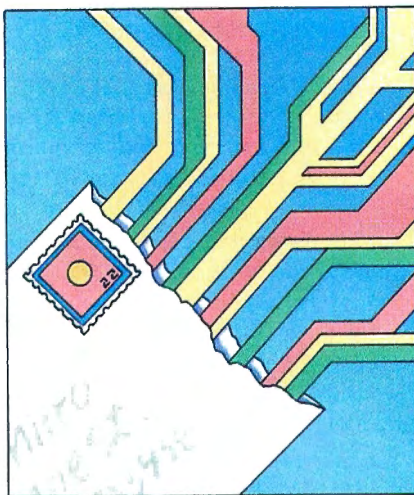
A serious business purchaser is reluctant to buy computers from salespeople whose main concern is radios and batteries. By overcoming its personnel problems, Tandy could capture the share of the business market its equipment deserves.

Brian K. Toumey
Warrendale, PA

IBM's Unwilling Suitor

Eric Maloney's February Side Tracks piece ("Tandy 1000 New BMOG," p. 8) had me rolling on the floor with laughter.

He notes that 83 percent of Radio Shack Computer Center (RSCC) dealers say IBM compatibility is important to Tandy sales. The Model 1000 is only sold because of its alleged compatibility. It is *not*, as



is claimed, an IBM clone, for it is decidedly not 100-percent IBM-compatible.

If the trend is indeed toward MS-DOS, your publication should look again at the statistics. Given the 83 percent of RSCC personnel who swear by IBM compatibility, how can 68 percent predict a bright future for Model 4D sales? The two statements are contradictory, but they reflect the usual paradox: Tandy is so wishy-washy about third-party sales that it makes itself look foolish.

David Freedman
South Orange, NJ

Not So SuperScripsit

Regarding David Dalton's November 1985 article ("Prose and Cons: Advanced Model 4 Word Processing," p. 37): I'd rather use Allwrite—not SuperScripsit—to edit a 140K ASCII text file.

How would you edit it without three single-sided disk drives? The file must first be converted to a SuperScripsit document, but where would you store a 140K document? Even after using MEMDISK to free space in drive zero, you'd still have trouble with such a large file.

With Allwrite, I don't even need the ex-

80 Micro's BBS is open 24 hours a day. It offers programs you can update and download, special-interest groups, and a classified section. You can reach the board at 603-924-6985; UART settings are 300/1,200 baud, 8-bit words, 1 stop bit, no parity.

tra 64K RAM to read and edit any ASCII file I could put on one side of a 5¼-inch double-density floppy disk. I use the GETFILE command to read as much of the file as memory can hold and then write it to a different disk in drive 1.

There isn't much you can do when you fill a disk in SuperScripsit. Fortunately, you can print either the whole document or a block of it, which lets you divide it into smaller pieces if you know how to use the TRSDOS Route function.

My advice to anyone who must use SuperScripsit is never to make a document longer than half of what the disk can hold. Then you can use the other half for an ASCII conversion of the document as a precaution.

Patrick A. Gainer
Newport News, VA

DOS Bootup

I'd like to see another DOS introduced for the Model III with greater external drive capabilities. TRSDOS 1.3I (the international version of TRSDOS 1.3) is straightforward and reliable, but I haven't been able to slow the stepping rate to control my new external drives.

What good is the debate that separates DOS users into beginners and seasoned programmers? In fact, the two groups are the same people who are individually at different stages in their developing expertise. The programmer born advanced should of course use LDOS, but what about those who only progressed after birth? Is there a DOS for them?

J.F. Melzian
Berlin, West Germany

MS-DOS Haters Unite!

Congratulations to Mike Barlow and friends (Input, November 1985, p. 12) for telling the truth about MS-DOS. I think it's even worse than the earlier versions of TRSDOS.

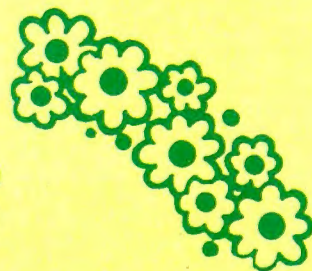
I feel sorry for unwitting buyers who choose MS-DOS because IBM is behind it. They should first consider TRSDOS, DOSPLUS, NEWDOS, and the many other niceties we TRS-80 owners are accustomed to.

Raul Crudele
Buenos Aires, Argentina

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80 Micro review 12/84
 Easy to use? ★★★★★
 Good docs? ★★★★★
 Bug free? ★★★★★
 Does the job? ★★★★★

Small Print: Hardware Power supply, speaker and manual included. Model I unit plugs into keyboard or expansion interface 40 pin bus. Model III, 4, 4P unit plugs into 50 pin I/O bus. Model 4P needs short 50 pin extension cable \$14.95. Use our "Y cable" (see next page) if your bus is already used. **Software** Works with all DOSes (not CPM), is 6.2K long, and relocates itself to the top of available memory. **Manual** available for \$5.

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Connection: Model I: plugs into the keyboard or expansion interface. Model III, 4, 4P: plugs into the 50-pin I/O bus. 4P needs short 50-pin extension cable \$14.95 Compatible with all operating systems.

Model I \$39.95
Model III, 4 \$59.95



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Send your questions or problems dealing with any area of Tandy/Radio Shack microcomputing to Feedback Loop, 80 Micro, 80 Pine St., Peterborough, NH 03458.

Personal Space

Q: I want to remove unnecessary files from my Model III system disk to make room for word processing and spelling dictionary programs.

I've used the Purge command to remove HERZ50, LPC, and MEMTEST, and Purge* to remove Basic/CMD, Convert/CMD, and XFERSYS/CMD. I need 14 granules of space and would like even more if possible. I want the disk to remain a system disk.

Can I remove Format, Backup, Diskdump or other files I don't need for word processing? I've tried everything I can think of to get rid of those files, but without success. The manual says you can convert a system disk to data by using Purge*, but I can't get it to happen. (Joan Littlefield, Irvine, CA)

A: The proper command is "PURGE :d (SYS,INV)", where d is the drive specification of the target disk. You can easily remove Format, Backup, Diskdump, and other files that aren't system files, as well as SYS5/SYS if you don't need to use Debug.

TRSDOS Patch

Q: Where can I find a patch to make TRSDOS 1.3 support the pair of Canon double-sided disk drives I am using on my Model 4?

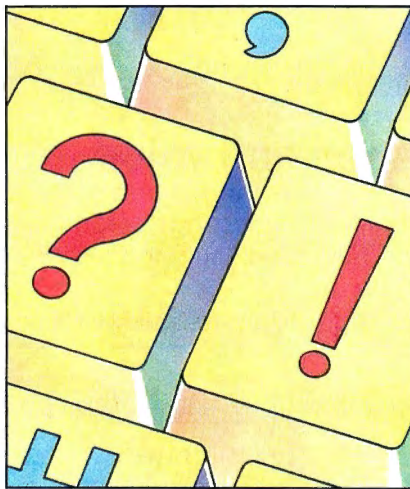
Also, what happened to the 80 Micro bulletin board system (BBS)? (Donald R. English, Edmond, OK)

A: Unfortunately, TRSDOS 1.3 is about the only Model III DOS that does not and cannot use your double-sided drives. If you want to take full advantage of your drives, you must use another DOS. LDOS 5.1 is a good choice because TRSDOS 6 can read and write to it. MULTIDOS will also read and write to TRSDOS 6 disks. Both LDOS and MULTIDOS will recognize double-sided drives.

The 80 Micro BBS is up and running 24 hours a day, seven days a week, except when it is being serviced. A 13-part series about the bulletin board, titled "BBS Express," ended in May 1985.

Selectric Transformer

Q: I have a Model III with two disk



drives and a DataRoyal series 5000 (5211) printer using a parallel interface. They work well together. I also use a Model I equipped with an interface board and an IBM 725 ASCII Selectric printer.

I'd like to use the Selectric system with the Model III. I tried interfacing the two units (40- and 32-pin connectors) and blew three chips in the Selectric interface board. What are the proper connections?

It would be nice to use a 150-cycle dot-matrix or 15-cycle print-quality system. Is a separate board necessary, or can the connections be made directly? (Fred Blanchette, Dracut, MA)

A: The Centronics parallel port has a 36-pin cable. On the Model III and 4, you'll have an edgcard connector at one end and the Centronics 36-pin connector at the other. Not all the pins are used, and you sometimes see computers with a smaller cable, such as the 26-pin one used for the Model 100, interfacing a 36-pin printer connector.

The Selectric is apparently configured to run off the I/O port (the 40-pin cable), while you tried connecting it to the printer port (the 32-pin cable).

Unfortunately, you can't just connect the Selectric cable to the I/O port on the Model III. The Model I uses memory mapping to send data while the Model III uses port mapping.

Can anyone help Blanchette solve his problem?

Scriptit on Tape

Q: Like Ralph H. Turner (July 1985, p. 16), I would like to transmit printer control codes from cassette Scriptit 3.1. I've spent many fruitless hours trying to adapt patches designed for disk Scriptit.

However, one patch (see "Scriptit Extras" by Richard W. Harrison and Louis S. VanSlyck, August 1984, p. 68) listed the original as well as the modified code, so it was easy to adapt. The patch doesn't enable printer codes, but gives access to ASCII characters 91-95 and 123-127. I use them in Model I Scriptit 3.1, together with a custom character generator ROM and the download character set of the Gemini-10X printer, to do word processing in French (the ROM is available from the Electronic Closet, 8187 Blakely Court West, Bainbridge Island, WA 98110).

Using a relocated version of Radio Shack's Debug, I installed the new look-up table at 6970 hexadecimal (hex), replacing the first 28 zero bytes at the end of Scriptit. This table takes the form:

```
9B 1B 9C 1C 9D 1F 31 XX 32 XX 33 XX 34
XX 35 XX 36 XX 37 XX 38 XX 39 XX 30 XX
3A XX
```

where XX represents the ASCII codes of the new characters. The first and last 4 bytes of Harrison and VanSlyck's New-code 2 seem unnecessary.

The second modification is exactly as in the article, except that the look-up address must be changed. At 50CD hex, I replaced the existing code:

```
FE 9B 20 04 3E 1B 18 2C FE 9C 20 04 3E 1C
18 24 FE 9D 20 04 3E 1F 18 1C
```

with the following:

```
E5 06 0E 21 70 69 BE 23 28 06 23 10 F9 E1
18 08 7E E1 18 20 00 00 00 00
```

I've been using this patch successfully for about six months. For anyone providing "before and after" code for a disk Scriptit patch that allows printer codes, I will try to adapt the code to cassette Scriptit and let you know if it works. (Jonathan Paterson, Hull, Quebec)

A: Thanks for the help. Paterson can be reached at 33 Boulevard St-Joseph, Hull, Quebec J8Y 3V8, Canada.

Driver's Ed

Q: In the September 1985 Feedback Loop (p. 16), George Crews said he had problems with Percom Data drives—occasional CRC errors in Micro-Systems Software's DOSPLUS 3.4 Diskzap, and failure to pass the read/write test in the Radio Shack Drive Analyzer (DDA) program.

I use Percom's drive setup in my Model III and had the same problem with the Tandy DDA: It passed all tests except the read/write. I discovered that DDA is

Illustration by Mark Fisher

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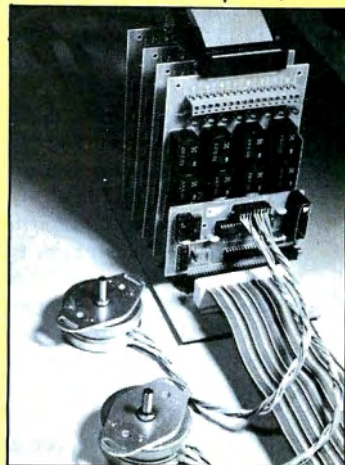
AR-132...\$49

Cable (3 ft.) Computer to **A-BUS**

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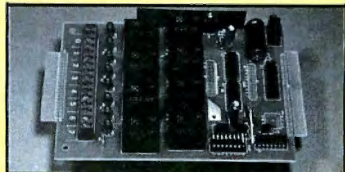
A-BUS Motherboard, for up to 5 cards (not needed if using only one card)

MB-120...\$99



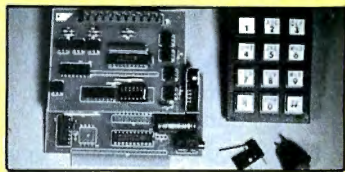
A-BUS ^{new} Relay Card: RE-140...\$129

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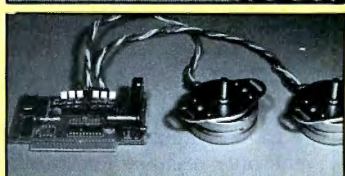
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Special Package: Controller, two steppers and power supply: PA-181\$99



Disk drive extender cable (8'')...C160:\$9.95

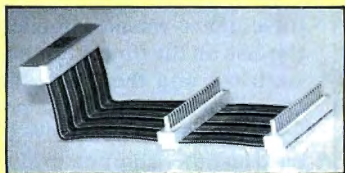
Y-Cable for Mod I bus (40 pin): • X2-40...\$29 • X3-40...\$44 • X4...\$59 • X5...\$74

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Printer-Switcher.....\$59

A must if you have two printers, plotters, or any devices using the standard parallel printer port. End the hassle of plugging and unplugging cables. You can select either device at the flick of a switch. For Models I,III,4,4P,4D.



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heavily copy protected and uses data flow through the FDC chip to test read/write integrity.

Tandy uses a WD-1793 FDC chip in the Model III, while Percom uses a WD-1791. The Model III service manual says the 1793 FDC is functionally identical to the 1791 except that the data bus is true instead of inverted.

This is why Crews' drives flunk the DDA read/write test. Every normal program in creation runs fine on the Percom system except the DDA.

The one other program that won't run on the Percom system is the copy-protected PFS:File, also from Tandy. It boots fine, but won't save or load data.

I know of no cure. Installing a 1793 chip doesn't work at all, so don't waste your money on it. (*Jtm Unger, Bensalem, PA*)

A: Thanks for the report. Does anyone else have a solution?

Keyboard Magic

Q: Regarding Carl Brown's problem with the Model III keyboard (January 1986, p. 16): a key also failed on my Model III, and I fixed it simply by remelting the old solder. When another key went, I resoldered the whole keyboard and haven't had a problem since. This method is much cheaper than replacing a key or an entire keyboard. (*Owen Shilling, Louisville, KY*)

A: Good suggestion. I would only add that if resoldering a key part fails, replacing the bad part with a new one is still cheaper than buying a new keyboard.

Holding On to CP/M

Q: Lyn McAllister's February letter (p. 16) reminded me of my own experience with an LNW computer with 40- and 80-track TEAC drives. The computer would sometimes go into what I call the "ignore stage," or get hung up when I was using a CP/M system disk, and resetting was the only escape. The problem was apparently disk-related. It seems the disk-drive motor wasn't big enough to turn the disk all the time; I think the disk was worn out and the lubrication used up. Changing disks cured the problem.

My question: Is the LNW CP/M format used on other computers? I'd like to buy some CP/M software, but the company is out of business and the computer is no longer supported. (*Larry Arbour, Baton Rouge, LA*)

A: I've never heard of a disk using up its lubrication, but anything is possible. As for the disk format, instead of looking for a compatible computer format, I suggest you buy SuperCross/XT from PowerSoft (17060 Dallas Parkway, Suite 114, Dallas, TX, 75248, 214-733-4475).

The program lets your computer read all the CP/M formats used on the market.

Barring that, does anyone know LNW's CP/M format (sector size, track size, interleave factor) and which other computers use the same format?

Mais Oui

Q: Is there a program for adding French accents to the Model 4 keyboard? (*Francine Leclerc, Montreal, Quebec*)

A: I'm not exactly sure what you want. There are word processing programs for remapping the keyboard to generate special characters. Both Prosoft's Allwrite and Anitek's LeScript let you specify a key combination with macro definitions to display any character from 127 to 255. Getting these characters to print depends on the type of printer you have.

If you're knowledgeable enough, you can write a DOS keystroke multiplier routine to do the same thing, but only for programs that honor the TRSDOS call routines (programs that directly read the keyboard bypass the DOS and ROM and will ignore such routines).

Changing Names

Q: Can I alter the name of a disk once I've formatted it? I can find no information on how to do this in the manual or in the disk version of the Tandy Disk Course (catalog number 26-2014), and I get no reply from Tandy's United Kingdom division.

Hitherto I have answered "TRS" to the prompt when formatting an empty disk, but perhaps it would be useful to be able to identify the disk more precisely when, for example, I'm getting a printout of the disk directory contents. Invariably using the name "TRS" isn't much help when you are working from more than 100 disks. (*A.D. Bangham, Great Shelford, Cambridge, England*)

A: TRSDOS won't let you change the name of a disk once it has been formatted. However, Super Utility from PowerSoft (\$79.95) lets you do it with surprising ease. Super Utility goes directly to the disk drives, bypassing and ignoring the DOS. It lets you read disk sectors, change information, and write the information back to your disk.

Drive Him Crazy

Q: The TEAC RX180 dual drives mentioned in last September's Feedback Loop (p. 16) won't run on my Model I. They fail to respond to either MULTIDOS or NEWDOS; with TRSDOS, they will only load. When I try getting a directory, the response is "Drive not available." Calling up Basic produces a "Program not found" response.

The drives worked fine when they

were tested on a Color Computer, and I would like to keep them. I have, however, been using a pair of Percom Data DSDD drives for five years on the Model I and need to have them overhauled. Where can Percom be reached? (*R.H. Saunders, Epping, NH*)

A: Since the Teac drives work OK on the Color Computer, I suspect the track-to-track stepping rate you specified is too fast for them. Try increasing the track access speed to 30 milliseconds (Tandy standard) and note the results. Once the drives are working properly, go back into the DOS and increase the stepping rate until you reach the minimum time the drives require for operation.

Contact Percom at 11220 Pagemill Road, Dallas, TX 75243, 214-340-7081.

Seiler's Helpers

Q: I'd like to respond to Gil Seiler and the problems he had interfacing a Tandy Daisy Wheel II printer to an AT&T 6300 computer (October 1985, p. 16). I've been using a DW IIB with different computers, including an Osborne Executive, IBM PC, and Compaq Portable, all running MicroPro's WordStar Professional, without any problems.

I ran a one-line Basic program:

```
LPRINT CHR$(27)+CHR$(21)
```

and later adapted a short Assembly-language program from a magazine to avoid running Basic on the IBM or Compaq. I also configured WordStar to send the character string (ESC+CTRLU) as the printer initialization string. This makes the change automatically when WordStar prints a file, and I don't have to run the other program at all. Once the change is made, the printer stays set until you turn it off, so you can exit WordStar and run other programs without further changes. (*Edward Klonka, Sacramento, CA*)

Q: Gil Seiler was apparently sending the control sequence incorrectly. The easiest remedy is to build a two-character file containing the initialization sequence in hex 1B and 15 (use Debug or another text editor that lets you input control characters). Then, in your AUTOREXEC.BAT file include the line "COPY filename PRN", where "filename" is the name of the file containing the two-character control sequence. Make sure the DW II is on-line, turned on, and connected. It will remain in "carriage return only" mode until it is turned off or reset with the ESC-CTRLV sequence. (*Ron Scott, Houston, TX*)

A: Thanks for the clear explanations.

Double Difficulties

Q: I recently acquired an MPI 5¼-inch drive (Model 52SA) that is double-sided,

double-density, and has 40 tracks per inch (tpi). I need the interface specs so I can connect it to a Model I, which has an installed double-density adapter, or to an LNW80 with an LNW 5/8 double-density adapter. (I use DOSPLUS 3.4 on both machines.) Can you tell me MPI's address?

My second question concerns using VisiCalc with DOSPLUS. I've copied VisiCalc from TRSDOS, and when I load a file using the /SL command and the right-arrow key, the screen displays "End of file" instead of listing a file name. How can I get this to function properly? (Carl R. Miller, Warmtinstler, PA)

A: MPI's address is 4426 S. Century Drive, Salt Lake City, UT 84123.

According to the technical support personnel at Micro-Systems Software (4301-18 Oak Circle, Boca Raton, FL 33431) Scriptsit and SuperScriptsit patches for DOSPLUS 3.4 are available on CompuServe's TELCOM SIG (PCS-52). Micro-Systems doesn't have a patch for VisiCalc. If you aren't a member of CompuServe, call technical support (305-391-5077) for assistance. They recommend that you upgrade to version 3.5.

Inventory Nightmares

Q: I'm having trouble pulling catalog numbers from The Small Computer Company's Profile Plus 4, which is run on a two-drive, 48K Model 4. I use TRSDOS 1.3.

I enter inventory information as it reads on the invoice with numbers, dashes, spaces, commas, and letters together. Sometimes the program won't pull a series of numbers represented with a hyphen (numbers 105-178, for example); the request will work the second time, but then another one will fail. I've been told the hyphen may be the culprit. The number series does show up when I call all the inventory data for a company.

I've heard that Radio Shack and the software company are working on this problem. Is an update coming, or should I look for another data-base program? (Edward L. Weeks Jr., Charleston, SC)

A: I don't have a solution readily available. The best source of information is probably the software company.

Your Move

Q: I have a solution for William Kirksey (August 1985, p. 14), who owns Models III and 4P and wants to put Radio Shack's MicroChess 1.5 on disk.

Drive zero should contain TRSDOS 01.03.00 and drive 1 should contain a formatted disk. At the Ready prompt type TAPE(S = T, D = D) and press the enter key; at the cassette prompt, type L and enter it. Type CHESS at the TRSDOS prompt to run Chess with the 01.03.00 disk.

Also, some Model I, Level II Basic (4K) tapes can be converted to run on the Model III/4; again, you must have TRSDOS 01.03.00 in drive 1 of the Model 4. Enter Basic and type POKE 16913,0; then type CLOAD "file name". At the ready prompt, remove the Level II tape, type POKE 16913,1 (a baud change POKE), and insert a new tape. Type CSAVE "file name" and use the new tape with 01.03.00 disk Basic. (name withheld, Texarkana, TX)

A: Thanks for the good advice.

Sticky Keys Unstuck

Q: I've fixed the malfunctioning keys on my 1981 Model III that I described in the January 1986 Feedback Loop (p. 16).

I disassembled the keyboard and found that with a little patience, a soldering iron, a desoldering wick, a Radio Shack DIP extractor, needle-nose pliers, and some knife blades, I could remove and repair the defective key switches.

First, pull off the plastic character key with the DIP extractor and desolder the two leads from the circuit board. Next, with the pliers squeeze the two locks of the switch assembly, and lift it from the board with the extractor or a knife.

Disassemble the switch by prying up the center of the molded latches on two sides of a gray plastic switch cover found on the sides opposite the keyboard retaining locks. You must pry each latch from the center because the locking features on the side could fracture easily.

The actual switch is beneath a white plunger and plunger spring. It consists of two plates with solder leads on their lower ends, separated by a frame of insulator material. Wrapped over the top of the assembly is a shiny silver leaf spring (the source of my problems).

I fixed the leaf by slightly bending its checkmark shape. Remember that bending it too much could cause the switch to stay on all the time.

To reassemble the switch, simply snap everything together in reverse order. Then snap the entire switch assembly back into the keyboard, making sure the leads go through their holes in the circuit board. Solder the leads to the board and replace the key cap. (Carl Brown, Kernersville, NC)

Q: I suggest removing the key cap and spraying a quick shot of Radio Shack's Archer TV Tuner and Control Cleaner & Lubricant into the gap between key body and actuator.

Another way to remove key caps is to fashion two hooks from paper clips. Hook one paper clip under the back edge of the cap and the other under the front edge. Pull up gently but firmly, with a front-to-back rocking motion, by alter-

nately pulling harder on one clip than on the other. (Don't hook the clips on the right and left sides of the cap: The actuator is more easily broken by left-to-right rocking than by front-to-back.)

It's easy to spot the gap into which you should aim the spray can's 6-inch plastic tube. Use only a shot and quickly press and release the key actuator to "work" the fluid into the internal moving parts. If this doesn't fix an intermittent malfunction problem, try a second shot.

The cure will last a year or more. (Michael Meyers, Upper Montclair, NJ)

A: Be careful not to spray too much cleaner in the key cavities. Excess lubricant (depending on which kind you use) can short-circuit the connectors, causing the key to appear to be always pressed.

Floppy-4P Connection

Q: In the August 1985 80 Micro, you described a method of connecting an external floppy disk to a Model 4P. I don't yet have the Model 4P technical manual and need to know which of the Q2 output pins I should connect to the inverter. Also, what type of IC do you recommend as an inverter? (J.B. Crawley, Campbellsville, KY)

A: The January 1986 issue ("On the Upgrade," p. 41) gives complete instructions on adding external disk drives to the Model 4P.

The Cursor Curse

Q: In the September 1985 Feedback Loop (p. 16), Steven Melnick requested a cure for the blinking "blob" cursor in Tandy's SuperScriptsit. I agree with him that it's a nuisance. Here's my fix for Model III SuperScriptsit version 1.2.08.

The cursor is stored internally as byte 8F (143 decimal) at two addresses. I changed the value to 5F, the underscore character, which I find less disconcerting while staring at the screen in search of inspiration.

The two fixes (in SuperZap notation) are: Change SCR17/CTL FRS2 Byt F3 from 8F to 5F; Change SCR16/CTL FRS4 Byt 0A from 8F to 5F. (Gil Spencer, Spit Junction, NSW, Australia)

A: Thanks for writing with the patches. Unfortunately, a blinking character remains. Does anyone know how to eliminate it? ■



Terry Kepner is a freelance writer, programmer, and editor. He writes monthly columns for Portable 100 Magazine, Pico, and 80 Micro, and is publisher of The Kepner Letter.

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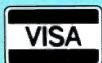
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Tandy Gets A Higher Grade

Tandyland

The hottest news from Fort Worth these days concerns sales of the Tandy 1000 in the education market. According to Amy Arutt, assistant manager of marketing information, the company's decision to package the Trackstar Apple II emulator board with Tandy 1000s is paying big dividends. Many educators rate Apple II compatibility as the chief selling point of the Tandy 1000, she says. One example is the Chicago Municipal School District, which recently spent \$800,000 to install Tandy 1000s in its classrooms.

The Trackstar Apple II emulator board, manufactured by Diamond Computer Systems Inc., Los Altos, CA, retails for \$375 (see the Photo). Schools that purchase a Tandy 1000 can bundle the board into the purchase price of the computer. It is not sold through Radio Shack Computer Centers nor through Tandy's Express Order Hardware service.

The packaging of the emulator board might be helping Tandy enlarge its share of the education market. According to Dataquest, a market-research firm located in San Jose, CA, Tandy's market share increased to 19 percent in 1985, compared to 12 percent in 1984. Apple's share decreased from 52 percent to 47 percent in the same period. IBM also gained ground last year, doubling the 4-percent share it staked in 1984.

Tandy hopes to strengthen its position with a 325,000-piece direct-mail campaign aimed at educators. The campaign promotes the 1000 as an inexpensive means for schools to upgrade to MS-DOS without sacrificing investments in Apple equipment. Promotional literature emphasizes the 1000's MS-DOS capabilities and its compatibility with Apple software (when equipped with Trackstar).

Educators who are not on Tandy's mailing list can obtain information from a local Radio Shack Computer Center or by calling Tandy's Education Division

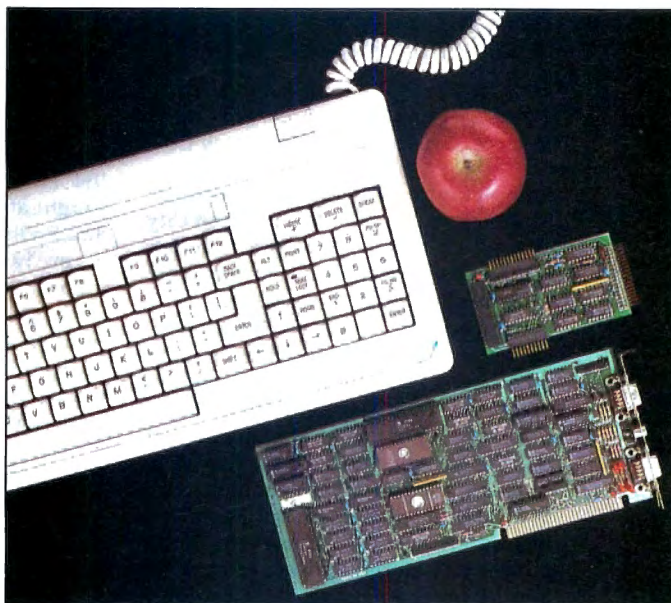


Photo. Diamond Computer System's Apple II emulator board.

(800-433-5682). Information will also be available through advertisements in the *T.H.E. Journal*, *Electronic Education*, and *Learning*.

MicroTrends

In 1985, the microcomputer industry spent \$1.2 billion to advertise in 134 publications, according to C Systems, a Ridgefield, CT, market-research firm. The firm has published a 500-page report on how microcomputer companies invested money for printed advertisements last year.

AT&T was the biggest spender, investing \$39.1 million to promote its microcomputer line along with its communications products. IBM placed second with advertising expenditures of \$36.5 million. Hewlett-Packard came in third, purchasing 1,503 advertising pages at a cost of \$15.2 million. Next on the list are Xerox, Digital Equipment Corp., and Texas Instruments, which spent \$10 million, \$8 million, and \$6 million, respectively.

Tandy appears close to the bottom of the list, having spent \$3,968,000 for 292.63 ad pages in 1985. The chief beneficiary of Tandy's spending was *Rainbow*, which ran 34 advertising pages for the company last year. *HOT CoCo* ran 29 Tandy ad pages, and *Creative Comput-*

ing published 26 pages. Next in order of Tandy's preference were *Business Week* and *The Wall Street Journal*. *80 Micro* ranked sixth on Tandy's list; it published 20 ad pages for the company in 1985.

For the complete report on the microcomputer industry's ad spending last year, write to Lynn O'Brien, C Systems, Box 637, Ridgefield, CT 06877. Request the High Tech Ad Placement (HiTAP) report.

Borland International (of SideKick fame) and Traveling Software (maker of the Ultimate ROM II software and other products for the Models 100 and 200) have locked horns over a product

Borland plans to introduce called Traveling Sidekick. In December, Traveling Software filed suit against Borland, claiming the company infringed on its trademark rights by using the word "traveling" in a product name. Soon after, the company agreed to try and settle the matter out of court.

Nine weeks of discussion failed to produce a satisfactory arrangement, however, and as of press time, the case has landed back in court. Though the matter might be resolved by the time you read this, the enduring question is why the problem arose in the first place. At this time, Traveling Sidekick is a nonproduct. Programming problems have stalled production. Nonetheless, Traveling Software's president, Mark Eppley, feels his company must defend its name against infringement attempts from a financially stronger foe. "I don't think it's morally right for them to come in here and use any name they want," he said. The company is determined to fight the issue, despite the formidable financial resources of its competitor and expectations that the suit will drag on.

IBM's introduction of the PC Convertible laptop computer on April 3 inflamed both hope and fear in the portable-computer industry. Analysts hope

IBM's presence will help legitimize the market, while IBM's competitors fear domination. Some analysts believe that IBM's influence could bring industry laptop sales to 120,000 this year, double what they were in 1985.

The PC Convertible base model weighs 13 pounds and has a detachable, 80-character by 25-line liquid-crystal display (LCD). Users can plug the unit into a desktop monitor when the LCD screen is removed. The laptop also features 256K of memory (expandable to 512K) and two 3½-inch, double-sided disk drives. The unit costs \$1,975 without the operating system, PC-DOS 3.2, which IBM sells separately for \$95.

Options include a 300-/1,200-baud direct-connect modem, a lightweight dot-matrix printer, and a battery recharger. A fully configured PC Convertible weighs close to 15 pounds and costs about \$3,000. Its relatively high price is a relief to other high-end laptop makers like Data General, Hewlett-Packard, Zenith, and GRiD, which are the companies most likely to feel competitive pressure from IBM.

Opinions about the PC Convertible are mixed. IBM's decision not to include an electroluminescent display (ELD) disappointed many who felt such a screen would be more readable than an LCD, which is cheaper to produce. Also, the 3½-inch disk drives mean users with software formatted for 5¼-inch drives will have to convert it or buy new products.

Although Lotus, Ashton-Tate, and Microsoft all say they will support the microfloppy format, it will take time for them to gear up production. This might delay introduction of programs for the IBM laptop.

Big Blue also unveiled an 8-MHz version of the PC AT (\$5,295) and a new XT model with a 20-megabyte hard drive (\$3,895). As an option, users can install a 3½-inch internal disk drive in the new XT. Though IBM will continue selling old versions of these computers, it has revised prices for its personal computer line. The 256K, single-drive IBM PC now costs \$1,845, down from \$1,995, while the price of the two-drive model drops from \$2,295 to \$1,995. A single-drive PC XT sells for \$2,145, down from \$2,279; a two-drive model costs \$2,295, down from \$2,570; and the 10-megabyte hard-disk version costs \$2,895, down from \$3,895. IBM cut prices to reduce pressure from lower-priced clones, such as the Tandy 1000 and the Leading Edge Model D personal computer.

Tandy portables have made few inroads into top Fortune 500 corporations and are not likely to gain much ground in

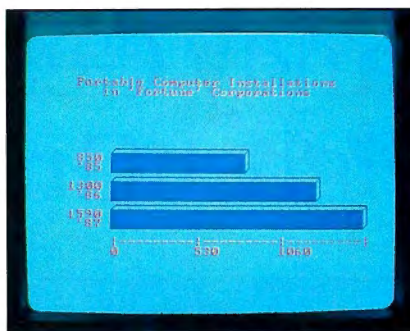


Figure. Portable-computer installations in Fortune 500 corporations. (Source: Newton-Evans Research Co.)

the near future. That's the projection of the Newton-Evans Research Co., Ellicott City, MD, which surveyed 101 Fortune 500 companies to ascertain their portable-computer buying plans in 1986 and 1987.

Compaq was singled out by 31 of the survey respondents as the preferred portable model, while IBM was favored by 22. Apple, Data General, Hewlett-Packard, and Sperry were also mentioned. None of the respondents cited Tandy, despite the price advantages of the Models 100, 200, and 600. Karen Dargis, an analyst with Newton-Evans, says the Tandy portables "lack the software most of the larger corporations want." Corporate users who have become accustomed to using MS-DOS software on their desktop computers no doubt want to run the same programs on their portables.

Based on its survey, Newton-Evans predicts that corporate spending for portable computers will increase in 1986 and continue on an upward track next year (see the Figure).

Hot Items

Can't figure out what to do with your old Model III? Maybe you should consider selling it. For \$20, you could advertise with Comp-Used, a used-computer service in Wilton, CT. Comp-Used maintains a data base of used-computer buyers and sellers; currently, the list contains about 1,000 names. Shoppers can call the service to inquire about specific items for sale or pay \$9 for a print-out of the complete list. Advertisers pay to list items and a commission to Comp-Used when a buyer is found.

According to Dan Delmar, president, a shopper recently paid \$500 for a used Radio Shack Model III with two drives and 48K of memory. Though you can sell a used computer for any price you want, the advertising and commission costs do not justify listing machines worth less than \$100. However, lower-priced items sell the fastest. "There's a trade-off in this business," Delmar said. "If you want

some quick cash or to get rid of a machine quickly, a low price on the unit is what you want. But if you're looking to make more money, you may have to list the machine for several months."

Comp-Used is one of several services nationwide that match used-computer sellers with potential buyers. Such services have existed for years for mainframe and minicomputer users and are now finding niches in the microcomputer market. According to Delmar, the number of systems for sale is generally equal to demand. The Comp-Used data base splits evenly between buyers and sellers, though individual sellers might list 12 or more machines. The most sought-after systems are Apples, IBMs, and Radio Shack Model IIIs. Used Model 4's are rarely listed, Delmar noted.

For more information, call Comp-Used customer service at 203-762-8677. This number connects you to the service's computer, which guides you through menus of customer information accessed by pressing buttons on your telephone.

Bill Bixby fans might want to write

Tandy if they want the television star to remain the company's spokesman. As of press time, rumor had it that Tandy would can Bixby in favor of a more dynamic screen, voice, and print personality when his contract expired in June. The report came from a source close to the Tandy Towers.

Though Tandy did not confirm the rumor, it didn't issue a strenuous denial either. When asked, Amy Arutt, assistant manager of marketing information, said, "At this time, there is no indication that [Bixby's contract] will not be renewed." She added that Bixby had helped the company's advertising campaign because of his popularity with television viewers. He became the company's spokesman in 1984.

Tandy's financial situation re-

mained strong through the third quarter of fiscal 1986, supporting analysts' contentions that the company has rebounded from its 1985 financial slump. Consolidated sales and operating revenues totaled \$766,725,000 for the quarter, a 13-percent increase over the 1985 third-quarter total. Worldwide sales rung in at \$256,795,000, up 11 percent over the previous year. U.S. retail sales increased 13 percent, with sales and operating revenues topping \$200 million. The third-quarter figure in 1985 was \$177,199,000. Wall Street watchers take note: Tandy's stock remained stable during the first three months of this year, a period when retailers normally enter a post-Christmas business slump. ■

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- Lets you specify recurring journal entries
- On-line inquiry for account status
- Reports include: Income Statement, Balance Sheet, Chart of Accounts, General Ledger Report, Accounts Distribution Report, Trial Balance
- Prints Financial Statement in flexible, user-defined format

THE Accounts Payable:

- 5 transaction types: Release, Hold, Void, Prepaid and Credit Memos
- Access invoices for payment or inquiry
- Priority status or projected payment date available for each voucher
- Maintains numeric control over checks
- Complete payment information on voucher stub checks
- Computes discounts
- Writes automatic payables schedule
- Automatic vouchers for recurring items
- Allows partial payments
- Reports include: Aged Trial Balance, Two Pre-check Reports, Aged Cash Requirements, Vendor History Report, Check Register, Checks, Summary of Accounts Distribution Vendor List, Account List

THE Accounts Receivable:

- Balance forward or open item billing
- Automatic computation of late charges or interest rates
- Handle cash, C.O.D. or credit customers
- Specify any 3 invoice aging periods
- Print statements at any interval
- THE A/R posts cash receipts or invoices to customer accounts, types customer statements and reminder notices, and organizes and prints management information reports
- Automatically records recurring charges
- Reports include: Aged Trial Balance, On-Line Enquiry, Batch Proof, Accounts Distribution Report, Customer Statements, Customer Lists, Invoice & Cash Batch Proof, General Ledger Update
- Optional dunning letters

THE Order Entry:

- Processes invoices singly or in batches
- Up to 99 lines items per order
- Held (unshipped) items are marked on the Order Report
- THE O/E system automatically shows customer credit rating
- Each invoice depletes THE Inventory automatically
- Sends accounting transactions to THE Accounts Receivable
- Assign separate line item amounts to independent sales and receivables accounts
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- THE Order Report provides urgent information on every order

THE Inventory:

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- Activity statistics for current or to-date period
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- Optional hard copy record of all inventory transactions for auditing
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- 30 character description field
- Reports include: Activity Report, Valuation Report, Auditability Proof, Reorder Report, Item List, and Item File Print

THE Payroll:

- Handles any combination of weekly, biweekly, semimonthly & monthly pay schedules
- Define up to 20 earning or deduction categories for all employees
- Assign any 8 categories for each employee
- Accountants can perform after-the-fact payroll processing
- Prints information for government reports
- Salary expenses can be distributed to different departments, branches or profit centers
- System includes safeguards and verification procedures
- Reports include: Company History, Pay Transaction Proof, Calculations Proof, Employee History, Employee Master List, Check Register, Payroll Journal, Vacation report, 940 & 941 Reports, W2 Forms, & Prints Checks
- Of course, THE Payroll calculates payroll including Federal & State taxes, prints checks, allows hand written checks, lets user maintain tax tables and keeps an extensive employee payroll history

THE Name & Address System:

- Create name & address files
- Print mailing labels
- Sort files by up to 4 items
- Search or sort by match or range
- Print a report of a NAD file
- Merge files
- 88 character open reference field
- Sort by any character in reference field
- 10 number zip code

THE Spreadsheet:

- On-line tutorial
- Cut & paste multiple spreadsheets
- Format: Global, Column, Row, Entry
- Arrays: Copy, Replicate, Move, Insert, Delete, Blank
- Labels: centered, right or left justified
- Variable cell width
- 2 Windows to view separate areas of worksheet
- 20 special math functions
- Manual or automatic recalculation
- Complete glossary of spreadsheet terms
- Maximum spreadsheet size: 255 Rows x 64 Columns
- Variable print formatting options
- Simple editing functions
- Status on contents of any cell
- Set hold on any row or column to prevent scrolling
- On-line help

THE Wordprocessor:

- On-line help
- Powerful editing: Erase, Copy or Cut & Paste characters, words, sentences, lines, paragraphs, pages, or user-defined blocks of text
- Automatic word wrap-around (may be turned off)
- User-defined page breaks, soft hyphen, tab, indent and margin settings
- Proportional & justified printing
- Global Search & Replace, Automatic & Examine
- Optional command character viewing
- Superscript and subscript
- Phrase files for boilerplate
- Print bold, centered, underline
- Edit ASCII files
- Right or left justification
- Hyphenation

THE Mailmerge:

- Integrates THE Wordprocessor & THE Name & Address System
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- Specialized mailings to select groups in your Name & Address System.
- Can read A/R customer file, A/P vendor file and payroll employee file so you may send customized Wordprocessor letters

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One More Round

If you've followed Jeanette J. Bieber-Moses' advice for **printing headers and footers during block printing on SuperScriptit** (May 1986, p. 25) and are still having trouble, **you may need a fix**. Tandy is working on the problem and will notify users when a patch is available. If you have questions in the meantime, contact Customer Service (817-390-4168).

N.A. Douglas' **Model I/III Cassette Basic conversion for NovaCalc** (February 1986 p. 25) prompted Belgian Walter Loncke to submit a similar, but **more efficient** conversion (see Fig. 1). Loncke's version reduces waiting time and also permits you to record spreadsheet information (name, date, and so on)—provided you avoid using commas.

More Tips

Bob Lockhardt of Yakima, WA, admits that his typing skills aren't always up to par. After discovering that he'd made some typos in Andy Levinson's TRSDOS 1.3 patches ("Patch Work," January 1985, p. 112, and "Patch Work II: The Sequel," August 1985, p. 72), Lockhardt **added an editing function** to Sean Robinson's **patch management program** ("Patch Maker," October 1985, p. 76). Figure 2 contains the necessary changes.

Removing the help and sample files from Model 4 DeskMate provides a bit more space on the data disk. That wasn't enough to satisfy Philadelphian Robert Nigro; he found a way to **save an additional 9K on DeskMate's program and data disks**.

First, format two blank disks using TRSDOS 6.02.00 by typing in:

```
FORMAT (Q=N,CY=42,ABS)
```

Next, invoke the Backup command to back up the program disk. When you specify drive zero as the source drive and drive 1 as the destination drive, the system responds with "Cylinder count differs—attempt mirror-image back-up?". Remove the system disk and insert the program disk; then type in YES to initiate the back-up. Type AUTO DM and then SYSGEN to save your changes.

To back up the data disk, insert the second newly formatted disk in drive 1 and follow the procedure outlined above. Begin by typing in:

```
BACKUP :0:1
```

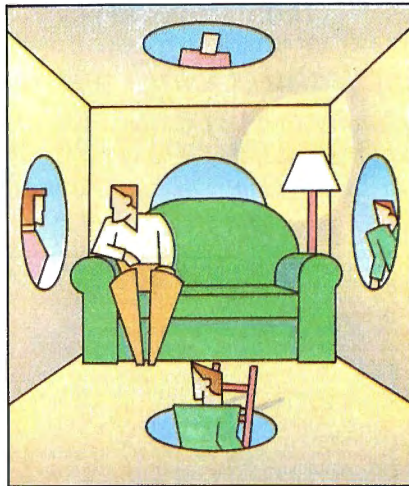


Figure 1. Changes to run NovaCalc under Cassette Basic.

```
1680 PRINT@0,N$;N$;:PRINT@0,"To load spreadsheet : ready tape re-
corder and press any key";
1690 I$=INKEY$;IFI$=""THEN1690
1700 INPUT#-1,A$;PRINT@64,A$;:FORD#=1TOH:FORA#=1TOUSTEP13
1710 INPUT#-1,B$(A$,D$),D$(A$,D$),B$(A#+1,D$),D$(A#+1,D$),B$(A#+
2,D$),D$(A#+2,D$),B$(A#+3,D$),D$(A#+3,D$),B$(A#+4,D$),D$(A#+
4,D$),B$(A#+5,D$),D$(A#+5,D$),B$(A#+6,D$),D$(A#+6,D$),B$(A
#+7,D$),D$(A#+7,D$),B$(A#+8,D$),D$(A#+8,D$)
1720 INPUT#-1,B$(A#+9,D$),D$(A#+9,D$),B$(A#+10,D$),D$(A#+10,D$),
B$(A#+11,D$),D$(A#+11,D$),B$(A#+12,D$),D$(A#+12,D$):NEXTA$:
NEXTD$:GOTO190
2040 I$=INKEY$;IFI$=CHR$(31)THEN190ELSEIFI$="Y"THEN2050ELSEIFI$=
"N"THEN2100ELSE2040
2050 PRINT@0,N$;N$;:PRINT@0,"Ready tape recorder; enter spreadsh
eet info ";:INPUTA$;PRINT#-1,A$
2060 FORD#=1TOH:FORA#=1TOUSTEP13:PRINT#-1,B$(A$,D$),D$(A$,D$),B$(
A#+1,D$),D$(A#+1,D$),B$(A#+2,D$),D$(A#+2,D$),B$(A#+3,D$),D
$(A#+3,D$),B$(A#+4,D$),D$(A#+4,D$),B$(A#+5,D$),D$(A#+5,D$),
B$(A#+6,D$),D$(A#+6,D$),B$(A#+7,D$),D$(A#+7,D$),B$(A#+8,D$),
D$(A#+8,D$)
2070 PRINT#-1,B$(A#+9,D$),D$(A#+9,D$),B$(A#+10,D$),D$(A#+10,D$),
B$(A#+11,D$),D$(A#+11,D$),B$(A#+12,D$),D$(A#+12,D$):NEXTA$:
NEXTD$:PRINT@0,N$;N$;:PRINT@0,"<Q>uit or <R>eturn to spread
sheet ?";
2090 I$=INKEY$;IFI$="Q"THEN2100ELSEIFI$="R"THEN190ELSE2090
2100 CLS:END
```

Figure 2. Changes to add an editing function to Robinson's patch-management program.

```
165 PRINT@712,"<E>dit file on disk."
215 IF S$ = "E" THEN GOSUB 1100
375 IF AN$="P" AND S$="E" THEN 420
570 IF S$ = "E" THEN RETURN ELSE S = S + 1
1100 CLOSE:OPEN"O",3,"PATCH/LST":CLOSE:KILL"PATCH/LST"
1110 OPEN"O",2,"PATCH/LST":CLOSE:OPEN"I",1,"PATCHER/LST"
1120 CLS: IF EOF(1) THEN 1180
1130 LINEINPUT#1,P$:LINEINPUT#1,D$
1140 PRINT P$;PRINT D$: GOSUB 420
1160 OPEN"E",2,"PATCH/LST":PRINT#2,P$;PRINT#2,D$
1170 CLOSE 2: GOTO 1120
1180 CLOSE:KILL"PATCHER/LST":CMD"I","RENAME PATCH/LST PATCHER/LST"
```

Figure 3. Corrected formulas for StackUp.

```
R22C1 R[-16]C-R[-14]C-R[-13]C
R22C2 ((R[-12]C[+4]*RC[-1])/((1-((R[-12]C[+4]))^
(-R[-15]C[-1])))+(R[-14]C[-1]*R[-12]C[+4]))
R22C3 (R[-10]C[+3]*R[-16]C[-2]-R[-11]C[-2])/((1-((R+
R[-10]C[+3])^(-R[-15]C[-2])))
R22C4 (R[-8]C[+2]*R[-16]C[-3]-R[-9]C[-3])/((1-((R+
R[-8]C[+2])^(-R[-15]C[-3])))
R22C7 R[-14]C[-6]-RC[-1]
```

When you are prompted to insert the source disk, remove the system disk and insert the DeskMate data disk.

Spreadsheet Corrections

The Multiplan formulas for StackUp (Spreadsheet Beat, January 1986, p. 114) contained a few errors. Figure 3 provides the correct formulas.

Help Lines

- ▶Leslie A. Schur (4-105 Greenbriar Estates, N. Reading, MA 01864) wants to acquire a disk drive for the Model I.
- ▶Dave McGlumphy (Box 6275, Chattanooga, TN 37401) needs a "new style" keyboard for a Level II Model I. ■

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A Nimble, RAM-based BBS

by David Dalton

★★★★

The **Fast80 BBS** runs on the Model 4 (128K) under DOSPLUS 4 or TRSDOS 6.2.x and requires a modem and at least one disk drive. SOTA Computing Systems Limited, 213-1080 Broughton St., Vancouver, British Columbia, V6G 2A8, 604-688-5009. \$79.95.

If you want a small bulletin board that's easy to set up and use, Fast80 is perfect. While it has its limitations, it's fast, reliable, and, best of all, won't wear out your disk drives.

Fast80's advantage is that it keeps all messages and its user data base in RAM, accessing the disk only to update its files. This distinguishes it from heavy-duty systems such as eSoft's TBBS, which uses so much disk I/O that it almost requires a hard disk.

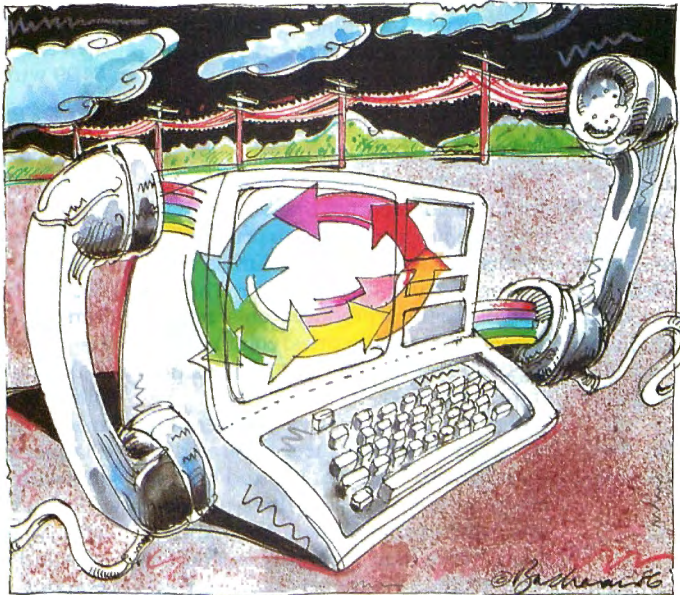
The drawback is that Fast80 is limited to 445 users, 240 messages, and 50 download files. In contrast, the Model III version of TBBS can handle an unlimited number of callers and about 1,800 live messages, while the MS-DOS version can maintain more than 10,000 live messages.

Features

Fast80 manages to pack some nice features into the Model 4's 128K of RAM.

It includes two message boards, one accessible by all registered callers and the other to only those with special permission. Each message board can have 120 messages of up to 472 characters each. Fast80 supports private messages, both to other users and the sysop.

The system stores each user's name, city, computer type, password, date of last call, and access level. The caller can modify much of this information, and the sysop all of it. When a caller logs in, the program tells him whether he has any messages waiting. He can read messages individually by number or advance sequentially from any starting number; he can also read new messages or those addressed to him.



Many Modems

The first version of Fast80 supported 300 baud only. The newer version (1.5) also supports 1,200 baud. Modems known to work with Fast80 include the Hayes 300 or 1200 (and most compatibles); Microconnection; Radio Shack Modem II; Radio Shack 4P internal modem; Radio Shack DCM 5; and Radio Shack DC-2212. The Anchor Signalman Mark XII modem can be modified to work with Fast80.

Fast80 can run all day without the floppy disks switching on. The sysop determines how often to dump its files to disk and can do so

I tested Fast80 with a U.S. Robotics Courier 2400 modem, which is Hayes compatible. Baud-rate detection was a little awkward. Fast80 uses the enter key to determine the caller's baud rate and wouldn't send its hello message until the caller pressed the key two or three times.

The Fast80 documentation uses the word "hot" for its fast-response menus. A caller can enter a command before the entire menu appears, and the program executes it immediately. Since disk I/O is minimal, this response can be fast indeed. In fact, one caller who helped me test Fast80 described it as "almost too fast."

Fast80 can hold 50 download files. Uploaded files cannot exceed 32K, but the sysop can post a file of any length. The program supports only ASCII upload and download; it does not feature XMODEM file transfer.

after every caller or as seldom as every 255th caller. The documentation recommends that you update disk files after every five to 15 callers. This takes only a few seconds.

You control the back-up frequency with a set-up utility called FASTUTIL. FASTUTIL also includes a RAM test to make sure that you have 128K and that the RAM is good. It asks for such information as what kind of modem you are using, how many drives you have, and what the caller time limit will be. You can also modify many of the messages that Fast80 sends to a caller.

Fast80 will print a log of all system activity. You can also print a complete list of users. The system sends messages for the sysop to a printer or special disk file.

One other feature of Fast80 is that the sysop can log on from a remote terminal.

Conclusion

If you're looking for a personal BBS and can live with a limited number of messages and files, I recommend Fast80. I tested it with more than 50 users and had no problems or bugs. Many callers praised Fast80's speed, and the only complaints had to do with the limited messages.

Fast80 makes it practical for every Model 4 user to have a BBS. Now your computer doesn't have to be bored when you're not home. ■

The Star Ratings

80 Micro's star ratings reflect our reviewer's impression of a product.

The stars mean:

- ★★★★★ Superior;
- ★★★★ Excellent;
- ★★★ Good;
- ★★ Fair;
- ★ Poor.

A Data Base Of Your Own

by David Engelhardt

★ ★ ★

The Creator runs on the Models 4 (64K) and 1000/1200/3000 (128K) and requires Basic and two disk drives (one for the MS-DOS version). TNT Software, 34069 Hainesville Road, Round Lake, IL 60073, 312-223-8595. \$45.

If you want to write software but aren't an experienced programmer, **The Creator** might be for you. Following your instructions, it will write a Basic data-base program specifically for your needs. The code is well documented and compact and can easily be modified.

The programs you create are at least 16K. Depending upon the machine you use, the records can contain up to 2,560 bytes and have as many as 200 fields per record.

I reviewed both the Model 4 and 1000 versions, which are the same except for some differences in installation.

In the Beginning

You must already know the data-file size, record length, number of fields within the record, and the type of data for each field. Data fields can be numeric or character fields.

You start out with a program called **Menu**. It gives you 14 options with which you define the format of your data-base program. First you define the length and type of each field. **The Creator** then asks you for a prompt name for that field and where to put the prompt on the screen, whether to clear the screen before the prompt, and if the prompt name and reply should be on the same line. You can also define from one to 20 key fields.

The Creator includes a feature called **Edit Specification** that lets you set up edit boundaries on any input entry. Many of these edits are message commands such as **No Entry** or **Length**, along with numeric and logical comparisons.

The program asks you to supply the names for each field you have previously defined. After a few more questions, it writes your Basic program to disk. This takes only about 30 seconds. Once your program is written, you run it like any other Basic program.

Your new program is made up of modules, so it's easy to make changes and enhancements. The manual lists where each subroutine starts and what it does.

I found one problem with the file initialization option. When you choose it, the program asks you to press C to continue or any other key to bail out. This safety

feature is important. If you've already initialized a file and do it again, you'll reinitialize and lose all your data. Unfortunately, the safety check didn't work on the Model 4 because **The Creator** added the safety check on the same line that scanned the keyboard. You can correct the problem by moving the code to a new line.

Your data base lets you do just about anything that can be done to a record within a file, including entering, deleting, updating, searching, and scanning records. You can scan one or all of the records in a file.

Other Features

The package includes a reporter program, called **Reporter**, that creates Basic language programs used to print data in a report format. The procedure is much the same as using **The Creator**. The generated program produces on-screen or printed reports with titles, column headings, tab sets, column and field relationships, and totals.

Reporter is impressive and reminds me of a mini-spreadsheet program. It's versatile and lets you set and change many options, such as lines per page and heading suppression. You can customize your final programs as you can **The Creator's** programs.

You can print the data in any sorted order and on any fields in the data file. To do this, you must use an included program to sort the file. The program supports automatic centering and positioning of the titles and data. You can also perform numeric and alphabetical operations on the data.

The Creator contains several utilities. One rebuilds the key pointer file if it is damaged. Another creates a specification file that holds the name, data types, and length of every defined field within a record. You can use it to convert older versions of **The Creator** specification files.

Another useful program in this package is **Cheapsort**, which can sort your data file any way you want and output an index file used to access the data in sorted form. The Model 1000 version contains a document file that tells you how to set up and run this program.

Conclusion

The manual contains quite a bit of information, including examples on how to run most of the programs. Some of the steps in the examples were out of sequence with the actual program, but inconsistencies weren't serious.

While this package was impressive, I was disappointed with some of the errors in the supported and created programs. **The Creator** gives you a great start, but don't be surprised if you find yourself making modifications and enhancements. ■

Another Dimension

by Richard Green

★ ★ ★ ★

VP-Planner 1.1 runs on the Models 1000/1200/3000 and requires 256K and one disk drive. Paperback Software International, 2612 Eighth Street, Berkeley, CA 94710, 415-644-2116. \$99.00; \$109 without copy protection.

VP-Planner is a spreadsheet that does everything Lotus 1-2-3 does, plus a whole lot more. But **VP-Planner** does it all for a mere \$99, only 20 percent of the cost of 1-2-3.

VP-Planner reads and works with 1-2-3 files. It has all the commands of 1-2-3 version 1A and a few from version 2. It uses the same data-base handling as 1-2-3, but you can also tie data in three other relationships, creating a five-dimensional data base. In addition, **VP-Planner** can read and write files compatible with dBase II and dBase III.

However, the program is not completely compatible with 1-2-3 and dBase files and it's generally slower in most operations. Despite this, it is still a real software bargain.

VP Features

VP-Planner's screen looks much like that of any spreadsheet. The column titles appear at the top in reverse video, and row numbers descend along the left side. The spreadsheet shows where you are working in two ways. As in 1-2-3, a reverse-video cell pointer lights the current position; additionally, the current column and row labels are highlighted.

The most noticeable difference between **VP-Planner** and 1-2-3 is the location of the control area. 1-2-3's is divided between the top and bottom of the screen; **VP-Planner's** takes up the bottom four lines, which display the input and status lines and the command menu.

Like 1-2-3, **VP-Planner** uses nested menus for control. You call menus from the initial Ready prompt or data-entry screen by pressing the / key. You can select commands from the menus in one of three ways: move the cursor over the desired command and press the return key, type the first letter of the command, or press a function key.

VP-Planner also has several features lacking in either version of 1-2-3, including an automatic macro generator. **VP-Planner's** method for creating macros to program complex or repetitious tasks is simpler than 1-2-3's, and you can store macros in the form of dBase files. You can maintain a library of macros to be

called and executed without keeping all of them within the resident spreadsheet.

Other unique features of VP-Planner include the ability to create up to six windows, automatic creation of a back-up file, the ability to create custom formats for numbers, and three new date formats.

Data Management

VP-Planner also has many more functions than 1-2-3's data manager. In addition to reading and writing directly to dBase files, you can create a complete dBase file, including all field names and attributes. You can also selectively read a dBase file, bringing into a worksheet only those fields desired. Finally, you can combine individual records from more than one dBase file into a VP-Planner worksheet.

This ability to work with dBase is handy, but it isn't problem-free. When you read a dBase file into the worksheet, no formatting commands are included. You must set the column width of the spreadsheet to allow for the size of each field. If you edit an indexed file, dBase must separately reindex it.

The greatest problem, however, is caused by the different field limits of dBase and VP-Planner. Since these limits can sometimes conflict, it's possible to create dBase files from VP-Planner that dBase can't handle and to have dBase files that can't be used by VP-Planner.

The Fifth Dimension

VP-Planner's most powerful feature is its ability to create multi-dimensional data bases. In an ordinary spreadsheet, you can present data in a simple two-dimensional relationship. It becomes complicated when you need the same structure for several similar but separate categories.

A two-dimensional spreadsheet lets you handle this problem in only two ways: You can replicate the data fields over a single large spreadsheet for each department, or you can keep a separate spreadsheet for each department. The first approach will soon exhaust your memory or your computer's.

The second approach works fine until you need to collect data from all departments. You must then create yet another spreadsheet to consolidate the data. This is time-consuming and susceptible to error.

VP-Planner solves this problem by allowing you to use up to five dimensions in a single data base, as if individual spreadsheets are stacked on top of each other. You can consolidate information from all spreadsheets by summing the appropriate stack of cells.

VP-Planner allows you to use up to five dimensions in a single data base.

Actually, VP-Planner's multi-dimensional data base is much more sophisticated. Once you set up such a data base, you can retrieve any data by any of the relationships. In fact, the data can be viewed in any two dimensions of the five that you establish.

Also, you can retrieve and view the data in three different ways: in a row/column spreadsheet format, as a graph, or as a printed report. Finally, if the multi-dimensional data base is not sufficiently sophisticated, you can link it to dBase II or III files.

A multi-dimensional data base offers an elegant solution to complex spreadsheet problems, albeit a solution not without problems. All the problems of a spreadsheet application—such as integrity of data, appropriateness of formulas, and accuracy of input—are present, with the added complexities of numerous interrelations among the data. Despite the problems, a multi-dimensional data base is more convenient and easier to control than multiple spreadsheets that must be manually collated.

Performance

The primary claim made for VP-Planner is that it "works just like 1-2-3 version 1A." How compatible is it? Very compatible, indeed. VP-Planner reads and follows all the commands and functions, including the macro language of 1-2-3 version 1A. I tested it with a 1-2-3 tax-planning template, which included everything that could affect an individual's return, including investment credits, depreciation, alternate minimum taxes, and income averaging.

The template made extensive use of recursive calculations and look-up tables; VP-Planner worked without any changes. In fact, VP-Planner is more compatible with 1-2-3 version 1A than is 1-2-3 version 2. Version 2 of 1-2-3 wouldn't run the tax planning model at all.

The primary differences between VP-Planner and 1-2-3 version 2 are that version 2 includes string-handling functions and macros not contained in VP-Planner. Also version 2 of 1-2-3 supports the Lotus/Intel/Microsoft extended memory specification, while VP-Planner doesn't.

VP-Planner is slower than 1-2-3 in most operations. A complicated tax problem took 43 seconds to recalculate using VP-Planner, while 1-2-3 did it in 39 seconds.

VP-Planner needed 34 seconds to sort a 22,000-byte alphanumeric file consisting of 318 records of four fields each; 1-2-3 sorted the same file in 12 seconds. VP-Planner took over 19 seconds to delete 100 rows while 1-2-3 deleted them in just over four seconds. A similar disparity exists in inserting rows: VP-Planner took 14 seconds, 1-2-3 only two.

Documentation

The VP-Planner disk is packaged in a hard cardboard carrier at the back of a paperback book. The program is on a single disk; a second disk contains sample files. The manual is divided into 10 chapters, five appendices, and two indexes. At the back are a registration form and order blanks for a noncopy-protected disk or a copy-protected back-up disk.

Aside from the manual's contents, its form is less than convenient. The paperback book has a very stiff cardboard disk carrier bound to the back cover that is constantly in the way.

Each chapter of the manual contains both reference material and tutorial lessons. The multi-dimensional data base receives the most attention. This is certainly appropriate, considering the complexity of setting up and using this feature. The manual is liberally illustrated with diagrams and examples.

The coverage of basic spreadsheet features and macros is less than adequate—a point recognized in the manual, which includes a brief bibliography of six instruction books for 1-2-3.

Conclusion

VP-Planner fulfills the advertising claims Paperback Software makes for it. It is indeed a faithful "clone" of Lotus 1-2-3 version 1A. No spreadsheet for 1-2-3 that I tried with VP-Planner failed to work properly. Additionally, it contains several enhancements that make it a more powerful data-management program than 1-2-3.

On the other hand, it is slower in most operations and it doesn't include a print-graph function. Also not to be discounted is the copy protection used. The original disk is copy protected and the program looks to the A drive for the original disk before it will work. If you wish to use the program on a hard disk without the key disk, you must pay an extra \$10 for an unprotected copy.

VP-Planner is an inexpensive and powerful program that melds significant data management functions with a powerful spreadsheet. It is a tremendous value. ■

Beefing Up The Model 100/200

by Terry Kepner

★★★★

Super ROM runs on the Model 100/200 (8K). Portable Computer Support Group, 11035 Harry Hines Blvd., #206, Dallas, TX 75229, 214-351-0564. \$199.95.

★★★★

The Ultimate ROM II runs on the Models 100/200 (8K). Traveling Software Inc., 11050 Fifth Ave. NE, Seattle, WA 98125, 800-343-8080. Express Order Software number 90-0409 (Model 100), 90-0410 (Model 200). \$229.85.

New hardware and software packages have added a great deal of power and versatility to the Model 100 since Tandy introduced it. Because the machine has so little RAM to work with, developers have turned to putting their programs into ROM chips, leaving RAM free for program operation.

The Ultimate ROM II and the Super ROM both expand a laptop's capabilities beyond merely note-taking and telecommunications. They add full-featured word processing, data-base management, and outline processing. In addition, the Super ROM package includes a spreadsheet.

The Ultimate ROM II

Traveling Software's Ultimate ROM II includes IDEA! (an outline processor), T-Base (a data-base program), T-Word (a word-processing program), ROM-View 80 [a liquid-crystal display (LCD) utility], and built-in support for the Tandy Portable Disk Drive. All the programs in the Ultimate ROM II are available separately on tape.

ROM-View 80 reformats the LCD characters to give you 60 characters per line. It can also change the Model 100's memory map to give you 80-column "pages," where the LCD acts as a 60-column window that you can move back and forth across the "page." ROM-View 80 works not only with the Traveling Software programs, but also with the Model 100's Basic, Text, and Telcom. The characters are a bit awkward to read at first, but I quickly got used to them.

IDEA! has already been reviewed (September 1985, p. 102) but it has new features. The program is now much faster than the cassette version and its limits have been raised. New quick-move and quick-copy functions make it easier to manipulate boilerplate and template forms. And you can now fully edit notes in the outliner, just as if you were in Text. Other improvements are the removal of

the 250-character limit on note length, allowing a fast insert mode for entering headings, and easy movement expanding and compressing subideas. IDEA! can also import and export files to and from the MS-DOS outline program ThinkTank.

T-Word is a full-featured word processor that gives you complete control over your documents (margins, page length, line spacing, and so on) with extensive printer commands including centered text, headers and footers, page breaks, number of pages printed, and so on.

You also have a choice of three methods to preview your document before printing. The first is a simple dot plot that uses the LCD graphics to represent a page layout. Each pixel represents one character on the page. You can't read it, but you can see the characters' physical page layout. The second shows you the first and last three lines of each page. This helps you locate page breaks and position footnotes. The final method displays the document exactly as if it were being printed on paper; ROM-View 80 will be handy here. If a print line contains more characters than can fit a display line, the remainder appears on the next display line in reverse video.

Word-processing enhancements include an overwrite feature, a search-and-replace function, and a character and word count from the document beginning at the cursor position. (These enhancements are also available in IDEA! and T-Base files.)

Finally, you can merge files when printing, insert the time and date into a document, and chain files. If you have TS-DOS and a Tandy Portable Disk Drive, you can chain files from the disk drive to make a printed file much larger than the Model 100's memory allows.

T-Base is a complex data-base program that operates as two programs: a data-base definition-and-input program and a report program that pulls information out of the data base.

In the definition section, you design the input screen, choose the field names, and specify field length. The maximum limit is 254 characters per input screen, 39 characters per line including the line description. You can define the data fields as text, integer, dollar/decimal, fraction, or date. You also can use secondary definitions, allowing a great deal of flexibility.

Data entry and manipulation are simple: F1 saves the current record into RAM; F2 deletes the current record from RAM; F3 finds a record; F4 displays the previous sequential record in the file; F5 displays the next sequential record in the file; F6 clears the screen and starts the record over; F7 recalculates all the calculated fields in the record; and F8 ex-

its the data-base program.

T-Base's report generator lets you sort your file by any field; rearrange each record's item order; set the page length for printing; set the page width; direct the output to any valid Model 100 destination device; set headings, column labels, and column positions; designate which fields are to be placed under which column labels; determine if subtotals and grand totals are to be calculated; and force new page starts where you want them.

Super ROM

PCSG's Super ROM, which lets you load the Tandy disk-operating system by pressing one key, contains Lucid (a spreadsheet program), Write ROM (a word processor), Lucid Database, and Thought (an outline processor). Lucid and Write ROM are available separately as ROM chips.

The two mainstays of Super ROM are Write ROM and Lucid. Write ROM, like T-Word, gives you total document and printer control: margins, line justification and spacing, headers and footers, search and replace, printer page pause, the number of copies to be printed, where the document will be printed, and a library file for inserting boilerplate and merging text. Other options include setting lines printed per page, adding a blank line after each carriage return (to separate paragraphs), and a center command.

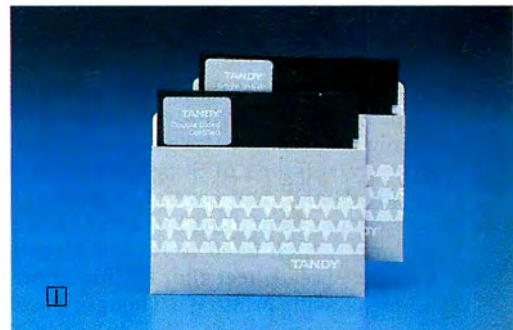
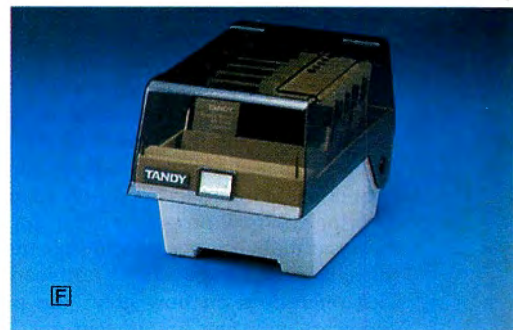
Lucid is an exceptional spreadsheet program that doesn't waste space by letting empty cells take up RAM. Its numerical limits are 254 rows by 126 columns, with the data limit linked to your computer's memory. A 25K Lucid file can take up to 125K when transferred to a desktop spreadsheet program such as Lotus 1-2-3. And Lucid compares very favorably with Multiplan and Lotus 1-2-3 in features (April 1985, p. 31). New features include find, sort, and access to Text from Lucid. For text access, just enter the Text file name in the cell.

The other two programs, Lucid Database and Thought, are based on the word-processor and the spreadsheet programs. The Lucid Database is essentially a set of data-base commands integrated into the spreadsheet. The data base provides multiple screens for both input and output forms. A blank screen appears when you begin, and you just fill it in with the field descriptions lengths.

While you can have multiple entries per line, you can't have more than seven lines total. The report-screen design is similarly limited. When inputting data, you can access Text and Lucid files by specifying their names in the appropriate locations.

Record selection for printing is similar to T-Base's, except you also can specify

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logical NOT, AND, and OR operations during processing. You are restricted to just one data element for the selection process, however. Unfortunately, you cannot sort records without printing.

Thought is a fast and simple mechanism for creating outlines. Function keys control almost all movement. Once created, the outlines are easy to print, but you have control over the left and right margins only, not the top or bottom margins. You do have control over which levels of the outline to print. For example, if you have an outline with seven levels, you can print only levels 1-4 and the remainder will remain hidden.

Conclusions

Neither package wins any awards for documentation. Both consist of an odd assortment of individual manuals for the old versions and new manuals detailing where the old manuals are outdated and covering the new programs. The Super ROM manuals are overwhelming, measuring almost 3 inches thick and loaded with references on how great the programs are and their unique features.

The Ultimate ROM II manuals are easier to read but more numerous—several small booklets explain the programs' new features.

Ultimate ROM II is almost completely bug-free; any errors you make return you to the Model 100's main menu. The early versions of Super ROM, on the other hand, had several problems. For example, formatting more than one column (which used to be safe) trashed your spreadsheet file. Hitting control-break while printing a Thought file also caused problems. Not only did the printer stop, but the Model froze and had to be cold-started. While these problems have been resolved in the latest version (1.7), PCSG should never have shipped any versions containing such bugs.

Which ROM chip you select depends on your needs. If you require a spreadsheet program, get Super ROM. If you want 60-column LCD displays in all your programs (including Telcom), then get Ultimate ROM II. Thought and Lucid Database are less powerful than IDEA! and T-Base, but T-Word and Write ROM are closely matched. T-Word is easier to use and the documentation is better written, but Write ROM is faster.

The consensus among users who have seen both chips is that while Super ROM is faster, Ultimate ROM II is better documented and has fewer bugs. Ultimate ROM II also provides for disk support with Traveling Software's TS-DOS, should you decide to get it. Both ROMs have a 30-day, money-back guarantee, so you can experiment without being stuck with a product you don't like. ■

Learning The Keys to C

by John B. Harrell III

★ ★ ★ ★

C: A Programming Workshop runs on the Models 1000/1200/3000 (256K) and requires one disk drive. Wordcraft, 3827 Penniman Ave., Oakland, CA 94619, 800-227-2400. \$39.95.

★ ★ ★ ★

Introducing C runs on the Models 1000/1200/2000/3000 (256K) and requires one disk drive. Computer Innovations Inc., 980 Shrewsbury Ave., Trenton Falls, NJ 07724, 201-542-5920. \$125.

Open almost any computer magazine today and you will find a program written in C. *80 Micro* recently devoted an issue to this language. Why all the attention to C? Well, it has a lot of power and flexibility. You can use it to write almost any computer application from hardware device drivers to word processors and graphics applications. But why isn't C more widely accepted?

Compilers are not the easiest software packages to use. You must remember a complex sequence of commands to compile, link, and run a C program. Also, many C compilers lack a text editor to facilitate source-program entry.

Introducing C and C: A Programming Workshop offer two approaches aimed at providing you with a low-cost, easy-to-use C training system. While both can get you up and running with C, there are significant differences between the two.

C: A Programming Workshop

This is an instruction book integrated with a software learning environment. The software is a tutorial workshop for learning C with over 450 window frames programmed into it. These windows let you easily step forward and backward through the material. You can also quit at any time and save your place with a "bookmark."

The Programming Workshop comes on two disks in standard PC/MS-DOS format and is copy protected. It provides a full-screen editor, compiler, run-time environment, and test module. The tests provide excellent reinforcement on the subject matter.

The material is organized into three types of display screens: instruction, self-test, and program exercise. These display screens are faithfully reproduced in the printed text for easy reference. You also have an "open-test-bed screen" to use during program development. This screen takes you directly into the programming environment and bypasses the instructional material.

The instruction screen presents the material to be learned—either a C programming concept or a code fragment (or a complete program)—to illustrate a concept. The self-test screen provides a half screen of questions with interactive responses. The program-exercise screen provides complete code modules for your experimentation, and you can execute, modify, save them to disk, or print them from the editor while in this screen.

The lessons are graduated from an introduction to the Workshop system to advanced C topics. The organization is good and the flow from one topic to another is clear and logical.

The Workshop compiler is not a true compiler in the strictest sense of the word. For example, you can't generate separate modules and link them together, nor can you include other source modules at compilation time. In addition, you can't save compiled programs and execute them later without recompiling them.

There are other limitations on the Workshop C system. First, it only implements a limited subset of the full C language as defined by Kernigan and Ritchie in *The C Programming Language*. Only integer and character expressions and structures are implemented—long integers and floating-point operations are not supported.

Also, you must declare data objects

Continued on p. 114

Benchmark source language	Time to execute	Notes
Aztec-C86 V. 3.20e	0.5 sec.	A
Workshop Compiler	7.9 sec.	A
Introducing C Interpreter	43.0 sec.	A,B
IBM PC Basic	8.5 sec.	A
A. Program execution timed on an IBM XT using a NEC V20 CPU chip at 4.77 MHz.		
B. Iteration count reduced to 1,000.		

Table. Benchmark performance of C Training Systems.

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Creative Computing Nov. 85

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Execution speed on the Model 3 for 10 iterations of the prime number program published in Byte, Jan 83, page 284.

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- Model 4 TRSDOS
- Model 4 Montezuma CP/M
- Model 4 Radio Shack CP/M
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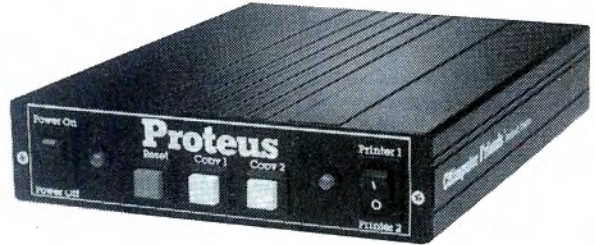
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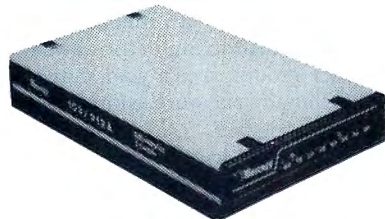
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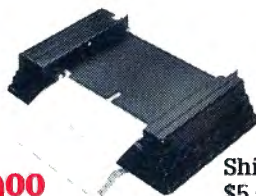


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I f asked to name the piece of software you absolutely couldn't do without, you might say your word processor, or your data-base manager, or maybe even your favorite game. The program I couldn't do without is my terminal program. That's right, my trusty terminal program equipped with XMODEM transfer protocol. With it and a good modem, I can search the world's bulletin board systems (BBSes) for all the software I'll ever need and get it at a fraction of the cost of commercial programs.

The world of free and nearly free public-domain software is as close as your telephone. Hundreds of BBSes throughout the country offer a great source of software for microcomputers of all kinds. One way of locating these treasures is to scour computer magazines and newsletters for leads. Last July, *80 Micro* published a list of over 1,800 BBSes, most of which offer programs for downloading. Some BBSes specialize in free programs; others offer their extensive data bases as incentives for membership donations. Usually, a small sum is all that's expected in exchange for unlimited use of the system.

As the number of commercial programs for 8-bit machines declines, TRS-80 users can be glad that this network of free software exists. Word processors, mailing-list generators, terminal programs, data-base managers, educational programs, and games of every kind are available for Model I, III, and 4 owners to download. Some of the best BBSes are based on the FidoNet, TBBS (The Bread Board System), and the Towne Crier (TC) software.

Some BBSes feature only system-specific programs. In this category are Guy Omer's 8/N/1 system in Gainesville, FL (904-377-1200), and Cheryl Dupre's TC Trader BBS (617-534-9028). These BBSes provide software and conversation relevant to Tandy's 8-bit systems. For users of Tandy MS-DOS computers, the King's Bench BBS (303-377-6725) and a FidoNet board in Weymouth, MA (617-331-8624), are system-specific for the Tandy 1000.

BBS system operators (sysops) like call-

ers to upload new programs. In fact, many will deny access to their boards unless callers can contribute something in exchange for the software they acquire. Proper BBS etiquette is considered crucial to maintaining the quality and volume of public-domain software.

Other Sources

User groups are another reliable source of public-domain software. TRS-80 user groups advertise in the computer sections of local newspapers, on grocery store bulletin boards, in the message sections of BBSes, and in the Reader Forum section of *80 Micro*. Many have ties with Radio Shack Computer Centers, so if you can't find the name of a local user group from any of the other places I mentioned, you might try the place where you bought your computer.

Among the best of the TRS-80 user groups is the Tandy Computer User's Group (703-836-0384). Based in Washington, DC, the group maintains an extensive library of public-domain software for Radio Shack computers from the Model 100 to the Model 4D. Programs are offered on disks because there are too many for the group to make available on line.

If you think user groups support only home applications, you are mistaken: Business applications have an equally strong following. Perhaps the most active business-oriented user group for Tandy owners is T-BUG, a 3-year-old group located in Chicago. Although it doesn't sponsor a BBS, the group produces a fine newsletter and has a membership that reaches far beyond the Chicago metropolitan area. T-BUG supports users of the Models II, 12, 16, and 6000 and provides programs for everyday business applications. If you're interested in joining, write to the group's membership chairman, Ron Newman, c/o Newman Electric Supply, 1655 Elmhurst Road, Elk Grove Village, IL 60007. A \$35 membership fee includes a subscription to the newsletter.

If user groups aren't your cup of tea, public-domain software companies pro-

vide another alternative for obtaining software. Recently, there has been an influx of companies that, for a fee, will send you programs in the public domain. Most specialize in programs for MS-DOS computers, including the Tandy 1000 and 3000. The companies advertise in the classified sections of *InfoWorld*, *ComputerWorld*, and *Computer Shopper*, but usually all you will find there is an address or phone number, with little indication of the programs that are available.

A few companies are more generous with the information they circulate about themselves. One such company is The Alternate Source (TAS), a premier software outlet for Model I, III, and 4 owners. The last flyer *80 Micro* received from this company announced the availability of public-domain software on double-sided floppy disks. Each disk costs \$10 and contains as many as 40 programs. To obtain a catalog, send a self-addressed, stamped envelope to The Alternate Source, 704 North Pennsylvania Ave., Lansing, MI 48906, 517-482-8270.

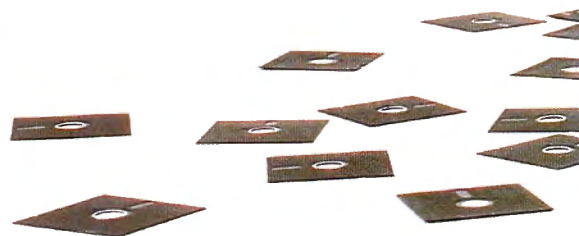
Another company selling a variety of public-domain software is Montezuma Micro (Redbird Airport Hangar #18, P.O. Box 32027, Dallas, TX 75232; 800-527-0347, 800-442-1310 in Texas). Montezuma specializes in CP/M and MS-DOS software.

Radio Shack computer owners can also contact the Public Domain Software Copying Company, which, like The Alternate Source, offers a variety of programs on inexpensively priced disks. Don Johnson, company president, says programs are available for virtually all major computer models, including those made by Tandy. For more information, a catalog, and price list, write to the company at 33 Gold St., New York, NY 10038.

Tandy 1000 and 3000 users have a few sources of their own. One is Public Domain SW (PDSW), which offers 1,700 programs for MS-DOS and PC-DOS computers. To obtain a catalog disk, mail \$7 plus \$1.65 for postage to the company at 3080 Olcott St., #B-130, Santa Clara, CA 95054. As an introductory offer, PDSW

Going Public

by Bradford N. Dixon



sells a package of five program-filled disks and the catalog disk for \$35.

Probably the best-known and most professional public-domain company specializing in MS-DOS software is the PC Software Interest Group (PC-SIG). PC-SIG has 450 disks of software, which it sells to members for \$6 per disk. The company also offers discounts on quantity orders. A \$15 membership fee includes a subscription to the group's quarterly newsletter. To order a copy of the 350-page PC-SIG Library, send \$8.95 to the company at 1030 E. Duane, Suite J, Sunnyvale, CA 94086.

If none of these public-domain software sources has what you want, you might investigate an on-line data-base service. The

Source, CompuServe, Delphi, and GENie provide space in their special-interest group sections (SIGs) for members to upload software. The programs are available free to subscribers. On-line services generally have a wide variety of software available for all makes of microcomputers, and as an added benefit, you don't have to log off while searching for programs that will run on different systems.

Obtaining software from an on-line service is not cheap, however. Though the programs themselves are free (once you are a subscriber), communicating with the service is not. In addition to the possible cost of a long-distance telephone call, you might also be charged for using a

switching company to access the data base. Then you incur on-line charges for the data-base service itself, and if you use a high-speed modem, you might have to pay a surcharge so you can download "free" software at a faster baud rate.

Caveat User

The adage "you get what you pay for" is worth remembering in the realm of public-domain software. While there are many benefits to this method of adding to your software library, there are drawbacks as well. For one thing, there are no guarantees of service and support as there are when you purchase software from a retail store or mail-order company.

Photographs by White/Packert Photography

**A treasure trove of free—
or nearly free—software awaits
Tandy users in the public domain.**



Top Picks In the Public Domain

A search of local and not-so-local bulletin board systems produced the following list of public-domain programs for Tandy/Radio Shack computers. Some of the programs rate high for their usefulness, while others demonstrate the capabilities of the machines that run them.

For the Models III and 4

FASTERM4/CMD is a terminal program for the Model 4 that eliminates the need for DeskMate's Telecom module. The program features pull-down windows, which you can access with the Model 4's three function keys, and the XMODEM file-transfer protocol. Although many BBSes offer the program for free, the author requests a donation of \$15 from satisfied users. In exchange, he will supply you with free upgrades and apprise you of bugs that other users might report. Mail checks or inquiries to Mel Patrick, 13699 70A Ave., Surrey, British Columbia V3W 2J8.

CHEAPWP/BAS is a line-oriented text editor for the Model 4. Written in Basic, it will not gobble up valuable space on your TRSDOS 6 disk. The program has features you might look for in a commercial word processor without the fancy commands. It will also run on the Models I and III with little or no alteration.

FIXFILE3/BAS is for Model III users with terminal programs that provide only

ASCII transfers (like Radio Shack's Vidtex). ASCII files often return the error "Direct statement in file" after you download and try to run them. To fix these errors, you have to remove them with a word processor. **FIXFILE3** allows you to convert them into useful code without the hassle of booting your word processor.

BINHEX/BAS is a popular Model III program that converts files in hexadecimal format to compressed binary code. It also converts binary files to hexadecimal format. This allows you to upload them to a BBS or another machine via a null modem without the use of XMODEM file-transfer protocol. The program also runs on the Model 4 by adding spaces to it.

For the Tandy 1000

MAP1K.BAS prints a hi-res world map on the computer screen in a variety of formats. You also can use it to print out maps on dot-matrix and ink-jet printers.

BOOGIE.BAS is an impressive musical presentation that takes advantage of the three-voice capability of the Tandy 1000. Originally designed for the IBM PC jr, it runs on the 1000 without modification.

PKXARC.COM is a machine-language program that allows you to run files with the .ARC extension on the Tandy 1000. When you peruse programs on a BBS, you are likely to encounter many files with this extension. It indicates software that has been run through an archiving pro-

gram, which removes modules (data files, text files, picture files, and so on) and merges them into a single file. **PKXARC.COM** restores the programs to their original state so they can run on the 1000.

DSKMOD.BAS is a disk-sector display-and-modify program that runs in Basic. You can use the program in place of Super Utility or The Norton Utilities to show you what's wrong with those disks that give your computer fits.

For the Model 100

XMOD100.BA installs XMODEM protocol capability in the Model 100, giving it the same telecommunications features as many Model 4 terminal programs. All the benefits of XMODEM on the Model 4 are duplicated for use on the Model 100. The program is a must for Model 100 owners who use the laptop for telecommunications.

For the Color Computer

ASCIED/BAS is an ASCII string search utility. It searches any ASCII file for occurrences of a specified string and then lets you edit the string if a match is found.

Mikeyterm is a terminal program featuring XMODEM protocol for the Color Computer. The program is quite long, containing four modules that must be run together. You have to run **MTERM1/BAS** through **MTERM4/BAS** to compile **Mikeyterm** on a disk or cassette. ■

Also, the documentation you receive with a public-domain program may be sketchy, poorly written, or nonexistent. Authors of public-domain software usually do not have a general audience in mind when they write their programs. It's a good idea, therefore, to look for programs that have on-line help files or REM statements to supplement whatever documentation exists.

There's also no guarantee that a public-domain program will work on your computer, even if the supplier says it will. And finding help when you have a problem is hit or miss. You can try calling the BBS or the company that supplied you with the program, but chances are you will not receive a reply as fast as you would if you called the 800 number of a retail supplier.

***It's a good idea
to look for
programs with
on-line help
files or REM
statements.***

You also should be prepared for operating hazards when downloading software from a BBS or on-line service. Defective phone lines, for example, can cause programs to come through garbled. A more troubling problem is the recent

spate of public-domain programs that have "worms" or timers planted in them. These programs can cause hard disks to reformat—with catastrophic results—and even destroy parts of your computer's firmware.

To guard against these acts of software terrorism, it's wise to back up your hard disk and floppies before using public-domain software. Another precaution is to avoid board-hopping into unknown territory. Get to know a few BBSes that you trust to have reliable software before downloading programs.

On the Bright Side

Despite the possible drawbacks, searching for free software in the public domain can be both fun and productive. Many TRS-80 computerists find satisfaction in down-

You could call your favorite BBSes to locate and download the programs we found in our quest, but to save you the effort of searching for them, *80 Micro* will send you copies on disk. We'll format the disks under TRSDOS 1.3 so you can convert files for the Model I or Model 4.

There's just one catch: You must provide us with a disk of your own containing at least three public-domain programs. Be sure to include on-line documentation or a file describing how the program works. The disk you send should be formatted under TRSDOS 1.3, 2.3, or 6.2. If a program requires a specific DOS, please submit it on a data disk for that DOS and identify the program as DOS-specific. The magazine will not accept copyrighted programs or those not in the public domain. However, if you've written programs you'd like to place in the public domain, we encourage you to submit them.

After we receive your disk, we'll return it with the public-domain programs listed at left copied onto it. Send your public-domain disks to *80 Micro* Disk Swap, *80 Micro*, 80 Pine St., Peterborough, NH 03458. Include \$1 to cover return postage. The Great Disk Swap will end September 1, 1986, so to be sure you don't miss out, mail in your disks before that date! ■

—Bradford N. Dixon



The Great

80 Micro Disk Swap

loading programs from BBSes and modifying them to their specifications. The fact that they don't pay much for the product is often just icing on the cake.

More importantly, many sysops believe the network of public-domain programs will become the lifeblood of TRS-80 systems if Tandy eventually decides to withdraw support. So, whether it's for fun or your own protection, boot up that terminal program, plug in your modem, and call a BBS in your area. Get involved in a user group. The benefit is longer life for your computer. ■

Bradford N. Dixon is a technical writer with 80 Micro. You can write to him at 80 Micro, 80 Pine St., Peterborough, NH 03458.

On-Line Sources

Following are the names and addresses of several major on-line services that have large dial-up data bases of public-domain software.

Genie
General Electric Information
Services Company
401 N. Washington St.
Rockville, MD 20850
800-638-9636

Delphi
3 Blackstone St.
Cambridge, MA 02139
617-491-3393

CompuServe Information Services
P.O. Box 20212
5000 Arlington Center Blvd.
Columbus, OH 43220
800-848-8199

The Source Information Network
Source Telecomputing Corporation
P.O. Box 1305
McLean, VA 22102
703-821-6666

Free Software for CP/M Users

managers with full remote operation.

Of course, the libraries contain uncounted numbers of Basic and machine-language games. Though most are only so-so, a few are outstanding. One of the exceptional offerings is a version of The Cave available in both 8080 and Z80 code.

What's the Hitch?

Unfortunately, the CP/M and SIG/M user groups can't supply you with ready-to-use disks unless you have a TRS-80 Model II, 12, 16, or 6000. The organizations supply disks in only a few formats, and the IBM 8-inch, single-sided, single-density format is standard. This isn't a problem if you own a TRS-80 computer that can support both 5¼-inch and 8-inch disks under CP/M (Lobo Max-80 or a Model I with a 5-inch or 8-inch doubler board).

To help users, the SIG/M User Group has a network of volunteer distributors who can convert the standard 8-inch disks into the proper 5¼-inch formats for almost every computer ever manufactured. But not all volunteers have a full set of disks.

Fortunately for TRS-80 Model I/III/4/4P/4D and Lobo Max-80 owners, HyperSoft and PowerSoft sell a utility (called Hypercross and SuperCross/XT, respectively) that lets any TRS-80 read most CP/M formats (with drive restrictions, of course; you can't read double-sided disks in single-sided drives, nor double-density disks in single-density drives). All you need to do is find someone who can supply the volumes on Kaypro II single-sided, double-density disks and you are in business.

For a list of the SIG/M User Group volumes and regional distributors, send \$2.50 (in the United States and Canada) or \$4 (outside the United States) to SIG/M User Group, P.O. Box 97, Iselin, NJ 08830. The group accepts only U.S. currency. For a list of the CP/M User Group disks, mail \$5 to The CP/M User Group, 1651 Third Ave., New York, NY 10028. Although the programs are free, the disks containing them are not, so be prepared for a copying fee. (Most groups charge this fee, no matter who supplies the disks.)

Mixed Media

Montezuma Micro, which sells CP/M 2.2 for the Model 4, has an extensive library of CP/M 2.2 programs. They're

available on 5¼-inch disks in 220K extended data format and in over 85 other formats. The company also sells 8-inch single-density disks. For more information, contact Montezuma at Redbird Airport Hangar #18, P.O. Box 32027, Dallas, TX 75232 (800-527-0347, 800-442-1310 in Texas).

If you have a modem, you can access hundreds of secondary sources of public-domain software on BBSes across the country; nearly all that are set up for CP/M computers have data bases of the current releases. The only cost for acquiring programs is the time you spend on the phone downloading them. *Computer Shopper* regularly publishes a comprehensive list of operating BBSes.

The only problem is that very few BBSes have a hard disk large enough to keep all the volumes (about 15 megabytes) on line simultaneously. Another source that is guaranteed to have the latest revisions of popular programs is the CP/M SIG on CompuServe.

A word of warning: Lately, some BBS users have been leaving programs that trash disks and cause all kinds of nasty problems for innocent and trusting souls downloading software. Some of these gems do their dirty work immediately; others work well for several days or weeks before their effect becomes apparent.

For an in-depth review of public-domain CP/M software, I suggest you buy *The Free Software Catalog and Directory* by Robert A. Froehlich (ISBN 0-517-55448-8) for \$9.95. The book lists all the programs in the CP/M User Group library and all those in the SIG/M User Group library up to volume 162. Programs are listed in numerical volume order, by keyword index, by file name, and by author.

Another good reference is Alfred Glossbrenner's *How to Get Free Software* (ISBN 0-312-39563-9), which costs \$14.95. Though more generalized than Froehlich's book, this one provides detailed descriptions of some selected CP/M programs and their sources.

If anyone is interested, I have a catalog disk of the SIG/M volumes up to 192. The catalog is available on floppy disks (single-density or double-density). If you want a copy, send \$15 and the disk format you require to Terry Kepner, CP/M Catalog Disk, P.O. Box 481, Peterborough, NH 03458. ■

—Terry Kepner



CP/M has a reputation of being an operating system for which thousands of free programs are available. But where do you find these programs and just how good are they?

There are two primary sources of public-domain programs: the CP/M User Group in New York and the SIG/M User Group in Iselin, NJ. Program quality ranges from excellent to terrible; about half are mediocre.

User groups file public-domain software in disk volumes in the order that programs are submitted. One disk volume is approximately 256K. The CP/M User Group has 92 disks (the number hasn't changed in 3 years); the SIG/M User Group has about 270 (it adds about three every month). In total, user group libraries contain approximately 3,000 programs, files, and documents. About 90 percent are for CP/M 2.2; the rest are programs for CP/M+, CP/M 86, and CP/M 68. Though new programs outnumber old ones, you'll find many redundancies as authors update old programs and re-release them.

Popular public-domain software includes the Modem and MDM7 telecommunications programs; Resource, a conversational machine-language disassembler; DU, a disk utility similar to Superzap; LU, a library/file compression utility that decreases ASCII files by as much as 50 percent; Sweep, a disk-file management utility that provides a DOS shell; and ZCPR, a superb replacement control processor for CP/M that does all the things CP/M+ was supposed to do.

You'll also find programs like fig-Forth, JRT Pascal (minus the documentation and some special utilities), Pistol, the entire Yale Star Catalog, several data-base management systems (in Basic and readily available for customization), dozens of text processors and formatters, and several bulletin board system (BBS)

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ROM: checksum test. **RAM:** three tests including every location and data value. **Video display:** character generator, video RAM, video signal. **Keyboard:** every key contact tested. **Line printer:** character tests with adjustable platen length. **Cassette recorder:** read, write, verify data. **Disk drives:** disk controller, drive select, track seek, read sectors, formatting, read/write/verify data with or without erasing, disk drive timer, disk head cleaner. Single or double density, 1-99 tracks. **RS-232-C Interface:** connector fault, data transmission, framing, data loop, baud rate generator.

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Bookkeeper keeps general ledger, accounts receivable and payable, produces customer statements. General ledger produces monthly and year-to-date totals. Receivables tracked to invoices, automatically updated as income entered.

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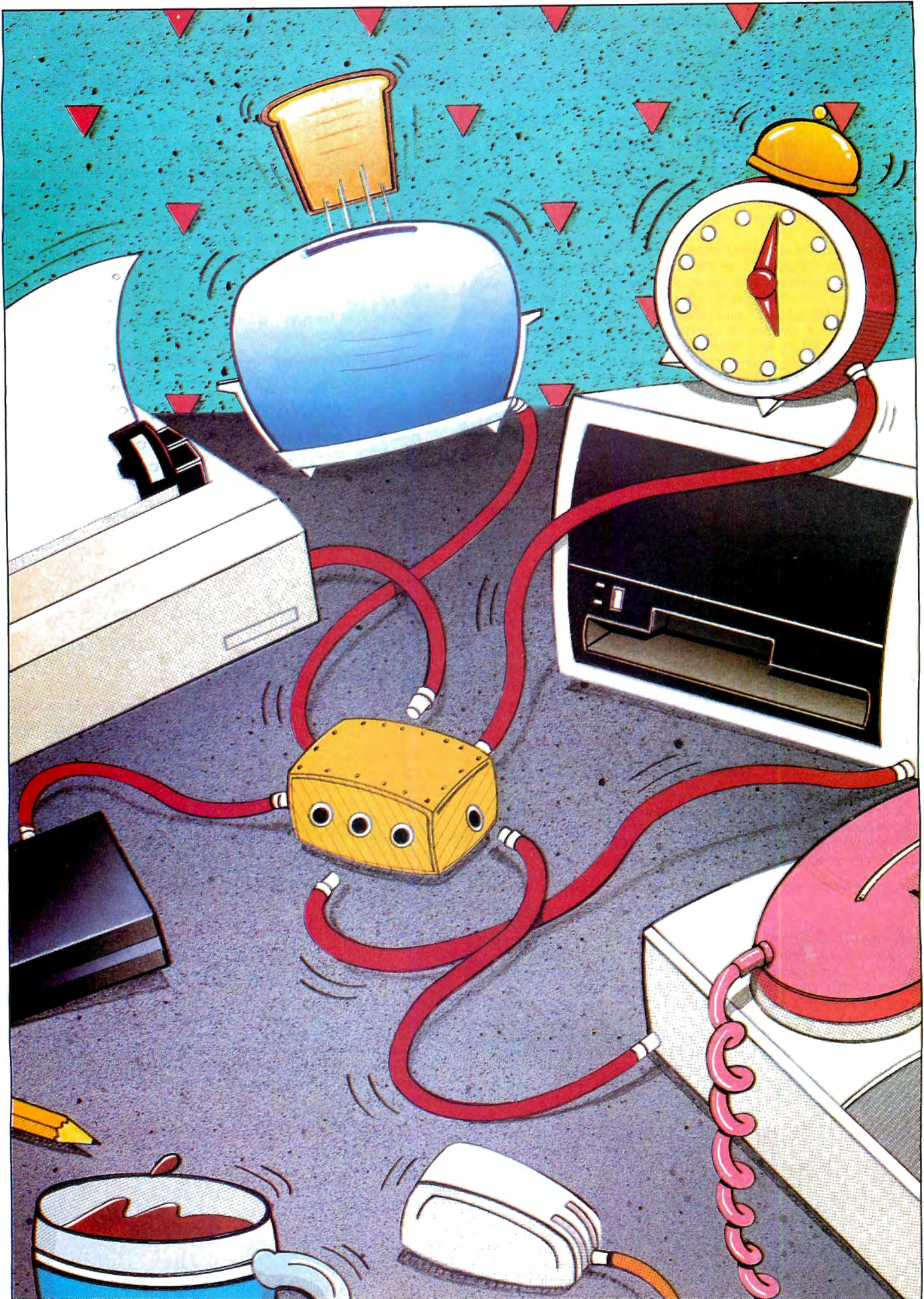
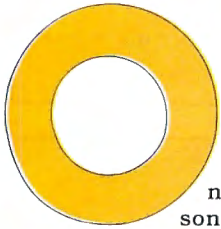


Illustration by Cameron Eagle

Write subroutines to make any device perform the way you want it to.



One feature that MS-DOS offers machine-language programmers is the ability to add device drivers for new peripherals. Seasoned 8088 programmers can also enhance standard I/O (input/output) properties by replacing an existing device driver with a custom job. You might write a driver for an oddball serial printer or add keyboard macro capabilities.

Unfortunately, most MS-DOS system manufacturers provide little or no documentation on this subject. I'll provide the details you need to write your own device drivers, along with a sample host program that lets you keep control of your computer while it's being remotely accessed via the RS-232. I wrote the host program using a template (also provided), which you can modify to design device drivers for your own needs.

BIOS con Dios

MS-DOS exhibits features of both CP/M and Unix, but falls short of achieving the strengths of either operating system. Perhaps the most common way to access such standard devices as the screen, the keyboard, and the RS-232 port is reprogramming MS-DOS's CP/M-like BIOS (Basic input/output system). The BIOS is a set of subroutines written by the computer manufacturer to interface machine-language programs to the computer's hardware. While the entry conditions to BIOS subroutines are usually standardized, the BIOS code itself almost always varies from computer to computer, and each device has calling parameters that are incompatible with other devices.

You access most MS-DOS BIOS subroutines by forcing an interrupt with the INT machine-language instruction to interrupts 10 hexadecimal (hex) through 1A hex.

MS-DOS versions 2.0 and later have a higher-level I/O system that parallels Unix's device-independent structure. To use it, open a file with the MS-DOS high-level file I/O functions 3C hex through 46 hex of the DOS function dispatcher, INT 21 hex. The file name should be the device name followed by a colon and null.

For example, you could use the following code to open a "file" to the RS-232 port:

```
FILENAME: DB 'COM1:',0
START:
    MOV DS,CS           ;Point DS:DX
                        ;to file name
    MOV DX,FILENAME
    MOV AL,2           ;Write only
                        ;access
    MOV AH,3DH         ;Open func-
                        ;tion call
    INT 21H           ;Open file"
```

Once the file has been opened, reads and writes performed through functions 3F hex and 40 hex go directly to the RS-232 port. If you change the device name from COM1: to CON:, all I/O will be processed through the local screen and keyboard (console).

The beauty of the system is that it lets you alter the I/O device without extensively changing the code. If you were working with the BIOS, you'd have to change the program quite a bit to reroute screen output to the line printer. With MS-DOS's device-independent file I/O system, however, you simply change the output device name.

MS-DOS also features the somewhat mysterious IOCTL function (function call 44 hex of INT 21 hex). IOCTL's main purpose is to provide a communications link to devices outside the normal character I/O channel. You can, for example, send control strings to the RS-232 device that modify the baud rate, stop bits, word length, and parity. The IOCTL function can also receive control strings, get the status of a device or file, determine what type file or device is being accessed, and perform a few other trivial functions.

Transmission Overhaul

So far, I've treated devices as magical I/O channels that MS-DOS handles internally through device drivers. But how do you make MS-DOS handle a device differently (to translate keyboard characters, for in-

stance) or to support a new device such as a RAM disk? It's sometimes easiest to go in at low level with a memory-resident program that intercepts the interrupts to BIOS I/O routines (see the sidebar on p. 47).

Another way is to write your own device driver. You may have encountered independent device drivers while using ANSI.SYS, a RAM-disk program, or a mouse driver. All are installed in MS-DOS during boot-up and specified through the Device assignment in the CONFIG.SYS file (e.g., Device = ANSI.SYS).

You can install both character and block-device drivers with the Device assignment. Character devices handle I/O in a serial stream, one character at a time. Block devices process I/O in blocks of data; they usually control disk drivers or disk-emulator drivers. All device drivers are .COM files that start at address zero (.COM files usually begin at offset address 100 hex).

Bit by Bit

The first 18 bytes of the program must contain a device header that describes the driver to be installed. Table 1 shows the elements of a device header.

Bytes zero to 3 in this header point to the next driver header installed in the system. They represent a double-word (32-bit) pointer (not one word as Tandy's documentation says) that should initially be set to -1 (FFFFFFFFH). Once the driver is installed, the value at this address changes to the address of the next driver.

MS-DOS stores device drivers in a linked list in memory with each driver pointing to the next through the pointer field in the device header. The NUL device is always number 1 in the list. MS-DOS installs each driver (which is listed in CONFIG.SYS) in the number 2 position at boot-up, pushing existing drivers higher on the list.

You can replace a DOS driver with one of your own by giving it the same name. DOS reads up the linked list in memory looking for a particular driver and uses the first one it comes to having the proper name.

Bytes 4-5 of the device header hold a 16-bit attribute word describing the device itself (see Table 2). Bit 15 of this word determines if the device driver is charac-

System Requirements

Model 1000, 1200, 2000 or 3000
MS-Assembler 1.0 or higher

A Driver of Your Own Device

by Robert D. Covington

ter- or block-oriented. Set the bit if the driver is character-oriented; also set bits zero to 4 to describe the character device that is being connected.

Bits zero and 1 of bytes 4-5, respectively, define the new device driver as the replacement for the standard console I/O routines run at MS-DOS command level. Bit 3 defines a replacement for the internal, real-time clock driver. Bits 2 and 4 define a device driver as a NUL or a special device, respectively. In most cases, neither bit is used; they should be left reset with a logical value of zero.

For block devices, bit 13 tells DOS whether the driver uses standard IBM format. It must be set if your block device has its FAT (file-allocation table) in a different place from that of an IBM disk.

With MS-DOS 3.0, bit 11 takes on significance. If a character device supports the open and close operations, or if a block device supports removable media, bit 11 should be set.

Lastly, bit 14 of bytes 4-5 of the attribute word specifies whether the device can accept and send control strings outside the normal I/O channel via the IOCTL function call. Here, you can control the communications parameters or transfer device statuses between the driver and an application program. If your driver doesn't support this feature, reset bit 14 so all attempts to send or receive control strings through IOCTL generate an error.

Bytes 6-7 and 8-9 mark the two entry points into your program. Because they are 16-bit offset pointers, the entries into the driver must be in the same 64K segment as the device header.

The device header's last section, bytes 10-17, represents the device's name. With character-oriented devices, any eight-character string serves as a name. If the name occupies fewer than 8 bytes (CON, LPT1, and HOST, for instance), pad the right-most bytes with spaces (ASCII 20 hex).

For block devices, the first byte in this section must contain the number of devices you want to define. To create a RAM-disk block device to emulate two disk drives, put a binary 2 in byte 10 of the device header. When DOS encounters the 2, it finds the last defined drive (usually C, D, or E depending on the computer) and starts assigning letters to each drive unit.

Your program, however, specifies drives with binary numbers starting from 1. This arrangement lets block-oriented devices operate correctly on systems with different drive configurations. Unfortunately, you have no control over the drive letter assigned to your device driver, which may make describing its installation and use difficult.

Issuing Orders

Once you've created the device header, you must write the code that processes

Contents	Next header offset		Next header segment		Attribute L H		Strategy offset		Interrupt offset		Device name
	0	1	2	3	4	5	6	7	8	9	
Byte number											10-17

Table 1. A breakdown of the device header (18 bytes). Addresses are stored least-significant byte first.

Bit	Contents
15	1 if character device; zero if block
14	1 if IOCTL supported
13	1 if non-IBM format (block devices only)
11	1 if character device supports open/close or if block device supports removable media (MS-DOS 3.0 only)
4	1 if special device
3	1 if current clock device
2	1 if NUL device (always clear to zero)
1	1 if current standard output
0	1 if current standard input

Table 2. Bit contents of attribute word. Unlisted bits must be off (zero).

Contents	Length	Block unit	Command		Status word L H		DOS reserved
			2		3	4	
Byte number	0	1					5-12

Table 3. The information transferred in the first 13 bytes of the request header.

Code	Function
0	Initialize driver
1	Media check (block only)
2	Build BPB (block only)
3	IOCTL input (only if IOCTL attribute bit set)
4	Input
5	Nondestructive input with no wait (character only)
6	Input status (character only)
7	Input flush (character only)
8	Output
9	Output with verify
10	Output status (character only)
11	Output flush (character only)
12	IOCTL output (only if IOCTL attribute bit set)
13	Open device (MS-DOS 3.0)
14	Close device (MS-DOS 3.0)
15	Removable media check (block only; MS-DOS 3.0)

Table 4. Command code summary. Commands 13-15 added with MS-DOS 3.0.

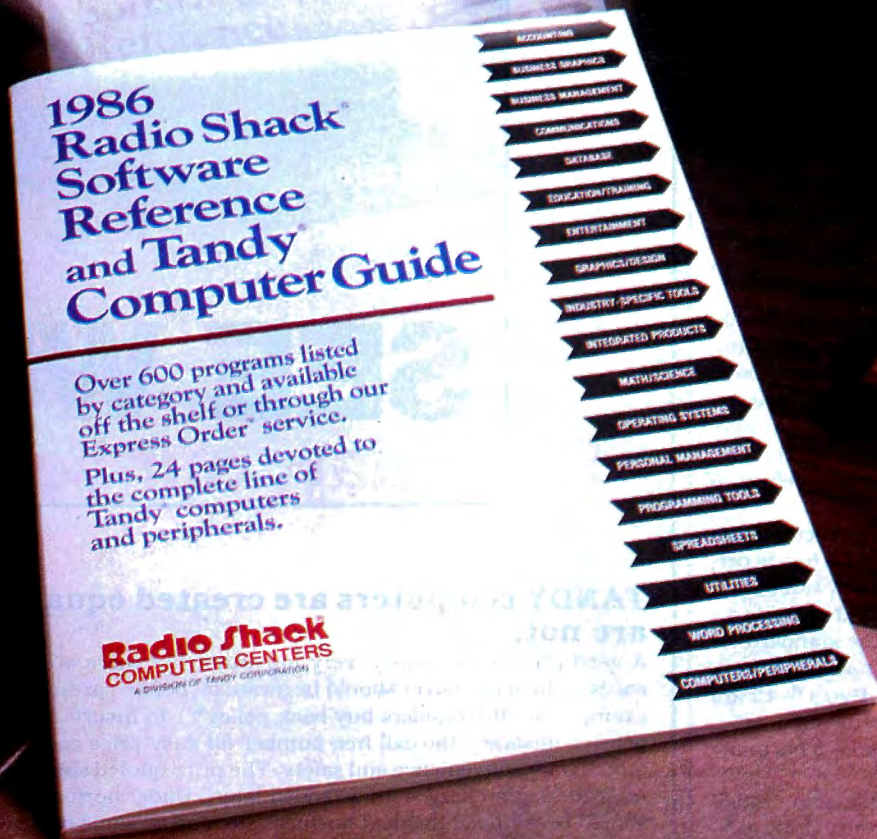
Contents	Unit number	Ending offset		Ending segment		Parameter/BPB array pointer
		14	15	16	17	
Byte number	13					18-21

Table 5. The 9-byte extension to request header passed for the INIT command.

commands from DOS to the device driver. DOS uses both entry points specified in the device header. It first calls the device-

strategy entry point (address offset in bytes 6 and 7 of the device header) with the address of an information package

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called the request header (stored in the register pair EB:BX). Included in the request header is the command code and the location of any data to be processed by the device driver. With current DOS versions, your device driver should store this request-header address safely away, then return control to DOS. In some future MS-DOS, this will be the spot to handle the bookkeeping demanded by multi-tasking.

MS-DOS next calls the second address in the device header (bytes 8 and 9), the device-interrupt entry point. The routines in this section of the device driver interpret the information in the request header and do the actual work of the device driver.

First, the program must save the 8088 registers. (If your driver routines need more stack space than necessary for saving the CPU registers, set up your own stack, making sure to save and restore the DOS stack.) Your routine must then parse the request header to find the function MS-DOS wants your device driver to perform. Table 3 contains a breakdown of the first 13 bytes of the request header.

Byte zero reports the length of the request header. You can ignore it, since the information is only used by MS-DOS to manage the request-header table.

Byte 1 contains the number for a block-oriented device (recall that MS-DOS numbers block devices sequentially from one). In the case of a RAM-disk driver that defines two virtual drives, the value at byte 1 could be either binary 1 or 2. You can ignore this byte if your driver defines a character-oriented device.

Byte 2 contains a code representing the command MS-DOS wants the driver to perform. The command code is a value from zero to 12 and is summarized in Table 4.

Bytes 3-4, the last in the standard request header, return device status; I'll talk about them in detail later. Bytes 5-12 are not used in current DOS versions.

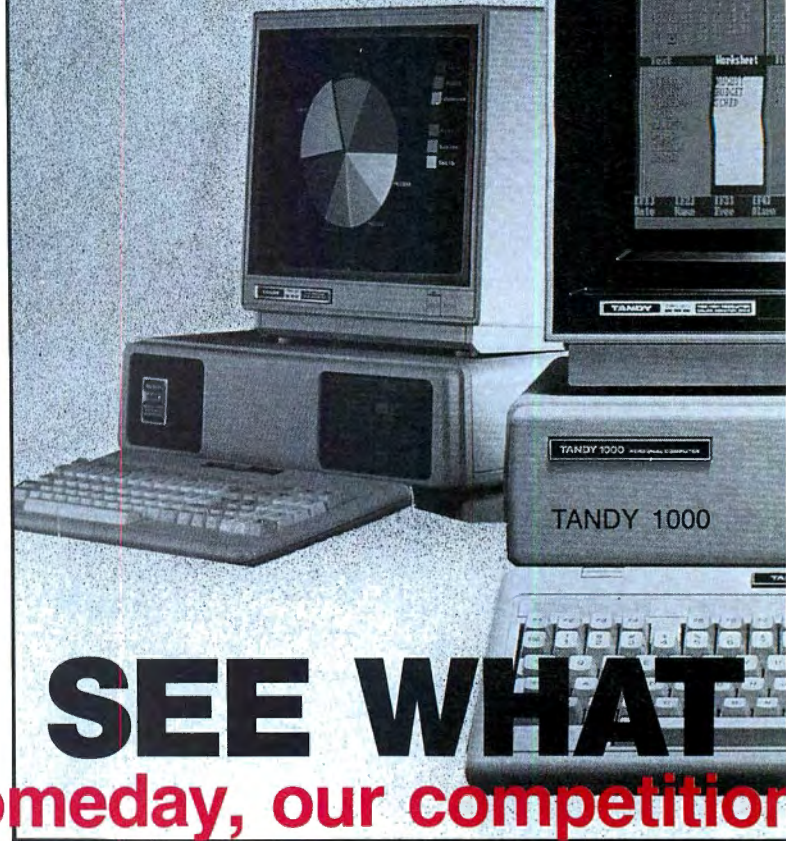
Command codes zero and 2 normally initialize the device driver.

The INIT command, code zero, initializes the driver during start-up. During device installation, DOS functions for file I/O and memory allocation should not be attempted. When INIT is requested, DOS passes the 32-bit register pair DS:DX, which points to the end of your program, and a 9-byte extension (bytes 13-21) to the standard request header, which Table 5 summarizes.

Byte 13 of the INIT request header holds the number of the drive preceding the one that your installed driver will handle. It lets you determine the drive letter assigned to block devices. For example, if byte 13 contains a binary 3, you know drives A, B, and C have already been defined and your driver will occupy slots D, E, or F. Before returning to DOS, you should set this byte to the number of block devices your driver defines.

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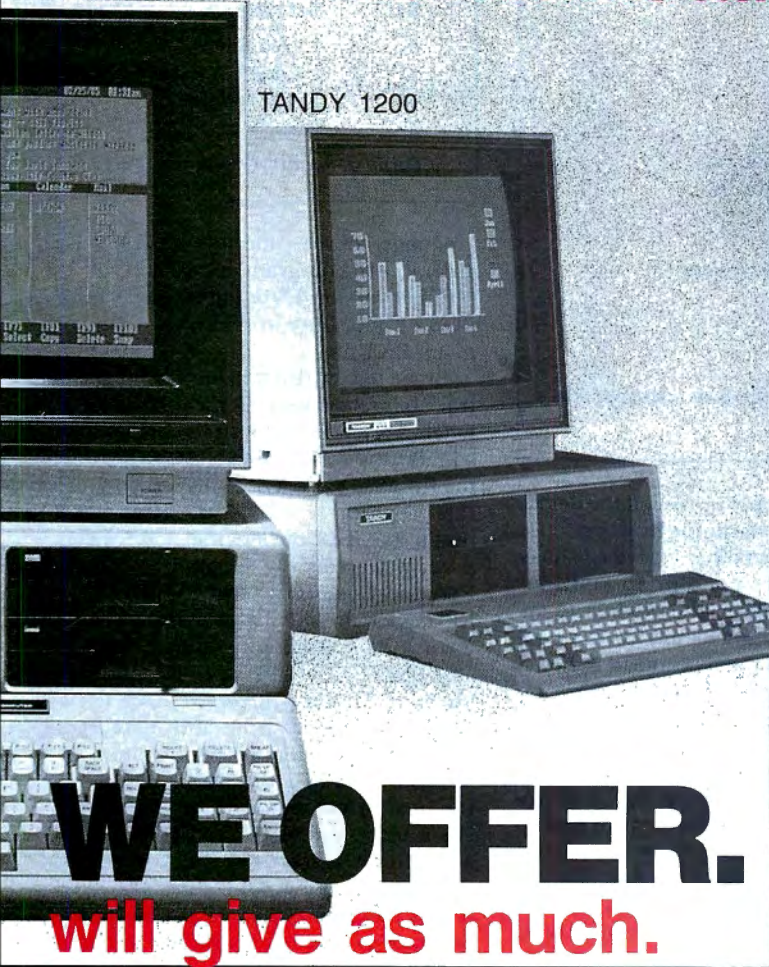
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The device driver uses bytes 14-17 to return the 32-bit ending address of your device driver. If your initialization routine is long, you can cut it free after initialization. Place it at the end of your driver and return an ending address pointing to the start of the INIT code.

During initialization, bytes 18-21 of the request header contain a 32-bit pointer to the character that follows the "=" on the line in the CONFIG.SYS file that loaded the device. Use it to parse commands placed after the driver's file name.

During parsing, treat characters zero to 32 as spaces and 33-128 as letters and symbols. Drivers that register spaces during parsing may not work on MS-DOS versions that convert such spaces to nulls. (The exception is the carriage return used to terminate the string.)

Upon exit from your driver's initialization, bytes 18-21 should contain a 32-bit pointer to an array of pointers. Each pointer in the array locates the BIOS parameter block (BPB) for one of the units that your driver defines. If you define several units that use the same BPB, all array numbers can point to one BPB. Character-oriented drivers don't need a BPB, which describes how block devices are logically divided. Table 6 describes the BPB.

Command 2 sets the BPB for a block-oriented device. Upon entering the device, the command passes a 9-byte extension of the standard-command request header. Byte 13 of the request header contains the media-descriptor byte (see Table 7) that describes the disk format and medium, and has the same value in the BPB as byte 10. Bytes 14-17 contain the 32-bit address for the buffer that holds the first sector of the FAT if the non-IBM format is reset (bit 13 of bytes 4-5 in the device header) or an empty sector buffer if the bit is set.

With a drive defined as non-IBM format, MS-DOS will write to the FAT sector the address of a data area to be placed in an unused sector on the block device. Bytes 18-21 contain the 32-bit address for the BPB. All told, a block-oriented device must set all 9 bytes of information before returning to MS-DOS.

Read/Write Arithmetic

All read and write operations but one are performed through a 9-byte extension to the standard request header described in Table 8.

The 32-bit address stored in bytes 14-17 of the request header points to a data-transfer address, which can be any address in MS-DOS's normal range. Data written to the device will be at this address and any input from the device should be stored starting here.

Bytes 18-19 hold a 16-bit value describing how many characters or sectors are being transferred. During output operations, MS-DOS sets the value on entry,

Byte	Contents
0,1	Bytes per sector (word)
2	Sectors per cluster (byte)
3,4	Reserved sectors from logical zero (word)
5	Number of FATs (byte)
6,7	Maximum number of root directory entries (word)
8,9	Total sectors including boot, directory, etc. (word)
10	Media descriptor (byte—detailed in Table 7)
11,12	Number of sectors per FAT (word)
End BPB, following three words optional for block device drivers	
13,14	Sectors per track (word)
15,16	Number of heads (word)
17,18	Number of hidden sectors (word)

Table 6. Contents of BIOS parameter block (BPB). Word entries are stored low-order byte first.

but in input operations, the driver should set the value before returning.

Bytes 20–21 hold the starting relative sector number for block-oriented transfers. With character devices, this 16-bit value can be ignored.

All these entry conditions apply to the I/O commands 3, 4, 8, 9, and 12.

Command 5 performs a nondestructive read to a character device. On exit from this command, byte 13 of the request header should contain the character from the input device.

Commands 7 and 11 flush any type-ahead buffers installed on a character-oriented device. They have no entry or exit conditions affecting the request header.

There are several incidental commands. Command 1 determines whether a block-oriented device's medium has been changed. If the medium has been changed, byte 14 of the extended request header should contain a -1 (FFH); if it hasn't, byte 14 should contain a binary 1. MS-DOS requests this information to determine if it must reread the FAT and parts of the directory before performing a disk function. The feature dramatically increases device access speed.

Commands 6 and 10 return the status of the character input and output devices, respectively.

The Return Trip

Once the device driver performs the function specified in the request header, it must return a 16-bit status value in bytes 3–4 of the request header (see Table 9).

Bit 8 of the status register specifies that the device driver performed the requested

operation. It will only be reset if the device driver failed to perform the function.

Bit 9 specifies whether a device is busy or has characters pending in an input buffer. If bit 9 is reset, the next write operation outputs immediately or the next input comes from the type-ahead buffer. If the bit is set, the next write operation waits until the previous character has been sent or the next input waits for input from the device. MS-DOS uses this status bit to streamline multi-tasking (if Microsoft ever decides to implement it) and to prevent slow devices from hindering faster ones. If you don't want to support this bit, always return with it reset.

Bit 15 of the status register comes back set if a device error occurs. Bits zero to 7 contain the error codes described in Table 10.

Once the status word has been set and stored in the request header, restore all the registers pushed during entry and perform a far return.

On to the Real Thing

If you've ever tried to access an MS-DOS machine from a remote terminal, you may have used the CTTY AUX command, which routes most console I/O to the RS-232. This method presents problems, however: You can't see what's happening on your computer once console I/O has been routed to the RS-232. Furthermore, rebooting is the only way to restore the screen and keyboard.

I've written a device driver like the AUX and CON devices that sends character I/O to both the console and the RS-232 (see Program Listing 1).

To create the driver, type the Assembly-

Bit	Setting
0	1 if double-sided
1	1 if 8 sectors/track
2	1 if removable
3–7	Must be set

Table 7. Media-descriptor byte.

language source code into an ASCII file, assemble the program using Microsoft Assembler version 1.0 or higher, and use MS-DOS's Link utility to convert the .OBJ file to an .EXE file.

Since device drivers don't contain control characters that change the program when it's loaded into memory, you must convert the .EXE file to a .COM file by using the MS-DOS's EXE2BIN utility. To use this program, type EXE2BIN Host.EXE (if that's the .EXE file's name) and the computer will create the .COM file. Next, type Rename Host.COM Host.SYS to change the device driver's extension to the standard .SYS extension. Finally, create a CONFIG.SYS file with a Device = Host.SYS line in it. This line directs MS-DOS to load Host.SYS at boot time and installs the driver in the system's device chain.

After installing the driver, reboot and the host driver will load into the system. For a test, type MODE COM1 300 8 N 1 and enter it, followed by CTTY Host. After the last command, all console I/O will go out both the RS-232 and console. The host program is simple enough not to require initialization.

You'll notice that the screen display has slowed down considerably. The device driver waits for each character to transmit out the RS-232 and screen before outputting the next character, slowing down screen I/O to about 300 baud.

To increase the screen speed, either type CTTY CON to redirect console I/O back to the normal console driver or type MODE COM1 9600 8 N 1, which hikes the rate to 9,600 baud.

The host driver doesn't work with Basic, Lotus 1-2-3, and other large application programs that normally don't use MS-DOS's device-independent I/O system. They either write directly to hardware or use the BIOS, so the CTTY command can't redirect I/O to another device. DOS utilities, a

Contents	Media descriptor	Transfer buffer offset	Transfer buffer seg	Byte count/sector count	Starting sector (rel.)				
Byte number	13	14	15	16	17	18	19	20	21

Table 8. Contents of 9-byte extension to request header for most input/output driver functions.

Bit	Setting
15	1 if error
9	1 if busy
8	1 if done
7–0	Error code if error bit set

Table 9. Request header status word. MS-DOS sets to zero; driver should set on return.

Intercepting Interrupts

To modify I/O for an existing device, you can take a low-level approach and write a memory-resident program that intercepts calls to the BIOS subroutine.

Such programs as SideKick and E-Z-DOS-IT, for instance, intercept the low-level keyboard interrupt to add a feature to the existing BIOS routine (e.g., response to a "hot" key). At some point, both programs give keyboard control back to the original BIOS routine. If you use this method to alter device I/O, you should follow a stringent set of rules.

- During initialization, always retrieve the current interrupt vector by using the MS-DOS function call 35 hex of INT 21 hex. AL must contain the interrupt number to modify. After exiting the driver, the 32-bit register pair ES:BX contains the interrupt vector. It's important to use function 35 hex so that jury-rigged memory-management systems on the 8088 work properly.

- Don't use self-modifying code for returning to the original subroutine. Many programmers return to the previous interrupt routine by saving the return ad-

dress in a long call instruction. While this self-modifying code usually works, it's the product of sloppy programming and more trouble than it's worth. The best method is to perform an indirect call to a separate buffer that holds the old vector address.

- Make sure your patch returns to the interrupt subroutine in the way the subroutine expects to find it. If you enable interrupts via an STI instruction, disable interrupts (CLI) before returning to the original routine. Also be sure the stack is balanced when it is exiting to the interrupt routine.

- Save the registers before doing anything and restore them just before exiting. This rule doesn't apply if you're intercepting a BIOS call that returns parameters and you want to return with a parameter from your program.

- To exit an interrupt routine without executing the original interrupt subroutine, use an IRET instruction instead of a far RET instruction.

- Don't keep interrupts disabled for very long. While MS-DOS computers are

more immune to problems resulting from long interrupts, there is still the danger of losing keys in the type-ahead buffer, having an inaccurate real-time clock, and losing characters during high-speed RS-232 communications.

If you do reenable interrupts, make sure your routine can accept an interrupt inside an interrupt.

- Take precautions against interrupts occurring faster than your interrupt routine can execute. Otherwise, the interrupt requests will overload the stack, eating away at MS-DOS, the applications program, or the device driver. Slow interrupt routines can also hurt system execution speed considerably.

- Remember that device drivers must be 100-percent relocatable. Even if you make Link load the program in upper memory, don't count on the subroutine being in the same place on a different machine.

For more details on working with interrupts, read Dave Rowell's March 1986 article ("We Interrupt This Program. . ." p. 68). ■

few file-transfer programs, and most language compilers will work, however.

To create a host driver that works in Basic, DOS, and other application programs, you must patch into the BIOS and manually redirect output. This method is harder than redirecting the output through MS-DOS's device-independent I/O system.

The Semi-Universal Template

Program Listing 2 contains a template for creating device drivers—a framework for most of the syntax, loading restrictions,

and request header handling you will ever need. I've called the template semi-universal because someone will surely come up with a driver that doesn't fit.

The template requires four major code areas. You make the first change after the first comment that contains a `-` symbol. This "define-word" instruction (DW) specifies the device attribute in the device header. Attributes must be set according to the guidelines in Table 2.

The device name is changed at the next `-` symbol. For character devices, change

the word "dummy." For block devices, change the text string to a binary number from 1-255 to specify the number of devices defined by the driver. In most cases, this will be DB 1.

Next is the area containing the BIOS parameter block if you're creating a block device. Skip this step if the driver is character oriented.

Finally, you must change the subroutines for each device function. All subroutines in Listing 2 use the default-return routine, which sets the status bit to a "done" condition and exits. In effect, this creates a driver that does nothing.

On entering each subroutine, the 32-bit register pair DS:BP points to the start of the request header from MS-DOS. It is therefore easy to use the 8088's indexed addressing mode to access each parameter in the request header.

When a subroutine has completed its function, it must set the status word in the request header and return. An easy way of returning with "no-error" status stored in the request header is to perform a jump to the return subroutine. ■

Robert D. Covington welcomes correspondence. Send a stamped, self-addressed envelope to P.O. Box 37007, Creve Coeur, MO 63141 for a reply.

Code	Error
00	Write-protect violation
01	Unknown unit
02	Device not ready
03	Unknown command
04	CRC error
05	Bad drive request structure length
06	Seek error
07	Unknown media
08	Sector not found
09	Printer out of paper
0A	Write fault
0B	Read fault
0C	General failure

Table 10. Error codes placed in bits zero to 7 of status word by driver.

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Program Listing 1. Device driver for routing I/O to both the keyboard and the RS-232 port.

```

PAGE      60,132
TITLE    Host I/O Console Device Driver
ASSUME   CS:CODE
CODE     SEGMENT
PROGSTART:
; *** Device Driver Header
DD      -1                ;Pointer to next device header (-1)
DW      1000000000000000B ;Device driver attribute
DW      OFFSET STRAT     ;Strategy entry point
DW      OFFSET INTENT    ;Interrupt entry point
DB      'HOST'           ;Device name padded with spaces
;
; *** Internal Variables
REQOFF:  DW      0                ;Request header offset address
REQSEG:  DW      0                ;Request header segment address
; *** Jump table for device driver commands
JMPTBL:
DW      INIT                ;Init
DW      RETURN              ;Media Check
DW      RETURN              ;Build BPB
DW      RETURN              ;IOCTL input
DW      INPUT               ;INPUT
DW      NDINPUT             ;Non-destructive input, no wait
DW      INSTAT              ;Input status
DW      INFLUSH             ;Input buffer flush
DW      OUTPUT              ;Output
DW      RETURN              ;Output with verify
DW      RETURN              ;Output status
DW      RETURN              ;Output buffer flush
DW      RETURN              ;IOCTL output
;
; *** Strategy Entry Point Routine
STRAT    PROC      FAR
MOV      WORD PTR CS:[REQOFF],BX ;Save request header address
MOV      WORD PTR CS:[REQSEG],ES
RET
ENDP
; *** Main device driver routine. Called from Interrupt entry point
INTENT   PROC      FAR
PUSHF                                ;Save registers
PUSH     AX
PUSH     BX
PUSH     CX
PUSH     DX
PUSH     SI
PUSH     ES
PUSH     DS
MOV      DS,WORD PTR CS:[REQSEG] ;Get segment for request header
MOV      SI,WORD PTR CS:[REQOFF] ;Get offset for request header
MOV      BL,[SI+2]                ;Get command byte in request header
MOV      BH,0                    ;Clear MSB
SHL      BX,1                    ;Multiply AX * 2
CALL    WORD PTR CS:[BX+JMPTBL] ;Call Device driver function
POP      DS
POP      ES
POP      SI
POP      DX
POP      CX
POP      BX
POP      AX
POPF
RET                                ;Return from driver
;
INTENT   ENDP
; *** Dummy return for device driver functions that are not used
RETURN   PROC      NEAR
MOV      [SI+3],512              ;Set done status
RET
ENDP
; *** Input Character
INPUT    PROC      NEAR
MOV      AH,1                    ;Check for a Keyboard character
INT      16H
JZ      NOKEY                    ;Jump if no key pressed
MOV      AH,0                    ;Get character from keyboard queue
INT      16H
JMP     RETINCHAR                ;Return with key entry
NOKEY:   MOV      AH,3            ;Get RS232 status
MOV      DL,1                    ;Use RS232 port 1
INT      14H
AND     AH,1                    ;Check for data ready
JZ      INSTAT                  ;Jump if no input
RETINCHAR:
MOV      BX,[SI+14]              ;Get data transfer address (DTA) offset
MOV      ES,[SI+16]              ;Get DTA segment
MOV      ES:[BX],AL              ;Save character input in transfer buffer
MOV      BYTE PTR [SI+18],1      ;Specify one character was transferred
JMP     INSTAT                  ;Set input status and return
;
INPUT    ENDP
; *** Get and set input status
INSTAT   PROC      NEAR
MOV      AH,1                    ;Check for a Keyboard character
INT      16H
JNZ     INWAIT                  ;Jump if input pending in queue
MOV      AH,3                    ;Get RS232 status
MOV      DL,1                    ;Use RS232 port 1
INT      14H
AND     AH,1                    ;Check for data ready
JZ      NOWAIT                  ;Jump if no input pending in input queue
INWAIT:  MOV      [SI+3],100H      ;Set character pending status
RET

```

Listing 1 continued

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Listing 1 continued

```

NOWAIT:      MOV     [SI+3],300H      ;Set character not pending status
              RET
INSTAT       ENDP
;
; *** Non-destructive keyboard input
NDINPUT      PROC    NEAR
              MOV     [SI+3],512
              RET
NDINPUT      ENDP
;
; *** Flush input buffer
INFLUSH      PROC    NEAR
              MOV     AH,3          ;Flush keyboard queue
              INT     16H
              MOV     AH,4          ;Flush RS232 queue
              MOV     DL,1          ;Clear RS232 port 1
              MOV     DH,3          ;Set XON/XOFF protocol
              INT     14H
              MOV     [SI+3],300H  ;Save done status, no errors, no more char
              RET
INFLUSH      ENDP
;
; *** Output character
OUTPUT       PROC    NEAR
              MOV     CX,[SI+18]    ;Get number of characters to output
              MOV     BX,[SI+14]    ;Get data transfer address (DTA) offset
              MOV     ES,[SI+16]    ;Get DTA offset
OUTLOOP:
              PUSH    BX           ;Save DTA offset
              MOV     AL,ES:[BX]   ;Get next character to output
              PUSH    AX           ;Save character
              MOV     AH,14        ;Write TTY Display BIOS function call
              MOV     BL,7         ;Set color/attribute to normal
              INT     10H
OWAIT:
              MOV     AH,3         ;Get current RS232 status
              MOV     DL,1         ;Check RS232 port 1
              INT     14H
              AND     AH,00100000B ;Check Xmit holding register (bit 5)
              JNZ    OWAIT        ;Wait till holding register empty
              POP     AX           ;Restore character to output
              MOV     AH,1         ;Transmit character out RS232
              MOV     DL,1         ;Use RS232 port 1
              INT     14H
              POP     BX           ;Restore DTA offset address
              INC     BX
              LOOP   OUTLOOP      ;Loop CX times
              MOV     [SI+3],512  ;Return with done status
              RET
OUTPUT       ENDP
;
; *** Driver initialization procedure
INIT         PROC    NEAR
ENDHOST      EQU     $
              LEA     AX,CS:ENDHOST ;driver end offset
              MOV     DX,CS        ;driver end segment
              MOV     [SI+14],AX    ;return end offset
              MOV     [SI+16],DX    ;return end segment
              MOV     [SI+3],512    ;Set done status
              RET
INIT         ENDP
CODE         ENDS
            END     PROGSTART

```

End

Program Listing 2. Device driver template.

```

PAGE        60,132
TITLE       Semi-Universal MSDOS device driver template
ASSUME     CS:CODE
CODE       SEGMENT
PROGSTART:
; *** Device Driver Header
DD         -1          ;Pointer to next device header (-1)
; ---> Change device attribute for your device driver
DW         1000000000000000B ;Device driver attribute
; *** Device driver entry points
DW         OFFSET STRAT      ;Strategy entry point
DW         OFFSET INTENT    ;Interrupt entry point
; ---> Put device name here or DB # for block device
DB         'dummy '        ;Device name padded with spaces
; *** Internal Variables
REQOFF:    DW         0      ;Request header offset address
REQSEG:    DW         0      ;Request header segment address
; ---> Note: If you have a BIOS parameter block, it should
; ---> go here.
BPB        EQU     $        ;Start of BPB
; *** Jump table for device driver commands
JMPTBL:
DW         INIT           ;Init
DW         MEDCHECK      ;Media Check
;
DW         BLDBPB       ;Build BPB
DW         IOIOCTL      ;IOCTL input
DW         INPUT        ;INPUT
DW         NDINPUT      ;Non-destructive input, no wait
DW         INSTAT       ;Input status
DW         INFLUSH      ;Input buffer flush
DW         OUTPUT       ;Output

```

Listing 2 continued

Listing 2 continued

```

;          DW      OUTPUTV      ;Output with verify
;          DW      OUTSTAT      ;Output status
;          DW      OUTFLUSH     ;Output buffer flush
;          DW      OUTIOCTL     ;IOCTL output
; *** Strategy Entry Point Routine
STRAT     PROC      FAR
MOV      WORD PTR CS:[REQOFF],BX ;Save request header address
MOV      WORD PTR CS:[REQSEG],ES
RET
ENDP
STRAT     ENDP
; *** Main device driver routine. Called from Interrupt entry point
INTENT    PROC      FAR
PUSHF                                ;Save registers
PUSH     AX
PUSH     BX
PUSH     CX
PUSH     DX
PUSH     SI
PUSH     DI
PUSH     BP
PUSH     ES
PUSH     DS
MOV      DS,WORD PTR CS:[REQSEG] ;Get segment for request header
MOV      SI,WORD PTR CS:[REQOFF] ;Get offset for request header
MOV      BL,[SI+2]                ;Get command byte in request header
MOV      BH,0                    ;Clear MSB
SHL      BX,1                    ;Multiply AX * 2
CALL    WORD PTR CS:[BX+JMPTBL] ;Call Device driver function
POP      DS                       ;Restore registers
POP      ES
POP      BP
POP      DI
POP      SI
POP      DX
POP      CX
POP      BX
POP      AX
POPF                                ;Return from driver
INTENT    ENDP
; *** Dummy return for device driver functions that are not used
RETURN    PROC      NEAR
MOV      [SI+3],512              ;Set done status
RET
ENDP
RETURN    ENDP
; ---> Media Check
MEDCHECK  PROC      NEAR
jmp      return
ENDP
MEDCHECK  ENDP
; ---> Input IOCTL
INIOCTL   PROC      NEAR
jmp      return
ENDP
INIOCTL   ENDP
; ---> Input Character
INPUT     PROC      NEAR
jmp      return
ENDP
INPUT     ENDP
; ---> Get and set input status
INSTAT    PROC      NEAR
jmp      return
ENDP
INSTAT    ENDP
; ---> Non-destructive keyboard input
NDINPUT   PROC      NEAR
jmp      return
ENDP
NDINPUT   ENDP
; ---> Flush input buffer
INFLUSH   PROC      NEAR
jmp      return
ENDP
INFLUSH   ENDP
; ---> Output character
OUTPUT    PROC      NEAR
jmp      return
ENDP
OUTPUT    ENDP
; ---> Output character with verify
OUTPUTV   PROC      NEAR
jmp      return
ENDP
OUTPUTV   ENDP
; ---> Output buffer flush
OUTFLUSH  PROC      NEAR
jmp      return
ENDP
OUTFLUSH  ENDP
; ---> Output IOCTL
OUTIOCTL  PROC      NEAR
jmp      return
ENDP
OUTIOCTL  ENDP
; ---> Initialize Driver
INIT      PROC      NEAR
ENDDEV    EQU      $
LEA      AX,CS:ENDDEV
MOV      DX,CS
MOV      [SI+14],AX ;return end offset
MOV      [SI+16],DX ;return end segment
MOV      [SI+3],512 ;Set done status
RET
ENDP
INIT      ENDP
; *** End of program
CODE      ENDS
END        PROGSTART

```

End

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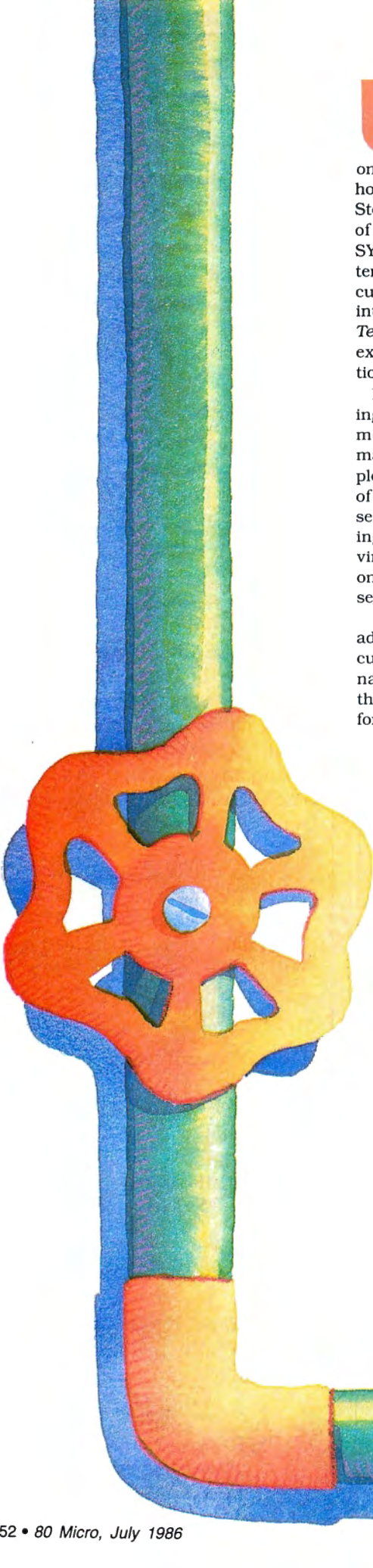
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Until recently, I thought that the Unix shell I used at work was one convenience I'd have to do without at home. Hardin Brothers' column (The Next Step, May 1985, p. 100) describing the use of TRSDOS 6.2's unused system file, SYS13/SYS, as an extended command interpreter (ECI) convinced me I could circumvent TRSDOS and create a Unix-like interface for the Model 4. The *Model 4 Technical Reference Manual* proved an excellent source for additional information on setting up an ECI.

In writing my ECI (see the Program Listing), I concentrated on the two features most important to me: multiple commands and command piping. The multiple-command feature lets you put a series of TRSDOS commands, separated by a semicolon, on a single line. Command piping, a procedure common in the Unix environment, sets up the display output of one program as the standard input for a second program.

To make the ECI more interesting, I added a special table to track the 10 most current command lines and a set of internal commands that let you manipulate the table and disable the ECI. See Table 1 for a list of sample commands.

To get all these features with a mini-

um of programming effort, I chose to implement the ECI in C using MISOSYS's PRO-LC compiler—it offers a number of features so you can develop an extensive command interpreter with a minimum of effort. Since MISOSYS's version of C is a subset of standard C, the ECI in the Program Listing should be totally compatible with most other C compilers, even the Radio Shack Model 4 version. However, if you use Radio Shack C, you must generate a /CMD file for use as an ECI.

Multiple Commands

In order to provide multiple-command capability in a single line, you need to store each command individually until you're ready to use it. To accomplish this, the ECI reserves a section of memory for a 20-entry command table (see the Figure). When you enter a line of multiple commands, the ECI parses the line and separately stores each entry in the command table along with a "not-yet-used" flag.

A counter in upper memory keeps track of the number of remaining commands; each time you invoke the ECI (after the completion of a command or program), the interpreter checks for an outstanding command. If one exists, the ECI passes it to the TRSDOS command

Working Within the System

by Daniel Zenzel Jr.

Create a Unix-like environment for the Model 4.

interpreter for execution. An on-screen message indicates which command TRSDOS is executing. If you don't want this display, change the "showflag" variable in routine init() to "N."

The procedures for processing multiple commands don't include an error-handling routine to check proper command execution. If an error causes the ECI to abort execution of one command within a series, a problem might arise because the ECI doesn't verify a successful execution before processing the next command. With a line like:

```
COPY TEST:2 :1; REMOVE TEST:2
```

the failure of the copy function presents a problem. To eliminate such difficulties, you can create a routine to substitute for the dummy chkerr() routine found in the source code.

Command Piping

The command below typifies the Unix piping format:

```
program1 | program2
```

When you type in this sequence at the command line, you set up a pipeline: Program 1 executes and its output (which usually goes to the display [*DO]) becomes standard input (which usually comes from the keyboard [*KI]) for program 2.

Under Unix, the transfer of information occurs simultaneously, but in TRSDOS 6.2 you can't realistically perform such tasks efficiently. The ECI in the listing performs piping differently. For example, if you type in list prog:0 | lpr, the ECI generates the commands below and puts them in the command table for execution:

```
Route *DO to TEMPX/DAT
list prog:0
Reset *DO
lpr <TEMPX/DAT
Remove TEMPX/DAT
```

(As with multiple commands, the ECI displays execution messages during piping. But after the ECI routes display output to the temporary file, no messages appear on the screen until *DO resets.)

To ensure that piping operates correctly, you must observe a few rules. First, be sure that you have enough room on your default disk to hold the temporary file TEMPX/DAT. If you don't have enough space, you can write-protect the disk by typing in:

```
SYSTEM (DRIVE=0, WP=Y)
```

This forces the system to create the file on the next drive. If the disk becomes full

during execution of the pipe, the ECI hangs up.

Unless you're familiar with command prompts and their proper responses, the first command in a pipe should not re-

<p>Multiple Commands: \$ dir :0;free :1;list test1:2;lib \$ system (sysres = 1);system (sysres = 2)</p> <p>Piping: \$ list testp:2 | lpr \$ list text:0 |hexbin</p> <p>Internal: \$.L \$.Q \$.V</p> <p><i>Table 1. Sample commands for the ECI.</i></p>

FFFF--	ECI
FFFO--	
FFCO--	
FC96--	History table 10 entries, each 81 bytes
F642--	Command table 20 entries, each 81 bytes
F641--	
F640--	Pipe flag
F63B-- (HIGH\$. Set by ECI.)	Number of commands

Figure. Upper-memory configuration required by ECI.



System Requirements

- Model 4
- TRSDOS 6.2
- 64K RAM
- C
- C Compiler

quire keyboard input. The ECI routes the display output to disk; consequently you can't easily detect prompts and confirm that your responses are correct.

Finally, any program receiving input from the pipe must be capable of processing a command-line input/output redirection argument, such as LC or RS 'C'. But, because HL (register 3) points to the command line when you enter a program, you can write a routine to perform the route in another language, e.g., Assembly language.

Making History

In addition to implementing multiple commands and piping, the ECI recognizes and acts upon a series of special commands whose main purpose is to support the ECI's history table (see Table 2). This table contains copies of the 10 most recent commands you entered since you last reset the system. Whenever you enter a command that is not an ECI internal command, the ECI puts that command in the history table. You can list the contents of the table by typing in .L; if you type in .#XX, where XX represents a command's number in the history table, the ECI passes the corresponding command to the interpreter for execution.

You can easily add custom commands to the ECI in the checkctrl() routine; in fact, you could replace the TRSDOS command interpreter. But rather than reinvent the wheel, I chose to pass all non-ECI commands to the TRSDOS interpreter for processing.

Memory, Memory

Since the ECI uses fixed addresses for the command and history tables, you don't need the added complexity of a memory-management module. For the ECI to work properly, however, you must assign it to the uppermost section of memory—between addresses F63B and FFFF.

Fortunately, the upper-memory residency requirement shouldn't create problems because, in most cases, you'll run the ECI at boot time. The program will therefore handle HIGH\$ automatically before you do anything else. Once you install ECI and it adjusts HIGH\$, you can use memory below HIGH\$ for normal procedures, including system-resident modules and machine-language routines.

Whenever you issue a command invoking the ECI, the program checks HIGH\$ and memory location FFF0. A value of FFFF in HIGH\$ tells the ECI to adjust HIGH\$ and install itself. If HIGH\$ is not FFFF, FFF0 must

contain the string "ECI" for normal processing to continue; otherwise, the ECI displays an error message and aborts to the TRSDOS command interpreter.

Easy Installation

When you compile the ECI program, you have a file called ECI/CMD. You must then copy the TRSDOS 6.2 SYS13 file using the following command:

```
Copy ECI/CMD to SYS13/SYS.LSIDOS (C=N)
```

The parameter, C=N, ensures that the SYS13 file retains its system status in the directory.

.C	Clears the history table.
.H	Help. Displays available commands.
.L	Lists the contents of the history table.
.Q	Quit. Exits to TRSDOS 6.2.
.V	Displays the ECI version.
.?	Help. Displays available commands.
.#1-	Executes lines 1-10 of history table.
.#10	

Table 2. ECI internal commands.

Next, you execute the ECI by pressing the asterisk key at TRSDOS Ready; the program installs itself and does not return to TRSDOS because the ECI sets the system flag EFLAG\$ to a nonzero value. This tells TRSDOS that an extended command interpreter is present. When you choose to quit (with the internal ECI command .Q), the program resets EFLAG\$ to zero, disabling the ECI.

With this installation procedure, you get the normal TRSDOS command interpreter each time you reset the computer.

If you want to install the ECI permanently so that it comes up at boot time, I recommend the procedure that Hardin Brothers outlines in The Next Step. A short recap follows. To display the address of the EFLAG\$, type in MEMORY(ADD="E") at TRSDOS Ready. You need this address, so make a note of it; then type in SYSGEN to save the system flags. After you use SYSGEN, the value of EFLAG\$ is zero. Since this tells TRSDOS not to use the ECI, you must patch the SYSGEN file by typing in the command below using the address from the memory command above:

```
PATCH CONFIG/SYS.CCC (X'060E' = FF)
```

Once you do so, you've permanently installed the ECI. ■

Daniel Zenzel Jr., who is currently working on his M.S. in computer science, is a systems programmer for the Burroughs Corp. You can write to him at P.O. Box 368, Perkasia, PA 18944.

Program Listing. ECI source code.

```

1  > /* ***** */
2  > /* Extended Command Interpreter          Dan Zenzel, Jr  */
3  > /*                                         May, 1985        */
4  > /*                                         */
5  > /* This Extended Command Interpreter provides Multiple Commands on */
6  > /* a single line, and minimal piping, as well as a history of the */
7  > /* last ten command lines executed since boot. Any of the history */
8  > /* commands may be executed via an internal ECI command given at */
9  > /* the command line. */
10 > /*                                         */
11 > /* This command interpreter will only work with TRSDOS 6.2, since */
12 > /* it supports the use of sysl3/sys. */
13 > /*                                         */
14 > /* For information on the Command Interpreter features and */
15 > /* limitations, please see documentation. */
16 > /*                                         */
17 > /* This Program utilizes the LC library, Copyright Jim Frimmel */
18 > /* ***** */
19 >
21 > /* ELSIE Standard I/O constants */
22 > #define EOF 0xFFFF
23 > #define eof 0xFFFF
24 > #define eol 13
25 > #define EOL 13
26 > #define FILE char
27 > #define NULL 0
28 > #define TRUE 1
29 > #define FALSE 0
30 > #define ON 0xFFFF
31 > #define OFF 0
32 >
33 > #option REDIRECT OFF /* Turn off LC i/o redirection */
34 > #option ARGS OFF /* There will be no arguments */
35 > #option INLIB /* We will need the library */
36 >
37 > /* ***** */
38 > /* Global Variables for ECI */
39 > /* ***** */
40 >
41 > #char hist_ptr, /* pointer to history table */
42 > cmd_ptr, /* pointer to command table */
43 > pipe_flg, /* Flag used in piping */
44 > num_of_cmds, /* number of cmds to do */
45 > eci_active, /* In memory ECI identifier */
46 > delimiter, /* a delimiter used in parse */
47 > showcmd, /* flag to show current cmd */
48 > cmd_line[80], /* user input command line */
49 > cmd_buf[80]; /* command table line buffer */
50 >
51 > #int index, /* an index into cmd line */
52 > initflag; /* flag for initial Version display */
53 >
54 > /* ***** */
55 > /* History and Command Table manipulation routines */
56 > /* ***** */
57 >
58 > /* Clearcommand */
59 > /* This routine clears the command table at init */
60 > /* (and in event of error). Note that for now, when */
61 > /* processing multiple commands, if an error occurs */
62 > /* the remaining commands will be executed. */
63 >
64 > #clearcommand()
65 > { int i,j;
66 > char *ptr;
67 > *num_of_cmds = '\0'; /* set number of cmds to zero */
68 > ptr = cmd_ptr; /* a local copy for us to use */
69 > for (i = 1; i <= 20; i++) /* there are 20 commands */
70 > {
71 > if (i != 1)
72 > ptr += 1;
73 > *ptr = '\0'; /* set 'used' flag to 'used' */
74 > for (j = 1; j <= 80; j++)
75 > {
76 > ptr += 1;
77 > *ptr = ' '; /* put a blank in table line */
78 > if (j == 60) /* 60 is arbitrary */
79 > *ptr = '\n'; /* make sure of a <cr> */
80 > }
81 > }
82 > }
83 >
84 > /* Clearhistory */
85 > /* This routine clears the history table */
86 > #clearhistory()
87 > {
88 > int i,j;
89 > char *ptr;
90 >
91 > ptr = hist_ptr; /* local copy for our use */
92 >
93 > for (i = 1; i <= 10; i++)
94 > {
95 > if (i != 1)
96 > ptr += 1;
97 > *ptr = '\0'; /* set flag to 'not valid' entry */

```

Listing continued

Listing continued

```
98 >     for (j = 1; j <= 80; j++)
99 >     {
100 >         ptr += 1;
101 >         *ptr = ' ';
102 >         if (j == 60) /* blank out the line element */
103 >             *ptr = '\n'; /* 60 is arbitrary */
104 >     } /* make sure of <cr> */
105 > }
106 > }
107 >
108 > /* AddCommand */
109 > /* This routine adds a command line to the */
110 > /* command table */
111 > addcommand(new)
112 > char *new; /* input is a pointer to a command line for table */
113 > {
114 >     int i;
115 >     char *cmdp;
116 >
117 >     *num_of_cmds += '\x01'; /* increment number of commands */
118 >
119 >     cmdp = cmd_ptr + ( (*num_of_cmds-1)*81); /* posn into cmd table */
120 >
121 >     *cmdp = '\x01'; /* set flag to show unused command */
122 >
123 >     for (i = 1; i <= 80; i++)
124 >         *(cmdp + i) = *(new + i - 1); /* copy new command to table */
125 > }
126 >
127 > /* AddHistory */
128 > /* This routine adds a command line to the */
129 > /* history table. Input is a pointer to the */
130 > /* command line to add. */
131 > addhistory(new)
132 > char *new; /* note : the expected line is 80 chars */
133 > {
134 >     int i,j;
135 >     char *hist;
136 >
137 >     /* First, bump the lowest nine commands up one line in */
138 >     /* the history table. */
139 >
140 >     for (i = 9; i >= 1; i--)
141 >     {
142 >         hist = hist_ptr + ( (i - 1) * 81); /* point at ith line */
143 >         for (j = 0; j <= 80; j++)
144 >             *(hist + j + 81) = *(hist + j); /* copy line up one */
145 >     }
146 >
147 >     /* now, just add the new line to bottom of table */
148 >
149 >     hist = hist_ptr; /* start of table */
150 >     *hist = '\x01'; /* set to valid */
151 >     for (i = 1; i <= 80; i++)
152 >         *(hist + i) = *(new + i - 1);
153 > }
154 >
155 > /* ***** */
156 > /* Extended Command Interpreter Initialization */
157 > /* ***** */
158 > /* Init */
159 > /* This routine makes sure that the ECI is installed */
160 > /* to execute all the time, and that upper memory is */
161 > /* properly initialized. Note that if the ECI is to */
162 > /* be used at all, it MUST be the FIRST thing to */
163 > /* alter the value of HIGH$. It expects the value */
164 > /* to be x'FFFF' in order to install. */
165 > /* Be Forewarned ! */
166 > init()
167 > {
168 >     char *regs[6]; /* register array for SVC calls */
169 > /* regs[0] = AF, regs[1] = BC, */
170 > /* regs[2] = DE, regs[3] = HL */
171 >     int retcod; /* function return code */
172 >     char *addr;
173 >
174 >     /* set the global pointers to point to the table addresses */
175 >
176 >     num_of_cmds = 0xF640;
177 >     pipe_flg = 0xF641;
178 >     cmd_ptr = 0xF642;
179 >     hist_ptr = 0xFC00;
180 >     eci_active = 0xFFFF;
181 >
182 >     /* Set showcmd flag to have ECI show commands being executed */
183 >
184 >     showcmd = 'Y';
185 >
186 >     /* Check HIGH$ */
187 >
188 >     regs[1] = 0;
189 >     regs[3] = 0;
190 >     retcod = call(100,regs); /* SVC # 100 returns HIGH$ in HL */
191 >     if (regs[3] == 0xFFFF)
192 >     { /* initialize ECI */
193 >         /* Set HIGH$ */
194 >         regs[1] = 0;
195 >         regs[3] = 0xF63B;
```

Listing continued on p. 108

Back Issues

January 1984: Tandy's Model 2000 and an MS-DOS overview; also, an Assembly language tutorial.

February 1984: The Creator—new and improved data base management, also, tabulate and analyze opinion polls.

March 1984: Hinrich's word processor, a III to 4 conversion program, and a Machine-language arcade game.

April 1984: CP/M digest, Model III/4 conversion program, pie and bar chart program, and new Scripsit characters.

May 1984: Telecommunications special, VisiCalc enhancements, Pascal, and a program that eases math anxiety.

June 1984: Tape to disk transfer program, award-winning graphics, and a business report analyzer.

July 1984: Guide to Disk Operating Systems, GW-Basic, and a Machine-language minimizer.

August 1984: Games issue, Model 4 ED-TASM, dBase II, Scripsit extras, and quality sales reports.

September 1984: Disk drive repair and maintenance and a guide to Editor/Assemblers.

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PRESENTS

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Can we talk? CP/M vs TRSDOS

By moving to CP/M on your Model 4 you achieve two things. First you open the door to a wealth of existing software. More 8-bit software runs under CP/M than any other operating system. This includes virtually all of the "big name" programs which have set the standards by which all others are measured. Programs like **WordStar**, **dBASE II**, and **Turbo Pascal** are available for CP/M, but not TRSDOS. Public domain software, almost unknown under TRSDOS, fills hundreds of megabytes of disk space. Valuable public domain programs like the **Small C Compiler** are just a toll-free phone call away. Most importantly, hundreds of applications programs are available from a multitude of vendors. Many include the source code. Wouldn't you like to be able to choose from scores of Accounts Receivable or General Ledger programs, instead of the meager selection you now have? Circle our special Reader Service number 600 on the Reader Service Card to receive our comprehensive free listing of suppliers of application programs that run under CP/M.

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Why use Montezuma CP/M?

We have already told you why our CP/M is the best for the Radio Shack Model 4 computer. The only question left to answer is "Why buy CP/M at all?" Radio Shack has abandoned TRSDOS — all of their new machines use MS-DOS. Most of the software producers have followed, leaving no new software development and saddling the TRSDOS user with whatever software "left-overs" he can find. Which DOS do you want to head into the future with: the one originally written for the Model I or the one that served as the basis for MS-DOS? Make the right choice right now for just \$169.

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We don't forget you after the sale. If you have a problem you will find our phones are answered by people, not answering machines or hold buttons. Our philosophy is very simple — we want you to be happy and satisfied with your purchase. If you have a problem then we have a problem, and we'll do whatever we can to resolve it.

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Can I use a hard disk drive?

CP/M hard disk drivers are available for Radio Shack, Aerocomp, and most other popular brands of hard disk drives. These drivers allow the hard drive to be partitioned into one to four logical drives of varying sizes.

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Size of Transient Program Area (TPA): 56,070 bytes in a 64k system. 55,046 bytes in a 63k system (with optional hard disk driver). **CP/M IOBYTE:** Fully implemented. **Device Drivers:** Disk (35, 40, 77, & 80 track, single/double density single/double sided, 3, 5, or 8 inch. (More than 85 disk formats supported) **Maximum Disk Capacity:** 40T SS=220k, 40T DS=440k, 80T DS=880k **RS-232:** All word lengths, parity, & baud rates. **Parallel Printer:** With or without line-feed and/or formfeed. **Video:** 24 by 80 with reverse video. **Keyboard:** Full ASCII with 9 function keys. **RAM Disk:** 64k, automatic on 128k systems. **Hard Disk:** Optional drivers available at extra cost for most popular models. Standard CP/M programs included: **ASM, DDT, DUMP, ED, LOAD, MOVCPM, PIP, STAT, SUBMIT, SYSGEN, and XSUB.**

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Scriptsit

by Eric Bagai

For word processing, many Model I/III/4 owners still swear by Scriptsit: it's almost transparent, nearly bug-free, and easy to use. Although the Scriptsit manuals are generally good, they aren't always as thorough as they should be. I'll elaborate on Scriptsit's useful Repeat command, reveal some hidden characters, and describe a few tricks that you won't find in the manuals.

To Repeat

► You can rapidly move the cursor to a specific screen location using the Repeat command, @-R on the Models I and III, clear-R on the Model 4. (In the command sequences below, "control" refers to the Scriptsit control key—the @ key in Model I/III Scriptsit, the clear key in Model 4 Scriptsit—not the key labeled "CTRL.") For example, to move the cursor to column 20, press control-R, type in 20, press the enter key, then press the right-arrow key.

The extra keystrokes are worthwhile if, for example, the screen width is set at more than 64 columns and you want to move the cursor exactly to column 102.

This rapid horizontal scroll spans lines, so if you want to find the 240th character to the right of the cursor, the command is control-R 240/enter/right arrow.

► The Repeat command allows vertical scrolling six times faster than normal: use control-R/enter/down arrow. You can also specify how many lines to move. For example, to find the 113th line of a document, place the cursor at the top and enter the command control-R 133/enter/down arrow. Use the Cursor Position command, break/?-C, to make sure the cursor is on line 113; this is also useful for determining where you are after a global find.

► Repeat also gives you an alternative to Scriptsit's command for inserting more than one character. Put the cursor where you want to begin inserting, press control-R/enter/control-S, and start typing the text. Interrupt this mode by pressing an arrow key, or the enter or clear key (shift-clear on the Model 4).

► To get continuous deletion, use control-R/enter/control-D. The words will crawl back into the cursor and into oblivion. Stop deletion by pressing clear (Models I and III) or shift-clear (Model 4).

Back in Command

► You can produce characters peculiar to

global command procedures on the command line. Pressing ! will give you the copy marker character (*). Control-Q produces the left bracket for block markers ([) and control-down arrow the right bracket (]). The ubiquitous line boundary marker (the square marker you get when you press enter) can be produced on the command line by entering control-X. This means you can globally replace, delete, find, or count the line-, paragraph-, copy-, and page-boundary markers.

► There's a way to expand the room inside a buffer. First, clear the blanks at the end of the file with control-D/control-F and press clear. Then press the break key and type in W.= 132 to reset the screen to maximum width. Scriptsit uses one extra character of memory for each screen line; with fewer screen lines you have a little more room for text.

► In Model I/III Scriptsit, the command @-T can get you in trouble if you hit it by accident. It may dump you into DOS, freeze the keyboard, play games with the screen, or produce an error message.

► Even if you don't have disk version 3.2 or higher, you can still use Scriptsit as a full-screen Basic editor by following a few simple precautions.

Limit program lines to 240 characters; exceeding that number in an ASCII-saved Basic program may rouse the dreaded "Direct statement in file" error message. Before saving your program, remove all

Scriptsit text markers and make sure a line marker appears after each program line.

As a precaution against losing the last sector of data when you load it into Basic, add three or more remark lines to the end of your program.

Shady Characters

► Model I/III owners can create 10 special characters, including right and left curly braces and square brackets, the backslash, the vertical bar, the tilde, and the underline. The Table shows how to produce the characters by pressing capital or lowercase Y and two numbers or letters simultaneously. ("Character Cache" by P. Gregory Springer discusses this in more detail; "Scriptsit Extras" by Richard W. Harrison and Louis S. VanSlyck lists Model III patches for the special characters. See Related Articles below.) The sequences produce garbage along with characters. To avoid having to remember each command and delete the surrounding garbage, create a file containing the special characters and mark each one with block markers. Chain the new file onto the one you're working with and insert the character blocks where you need them.

Brackets and braces turn Scriptsit into a full-screen C language editor; users of versions 3.2 and earlier should follow the procedures for editing Basic programs.

Remember that, although the new characters resemble text and boundary markers, they are simply ASCII characters. ■

Eric Bagai is a member of the Valley TRS-80 Hacker's Group and can be reached at P.O. Box 9747, North Hollywood, CA 91609.

Keys	Character
y13 yqs	{
y14 yqt	|
y15 yea	}
y16 yqv	~
y17 yqw	±
Y13 YQS	[
Y14 YQT	\
Y15 YQU]
Y16 YQV	^
Y17 YQW	—

Table. Special character codes.

System Requirements

**Models I, III, and 4/4P/4D
Cassette or Disk Scriptsit**

Related Articles

Allen, Dennis, "The (Single) Key to Scriptsit and TRSDOS Commands," June 1984, p.126. Creating an auto-load utility for the Model III.

Harrison, Richard W. and Louis S. VanSlyck, "Scriptsit Extras," August 1984, p. 68. Patching Model III Scriptsit to add 11 special characters.

Knight, Clifford, "Model 4 Scriptsit the Write Way," January 1985, p. 60. Reassigning Model 4 command keys.

Springer, P. Gregory, "Character Cache," April 1984, p. 188. Producing 10 special characters in Model I/III Scriptsit.



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Bring 'Em Back Alive

The next time you kill a file by mistake, don't get mad—get it back. Here's how.

Rats! That wasn't the file I meant to kill." Sound familiar? Fortunately, if you use Model 4 TRSDOS, accidentally deleting a file needn't be catastrophic. TRSDOS 6.x retains a removed file's directory record, making it possible to recover the file through some minor disk zapping. Of course, you have to take action before writing to the disk or you may overwrite the file.

You don't have to be an expert at modifying disk sectors to use the recovery technique. In fact, it's a good way to learn something about how TRSDOS 6.x manages files.

Learning the Territory

Saving a file requires a disk-zap program or TRSDOS's Debug utility. The box on page 62 provides step-by-step instructions for using Debug. I've written my own Model 4 Debug utility, Disk Zapper (see "Zap Master," April 1985, p. 62), so what you see on the screen may differ slightly from the information presented in Figs. 1 and 2. The byte positions will be the same, however.

Everything the DOS needs to know about a particular disk's files is located on the disk's directory track, cylinder 20 (14 hexadecimal [hex]).

Figures 1a-1c show three sectors from a typical system disk's directory cylinder (most disks contain 40 tracks of data, each consisting of 18 256-byte sectors). Each granule is made up of six sectors. Figure 1a shows the contents of sector zero, the granule allocation table (GAT). This tells which granules are in use. When you use the Remove command to delete a file, the GAT is updated to reflect the newly available space.

Figure 1b shows sector 1, the hash index table (HIT). This tells the DOS where to find a file's directory record (DIREC), which is stored elsewhere on cylinder 20. Each nonzero byte in the HIT is one file's

System Requirements

Models 4, 4P, and 4D
64K RAM
Two disk drives
TRSDOS 6.x

	Drive 1								Cylinder 20							Sector 0	
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	FF	FF	FB	FC	FF	FF	FF	F9	F8	FF	FF	FF	FF	FF	FF	FF	.....
1	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	.....
2	FF	FF	F9	F8	F8	F8	F8	F8	FF	FF	FF	FF	FF	FF	FF	FF	.....
3	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	.....
4	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	.....
5	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	.....
6	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	.....
7	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	.....
8	F8	F8	F8	F8	F8	F8	F8	F8	FF	FF	FF	FF	FF	FF	FF	FF	.....
9	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	.....
A	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	.....
B	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	.....
C	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	61	05	42	E0	42	.....
D	54	52	53	44	4F	53	36	31	30	39	2F	33	30	2F	38	34	TRSDOS61 09/30/84
E	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
F	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

(+)next sector, (-)previous sector, (M)odify, (I)ntput new sector number, (Q)uit

Figure 1a. Display format of a system disk's granule allocation table (sector zero).

	Drive 1								Cylinder 20							Sector 1	
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	A2	C4	2E	2F	2C	(2D)	2A	2B	00	00	00	00	00	00	00	00	.../,-*+
1	00	00	00	00	00	(01)	00	00	00	00	00	00	00	00	00	00	.....
2	28	29	26	27	27	(A7)	26	A6	FA	32	54	EA	F0	43	00	00	()&'! .&. .2T..C..
3	00	00	00	00	00	(01)	00	00	00	00	00	00	00	00	00	00	.....
4	3D	17	00	00	00	(00)	00	00	00	00	00	00	00	00	00	00	=.....
5	00	00	00	00	00	(01)	00	00	00	00	00	00	00	00	00	00	.....
6	F7	00	00	00	00	(00)	00	00	00	00	00	00	00	00	00	00	.....
7	00	00	00	00	00	(01)	00	00	00	00	00	00	00	00	00	00	.....
8	5C	00	00	00	00	(2B)	00	00	00	E1	49	00	00	00	00	00	\.....+.. ..I....
9	00	00	00	00	00	(01)	00	00	00	00	00	00	00	00	00	00	.....
A	75	C5	16	00	00	(00)	00	00	00	00	00	00	00	00	00	00	u.....
B	00	00	00	00	00	(01)	00	00	00	00	00	00	00	00	00	00	.....
C	65	00	F2	00	00	(00)	00	00	00	18	00	00	00	00	00	00	e.....
D	00	00	00	00	00	(01)	00	00	00	00	00	00	00	00	00	00	.....
E	48	00	00	00	00	(00)	00	00	00	00	00	00	00	00	00	00	H.....
F	00	00	00	00	00	(01)	00	00	00	00	00	00	00	00	00	00	.....

(+)next sector, (-)previous sector, (M)odify, (I)ntput new sector number, (Q)uit

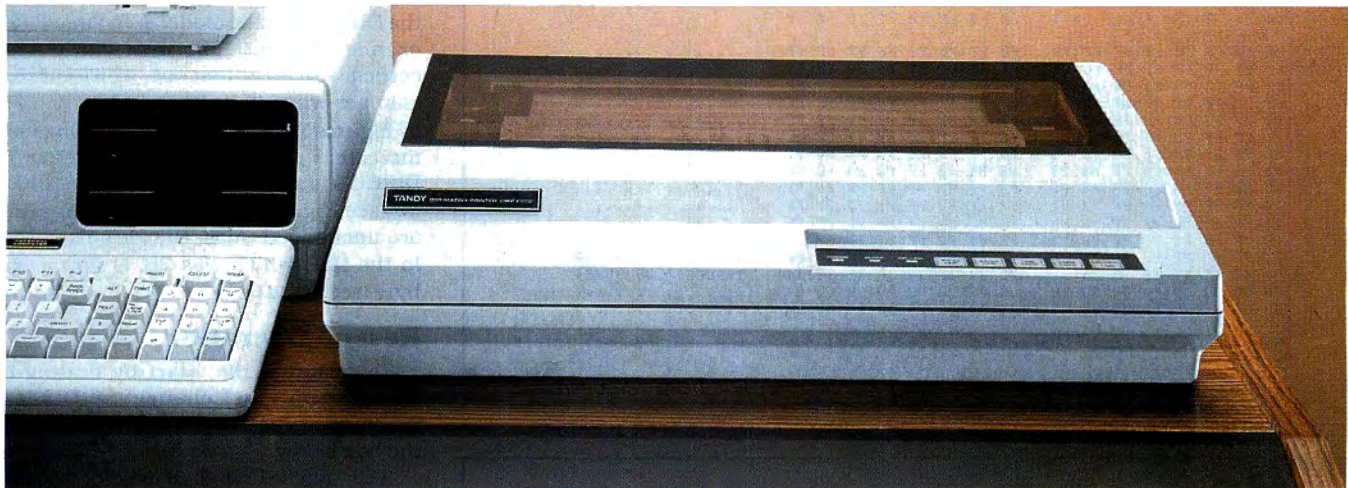
Figure 1b. Display format of a system disk's hash index table (sector 1).

	Drive 1								Cylinder 20							Sector 7	
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	5F	09	7B	9C	00	53	59	53	33	20	20	20	20	53	59	53	..{..SYS 3 SYS
1	F6	37	96	42	03	00	15	20	FF	FF	FF	FF	FF	FF	FF	FF	.7.B.....
2	5F	09	7B	13	00	53	59	53	31	31	20	20	20	53	59	53	..{..SYS 11 SYS
3	F6	37	96	42	05	00	13	00	FF	FF	FF	FF	FF	FF	FF	FF	.7.B.....
4	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
6	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
7	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
8	10	04	7B	2D	00	4D	41	49	4C	4C	49	53	54	20	20	20	..{-MAL LLIST
9	96	42	96	42	1E	00	01	04	FF	FF	FF	FF	FF	FF	FF	FF	.B.B.....
A	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
B	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
C	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
D	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
E	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
F	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

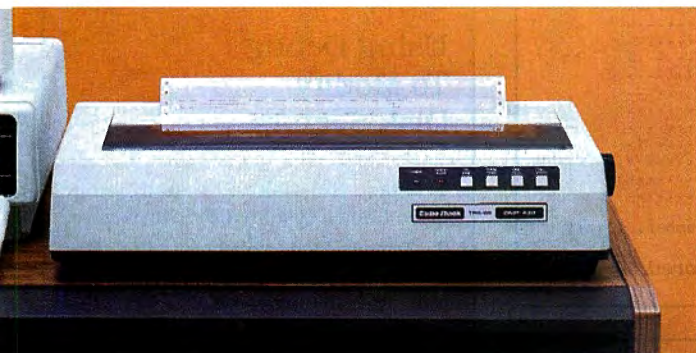
(+)next sector, (-)previous sector, (M)odify, (I)ntput new sector number, (Q)uit

Figure 1c. Display format of a system disk's directory record sector (sector 7).

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	Drive 1							Cylinder 20					Sector 0				
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	FF	F8	F8	FC	FF	FF	FF	F9	F8	FF	FF	FF	FF	FF	FF	FF
1	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	.....
2	FF	FF	F9	F8	F8	F8	F8	F8	FF	FF	FF	FF	FF	FF	FF	FF	.....
3	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	.....
4	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	.....
5	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	.....
6	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	.....
7	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	F8	.....
8	F8	F8	F8	F8	F8	F8	F8	F8	FF	FF	FF	FF	FF	FF	FF	FF	.....
9	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	.....
A	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	.....
B	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	.....
C	FF	FF	FF	FF	FF	FF	FF	FF	FF	FF	61	05	42	E0	42	.....
D	54	52	53	44	4F	53	36	31	30	39	2F	33	30	2F	38	34	.....
E	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
F	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

(+)next sector, (-)previous sector, (M)odify, (I)nput new sector number, (Q)uit

Figure 2a. Granule allocation table after Maillist has been removed.

	Drive 1							Cylinder 20					Sector 1				
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	A2	C4	2E	2F	2C	2D	2A	2B	00	00	00	00	00	00	00	00	.../,-**
1	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
2	28	29	26	27	27	A7	26	A6	FA	32	54	EA	F0	43	00	00	()&'!'.&. .2T..C..
3	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
4	3D	17	00	00	00	00	00	00	00	00	00	00	00	00	00	00	=.....
5	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
6	F7	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
7	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
8	5C	00	00	00	00	00	00	00	00	00	E1	49	00	00	00	00	\.....
9	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
A	75	C5	16	00	00	00	00	00	00	00	00	00	00	00	00	00	u.....
B	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
C	65	00	F2	00	00	00	00	00	00	00	18	00	00	00	00	00	e.....
D	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
E	48	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	H.....
F	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

(+)next sector, (-)previous sector, (M)odify, (I)nput new sector number, (Q)uit

Figure 2b. Hash index table after Maillist has been removed.

	Drive 1							Cylinder 20					Sector 7				
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	5F	09	7B	9C	00	53	59	53	33	20	20	20	20	53	59	53	..{..SYS 3 SYS
1	F6	37	96	42	03	00	15	20	FF	FF	FF	FF	FF	FF	FF	FF	.7.B...
2	5F	09	7B	13	00	53	59	53	31	31	20	20	20	53	59	53	..{..SYS 11 SYS
3	F6	37	96	42	05	00	13	00	FF	FF	FF	FF	FF	FF	FF	FF	.7.B...
4	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
5	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
6	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
7	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
8	00	0C	7B	2D	00	4D	41	49	4C	4C	49	53	54	20	20	20	..(-.MAI LLIST
9	96	42	96	42	1E	00	01	04	FF	FF	FF	FF	FF	FF	FF	FF	.B.B...
A	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
B	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
C	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
D	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
E	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
F	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....

(+)next sector, (-)previous sector, (M)odify, (I)nput new sector number, (Q)uit

Figure 2c. Directory record sector after Maillist has been removed.

hash code. The hash code is a shortened representation of the file's name.

The hash code's position indicates where you can find that file's DIREC. The first column (zero) lists DIRECs on sector 2 (since sectors zero and 1 contain the GAT and HIT, not DIRECs); the second column lists those on sector 3, and so on. (The system on the Model 4D is different—odd-numbered rows contain DIREC positions for sectors 17-32.) The hash code bytes' order in the column indicates the corre-

sponding DIRECs' positions in the DIREC sector. The circled bytes in Fig. 1b correspond to DIRECs located in sector 7.

Notice that some codes appear twice. This duplication, called a collision, occurs when two file names hash to the same code. When this happens, the DOS checks each DIREC with that code until it finds the correct file name.

Figure 1c shows sector 7, which contains 32-byte DIRECs for three files: SYS3/SYS, SYS11/SYS, and Maillist. Note that

Maillist's DIREC is in the fifth position on sector 7 (since each DIREC takes up two rows). For a byte-by-byte breakdown of the DIREC, see the *Model 4 Technical Reference Manual*. The byte you're concerned with is the first one, which the DOS changes when you remove a file.

Figures 2a-2c show the same three sectors after I removed Maillist. Note that its DIREC's first byte has changed from 10 to 00 (see Fig. 2c) but the remaining bytes are unchanged. Also, the file's hash code in the HIT, which was 2B, is now a zero byte (see Fig. 2b).

Rescue Operation

To restore a file, start by finding its DIREC. You must change the DIREC's first byte, using the technique outlined in the box below.

The byte's first digit will be an even number. Change it to the next highest odd number: If it's zero, change it to 1; if it's 4, change it to 5. Don't make any changes to the second digit.

Using Debug To Modify Disk Sectors

1. Place the disk to be modified in drive 1 and a system disk in drive zero.
2. Type in Debug and press the enter key. Then press the break key. You may have to press break more than once.
3. When Debug loads, type in 1,14,0,R,5000,18 and press enter. This loads the contents of 18 sectors starting with sector zero of cylinder 14 hex, drive 1, into memory starting at location 5000 hex. (Model 4D owners must type in 1,14,0,R,5000,36.)
4. The screen will display the first sector, sector zero. You can view the other sectors by pressing the plus sign to move forward; press the minus sign to move backward.
5. To make a modification, type in Hxxxx, where xxxx is the hex address of the byte you want to change, and press the space bar. Vertical bars appear to the right and left of the selected byte.
6. Type in dd, where dd is the byte's new value, and press the space bar. The vertical bars will move to the next byte. Repeat until you've made all your changes; then press enter.
7. To write modified sectors to disk, type in 1,14,0,*5000,18 and press the enter key. (On the Model 4D, use 36 instead of 18.)
8. To return to DOS, type O and press the enter key. ■

In Maillist's case, the first digit is zero (see Fig. 2c), so I changed it to 1.

The file will have multiple DIRECs if you've used the same file name before. That means you'll have to examine the file sectors themselves to determine which version is the latest one. The DIREC tells you where to look; see the box on this page for specifics.

Once you've succeeded in locating the DIREC, you can find the file's hash code. Move back to the HIT on sector 1 and find the corresponding hash code. Maillist's DIREC is in sector 7's fifth position; since every odd row is reserved for directory entries for double-sided disks, Maillist's hash code is positioned six columns over and nine rows down.

Now you must restore the file name's hash code. There's only one problem: Once a file is gone, you have no way of knowing what its hash code was, since users don't have access to the hashing formula.

You have two alternatives. One is to create a file with the same name on another disk and check its hash code. Another is to substitute a file name whose hash code you already know. The latter alternative requires that you change the file's name in the DIREC. Note that the DIREC allocates 8 bytes for the name and 3 bytes for the extension. The slash doesn't appear.

Blanks are filled with spaces (ASCII 20).

Once you have the hash code, write it to the proper location in the HIT sector.

This leaves the GAT sector. You could attempt to repair the GAT, but it's a tedious and unreliable process. Since you don't have to repair the GAT to read the file, copy the file to another disk, remove it from the first disk, then copy it back. If you used a dummy name in order to reconstruct the HIT, you can rename the file at the same time.

The DOS may or may not place the file back in the same disk sectors; it depends on the location of unused granules. Usually, the DIREC will be in a different position in the directory cylinder. ■

You can write to David A. Williams at 2452 Chase Circle, Clearwater, FL 33546. Please enclose a self-addressed, stamped envelope for a reply.

Related Articles

Williams, David A., "Zap Master," April 1985, p. 62. A refined Model 4 Debug.

Payne, Douglas, "That Sinking Feeling," March 1985, p. 38. An explanation of Model III/4 disk error messages.

Locating File Sectors

The DIREC's 23rd through 30th bytes indicate a file's extent fields—the areas on the disk where the file's contents are stored. The underlined bytes in Fig. 1c are Maillist's extent fields. Maillist has only one extent, which means it is stored in one contiguous area on the disk. Each DIREC can contain up to four extent fields.

An extent field's first byte is the cylinder number in hex. The second byte's first digit contains the starting sector number, but you have to decode it. To do so, divide the digit by 2 and multiply the result by 6. Use only the integer that results from dividing by 2, and ignore any values to the right of the decimal point. For example, if the digit is zero or 1, the sector is zero; if it's 2 or 3, the sector is 6; if it's 4 or 5, the sector is 12. Using this formula, you can determine that Maillist begins on cylinder 1 hex, sector zero. ■

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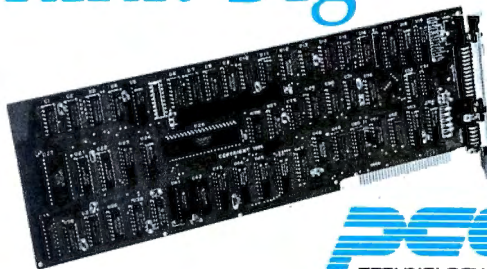
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Montezuma's collection of public domain software is made up of programs from the very simple to the very complex that we have found eligible for inclusion in our library. Both CP/M and MS-DOS libraries are offered. The libraries consist of hundreds of disks filled with thousands of programs. These libraries have been compiled from many sources and have been reviewed for the most part by our crack team at our plush offices deep in the heart of our luxurious headquarters. We have removed a lot of programs that exist in other public domain libraries for the sole purpose of increasing the number of disks that are available. For example, our team decided not to include the numerous early versions of modem programs that took up enormous amounts of disk space yet were of no particular value as long as the latest version is available. There are a lot of programs duplicated in the various CP/M and MS-DOS collections and we have pruned our library in an attempt to eliminate duplications and multiple versions of the same program. This was done in an attempt to provide selections based on quality rather than quantity.

THE CP/M LIBRARY

In the beginning there was only one operating system and it was CP/M. Also in the beginning there were only eight inch single density floppy disk drives that had 75 data tracks each with 26 sectors containing 128 bytes of data for a total capacity of 243K. Then somebody figured out that you could stuff more data in the same space using double density and both sides of the diskette. As if the situation wasn't confusing enough, five and one-quarter inch drives were introduced and they slowly choked out their bigger brothers. That was great because the new drives took a lot less space and had lower and simpler power requirements. However, there was a catch. As each manufacturer introduced the new drives to their equipment, they also introduced their own disk format. On one hand it was kind of stupid because it made the interchange of data between different manufacturer's drives almost impossible. On the other hand it allowed people like us to make a little money because we figured out how the disks were constructed and then wrote software to exchange data between the different formats. Still one problem

remains. Five and one-quarter inch diskettes don't hold as much as the eight inch diskettes. This makes it necessary to split some disks up into volumes. You will find some disks with 180K of data on volume 1 and 60K on volume 2. You have to get two disks but they aren't full. Somehow seems as though you are getting cheated, doesn't it? So much for being fair.

Now to the point of all this. Our CP/M library consists of hundreds of disks in the Montezuma Micro Single Side 40tk 220K Super Data Format. You must have Montezuma Micro CP/M 2.2 version 2.30 or later in order to read this high capacity disk format. Those of you who already own Montezuma Micro CP/M can obtain the latest version by following the instructions listed in your owners manual. For those who want a copy of the public domain software on a non-standard format please specify the format and add the appropriate handling charge. See the details on the order blank located on the inside back cover.

A catalog disk is available for those of you who wish more detail about the specific contents of each CP/M library disk than is offered in our listing. The catalog disk, number C000, has a complete listing of the contents of each of the CP/M library disks along with the size of each file. Some of the CP/M library disks have the notation LBR (library) or SQ (squeeze) at the end of their descriptions. Disks with these notations require the LU/NULU program or the USQ/NSWEEP programs in order for the files to be read. Many disks contain a .DOC or a README file describing the programs or operation of the programs contained on the disk. Most BASIC programs that require the use of Microsoft BASIC (MBASIC) are usually indicated by a filename ending in .BAS however there are many versions of BASIC, such as CBASIC, and programs running under a different version of BASIC are usually, but not always, marked to inform you of this requirement. If you need MBASIC, and you already own TRSDOS, you can use Monte's BASCON.

TRANSFERRING FILES

A word about moving files between CP/M, TRSDOS 1.3/6.x and MS-DOS 1.0 and later. Montezuma's DBLCROSS software included in Monte's Toolkit enables you to freely move files from any one of these formats to any other. You can strip control codes, add or remove linefeeds or do whatever is appropriate to the job at hand with simple menu options. This can be real handy when you want to convert all your Scriptit® files to either CP/M or MS-DOS format so you can use them on another word-processor without retyping them. It also works the other way enabling you to do whatever you want. The same holds true for many data files particularly between CP/M and MS-DOS. While we have taken most of the mystery and almost all of the pain out of moving files between CP/M - TRSDOS and MS-DOS one little fact remains. YOU CANNOT RUN 8-BIT PROGRAMS ON 16-BIT MACHINES. The same is true in reverse. Programs written to run under CP/M will not work on the IBM PC without special equipment on the IBM. Forget about TRSDOS. Don't confuse running PROGRAMS with moving DATA files. The data can be moved and accessed by a 16-bit version of a similar program. For example you can move your CP/M Wordstar files to MS-DOS and access them using IBM Wordstar with no problem. The same is true for most database data. Just remember the data will transfer but the program will not.

THE MS-DOS LIBRARY

The MS-DOS library consists of many hundreds of disks in double-side 360K format. MS-DOS started out life as version 1.0 with a disk capacity of 320K. Thank goodness someone came to their senses and released version 2.0 which has a 360K capacity. You must have MS-DOS 2.0 or later in order to read this MS-DOS library disk format.

A catalog disk is available for those of you who wish more detail than offered in our listing about the specific contents of each disk. The catalog disk, number M000, has a complete listing of the contents of each of the MS-DOS library disks along with a description of each file.

USING THE SOFTWARE

Follow the instructions in your DOS for listing the contents of the .DOC, READ.ME, etc. files on your screen or printer. For example, to list the contents of the file GOODTIME.DOC type this example from your keyboard. TYPE GOODTIME.DOC and press the return/enter key. If you would like to print the file on your printer, press the Control key and the P key just before you press the return/enter key. The file will list on the screen as well as on your printer.

IN CASE OF TROUBLE

We guarantee the disk we send you to be machine readable. In the event something strange happens and your disk is imperfect please call us and we will remedy the problem straight-away. Please keep in mind that we do not guarantee the software contained on the disk to do anything in particular. We did not write the software and are only distributing it to you. Many times the original author will have his name on the disk and some of these persons do not mind talking to users of their work if you can track them down. We are unable to provide assistance of any kind in locating these people. On the other hand, some of them are quite vocal about not wishing to speak with anyone. In those cases user groups or online databases such as CompuServe or the Source may be able to provide assistance. If you find disk number XXX is a big disappointment to you, please do not ask for a refund or an exchange for another disk as neither is possible. All sales are final and we cannot assume any liability for damage of any kind, direct or consequential arising from the use of disks supplied.

We have made every reasonable effort to ensure these libraries contain only public domain software. In the event your copyrighted software is suspected of being a part of our library please write us with full particulars and we will investigate the matter and remove the software from the library if such action is warranted.

"FREE" FREE SOFTWARE

We always welcome new additions to the CP/M and MS-DOS public domain libraries. We even pay for them, in kind. If you want to place one of your original programs in the public domain just send it to us and enclose a note authorizing its release. We will review it and if it is accepted we will send you a disk of your choice from the same library. Your program should be commented and include the source as well as a .DOC or READ.ME file explaining its operation and purpose.

HOW TO ORDER

Look over the listings of the CP/M and MS-DOS libraries and make your selections. There are two ways to order. Use the handy order blank on the back cover (please make as many copies as you wish) or call us toll-free. We accept American Express, MasterCard and Visa credit cards. We welcome Cashier's Checks, Money Orders and we will ship COD. COD's require cash or a Cashier's Check on delivery. We welcome your personal or company check and we will ship immediately as long as it is bank imprinted, contains your street address (sorry but no PO Boxes or APO/FPO addresses), a telephone number where you can be reached, and your signature exactly agrees with the bank imprint. Otherwise your check will be held three weeks for clearance purposes. **All sales are made with the understanding that the disks are not returnable or refundable. If you cannot agree to this policy please do not buy from us. We will replace any defective item as long as we are informed by any means within thirty days after receipt of the disk.** We ship by US Mail, UPS ground, second day air, next day air, Federal Express (billed to customer's account only) or most any way you want. We do not ship COD's via air.

800-527-0347 USA**ORDER NOW...TOLL-FREE****800-442-1310** TEXAS**CP/M® PUBLIC DOMAIN LIBRARY****Montezuma Micro SS 220K Super Data Format**Requires Montezuma Micro CP/M
version 2.30 or later

- C001 The original ADVENTURE game. Vol. 1 of 2 Database files
- C002 The original ADVENTURE game. Vol. 2 of 2 FORTRAN source
- C003 Overflow from disk #C002
- C004 Utilities: Print allocation map; Sorted DIR; Bad block lockout
- C005 Overflow from disk #C004
- C006 6502 Simulator system from Dr. Dobbs October 1980
- C007 Overflow from disk #C006
- C008 Public domain version of the UCSD Pascal interpreter system
- C009 Overflow from disk #C008
- C010 Utilities: Sorted DIR; File search; Vol. sector display/update
- C011 Overflow from disk #C010
- C012 Assorted BASIC games, may need modification; RESOURCE disassembler
- C013 Overflow from disk #C012
- C014 An expanded version of the original ADVENTURE game — Data & subroutines
- C015 Overflow from disk #C014
- C016 Utilities: File encode/decode; Memory test; Sort variable length records
- C017 Overflow from disk #C016
- C018 The Yale catalog of bright stars: Vol. 1 of 8
- C019 Overflow from disk #C018
- C020 The Yale catalog of bright stars: Vol. 2 of 8
- C021 Overflow from disk #C020
- C022 The Yale catalog of bright stars: Vol. 3 of 8
- C023 Overflow from disk #C022
- C024 The Yale catalog of bright stars: Vol. 4 of 8
- C025 Overflow from disk #C024
- C026 The Yale catalog of bright stars: Vol. 5 of 8
- C027 The Yale catalog of bright stars: Vol. 6 of 8
- C028 Overflow from disk #C027
- C029 The Yale catalog of bright stars: Vol. 7 of 8
- C030 Overflow from disk #C029
- C031 The Yale catalog of bright stars: Vol. 8 of 8
- C032 Overflow from disk #C031
- C033 Extensive language analyzer in PL/I with doc & examples
- C034 Overflow from disk #C033
- C035 Original PDP-11 code for DUNGEON Vol. 1 of 3
- C036 Overflow from disk #C035
- C037 Original PDP-11 code for DUNGEON Vol. 2 of 3
- C038 Overflow from disk #C037
- C039 Original PDP-11 code for DUNGEON Vol. 3 of 3
- C040 Overflow from disk #C039
- C041 Accounts receivable/payable in PL/I and ASM; Database in PL/I
- C042 Volume cataloging system
- C043 Overflow from disk #C042
- C044 SAM76: An interactive text manipulation language
- C045 Utilities: File transfer; USER / assist; Remote Bulletin Board System
- C046 Overflow from disk #C045
- C047 DIMS: Dan's Information Management System database in BASIC
- C048 MODEM V7.6, BYE V7.8: Modem programs with source
- C049 Overflow from disk #C048
- C050 RESOURCE disassembler V7.3; Small FORTH; FINDBAD volume flaw utility
- C051 Overflow from disk #C050
- C052 Full screen editor in C — originally developed for H19
- C053 Overflow from disk #C052
- C054 ZCPR V1.6: A Z80 replacement for the CP/M CCP (SQ)
- C055 Overflow from disk #C054
- C056 Benchmarks in C, Fortran, BASIC; Shell sort; CBASIC2 game
- C057 Overflow from disk #C056
- C058 A complete database system in PL/I-80
- C059 Overflow from disk #C058
- C060 In Context Editor in PL/I-80; Typing Tutor in BASIC (both for ADM-31)
- C061 Overflow from disk #C060
- C062 Remote Bulletin Board System in BASIC and ASM
- C063 Overflow from disk #C062
- C064 The FED: CBASIC2 program used by Fed Reserve to test money supply policy
- C065 Overflow from disk #C064
- C066 SYSLIB: A library of over 130 M80 ASM subroutines Vol. 1 of 3
- C067 Overflow from disk #C066
- C068 SYSLIB: A library of over 130 M80 ASM subroutines Vol. 2 of 3
- C069 Overflow from disk #C068
- C070 SYSLIB: A library of over 130 M80 ASM subroutines Vol. 3 of 3
- C071 Overflow from disk #C070
- C072 Disassembler for Z80; Translate Intel 8080 code to Zilog Z80
- C073 Overflow from disk #C072
- C074 68000 cross assembler; Tiny ADA compiler written for Polymorphic system
- C075 MODEM V7.98: Modem communications program with source
- C076 Overflow from disk #C075
- C077 ZCPR2: Improved CP/M command processor Vol. 1 of 10
- C078 Overflow from disk #C077
- C079 ZCPR2: Improved CP/M command processor Vol. 2 of 10
- C080 Overflow from disk #C079
- C081 ZCPR2: Improved CP/M command processor Vol. 3 of 10
- C082 Overflow from disk #C081
- C083 ZCPR2: Improved CP/M command processor Vol. 4 of 10
- C084 Overflow from disk #C083
- C085 ZCPR2: Improved CP/M command processor Vol. 5 of 10
- C086 Overflow from disk #C085
- C087 ZCPR2: Improved CP/M command processor Vol. 6 of 10
- C088 Overflow from disk #C087
- C089 ZCPR2: Improved CP/M command processor Vol. 7 of 10
- C090 Overflow from disk #C089
- C091 ZCPR2: Improved CP/M command processor Vol. 8 of 10
- C092 Overflow from disk #C091
- C093 ZCPR2: Improved CP/M command processor Vol. 9 of 10
- C094 ZCPR2: Improved CP/M command processor Vol. 10 of 10
- C095 ZCPR2 Update disk
- C096 Overflow from disk #C095
- C097 Simple word processor program in ASM with doc & source
- C098 Overflow from disk #C097
- C099 A demonstration system for dBASE II
- C100 Hard vol. backup programs (may be hardware-specific)
- C101 Remote Bulletin Board System in BASIC (SQ)
- C102 Overflow from disk #C101
- C103 KERMIT: Modem communications for CP/M to mainframe, source in C
- C104 Overflow from disk #C103
- C105 PISTOL: Portably Implemented Stack Oriented Language similar to FORTH
- C106 Overflow from disk #C105
- C107 XLISP: An Experimental LISP compiler in ASM & C
- C108 Overflow from disk #C107
- C109 LU, LDIR, LRUN: Library filing and utility system for LBR files
- C110 Overflow from disk #C109
- C111 ZCPR2 Upgrades Vol. 1 of 2
- C112 Overflow from disk #C111
- C113 ZCPR2 Upgrades Vol. 2 of 2
- C114 Overflow from disk #C113
- C115 ROFF4 V1.50: A text formatting package in C
- C116 Overflow from disk #C115
- C117 Utilities: Communications program with XMODEM protocol; DIR sort & pack
- C118 Overflow from disk #C117
- C119 Mini Bulletin Board System in BASIC (SQ) from Australia
- C120 Overflow from disk #C119
- C121 A complete order and inventory system in dBASE II (LBR)
- C122 Overflow from disk #C121
- C123 SIGNON: A system of programs for running an RCP/M bulletin board
- C124 Overflow from disk #C123
- C125 Software Tools of Australia Vol. 17 - Programs in C, BAS, ASM
- C126 Overflow from disk #C125
- C127 California Energy Commission Building Energy Design Analysis Vol. 1 of 2
- C128 Overflow from disk #C127
- C129 California Energy Commission Building Energy Design Analysis Vol. 2 of 2
- C130 Overflow from disk #C129
- C131 68000 Cross Assembler from Dr. Dobbs Journal 6800 Cross Assembler
- C132 Overflow from disk #C131
- C133 BASIC games extracted from Software Tools of Australia
- C134 Overflow from disk #C133
- C135 Depreciation in BASIC; WordStar indexing program in Pascal
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- C137 Graphing ASM subroutines for MX80; Intel to Zilog source translator
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- C139 Utilities: Text display; Super DIR; VFILER - Screen-oriented file util.
- C140 Overflow from disk #C139
- C141 CITADEL: A complete bulletin board system in C
- C142 Overflow from disk #C141
- C143 FORTH-83: Editor, assembler, & documentation
- C144 Overflow from disk #C143
- C145 Atlanta Database User Group: Member records & banking systems
- C146 Overflow from disk #C145
- C147 Utilities: Extended ERAse; Cross ref from .PRN files (LBR)
- C148 Overflow from disk #C147
- C149 Compilers: Concurrent Pascal-S; PL/0 — written in Pascal (not Turbo)
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- C151 CBASIC Users Group: Assorted programs in CBASIC
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- C153 Regular Expression Compiler (REC) in ASM Vol. 1 of 4
- C154 Overflow from disk #C153
- C155 Regular Expression Compiler (REC) in ASM Vol. 2 of 4
- C156 Overflow from disk #C155
- C157 Regular Expression Compiler (REC) in ASM Vol. 3 of 4
- C158 Overflow from disk #C157
- C159 Regular Expression Compiler (REC) in ASM Vol. 4 of 4
- C160 Overflow from disk #C159
- C161 8080 to 8086 conversion utilities
- C162 Overflow from disk #C161
- C163 A/R template for SuperCalc; Bulk ERAse of .BAK, .HEX, etc.
- C164 Overflow from disk #C163
- C165 Programs for BDS C: Functions in ASM; Bulletin Board; CRT I/O (LBR)
- C166 Overflow from disk #C165
- C167 C programs: File archiver; Brace matcher; Calls for Aztec C; More (LBR)
- C168 Overflow from disk #C167
- C169 Utilities: Forth to CP/M screen - file xter; Synonyms for COM files (LBR)
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- C171 ZCPR3: Z80 replacement for CP/M command processor Vol. 1 of 9
- C172 Overflow from disk #C171
- C173 ZCPR3: Z80 repl. for CP/M command processor Vol. 2 of 9
- C174 Overflow from disk #C173
- C175 ZCPR3: Z80 repl. for CP/M command processor Vol. 3 of 9
- C176 Overflow from disk #C175
- C177 ZCPR3: Z80 repl. for CP/M command processor Vol. 4 of 9
- C178 Overflow from disk #C177
- C179 ZCPR3: Z80 repl. for CP/M command processor Vol. 5 of 9
- C180 Overflow from disk #C179
- C181 ZCPR3: Z80 repl. for CP/M command processor Vol. 6 of 9
- C182 Overflow from disk #C181
- C183 ZCPR3: Z80 repl. for CP/M command processor Vol. 7 of 9
- C184 Overflow from disk #C183
- C185 ZCPR3: Z80 repl. for CP/M command processor Vol. 8 of 9
- C186 Overflow from disk #C185
- C187 ZCPR3: Z80 repl. for CP/M command processor Vol. 9 of 9
- C188 Utilities: Paged file list; MX80; Passwords; Z80 debugger (LBR)
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- C190 Dot-matrix printer plotting package for C. Itoh, Epson, Okidata
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- C192 Fluff minimax algorithm Dr. Dobbs 7/84; Simplex algorithm Byte 5/84 (LBR)
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- C194 Utilities: LBR extract; SUBMIT replacement; Super DIR; DDT improved
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- C196 Utilities: FIND files; Squeeze/unsqueeze (SQ)
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- C198 A complete property management package using dBASE II Volume 1 of 2
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- C202 Utilities for ZCPR3: DIR sort/pack; Vol. zap; File utility; More (SQ)
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- C204 Source code for ZCPR3 utilities (SQ)
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- C210 Forth 83 system with example, documentation, & utilities
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- C212 Utilities: Columnar listings; Sort files; TYPE command improved (LBR)
- C213 Overflow from disk #C212
- C214 Utilities: ERAse improved; NSWPF file handler; improved TYPE (LBR)
- C215 Overflow from disk #C214
- C216 Regular Expression Compiler with floating point (LBR)
- C217 Overflow from disk #C216
- C218 Regular Expression Compiler without floating point (LBR)
- C219 Overflow from disk #C218
- C220 MEX V1.12 modem communications program (SQ)
- C221 Overflow from disk #C220
- C222 Assorted overlays for use in constructing MEX system (SQ)
- C223 Overflow from disk #C222
- C224 Assorted overlays for use in constructing MEX system (SQ)
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- C237 Overflow from disk #C236
- C238 Databases: Article retrieval; Ref books; Ref material (LBR)
- C239 Overflow from disk #C238
- C240 Kermit communications V3.9; Updated 8080 to Z80 source translator
- C241 Overflow from disk #C240
- C242 Utilities: C cross ref; Super DIR V7.7; Print utility in C (LBR)
- C243 Overflow from disk #C242
- C244 Pilot system in Pascal/Z; Deductive reasoning helps (LBR)
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- C246** Full screen Z80 debugger. Lots of features, documentation (SQ)
 C247 Overflow from disk #C246
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 C249 Overflow from disk #C248
 C250 Z80 small Prolog with doc; Z80 screen file manager (LBR)
 C251 Package of statistical software: Utilities, game, etc.
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 C256 Overflow from disk #C255
 C257 CNVRT Runtime library, compiler, and help files
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 C260 A complete General Ledger system in BASIC
 C261 PILOT language interpreter with ASM source & examples
 C262 Assorted games in Microsoft BASIC and BASIC-E, forerunner of CBASIC
 C263 Z80 assemblers, with source; Simple editor
 C264 Overflow from disk #C263
 C265 Assorted BASIC games: Biorhythm; Chess; Maze; StarTrek; More
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 C267 CP/M STOIC: A threaded interpretive language like Forth
 C268 Overflow from disk #C267
 C269 Games in BASIC: Baseball; Civil war; Craps; Swarms; Etc.
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 C271 More BASIC games: Drag race; Football; Hangman; Mastermind; More
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 C273 Simple database system; ALGOLM compiler, a subset of the ALGOL language
 C274 Search & Rescue programs in BASIC
 C275 Educational programs in CBASIC
 C276 Overflow from disk #C275
 C277 Utilities: Quick SUBMIT; Vol. catalog; File compare; Checksum
 C278 Overflow from disk #C277
 C279 Assorted programs for Ham radio in BASIC
 C280 Overflow from disk #C279
 C281 The Osborne Accounts Receivable & Accounts Payable systems in BASIC
 C282 Overflow from disk #C281
 C283 The Osborne General Ledger system in BASIC
 C284 The Osborne Payroll system in BASIC
 C285 Overflow from disk #C284
 C286 A complete adventure game in BDS C
 C287 Overflow from disk #C286
 C288 Another collection of games in BASIC
 C289 Overflow from disk #C288
 C290 Math package for Microsoft muMATH
 C291 Overflow from disk #C290
 C292 BusinessMaster II accounting package - Vol. 1 of 5 - Documentation
 C293 Overflow from disk #C292
 C294 BusinessMaster II accounting package - Vol. 2 of 5 - Initial, Startup
 C295 Overflow from disk #C294
 C296 BusinessMaster II accounting package - Vol. 3 of 5 - Sample files, Payroll
 C297 Overflow from disk #C296
 C298 BusinessMaster II accounting package - Vol. 4 of 5 - PO/AP, Order entry/AR
 C299 BusinessMaster II accounting package - Vol. 5 of 5 - General ledger
 C300 Utilities: Volume catalog & cross reference; ERAse/UNERASE; Vol. ZAP (SQ)
 C301 Overflow from disk #C300
 C302 More than 50 games in Microsoft BASIC
 C303 Overflow from disk #C302
 C304 Financial planning in CBASIC; AP & AR in CBASIC; Many BASIC games
 C305 Overflow from disk #C304
 C306 Original ADVENTURE and other games in BASIC (SQ)
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 C308 Cross assemblers for the 6800 and 1802
 C309 Utilities: File archive; Bad sector lockout; Help system; More
 C310 Overflow from disk #C309
 C311 Functions for BDS C: Floating point; Console I/O; Redirected I/O
 C312 Assorted programs, functions for BDS C
 C313 BDS C programs: Higher math functions; File directory; Floating point
 C314 BDS C programs: DIR, Program list; File compression; Word Count program
 C315 Overflow from disk #C314
 C316 BDS C programs: File concatenation; File compare; Text processor
 C317 Overflow from disk #C316
 C318 BDS C programs: Benchmark; Curly brace matcher; Modem program
 C319 Overflow from disk #C318
 C320 BDS C programs: File squeeze/unsqueeze; TYPE for squeezed files
 C321 Overflow from disk #C320
 C322 Software Tools in RATFOR: Complete package in FORTRAN
 C323 BDS C programs: File conversion; Text formatter; Software tools
 C324 A large collection of games in BDS C
 C325 Overflow from disk #C324
 C326 Utilities: Bad sector lockout; Sorted DIR; Z80 disassembler (LBR)
 C327 Utilities: Catalog; Simple vol. ZAP; Editor; File printer; BASIC cross reference
 C328 Games in BASIC: Wizard's Castle; Eliza; Lost Gold; Zodiac (SQ)
 C329 Games in Z80 code, written for Kaypro; Z80 Chess
 C330 Printer art: Assorted pictures to print on your printer (SQ)
 C331 Games and programs in BASIC -- a mixed bag
 C332 BASIC games: DC10; Fireman; Kolossus; Rental property program
 C333 Utilities: Fast SUBMIT; File FIND; File FIX; Password
 C334 MYSTERY -- a large ADVENTURE type game (LBR)
 C335 Utilities: A collection for creation/maintenance of libraries (LBR)
 C336 ALGOLM compiler; FORTH interpreter; Ham programs; Key utility (LBR)
 C337 Utilities: ERAse & UNERASE; Printer Spool & Despool (LBR)
 C338 Utilities: Library; Help system; Super DIR; Improved TYPE (LBR)
 C339 Ron Cain's Small C; A collection of WordStar notes & utilities (LBR)
 C340 Extensive Help system (LBR)
 C341 Games developed for the Kaypro 2 -- some video functions may not work
 C342 Games developed for the Kaypro 2 -- some video functions may not work
 C343 Original ADVENTURE as implemented for the Kaypro 2
 C344 Utilities: Super DIR V8.8; TYPED V3.1 (LBR)
 C345 Utilities: Lower to upper case; CP/M POWER; Memory to vol. (LBR)
 C346 Z80 assembler system (LBR)
 C347 Utilities: String replacement in file; Turbo Pascal cross reference (LBR)
 C348 Extensive graphic plotting package for Epson MX-80 (LBR)
 C349 WordStar utilities: Footnotes; Document to non-document & back (LBR)
 C350 Another comprehensive Help system (LBR)
 C351 Utilities: MX-80 setup; Gothic letter banner; Word* PS on Prowriter (LBR)
 C352 HANDY V2.0: A collection of desktop tools in CBASIC (LBR)

Monte's SELECT Disk #C900: Essential CP/M Utilities

This is a collection of utilities that Monte feels no CP/M user should be without. Each of these programs has been unsqueezed, de-librariated, and installed as needed to be usable on your system immediately. Source code is included when available. Here's what you get:

NSWEEP: Probably the most-used CP/M program ever written, this handy utility will copy, erase, list, squeeze, and unsqueeze files either singly or in groups. You'll need this program for any public domain disk listed in the catalog with (SQ).

UNERA: Have you ever typed "ERA *.BAS" when you meant to say "ERA *.BAK"? For those terrifying moments when programs or data disappear right before your eyes you need UNERASE. This program will resurrect the lost file or files with the same amount of ease that it took to ERAse them in the first place.

FINDBAD: Now you can recycle all those diskettes you were too cheap to throw away. You know, the ones with one or two bad sectors on them. FINDBAD will scan a disk and put all of the bad sectors into a dummy file so that CP/M won't try to use them.

NULU: CP/M isn't all that thrifty with disk space when writing small files. NULU solves that problem by collecting a number of small files into a single library file. Many public domain programs are distributed in libraries. Disks that contain libraries are listed in our public domain catalog with (LBR). You'll need NULU to extract the programs so that they may be used.

Monte's SELECT Disk #C901 MEX - The Modem Executive

There are a lot of modem programs in the public domain. This is the best one that we've found. On this disk we give you the MEX program (sorry, no source), a user's manual, an online help file, and the source code for the file that we used to tailor it to the Model 4/4P/4D. You'll need NSWEEP for the text files, which had to be squeezed so we could make everything fit.

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- M330** Super-Trek: StarTrek converted from 370 Disk 2 of 3
- M331** Super-Trek: StarTrek converted from 370 Disk 3 of 3
- M332** Utilities: Programmer's calculator; DOS 2 Help; dBASE II Mailing list
- M333** Word processor for kids; Checkbook ledger; File listing utility
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- M337** U.S. Census Utility County and City Databook Disk 2 of 2
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- M341** Assorted utilities: Disk utility; Unix terminal; Library utilities; dBASE
- M342** Utilities: Extended DIR; dBASE phone directory; Time keeping; BATCH lang.
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- M374** Small Database (SDB) V2.0; Ron Cain's Small C-PC V1.1
- M375** Remote Bulletin Board System V12.5b (Requires ARC archive utility)
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High Time

An independent elapsed-time clock for the Model 4.

On-line computer services like CompuServe, Dow Jones News/Retrieval, Delphi, and The Source give new meaning to the phrase "time is money." I've written a program for the Model 4 called ETimer that can help you keep down connect-time expenses by clocking the time you spend on line. You can use the program for many other time-keeping applications, as well.

ETimer's display option allows you to print the time on screen in the format 00~00~00. The program updates the clock once every second and keeps time regardless of whether you set the display option on or off. If reverse video is active on your monitor, the timer appears in reverse as well.

The program's other functions include a chime that you can set to go off every hour, a freeze feature to stop the timer at its current setting, a kill capability, a reset capability, and a status check of the function settings.

Because it is a background task, ETimer executes independently from the system's built-in clock and the program you're running, whether it's DOS, Basic, or an application.

Time on Your Side

To install ETimer, assemble the source code in Program Listing 1 using MISO-SYS' Pro-Create editor/assembler or Radio Shack's Assembly-Language Development System (ALDS). If you use ALDS, be sure to change the ORG label in line 170 to PSECT and omit lines 480-510 (the SVC macro). In addition, you must substitute the operand #A or #1 for #AA and #B or #2 for #BB in lines 330-470.

If you don't have an editor/assembler, type in the Basic code in Program Listing 2; you can then access ETimer from Basic with the statement:

**LOAD
80**

System Requirements

**Model 4
TRSDOS 6.2
Editor/assembler or Basic**

Feature	Parameters	Operation
Chime	C=Y or C=N	Turns hourly chime on or off. Chime sounds through the Model 4's internal speaker.
Display	D=Y or D=N	Prints the time on screen in the format 00~00~00. The clock is updated once every second. The on/off status of the display does not affect your ability to freeze the timer.
Freeze	F=Y or F=N	Stops the timer at its current setting.
Kill	K=Y or K=N	Removes ETimer from the task-control block vector table and reclaims high memory, if possible.
Reset	R=Y or R=N	Changes the timer to 00~00~00. The other functions are not affected by this parameter setting. If this function is not active, ETimer counts to 255~59~59 and resets itself.
Status	S=Y or S=N	Prints the current settings of the display, freeze, and chime functions.

Table. ETimer functions and parameter settings.

Program Listing 1. ETimer/SRC.

```

00100 ;*****
00110 ;**
00120 ;** Source Code For : ETIMER
00130 ;** Program Author : Frank A. Yacucci
00140 ;** Description : On-Screen Elapsed Time Clock
00150 ;**
00160 ;*****
00170 ORG 2600H ;Program origin
00180 ;* System Supervisor Call EQUates and Macros *
00190 @ABORT EQU 21 ;Abort Program
00200 @ADTSK EQU 29 ;Add an Interrupt Level Task
00210 @CKBRKC EQU 106 ;Check BREAK bit and clear it
00220 @CKTSK EQU 28 ;Check if Task Slot is in Use
00230 @DSPLY EQU 10 ;Display Message Line
00240 @FLAGS EQU 101 ;Point Register IY to System Flag Table
00250 @GTMOD EQU 83 ;Get Memory Module Address
00260 @HEXDEC EQU 97 ;Convert Binary to Decimal ASCII
00270 @HEXB EQU 98 ;Convert 1 Byte to Hex ASCII
00280 @HIGH$ EQU 100 ;Get or Alter HIGH$ or LOW$
00290 @PARAM EQU 17 ;Parse Parameter String
00300 @RMTSK EQU 30 ;Remove Interrupt Level Task
00310 @SOUND EQU 104 ;Sound Generation
00320 @VDCTL EQU 15 ;Video Functions
00330 DSPLY MACRO #AA
00340 LD HL,#AA ;Point to message
00350 SVC @DSPLY ;Display it
00360 ENDM ;End of Macro
00370 FLAG MACRO #AA
00380 LD DE,#AA ;Macro to Test Parameter Value
00390 LD A,D ;Get flag value
00400 OR E ;Move Register D to Register A
00410 ENDM ;Logical OR it with Register E
00420 MOV MACRO #AA,#BB ;End of Macro
00430 PUSH #BB ;Macro to move a 16-bit number
00440 POP #AA ;Save the Register
00450 ENDM ;Recall the Register
00460 SVC MACRO #AA ;End of Macro
00470 LD A,#AA
00480 RST 28H
00490 ENDM
00500 ;* Display Title and Find if Task is Resident *
00510 START SVC @CKBRKC ;Was the BREAK key hit?
00520 RET NZ ;Return if it was
00530 PUSH HL ;Save command line parameter pointer
00540 DSPLY TITLE ;Display title
00550 LD DE,MODNAME ;Point to module name
00560 SVC @GTMOD ;Is it already resident?

```

Listing 1 continued

Listing 1 continued

```

00570 JR NZ,CHECK ;No, jump to install it
00580 MOV IX,DE ;Move module address to Register IX
00590 JR GETPARG ;Jump to test parameters
00600 ;* Check if Installation is Possible *
00610 CHECK LD C,11 ;Task Slot 11
00620 SVC @CKTSK ;Is it available?
00630 JR NZ,NOTOPEN ;Jump if not
00640 SVC @FLAGS ;Point Register IX to system flags
00650 BIT 0,(IX+2) ;Can HIGH$ be changed?
00660 JR NZ,NOCHG ;Jump if not
00670 BIT 1,(IX+2) ;Was program called from DOS Ready?
00680 JR Z,INSTALL ;Jump if it was
00690 LD HL,MUSTDOS ;Point to installation error messages
00700 DB ODDH
00710 NOTOPEN LD HL,BUSY
00720 DB ODDH
00730 NOCHG DSDPLY CANTCHG ;Display it
00740 DSDPLY ABORTED ;Display abort message
00750 SVC @ABORT ;Abort and return to DOS
00760 ;* Install Task into High Memory *
00770 INSTALL LD HL,0 ;Get current HIGH$
00780 LD B,L
00790 SVC @HIGH$
00800 LD (OLDHIGH),HL ;Save it in module
00810 MOV DE,HL ;Move HIGH$ to Register DE
00820 LD HL,MODEND-1 ;Get end of module pointer
00830 LD BC,MODEND-HEADER ;Get module length
00840 LDDR ;Move module to memory
00850 LD B,0
00860 MOV HL,DE ;Move new HIGH$ to Register HL
00870 SVC @HIGH$ ;Lower HIGH$
00880 MOV IX,HL ;Move HIGH$ to Register IX
00890 LD BC,TASK-HEADER+1 ;Offset to first byte of task
00900 ADD HL,BC ;Add offset to HIGH$
00910 LD (IX+12),L ;Put Task Control Block
00920 LD (IX+13),H ;Address in module
00930 MOV HL,IX ;Move contents of Register IX to Reg. HL
00940 LD BC,MODTCB-HEADER+1 ;Offset to TCB
00950 ADD HL,BC ;Add offset
00960 MOV DE,HL ;Move it to Register DE
00970 MOV IX,DE ;Move TCB address to Register IX
00980 LD C,11 ;Task Slot 11
00990 SVC @ADTSK ;Add task to processor
01000 DSDPLY INSTLED ;Display message
01010 ;* Parse Command Line and Take Appropriate Action *
01020 GETPARG POP HL ;Restore parameter pointer
01030 LD DE,PTABLE ;Point to parameter table
01040 SVC @PARAM ;Check parameters
01050 JR Z,KILL ;Jump if all parameters are ok
01060 DSDPLY BADPARG ;Display bad parameter message
01070 LD HL,0 ;Return code
01080 RET ;Return to caller
01090 ;* Remove Task and Reclaim Memory if Possible *
01100 KILL FLAG 0000H ;Test KILL flag
01110 KFLAG EQU $-4
01120 JR Z,FREEZE ;Jump if flag is off
01130 SVC @FLAGS ;Point to system flags
01140 BIT 1,(IX+2) ;At TRSDOS Ready?
01150 JR Z,KILL1 ;Jump if yes
01160 DSDPLY MUSTDOS ;Display message
01170 LD HL,0 ;Return code
01180 RET ;Return to caller
01190 KILL1 LD C,11 ;Task Slot 11
01200 SVC @RMITSK ;Unschedule task
01210 LD DE,MODNAME ;Point to module name
01220 SVC @GTMOD ;Get memory location
01230 JR NZ,NOCLAIM
01240 MOV IX,HL ;Move address to Register IX
01250 LD HL,0 ;Get current HIGH$
01260 LD B,L
01270 SVC @HIGH$ ;Change HIGH$ to old HIGH$
01280 INC HL ;Increment HIGH$
01290 MOV DE,IX ;Move contents of Register IX to Register DE
01300 XOR A ;Clear carry flag
01310 SBC HL,DE ;Can memory be reclaimed?
01320 JR NZ,NOCLAIM ;Jump if not
01330 LD L,(IX+2) ;Get old HIGH$ from memory module
01340 LD H,(IX+3)
01350 LD B,0
01360 SVC @HIGH$ ;Change HIGH$ to old HIGH$
01370 LD HL,RECLAIMED ;Point to message
01380 DB ODDH
01390 NOCLAIM DSDPLY NORECLM ;Display message
01400 LD HL,0 ;Return code
01410 RET ;Return to caller
01420 ;* Freeze or Unfreeze Clock *
01430 FREEZE LD A,(FRESP) ;Get response byte
01440 BIT 6,A ;Was a flag entered?
01450 JR Z,RESET ;Jump if not
01460 FLAG 0000H ;Test FREEZE flag
01470 FFLAG EQU $-4
01480 JR NZ,FREEZE1 ;Jump if it is ON
01490 LD (IX+34),ODDH ;Modify memory module to UNFREEZE clock
01500 LD (IX+35),34H
01510 JR RESET ;Jump to RESET
01520 FREEZE1 LD (IX+34),18H ;Modify memory module to FREEZE clock
01530 LD (IX+35),20H
01540 ;* Reset Clock *
01550 RESET LD A,(RRESP) ;Get response byte
01560 BIT 6,A ;Was a flag entered?
01570 JR Z,DISPLAY ;Jump if not
01580 FLAG 0000H ;Test RESET flag
01590 RFLAG EQU $-4

```

Listing 1 continued

You can access ETimer's clock functions from any program, whether it's DOS, Basic, or an application.

SYSTEM "RUN file name (parameters)"

To load ETimer from TRSDOS, type in:

ETIMER (parameters)

The program is loaded in high memory in the system library execution area (2600-2FFF hexadecimal). To protect itself from being overwritten, ETimer lowers the high-memory marker (HIGH\$) 152 bytes after installation. You can access ETimer's clock functions from any applications program that doesn't overwrite this area of memory.

The parameters specify which of the program's clock functions you want to be active. ETimer automatically activates the chime, display, and status functions and suppresses the freeze, kill, and reset functions on first execution.

To change these defaults, specify parameters on the command line in the format $x = Y$ or $x = N$, where x is the first letter of the function name (see the Table). For example, typing in:

ETIMER (C=Y, F=N, S=N)

activates the chime (C) option while suppressing the freeze (F) and status (S) options.

ETimer searches the command line for valid parameters and modifies the instructions in high memory accordingly. To deactivate preset defaults, the program simply skips over the sections of code that don't need to execute.

ETimer uses task slot 11 in the TRSDOS task-control block vector table (TCBVT). This table holds 12 16-bit memory locations pointing to task routines. Entries are divided into three priority levels: low (slots zero to 7), medium (slots 8-10), and high (slot 11). Tasks in slot 11 are executed 60 times a second.

Activating the kill function removes ETimer from the TCBVT and allows you to reclaim the area of high memory, so long as you've placed nothing below it. When the task is complete, ETimer prints the message "Memory reclaimed" on screen. ■

You can write to Frank A. Yacucci at 44 North Roanoke, Austintown, OH 44515, 216-793-9505. Send a self-addressed, stamped envelope for a reply.

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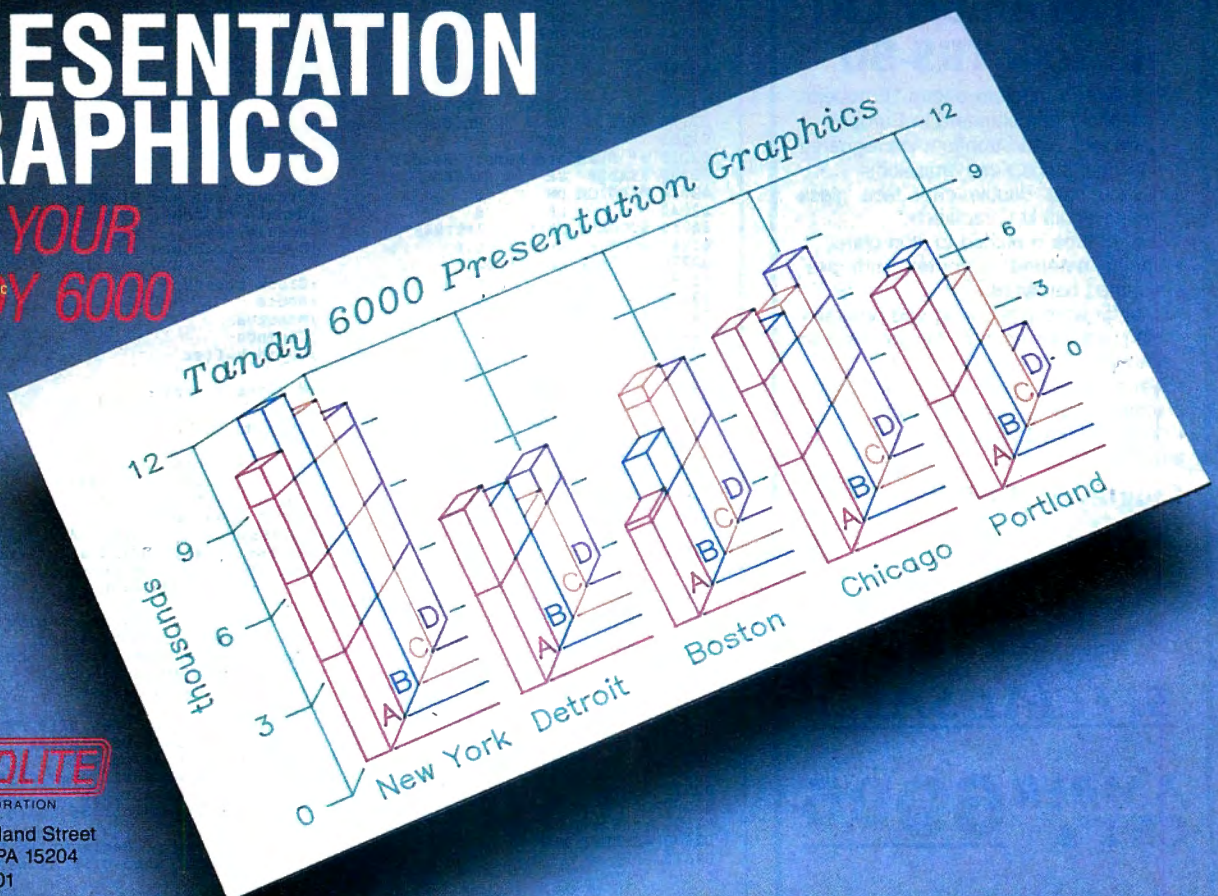
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Listing 1 continued

```

01600 JR Z,DISPLAY ;Jump if it is OFF
01610 LD (IX+4),60 ;Reset counter
01620 LD (IX+5),0 ;Reset hours
01630 LD (IX+6),0 ;Reset minutes
01640 LD (IX+7),0 ;Reset seconds
01650 DSPLY WASRSET ;Display message
01660 ;* Turn Clock Display ON or OFF *
01670 DISPLAY LD A,(DRESP) ;Get response byte
01680 BIT 6,A ;Was a flag entered?
01690 JR Z,CHIME ;Jump if not
01700 FLAG 0000H ;Test DISPLAY flag
01710 DFLAG EQU $-4
01720 JR Z,DSPOFF ;Jump if it is OFF
01730 LD (IX+41),20H ;Modify memory module to turn DISPLAY ON
01740 LD (IX+42),19H
01750 LD (IX+54),20H
01760 LD (IX+55),0CH
01770 LD (IX+68),ODDH
01780 JR CHIME ;Jump to CHIME
01790 DSPOFF LD (IX+41),0C0H ;Modify memory module to turn DISPLAY OFF
01800 LD (IX+42),0
01810 LD (IX+54),0C0H
01820 LD (IX+55),0
01830 LD (IX+68),0C9H
01840 ;* Turn Hourly Chime ON or OFF *
01850 CHIME LD A,(CRESP) ;Get response byte
01860 BIT 6,A ;Was a flag entered?
01870 JR Z,STATUS ;Jump if not
01880 FLAG 0000H ;Test CHIME flag
01890 CFLAG EQU $-4
01900 JR Z,CHMOFF ;Jump if it is OFF
01910 LD (IX+60),06H ;Modify memory module to turn CHIME ON
01920 LD (IX+61),07H
01930 JR STATUS ;Jump to STATUS
01940 CHMOFF LD (IX+60),18H ;Modify memory module to turn CHIME OFF
01950 LD (IX+61),03H
01960 ;* Clock Status *
01970 STATUS FLAG 0FFFFH ;Test STATUS flag
01980 SFLAG EQU $-4
01990 JR Z,EXIT ;Jump if flag is off
02000 MOV IY,IX ;Move contents of Register IX to Register IY
02010 DSPLY TMRDSPY ;Display DISPLAY status
02020 LD A,(IY+68) ;Get a byte from the memory module
02030 CP ODDH ;Compare it
02040 JR NZ,DSPLYOFF ;Jump if it is not equal
02050 LD HL,HON ;DISPLAY is ON
02060 DB ODDH
02070 DSPYOFF DSPLY HOFF ;DISPLAY is OFF
02080 DSPLY HRLYCHM ;Display CHIME status
02090 LD A,(IY+60) ;Get a byte from the memory module
02100 CP 6H ;Compare it
02110 JR NZ,CHMEOFF ;Jump if it is not equal
02120 LD HL,HON ;CHIME is ON
02130 DB ODDH
02140 CHMEOFF DSPLY HOFF ;CHIME is OFF
02150 LD A,(IY+34) ;Get a byte from the memory module
02160 CP ODDH ;Compare it
02170 JR Z,EXIT ;Jump if it is equal
02180 DSPLY FROZEN ;Display FROZEN status
02190 EXIT LD HL,0 ;Return code
02200 RET ;Return to caller
02210 ;* Standard Memory Header *
02220 HEADER JR TASK
02230 OLDHIGH DW 0 ;Storage for old HIGH$
02240 DB 6 ;Length of name
02250 MODNAME DEFM 'ETIMER' ;Module name
02260 MODTDCB DW 0,0 ;System pointers
02270 ;* Task Data Area *
02280 DB 60 ;Clock counter
02290 DB 0 ;Hours
02300 DB 0 ;Minutes
02310 DB 0 ;Seconds
02320 DEFM ' ' ;Hours buffer
02330 DB 31
02340 DEFM ' ' ;Minutes buffer
02350 DB 31
02360 DEFM ' ' ;Seconds buffer
02370 ;* Beginning of Task *
02380 TASK DEC (IX+4) ;Decrement counter
02390 RET NZ ;Return if it is not zero
02400 LD B,60 ;Put 60 in Register B
02410 LD (IX+4),B ;Reset counter
02420 INC (IX+7) ;Increment the number of seconds
02430 ;Becomes 'JR SETBUFF' when timer is FROZEN
02440 LD A,(IX+7) ;Get the number of seconds
02450 CP B ;Have 60 seconds elapsed
02460 JR NZ,SETBUFF ;Jump if not
02470 ;Becomes 'RET NZ' when display is OFF
02480 LD (IX+7),0 ;Reset the number of seconds
02490 INC (IX+6) ;Increment the number of minutes
02500 LD A,(IX+6) ;Get the number of minutes
02510 CP B ;Have 60 minutes elapsed
02520 JR NZ,SETBUFF ;Jump if not
02530 ;Becomes 'RET NZ' when DISPLAY is OFF
02540 LD (IX+6),0 ;Reset the number of minutes
02550 LD B,7 ;Set tone & duration
02560 ;Becomes 'JR SETBUFF' when CHIME is OFF
02570 SVC @SOUND ;Make the chime through internal speaker
02580 INC (IX+5) ;Increment the number of hours
02590 ;* Set up Display Buffer *
02600 SETBUFF MOV HL,IX ;Move contents of Register IX to Register HL
02610 ;Becomes 'RET' when DISPLAY is OFF
    
```

Listing 1 continued

Listing 1 continued

```

02620      LD      BC,8      ;Offset to display buffer from TCB
02630      ADD     HL,BC      ;Add the offset
02640      EX      DE,HL      ;Register DE points to display buffer
02650      PUSH    DE          ;Save buffer pointer
02660      LD      B,3        ;Set loop counter to 3
02670 SLOOP  PUSH    BC          ;Save loop counter
02680      LD      A,(IX+5)    ;Get number to convert
02690      CP      10         ;Compare it to 10
02700      JR      NC,GREATER  ;Jump if number > 9
02710      LD      C,A        ;Put number in Register C
02720      EX      DE,HL      ;Move buffer pointer to Register HL
02730      SVC     @HEX8      ;Convert number to hexadecimal
02740      LD      A,' '      ;Fill rest of buffer with spaces
02750      LD      (HL),A
02760      INC     HL
02770      LD      (HL),A
02780      INC     HL
02790      LD      (HL),A
02800      INC     HL
02810      EX      DE,HL      ;Move buffer pointer to Register DE
02820      JR      SNEXT      ;Jump for next number
02830 GREATER LD      H,0        ;Put number in Register HL
02840      LD      L,A
02850      SVC     @HEXDEC    ;Convert number to decimal
02860 SNEXT  INC     DE          ;Increment pointers
02870      INC     IX
02880      POP     BC          ;Restore loop counter
02890      DJNZ   SLOOP      ;Loop back
02900 ;* Display Data in Buffer *
02910      POP     DE          ;Restore buffer pointer
02920      LD      HL,0034H    ;Starting position to display the time
02930      LD      B,17       ;Move up to 17 bytes to the screen
02940 DLOOP  PUSH    BC          ;Save loop counter
02950      LD      A,(DE)     ;Get a character from the display buffer
02960      CP      ' '        ;Is it a space?
02970      JR      Z,DNEXT    ;Jump if it is
02980      LD      C,A        ;Put character to display in Register C
02990      PUSH    DE          ;Save buffer pointer
03000      LD      B,2
03010      SVC     @VDCTL     ;Display the character
03020      POP     DE          ;Restore buffer pointer
03030      INC     L
03040 DNEXT  INC     DE          ;Increment pointers
03050      POP     BC          ;Restore loop counter
03060      DJNZ   DLOOP      ;Loop back
03070      RET
03080 MODEND EQU     $        ;End of memory module pointer
03090 ;* Data Storage Area *
03100 TITLE  DEFM      ETIMER -- On-Screen Elapsed Time Clock'
03110      DB      10
03120      DEFM      ' by Frank A. Yacucci -- Eagle Software'
03130      DB      10,13
03140 ;* Task Installation Messages *
03150 ABORTED DB      10
03160      DEFM      'Installation aborted!'
03170      DB      13
03180 BADPARM DEFM      'Bad parameter found!'
03190      DB      13
03200 BUSY     DEFM      'Cannot install, Task Slot 11 is busy!'
03210      DB      13
03220 CANTCHG DEFM      'HIGH$ cannot be changed!'
03230      DB      13
03240 INSTLED DEFM      'ETIMER has been installed.'
03250      DB      13
03260 MUSTDOS DEFM      'Must be at TRSDOS Ready!'
03270      DB      13
03280 ;* Task Removal Messages *
03290 NORECLM DEFM      'ETIMER unscheduled, high memory could not be reclaimed!'
03300      DB      13
03310 RECLMED DEFM      'ETIMER unscheduled, high memory has been reclaimed.'
03320      DB      13
03330 ;* Clock Status Messages *
03340 HRLYCHM DEFM      'Hourly chime'
03350      DB      3
03360 TMRDSPY DEFM      'ETIMER display'
03370      DB      3
03380 FROZEN  DEFM      'ETIMER is FROZEN.'
03390      DB      13
03400 HON     DEFM      ' is ON.'
03410      DB      13
03420 HOFF   DEFM      ' is OFF.'
03430      DB      13
03440 WASRSET DEFM      'ETIMER has been reset.'
03450      DB      13
03460 ;* Parameter Table/Data *
03470 PTABLE  DB      80H
03480      DB      55H
03490      DEFM      'CHIME'
03500 CRESP   DB      0
03510      DW      CFLAG
03520      DB      57H
03530      DEFM      'DISPLAY'
03540 DRESP   DB      0
03550      DW      DFLAG
03560      DB      56H
03570      DEFM      'FREEZE'
03580 FRESP  DB      0
03590      DW      FFLAG
03600      DB      54H
03610      DEFM      'KILL'
03620      DB      0
03630      DW      KFLAG
03640      DB      55H

```

Listing 1 continued

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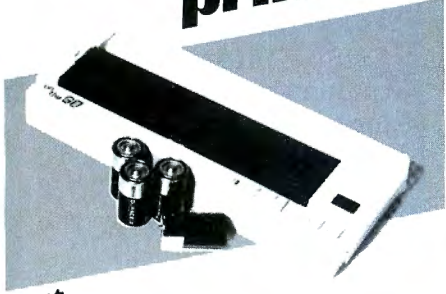
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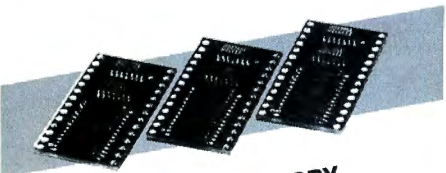
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Listing 1 continued

```
03650 DEFM 'RESET'
03660 RRESP DB 0
03670 DW RFLAG
03680 DB 56H
03690 DEFM 'STATUS'
03700 DB 0
03710 DW SFLAG
03720 DB 0 ;Parameter table terminator
03730 END START
```

End

Program Listing 2. ETimer/ASC.

```
1 DEF FNV=VAL("&H"+AS):READ FSPEC$,NUMITEMS,TOTAL:FOR X=1 TO NUMITE
MS:READ A$:TOTAL1=TOTAL1+FNV:NEXT:IF TOTAL1<TOTAL THEN PRINT"INV
ALID DATA!":STOP ** 9882
2 RESTORE 4:OPEN"R",1,FSPEC$,1:FIELD 1, 1 AS B$:FOR X=1 TO NUMITEMS
:READ A$:LSET B$=CHR$(FNV):PUT 1,X:NEXT:CLOSE:PRINT FSPEC$ HAS B
EEN CREATED!":END ** 9478
3 DATA "ETIMER/CMD",1179,101245 ** 1809
4 DATA 05, 09, 00, 00, 00, 45, 54, 49, 4D, 45, 52, 05, 09, 00, 00 ** 3033
5 DATA 26, 20, 20, 20, 20, 20, 20, 01, FE, 00, 26, 3E, 6A, EF, CO ** 3116
6 DATA E5, 21, 68, 28, 3E, 0A, EF, 11, D5, 27, 3E, 53, EF, 20, 05 ** 3191
7 DATA D5, DD, E1, 18, 6C, 0E, 0B, 3E, 1C, EF, 20, 13, 3E, 65, EF ** 3268
8 DATA FD, CB, 02, 46, 20, 0E, FD, CB, 02, 4E, 28, 17, 21, 57, 29 ** 3202
9 DATA DD, 21, FD, 28, DD, 21, 23, 29, 3E, 0A, EF, 21, D1, 28, 3E ** 3235
10 DATA 0A, EF, 3E, 15, EF, 21, 00, 00, 45, 3E, 64, EF, 22, D2, 27 ** 3204
11 DATA E5, D1, 21, 67, 28, 01, 98, 00, ED, B8, 06, 00, D5, E1, 3E ** 3183
12 DATA 64, EF, E5, DD, E1, 01, 25, 00, 09, DD, 75, 0C, DD, 74, 0D ** 3249
13 DATA DD, E5, E1, 01, 0C, 00, 09, E5, D1, D5, DD, E1, 0E, 0B, 3E ** 3264
14 DATA 1D, EF, 21, 3C, 29, 3E, 0A, EF, E1, 11, 32, 2A, 3E, 11, EF ** 3252
15 DATA 28, 0A, 21, E8, 28, 3E, 0A, EF, 21, 00, 00, C9, 11, 00, 00 ** 3138
16 DATA 7A, B3, 28, 4C, 3E, 65, EF, FD, CB, 02, 4E, 28, 0A, 21, 57 ** 3257
17 DATA 29, 3E, 0A, EF, 21, 00, 00, C9, 0E, 0B, 3E, 1E, EF, 11, D5 ** 3235
18 DATA 27, 3E, 53, EF, 20, 22, E5, DD, E1, 21, 00, 00, 45, 3E, 64 ** 3179
19 DATA EF, 23, DD, E5, D1, AF, ED, 52, 20, 0F, DD, 6E, 02, DD, 66 ** 3323
20 DATA 03, 06, 00, 3E, 64, EF, 21, A8, 29, DD, 21, 70, 29, 3E, 0A ** 3175
21 DATA EF, 21, 00, 00, C9, 3A, 4E, 2A, CB, 77, 28, 19, 11, 00, 00 ** 3160
22 DATA 7A, B3, 20, 0A, DD, 36, 22, DD, 01, FE, FC, 26, DD, 36, 23 ** 3254
23 DATA 34, 18, 08, DD, 36, 22, 18, DD, 36, 23, 20, 3A, 5F, 2A, CB ** 3196
24 DATA 77, 28, 1D, 11, 00, 00, 7A, B3, 28, 16, DD, 36, 04, 3C, DD ** 3176
25 DATA 36, 05, 00, DD, 36, 06, 00, DD, 36, 07, 00, 21, 1B, 2A, 3E ** 3143
26 DATA 0A, EF, 3A, 4A, 2A, CB, 77, 28, 31, 11, 00, 00, 7A, B3, 28 ** 3183
27 DATA 16, DD, 36, 29, 20, DD, 36, 2A, 19, DD, 36, 36, 20, DD, 36 ** 3211
28 DATA 37, 0C, DD, 36, 44, DD, 18, 14, DD, 36, 29, C0, DD, 36, 2A ** 3243
29 DATA 00, DD, 36, 36, C0, DD, 36, 37, 00, DD, 36, 44, C9, 3A, 39 ** 3210
30 DATA 2A, CB, 77, 28, 19, 11, 00, 00, 7A, B3, 28, 0A, DD, 36, 3C ** 3184
31 DATA 06, DD, 36, 3D, 07, 18, 08, DD, 36, 3C, 18, DD, 36, 3D, 06 ** 3210
32 DATA 11, FF, FF, 7A, B3, 28, 3F, DD, E5, FD, E1, 21, E9, 29, 3E ** 3319
33 DATA 0A, EF, FD, 7E, 44, FE, DD, 20, 04, 21, 0A, 2A, DD, 21, 12 ** 3264
34 DATA 2A, 3E, 0A, EF, 21, DC, 29, 3E, 0A, EF, FD, 7E, 3C, FE, 06 ** 3334
35 DATA 20, 04, 21, 0A, 2A, DD, 21, 12, 2A, 3E, 0A, EF, FD, 7E, 22 ** 3222
36 DATA FE, DD, 28, 06, 21, F8, 29, 3E, 0A, EF, 21, 00, 00, C9, 18 ** 3222
37 DATA 22, 00, 00, 06, 45, 54, 49, 4D, 45, 52, 00, 00, 00, 00, 3C ** 3059
38 DATA 00, 00, 00, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20, 1F ** 3023
39 DATA 20, 20, 20, 20, 20, 20, DD, 35, 04, C0, 01, FE, F8, 27, 06, 3C ** 3150
40 DATA DD, 70, 04, DD, 34, 07, DD, 7E, 07, B8, 20, 19, DD, 36, 07 ** 3224
41 DATA 00, DD, 34, 06, DD, 7E, 06, B8, 20, 0C, DD, 36, 06, 00, 06 ** 3186
42 DATA 07, 3E, 68, EF, DD, 34, 05, DD, E5, E1, 01, 08, 00, 09, EB ** 3237
43 DATA D5, 06, 03, C5, DD, 7E, 05, FE, 0A, 30, 10, 4F, EB, 3E, 62 ** 3245
44 DATA EF, 3E, 20, 77, 23, 77, 23, 77, 23, EB, 18, 06, 26, 00, 6F ** 3170
45 DATA 3E, 61, EF, 13, DD, 23, C1, 10, DC, D1, 21, 34, 00, 06, 11 ** 3177
46 DATA C5, 1A, FE, 20, 28, 09, 4F, D5, 06, 02, 3E, 0F, EF, D1, 2C ** 3252
47 DATA 13, C1, 10, ED, C9, 20, 20, 20, 20, 20, 20, 20, 20, 45, 54 ** 3085
48 DATA 49, 4D, 45, 52, 20, 2D, 2D, 20, 4F, 6E, 2D, 53, 63, 72, 65 ** 3171
49 DATA 65, 6E, 20, 45, 6C, 61, 70, 73, 65, 64, 20, 54, 69, 6D, 65 ** 3141
50 DATA 20, 43, 6C, 6F, 63, 6B, 0A, 43, 6F, 70, 79, 72, 69, 67, 68 ** 3172
51 DATA 74, 20, 15, EF, 15, 20, 31, 39, 38, 35, 20, 62, 79, 20, 46 ** 3095
52 DATA 72, 61, 6E, 6B, 20, 41, 2E, 20, 59, 61, 63, 75, 63, 63, 69 ** 3127
53 DATA 20, 2D, 20, 20, 45, 61, 67, 6C, 65, 20, 53, 6F, 66, 74, 77 ** 3142
54 DATA 61, 72, 65, 0A, 0D, 0A, 49, 6E, 73, 74, 61, 6C, 6C, 61, 74 ** 3172
55 DATA 69, 6E, 6E, 20, 61, 62, 6F, 72, 74, 65, 64, 21, 0D, 42, 61 ** 3148
56 DATA 64, 20, 70, 61, 72, 61, 6D, 65, 74, 65, 01, FE, F4, 28, 72 ** 3147
57 DATA 20, 66, 6F, 75, 6E, 64, 21, 0D, 43, 61, 6E, 6E, 6F, 74, 20 ** 3181
58 DATA 69, 6E, 73, 74, 61, 6C, 6C, 2C, 20, 54, 61, 73, 6B, 20, 53 ** 3162
59 DATA 6C, 6F, 74, 20, 31, 31, 20, 69, 73, 20, 62, 75, 73, 79, 21 ** 3112
60 DATA 0D, 48, 49, 47, 48, 24, 20, 63, 61, 6E, 6E, 6F, 74, 20, 62 ** 3147
61 DATA 65, 20, 63, 68, 61, 6E, 67, 65, 64, 21, 0D, 45, 54, 49, 4D ** 3135
62 DATA 45, 52, 20, 68, 61, 73, 20, 62, 65, 6E, 20, 69, 6E, 73 ** 3116
63 DATA 74, 61, 6C, 6C, 65, 64, 2E, 0D, 4D, 75, 73, 74, 20, 62, 65 ** 3165
64 DATA 20, 61, 74, 20, 54, 52, 53, 44, 4F, 53, 20, 52, 65, 61, 64 ** 3081
65 DATA 79, 21, 0D, 45, 54, 49, 4D, 45, 52, 20, 75, 6E, 73, 63, 68 ** 3141
66 DATA 65, 64, 75, 6C, 65, 64, 2C, 20, 68, 69, 67, 68, 20, 6D, 65 ** 3155
67 DATA 6D, 6E, 72, 79, 20, 63, 6F, 75, 6C, 64, 20, 6E, 6F, 74, 20 ** 3194
68 DATA 62, 65, 20, 72, 65, 63, 6C, 61, 69, 6D, 65, 64, 21, 0D, 45 ** 3136
69 DATA 54, 49, 4D, 45, 52, 20, 75, 6E, 73, 63, 68, 65, 64, 75, 6C ** 3155
70 DATA 65, 64, 2C, 20, 68, 69, 67, 68, 20, 6D, 65, 6D, 6F, 72, 79 ** 3171
71 DATA 20, 68, 61, 73, 20, 62, 65, 65, 6E, 20, 72, 65, 63, 6C, 61 ** 3109
72 DATA 69, 6D, 65, 64, 2E, 0D, 48, 6F, 75, 72, 6C, 79, 20, 63, 68 ** 3187
73 DATA 69, 6D, 65, 03, 45, 54, 49, 4D, 45, 52, 20, 01, 7F, F0, 29 ** 3147
74 DATA 64, 69, 73, 70, 6C, 61, 79, 03, 45, 54, 49, 4D, 45, 52, 20 ** 3123
75 DATA 69, 73, 20, 46, 52, 4F, 5A, 45, 4E, 2E, 0D, 20, 69, 73, 20 ** 3156
76 DATA 4F, 4E, 2E, 0D, 20, 69, 73, 20, 4F, 46, 46, 2E, 0D, 45, 54 ** 3189
77 DATA 49, 4D, 45, 52, 20, 68, 61, 73, 20, 62, 65, 65, 6E, 20, 72 ** 3116
78 DATA 65, 73, 65, 74, 2E, 0D, 80, 55, 43, 48, 49, 4D, 45, 00, 6E ** 3157
79 DATA 27, 57, 44, 49, 53, 50, 4C, 41, 59, 00, 36, 27, 56, 46, 52 ** 3105
80 DATA 45, 45, 5A, 45, 00, F2, 26, 54, 4B, 49, 4C, 4C, 00, 98, 26 ** 3150
81 DATA 55, 52, 45, 53, 45, 54, 00, 12, 27, 56, 53, 54, 41, 54, 55 ** 3071
82 DATA 53, 00, 87, 27, 00, 02, 02, 00, 26 ** 1968
```

End



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Go Wild

Three mass file-handling routines for TRSDOS 1.3 simplify disk-file maintenance.

For many of us, patching and enhancing TRSDOS 1.3 has become an essential part of computing. The DOS just doesn't have the features we need. One that's sorely lacking is a wildcard feature for mass file handling. In the interest of a better TRSDOS, I wrote three wildcard file utilities that copy, delete, and set attributes for any or all files on a disk.

I modeled the programs after TRSDOS 1.3's Purge utility, which lists each file in a directory individually and asks if you want to kill it, take no action and move to the next file, or return to TRSDOS Ready. My programs also let you take wholesale action on a disk, if you want, without being queried file by file.

Purge requires that you know a disk's master password; my utilities don't. They temporarily disable TRSDOS 1.3's password protection so you can manipulate any protected file. While Purge works with visible or invisible files, my programs handle only visible files. However, I've provided a fourth utility that makes it easy to change invisible files, even protected ones, to visible files (see below).

How to Use Them

The three programs' source codes are so similar that I've provided a complete listing only for Wild Copy (Program Listing 1). To obtain listings for Wild Kill and Wild Attribute, make the modifications shown in Figs. 1 and 2. Once you assemble the listings to disk, you can run the utilities from TRSDOS Ready.

Wild Copy copies visible files from a source drive to a destination drive. To run the program, type in WILDCOPY and press the enter key. (At this point, you can remove the utility disk, but you must keep a system disk in drive zero at all times.) You'll be prompted to name your source and destination drives. Then you'll see the prompt "Query (Y or N)." If you want to

Changes for WILDKILL/ASM

```
Delete lines: 180
              300-350
              840-890
              1750
```

Change lines:

```
00020 ;* Wild Card File Kill Utility (WILDKILL/ASM)      *
00050 ;* Deletes any or all files from a TRSDOS 1.3 disk *
00820 PREPARE LD      A,13      ;prepare command buffer
01660 MESS1  DEFM     'Wild Card File Kill Utility:',10,10
01700 MESS4  DEFM     'Kill (Y/N/Q)? ',14,3
01710 COMMAND DEFM     'KILL '
```

Figure 1. Wild Kill. To obtain the source code for Wild Kill, make these changes to Program Listing 1.

Changes for WILDATTR/ASM

```
Delete lines: 300-350
              820-890
              1680
              1750
```

Add lines:

```
00155 INPUT    EQU      40H
00421          LD       HL,MESS4      ;get attributes
00422          CALL    PRINT
00423          LD       B,
PARLEN
00424          LD       HL,ATTRIB
00425          CALL    INPUT
00426 ;
00830 PREPARE LD      HL,ATTRIB      ;append attributes after
00840          LD       BC,PARLEN    ; filename
00850          LDIR
01705 MESS5  DEFM     'Set Attributes (Y/N/Q)? ',14,3
```

Change lines:

```
00020 ;* Wild Card File Attrib Utility (WILDATTR/ASM)    *
00050 ;* Gives common attributes to any or all files.    *
01060          LD       HL,MESS5
01660 MESS1  DEFM     'Wild Card File Attrib Utility:',10,10
01700 MESS4  DEFM     'Enter Attributes: ',14,3
01710 COMMAND DEFM     'ATTRIB '
01720 PARAM1 DEFS     64
01730 ATTRIB DEFS     32
```

Figure 2. Wild Attribute. To obtain the source code for Wild Attribute, make these changes to Program Listing 1.

Enter Attributes: (I)

(sets a visible file to invisible)

Enter Attributes: (ACC = SMITH,UPD = JONES,PROT = EXEC)

(sets the access password to SMITH, the update password to JONES, and the protection level to execute only)

Enter Attributes: (ACC = ,UPD = ,PROT = FULL)

(completely unprotects a file)

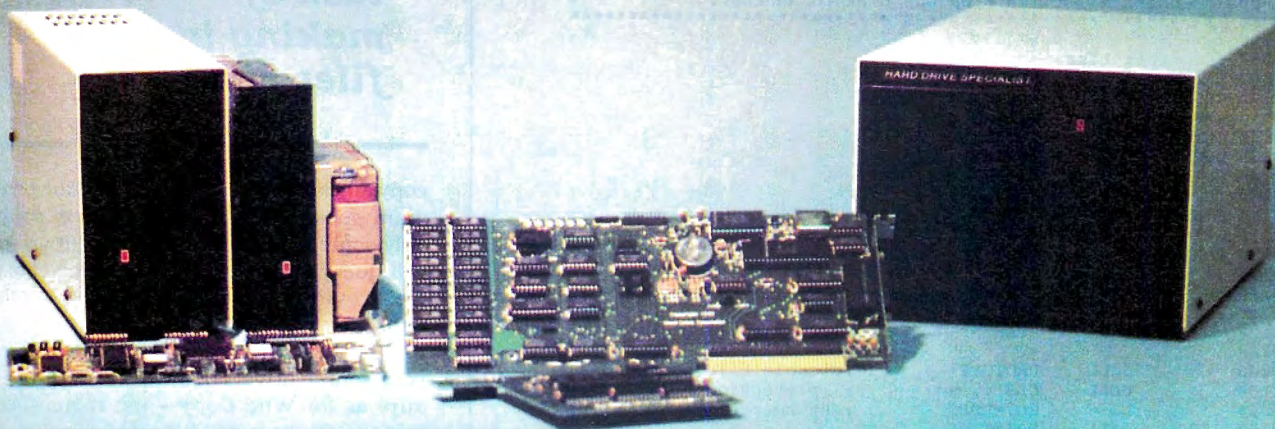
Figure 3. Sample attribute settings for Wild Attribute.



System Requirements

Model III
TRSDOS 1.3
Assembly language
Editor/assembler

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Program Listing 1. Wild Copy.

```

00010 ;*****
00020 ;* Wild Card File Copy Utility (WILDCOPY/ASM) *
00030 ;* by Craig Chaiken *
00040 ;* 09/08/85 *
00050 ;* Copies all files from one disk to another. *
00060 ;*****
00070 ;
00080 ;Constant List:
00090 ;
00100 CLS EQU 01C9H
00110 CMDDOS EQU 429CH
00120 CRTOUT EQU 0033H
00130 DOS EQU 402DH
00140 PRINT EQU 021BH
00150 INKEY EQU 0049H
00160 START EQU 09000H
00170 DATA EQU 0A000H
00180 PARLEN EQU 40
00190 ;
00200 ;-----
00210 ;
00220 ORG START
00230 ;
00240 CALL PROTOFF ;disable file password
00250 CALL CLS ; protection
00260 LD HL,MESS1 ;get source drive
00270 CALL PRINT
00280 CALL DRIVE
00290 LD (SOURCE),A
00300 ;
00310 LD HL,MESS2 ;get destination drive
00320 CALL PRINT
00330 CALL DRIVE
00340 ADD A,30H
00350 LD (DESTIN),A
00360 ;
00370 LD HL,MESS3 ;get query flag
00380 CALL PRINT
00390 CALL YNQ
00400 LD (CONFIRM),A
00410 CALL NEWLINE
00420 ;
00430 LD IX,WILD ;get RAM directory
00440 PUSH IX
00450 LD HL,DATA
00460 LD A,(SOURCE)
00470 LD B,A
00480 LD C,0
00490 LD A,9EH
00500 RST 28H
00510 ;
00520 WILD CALL CLS
00530 CALL NEWLINE
00540 LD HL,DATA
00550 LD BC,21
00560 PREMOVE PUSH HL
00570 PUSH BC
00580 LD DE,PARAM1
00590 MOVE LD A,(HL) ;move fspec to command buffer
00600 INC HL
00610 CP 0
00620 JR Z,NEXT
00630 LD (DE),A
00640 INC DE
00650 CP ' '
00660 JP Z,NEXT
00670 JR MOVE
00680 ;
00690 NEXT CALL PREPARE
00700 POP BC
00710 POP HL
00720 ADD HL,BC
00730 LD A,(HL)
00740 CP 0
00750 JR NZ,COMPENS
00760 INC HL
00770 COMPENS LD A,(HL)
00780 CP '+'
00790 JP Z,EXIT
00800 JR PREMOVE
00810 ;
00820 PREPARE LD A,':' ;prepare command buffer
00830 LD (DE),A ;with destination param.
00840 INC DE
00850 LD A,(DESTIN)
00860 LD (DE),A
00870 INC DE
00880 LD A,13
00890 LD (DE),A
00900 ;

```

Listing 1 continued

Pass Off simplifies the task of making invisible files visible.

copy all visible files, answer N and the program goes to work. If you want to copy only some files, press Y, and the program will query you (Y/N/Q) about each visible file. Press Y to copy the file, N to bypass it, and Q to exit to TRSDOS Ready.

Wild Kill deletes any or all files from your source drive. Follow the same procedure as for Wild Copy—just remember that the program will kill all visible files if you specify no query.

Wild Attribute sets files' protection level, access password, visible/invisible status, and so on. To run the program, type in WILDATTR at TRSDOS Ready. As with Wild Copy, you specify a drive number and answer the query prompt. Now you're prompted for new attributes; you can enter one or several parameters, but only one set of parameters each time you run the program. Remember to enclose your responses in parentheses (see Fig. 3 for some samples).

If you chose no query, Wild Attribute changes all visible files according to the attributes you typed in. The query option, like that for the other two programs, displays each file's name and lets you choose whether to set its attributes, leave it unchanged, or quit the program.

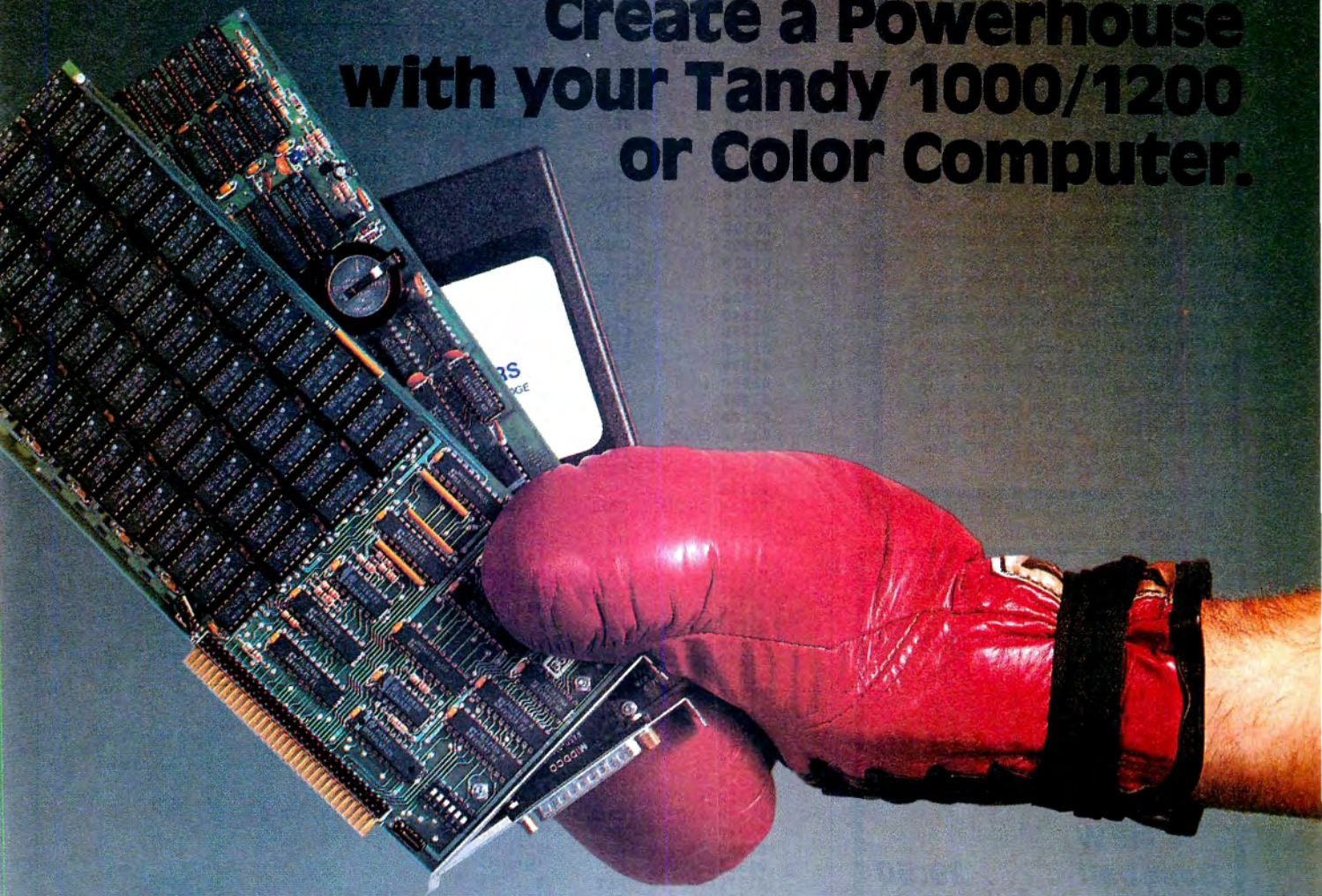
About Invisible Files

Since the wildcard utilities won't work with invisible files, I've included a utility called Pass Off (Program Listing 2) that simplifies the task of making invisible files visible. To activate the assembled program, type in PASSOFF at TRSDOS Ready. This disables all TRSDOS 1.3 file password protection until you reset your computer. A rapidly changing character in the screen's upper-right corner indicates that Pass Off is active.

To change the attributes of protected invisible files, type in DIR :d (SYS,INV) at TRSDOS Ready (d represents the drive number). A directory of all visible and invisible files will appear on the screen. For each invisible file (any file with an I as the first character in the attribute column), type in a command in the form ATTRIB filename/ext:d (N). This makes the file visible and gives you access to its code. You now have the ability to manipulate any file on your disk—even Basic/CMD. ■

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Listing 1 continued

```

00910      LD      A,(CONFIRM)      ;query before copying?
00920      CP      'N'
00930      JR      Z,CONT
00940      ;
00950      LD      A,10              ;restore cursor
00960      CALL   CRTOUT
00970      LD      A,27
00980      CALL   CRTOUT
00990      LD      A,27
01000      CALL   CRTOUT
01010      LD      A,30
01020      CALL   CRTOUT
01030      ;
01040      LD      HL,COMMAND      ;query
01050      CALL   PRINT
01060      LD      HL,MESS4
01070      CALL   PRINT
01080      ;
01090      CALL   YNQ              ;get answer to query
01100      CP      'Y'
01110      LD      HL,COMMAND
01120      CALL   Z,CMDDOS
01130      RET
01140      ;
01150      DRIVE CALL   INKEY      ;GET LEGAL DRIVE NUMBER
01160      CP      '0'
01170      JP      C,DRIVE
01180      CP      '4'
01190      JR      NC,DRIVE
01200      CALL   NEWLINE
01210      SUB      30H
01220      RET
01230      ;
01240      NEWLINE PUSH   AF      ;CHAR. + LINEFEED +CURSOR OFF
01250      CALL   CRTOUT
01260      LD      A,10
01270      CALL   CRTOUT
01280      LD      A,15
01290      CALL   CRTOUT
01300      POP      AF
01310      RET
01320      ;
01330      YNQ   CALL   INKEY      ;WAIT FOR Y, N, OR Q
01340      CP      'Y'
01350      RET      Z
01360      CP      'N'
01370      RET      Z
01380      CP      'Q'
01390      JP      Z,EXIT
01400      JR      YNQ
01410      ;
01420      ;
01430      PROTOFF LD      HL,(4013H) ;install protection
01440      LD      HL,(EXEC),HL      ; disabler
01450      LD      HL,PATCH
01460      LD      HL,(4013H),HL
01470      RET
01480      ;
01490      PATCH  EXX              ;if overlay 2 is resident
01500      EX      AF,AF'          ; then load 4ED4H
01510      LD      A,(4414H)      ; with 18H
01520      AND      0FH
01530      CP      2
01540      JR      NZ,PATCH1
01550      LD      A,18H
01560      LD      (4ED4H),A
01570      PATCH1 EX      AF,AF'
01580      EXX
01590      DEFB   0C3H
01600      EXEC  DEFW   0
01610      ;
01620      EXIT  LD      HL,(EXEC) ;restore password
01630      LD      HL,(4013H),HL ; protection
01640      JP      DOS
01650      ;
01660      MESS1  DEFM   'Wild Card File Copy Utility:',10,10
01670      DEFM   'Enter Source Drive Number: ',14,3
01680      DEFM   'Enter Destination Drive Number: ',14,3
01690      MESS3  DEFM   'Query (Y or N): ',14,3
01700      MESS4  DEFM   'Copy (Y/N/Q)? ',14,3
01710      COMMAND DEFM   'COPY '
01720      PARAM1 EQU      $
01730      DEFS   64
01740      SOURCE  DEFB   0
01750      DESTIN  DEFB   0
01760      CONFIRM DEFB   0
01770      END      START
    
```

End

Program Listing 2. Pass Off.

```

00100 CLS      EQU      01C9H
00110 PRINT   EQU      021BH
00120 HANDLER EQU      4013H
00130 MEMTOP  EQU      4411H
00140 OVERLAY EQU      4414H
00150 CHECK   EQU      4ED4H
00160 START   EQU      0FE00H
00170 ;
00180 ;      ORG      START
00190 ;
00200 PROTOFF LD      HL, (HANDLER) ;install password disable
00210 LD      (EXEC),HL ; patch
00220 LD      HL,PATCH
00230 LD      (HANDLER),HL
00240 LD      (MEMTOP),HL ;reset top of memory
00250 CALL    CLS
00260 LD      HL,MESSAGE
00270 CALL    PRINT
00280 RET
00290 ;
00300 MESSAGE DEFM    'Password Checking Disabled',10,13
00310 ;
00320 ;      ORG      0FF00H
00330 ;
00340 PATCH   DI      (3C3FH),A
00350 LD
00360 EXX
00370 EX      AF,AF'
00380 LD      A,(OVERLAY) ;check if overlay 2
00390 AND    0FH ; is currently
00400 CP      2 ; loaded
00410 JR      NZ,PATCH1
00420 LD      A,18H ;if so then make
00430 LD      (CHECK),A ; memory patch
00440 PATCH1 EX      AF,AF'
00450 EXX
00460 DEFB    0C3H ;jump to original
00470 EXEC   DEFW    0 ; interrupt handler
00480 ;
00490 END     START

```

End

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Most programmers use logical AND to test a series of program conditions, but you can incorporate AND into your programs to produce cycles in situations where traditional cycles won't do. More than this, AND cycles can sometimes produce elegance, that elusive combination of brevity and efficiency programmers strive for.

Loop Poop

By definition, loops are round, and you use them for cyclical events—odd/even toggles, eight-hour cycles, sets of a dozen columns. Fortunately, the computer is a cyclical beast at its base level. The binary numbers used to count decimally cycle from 00000000 to 11111111 and back again. If you could watch a byte's 8 bits flip-flop between zero and 1 as the byte counts through a cycle, you'd notice that each binary digit has a rhythm of its own: The first bit oscillates furiously with each increment, while the eighth clunks lazily along.

Even Now

Consider some applications that take advantage of a computer's binary nature. For clarity, I'll use examples from Basic, but you can use the concepts explained here in other languages.

Along about lesson 3 of your favorite how-to-program -in-Basic-for-fun-and-profit manual, you probably ran into an exercise like this:

```
10 INPUT "ENTER AN INTEGER"; A%
20 IF A%/2=INT(A%/2) THEN PRINT "EVEN"
   ELSE PRINT "ODD"
30 GOTO 10
```

This common test for evenness gives the false impression that the machine must

perform an arithmetic operation to differentiate between odd and even numbers. Not so. Try this variation:

```
10 A$(0)="EVEN":A$(1)="ODD"
20 INPUT "ENTER AN INTEGER";A%
30 PRINT A$(A% AND 1): GOTO 20
```

The first—and common—method comes from our tendency to think decimally about numbers: An even number is one you (or the computer) can divide evenly by 2.

The computer's computational process, however, obviates the need for division and comparison. A computer recognizes an odd binary number by its first bit; if it's set (that is, if a 1 appears in the 1's column) it's odd. The logical AND is a binary operator; it works on the computer's most

fundamental level. Consequently, AND 1 yields either a zero or a 1 in any number's 1's column, depending on the on/off condition of the first bit of an integer—regardless of the numerical value of the number you're ANDing.

Making Sundaes

Alternating between two states is a basic component of repetition—the computer's strong suit. That makes this flip-flopping of first bits useful, whether in the your-turn/computer's-turn play of many games, the input/display sequence of word processors, or the calculation/storage cycles in applications.

But the other bits of a byte also set and reset regularly, and you can put these to work, too. Run Program Listing 1. If you look at it analogically, you have three input routines, followed by a calculation phase, summed up in a report (along with some storage).

It works because, again, AND is a binary operator. The statement A% AND 3 considers the first and second bits of an integer—in this case A%. As the computer increments A%, its first 2 bits run through the same cycle over and over again: 00 (0), 01 (1), 10 (2), 11 (3). As a result, AND 3 will produce only the numbers zero through 3 (regardless of the variable's value), which you can then put to good use. Likewise, AND 7 will yield only the numbers zero through 7.

In fact, for every value you may use to monitor a counter (or any other type of controlling variable) at its binary level, a distinct pattern of "hits" emerges, along with a distinct repeating sequence of numbers.

You've probably seen program sequences similar to this:

```
10 FOR A%=0 TO (end of video memory)
20 PRINT CHR$(191); ' a "full" graphics block
30 NEXT A%
```

It's a simple (and slow) way to turn your video display white (or green) in Basic. Programmers have discussed it so often that it's known by its generic name, the white-out routine. I'll use it to demonstrate some of the patterns generated when you AND a counter.

Type in Program Listing 2. Stripes! At least to begin with. If you're patient enough to continue beyond the first few

How AND Why

To understand how the AND operator works, try this in Basic:

```
10 PRINT 20 AND 7
```

The result is 4. Surprised? Since the AND operator works on a binary level, ANDing two values produces one made up *only* of the bits (binary digits) common to both. The numbers 20 and 7 expressed as 8-bit binary numbers are 00010100 and 00000111, respectively. When you AND them, like this:

```
   00010100
AND 00000111
-----
   00000100
```

The resulting value, 00000100, is 4.

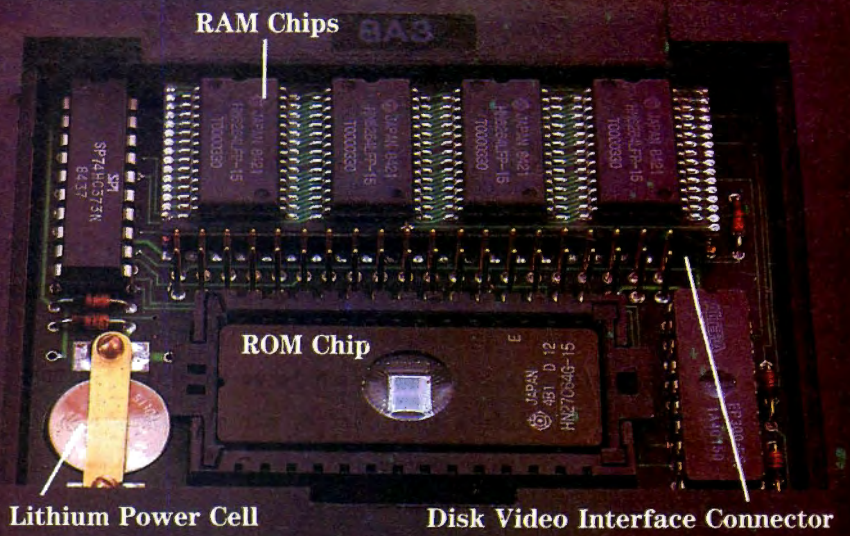
You can use the AND operator with text, as well. For example, the statement:

```
PRINT ASC("9") AND 15
```

will yield the *numeric* value of the *literal* character when you AND them as follows:

```
   00101001 ("9"), the character
AND 00001111 (15, the value)
-----
   00001001
```


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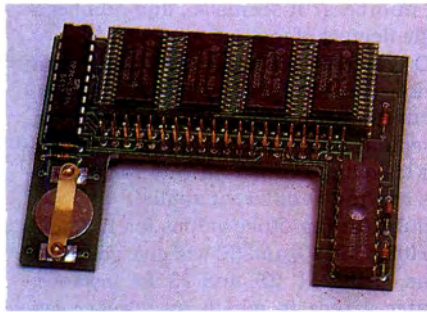
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Program Listing 1. Putting AND through a cycle.

```
10 A% = 1
20 ON (A% AND 3) + 1 GOSUB 400, 100, 200, 300
30 IF (A% AND 3) = 0 THEN GOSUB 500
40 A% = A% + 1:GOTO 20
99 '
100 PRINT "Subroutine: Vanilla, chocolate, or strawberry?":RETURN
199 '
200 PRINT "Subroutine: Hot fudge, butterscotch, or pineapple?":RETURN
299 '
300 PRINT "Subroutine: Whipped cream and nuts?":RETURN
399 '
400 PRINT "Subroutine: (A brief pause while we make it.)":RETURN
499 '
500 PRINT "Subroutine: Here's your sundae, sir or madam.":
501 PRINT "      (Collect money.)"
502 PRINT "      (Make change.)"
503 PRINT "      (Smile.)"
504 PRINT "      (Have a nice day!)"
```

End

Program Listing 2. Rhythmic syncopation.

```
10 INPUT "Line length (64,80...)"; L%
20 INPUT "Number of video lines"; D%
30 V% = L% * (D% - 1)
40 FOR N% = 1 TO 256
50 CLS
60 FOR A% = 0 TO V% - 1
70 IF A% AND N% THEN PRINT CHR$(191); ELSE PRINT " ";
80 NEXT A%
90 PRINT "AND"; N%, "Press any key";
100 I$ = INKEY$:IF I$ = "" THEN 100
110 NEXT N%
```

End

Program Listing 3. Three independent tasks coincide at regular intervals.

```
10 P1% = 0: P2% = 0: P3% = 0: A% = 0: S$ = ""
15 ' replace PRINT @ statements with LOCATE 0, P1%...or
   another appropriate construction if necessary.
20 PRINT @P1%, "1"; @P2%, "2"; @P3%, "3";
30 IF A% AND 1 THEN PRINT @P1%, S$;: P1% = (P1% + 1) AND 63
40 IF A% AND 3 THEN PRINT @P2%, S$;: P2% = (P2% + 1) AND 63
50 IF A% AND 7 THEN PRINT @P3%, S$;: P3% = (P3% + 1) AND 63
60 A% = (A% + 1) AND 16383
70 GOTO 20
```

End

screens, you'll see patterns beyond the initial and simple odd/even flip-flopping. The lines' rhythms syncopate, and narrow stripes mix with wide ones. If you have an 80-column screen, the stripes break down when the binary operation of the AND beats against the decimal condition of a screen designed to coincide with a standard sheet of paper.

These on/off, go/no-go patterns aren't the only alternations possible. Small changes produce entirely new sets of rhythms. Make these modifications to Listing 2:

```
45 FOR N1% = 1 TO N%
70 IF (A% AND N%) AND (A% AND N1%)
   THEN ...
85 NEXT N1%
```

Weird and wonderful things begin to happen, and you still haven't exhausted the possibilities. Stretching them further, you can change the middle AND in line 70 to OR. Still further, you can step one or more of the variables. And that doesn't

even take into consideration the actual values generated, like the ones we used to make sundaes.

Suddenly you go beyond the ordinary mine/yours/his/hers sequence of turns. AND 11, for example, gives you zero, 1, 2, 3, zero, 1, 2, 3, 8, 9, 10, 11, 8, 9, 10, 11. . . (far different from the sequences you're used to seeing, and difficult to produce in any other way).

What sorts of geometry would such a technique render?

I can suggest some applications. What if, for instance, the "counter" being monitored were your computer's clock? You could get regularly flashing cursors and messages and irregularly sequenced graphics (meant to simulate explosions, possibly?) with ease.

And if the counter were a real-time clock—a portion of TIME\$, for example—then a bulletin board system could initiate its housekeeping and file-management

Having AND at your command may turn a cumbersome routine into an elegant bit of programming.

functions automatically every eight hours, or remind users of the time every five minutes.

Going in Cycles

Making a sundae took five operations in sequence and combination. Many applications require this mixed bag of routines within a cycle. I know of a simulation in which each turn consists of 21 events. Both short sequences and individual moves alternate between the players. Some moves are simultaneous and others are unique within the turn. Ordinarily, a series of GOSUB or Call commands will bring each event into play in its proper order, but with a bit of cleverness, a single instruction can do the job elegantly.

And the "counter" need not count. It may be the result of a calculation or user input, certain of which will demand one set of responses, others another set.

One more example, not very elegant in this context (see Program Listing 3). Racing numbers? It seems so, and number 3 is the fleetest of foot.

Or you may see it as three independent tasks—each operating at its own frequency—that coincide, one with another, at regular intervals. Or they may be vehicles traveling at different velocities or vectors moving at different angles.

Substituting other values for 1, 3, and 7 in lines 39, 40, and 50 will give you other ideas. Using 11, 26, and 73, for instance, creates a race in which no number can maintain the lead. Does this suggest sound or radio waves going in and out of phase? The beats of a musical chord? Regardless, the timing of each event is dependent on one control: A%.

Incidentally, you may have noticed how nicely the AND 63 in lines 30, 40, and 50 limits the field of action. Also, AND 16383 in line 60 performs a valuable service: It prevents an overflow error by keeping A% well within its limits as an integer.

Like any programming tool, its value is far from universal, but having AND at your command may, from time to time, turn a cumbersome routine into an elegant bit of programming. ■

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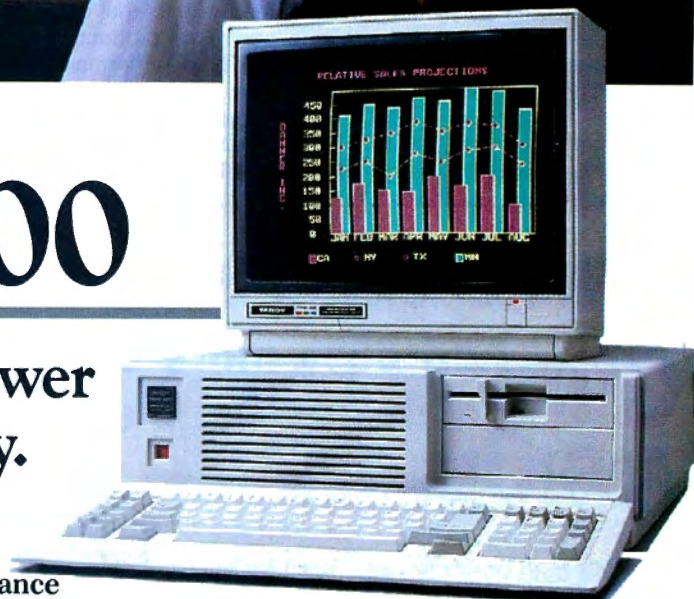
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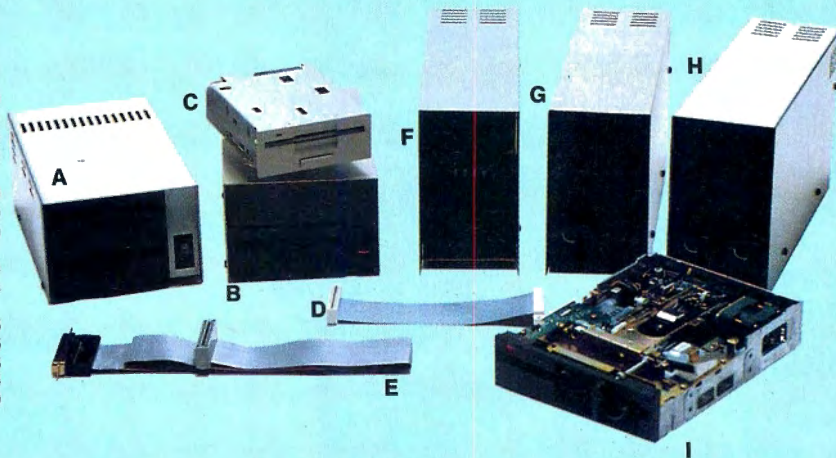
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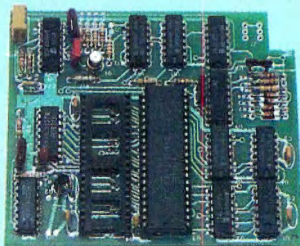
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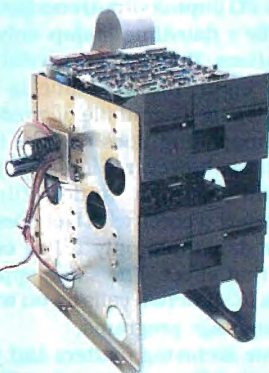
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Keeping Dates

I'm writing about file dates this month for those of you who create directory screens full of data files or programs and sometimes wish you could travel backward in time to find the most recent version of a file. I've also got the poop on the Model 1000A, Tandy's Disk Cartridge System, and an undocumented Basic screen-dump statement.

Time Stamp

When DOS creates or modifies a file, it stamps it with the current system date and time, which are revealed when you take a directory. When you're recovering from a minor disk disaster or sorting out forgotten files on a crowded disk, it helps to know the conditions under which the date/time in a file's directory entry is changed by DOS commands or application programs. Fortunately, there's a common-sense rule: If the file content is changed, so is its date/time.

The MS-DOS Copy and Rename commands don't change the contents of a file, and they don't change the file date/time. If you create a new copy of an existing file and give it a new name:

```
COPY OLDFILE NEWFILE
```

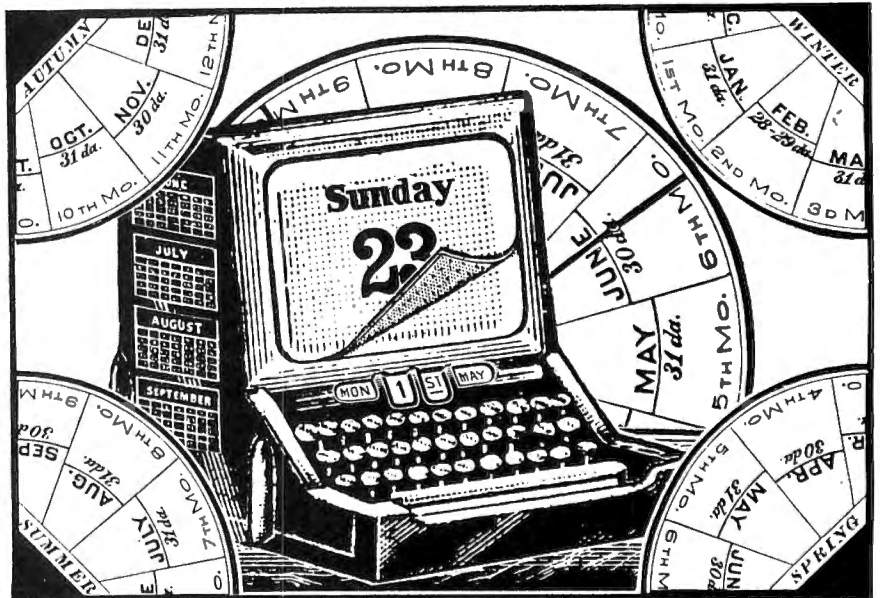
the new copy will have the same date/time as the old file. Use Copy to back up files; you'll always know if two files are the same because they'll have the same date/time.

The combine and append forms of the Copy command (using the plus symbol) do create and modify files. The following command:

```
COPY FILE1 + FILE2 FILE1
```

appends FILE2 to FILE1. FILE1 is modified so its date/time is reset with the current system date/time. FILE2 remains unchanged along with its date/time.

Application programs also follow this common-sense rule, but with a twist. Any file-save operation from an application changes the file date/time, even if you've made no modifications to the file. Loading a letter into your word proces-



sor or a program into GW-Basic and then immediately saving it back to disk changes the date/time in the file's directory entry. Loading and running a Basic program doesn't change its date/time.

EDLIN, the MS-DOS line editor, automatically saves the file you're editing when you exit back to DOS with the E command. Actually, it renames the old version of the file with the BAK extension, then writes the new version either as a new file, or over the old version of the back-up copy. The back-up copy keeps the old file date/time. If you're editing a batch file with EDLIN and decide you don't want to make file changes after all, you can exit with the Q (for quit) command.

Basic file I/O (input/output) commands change a file's date/time stamp only in write operations. If you close a serial file opened for input, the date/time is unchanged. Closing a serial file opened for output or appending does change that file's date/time, however. Similarly, just opening and closing a random file or reading in a few records with Get doesn't change the date/time; only a Put command has that effect. The same applies to DOS disk I/O function calls if you write machine-language programs.

If accurate archiving matters and you dislike scanning through several versions of a data file to see which is the latest, then hew consistently to two rules:

1. Answer the date and time prompts correctly when you turn on the computer.
2. Use the DOS Copy command to back up important files. Don't use the application program that produced the original to make the back-up or you'll end up with identical files having different time stamps.

Eyestrain

During their big year-end sale, Tandy sold out of the Model 1000 and quietly phased in the 1000A, which has fewer chips (through VLSI technology), different video circuitry, and a socket for an 8087 floating-point math coprocessor. Unfortunately, some new 1000A owners found their RGB monitors barely readable.

According to Tandy, the monitor manufacturer slightly changed the electronics so that some 1000A/RGB monitor combinations resulted in fuzzy video images. Tandy adjusted the 1000A's RGB video circuitry when they discovered the problem.

Tandy will fix it by replacing a resistor pack for free during the 90-day warranty period. For inexperienced owners who were unaware their monitor isn't supposed to be fuzzy or who figure they got what they paid for, the resistor replacement costs about \$40 after the warranty expires.

If you have a Tandy 1000A with RGB monitor and can't tell uppercase M from

System Requirements

Model 1000



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- Structure Assignment, Passing/Returning Structures

abs
asm
asmx
atan
atof
atoi
atol
bdos
bdosx
bios
biosx
calloc
ceil
cfree
chain
character
chdir
chmod
clearerr
close
clrscrn
cmpstr
conbuf
conc
cos
cpyst
creat
curshlk
curshln
curscol
cursrow
cursrff
curson
delete
drand
exec
execd
execv
exit
exitmsg
exp
fabs
fclose
fdopen
feof
ferror
fflush
fgets
fileno
filetrap
find
floor
fopen
sprintf
fputs
fread
free
freopen
fscanf
fseek
ftell
fwrite
getc
getch
getch
putch
getchar

Functions

getcseg
getdseg
getd
putd
getdate
gettime
geti
puti
getkey
getmode
setmode
hypot
getw
heapsiz
heaptrap
hypot
index
inp
insert
iofilter
isalnum
isalpha
iscntrl
isdntrl
isdigit
islower
isprint
ispunct
isspace
isupper
itoa
keypress
lefts
gets
log
log10
longjmp
lseek
malloc
alloc
mathtrap
mid\$
mkdir
modf
movmem
open
outp
peek
perror
poke
poscurs
pow
printf
putc
putchar
puts
putw
rand
longjmp
read
readattr
reach
writech
readdot
sqr
srand
scanf
realloc
rename
replace
repmem
rewind
rights
rindex
rmdir
scanf
setbuf
setbufsiz
setcolor
setdate
settime
setjmp
setmem
sin
sound
sprintf
sqrt
srand
scanf
stacksiz
str\$
strcat
strcmp
strcpy
strlen
strncat
strncpy
strsave
system
tolower
toupper
ungetc
ungetch
unlink
write
writechs
xmembeg
xmemend
xmemget
xmemput
xmovmem
_exit

MIX Editor **\$29.95**

When you're programming in a high level language you need a high powered editor. That's why we created the MIX Editor. It's a powerful split screen text processor that works great with any language. It has auto indent for structured languages like Pascal or C. It has automatic line numbering for BASIC. It even has fill and justify for English.

You can split the screen horizontally or vertically and edit two files at once. You can move text back and forth between the two windows. You can also create your own macro commands from an assortment of over 100 predefined commands. It

comes configured like WordStar but you can customize it to work like other editors or word processors.

The editor works terrific with our C compiler. The MSDOS/PCDOS version has a macro for compiling direct from memory. If your program has an error the editor positions the cursor to the error and displays an error message. You can also run other programs and execute DOS commands. Because the editor works so well with our C compiler we want to make sure you have both. For a limited time we're offering the editor for only \$15 when purchased with the C compiler.

ASM Utility **\$10**

The ASM utility allows you to create your own assembly language function libraries. It works with Microsoft's MASM or M80 assemblers. It provides macros for function entry and exit so you don't have to worry about environment details. It also provides a macro for calling C functions from assembly language. Lots of useful assembly language functions are included as examples.

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W, or can't read highlighted text (reverse video), you may have the problem. The CM-2 monitor normally produces clear text (it's nothing like the CM-1, but better than an IBM color monitor), and the problem should be immediately apparent. The cheaper CM-4 display, on the other hand, isn't as clear; be sure your CM-4 is much fuzzier than others before demanding a fix from your local Tandy repair people.

Reader Anton Nosek (Corte Madera, CA) struck out on his own and fixed his fuzzy display (I don't recommend this, however). Resistor pack RP12, 68 ohms according to 1000A schematics, should now be 33 ohms (Tandy Technical Bulletin 1000:22). Nosek also noticed a trimpot, which he adjusted to lower the speaker volume, near the left front corner of his 1000A.

Should you buy and install an 8087 math chip for a 1000A? The 8087 handles special machine-language instructions that perform floating-point math operations 50-100 times faster and more efficiently than the 1000's 8088 CPU (central processing unit).

A program will run faster on an 8087-equipped computer only if it uses the 8087's floating-point instructions. Lotus 1-2-3, for instance, uses 8087 math instructions if it finds an 8087 chip in your computer. If not, it resorts to equivalent math algorithms using the slower 8088 instructions.

Several vendors provide 8087 boards you can put in the socketless 1000. Hard Drive Specialist (16208 Hickory Knoll, Houston, TX 77059, 713-480-6000) sells an 8087 board for the 1000 (\$249), and an 8087 chip for the 1000A (\$119). Trionix (3563 #B Roosevelt St., Carlsbad, CA 92008, 619-434-4439) also sells an 8087 board for the 1000 (\$235). I'll be trying out both.

Bernoulli Box Bingo

Tandy's Disk Cartridge System (DCS) is an Iomega Bernoulli Box, a disk storage device with definite advantages and a high price (\$2,395 for a 10-megabyte unit with interface card). The Bernoulli Box employs unusual engineering to achieve hard-drive speed and data capacity on a soft-surfaced disk. The rapidly spinning disk creates an air current between the disk and the read/write head, drawing the flexible disk surface close enough to the head (that's Bernoulli's principle) to permit high-density information storage.

The moving dimple on the disk surface never comes in contact with the read/write head, thus eliminating friction common to floppy disks. The major advantage of the DCS over a Winchester-type hard drive is that smoke particles

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and vibrations will disrupt the airflow between disk and head, causing the disk to pull away from the head instead of crashing like a hard drive.

Another plus is the removable 10-megabyte cartridge (approximately \$80). If you produce data files smaller than 10 megabytes and don't need to have all the data on one drive, you can simply plug in a new cartridge when the old one fills up. With a two-drive unit (\$3,395 including expansion board), you can back up 10 megabytes from one cartridge to another in less than five minutes. The disadvantage, besides the high price, is that you can't boot the system from a DCS. You can, however, set it up as the system disk after bootup.

The DCS's expansion card fits in Models 1000, 1200, and 3000. (A second adapter for the Model 2000 is imminent.) I used Tandy's DCS with a 1000 and a 3000. To get a rough idea of speed, I ran the Doran test using Norton Utilities' Disktest program. The Box produced results of 63.4 KB/s (kilobytes per second) on the 1000 and 64.2 KB/s on the 3000. An XT hard drive typically tests at 44 KB/s. The DCS tied with the 3000's own hard drive.

The DCS comes with a driver program (install it in CONFIG.SYS) and three utility programs: a DCS formatter and Backup and Restore programs for backing up a hard drive to DCS cartridges. The DCS user's manual has lots of good details on using the software.

The Format command lets you assign a volume name and set the interleave. Formatting 10 megabytes took one minute, 26 seconds. If you back up a hard drive onto a DCS cartridge with the DCS back-up utility, the cartridge can't be used for normal file storage. The back-up utility compacts all files and subdirectories into one huge file. Backing up 5 megabytes' worth of files took a little more than three minutes.

One difference between this Bernoulli Box and the one I looked at two years ago is that the current version starts ticking annoyingly after 10 seconds of disuse. According to the manual, the DCS is performing a head-seek pattern to distribute wear evenly over the disk surface. Although the head doesn't touch the disk, the constant surface flexing at high RPMs must eventually take its toll. ■



Dave Rowell is an 80 Micro technical writer specializing in MS-DOS computing. Address correspondence to him to 80 Micro, 80 Pine St., Peterborough, NH 03458.

Untangling Wires

The Multi-Link user-programmable interface cable from Craig Data Cable Co. is one solution to RS-232 asynchronous interfacing problems. Its selectable configurations cover 95 percent of interface applications, including printers, plotters, CRTs, modems, and others.

The expandable, 10-foot cable has RS-232 male-male connectors at each end. It sells for \$19.95. For information, contact Craig Data Cable Co. Inc., 652 Glenbrook Road, Stamford, CT 06906, 800-243-5760 (203-356-9315 in Connecticut).

Circle 570 on Reader Service card.

Kick in the DOS

Dynatec's PC Supercharger makes IBM PC/ATs and compatibles run at twice their normal speed. It plugs into the computer's 8088 socket, leaving expansion slots free for memory, video, and other peripheral boards.

Supercharger uses a fast 8088-1 microprocessor and is 100-percent compatible with MS-DOS hardware and software. Memory access, screen writes, and operation of high-capacity memory and graphics boards are all performed at faster rates that vary according to the application.

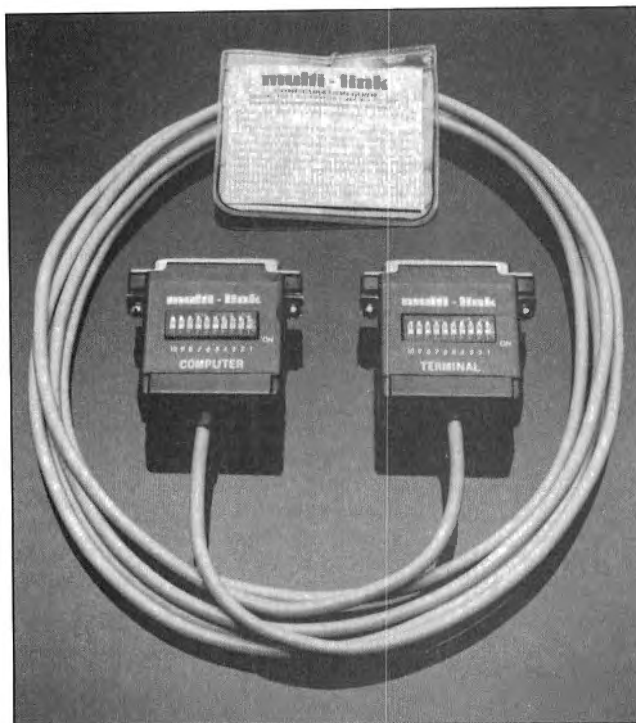
Retail price is \$279.95. Illustrated instructions are provided. For further details, contact Dynatec Systems Inc., 870 East 9400 South, Suite 103, Sandy, UT 84070, 801-572-6867.

Circle 572 on Reader Service card.

Helping Hand

A new 64K, multi-function buffer from Reasonable and Commercial Sales Inc. works with all Centronics parallel printer systems.

Built-in memory diagnostics run a self-test each time the unit is turned on. The buffer receives print data at



The programmable, asynchronous interface cable from Craig Data.

up to 8,000 characters per second and outputs it at the printer's rate, freeing the computer for the next job. Connecting several buffers serially increases capacity.

The unit comes with power supply, cables, and documentation. It sells for \$89.95 plus postage and handling. For details, contact Reasonable and Commercial Sales Inc., 8115 SE 82nd, Portland OR 97266, 503-775-3939.

Circle 578 on Reader Service card.

Its Favorite Subject

Digital Trainer-1 from IM-Press is a software package that teaches digital logic concepts on an MS-DOS computer.

Such devices as AND, OR, INVERTER, NAND, half adders, and registers are explained individually and in combination. Users can design and emulate a micro-computer device on screen, along with several fixed ROMs, RAM, and an EPROM burner to create their own ROM code. Digital-to-analog

and analog-to-digital interface devices, complete with sensors and controls, are also covered.

Digital Trainer-1 costs \$10 and is distributed as a "shareware" product. Software libraries, user groups, and computer stores may request a free copy on their official letterhead. For information, contact IM-Press, 1412 Rosewood, Ann Arbor, MI 48104, 313-761-2231.

Circle 573 on Reader Service card.

Scalpel, Please

A miniature soldering iron from M.M. Newman Corp. makes precision electronic assembly easier.

The Antex Model G/3U is 6½ inches long, weighs less than an ounce, and comes with a 6-foot cord. It heats up to 725 degrees Fahrenheit in 45 seconds. More than 40 tip styles are featured, including a .012-inch tapered needle point. The slide-on tips are directly grounded to protect sensitive components.

Retail price is \$17.95. For information, contact M.M. Newman Corp., 7 Hawkes St., P.O. Box 615, Marblehead, MA 01945, 617-631-7100.

Circle 577 on Reader Service card.

A Way with Circuits

Circuit Design Mate from Midwest Micro-Tek is a schematic capture program designed to run on IBM PC/XT/ATs and compatibles. It allows schematics editing the way a word processor handles text.

The menu-driven program includes an on-line manual and standard TTL library. Users can create libraries of frequently used components and print schematics on Epson-compatible dot-matrix printers.

System requirements include two double-sided disk drives or one disk drive and hard disk, PC-DOS/MS-DOS 2.0 or higher, and a 640- by 200-pixel IBM-compatible graphics card. For details, contact Midwest Micro-Tek Inc., P.O. Box 29376, Brooklyn Center, MN 55429, 612-560-6530.

Circle 576 on Reader Service card.

Matthew, Mark, Luke, and Bill

Basic and MS-DOS enthusiasts can learn more about the inner workings of a computer giant by reading the 1000-page volumes in the Microsoft Reference Library. Each book will contain technical data previously unavailable to the general public, including information on Microsoft operating systems, languages, and application software. Entire volumes will be devoted to Windows, system programming, Xenix, CD-ROM, and future MS-DOS versions.

The first volume, the *MS-DOS Technical Reference Encyclopedia*, includes contributions by founder William

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★★★★ See the 5-Star review in the Oct. '85 issue! ★★★★★

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Do you really like SCRIPSIT™, but wish it did a whole lot more? You'd like a lot of new features without having to relearn a whole new system or spending much additional money? Our PowerScript 4.2 is just the answer. PowerScript 4.2 adds two categories of additions to SCRIPSIT™. Directory/File functions (DIR, FREE, KILL, CHAIN, LINK), and embedded printer control functions. With all the smarter printers out there, it doesn't make any sense to use a "dumb" word-processor anymore. In this case, "dumb" means it can't really control your printer to its fullest capacity. If you notice, there are MANY word processors out there for the TRS-80™ besides the ones from Tandy. We could recommend any one of these. IF YOU WANTED TO BUY SOMETHING NEW. One of the problems, however, is that you need to learn new commands. The second problem (maybe the main one) is that you need to shell out a lot more money to buy it! PowerScript 4.2 gives you many new features, while retaining the commands you already know—at a very low price! All our previous files will, of course, be compatible. PowerScript 4.2 received a 4½ star rating in 80 Micro's July '85 issue. Supports Mod I, III, and 4 versions of SCRIPSIT™ (Ownership of SCRIPSIT required).

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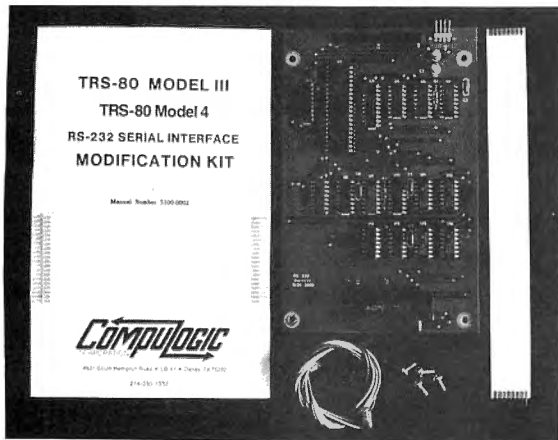
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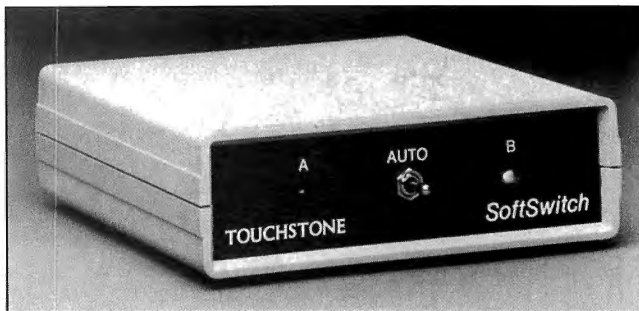
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MS-DOS NEW PRODUCTS



Touchstone Technology's Softswitch directs parallel printer output.

H. Gates and sells for \$134.95. For information, contact Microsoft Press, 10700 Northup Way, Box 97200, Bellevue, WA 98009, 206-828-8080.

Circle 575 on Reader Service card.

Three 5-foot ribbon cables (\$17 each) are required. For information, contact Touchstone Technology Inc., 955 Buffalo Road, P.O. Box 24954, Rochester, NY 14624, 716-235-8358.

Circle 579 on Reader Service card.

Ambidexterity

Touchstone Technology's Softswitch is an auto-manual printer switch that uses embedded codes to direct a microcomputer's output between two parallel printers. The solid-state decoding and switching device can be used either as a manual A-B or software-controlled, code-sensitive switch. Its 5- by 5- by 1 1/2-inch case features LED indicators.

Softswitch handles repetitive switching tasks and can be used for remote and unattended operations in addition to routine needs.

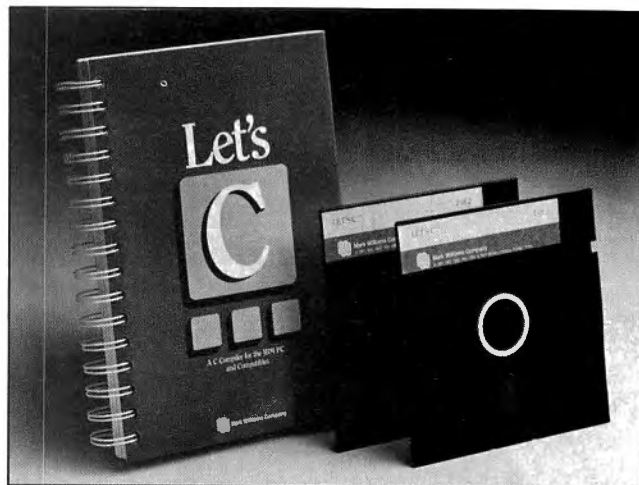
The \$139.95 list price includes external ac-to-dc power supply, operating instructions, and a 1-year war-

Programmer's Phrasebook

Let's C from Mark Williams Company is a C-language compiler providing an alternative to expensive professional and low-priced beginner's models.

The compiler is based on the one offered in Mark Williams' \$495 C Programming System. Features include recent C extensions; a standard C library; full Unix compatibility; one-step compiling, linking, and assembling; English-language error messages; and a MicroEMACS full-screen editor and source code.

Let's C runs on IBM PCs and compatibles with MS-DOS 2.0 or higher, and re-



Let's C is an abbreviated C-language compiler from Mark Williams Company.



Disc Instruments' Lynx cursor control device.

quires 128K RAM plus two disk drives or a hard disk. It sells for \$75. For details, contact Mark Williams Company, 1430 West Wrightwood, Chicago, IL 60614, 312-472-6659.

Circle 574 on Reader Service card.

Mickey Mouse Club

A new software graphics driver allows the Lynx trackball device from Disc Instruments to emulate Microsoft's mouse.

The driver disk contains a command file loaded ahead of program software that can be

added to a hard-disk AUTO-EXEC routine. The trackball plugs into the serial port of IBM PC/XT/ATs and compatibles. You can use it on any convenient surface or hold it in your hand.

The Lynx alone costs \$119, \$149 with a cable/interconnect and plug-in power supply but without a driver and manual, and \$159 with everything. Contact Disc Instruments (a Honeywell subsidiary), at 102 East Baker St., Costa Mesa, CA 92626, 714-979-5300.

Circle 571 on Reader Service card.

MS-DOS New Products Index

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Mistaken Measures

When the American National Standards Institute (ANSI) first announced that it was proposing a standard for Basic, I believed the idea was a good one. I assumed the ANSI standards committee would take user preferences into account and preserve the spirit, if not the exact likeness, of popular existing versions of Basic. I didn't suspect that ANSI would alter features that had proved their worth to millions of Basic users in thousands of useful applications.

I envisioned a standard that combined the best features of Microsoft, DEC, and IBM VS Basic. Though I expected Microsoft's influence to dominate, I suspected DEC's syntax would win a few rounds and that IBM and a few other manufacturers would have some say, too. Overall, I looked forward to the possibility of writing applications on a Tandy 1000 that could run on minis and mainframes.

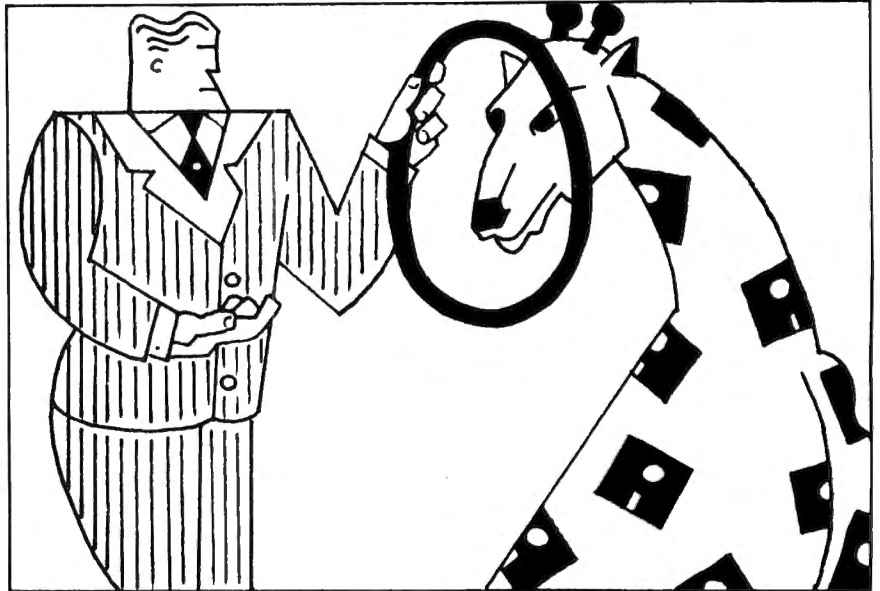
Alas, ANSI had other ideas. The search-and-destroy tactics of its standards committee left little of the old Basic intact. In its place, ANSI gave us a standard made in its own image and likeness. ANSI standard Basic is a mish-mash that looks like a mutant Fortran sired by Pascal and by PL/I.

Tried and True

Basic proved too inviting a target for the academic types on the standards committee who love to impart wisdom where it isn't needed. They couldn't sit back and let the motley horde of Basic users define the standard, after all. They felt obliged to impose an enlightened presence.

The result is a setback for us all. Before ANSI interfered, Basic had evolved in harmony with the needs and preferences of users. Features were added, dropped, or modified, depending on their adaptive qualities. Versions that users found too slow fell into well-deserved obscurity. Those that did the job rose naturally to the top of the evolutionary ladder.

The form of Basic that emerged from this process of natural selection is, I believe, the most powerful programming language in use today. Though it is not very large and not as complex as PL/I and Cobol, it can manage more tasks



than other languages. It can perform all of the computational tasks of Fortran, yet it is easier to use. Compiled, it might run even faster than Fortran. It can manipulate character strings better than Pascal and C, and it can perform graphics, communications, and low-level memory manipulations as well.

You'd expect that the ANSI standards committee would have taken into account the most popular dialects of Basic when it formulated its standard. Microsoft, DEC, and IBM VS Basic became the most popular versions of the language because they incorporated features users want. But there's little resemblance between these versions of Basic and the standard ANSI has endorsed.

A case in point is the Let statement. In ANSI standard Basic, this worthless keyword is no longer optional; it's mandatory. Not even the MID\$ function was left unscathed; the standards committee thought it confusing and so changed it to something far different and not a bit better.

ANSI standard Basic goes straight downhill from there. BCD (binary-coded decimal) arithmetic must be applied, no matter that it guarantees three to four times slower execution. File input/output (I/O) is atrocious and may mark a return to the glory days of Applesoft. GOTOs, of course, are discouraged. ANSI says this is for our own good. Shout hal-

lelujah; we've been delivered. (Pardon me a moment while I choke. I feel as if a friend has been sentenced to death.)

Standard Cases

In case you think I'm merely ranting against authority (I've been called an iconoclast by some in this industry), allow me to set the record straight: I think standards can be, and usually are, beneficial. The standards for ASCII codes and RS-232C serial interfaces are two examples.

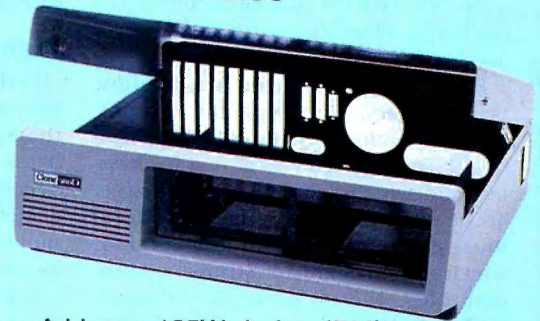
C has a standard, of sorts: Brian Kernighan's and Dennis Ritchie's *The C Programming Guide*. Though it has holes, the guide has become a standard reference for C programmers. So far, at least, ANSI hasn't found a way to improve on it. In a few years, I'm sure they'll get to it, though; the standards committee just won't rest until it rids the world of all GOTOs. (Why, C even allows numeric operations on character data. Now that's really sloppy!)

A Cobol standard has existed for years, and so has one for PL/I. There's even talk of standardizing Assembly language, which I think would be useful. It's easy to become confused by Assembly-language mnemonics that run left to right for one processor and right to left for another, not to mention by the widely differing ways the language represents essentially similar operations.

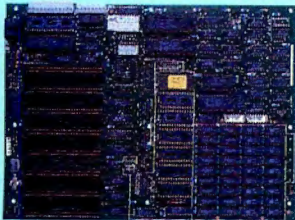
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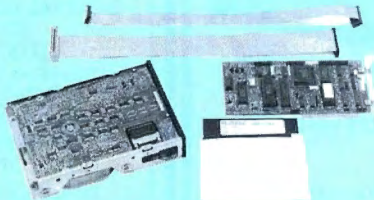
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I wonder, though, how ANSI will cope with the jump instruction in Assembly language. After all, a jump is nothing more than a GOTO with a different name. Maybe if the standards committee isn't told what the jump instruction does...

But not all standards are benign. Some, in fact, are downright harmful. The International Standards Organization (ISO) relegated Pascal to a backwater from which it might never emerge. To be even marginally useful, Pascal must go far beyond the ISO version, which has no character strings, no random files, and no multiple-precision arithmetic, to mention just a few things.

Fortran was initially helped by Fortran-77, a standard that helped keep the language alive. But a new standard recently proposed by ANSI, Fortran-88, is likely to do more harm than good. The new standard will outlaw the use of blank common blocks and GOTOs, features that ANSI believes encourage unstructured programming.

Though I'm not a fan of either Fortran, I believe the old saw, "If something ain't broke, don't fix it." A number of academic computing centers still support Fortran, primarily because many faculty members

were trained on the language. Applications they wrote with the language 10 years ago still work fine. But probably 90 percent of their existing Fortran-77 applications won't run under Fortran-88.

Fighting Mad

Perhaps I'm too cynical, but I can't help linking ANSI standard Basic with the fact that the chairman of the standards committee is one of the authors of True Basic, the *only* version of Basic that conforms to the standard. It would be quite an edge to write a standard for Basic that shut the competition down.

Likewise, I'm suspicious of the ads for True Basic that denigrate Microsoft's version by referring to it as "street Basic." I've been in the trade a long time, and until I read an ad for True Basic, I'd never heard of "street Basic." I don't know about you, but I think negative advertising stinks. I think a good product stands or falls on its merits. Only a poor product needs to rip the competition to garner sales. After reading True Basic's ad, I wouldn't touch the product with a 10-foot pole.

What can be done to combat ANSI's search-and-destroy tactics? For one thing, I intend to let Microsoft, IBM, and

DEC know what I think. I'll let the ANSI standards committee know too, for all the good it'll do. I hope you do the same.

Tell them this: If anyone tries to offer an ANSI standard version of Basic, you won't buy it. Tell them you want Microsoft Basic or something compatible. You don't want a monster of a language pieced together like Frankenstein; you want a tested, practical version of Basic that has been molded and enhanced over the years.

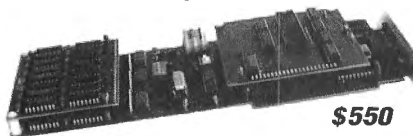
We're users. There are several million of us, and even if our views run counter to academic theories of computing, our opinions count for something. They ought to count a lot more than those of the ANSI standards committee. How dare they ignore us? How dare they! ■



Bruce Tonkin is an independent software developer, industry critic, and author of The Creator data-base manager. You can reach him at 34069 Hainesville Road, Round Lake, IL 60073.

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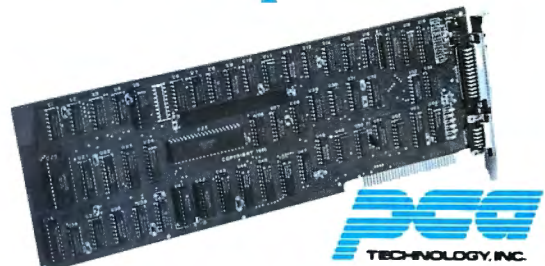
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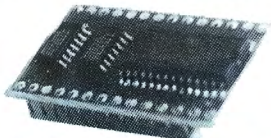
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8607

Debug Stops Here

Before I bought my first computer, I read that a programmer spends 50 percent or more of his time debugging. This seemed to me like a silly waste of time. If you think clearly and type carefully, I reasoned, you should rarely need to debug a program.

I hadn't had my Model I long before I found that my line of reasoning bore no relationship to the real world of programming. Like most beginning programmers, I spent countless hours tracking down and fixing stupid errors, logical errors, syntax errors, and even the "unprintable errors" that Model I Basic sometimes reported. The debugging process was always slow and often discouraging.

I have since discovered that certain techniques and tools can speed up debugging and make it less painful. I still spend hours chasing bugs, but I usually do so with a sense that my efforts are leading efficiently toward a relatively bug-free program.

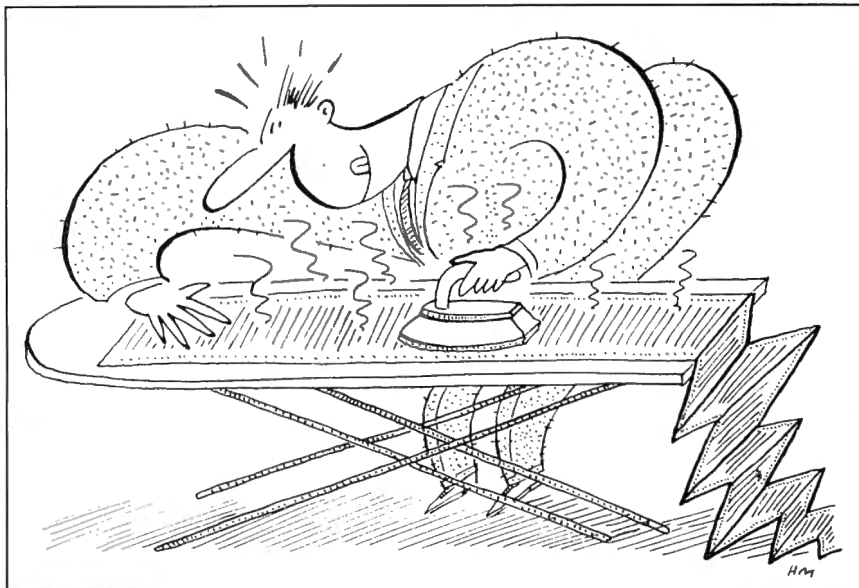
I get many questions, both by mail and on CompuServe, from readers who need help debugging. Unfortunately, I don't have the time to help each person. I'm therefore devoting this month's column to the debugging techniques I use each month while creating the demonstration programs for this column. I'll include a combination of a macro instruction and JCL (job-control language) program I've developed that gives me something similar to the power of the symbolic debuggers available for MS-DOS computers.

Before I start, I need to explain that debugging tends to be the most idiosyncratic part of programming. I hope this discussion will help many of you, but some programmers, especially those who have developed their own debugging techniques, might disagree with my working methods.

**LOAD
80**

System Requirements

Model I, III, or 4
TRSDOS 6.x or LDOS
EDAS (Pro-Create)
Editor/assembler



Program Listing 1. Demonstration program.

```

00100 ; High Memory Module Finder
00110 ; For TRSDOS 6.2.x
00120 ;
00130 ;-----
00140 ; SVCs used:
00150 @ABORT EQU 15H
00160 @CLS EQU 69H
00170 @DEBUG EQU 1BH
00180 @DSPLY EQU 0AH
00190 @ERROR EQU 1AH
00200 @EXIT EQU 16H
00210 @HEX16 EQU 63H
00220 @HIGH$ EQU 64H
00230 ;-----
00240 ; Constants:
00250 CR EQU 0DH ;Carriage return
00260 LF EQU 0AH ;Line feed
00270 ETX EQU 03H ;Message terminator
00280 JMPR EQU 18H ;Jump Relative instruction
00290 ;-----
00300 ; Macro commands used:
00310 ;
00320 SVC M JRO #NUM
00330 L L A,#NUM
00340 RST 28H
00350 ENDM
00360 ;
00370 PRINT MACRO #ADDR
00380 PUSH AF
00390 PUSH DE
00400 PUSH HL
00410 LD HL,#ADDR
00420 SVC @DSPLY
00430 JP NZ,SVCERR
00440 POP HL
00450 POP DE
00460 POP AF
00470 ENDM
00480 ;
00490 DEBUG MACRO #NUM,#TITLE
00500 IF $_D#NUM
00510 SVC @DEBUG
00520 JR $$?
00530 DB #TITLE
00540 EQU $$?
00550 ENDF
00560 ENDM
00570 ;

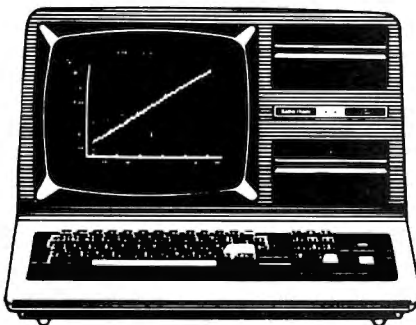
```

Listing 1 continued

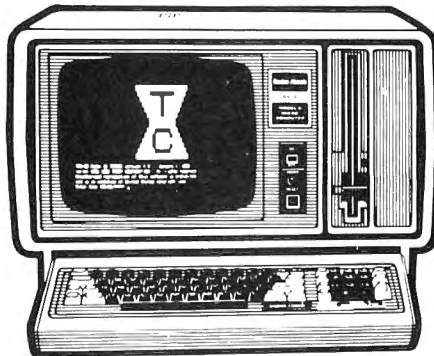
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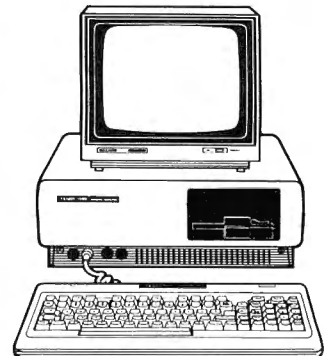
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Listing 1 continued

```

00580 ;-----
00590 ;
00600          ORG      3000H
00610 BEGIN  JR      START          ;Skip data area
00620 ;
00630 BUF    DS      16              ;16 spaces for module name
00640 HIGH   DW      $-$            ;Space for HIGH$
00650 NEWHI DW      $-$            ;Space for next HIGH$
00660 ;
00670 START  SVC      @CLS
00680        PRINT    HELLO          ;Logon message
00690        LD      B,0              ;Function: HIGH$
00700        LD      HL,0             ;Function: get current value
00710        DBUG    1,'GetHigh$'
00720        SVC      @HIGH$         ;Get current HIGH$ in HL
00730        JP      NZ,SVCERR      ;Go if error report
00740        LD      (HIGH),HL       ;Else save current value
00750        CALL   DSPHL           ;and display it
00760        CALL   MLOOP          ;Show each module
00770        JP      DONE           ;Close up and leave
00780 ;-----
00790 ; Main Loop -- Show each module name & addresses in hex
00800 ; At start -- assume that HL holds current contents of (HIGH)
00810 ;-----
00820 MLOOP   EQU      $
00830        DBUG    2,'Main loop'
00840        INC     HL                ;Check for 0FFFFH end of list
00850        LD      A,H              ;Get MSB
00860        OR     L                 ;Merge LSB
00870        RET     Z                ;If HL had 0FFFFH, we're done
00880        LD      A,JMPR          ;Else test for JR instruction
00890        CP      (HL)             ;Did we find one?
00900        JR     Z,MLP1           ;Yes -- go
00910        CALL   BADMOD          ;Else display "Bad Module ..."
00920        RET                     ;And end
00930 ;-----
00940 MLP1   EQU      $
00950        DBUG    3,'MLP1'
00960        LD      (HIGH),HL       ;Save beginning of module
00970        INC     HL                ;HL==> offset to module start
00980        INC     HL                ;HL==> old HIGH$
00990        LD      E,(HL)          ;Get LSB
01000        INC     HL
01010        LD      D,(HL)          ;And MSB
01020        LD      (NEWHI),DE      ;And save old HIGH$
01030        INC     HL                ;HL==> Name length
01040        LD      C,(HL)          ;Get name length
01050        LD      B,0              ;BC = name length
01060        INC     HL                ;HL==> Beginning of name
01070        LD      DE,BUF          ;DE==> Beginning of buffer
01080        LDIR                    ;Move name
01090        LD      A,ETX           ;Marker for end of name
01100        LD      (DE),A           ;Mark end of name
01110        CALL   MODNAM          ;Display module name
01120        CALL   MODBEG          ;Display beginning address
01130        CALL   MODEND          ;Display ending address
01140        CALL   MODLEN          ;Display module length
01150        LD      HL,(NEWHI)      ;Get new high$ address
01160        LD      (HIGH),HL       ;Save it
01170        JR     MLOOP          ;And start again
01180 ;-----
01190 ; Show the value in HL in hex notation
01200 ;-----
01210 DSPHL  EQU      $
01220        DBUG    4,'Disp HL'
01230        PUSH   HL                ;Save it first
01240        PUSH   DE
01250        PUSH   AF
01260        EX     DE,HL            ;Value into DE
01270        LD      HL,BUF           ;HL==> display buffer
01280        SVC      @HEX16         ;Convert number
01290        LD      A,ETX           ;Mark end display string
01300        LD      (HL),A         ; with carriage return
01310        LD      HL,BUF           ;HL==> buffer again
01320        SVC      @DSPLY        ;Put it on screen
01330        POP    AF              ;Recover registers
01340        POP    DE
01350        POP    HL
01360        RET                     ;We're done
01370 ;-----
01380 ; Display an SVC error and then exit
01390 ;-----
01400 SVCERR  EQU      $
01410        DBUG    5,'SVCerror'
01420        LD      C,A              ;Move error code to C
01430        SVC      @ERROR         ;Display error message
01440        SVC      @ABORT         ;And end
01450 ;-----
01460 ; Display "Bad module header at ...." and end
01470 ;-----
01480 BADMOD EQU      $
01490        DBUG    6,'BadMod'
01500        PRINT   BADHEAD         ;Display message
01510        LD      HL,(HIGH)       ;Get address
01520        CALL   DSPHL           ;Show address
01530        SVC      @ABORT
01540 ;-----
01550 ; Display module name
01560 ;-----
01570 MODNAM EQU      $

```

Listing 1 continued

General Debugging

When I write an Assembly-language program, I always hope (and I'm inevitably disappointed) that the program will work the first time it runs. After it crashes or locks up the computer, I start debugging. When I'm lucky, the program runs well enough during the first test to give me some hints about what has gone wrong. When I'm unlucky, the program crashes immediately without producing any useful output or other hints about where to start looking.

A programmer can use three complementary debugging techniques: single-stepping through a program, setting breakpoints, and examining the contents of memory areas and CPU registers. Unless a program is short, single-stepping through the whole thing is a waste of time. Almost every program I write contains sections from programs I've written and debugged previously. I am reasonably sure that those sections work; my errors usually occur when I am working out some new ideas or techniques.

If I strongly suspect that one section of a program is flawed, I will set a breakpoint at the beginning of that section and let the program run up to that point. If the program never reaches the breakpoint, I set a breakpoint closer to the beginning of the program. If the program does get to the breakpoint and stops, I thoroughly examine all memory data areas and the Z80 registers to see if all looks like I think it should. If so, I know I can safely ignore everything before the breakpoint, at least for the time being.

Next, the slow work begins. I start single-stepping from the breakpoint through the part of the program that I suspect. I constantly examine each memory data area that the program changes, as well as the CPU registers. As the computer executes each instruction, I check my listing of the program, especially the comments I've written, to see if the computer is doing what I want it to. Generally, I only have to single-step through a section once to find a major bug or confirm that the code is working correctly.

If the bugs I find are small, I alter the program in memory, make a comment on my source code, and continue setting breakpoints and single-stepping to find the next bug. When that's not possible, I leave the debugger, rewrite sections of my source code, recompile the program, and start debugging again.

It's not enough, of course, to get a program to run once from beginning to end. The second part of testing is to try a variety of input data, including data that should cause the program to trap and report errors. The first time a program runs,

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Listing 1 continued

```

01580      DEBUG      7,'ModName'
01590      PRINT      MNAME          ;Print message
01600      LD         HL,BUF        ;HL==> buffer containing name
01610      SVC        @DSPLY        ;Print it
01620      RET
01630 ;-----
01640 ; Display starting address of module
01650 ;-----
01660 MODBEG EQU      $
01670      DEBUG      8,'ModBeg'
01680      PRINT      MBEGIN          ;Print label
01690      LD         HL,(HIGH)       ;Get start address
01700      CALL      DSPHL           ;And show it
01710      RET
01720 ;-----
01730 ; Display ending address of module
01740 ;-----
01750 MODEND EQU      $
01760      DEBUG      9,'ModEnd'
01770      PRINT      MEND            ;Print label
01780      LD         HL,(NEWHI)       ;Get ending address
01790      CALL      DSPHL           ;Show it
01800      RET
01810 ;-----
01820 ; Display module length
01830 ;-----
01840 MODLEN EQU      $
01850      DEBUG      10,'ModLen'
01860      PRINT      MLENGTH         ;Print label
01870      LD         HL,(NEWHI)       ;Get last byte
01880      LD         DE,(HIGH)       ;Get starting address
01890      INC        HL               ;Add one
01900      OR         A               ;Clear carry flag
01910      SBC        HL,DE           ;Find HL - DE
01920      CALL      DSPHL           ;Display it
01930      RET
01940 ;-----
01950 ; We're at the end of the module list
01960 ;-----
01970 DONE   PRINT      ENDLIST        ;Print the message
01980      LD         HL,0             ;Return "no error"
01990      SVC        @EXIT           ;Back to TRSDOS
02000 ;-----
02010 ; Messages:
02020 HELLO DB          'Directory of high memory modules:',LF,LF
02030      DB          'HIGH$ is currently set to: ',ETX
02040 ;
02050 BADHEAD DB        LF,'Bad module header encountered at ',ETX
02060 ;
02070 MNAME  DB          LF,LF,'Name: ',ETX
02080 ;
02090 MBEGIN DB          ' Begins at ',ETX
02100 MEND   DB          ' Ends at ',ETX
02110 MLENGTH DB         ' Length ',ETX
02120 ;
02130 ENDLIST DB         LF,LF,'End of high-memory modules',LF,CR
02140 ;
02150      END      BEGIN

```

End

I give it easy and "normal" data to handle. But I have more fun looking for the logical bugs that come from unusual input.

Improving the Process

This month's demonstration program and the special debugging techniques I'll be describing work with both TRSDOS 6.2 and EDAS (Pro-Create assembler from MISOSYS). The same ideas will work with other assemblers that support both macro commands and conditional assembly, but you will have to modify the programs.

I use the native TRSDOS 6.x system debugger almost exclusively. Other monitor/debugging tools are more powerful, but the Debug utility has two important advantages. First, it runs from the library overlay area of memory below 3000 hexadecimal (hex), so it rarely conflicts with applications and utility programs that load and run from the "normal" 3000 hex address. Second—and this is most important—a program can invoke the debugger with the

@Debug supervisory call (SVC).

The demonstration program (see Program Listing 1) is simple; it produces a directory of the memory area in a Model 4 from HIGH\$ to the top of physical memory (OFFF hex). It does so by assuming that everything in protected high memory has a properly constructed module header and was installed by following the rules of TRSDOS 6. Because it makes those assumptions, it performs minimal error checking.

The most important part of the program is the macro instruction called DEBUG that is defined on line 490. This macro requires two parameters: a number and a string in single quotes. It uses the number to test whether a specific label has been set to a nonzero value (see the If statement in line 500). If the label has a zero value, nothing will be assembled when the DEBUG macro instruction is invoked. If the label has a nonzero value, the macro instruction will place four lines into the Assembly-language program.

The first line created by the macro instruction will be a call to the @Debug SVC. When a program executes the call, the TRSDOS Debug monitor is invoked, the program stops, and the normal Debug display appears on the screen along with the present contents of each of the Z80 registers. You can either single-step your program from that point on or use Debug's g command to continue execution until the next invocation of the @Debug SVC.

The second line created by the Debug macro instruction is a relative jump to the macro's fourth line, a locally created label. Between the jump instruction and the label, the macro instruction places a string of characters. That string is important because it will show up on the Debug screen in the ASCII field just to the right of the program counter (PC) register. Instead of having to figure out what section of the program was running before Debug was called, you can simply read the label on the screen and immediately know where you are.

Using the Debug System

From the preceding discussion, you may not understand just what to expect when you use the DEBUG macro instruction. The first use of the DEBUG macro instruction in the sample program is on line 710. If the label \$D1 has been set to a nonzero value (more about that later), the macro invocation at line 750 will add the following instructions to the program:

```

LD      A,@DEBUG
RST     28H
JR      $$D
DB      'GetHigh$' $$D EQU $

```

When you run the program, it will stop at line 710, the system Debug monitor will appear, and the label "GetHigh\$" will be visible on the right side of the screen on the line starting with PC (program counter) to tell you where you are in the program.

In essence, the DEBUG macro instruction lets you set breakpoints in your program at assembly time rather than when you are using the Debug monitor. The advantage is that you can concentrate more on the activity of your program when you are single-stepping with the monitor rather than on the actual addresses of the program. If you change one or two instructions and reassemble the program, you will not have to worry about whether the addresses for subsequent breakpoints have changed because they will be included in the program itself.

To make this system work, you must have an easy way of setting the value of the \$_D labels that turn breakpoints off or on. You could, of course, create a table

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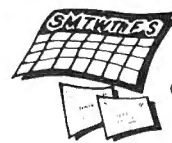
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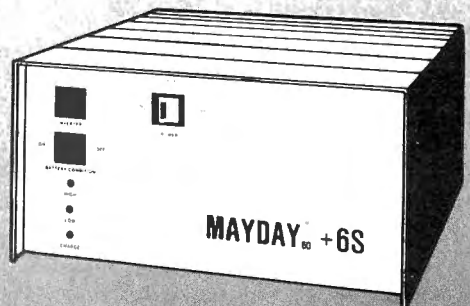
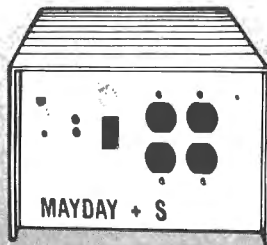
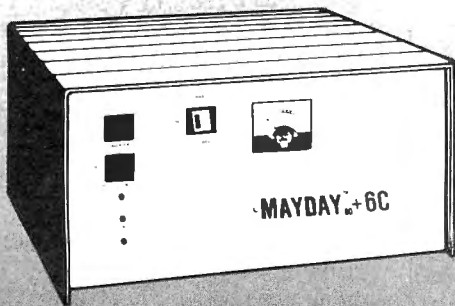
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Used with the DEBUG macro instruction in Listing 1, the ASSMBL/JCL (job-control language) can simplify the process of setting breakpoints and assembling your source code. Invoke the JCL with the command DO ASSMBL (F = file name, D1, D2, etc. test, print).

- File name The name of your source code file (/ASM) file. It will also be the name of the complete Command (/CMD) file. Do not add the /ASM extension to the end of the file name.
- Dn A list of one or more breakpoints (calls to the @DEBUG SVC) inside your program. For example, D1 sets breakpoint 1, D2 sets breakpoint 2, etc. You can replace "n" with any number from one to 10.
- Test Forces a "test" assembly by involving the "wait on error" (-we) assembler switch. If Test is specified, no CMD file is generated.
- Print Sends a copy of the assembled program to your printer. It activates the -lp, -nm, -nc, and -ne assembler switches. Note: Do not specify both the Test and Print parameter for the same assembly.
- Abbreviations: T = Test, P = Print

Example: The command DO ASSMBL (F = MODULES,D1,D5,P) assembles the file Modules/ASM, sets breakpoints 1 and 5, creates the file Modules/CMD, and sends the source code with assembled instructions to the printer.

Figure. Syntax and optional parameters for the JCL program.

Program Listing 2. ASSMBL/JCL, a JCL file for assembling machine-language programs. Use with the DEBUG macro instruction in Listing 1.

```

//if -f          //end          //if print
//quit          //if d6          //set p
//end           $_D6 EQU -1     //end
edas (jcl)     //else          //if -p&-t
L #f#         $_D6 EQU 0      A #f# -nl
I 1,1         //end          B
*list off     //if d7          //exit
//if d1       $_D7 EQU -1     //end
$_D1 EQU 1    //else          //if -p&t
//else       $_D7 EQU 0      A -we
$_D1 EQU 0    //end          //stop
//end        //if d8          //end
//if d2       $_D8 EQU -1     //if p&-t
$_D2 EQU -1  //else          A #f# -lp-ne-nm-nc
//else       $_D8 EQU 0      B
$_D2 EQU 0    //end          //exit
//end        //if d9          //end
//if d3       $_D9 EQU -1     //if p&t
$_D3 EQU -1  //else          . Can't test and print
//else       $_D9 EQU 0      . at the same time
$_D3 EQU 0    //end          . Assembly aborted
//end        //if d10         //stop
//if d4       $_D10 EQU -1    //end
$_D4 EQU -1  //else
//else       $_D10 EQU 0
$_D4 EQU 0    //end
//end        *list on
//if d5       %80
$_D5 EQU -1  //if test
//else       //set t
$_D5 EQU 0    //end

```

End

of labels near the beginning of the program and edit that table before each reassembly as your debugging progresses. But that sounds too much like a menial task that the computer should be able to handle by itself.

Program Listing 2 is a JCL program that does all the work for you. It loads EDAS and your source code, creates a table of \$_D values, and gives the appropriate commands to assemble the program. The Figure shows the syntax and optional parameters for using the JCL program. You may think that a JCL program slows your computer down too much; however, I've found that reassembling Listing 1 using the ASSMBL/JCL program in Listing 2 takes less than 10 seconds if I have both the JCL program and the Assembly-language source code in MEMDISK. I'm sure it would take me much longer to do the job manually.

If you are using the JCL program in Listing 2 with EDAS and LDOS on a Model I or III, you will need to make one change. About three-quarters of the way through the listing is a line that contains %80, which sends a break character to EDAS, forcing it out of insert mode. Change this to %01. The Model 4's break key is decoded as 80 hex, while the I/III's is decoded as 01 hex. Otherwise, the program should work well on any computer that uses either LDOS or TRSDOS 6 and EDAS.

I've found that liberally sprinkling my source code with DEBUG macros and using the ASSMBL/JCL program speeds up my Assembly-language program development time considerably. Much of the menial work that used to interfere with the thought processes of debugging is now gone, and I can concentrate completely on finding and removing bugs.

For example, my first version of Listing 1 had three bugs, one of which was bad enough to freeze up my computer completely. I found all three and had what appeared to be a fully debugged program a half-hour after I finished the first draft of the source code. I'm sure this is no speed record, but it is considerably faster than the time I used to spend searching for programming errors. Perhaps these tools can help make your Assembly-language programming more enjoyable and less frustrating as well. ■



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Listing continued from p. 55

```

196>     retcod = call(100,regs);          /* HIGH$ will now be F63B */
197>     clearcommand();                 /* clear the command table*/
198>     clearhistory();                 /* clear history table */
199>     *pipe_flg = '\0';               /* No piping now */
200>     *eci_active = 'E';              /* Set in-memory ECI id */
201>     *(eci_active + 1) = 'C';
202>     *(eci_active + 2) = 'I';
203>     /* Set EFLAG$ */
204>     retcod = call(101,regs);         /* IY will point to flags */
205>     addr = regs[5];
206>     *(addr + 4) = '\xFF';           /* IY + 4 to non-zero will */
207>                                       /* force the ECI to active */
208>     initflag = 1;                   /* set to display version */
209> }
210> else if ((regs[3] != 0xFFFF) && ((*eci_active != 'E') ||
211>   (*(eci_active+1) != 'C') || (*(eci_active+2) != 'I')))
212> { /* ECI is not the first thing installed */
213>
214>     puts("\nECI Cannot Install - High Memory In Use\n");
215>
216>     /* set eflag for abort to trsdos 6.2 */
217>
218>     retcod = call(101,regs);
219>     addr = regs[5] + 4;
220>     *addr = '\0'; /* to disable eci */
221>     regs[0] = 0;
222>     retcod = call(21,regs); /* abort will return to TRSDOS 6.2 */
223> }
224> else
225> { /* Should be ok, ECI is installed */
226>     initflag = 0; /* set zero so dont display version agn */
227> }
228> /* Set EFLAG$ */
229> retcod = call(101,regs);
230> addr = regs[5];
231> *(addr+4) = '\xFF';
232>}
233> /* FindCommand */
234> /* This routine returns the index (integer) to */
235> /* the next command in command table to execute */
236> findcommand()
237> {
238>     char *ptr;
239>     int i;
240>
241>     ptr = cmd_ptr; /* local copy of pointer to command table */
242>     i = 1;
243>
244>     while ( (*ptr == '\0') && (i <= 20) )
245>     {
246>         ptr += 81;
247>         i += 1;
248>     }
249>     return(i);
250>}
251>
252> /* CheckCtrl */
253> /* This routine checks a user input command line for */
254> /* an internal ECI command. If one exists, it executes */
255> /* it. If none exists, it returns zero, if one did */
256> /* it will return 1 */
257> checkctrl()
258> {
259>     int i,j,empty,k;
260>     char *regs[6];
261>     char c, *addr;
262>
263>     if (cmd_line[0] == '.') /* It is an Internal ECI Command */
264>     {
265>         if ((cmd_line[1] == '?') || (cmd_line[1] == 'H') ||
266>           (cmd_line[1] == 'h') || (cmd_line[1] == '\n'))
267>         {
268>             /* It is an ECI Help Request */
269>             puts("\n\n ECI Internal Commands:\n");

```

Listing continued

Listing continued

```

270>     puts("?.? Help (Also .H .h)\n");
271>     puts("?.Q Exit ECI to TRSDOS 6.2\n");
272>     puts("?.V Display ECI Version Info\n");
273>     puts("?.L Display Contents of History Table\n");
274>     puts("?.C Clear the History Table\n");
275>     puts("?.#xx Execute command line xx from History Table\n\n");
276>     return(1);
277> }
278> else if ((cmd_line[1] == 'C') || (cmd_line[1] == 'c'))
279> {
280>     /* Clear the History Table */
281>     clearhistory();
282>     puts("\nECI - History Table Cleared\n");
283>     return(1);
284> }
285> else if ((cmd_line[1] == 'Q') || (cmd_line[1] == 'q'))
286> {
287>     /* Exit to TRSDOS 6.2 */
288>     puts("\nTerminate ECI. Enter Y or N ? ");
289>     c = '\0';
290>     while( (c != 'Y') && (c != 'y') && (c != 'N') && (c != 'n'))
291>         c = getchar();
292>
293>     if ( (c == 'Y') || (c == 'y')) /* terminate */
294>     {
295>         call(101,regs); /* Set EFLAG */
296>         addr = regs[5] + 4;
297>         *addr = '\0';
298>         regs[0] = 0;
299>         exit(0); /* Abort to TRSDOS */
300>     }
301>     else
302>         return(1);
303> }
304> else if ((cmd_line[1] == 'V') || (cmd_line[1] == 'v'))
305> {
306>     /* Display Version Information */
307>     puts("\n\nECI Version 1.0 - May, 1985\n");
308>     puts(" Daniel Zenzel, Jr\n");
309>     puts("\n LC Library, Copyright 1982, James J. Frimmel\n");
310>     return(1);
311> }
312> else if ((cmd_line[1] == 'L') || (cmd_line[1] == 'l'))
313> {
314>     /* Display History Table Contents */
315>     empty = 0;
316>     puts("\n\n Current History Table : \n\n");
317>
318>     for (i = 0; i <= 9; i++)
319>     {
320>         if (*(hist_ptr + (i * 81)) == '\x01')
321>         {
322>             empty += 1;
323>             k = 0;
324>             printf("%d > ", i+1);
325>             while (putchar(*(hist_ptr+(i*81)+1+k)) != '\n')
326>                 k += 1;
327>         }
328>     }
329>
330>     if (empty != 0)
331>         puts("\nWhere #1 is the most recent command line\n\n");
332>     else
333>         puts("\nHistory Table is empty\n\n");
334>     return(1);
335> }
336> else if (cmd_line[1] == '#')
337> {
338>     /* Execute a command from the History Table */
339>
340>     i = atoi(cmd_line + 2); /* get command line number */
341>
342>     if ((i >= 1) && (i <= 10)) /* valid number */
343>     {

```

Listing continued

Listing continued

```

344> /* Copy History entry into the command line */
345> for (j = 0; j <= 79; j++)
346>   cmd_line[j] = *(hist_ptr+(i-1)*81+l+j);
347>   return(0); /* force a command parse */
348> }
349> else /* invalid number */
350> {
351>   puts("\nECI - Invalid history entry number - ignored");
352>   return(1);
353> }
354> }
355> else
356> {
357>   /* Invalid ECI Internal Command */
358>   puts("\nECI - Invalid Internal Command (.? for HELP)");
359>   return(1);
360> }
361> }
362> else /* It must be a parseable command line */
363>   return(0); /* force a command parse */
364> }
365>
366>
367> /* Get_Cmd */
368> /* This routine takes apart an input command line, up
369> /* to a delimiter (<cr> <pipe> <,>, and returns 1) posn
370> /* in line, 2) delimiter found, 3) len of command found
371> /*
372> get_cmd(buf, lin, start, delim, len)
373> char *buf, /* command input line ptr */
374> *lin, /* buffer for command found */
375> *delim, /* ptr to a delimiter */
376> int start, /* posn to start search in command line */
377> *len; /* pointer to a length variable for ret */
378> {
379>   int i, j;
380>
381>   for (i = 0; i <= 79; i++)
382>     lin[i] = ' '; /* blank out buffer */
383>
384>   i = start;
385>   j = 0;
386>
387>   while (buf[i] == ' ') /* Skip over any Leading Spaces */
388>     i += 1;
389>
390>   while ( (buf[i] != '\n') && (buf[i] != ',') && (buf[i] != '|') )
391>   {   lin[j] = buf[i];
392>       i += 1;
393>       j += 1;
394>   }
395>
396>   if (buf[i+1] == '\n') /* take care of case of extra delimiter at */
397>     *delim = '\n'; /* end. Make delimiter <cr> */
398>   else
399>     *delim = buf[i]; /* else set the delimiter for return */
400>
401>   *len = j - 1; /* Set the length for return */
402>
403>   return(i); /* return position of delimiter */
404> }
405> /* Parse */
406> /* This routine processes the cmd_line, producing the
407> /* command in cmd_buf for placement into command table */
408> parse()
409> {
410>   int i, j, pipe_flag, get_cmd(), pos, len;
411>   char *rtl, *rt2, *redir, *del;
412>
413>   /* First, clear the command table */
414>   clearcommand();
415>
416>   i = 0;
417>   rtl = "Route *DO to TEMPX/DAT ";

```

Listing continued

Listing continued

```

418>   rt2 = "Reset *DO ";
419>   del = "Remove TEMPX/DAT ";
420>   *(del+16) = '\n';
421>   *(rtl+22) = '\n';
422>   *(rt2+9) = '\n';
423>   redir = "<TEMPX/DAT ";
424>   *(redir+10) = '\n';
425>
426>   pos = get_cmd(cmd_line, cmd_buf, i, &delimiter, &len);
427>
428>   if (delimiter == '\n')
429>   {
430>     cmd_buf[len + 1] = '\n';
431>     addcommand(cmd_buf); /* add command to table */
432>   }
433>   else /* multiple command or pipe */
434>   {
435>     do
436>     {   if (delimiter == '|')
437>         {   cmd_buf[len + 1] = '\n';
438>             addcommand(cmd_buf);
439>         }
440>         else if (delimiter == '|')
441>         {
442>           /* Put route command (DO to TEMPX/DAT) to table */
443>           addcommand(rtl);
444>
445>           pipe_flag = 1; /* set local flag for active pipe */
446>
447>           /* now put out first command */
448>           cmd_buf[len + 1] = '\n';
449>           addcommand(cmd_buf);
450>
451>           /* now put out the reset of *DO */
452>           addcommand(rt2);
453>
454>           /* get another command */
455>           pos = get_cmd(cmd_line, cmd_buf, pos+1, &delimiter, &len);
456>
457>           if (delimiter == '|') /* not supposed to pipe again */
458>           {
459>             puts("\nToo Many pipe levels.. Skipping command..\n");
460>             pos = get_cmd(cmd_line, cmd_buf, pos+1, &delimiter, &len);
461>           }
462>           if (delimiter == ',') /* semicolon */
463>           {
464>             cmd_buf[len + 1] = ' '; /* insert redirection */
465>             for (j = 0; j <= 11; j++)
466>               cmd_buf[len + 2 + j] = *(redir+j);
467>             addcommand(cmd_buf);
468>             pipe_flag = 0;
469>             addcommand(del); /* add the removal of temp file */
470>           }
471>           /* end if piping */
472>
473>           if (delimiter != '\n') /* not end of line yet */
474>             pos = get_cmd(cmd_line, cmd_buf, pos+1, &delimiter, &len);
475>
476>         } while (delimiter != '\n');
477>
478>         cmd_buf[len + 1] = '\n';
479>
480>         if (pipe_flag == 1)
481>         {
482>           /* Insert Redirection */
483>           cmd_buf[len + 1] = ' ';
484>           for (j = 0; j <= 11; j++)
485>             cmd_buf[len + 2 + j] = *(redir+j);
486>           addcommand(cmd_buf);
487>           addcommand(del); /* add command for removal of temp file */
488>           pipe_flag = 0;
489>         }
490>         else
491>           addcommand(cmd_buf);

```

Listing continued

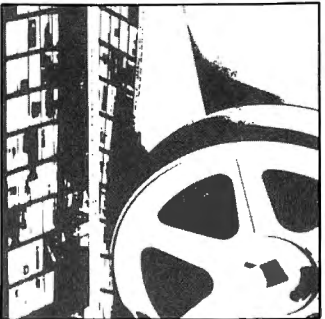

```

Listing continued
492> } /* end of parse */
493>}
494>
495> /* Prompt
496> /* This routine prompts the user for a command line.
497> /* It is essentially the 'TRSDOS Ready' of the ECI
498> prompt()
499> {
500> int i,ok;
501> char c;
502>
503> /* if initflag is set, this is first time in since boot, and */
504> /* the Version number/library copyright should be displayed */
505> if (initflag == 1)
506> {
507> ok = 0;
508> initflag = 0;
509> cmd_line[0] = ' ';
510> cmd_line[1] = ' ';
511> cmd_line[2] = '\n';
512> }
513> else
514> while (ok != 0) /* prompt until get something useable */
515> {
516> putchar('\n');
517> putchar('$');
518> putchar(' ');
519>
520> i = 0; /* index into cmd_line */
521>
522> c = getchar(); /* get a character */
523>
524> if (c == '\xFF') /* handle a possible break */
525> {
526> clearerr(stdin); clearerr(stdin); }
527>
528> /* The character input loop follows. Note that <Break> */
529> /* and <shift><left-arrow> are treated the same. A new */
530> /* prompt will appear, and all data on the 'broke' line*/
531> /* will be ignored
532>
533> while ((c=='\xFF')&&(c!='\n')&&(c!='\x18')&&(i<=79))
534> {
535> if (c == '\b') /* handle a backspace */
536> {
537> i = i - 1;
538> if (i < 0)
539> i = 0;
540> }
541> else
542> {
543> cmd_line[i] = c;
544> i += 1;
545> }
546> c = getchar(); /* get next character */
547>
548> if ( (c == '\n') && (i <= 79) ) /* <cr> is valid */
549> {
550> ok = 0;
551> cmd_line[i] = '\n';
552> }
553> if ( (i > 79) && (c != '\n') )
554> puts("<*** Input too long ***>");
555> if ( (c == '\xFF') || (c == '\x18') ) /* break / shift left */
556> {
557> puts("<*** Break ***>");
558> clearerr(stdin); /* reset the eof indicator in fcb of */
559> /* stdin, so can continue
560> clearerr(stdin);
561> }
562> } /* end of while not ok */
563>
564> /* Chkerr
565> /* This routine checks for an op sys error on previous cmd
566> chkerr()

```

Listing continued

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Listing continued

```

567>{
568> /* This routine is a dummy for now, and can be added
569> /* to as one desires. It allows adding things to the
570> /* ECI to handle any errors. Note that a method of
571> /* detecting errors in the execution of previous
572> /* commands in a multiple command list is not
573> /* implemented here.
574> /* It is suggested that a flag be kept in the upper
575> /* memory used by the ECI. When an error is detected,
576> /* the command table should be cleared out, to avoid
577> /* possible disastrous consequences. (e.g.
578> /* a copy that fails, followed by a remove !!! This
579> /* version would continue with the remove. You may
580> /* want to add this capability ! )
581>
582>
583> /* MAIN
584> /* This is the main body of the Extended Command Interpreter */
585> main()
586> {
587>   int cmdno,k;
588>   char *bufcmd;
589>
590>   init();
591>   chkerr();
592>   while (*num_of_cmds == 0)
593>   {
594>     prompt(); /* prompt user
595>     if (checkctrl() != 1) /* check for internal command */
596>     {
597>       addhistory(cmd_line);
598>       parse();
599>     }
600>
601>   }
602>
603> /* ok, now there must be a command in table to execute
604>
605> /* Decrement number of commands */
606> *num_of_cmds = *num_of_cmds - '\x01';
607>
608> cmdno = findcommand(); /* get index into cmd table */
609>
610> bufcmd = cmd_ptr + ((cmdno - 1) * 81) + 1; /* point to cmd */
611> *(bufcmd-1) = '\0'; /* set entry to used */
612>
613> /* if the command is a route *do to temp, set pipe flag */
614>
615> if ((*bufcmd=='R')&&(*bufcmd+1)=='o')&&(*bufcmd+17)=='X')
616> *pipe_flg = '\x01';
617>
618> /* if the command is a reset *do , set pipe flag to zero */
619>
620> if ((*bufcmd=='R')&&(*bufcmd+1)=='e')&&(*bufcmd+2)=='s')&&
621> (*bufcmd+6)=='*')&&(*bufcmd+8)=='O')
622> *pipe_flg = '\0';
623>
624> /* If the display-commands flag is set, display the command */
625> /* before executing it.
626>
627> if (showcmd == 'Y')
628> {
629>   printf("\nECI Executing : ");
630>   k = 0;
631>   while (putchar(*(bufcmd+k)) != '\n')
632>     k += 1;
633>
634> }
635> /* execute the command via a call to cmdi */
636> cmdi(bufcmd);
637>
638>
639>
640>

```

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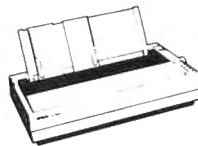
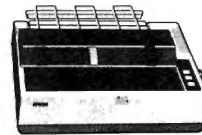
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- Compare the displayed line numbers and checksum values with the check-

sums shown in the listing. Find and correct errors in lines having checksum values that don't match.

—Beverly Woodbury
Technical Editor

Program Listing. Checksum.

```

10 'CHECKSUM/BAS by Beverly Woodbury -- 2/7/86          ** 97
20 CLEAR 1000 :CLS:PRINT@140,"VERIFY CHECKSUMS ON PROGRAM" ** 3746
30 PRINT:PRINT:INPUT "Enter name of file to verify";F$ ** 4278
40 PRINT:PRINT:PRINT "List Checksums to:" ** 3234
50 PRINT TAB(10) "1. Printer";PRINT TAB(10) "2. Screen" ** 3638
60 PRINT:PRINT:PRINT TAB(30);:INPUT C ** 2484
70 OPEN "I",1,F$ ** 857
80 IF EOF(1) THEN CLOSE:END ** 1673
90 LINEINPUT#1,L$:L=VAL(LEFT$(L$,6)) ** 2202
100 A=VARPTR(L$):GOSUB 210 :Q=PEEK(A) ** 2289
110 LS=PEEK(A+1):MS=PEEK(A+2):A=MS*256+LS:GOSUB 210 ** 3170
120 FOR K=1 TO Q:P=PEEK(A):CS=CS+P:A=A+1:NEXT K ** 2940
130 IF CS=0 OR L=0 THEN 80 ** 1495
140 IF CS<10000 THEN D$="-" ** 1500
150 IF CS<10000 THEN D$="- " ** 1485
160 IF CS<1000 THEN D$="-" ** 1470
170 IF CS<100 THEN D$="- " ** 1455
180 IF C=1 THEN LPRINT "Line";L;D$;CS:CS=0 ** 2693
190 IF C=2 THEN PRINT "Line";L;D$;CS:CS=0 ** 2619
200 GOTO 80 ** 723
210 IF A>32767 THEN A=(65536-A)*-1 ** 1831
220 RETURN ** 660
    
```

End

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- G. Do you plan to purchase another TRS-80/Tandy Computer during the next 12 months?**
 1. Yes 2. No 3. Don't know
- H. Where do you use your TRS-80/Tandy Computer? Check all that apply.**
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- J. How many purchases have you made based on an ad you saw in 80 Micro?**
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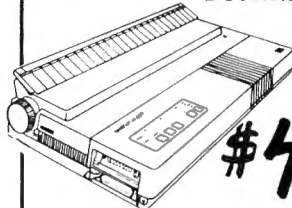
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Continued from p. 30

and functions prior to use. This forces you to write programs that don't look like native C code. You will have difficulty getting sample programs to run with the Workshop if you key them in from magazine source listings.

The programming environment and text editor are simple to use. I didn't like the editor's command structure since it is different from everything else I have used, but this is a matter of preference. More importantly, you must first enter the text editor before you can load a program. Also, you are limited to 6,000 characters of source code, and the editor always writes about 200 characters of comments in the file—even when you are loading an old source program.

Saving a program is not easy. You must delimit the source program as a block and then exit the editor to the programming menu to write the program to a file (or print it, for that matter). The programming environment will not accept a file extension, and the default extension is .PRG, which is inconsistent with almost every C compiler on the market. This means that you must rename all your program source files to use them with the Workshop.

I found some other programming inadequacies in this implementation. The Workshop doesn't support command-line arguments. And there are also limitations on the print- and scan-formatting strings.

Introducing C

The Introducing C language training system comes with a full interactive editor and interpreter much the same as the Basic interpreter for your computer. This system is one of the easiest environments that I have ever used. The text that accompanies the software is divided into self-paced training modules that you read and use to experiment with the interpreter. The latter part of the book is a reference section for the Introducing C system, containing instructions on using the editor and interpreter, language differences from the full Kernigan and Ritchie implementation, and an explanation of all library modules supplied.

The disk includes two library modules, which contain all C library functions used in the text. These functions are compiled using the Optimizing C86 Compiler and will link to any of your sample programs. In addition to providing you with all special functions that you use during the instruction modules, you get an outstanding graphics capability that is virtually identical to Basic's.

The manual's introductory section and errata sheet explain how to get started with the system. You simply make copies of the supplied disk and start using

The Introducing C training system has a polished feel. It's easy to use but very slow.

it. Hard-disk users can simply copy all files to their hard disk and begin.

While Introducing C draws heavily on Kernigan and Ritchie, it was designed as an introduction to programming and no prior user experience is required or assumed. The author's style is easy and relaxed, and the package covers everything from the basic topics of getting started to the most complex topics of pointers, structures, and unions.

Good illustrations and many examples highlight all key facets of the material. The editor's commands are logical and easy to remember. Many are closely associated with the standard Unix editor (vi) commands. The editor allows many powerful operations such as block copying and moving, search-and-replace operations, and rapid movement through the source file.

The interpreter provides a convenient method to rapidly check your source code. Press the F2 key and your program will be checked for proper syntax and executed if no errors exist. You can also trace program execution with a simple command to investigate the statement, program stack, memory changes, and variables. More importantly, you can specify that only a small range of statements be traced, significantly limiting the data you must visually inspect.

Introducing C implements a nearly complete subset of Kernigan and Ritchie C. Important features not supported are: three- and higher-dimension arrays, explicitly defined statics and externals, overflow and divide check detection, casts and address of functions, type definitions, preprocessor directives other than a limited form of #Define, GOTO instructions, and labels. Most of the limitations listed above are minor and will not affect your programs.

The interpreter also doesn't support structure initialization. Initialization at time of compilation allows you to specify the contents of data items without explicit assignment statements and is used extensively in some programs. Since most data initializations are supported, this shouldn't be a problem.

The most dangerous deviation from

Kernigan and Ritchie involves the definition of functions. Normally, you must specify the names of the parameters in the function-definition header and the compiler will assume that the variables represent the data items (integer values unless otherwise declared) the function manipulates. Introducing C specifies function parameters by the order of declarations following the function header.

Conclusion

I ran a program that prints out a starting message, counts to 10,000, and prints an ending message, using it to check each training system's performance. I also compared the training systems to an equivalent Basic program and to the object code produced by the Aztec-C86 compiler. (See the Table.)

The Aztec-C86 compiler is the fastest, as would be expected. While the Workshop is not as speedy as a native compiler, the times are respectable. But the Computer Innovations interpreter is very slow. I went to lunch and came back while the interpreter was counting to 10,000. I then reduced the count to 1,000 for the interpreter to get a more reasonable time.

Considering its price, the Workshop is an excellent value. The compiler and training system perform as specified. It also produces good code and will not bore you to tears while waiting for your sample programs to execute.

On the negative side, the Workshop deviates too far from Kernigan and Ritchie to be a useful tool for anything more than a gentle introduction in C. Couple this with the inability to link other (compiled) programs or to build a source file of more than 6,000 characters and it has serious limitations.

The Introducing C training system has an exceptionally polished feel and look. The interpreter is an excellent implementation of Kernigan and Ritchie. While the exceptions are important to note, only the more esoteric programs will use these features, and as a beginner, you will not be hampered. Another plus in its favor is that Introducing C is not copy protected.

On the performance side, Workshop far outstrips Introducing C. This is a serious flaw in the Computer Innovations interpreter and should be corrected.

If you are serious about learning C, I recommend Introducing C as the most effective means of getting started, based on its more robust implementation of the language, lack of copy protection, and the many features of the editor and interpreter. If you are on a limited budget or just want to dabble in the language, then C: A Programming Workshop is a good experimental vehicle. ■

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Elixir

★★★

Elixir runs on the Models I and III (48K) and requires one disk drive. Donald W. Ady, 56 Oak Ridge Ave., Summit, NJ 07901, 201-277-3365. \$39.50.

Elixir is a diverse collection of utility programs. It includes numerous application programs: Editor creates text and graphic screen displays for Basic programs; ZDraw is much like Editor but has a more extensive graphics repertoire; Verify verifies disk files; Piano provides a manual keyboard for tunes and sound effects; Counter determines the word count and average word length for a text file; and Zapper captures screen displays for Editor to retrieve and modify.

Elixir also provides an excellent assortment of machine-language USR routines that you can easily implement in your own programs. They are packed into Basic program lines and offer routines to enhance your programming efforts: invert the screen display, flip the display horizontally or vertically, bitwise and character screen scrolls, fill displays with graphics horizontally or vertically, screen prints, bubble sorts, and others.

The 46-page Elixir documentation contains a great deal of useful information, but it's written so poorly that only the simplest passages make sense. Luckily, the author has included numerous practice sessions.

The Elixir programs are quite useful, but some of the programming techniques used are second rate at best. The best example is the extensive use of the Basic Input command for data entry. Although Input is acceptable for quickly writing a program of limited usefulness, it is generally considered unacceptable for commercially produced software.

—Mark D. Goodwin

Model 4 CP/M

★★★

Rose's Mod 4 CP/M runs on the Model 4 (64K) and requires one disk drive. Total Access, P. O. Box 790276, Dallas, TX 75379. 800-527-3582. \$69.

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This is a previous release of Montezuma Micro's CP/M 2.2, which has since been updated. The software package is virtually identical to the system I reviewed in March 1984 (p. 94).

You receive a disk containing the CP/M

operating system and several utilities. One of the files contains a brief manual that documents the implementation features for this release. You also get a single instruction sheet telling you how to make a back-up copy and print the disk text file containing the manual.

As an introduction to CP/M, you also get a copy of *The CP/M Handbook with MP/M* by Rodney Zaks. This is an excellent choice for a first manual; the book is easy to read, complete, and structured.

Other utilities include the INTERCHG program, which can read 26 different CP/M disk formats.

The Format routine is excellent; you have choice of format, verify, or back up. You must format your disk prior to backing it up.

You have control over much of the operating system with the CONFIG utility. You can use different disk drives, change serial port and printer parameters, and redefine the function keys. CONFIG also lets you display the sign-on banner on reset and automatically execute an application. If you have a 128K Model 4, Rose provides a utility for using the additional 64K as a RAM disk.

This CP/M version got a rave review from me when I first evaluated it. The version numbers have changed and the name is different, but the best part is the price. The current Montezuma CP/M system has many advantages over Rose's version, particularly with its different utilities. But Rose's CP/M offers an excellent, inexpensive way to get your feet wet.

—John B. Harrell III

The Spreadsheet

★★★

The Spreadsheet runs on the Model 1000/1200/3000 (256K) and requires one disk drive. Indian Ridge Enterprises, 508 Second St., Oakland, CA 94607, 415-268-1631. \$29.95.

Almost anyone can find a use for spreadsheets, but most of them cost at least \$100. Now for only \$29.95, you can get a spreadsheet that will beat the pants off the one in DeskMate. While The Spreadsheet doesn't have the speed, graphing, and data-management capabilities of more expensive programs, it is simple to use, ideal for home applications, and an excellent value for the money.

The Spreadsheet has a tutorial that can be used for initial training. You can later set it to partial training mode until you are completely familiar with the program. While the tutorial doesn't teach you everything, it gives enough information to get you started.

The manual is a paperbound book, with photo-reduced dot-matrix print of mar-

ginal quality. The content is clear and well organized; while there is no index, the table of contents is very complete.

The Spreadsheet is patterned after VisiCalc, the original spreadsheet for personal computers. The special functions appear in a line across the top of the screen. To activate any function, you press the first letter of the word. Additional choices will then appear if the function does more than one thing.

The arrow keys control cursor movement. If you are on a full screen and try to move the cursor more than one row off the screen, the screen is entirely (and slowly) redrawn for each row. If you wish to move a substantial distance, the GOTO command is the best way.

You can edit the entry in any cell, but you don't use the insert or delete keys. Instead, you use control-S, D, E, or X to move left or right and insert or delete a character.

Formulas are entered by starting with an arithmetic function key such as + or -, or by using the @ key and one of the built-in functions. The Spreadsheet includes many built-in mathematical functions such as sum, minimum, maximum, count, average, lookup (a value from a table), net present value, integer, absolute, exponents, pi, square root, logarithm, sine, and cosine.

The Spreadsheet has an elementary bar-graph function, which converts numbers in the cells into asterisks. You may need to divide your data by 10, 100, or more to get it to a manageable size.

Disk access from the program is sophisticated. It provides a directory, and if you use a duplicate file name, you are told so and asked whether you wish to overwrite the old file or back it up first. You can save just the values in the sheet or both formulas and values. You can load partial sheets by specifying a cell range, and then adjust the formulas, if desired, to reflect the position in the new spreadsheet. You can also import the values without the formulas.

Printer output is excellent. You can specify the cell range to print. If the range will not fit on one page, the program automatically prints it on several pages, leaving neat borders. While you can specify 80 or 132 columns for your printer, there is no way to put an 80-column printer into condensed-print mode. I was disappointed that it isn't possible to export the data as a standard ASCII file so that an auxiliary program could print the spreadsheet sideways on the paper.

The program has all the format features you are likely to need, including left, right, or centered text and dollar, integer, general, exponential, or graphed numbers. You can apply formats to rows, columns, the entire spreadsheet, or a single cell.

ACTUAL SIZE.

You can open windows horizontally or vertically and scroll them together or apart. Columns or rows can be held on screen while other sections are scrolled.

The Spreadsheet is loaded with features and provides excellent value for the money. Business users should keep the following drawbacks in mind: lack of sophisticated graphing, limited spreadsheet size, slower calculation and screen-redraw time, awkward editing, and the inability to export data as an ASCII file. If your business is large enough to have an accountant, you need a top-of-the-line spreadsheet program. But The Spreadsheet will meet the needs of many of us.

—Wynne Keller

Z-EDIT

★★

Z-EDIT runs on the Model 4 (64K) and requires TRSDOS 6.x and one disk drive. Frank Software, 1164 Emilie St., Green Bay, WI 54301. \$29.95.

Most Assembly-language programmers would welcome a full-featured text editor in their software libraries. Unfortunately, that's not what you will receive with Z-EDIT.

Your first reaction to the program will probably be one of shock. Z-EDIT doesn't come with a printed manual. Frank Software has decided that all computer owners have a secret yearning to be book publishers. To start the presses rolling, you are instructed to print out a text file called Help/FIL. Although it is quite easy and Frank Software does supply instructions for performing the printout, what happens if you don't have a printer?

Z-EDIT's manual isn't worth much more than the paper it's printed on. It presents only the briefest explanations of Z-EDIT's features. Furthermore, the manual includes only a few limited examples.

Z-EDIT is a quasi-screen editor; that is, it has the outward appearance of a full-screen editor. However, most of Z-EDIT's features are line oriented. Z-EDIT's features are normal for a text editor, as far as they go. Perhaps Z-EDIT's only unique features are the limitations it imposes on text size: a maximum line length of 72 characters and a maximum text length of 337 lines.

Compared to most editor/assembler editors, Z-EDIT is a step downward. Z-EDIT doesn't support any superior features and its 337-line text length limitation is a severe handicap. Except for the simplest examples, most Assembly-language programs will require more than 337 lines of code. Most Assembly-language programmers would welcome a good text editor. It won't be Z-EDIT.

—Mark D. Goodwin



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For the Color Computer

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Fireworks Factory

by William C. Garretson

Whoosh! Bang! Fireworks are blazing and the fire department isn't resting easy—the aerial spectacle doesn't come without a price. With my fireworks simulator program, you can enjoy the incendiary pastime in the safety of your own home and beat the traffic to boot.

Setting Up

Type in the Basic loader in Program Listing 1. If you don't have a disk system, change the eighth data item in line 110 (87) to 83 and the four-digit number at the end of the same line to 3287.

Run the program. If you get a "Data Typo" error, correct the indicated line and rerun the program until you get the "FIREWORK.BIN" message. If you want to save the Basic loader, do so now before executing the machine-language program. To save Firework.BIN to disk, type SAVEM"Firework", &H3030, &H34EE, &H3030.

If you have a disk system, make sure its default setting is Files 2,256 before you execute FIREWORK.BIN. Otherwise, the program might wreak havoc on the DOS (disk-operating system).

Lighting the Fuse

The best way to learn about the functions of the fireworks simulator is to see them in action. Load Firework.BIN and type in the Basic driver (Program Listing 2). Issue the Run command. When the purple title screen becomes visible, press any key and the seven-option master menu will appear.

Select option 1. Generate Random Data. (Screen-dump samples 1 and 2 are inverted monochrome derivatives of this option.) The screen clears, and the program asks for the number of events. For the trial run, enter a number around 50 or 100.

The program next prompts you on intensity, which is a value determining the time between consecutive events; the higher the value, the shorter the time lapse. Enter any value between one and

System Requirements

16K RAM
Extended Color Basic

Program Listing 1. Fireworks program.

```

10 *****
20 * FIREWORKS SIMULATOR *
30 * BASIC DRIVER *
40 *****
50 'BY WILLIAM C. GARRETSON
60 '
70 'MIN. REQUIREMENTS: 16K ECB
80 '
90 PCLEAR4: CLEAR600, &H302F: PC=&H
3030: IPPEEK(PC)<>520RPEEK(PC+257
)<>&HCB ORPEEK(PC+1213)<>5THENPR
INT" MACHINE-LANGUAGE FIREWORK.B
IN" PROGRAM MUST BE LOADED @ "HE
X$(PC)"HEX": STOP
100 POKE&H4000, 85: IPPEEK(&H4000)
=&5THENDL=&H7FFF ELSEDL=&H3FFF
110 DB=PC+1216: CLS7: PRINT0102, "F
IREWORKS SIMULATOR": POKE1135, 23
9: PRINT0207, "BY": PRINT0262, "W
illiam C. Garretson": POKE1293, 239
: POKE1296, 239: POKE1295, 46
120 PRINT0307, "PRESS ANY KEY TO
CONTINUE. ": POKE1416, 239: POKE142
0, 239: POKE1424, 239: POKE1427, 239
130 IF INKEY$="" THEN130
140 POKE&H15A, INT(DB/256): POKE&H
15B, DB-PEEK(&H15A)*256: DI=DB: AS=
**
150 CLS: PRINT: PRINT"1 -- GENERAT
E RANDOM DATA": PRINT: PRINT"2 --
ENTER HEX STRING DATA": PRINT: PRI
NT"3 -- COMPIL AND APPEND HEX D
ATA": PRINT"4 -- PERFORM"
160 PRINT: PRINT"5 -- HARDCOPY HE
X STRING": PRINT: PRINT"6 -- NEW":
PRINT: PRINT"7 -- QUIT"
170 KS=INKEY$: IF KS="" THEN170 ELSE
X=ASC(KS)-48: IF X<10R X>27 THEN170 EL
SEONX GOTO230, 180, 190, 220, 210, 300
0, 310
180 CLS: INPUT"HEX STRING": AS: GOT
O150
190 IF LEN(AS)<2 THEN150 ELSE FORK=1
TO LEN(AS)-1 STEP2
200 IF DI>DL THEN SOUND1, 1: GOTO170
ELSE POKEDI, VAL("&H"+MID$(AS, K, 2
)): DI=DI+1: NEXT X: SOUND128, 1: GOTO1
50
210 PRINT*-2, AS: GOTO170
220 POKE&H15C, INT((DI-1)/256): PO
KE&H15D, DI-1-PEEK(&H15C)*256: EXE
CPC: GOTO150
230 CLS: INPUT"NO. OF EVENTS": X: I
FX<0 THEN230
240 INPUT"INTENSITY": Y: IF Y<10R Y>
32 THEN240 ELSE Y=INT(Y)
250 X=X-1: IF X<0 THEN150 ELSE IF RND(
4)<>2 THEN POKEDI, RND(32)*4+126: PO
KEDI+1, RND(190): POKEDI+2, RND(126
): POKEDI+3, RND(32)*4-1: POKEDI+4,
RND(255): POKEDI+5, RND(3): DI=DI+7
: GOTO270
260 POKEDI, RND(16)*4+125: POKEDI+
1, RND(190): POKEDI+2, RND(126): PO
KEDI+3, RND(32)*4-2: POKEDI+4, RND(3
2)*4-1: POKEDI+5, RND(255): POKEDI+
6, RND(3): DI=DI+8
270 P=(32-Y)*4: IF P=128 THEN P=124
280 POKEDI, P: DI=DI+1: IF RND(Y/4)=
1 THEN POKEDI, 192: DI=DI+1
290 IF DI>DL THEN150 ELSE250
300 DI=DB: GOTO170
310 END

```

End

Program Listing 2. Basic driver for fireworks program.

```

10 *****
20 * BASIC LOADER FOR *
30 * FIREWORKS SIMULATOR *
40 *****
50 'BY WM. C. GARRETSON
60 '
70 '
80 PCLEAR2: CLEAR300, &H302F: A=&H3
030
90 FOR X=1 TO 45: C=0: PORY=1 TO 27: REA
DDS: V=VAL("&H"+DS): POKEA, V: C=C+V
: A=A+1: NEXT Y: READT: IPT<<C THENPR
INT"DATA TYPO IN LINE"X+10+100: EN
D
100 NEXT X: CLS: PRINT" FIREWORK. BI
N" NOW IN MEMORY FROM 3030H T
O 34EEH": END
110 DATA 34, 76, 32, E9, FE, E9, 86, 87
, 17, 2, F7, 17, 3, 6, 48, 5F, ED, 63, FE, 1
5, A, CC, BF, 3F, ED, 65, 86, 3291
120 DATA 5F, ED, 67, ED, 69, 11, B3, 1,
5C, 23, 6, 32, E9, 1, 17, 35, F6, CC, BF, 4
0, B7, FF, 2, F5, FF, 0, 27, 3211
130 DATA EF, A6, C0, 85, 3, 26, 26, 48,
24, 16, 2A, 7, 86, 7, 17, 2, BB, 20, D7, CC
, 7F, 8, B7, FF, 2, F5, FF, 2867
140 DATA 0, 26, FB, 20, CA, 80, 1, 25, C
6, 8E, 5, 74, 30, 1F, 26, FC, 20, F3, 44, 4
6, 10, 2B, 0, 00, 85, 20, 27, 2320
150 DATA 4, 37, 10, 20, 2, AE, 67, AF, 6
9, 84, 1F, 85, 10, 27, 13, 4C, F6, FF, 22,
C4, EF, F7, FF, 22, 17, 3, 74, 2760
160 DATA CA, 10, F7, FF, 22, 20, 92, 4C
, A7, 6C, CC, 3, 07, E7, 6B, A7, 62, AE, 6B,
EC, 69, ED, E4, 31, BD, 0, 27, 3409
170 DATA EC, A1, AB, E4, EB, 61, ED, E4
, 5D, 2B, 7, 81, BF, 27, 13, 4C, F6, FF, 1
F, 26, EA, 86, 1, A5, 62, 10, 3027
180 DATA 27, FF, 00, 63, 62, A6, 6C, 17
, 3, 34, 20, CP, 0, 0, PP, 0, 2, 0, FF, FF, 0
, 2, FE, FF, 4, 0, FE, 2714
190 DATA FE, 0, 4, FF, FF, 2, FE, FE, 0,
2, 2, 2, FF, FF, FF, 0, 10, 25, 0, B7, A7
, 6B, 44, 44, A7, 6C, 2972
200 DATA 85, 8, 27, 12, 85, 4, 27, A, E6
, C4, 53, 86, FF, 33, CB, 16, FF, 1B, EC, 6
5, 20, A, 85, 4, 27, 4, EC, 2635
210 DATA 67, 20, 2, 37, 6, ED, E4, 37, 6
, ED, 67, E0, 61, 1D, 2B, 2, 4C, 50, 50, E7
, 6E, A7, E8, 10, E6, 67, 4F, 2863
220 DATA E0, E4, 24, 3, 50, 43, 4A, 4C,
E7, 6D, A7, 6F, 4F, 5F, ED, E8, 11, A7, E8
, 13, 10, 8E, 1, 0, E0, 0, 90, 2929
230 DATA 6F, E8, 14, EC, E8, 11, AB, 6D
, A7, E8, 11, 30, 1C, 24, B, 6C, E8, 14, A6
, E4, AB, 6F, A7, E4, 30, 1D, EB, 3410
240 DATA 6E, E7, E8, 12, 30, 1C, 24, C,
6C, E8, 14, E6, 61, EB, E8, 10, E7, 61, 30
, 1D, EC, E8, 13, 27, 21, 2A, 7, 2898
250 DATA 5D, 27, 1C, A6, 6C, 20, 2, A6,
6B, A7, 62, 63, E8, 13, 30, 1B, EC, E4, 5D
, 2B, A, 81, BF, 22, 6, 17, 1, 2425
260 DATA AE, 30, 88, EF, 30, 1F, 26, FC
, 31, 3F, 26, A0, 16, FE, 7C, 85, 20, 27, 4
, 37, 10, 20, 2, AE, 69, AF, E4, 2671
270 DATA 84, 1F, 4C, 5F, A7, 6B, A6, C0
, A7, 6D, 44, 44, ED, 6E, 44, 44, 4C, C6, 8
0, ED, E8, 10, CC, 0, 0, ED, E8, 3421
280 DATA 12, 37, 6, ED, E8, 14, 86, 80,
E6, 6B, 54, 27, 3, 44, 20, FA, 34, 6, 4F, 3
4, 7, EC, 63, E3, 61, ED, 61, 2832
290 DATA E6, E8, 10, 3D, 4D, 26, 2C, E7,
E4, A6, 62, E6, E8, 10, 3D, AB, E4, 24, 6,
EC, 61, A3, 63, ED, 61, 64, 63, 3497
300 DATA 66, 64, 24, DB, AE, 61, 30, 1,
AF, 61, A6, E8, 10, A7, E8, 11, 31, E8, 1C
, CC, C0, C0, AE, 65, ED, A4, AF, 3627
310 DATA 22, 31, 28, 6A, E8, 11, 26, F5
, E6, E8, 10, E7, E8, 11, A6, E8, 1A, 5F, E

```

Listing 2 continued

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Ordering Information: Specify model (Original, F-version, or CoCo 2 Model Number). Payment by C.O.D., check, MasterCard, or Visa. Credit card customers include complete card number and expiration date. Add \$2.00 for shipping, 3.50 to Canada; except monitors (call for shipping charges before ordering monitors). New York state residents add 7% sales tax. **Dealer Inquiries Invited**

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Listing 2 continued

```
F, E8, 1A, 3F, E8, 2F, 31, 8D, 1, 3238
32F DATA 41, 33, A9, B, 8F, ED, 63, C6,
1, 48, 25, 16, 28, A, E7, 2, E7, 3, 84, 7F,
EC, A6, 2F, 1F, E7, 3, 5F, 2634
33F DATA E7, 2, 4F, EC, C6, 2F, 15, 28,
A, E7, 2, 5F, E7, 3, 4F, EC, C6, 2F, 9, 5F,
E7, 2, E7, 3, 84, 7F, EC, 2962
34F DATA A6, ED, 84, 3F, 8, 6A, E8, 11,
27, 6, EC, 63, E3, 61, 2F, BF, 32, 65, 33,
6E, EC, 6B, A7, 6C, E7, 6B, 63, 324F
35F DATA 6F, AE, 6B, 31, 49, EC, 22, ED,
E4, E6, A4, EB, 24, 24, 8, AB, 26, EB, 43,
24, 2, AB, 26, E7, A4, AB, 44, 335F
36F DATA A7, 22, E6, 23, A6, 21, AB, 25,
24, 4, EB, 27, AB, 43, E7, 23, A7, 21, A6,
22, 1F, A3, E4, 27, 22, A6, 41, 28F2
37F DATA A6, C6, A7, 62, EC, E4, 5D, 2B,
6, 81, BF, 22, 2, 8D, 77, EC, 22, 5D, 2B,
C, 81, BF, 22, 8, ED, E4, A6, 3262
38F DATA 46, A7, 62, 8D, 66, 31, 28, 3F,
1F, 26, A9, EC, 44, C3, B, C, ED, 44, 86,
2F, A9, 6C, 5F, 83, B, 8, 24, 2473
39F DATA FB, A6, 43, A9, 42, A7, 43, 22,
8A, EE, 47, 16, FD, 1E, 34, 36, 48, 5F, 1
F, 2, 4F, 8E, C, B, ED, A1, 3F, 2715
40F DATA 1F, 26, FA, 35, B6, 34, 16, 8E,
FF, C9, E7, 84, 3F, 3, E7, 81, E7, 8F, C6,
7, 44, 24, 6, 3F, 1, E7, 8F, 3F73
41F DATA 2F, 2, E7, 81, 5A, 26, F2, F6,
FF, 22, C4, 7, CA, E9, 34, 4, 48, 48, 48, A
A, E9, B7, FF, 22, 35, 96, 34, 3337
42F DATA 36, AE, 6B, EC, 68, 54, 54, 3F,
85, C6, 2F, 3D, 3F, 8B, 31, 8D, B, 1A, EC,
69, 84, 3, 48, 31, A6, C4, 3, 268F
43F DATA 86, 55, 3D, E4, A4, 34, 4, A6,
84, A4, 21, AA, E9, A7, 84, 35, B6, C9, 3F,
3F, C9, C, P3, 3, FC, B, 8F, 3299
```

```
44F DATA 6, 8F, B, 7F, 12, 7F, 17, 7F, 1
D, 7F, 23, 7E, 28, 7E, 2E, 7D, 34, 7C, 38,
7B, 4F, 7B, 45, 7A, 4B, 79, 5F, 233F
45F DATA 78, 56, 77, 5B, 76, 5F, 75, 64,
73, 6B, 72, 7F, 71, 75, 6F, 78, 6B, 7C, 6
B, 81, 6A, 87, 6B, 88, 66, 92, 64, 3F51
46F DATA 95, 62, 98, 5F, A9, 5E, A4, 5C,
A8, 5A, AC, 58, 81, 55, 87, 53, 8B, 5F, C
3, 4D, CB, 4A, CC, 4A, CD, 46, CD, 3624
47F DATA 44, D3, 4F, D7, 3F, D7, 3C, D9,
39, DC, 36, DC, 34, DF, 31, DF, 2E, E1, 2
B, E2, 28, E4, 25, E6, 22, E7, 1F, 3582
48F DATA E8, 1C, E8, 19, E8, 16, EB, 13,
EC, 1F, ED, B, EE, 9, EE, 6, EE, 3, EE, B,
34, 3E, 48, 48, 34, 2, CC, 3F11
49F DATA FF, 3, 1F, 8B, D5, 1, 26, 8, D5,
3, 26, 4, D5, 23, 26, 1F, DA, 23, D7, 23,
D6, 1, C4, 7F, D7, 1, D6, 2724
50F DATA 3, C4, 7F, D7, 3, 31, 8D, B, 19,
E6, A9, 27, 11, A6, E4, 3D, 48, 8A, 2, 97,
2F, 8E, B, 27, 3F, 1F, 26, 2353
51F DATA FC, 2F, EB, 32, 61, 35, BE, 1,
FF, FD, FB, F9, F7, F5, F6, FF, ED, EB,
F9, E7, E5, EB, E1, DF, F1, DB, 5459
52F DATA D9, D7, DA, E3, D1, CF, CD, CB,
C9, CC, C5, C3, C1, BF, CD, CF, BE, B7, B
5, B3, B1, AF, AD, B9, A9, B7, A5, 5245
53F DATA A3, A1, 9F, A2, 9B, AD, 97, 95,
93, A1, 94, 8D, 8B, 89, 87, 85, 83, 86, 7
F, D, 8B, 79, 8B, 75, 78, 71, 6F, 3791
54F DATA 6D, 6B, 69, 67, 3A, 63, 61, 5F,
5D, 5B, 59, 5C, 69, 53, 51, 5F, 4D, 4B, 4
E, 47, 45, 43, 41, 3F, 3D, 4F, 49, 2329
55F DATA 37, 35, 47, 31, 2P, 32, 2B, 29,
27, 25, 33, 21, 24, 1D, 1B, 19, 17, 15, 1
3, 2A, F, 1D, B, 9, 7, 5, B, 867
```

End

32, inclusive, and allow several seconds as the program generates the data before the master menu reappears.

Select option 4 (Perform), sit back, and enjoy the show.

When the show is over, the program returns to the master menu. If you repeat options 1 or 3 (Compile and Append hex data), the new data will be appended to data already compiled. Option 6 (New) erases the compiled data buffer.

Color by Numbers

Option 2 lets you control the appearance and location of the fireworks by asking for a string of hexadecimal (hex) digits (you may input any other characters, but option 2 will compile them as zero). The Table contains helpful formulas, in which V is the decimal value of the number to be converted to two-character hex, and the number following V determines the order in which the hex numbers appear in the string.

You can omit V2 and V3 if you add 128 to V1 for the missile, or subtract 128

Timed pause

V1 = time in seconds (up to 3.1) x 40.
Example: .5 second pause = 14 hex.

Space bar prompt

V1 = 128 (80 hex).

Screen clear

V1 = 192 (C0 hex).

Missile

V1 = trail color 1 (range 0-3) x 4 + trail color 2 (range 0-3) x 16 + 1.
V2 = vertical launch site position (range 0-255, 0-191 visible).
V3 = horizontal launch site position (range 0-255, 0-127 visible).

V4 = vertical end position.

V5 = horizontal end position.

Example: black-and-white missile from lower-left to upper-right corner = 31 BF 00 00 7F hex.

Explosion

V1 = explosion intensity (range 0-31) x 4 + 130.

V2 = vertical location.

V3 = horizontal location.

Example: mid-intensity explosion at center screen = BE 5F 3F hex.

Flower

V1 = [number of petals or offshoots (range 1-32) - 1] x 4 + 131.

V2 = vertical location.

V3 = horizontal location.

V4 = trail color 1 (range 0-3) + trail color 2 (range 0-3) x 4 + [deceleration value (range 1-16) - 1] x 16.

V5 = offshoot head color (range 0-3).

V6 = radial adjustment (range 0-255).

Example: medium to large flower at center screen with 11 petals, all colors but black, no radial adjustment = AB 5F 3F 27 02 00 hex.

Data repeat

V1 = 193 (C1 hex).

V2 = number of bytes to be repeated (range 0-255).

Example: indefinitely repeating the repeat directive = C1 00 hex.

Table. Hexadecimal formulas for altering fireworks screen display.

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EMCD86



from V1 for the explosion or flower. This modification appropriates certain default screen coordinates in lieu of coordinates taken from the data. The flower default is equal to the last explosion location, and the explosion default is the last missile endpoint. The missile launch default is (191,63); you can add 64 instead of 128 to V1, which will make the default equal to the previous missile endpoint instead.

It's important not to separate the hex data with punctuation as you're entering it. Press the enter key when you're finished. The program returns to the master menu and no compilation takes place. Use option 3 if you wish to compile.

Don't be discouraged if the hex-coding process seems tedious. No data you could possibly enter will crash the program. Furthermore, option 6 can't erase your source string. Experiment boldly until you find what you're looking for.

Note option 3. As its label suggests, you can append input data to the performance buffer with the touch of a key. Copy the same data into the buffer as many times as you wish, adjacently or interspersed with random data.

Option 5 sends the hex string to the printer, while option 7 terminates the program.

Ph.D. in Explosives

If you plan to direct your own Fourth of July exhibition, you'll need a few

hints on fine-tuning the hex values.

When a color-mode designation is required, zero and 3 represent black and white, respectively. However, 1 and 2 may represent blue and red respectively, or vice-versa. You can't predict which of these color sets applies each time you turn on or reset the computer, but you can use color 1, observe whether it produces blue or red, and calculate the rest of the data accordingly.

When specifying a deceleration value for a flower, remember that the larger the value is, the smaller the flower. A deceleration value of zero creates a large flower that undergoes considerable screen wraparound, producing a showering effect.

Radial adjustment refers to the starting angle of the flower's radiating pattern. Let's say you've placed a 32-petal flower on the screen and want 32 more petals of a different color to alternate with the first. If you don't specify a radial adjustment for either flower, the second flower will blot out the first.

Note, however, that 256 (the total number of available angular units) divided by 32 (the number of petals) equals eight, which is the number of angular units between consecutive petals. Since the second set of petals must mesh with the first, the initial new petal must appear halfway between the first two petals of the original flower. Half of eight is four, so you would assign a radial ad-

justment of four to the second flower.

Press the break key to stop a show in progress. If you're using a space-bar-prompt directive, press the space bar before hitting the break key.

You can erase one flower or missile, without clearing the entire screen, by compiling another event of exactly the same specifications. In this case, all color codes will be zero (black).

Finally, since the missile directive is essentially a slowed-down, color-enhanced version of the Line statement, you can use it to print words and draw pictures with a special flair. ■

William C. Garretson welcomes questions and comments. Write to him at 828 Gregory Ave., Bedford, TX 76022.



Personal Proofreader

by Delmar Searls

Word processors make it easier than ever to correct spelling and typing errors, but finding those errors requires time for careful proofreading. If you think you wouldn't get enough use from a commercial spelling checker to justify the cost, try the two Basic programs I've written that compare the words in a text with those in a dictionary you compile yourself.

Program Listing 1, Checker, creates a list of the different words in the text. The second program, Speller, compares this list against the dictionary. It uses files containing the text word list, the dictionary, and a temporary file to produce a shorter list of "misspelled" words that are either added to the dictionary as new

words (proper names, for example) or placed in a file of truly incorrect words.

Nodes and Pointers

Checker reads words from an ASCII file and stores them alphabetically in a linked list, one at a time. It takes a long time to search the list for the proper insert space, so I've set up 26 lists—one for each letter of the alphabet.

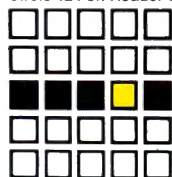
Each item in a linked list is called a node and consists of two elements: a word and a pointer to the next node. A special pointer recognizes the first node. (For more details, see "Linked Lists," *HOT CoCo*, November 1985, p. 63.)

At first glance, Checker may seem hard to read. Some readability was lost when I took steps to make up for the loss of execution speed that resulted from converting the original structured Basic program to Extended Color Basic. I condensed instructions into single lines and moved frequently used loops toward the beginning of the program.

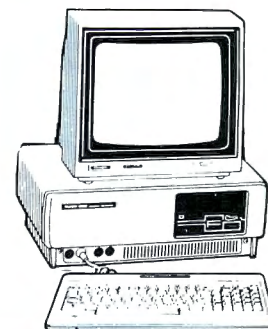
Checker's main functions are better understood as modules. Notice that I've identified them this way in the Listing.

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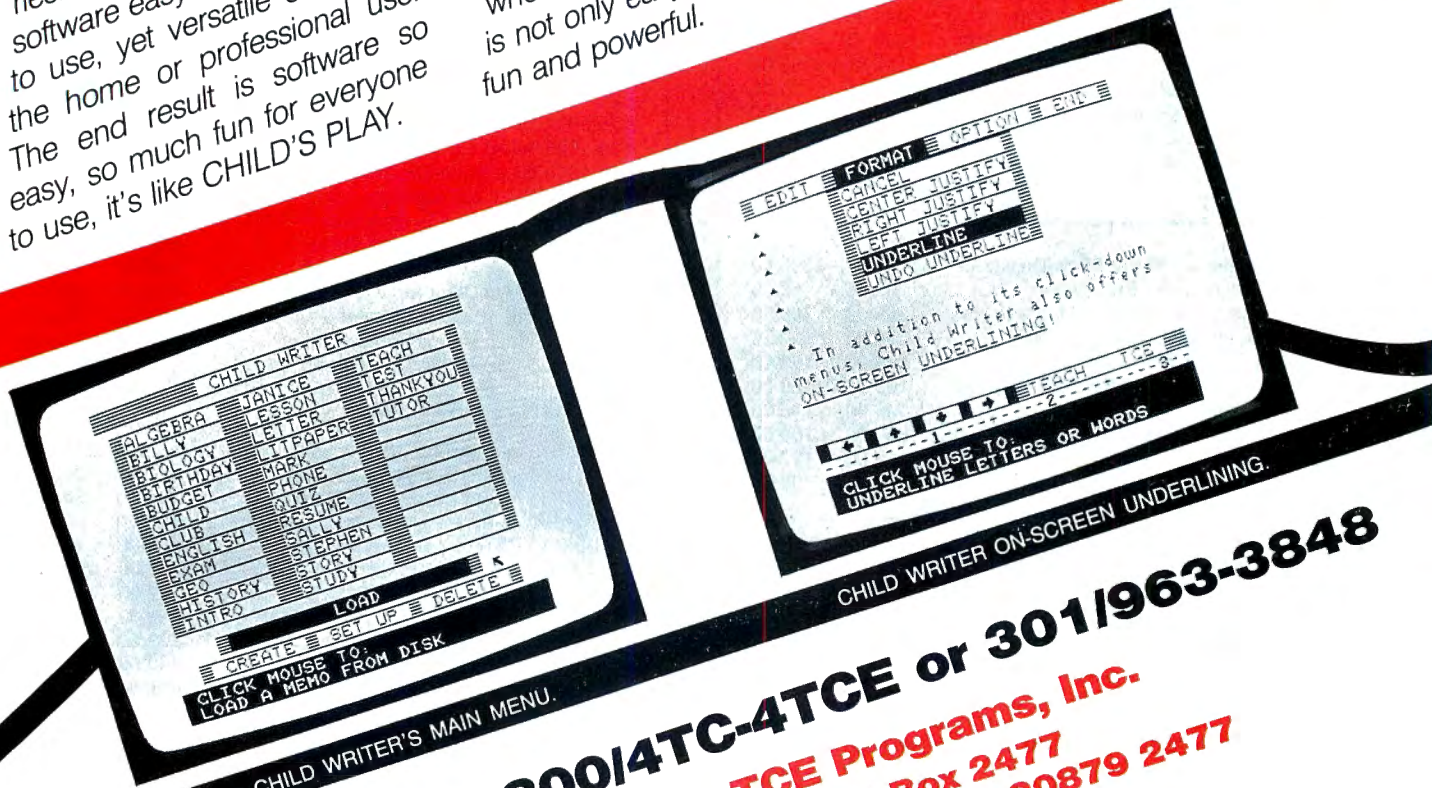
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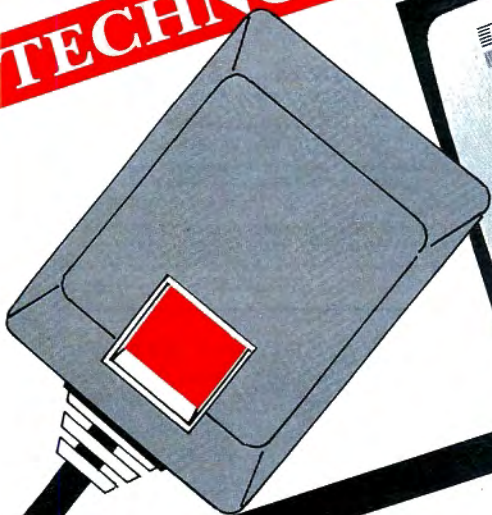
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Program Listing 1. Checker.

```

100 GOTO 2000
200 '+++++
300 ' NEW WORD?
400 '+++++
1000 P1=0:P2=PL(ASC(L$)-96):IF P2
=>0 THEN NUWORD=-1:RETURN
1100 IF W$>WDS(P2) AND PT(P2)<>0
THEN P1=P2:P2=PT(P2):GOTO 1100
1200 IF W$=WDS(P2) THEN NUWORD=0:
RETURN ELSE NUWORD=-1:IF W$>WDS(
P2) THEN P1=P2:RETURN ELSE RETUR
N
1300 '+++++
1400 ' GET NEXT WORD
1500 '+++++
2000 L=LEN(T$)
2100 IF INSTR(T$, " ")=1 THEN L=L-
1:T$=RIGHT$(T$,L):GOTO 2100
2200 IF T$<>" " THEN 2300 ELSE GOSU
B 1100: IF DONE THEN RETURN ELSE
L=LEN(T$):GOTO 2100
2300 PT=INSTR(T$, " "):IF PT=0 THE
N W$=T$:T$="" :GOTO 2500
2400 W$=LEFT$(T$,PT-1):T$=RIGHT$(
T$,L-PT)
2500 L$=LEFT$(W$,1)
2600 IF (L$="A" AND L$<="Z") OR
(L$>"a" AND L$<="z") THEN 2700 E
LSE W$=RIGHT$(W$,LEN(W$)-1):IF W
$="" THEN 2100 ELSE L$=LEFT$(W$,1)
:GOTO 2600
2700 IF (L$>"A" AND L$<="Z") THE
N L$=CHR$(ASC(L$)+32) : MID$(W$,
1,1)=L$
2800 R$=RIGHT$(W$,1):IF (R$="A"
AND R$<="Z") OR (R$="a" AND R$<
="z") THEN RETURN ELSE W$=LEFT$(
W$,LEN(W$)-1):IF W$="" THEN 2100
ELSE GOTO 2800
2900 '+++++
3000 ' ADD WORD TO LIST
3100 '+++++
4000 IF P1=0 THEN T=ASC(L$)-96:PT
(P)=PL(T):PL(T)=P:GOTO 4100 ELSE
PT(P)=PT(P1):PT(P1)=P
4100 WDS(P)=W$:P=P+1:RETURN
4200 '*****
4300 ' MAKE WORD LIST
4400 '*****
10000 PRINT "WORKING":GOSUB 2000
10100 IF DONE THEN RETURN
10200 PRINT " ":GOSUB 1000:IF NUWO
RD THEN GOSUB 4000
10300 GOSUB 2000:GOTO 10100

```

```

1040 '-----
1050 ' READ NEW LINE
1060 '-----
1100 IF EOF(1) THEN DONE=-1 ELSE
LINEINPUT#1,T$
1110 RETURN
1120 '*****
1130 ' MAIN DRIVER
1140 '*****
20000 PCLEAR1:CLEAR 15000,32767
20100 GOSUB 30000 'INITIALIZATION
-----
20200 GOSUB 40000 'OPEN FILE
20300 GOSUB 10000 'MAKE WORD LIST
-----
20400 CLOSE : OPEN "O", #1, "WORD
S.LST"
20500 GOSUB 50000 'LIST TO DISK
20600 CLOSE
20700 PRINT:PRINT"CHECKING SPELLI
NG...":RUN"SPELLER"
20800 '*****
20900 ' INITIALIZATION
21000 '*****
30000 DIM P1,P2,T$,W$,L,WDS(10000)
PT(10000),PL(26):DONE=0:P=1:RETR
N
30100 '*****
30200 ' OPEN FILE
30300 '*****
40000 CLS:PRINT "NAME OF INPUT F
ILE?":PRINT "-> " : LINEINPUT IN
$
40100 OPEN "I", #1, IN$:RETURN
40200 '*****
40300 ' SEND LIST TO DISK
40400 '*****
50000 FOR I=1 TO 26
50100 P=PL(I)
50200 IF P<>0 THEN PRINT#1,WDS(P)
:P=PT(P):GOTO 50200
50300 NEXT I
50400 RETURN

```

Program Listing 2. Speller.

```

100 FILES 4, 1024: GOSUB 10000 'O
PEN FILES
200 GOSUB 20000 'CHECK SPELLING
300 CLOSE
400 KILL "DICT.LST" 'DELETE OLD
DICTIONARY
500 RENAME "TEMP.LST" TO "DICT.LS

```

```

T" 'UPDATED DICTIONARY
600 GOSUB 30000 'PRINT MISPELLED
WORDS
700 CLOSE:CLEAR5000:FILES2:PCLEAR4
:END
800 '*****
900 ' OPEN FILES
1000 '*****
10000 OPEN "I", #1, "WORDS.LST"
10100 OPEN "I", #2, "DICT.LST"
10200 OPEN "O", #3, "TEMP.LST"
10300 OPEN "O", #4, "WORDS.MIS"
10400 RETURN
10500 '*****
10600 ' CHECK SPELLING
10700 '*****
20000 IF EOF(1) THEN PRINT "NO WO
RD FILE" : CLOSE : STOP
20100 IF EOF(2) THEN PRINT "NO DI
CTIONARY FILE" : CLOSE : STOP
20200 INPUT#1,W$: INPUT#2,D$
20300 IF W$>D$ THEN PRINT#3,D$: I
NPUT#2,D$: GOTO 20300
20400 IF W$=D$ THEN 20500 ELSE GOS
UB 25000: IF EOF(1) THEN PRINT#3,
D$:GOTO 20700 ELSE INPUT#1,W$: GO
TO 20300
20500 PRINT#3,D$: IF EOF(1) THEN
:GOTO 20300
20700 ELSE INPUT#1,W$: INPUT#2,D$
:GOTO 20300
20600 '---WE'VE REACHED THE END
OF THE WORD LIST.
20700 IF EOF(2) THEN RETURN ELSE
INPUT#2,D$:PRINT#3,D$:GOTO 20700
20800 '-----
20900 ' ADD WORD TO DICT?
21000 '-----
25000 PRINT CHR$(34); W$; CHR$(34
); : " NOT IN DICTIONARY."
25100 PRINT: INPUT "ADD IT <Y OR
N>":AS
25200 PRINT:PRINT
25300 IF AS="Y" THEN PRINT#3,W$ E
LSE PRINT#4,W$
25400 RETURN
25500 '*****
25600 ' PRINT LIST OF POSSIBLY M
ISPELLED WORDS
25700 '*****
30000 OPEN "I", #1, "WORDS.MIS"
30100 PRINT#-2:PRINT#-2:PRINT#-2,
"THESE WORDS MAY BE MISPELLED:"
30200 PRINT#-2
30300 IF EOF(1) THEN RETURN ELSE
INPUT#1,W$: PRINT#-2,W$:GOTO 303
00

```

End

The main driver (lines 2000-2070) calls subroutines to perform specific tasks and is normally quite short.

The initialization module (line 3000) assigns dimensions to the arrays used to store words and pointers. The variable DONE is a flag indicating the end of the input file. (In Basic, a value of zero denotes false, while -1 denotes true. DONE is initially set to false.) Variable P is a pointer to the next available slot in the array. It points initially to the first slot.

The open-file module (lines 4000-4010) asks for the text file name and then opens the file for input. The make-word-list module (lines 1000-1030) is the heart of the program. It takes successive words from the text and inserts them into the word list if they don't already appear in it.

A word is defined as a sequence of non-blank characters beginning and ending with a letter of the alphabet. Thus, "don't" and "first-rate" would both be counted as words.

The get-next-word module (lines 200-280) does what its name implies, as does the read-new-line module (lines 1100-1110).

The new-word? module (lines 100-120) searches the appropriate linked list for the word currently being pulled from text. If the word isn't in the list, the module determines where it should be inserted. The add-word-to-list subroutine (lines 400-410) does the inserting.

When the program reaches the end of the text file, it calls the send-list-to-disk subroutine at line 5000.

The last instruction that Checker executes runs Speller (Program Listing 2), which compares the words in the word list with those in the dictionary.

Find the Misspelling

Speller uses four files: the word list, the dictionary, a list of misspelled words that it generates, and a temporary file. The latter file becomes the revised dictionary (including the words you've just added) after the program has finished running.

The check-spelling module (lines 2000-2070) reads one word each from the word list and the dictionary. If the words match, it means the text word is spelled correctly and the program moves on to compare the next word pair.

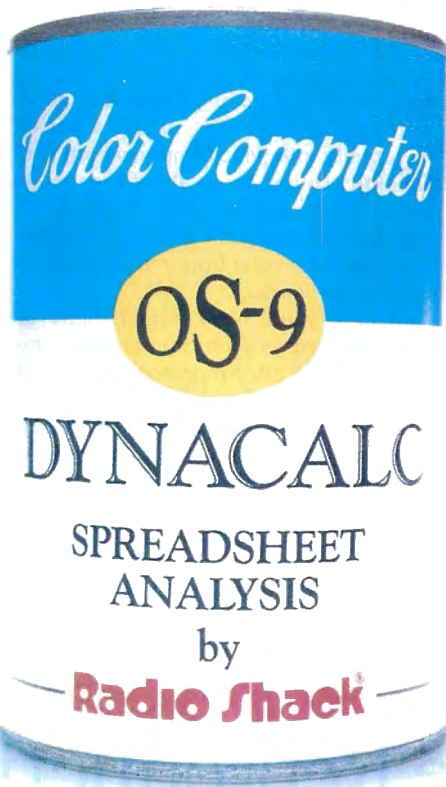
At each new text word, the program moves alphabetically down the dictionary list searching for the same word. If it doesn't find it, the add-word-to-dictionary? subroutine prompts you about adding the word to the dictionary. Words not added to the dictionary automatically go into the file of misspelled words.

Running the Program

Try running Checker. The program asks you for the name of the text file; type it and press the enter key. Don't forget that the text file must have been saved in ASCII format; ASCII files are indicated with the letter "A" as the fourth term in the directory listing (for example, SAMPLE TXT 2 A 6). Unpredictable things will happen if you try to use Checker with a non-ASCII file.

The program next displays the message "Working," and a period appears as each word is read from the text. Occasionally, you may think the program has stopped, but it only appears that way while the Basic interpreter stops occasionally to rearrange string variables in memory.

A prompt appears to notify you when Speller is working. Text words not found



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in the dictionary are displayed. Type Y to add such words to the dictionary. Any other response puts them in the misspelled list.

The misspelled words are then printed on your printer and stored in a disk file named Words.MIS.

Webster from Scratch

You may wonder how a homemade dictionary can compete with a 20,000-word commercial spelling checker. Remember that such mass-market programs must meet the needs of many users; your smaller dictionary will gradually accumulate most of the words that are peculiar to your needs.

Start the dictionary with a list of commonly used words; the *American Heri-*

tage Word Frequency Book is a good source. You may want to add a list of commonly misspelled words, which you can find in many books about proofreading and editing. The first *People's Almanac* (Doubleday & Co. Inc., 1975) also has a list of several hundred commonly misspelled words.

At first, you'll have to add many of your own words each time you use the program, but after repeated use, you'll find that the dictionary contains most of the words you ordinarily use. My dictionary, for example, contains quite a few computer terms.

Using a word processor, enter the first list of commonly used words, one word per line, in alphabetical order. The last entry in the dictionary must be "zzzz-

zzzzzz" to ensure that Speller always reaches the end of the word list before it reaches the end of the dictionary.

Save the dictionary (on disk in ASCII format) as DICT.LST. Save Checker and Speller on the same disk. If you have one disk drive, the ASCII text file must also go on this disk. If you have two drives, it's easier to use the program disk in drive zero and the text file in drive 1. Remember to indicate the drive number when you're entering the file name. If the text file was named Letter.TXT, you would enter Letter.TXT:1 as the file name. ■

Delmar Searls welcomes questions and comments. Contact him at 205 W. Main St., Wilmore, KY 40390. Include a stamped, self-addressed envelope.

Fine Reproductions

by Ronald H. Orcutt

Generating high-resolution graphics on a Color Computer is more rewarding when you can transfer your handiwork to paper. Luckily, Tandy's DMP-105 printer provides many features of more expensive dot-matrix printers. My program allows it to print out the bit-mapped graphics generated by Extended Color Basic's (ECB) PMODE 4.

Behind the Projector

First, it helps to know something about how pixels are represented in memory and how my program (see Program Listing 1) translates this code into a form that the printer can understand.

ECB divides graphics memory into 1,536-byte pages, and four of these pages equal a screenful of hi-res graphics. (This is also the default value.) It's a good idea to use the PCLEAR 8 command to reserve another four pages at the top of the program.

The first four-page group is called SCRNI, while the second, optional group is SCRNI2. You can use the PCOPY command to copy the contents of one

System Requirements

Extended Color Basic
Editor/assembler
DMP-105 printer

Program Listing 1. Program for translating graphics into printable code.

```

6000          0E00      00100      ORG      $6000
                2600      00110 SCRNI  EQU      $0E00
                A02      00120 SCRNI2 EQU      $2600
6000 CC       0E20      00130 OUT   EQU      $0A002
6003 FD       60D1      00140 SCPR  LDD      #SCRNI+32
6006 8E       2600      00150 STD      COL
6009 CE       60D3      00160 LDX      #SCRNI2 SAVE
600C A6       84        00170 LDU      #TEMP SCRNI2
600E 6F       80        00180 LDA      ,X GRAPHICS
6010 A7       C0        00190 CLR      ,X+ *
6012 8C       2680      00200 STA      ,U+ *
6015 26       F5        00210 CMPX   #SCRNI2+128 *
6017 86       FE        00220 BNE     CONT *
6019 97       6F        00230 LDA      #-2 SEND OUTPUT
601B 86       1B        00240 STA      $6F TO SER PRINTER
601D AD       9F A002   00250 LDA      $1B SET 72
6021 86       17        00260 JSR     [OUT] DOTS PER
6023 AD       9F A002   00270 LDA      $17 INCH
6027 86       12        00280 JSR     [OUT] *
6029 AD       9F A002   00290 LDA      $12 SET GRAPHICS
602D 8E       0E00      00300 JSR     [OUT] MODE
6030 86       1B        00310 LDX      #SCRNI2 START
6032 AD       9F A002   00320 LDA      #27 SPACE
6036 86       10        00330 JSR     [OUT] TO
6038 AD       9F A002   00340 LDA      #16 CENTER
603C 4F       00360      00350 JSR     [OUT] OUTPUT
603D AD       9F A002   00360 CLRA     *
6041 86       B2        00370 JSR     [OUT] *
6043 AD       9F A002   00380 LDA      $178 *
6047 1F       12        00390 JSR     [OUT] *
6049 C6       07        00400 GP20  TFR      X,Y TEST
604B 6D       84        00410 LDB      #7 FOR
604D 26       1E        00420 TST     ,X NULL
604F 30       88 20     00430 BNE     DONE BLOCK
6052 5A       00440      00440 LEAX   32,X *
6053 26       F6        00450 DECB   *
6055 86       1C        00460 BNE     TEST *
6057 AD       9F A002   00470 LDA      $1C SEND
605B 86       08        00480 JSR     [OUT] NULL
605D AD       9F A002   00490 LDA      #8 BLOCK
6061 86       80        00500 JSR     [OUT] TO
6063 AD       9F A002   00510 LDA      #128 PRINT
6067 30       89 FF20   00520 JSR     [OUT] BUFFER
606B 20       20        00530 LEAX   -224,X *
606D 1F       21        00540 BRA     GPO *
606F 108E 0008 00550 TFR      Y,X NOT
                00560 LDY     #8 A

```

Listing 1 continued



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Listing 1 continued

```

6073 C6 07 00570 GP10 LDB #7 NULL
6075 68 84 00580 SHIFT LSL ,X BLOCK
6077 46 00590 RORA SO
6078 30 88 20 00600 LEAX 32,X CONVERT
607B 5A 00610 DECB AND
607C 26 F7 00620 BNE SHIFT SEND
607E 44 00630 LSRA TO
607F 8A 80 00640 ORA #80 PRINT
6081 AD 9F A002 00650 JSR [OUT] BUFFER
6085 30 89 FF20 00660 LEAX -224,X GET
6089 31 3F 00670 LEAY -1,Y NEXT
608B 26 E6 00680 BNE GP10 BLOCK
608D 30 01 00690 LEAX 1,X *
608F BC 60D1 00700 CMPX COL LINE DONE?
6092 26 B3 00710 BNE GP20 NO/
6094 86 0D 00720 LDA #0D YES
6096 AD 9F A002 00730 JSR [OUT] PRINT IT
609A FC 60D1 00740 LDD COL GO
609D C3 00E0 00750 ADDD #80 FOR
60A0 FD 60D1 00760 STD COL NEXT
60A3 BE 60D1 00770 LDX COL LINE
60A6 30 88 E0 00780 LEAX -32,X *
60A9 1083 26A0 00790 CMPD #SCRN2+160 DONE?
60AD 26 81 00800 BNE GP30 NO/
60AF 86 1E 00810 LDA #30 YES
60B1 AD 9F A002 00820 JSR [OUT] RESTORE
60B5 86 0A 00830 LDA #0A PRINTER TO
60B7 AD 9F A002 00840 JSR [OUT] TEXT
60BB AD 9F A002 00850 JSR [OUT] MODE
60BF 0F 6F 00860 CLR $6F *
60C1 8E 2600 00870 LDX #SCRN2 NOW
60C4 CE 60D3 00880 LDU #TEMP RESTORE
60C7 A6 C0 00890 LDA ,U+ SCRN2
60C9 A7 80 00900 STA ,X+ GRAPHICS
60CB 8C 2680 00910 CMPX #SCRN2+128 *
60CE 26 F7 00920 BNE CONT2 *
60D0 39 00930 RTS RETURN TO BASIC
60D1 0E20 00940 COL FDB $0E20
60D3 00950 TEMP RMB 128
0000 0000 00960 END
    
```

00000 TOTAL ERRORS

End

Program Listing 2. Program to generate sine-wave graphics for a test printout.

```

100 REM GPRTEMO--DAMPED SW
110 POKE150,18
120 CLEAR200,4H5FFF
130 LOADM"SCRPT.BIN"
140 DEFUSR0=&H6000
150 PMODE4,1
160 PCLS
170 SCREEN1,1
180 LINE(0,0)-(200,191),PSET,B
190 LINE(0,91)-(200,91),PSET
200 B=-7.33E-2
210 PI=3.14159
220 TP=2*PI
230 SS=TP/200
240 FORS=0TO200
250 AR=S*SS
260 Y2=EXP(B*AR)
270 IF AR<=TP THEN300
280 AI=INT(AR/TP)
290 AR=AR-AI*TP
300 Y2=Y2*SIN(AR)+1'FUNCTION
310 Y2=Y2*100
320 YP=191-Y2
330 IF YP>191 OR YP<0 THEN 350
340 PSET(S,YP)
350 NEXTS
360 SCREEN0,1:CLS:PRINT"TO EXIT
HRG SCREEN, HIT A KEY
370 FORD=0TO200:NEXTD
380 SCREEN1,1
390 IFINKEY$=""THEN390
400 CLS
410 PRINT"FOR HARD COPY ENTER A
1, ENTER 2 TO RETURN TO SCREEN"
420 PRINT"TO EXIT ENTER ANYTHING
ELSE."
430 INPUT"ANSWER";ANS
440 IFANS="1"THEN=USR0(0):END
450 IFANS="2"THEN360
460 END
    
```

End

192 Rows
32 Bytes
Across = 192 Rows
256 Bits
Across

```

C0 C0 C0 ... = 110000001100000011000000 ...
C0 C0 C0 ... = 110000001100000011000000 ...
C0 C0 C0 ... = 110000001100000011000000 ...
C0 C0 C0 ... = 110000001100000011000000 ...
FF C0 C0 ... = 111111111100000011000000 ...
FF C0 C0 ... = 111111111100000011000000 ...
C0 C0 C0 ... = 110000001100000011000000 ...
C0 C0 C0 ... = 110000001100000011000000 ...
C0 C0 C0 ... = 110000001100000011000000 ...
C0 C0 C0 ... = 110000001100000011000000 ...
...
...
...
    
```

Figure 1. Bit representation of screen graphics.

```

1 X 7 Byte = 8 X 7 Bit
Block Block
| C0 | ... = | 11000000 | ...
| C0 | ... = | 11000000 | ...
| C0 | ... = | 11000000 | ...
| C0 | ... = | 11000000 | ...
| FF | ... = | 11111111 | ...
| FF | ... = | 11111111 | ...
| C0 | ... = | 11000000 | ...
-----
C0 ... = 11000000 ...
C0 ... = 11000000 ...
C0 ... = 11000000 ...
    
```

Figure 2. Bit and byte blocks to be translated from screen memory.

page onto another; for example, use the following code to make a copy of SCRNI:

```
FOR I=1 TO 4:PCOPY I TO I+4:NEXT I
```

In PMODE 4, each graphics screen consists of 192 rows of 32 bytes (256 bits). Each 1 bit represents a pixel that is on, while a zero bit stands for a pixel that is off. Figure 1 shows the bits in a graphics representation of the word "Hi."

To reproduce a copy of the screen on the printer, each "on" pixel must be converted to a printed dot. The DMP-105 works with units of seven vertical dots, so Listing 1 is designed to operate on 1-by 7-byte blocks (8-by 7-bit blocks) in SCRNI memory. Figure 2 shows the block arrangement.

If all 7 bytes in a block are zero, a null (nonprinting) block is sent to the printer buffer. If the block has any nonzero elements, the leftmost bit from each byte in the block is right-shifted into the A accumulator to form a transformed byte. The new byte is right-shifted and its most-significant bit is set, completing the dot code that goes to the printer buffer.

The program repeats this process eight times to complete the block, then transforms the remaining 31 blocks that make up the first seven rows of the screen. The result is a line of 256 dot-code values that is sent to the printer via a CR command to the buffer.

The rest of screen memory is similarly converted. Remember that the contents of graphics pages 1-4 will be erased,

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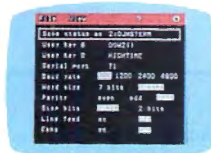
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since the bit shifts are all done in memory; if you need to reuse the graphics pages, save them before carrying out the conversion.

Final Notes

If you're using a cassette-based system, change lines 110 and 120 of Listing 1 to the following:

```
110 SCRN1 EQU $0600
120 SCRN2 EQU $1E00
```

The choice of \$6000 as the originating address is completely arbitrary; just change the ORG directive to assemble the program elsewhere in memory.

Also, change line 130 in the test program (Program Listing 2) to the following:

```
130 CLOADM"SCRPRT.BIN"
```

I recommend that you speed up the conversion process by operating the printer at 2,400 baud. To do this, set the baud-rate switch on the printer and

POKE 18 into memory location 150. (See line 110 in Listing 2.)

For a simple illustration of the DMP-105's graphics printing capabilities, assemble Listing 1 as SCRPRT.BIN. Enter and run Listing 2 to generate a sine wave on screen, then try to print it out, using what you've learned in this article. ■

You can reach Ron Orcutt at 414 S. Main St., Erwin, TN 37650.

Switch

by Lee Briggs

I wrote Switch to prove that Color Basic could produce a challenging game. The object is to change the colors of the squares on the playing field while avoiding "enemies." I'll describe the program for the benefit of those of you learning Basic.

Creating the Graphics

You can find all the graphics characters I used on p. 276 of *Getting Started with Color Basic* (Appendix B). Review Appendix B if you don't remember how to produce the graphics characters on your CoCo.

As Appendix B tells you, you add to the character value to change its color. For example, PRINT CHR\$(129 + 48) prints CHR\$(129) with a red square. You can add the values together as PRINT CHR\$(177) to produce the same character. You can also use a variable to contain the value. Below are three examples that produce the same character:

```
A = 129 + 48
PRINT CHR$(A)
A$ = CHR$(129 + 48)
PRINT A$
A = 129
B = 48
PRINT CHR$(A + B)
```

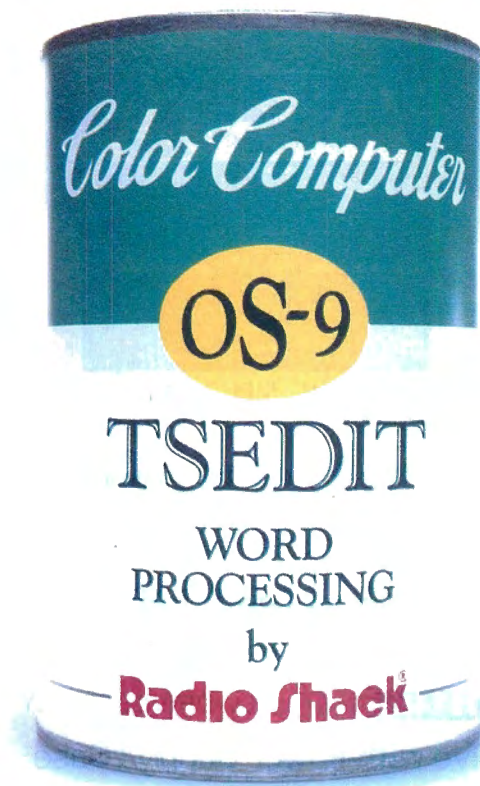
You can concatenate these characters into one variable, allowing many to be put in one Print statement. This speeds execution. For example:

System Requirements

16K RAM
Color Basic

Lines	Description
10-410	Initialization
110-140	Initializes the DISP array
300-410	Initializes the enemy arrays
500-6540	The program's main playing loop
500-504	Initializes for each game
510-690	Initializes for each level
1000-1070	Displays the playing field
2000-2050	Displays the player and enemies
3000-6540	Main loop
3000-3060	Gets an arrow input
3100-3240	Moves the player
3100-3130	Moves the player
3140	Determines if you have lost
3200-3205	Calculates score and displays it
3210	Determines if you have completed a level
3220-3240	Signals completion of a level
4000-6540	Moves the enemies
4000	Determines if E1\$ will move
4015	Clears the square E1\$ currently occupies
4020-4060	Determines direction of move
4070	Determines if E1\$ has moved into player's square
5000	Skips moves of E2\$ and E3\$ for level 1
5010-5100	Moves E2\$ as above
6000	Skips move of E3\$ for level 2
6010-6100	Moves E3\$ as above
6500-6540	Displays enemies' new positions
7000-7150	Signals lost game; gets new high score; displays scores; asks if you want to play again
9000-9049	Displays a square with the starting color
9050-9099	Displays a square with the changed color
9100-9199	Displays E1\$
9200-9299	Displays PL\$
9300-9399	Displays E2\$
9400-9499	Displays E3\$

Table. Program-line descriptions for Switch.



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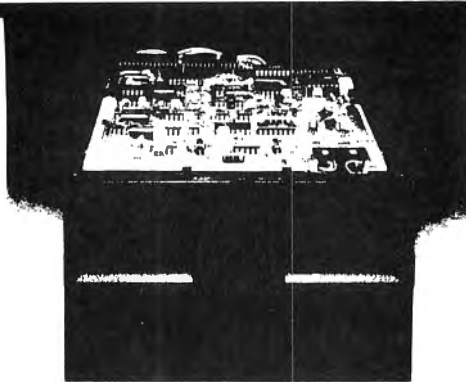
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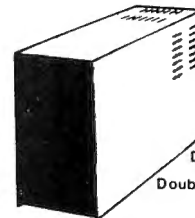
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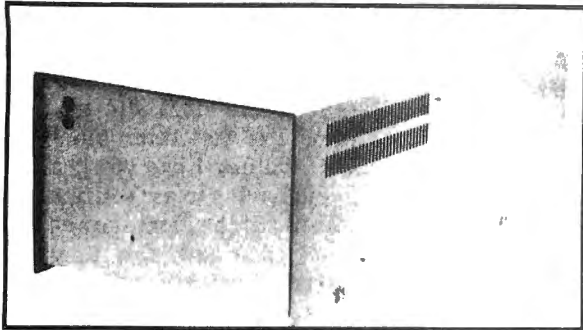
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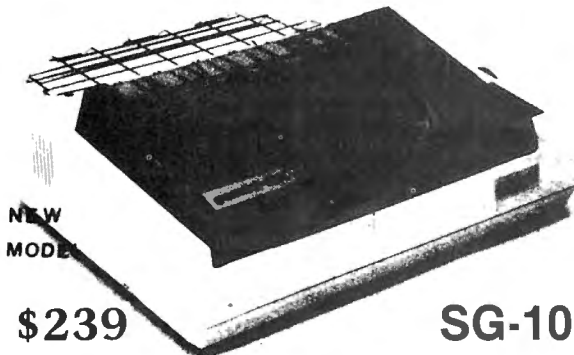
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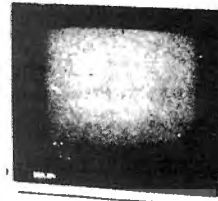
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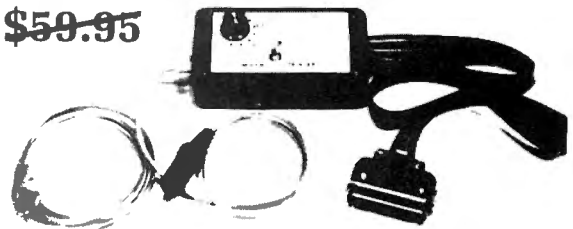
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```
A$ = CHR$(129 + 48) + CHR$(131 + 48) +
CHR$(131 + 48) + CHR$(130 + 48)
PRINT A$
```

These statements produce the top quarter of a square like the ones used in Switch (see the Program Listing on p. 140).

Choosing the Colors

Switch chooses the starting and changed colors at the beginning of each level. The program chooses the starting color randomly and then adds four to its value if it's less than four, or subtracts four to determine the changed color. This always produces two colors that contrast well, even on a black-and-white TV. The resulting values are then multiplied by 16 to produce one of the graphics characters from Appendix B.

Initializing the Squares

Four-element arrays contain the playing squares and the player, with each element consisting of the four graphics characters previously explained. Lines 580-690 initialize them at the beginning of each level (see the Table). SS\$ contains the characters making up the square, with the unshaded portions in the starting color. SC\$ is the same as SS\$, except that it has the changed color. PL\$ is the same as SC\$, but with the player characters in the middle. The Figure illustrates these shapes.

Using the arrays in this manner allows for efficient movement of the player. The program just clears the square number that the player currently occupies by displaying the SC\$ array in that position using four Print statements. Then four more Print statements display the player in the new position. Switch needs the SS\$ array only to clear an unchanged square when moving an enemy.

Keeping Track Of Switched Squares

The CHANGED array keeps track of which squares have been changed. This is a two-dimensional array with an element corresponding to each square on the playing field. The program initializes the array to zeros at the beginning of each level. If, when the player moves onto a square, the CHANGED array's corresponding element's value is zero, three things happen: The value becomes one, the score is incremented by 10, and the total number of squares changed (X) is incremented by one.

The CHANGED array determines whether to clear the enemy's current position when it moves by printing the SS\$ or SC\$ array.

Determining Enemy Moves

The random-number generator determines whether an enemy will move or not. The RN variable is initialized at seven at the beginning of the game. It is decremented by one at the beginning of each level. The RND function uses the RN variable, and if the number generated is one, the enemy moves. Therefore, in level 1, there is a one-in-six chance that the enemy will move. In level 2, there is a one-in-five chance that each of two enemies will move, and so on to level 5, where there is a one-in-two chance that each of three enemies will move.

Playing the Game

The player starts in the upper-left corner of the screen, and the four arrow keys control its movement. The first enemy starts in the lower-left corner. The first level is easy, if you are patient. The enemy usually stays near the lower-left corner at this level.

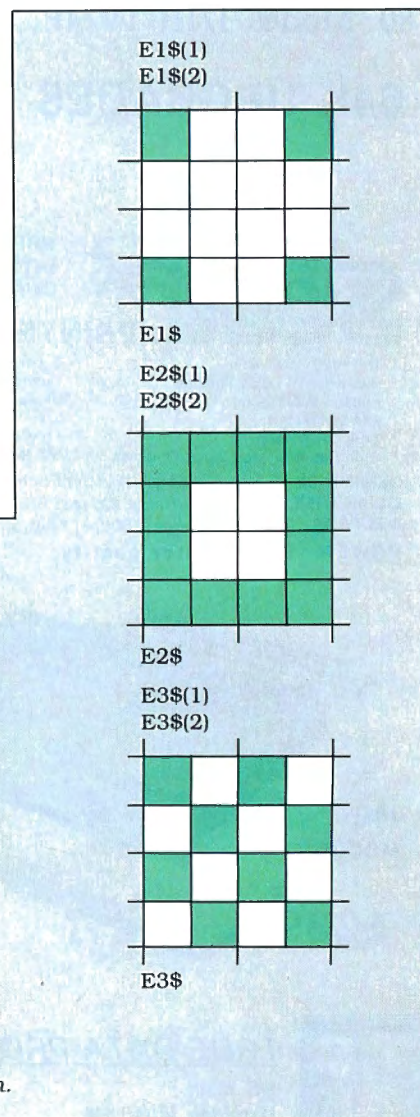
Level 2 contains two enemies, and from level 3 on, there are three enemies. The enemies move more and more frequently as the levels increase. You receive 10 points for each square that you switch. You receive an increasing bonus for completing each level.

Programming Exercises

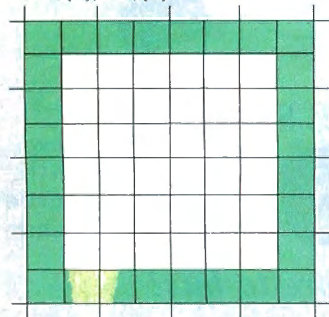
I have some suggestions for changing the program. You can follow them either to change the difficulty of the game or learn more about Basic programming.

- Make the player joystick controlled.
- Allow for more players in the game, or add a bonus-player option.
- Allow the player to fall off the playing field if you move it too far, ending play.
- Make one of the enemies pursue the player. ■

Address correspondence to Lee Briggs, 4 Colchester Arms, Colchester, CT 06415.

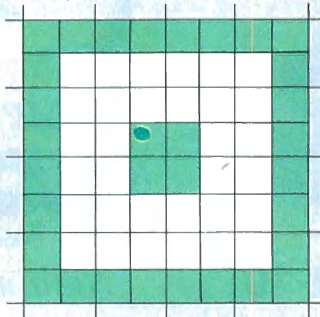


```
SS$(1),SC$(1)
SS$(2),SC$(2)
SS$(3),SC$(3)
SS$(4),SC$(4)
```



Playing Squares
(unshaded portion contains starting or changed color)

```
PL$(1)
PL$(2)
PL$(3)
PL$(4)
```

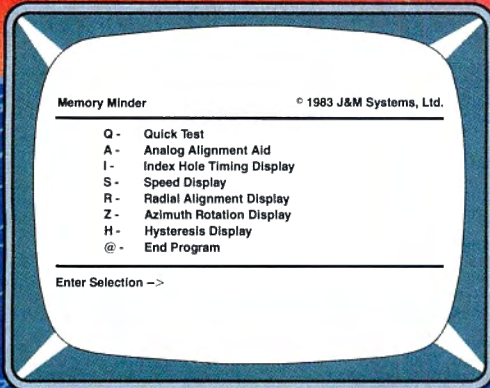


Player Display

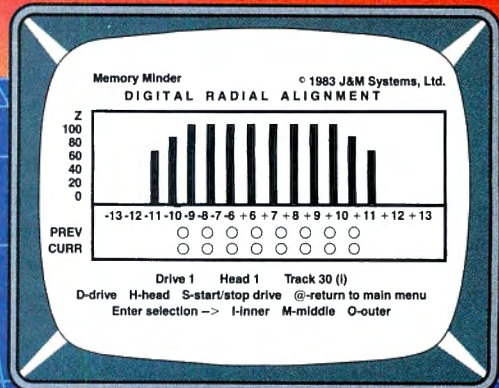
Figure. Graphics characters used in Switch.

MEMORY MINDER T.M.

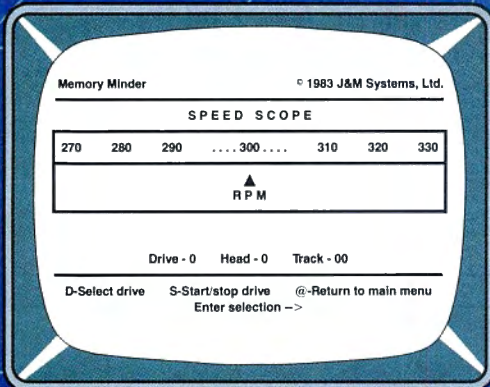
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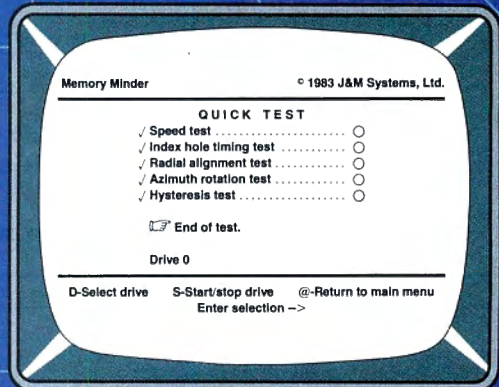
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Program Listing. Switch.

```

100 CLS
20 DIM DISP(7,4)
30 DIM SSS(4),SCS(4),PLS(4)
40 DIM ELS(2),E2S(2),E3S(2)
50 DIM CHANGED(7,4)
60 PRINT#37,"WELCOME TO switch !

100 REM ** INITIALIZE
110 FOR I=1 TO 7:FOR J=1 TO 4
130 DISP(I,J)=(I*4)-2+((J-1)*1
28)
140 NEXTJ:NEXTI
150 HIGHSCORE=#
300 REM ** INITIALIZE ENEMIES
310 ELS(1)=CHR$(135+16)+CHR$(139
+16)
330 ELS(2)=CHR$(141+16)+CHR$(142
+16)
350 E2S(1)=CHR$(129+48)+CHR$(130
+48)
370 E2S(2)=CHR$(132+48)+CHR$(136
+48)
390 E3S(1)=CHR$(134+112)+CHR$(13
4+112)
410 E3S(2)=CHR$(134+112)+CHR$(13
4+112)
500 REM ** RE-INITIALIZE FOR EAC
H GAME
502 LEVEL=#:RN=7:SCORE=#
504 H2=#:V2=#:H3=#:V3=#
510 REM **SET UP FOR EACH LEVEL
515 CS=RND(8)-1
520 IF CS<4 THEN CC=CS+4 ELSE CC
=CS-4
525 CLS:CS=CS*16:CC=CC*16
530 RN=RN-1:LEVEL=LEVEL+1:X=1
535 IF RN<2 THEN RN=2
540 FOR I=1 TO 7:FOR J=1 TO 4
550 CHANGED(I,J)=#
560 NEXT:NEXT
570 CHANGED(1,1)=1
580 SSS(1)=CHR$(129+CS)+CHR$(131
+CS)+CHR$(131+CS)+CHR$(130+CS)
590 SCS(1)=CHR$(129+CC)+CHR$(131
+CC)+CHR$(131+CC)+CHR$(130+CC)
600 PLS(1)=SCS(1)
610 SSS(2)=CHR$(133+CS)+CHR$(143
+CS)+CHR$(143+CS)+CHR$(138+CS)
620 SCS(2)=CHR$(133+CC)+CHR$(143
+CC)+CHR$(143+CC)+CHR$(138+CC)
630 PLS(2)=CHR$(133+CC)+CHR$(142
+CC)+CHR$(141+CC)+CHR$(138+CC)
640 SSS(3)=SSS(2)
650 SCS(3)=SCS(2)
660 PLS(3)=CHR$(133+CC)+CHR$(139
+CC)+CHR$(135+CC)+CHR$(138+CC)
670 SSS(4)=CHR$(132+CS)+CHR$(140
+CS)+CHR$(140+CS)+CHR$(136+CS)
680 SCS(4)=CHR$(132+CC)+CHR$(140
+CC)+CHR$(140+CC)+CHR$(136+CC)
690 PLS(4)=SCS(4)
1000 REM ** DISPLAY FIELD
1010 FOR J=1 TO 4:FOR I=1 TO 7:F
OR L=1 TO 4
1060 PRINT@DISP(I,J)+((L-1)*32
),SSS(L);
1070 NEXT:NEXT:NEXT
2000 REM ** DISP PLAYERS
2010 HP=1:VP=1:H1=1:V1=4
2020 GOSUB 9100
2030 IF LEVEL>1 THEN H2=7:V2=4:G
OSUB 9300
2040 IF LEVEL>2 THEN H3=4:V3=4:G
OSUB 9400
2050 GOSUB 9200
3000 REM ** PLAY
3010 MVS=INKEY$:IF MVS=""THEN 40
00
3020 IF MVS=CHR$(94) THEN MOVE=1
:GOTO3100
3030 IF MVS=CHR$(10) THEN MOVE=2
:GOTO3100
3040 IF MVS=CHR$(8) THEN MOVE=3:
GOTO3100
3050 IF MVS=CHR$(9) THEN MOVE=4:
GOTO3100
3060 GOTO3010
3100 REM ** MOVE PLAYER
3103 H=HP:V=VP:GOSUB 9050
3105 IF MOVE=1 THEN IF VP>1 THEN
VP=VP-1
3110 IF MOVE=2 THEN IF VP<4 THEN
VP=VP+1
3120 IF MOVE=3 THEN IF HP>1 THEN
HP=HP-1
3130 IF MOVE=4 THEN IF HP<7 THEN
HP=HP+1
3140 IF (HP=H1 AND VP=V1) OR (HP
=H2 AND VP=V2) OR (HP=H3 AND VP=
V3) THEN 7000
3150 GOSUB 9200
3200 IF CHANGED(HP,VP)=# THEN CH
ANGED(HP,VP)=1:SCORE=SCORE+10:X=
X+1
3205 PRINT@400,SCORE;" LEVEL- "
;LEVEL;
3210 IF X<28 THEN 4000
3220 SCORE= SCORE+((LEVEL*10)*50
)
3230 SOUND5,2;SOUND100,2;SOUND1
50,2;SOUND200,4;SOUND150,2;SOUND
200,4
3240 GOTO 510
4000 IF RND(RN)>1 THEN 5000
4010 REM ** MOVE E1
4015 H=H1:V=V1:IF CHANGED(H1,V1)
=# THEN GOSUB 9000 ELSE GOSUB 90
50
4020 EM=RND(4)
4030 IF EM=1 THEN IF V1>1 THEN V
1=V1-1
4040 IF EM=2 THEN IF V1<4 THEN V
1=V1+1
4050 IF EM=3 THEN IF H1>1 THEN H
1=H1-1
4060 IF EM=4 THEN IF H1<7 THEN H
1=H1+1
4070 IF HP=H1 AND VP=V1 THEN GOS
UB 9100:GOTO 7000
5000 IF LEVEL<2 THEN 6500
5010 IF RND(RN)>1 THEN 6000
5020 REM ** MOVE E2
5030 H=H2:V=V2:IF CHANGED(H2,V2)
=# THEN GOSUB 9000 ELSE GOSUB 90
50
5050 EM=RND(4)
5060 IF EM=1 THEN IF V2>1 THEN V
2=V2-1
5070 IF EM=2 THEN IF V2<4 THEN V
2=V2+1
5080 IF EM=3 THEN IF H2>1 THEN H
2=H2-1
5090 IF EM=4 THEN IF H2<7 THEN H
2=H2+1
5100 IF HP=H2 AND VP=V2 THEN GOS
UB 9300:GOTO 7000
6000 IF LEVEL<3 THEN 6500
6010 IF RND(RN)>1 THEN 6500
6020 REM ** MOVE E3
6030 H=H3:V=V3:IF CHANGED(H3,V3)
=# THEN GOSUB 9000 ELSE GOSUB 90
50
6050 EM=RND(4)
6060 IF EM=1 THEN IF V3>1 THEN V
3=V3-1
6070 IF EM=2 THEN IF V3<4 THEN V
3=V3+1
6080 IF EM=3 THEN IF H3>1 THEN H
3=H3-1
6090 IF EM=4 THEN IF H3<7 THEN H
3=H3+1
6100 IF HP=H3 AND VP=V3 THEN GOS
UB 9400:GOTO 7000
6500 REM ** DISPLAY ENEMIES
6510 GOSUB9100
6520 IF LEVEL>1 THEN GOSUB 9300
6530 IF LEVEL>2 THEN GOSUB 9400
6540 GOTO 3000
7000 REM ** LOST
7010 SOUND5,3;SOUND50,3;SOUND50
,3;SOUND2,8
7095 IF HIGHSCORE<SCORE THEN HIG
HSCORE=SCORE
7100 PRINT:PRINT"SCORE: ";SCORE
7105 PRINT:PRINT"LEVEL: ";LEVEL
7110 PRINT:PRINT"HIGH SCORE: ";
HIGHSCORE
7120 PRINT:PRINT"GAME OVER, PLAY
AGAIN ?"
7130 AS=INKEY$:IF AS=""THEN7130
7140 IF AS="Y" THEN 5000
7145 IF AS<>"N" THEN 7130
7150 END
8990 REM *****
*****
8999 REM *****
*****

9000 REM ** RESET - OLD COLOR
9010 FOR L=1 TO 4
9020 PRINT@DISP(H,V)+((L-1)*32
),SSS(L);
9030 NEXT
9040 RETURN
9050 REM ** RESET - NEW COLOR
9060 FOR L=1 TO 4
9070 PRINT@DISP(H,V)+((L-1)*32
),SCS(L);
9080 NEXT
9090 RETURN
9100 REM ** DISP ENEMY #1
9110 FOR I=1 TO 2
9120 PRINT@DISP(H1,V1)+33+((I-1
)*32),ELS(I);
9130 NEXT
9190 RETURN
9200 REM ** DISP PLAYER
9210 FOR I=1 TO 4
9220 PRINT@DISP(HP,VP)+((I-1)*3
2),PLS(I);
9230 NEXT
9290 RETURN
9300 REM ** DISP ENEMY #2
9310 FOR I=1 TO 2
9320 PRINT@DISP(H2,V2)+33+((I-1
)*32),E2S(I);
9330 NEXT
9390 RETURN
9400 REM ** DISP ENEMY #3
9410 FOR I=1 TO 2
9420 PRINT@DISP(H3,V3)+33+((I-1
)*32),E3S(I);
9430 NEXT
9490 RETURN

```

End

Check PPoint

Send your letters, club and BBS notices, and requests for assistance to Check PPoint, 80 Micro, 80 Pine St., Peterborough, NH 03458.

ZeroK Memory

In the March Doctor ASCII column (p. 148), we forgot to tell you the address and phone number of Orbit Electronics, the maker of the Supercomp 68008 board for speeding up the CoCo. It's P.O. Box 613, Derby Lane, VT 05830, 819-876-2926.

Line Tamer

While experimenting with his Color

Computer, Tony Sciacca of Gretna, LA, figured out how to get rid of the condensed width of most screen-dump printouts. Before invoking the BWDUMP command, Sciacca types in the following Print command to put his DMP-110 printer in elongation mode:

```
PRINT#-2, CHR$(27);CHR$(14)
```

Zapped Again

ZapZ, the disk-repair program described in the March issue ("A Fine Fix," p. 120), requires several modifications sent in by coauthor Alain Dussault. Following are the correct edited lines:

```

1010 PCLEAR4:CLEAR3000,299999:
DIM CO$(20),PA(40),D$(10),E$(10),
ER$(6),A$(4)
1060 CLEAR 3000,299999:DIM CO$(20),
PA(40),D$(10),E$(10),ER$(6),A$(4)
1180 '
1610 IF MID$(B$,1,1)<>"$" THEN 1640

```

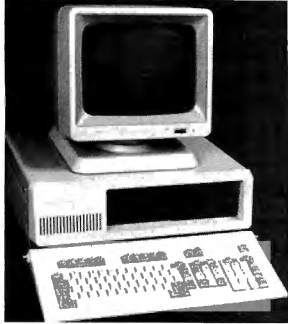
Dussault has written an improved version of ZapZ containing three useful new commands (KIDIR, LSN, and HEX-DUMP) that he'll mail to anyone who sends him \$3, a formatted disk, and an unstamped, self-addressed envelope. The address is 2165 Manon St., Laval, Quebec, Canada H7S 1V5.

Paul Hanke of Maplewood, NJ, writes

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that ZapZ has helped him debug problem disks and increased his understanding of disk file structure. He's modified the print commands to work on a non-standard printer.

Replace lines 5180-5220 with those shown in the Figure. <LF\$> represents

a line-feed option elsewhere in the program; set it equal to zero (LF\$ = "") if you don't need a line feed, or to CHR\$(10) if you do. Other parameters such as DR, TR, and SE are taken from choices made before the Print command was selected.

```

5180 'ZAPZ ALTERNATE SCREEN-TO-P
RINTER ROUTINE BY PAUL HANKE
5182 'ZAPZ, 80 MICRO, 3/86, P. 120
5190 IFPEEK(65314)/2=INT(PEEK(65
314)/2) THEN 5192 ELSE PRINT@330, "PR
INTER NOT ON!" : FORK=1 TO 1000 : NEXT
: PRINT@330, STRINGS(20, 32) : GOTO 51
90
5192 POKE65494, 0 : PRINT@330, " "; L
INE INPUT "DISK NAME: "; NS : PRINT#-2
, TAB(6); "DISK I.D. : "; NS; " "; P
RINT@330, STRINGS(20, 32); : PRINT@3
30, "PRINTING"
5194 DSKI$DR, TR, SE, M$, N$
5196 C1=1; C2=16; W=0; RJ=0
5198 PRINT#-2, " DISK SCAN: TRAC
K #"; TR; " SECTOR #"; SE; LF$; PRINT#
-2, LF$
5200 PRINT#-2, TAB(5); : FORJ=0 TO 15
: PRINT#-2, USING"###"; : J; : NEXT J; P
RINT#-2, LF$; PRINT#-2, TAB(6) STRI
NG$(63, "-"); LF$
5202 PRINT#-2, USING"###"; W; : PRIN
T#-2, "> "; : FORY=C1 TO C2
5204 VS=MID$(M$, Y, 1); PRINT#-2, US
ING"###"; : ASC(V$); : NEXT Y; PRINT#-
2, LF$
5206 IFY>=128 AND RJ=1 THEN RETURN EL
SE IFY>=128 AND RJ=0 THEN 5210
5208 W=W+16; C1=C1+16; C2=C2+16; IF
C2>128 THEN C2=128; GOTO 5202 ELSE 520
2
5210 M$=NS; RJ=1; C1=1; C2=16; W=W+1
6; FORQ=1 TO 128; V=ASC(MID$(M$, Q, 1
)); IFV<>0 AND V<>255 THEN GOSUB 5202; E
LSE NEXT Q
5212 PRINT#-2, TAB(6) STRINGS(63, "
-"); PRINT#-2, LF$; PRINT#-2, LF$
5220 RETURN
    
```

Figure. Reader Paul Hanke's changes to make ZapZ run on nonstandard printers.

On Line

► Sysop Bill Satterwhite writes that the Peninsula CoCo Board in Tabb, VA (804-868-0922), on line since May 1984, has several new features. It now supports program uploads and downloads, electronic mail, public and private messages, Dungeons & Dragons, and special-interest groups (SIGs) for Tandy, Commodore, Apple, Atari, and MS-DOS computer owners.

Parameters are 300/1,200 baud, 8 bits, 1 stop bit, no parity. Passwords are usually approved within 24 hours. Security is strict, and only public-domain programs are allowed.

Clubhouse

► The Seacoast CoCo Tug meets the second Wednesday of every month in the Rye Public Library, Rye Center, NH. For information, contact Fred Ahlberg, 34 Rockrimmon Road, Kingston, NH 03848.

Seeking Help

► Christian Espinosa (Route 2, Box 22-D, Clarksville, AR 72830) wants to trade clues and hints to two Tandy game programs: Bedlam and Madness and the Minotaur. ■

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Doctor ASCII

by Richard E. Esposito, Richard W. Libra, and Raymond W. Rowe

Driving Forces

Q: Can I use non-Radio Shack disk drives with my 16K Extended Color Basic CoCo 2? Will I still be able to use Radio Shack software?

Also, can I get a printout or on-screen display of my computer's commands and their functions? (*Tim Bizzell Jr., Jeffersonville, IN*)

A: You need a disk drive with an industry-standard interface—one made for an IBM PC, Tandy 1000, or a Tandy Model III or 4 will work. Drives for the Commodore 64 or Atari 400/800 won't work because they use an RS-232 interface. Even if you could hook up a Commodore or Atari drive, you wouldn't be happy with the data-transfer speed—these drives aren't much faster than a cassette recorder.

The CoCo's ROM doesn't have a help utility. Because you have only 16K of RAM, you would need to store such a utility on disk (if you upgraded to 256K or 512K, you could set up a RAM disk). Tandy's *TRS-80 Color Computer Quick Reference Guide* (catalog number 26-3194; \$4.95), a pocket-size condensation of the CoCo's three reference manuals and the EDTASM+ manual, contains much of the information you want.

Conversion Project

Q: I recently acquired three used Radio Shack vertical drives (catalog number 26-3029) with the intention of using them as drives 1-3 on my old CoCo. I thought I was smart enough to daisy-chain the four drives.

The drive zero cable appears to have missing contacts in the card connectors.

Feature	Pin
Index/sector	8
Drive select zero	10
Drive select 1	12
Drive select 2	14
Motor on	16
Direction select	18
Step	20
Write data	22
Write gate	24
Track 00	26
Write-protect	28
Read data	30
Drive select 3 (or side select)	32

Figure 1. Overall pin assignments for pins 7-32.

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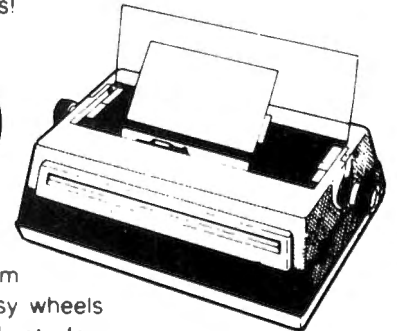


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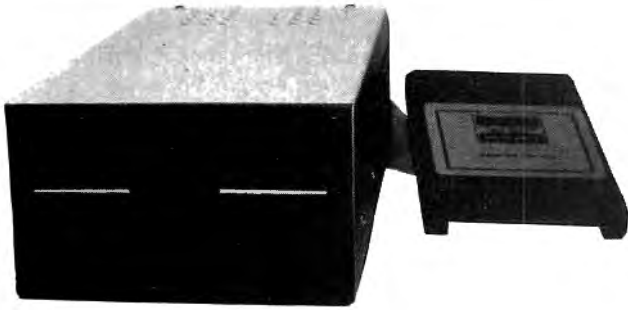
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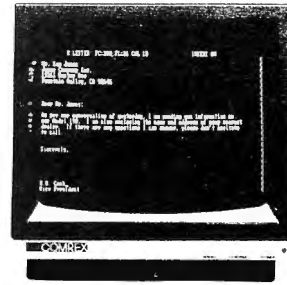
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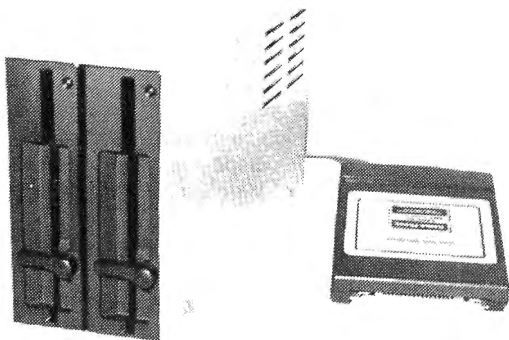
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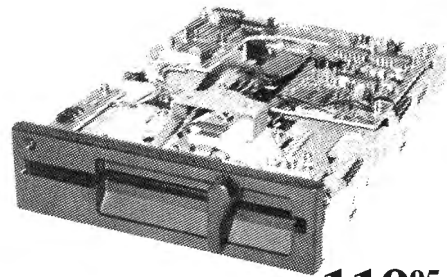
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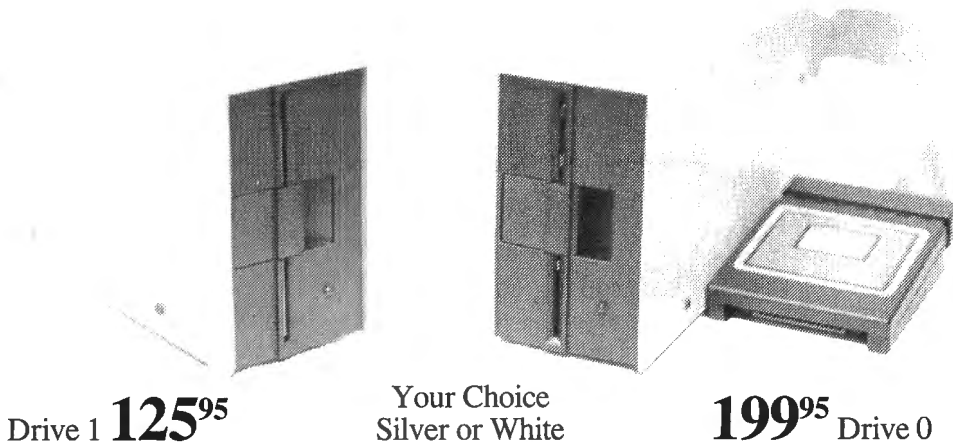
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5	6
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1	2

Figure 2. The pin-numbering layout on the connector from top to bottom.

I have been unable to find the proper assignments for the 34-pin conductor cable supplied with drive zero. Can I connect the drives? If so, what are the correct cable-connector pin assignments? (*John McNetrney, Madison, WI*)

A: To convert a standard cable (no teeth missing) into a Radio Shack four-drive cable, remove teeth 12, 14, and 32 at the connector for drive zero. At drive 1, remove teeth 10, 14, and 32; at drive 2, remove teeth 10, 12, and 32; and at drive 3, remove teeth 10, 12, and 14.

Figure 1 shows the overall pin assignments for pins 7-32. The odd lands (7, 9, and so on) go to ground. Figure 2 provides the pin-numbering layout on the connector (from bottom to top) with the open slot facing you.

The Right Height

Q: Do the non-Radio Shack drives (with Radio Shack controllers) sold by Radio Shack Computer Centers have the same DOS as the CoCo? If not, which is better? Can you run the same software?

How do the CoCo's DOS and MS-DOS differ? What does OS-9 boot capability mean? (*John King, Colonial Beach, VA*)

A: Since the drives you mention come with Radio Shack controllers, they are functionally equivalent. Go with the half-height drives—they're direct-drive units and are less troublesome than the belt-driven, full-height drives.

MS-DOS requires an Intel 8088, 8086, 80186, or 80286 microprocessor or a fast emulator that can be programmed with the 68000 chip—the big brother of the CoCo's 6809.

OS-9 boot capability means that you can boot up OS-9 from the system disk without first using a second disk to load in a bootstrap program.

Bad Driving Conditions

Q: I'm having trouble loading and running CoCo 2 programs on my CoCo I's full-height Tandy disk drive (Disk Extended Color Basic 1.1). I either get an I/O error when I try to load a program (even when I invoke DIR), or the program "blows up" when I type in RUN or EXEC. Can I copy or zap CoCo 2 programs so that they'll work on my machine? (*Fred Smartt, FPO, NY*)

A: The source of the problem is your old TEC disk drive. These drives were troublesome and Tandy eventually changed vendors. Discard the drive and buy a good "bare" drive (such as the TEAC 55BV, which costs about \$99) and install it in your old case.

Tied Up in Ribbons

Q: I have a solution for David O. Winifred's ribbon-feed problem on the Comrex CR-1 (March 1986, p. 149). The Comrex CR-1, BMC PB-101, and Daisy Writer are identical Brother machines; all use IBM Selectric II ribbons. The claws on the plastic spool dig into the ribbon and pull it as the spindle turns.

Unfortunately, the ribbons have a tendency to wrap around the take-up spool and jam. To solve the problem, carefully remove the ribbon cartridge. (If the top of the spool is pulled off its shaft in the process, retrieve the top and snap it back onto the spool after removing the torn tape.) You'll find that the used ribbon is wound unevenly and prevents free movement of the spindle.

Find the end of the used ribbon and remove enough ribbon to allow the spindle to turn freely. Cut and discard the used ribbon. Then overlap the two ribbon ends, tape them together, and wind the splice onto the take-up spool. To prevent the problem from recurring, repeat this procedure periodically. (*George Terhune, Hoffman Estates, IL*)

A: Thanks for the information.

Upgrading to 64K

Q: I have a new 16K CoCo 2 Model B (serial number 26-3134B) and want to upgrade it to 64K. I read Martin Goodman's "The Other Korean CoCo, A Different Story" (*HOT CoCo*, June 1985, p. 54), which explains the upgrade for a Model A. I removed the cover of my CoCo and, although it says Model B, it resembles a Model A. According to the article, I need a Hitachi (part number 50646) or a NEC (part number 41254) 64K RAM chip. Can you provide an address so I can get more information?

Also, I have a 24-pin 8K by 8-bit ROM chip with Color Basic 1.3. Where can I purchase the 16K by 8-bit (128K bit) ROM that contains Color Basic 1.3 and Extended Color Basic 1.1? Can I simply

plug in this chip after removing Basic 1.3? (*Robert Green, Oppatowner, MD*)

A: You can use two 64K by 4-bit RAM chips to upgrade to 64K, or you can use Tandy's satellite board (part number MX6436) with eight 4164 64K by 1-bit RAM chips (Radio Shack National Parts, 900 E. Northside Drive, Fort Worth, TX 76102). In either case, you'll need to solder a jumper at location J6 on the board. To get Extended Color Basic, you need Tandy's combination Basic/Extended Color Basic RAM (part number AX9534). After installing this 28-pin ROM chip, adjust the jumpers at J1, J2, J3, J4, and J5 to the 128K position. See the May 1986 Doctor ASCII (p. 142) for a list of suppliers for 4164 memory chips.

OS-9 Version 2.00.00

Q: Is the new OS-9 version 2.00.00 for the CoCo compatible with PBJ Inc.'s Word-Pak drivers and D.P. Johnson's SDisk and Bootfix? I would like to upgrade, but not at the expense of my 80-column display and double-sided drives. (*Arnold Vate, Brooklyn, NY*)

A: The upgrade, which costs \$24.95, includes two disks. The first contains an updated version of the system and a few new utilities; the second is completely new. The CONFIG program on the second disk lets you customize a system disk without the headaches caused by Save and OS9GEN or Cobbler. After booting OS-9, remove the system disk and replace it with the Boot/CONFIG disk. Type in CHD /DO/CMDS; when you type in CONFIG, a menu of modules appears.

By replacing files in the modules directory of the Boot/CONFIG disk, you can doctor the upgrade to work with Word-Pak, SDisk, and Bootfix. Files with the extensions .dd, .dr, and .hp are device descriptors, device drivers, and ASCII help files, respectively. Those without extensions are files you might want in your OS-9 boot.

To use Word-Pak, replace CCIO.dr with Wordpak.dr; rename your Word-Pak device descriptor as Term.dd and substitute it for TERM80.dd. For double-sided drives, replace D0.dd, D1.dd, D2.dd, and so on, with your double-sided file versions, using the same names. Replace CCDISK.dr with SDisk.

After completing these changes, you can use the CONFIG program to generate a double-sided drive system with an 80-column Word-Pak display. If you want to boot from a double-sided drive, select N (no programs) on a new system disk. (You must run Bootfix on it at least once to put the boot on one side of the disk so that Tandy's DOS routine doesn't crash.) You can then create directories with MAKDIR and copy any files you want on your new system. ■

Color Monitor

by Scott Norman

It's time to look at yet another multi-function integrated software product for the Color Computer. I will get off this kick someday; it's just that the idea of a single package addressing most people's software needs is so popular that it deserves one more column.

I'm happy to report that my subject—Four Star Software's PenPal—performs well and offers a good selection of functions.

Not that PenPal is the answer to everyone's prayers. I've been using version 1.0 and would like to see changes in its word processor, spreadsheet, graphing module, and data manager (the Telecommunications module in version 1.0 is an impressive-looking feature that will, unfortunately, have to wait until another day). Version 2.0 is supposed to address these shortcomings; I hope so.

Sometimes I'll go out on a limb to describe version 2.0 features I haven't used, but I'll make it clear when I'm referring to the upgraded PenPal.

Salutation

Ever since the Apple Macintosh was introduced in 1984, icons—little video pictures representing program options—have been a much-ballyhooed feature of

multi-function software. While a lot can be said for using icons to make programs understandable, 64K CoCos can ill afford to sacrifice much RAM to such niceties.

PenPal authors Dave Shewchun and Roland Knight have avoided icons and used a simplified main-menu graphic along with function keys. In the main menu, a series of rectangular boxes represents the program modules; the name of each data file shows up beneath the program that created it or beneath another routine that can read it. One of PenPal's strengths is that it's easy to use a routine to create files that can be used by another routine.

To work on an existing data file, you just move the cursor over the file's name and press the enter key to summon the appropriate program modules. You can use the CoCo's arrow keys to select a

Products Mentioned

Four Star Software
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PenPal requires 64K and at least one disk drive. Version 2.0 costs \$89.95; upgrades of version 1.0 sell for \$15.

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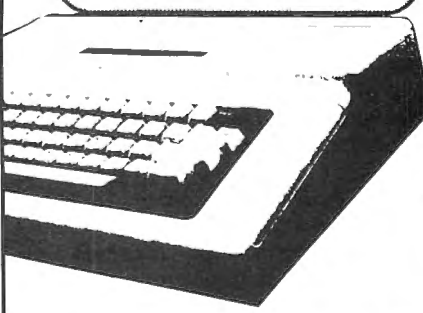
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Most commands are entered by pressing the clear key along with one of 12 keys in the top row of the keyboard. Clear converts number keys 1 to zero to program-specific function keys called F1-F0, while the colon key becomes F11 and the minus key becomes F12 (the latter two function the same in all modules). F11 converts keys F1-F4 into "alternate function keys," which in turn activate an on-screen calculator, let you change printer parameters, toggle between white and green video backgrounds, and call up help screens. F12 saves current data files and exits modules.

A menu strip remains at the bottom of the screen to remind you of the functions performed by F1-F0. Usually, F0 toggles between two independent sets of function key assignments.

The keys would be too complicated without the on-screen prompting line. I quickly memorized major key assignments for the various program modules and relied on the prompting line for the rest. It would help if key assignments were more consistent; in the word processor, for instance, F1 starts the process of selecting a text block for copying, deletion, or movement, while F6 performs this function in the spreadsheet.

In principle, you can run PenPal on a 64K CoCo with a single disk drive, but as usual, a multiple-drive setup is more convenient. The program defaults to drive zero for data storage, but the main menu also has function-key assignments, one of which lets you specify another drive for data files. Unfortunately, you must repeat the process with each run. Printer parameters are automatically stored in a configuration file on the program disk, but no other preferred options will be recorded.

How to Write

My copy of Write, the PenPal word processing module, is adequate for correspondence, school work, and informal writing. It has most of the usual features of electronic text preparation but lacks things necessary for professional-quality work. Again, improvements are said to be at hand.

The size of the text buffer isn't an issue; Write can handle nearly 35K of material, which is excellent for a CoCo word processor. It has a full complement of commands for cursor movement, block manipulation, text search and replacement, and the like, and you can choose between insert and overstrike modes for entering text. It's easy to merge the current text with other files, including properly saved spreadsheets, graphs, and data-base records created with other PenPal modules. There's even a function

key for performing quick word counts.

My reservations center on print formatting. Like other PenPal components, Write obeys the formatting commands established with the alternate function keys: left margin, line length (which includes the left margin count), lines per page, and so on. It also lets you center a piece of text or align it on both margins. Right now, however, I can't change margins or line spacing in the middle of a document, send control codes to my printer for special fonts, or set up page headers and footers. There's no way to check pagination, insert a page-break command, print page numbers, or set up tabs. Those are the features I need to prepare a manuscript for publication.

I have other bones to pick (inserting a line feed in the middle of a line requires a whole block move operation, for example), but these too are said to be fixed in version 2.0. I can hardly wait.

Speedy Spreadsheet

Calc, the PenPal spreadsheet, handles most chores usually assigned to the breed. It can build good-sized worksheets and has a decent assortment of mathematical functions, but it's weak on built-in financial formulas and lacks the sorting, indexing, and table-lookup functions of its more complex competitors.

Calc is easy to interface with Write and the Graph-It graphics routine, but I was bothered by a couple of mathematical bugs that supposedly have been exterminated in version 2.0.

With a capacity of nearly 27,000 bytes, Calc is competitive with other major-league CoCo spreadsheets. Facilities for handling up to 255 rows or columns are provided; of course, memory limitations make it impossible to approach both limits on the same sheet.

Numbers are displayed as integers or in dollars-and-cents format. Calc also handles scientific notation but lacks a variety of fixed decimal places. If you use the default format in a calculation, you'll get as many decimal places as the system wants to give.

Numbers and text labels are entered by direct typing, but you must use function keys to put formulas in particular cells. Judicious use of block-selection keys allows you to fill a range of cells with formulas, with cell references all properly adjusted.

In another departure from common practice, Calc lacks an automatic recalculation mode. You must hit the F2 key to change a figure and see the result on the recalculated worksheet. This approach saves time when you're making many changes on a complex sheet. Calc seems to have no problem in the speed department, anyway.

Graphic Depictions

The Graph-It module prepares pie, line, bar, and dot charts from rows and columns of Calc data. The linkage is dynamic, so if you make a change to the spreadsheet, the graph will be updated the next time it is opened.

Pie charts can be filled in with a dazzling array of patterns, while other types of graphs can display up to five data sets at a time. There are provisions for adding several text sizes and styles to graphs. Two printout sizes are available.

Everything works smoothly, but I still have a wish list of Graph-It improvements. It should be possible to specify nonuniformly spaced data points for a graph's horizontal axis, and the routine for labeling the vertical axis should indicate nice round numbers instead of reproducing only the highest and lowest values in the data set.

Better Than Cards

The Database module is more powerful than the "index card" routines typically furnished with integrated software. At the cost of forcing you to set up a conventional, rigid field structure for data files, it lets you sort files, search for records that satisfy specific criteria, and generate a couple of report formats.

The data-entry form can occupy only one video screen. Field labels are limited to 15 characters, while the fields themselves may be up to 256 characters long; up to 21 shorter fields can be crammed into a record. Since the program is disk based, you could presumably devote an entire disk to a single massive data file.

That would likely be a mistake, however, because the price you pay for Database's organization is sluggish response to sorting commands. In my tests, it took about 20 seconds to change a puny eight-record file to reverse order according to a single sort field.

Outside of that, Database is good at handling conventional files. I do wish I could get totals of numeric fields in reports and save multiple report specifications on disk. A specification might consist of a set of search criteria plus the commands for including particular data fields in the report.

On the bright side, it's easy to generate columnar reports and reports mimicking the layout of the data-entry screen, as well as Write-compatible copies of individual Database records. I'm promised the new version of PenPal will be streamlined, although a true mail-merge capability isn't in the cards just yet. ■

Scott Norman is the manager of solid-state science at GTE Laboratories in Waltham, MA. Write to him at 8 Doris Road, Framingham, MA 01701.

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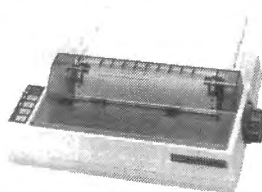
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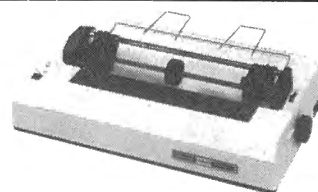
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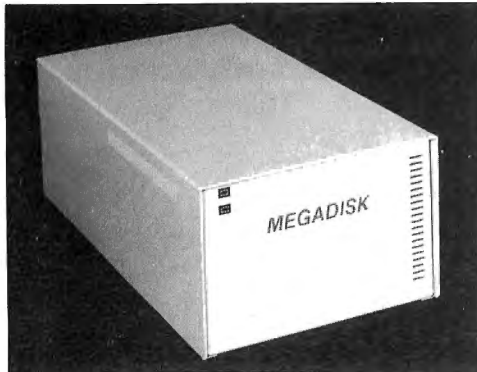


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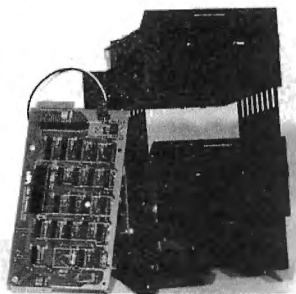
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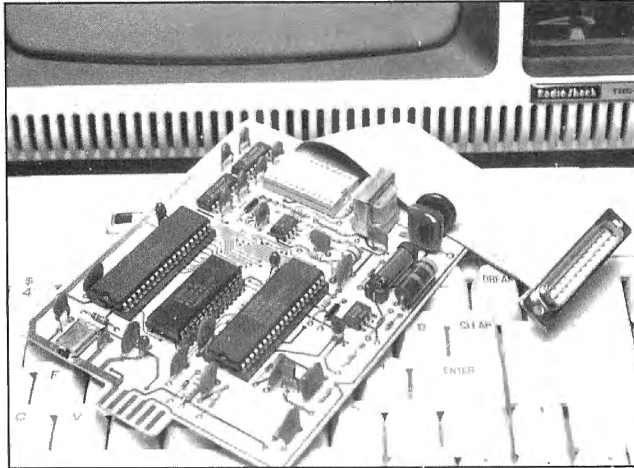
CP/M Help

SourceView Software International (SSI) announces two new products: the Source Student Record System (order number 523-3) and the Disassembler Toolbox II Z-80 (order number 057-6).

The Source Student Record System (\$99) is a file-management package for Model 4's running CP/M. The package is designed to help teachers calculate and maintain student grades.

The software can keep track of 10 assignments per student in classes with enrollments of 100 or fewer students. Teachers can add student records to the class file and update grades. The program computes students' grades and calculates the class mean and standard deviation.

The Disassembler Toolbox



The Teletrends modem card for the Model 4P.

II Z-80 (\$99) is a debugging utility for CP/M users. The utility provides 25 separate commands for documenting and correcting bugs in machine-language and other programs. Disassembler Toolbox II runs under any memory size and automatically locates itself to the upper end of memory (1900 hexadecimal below the base of the operating system).

Both the Source Student Record System and the Disassembler Toolbox II Z-80 utility are available through a variety of independent and chain specialty stores, including software stores, bookstores, and independent computer dealerships. You can also purchase them from SourceView Software International. For dealer referrals and credit-card purchases, call 800-443-0100, extension 440.

For a catalog of all 497 SSI products, send \$5 (refundable upon first catalog software purchase) to SourceView Software International, 835 Castro St., Martinez, CA 94553.

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Higher Education

A catalog describing courses in over 30 advanced technologies is available from Integrated Computer Systems, a technical education firm located in Los Angeles.

The catalog outlines courses offered by the firm in five subject areas: software languages and methods, networks and data communications, digital systems, microcomputers and systems, and special interest.

The courses give participants a working knowledge of new technologies that can be applied in their professions. Prices for the two- and four-day courses range from \$595 to \$1,095.

For a copy of the catalog and course details, contact Yolande Amundson, Integrated Computer Systems, 6305 Arizona Place, P.O. Box 45405, Los Angeles, CA 90045, 800-421-7014.

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No Horseplay

MISOSYS announces Mister ED, a package of applications for use with PRO-NT0 on the Model 4 (128K). Mister ED provides editors for a number of different purposes. The disk editor (DED) lets you edit sectors on both hard disks and floppies. The file editor (FED) lets you edit records of a disk file. With the memory editor (MED), you can edit a page (256 bytes) of memory, including external bank-switched memory. Each editor provides full cursor positioning, ASCII or hexadecimal entry, string search, character insert/

quash, and page scrolling.

The package includes a full-screen text editor (TED), which provides a 30K text buffer (the buffer requires a free bank of RAM). This editor gives you full cursor manipulation, page up/down, character insert and overstrike modes, various delete modes, and block operations.

With Mister ED's video editor (VED), you can perform Card-type editing of the video screen and load or save screen files. VED also lets you mark a block of screen data for export to other programs.

Two other applications, CardForm (populates a Card data file with a form) and REGENBU (shrinks the Bringup data file) are also provided.

Mister ED is available for \$59.95 plus shipping and sales tax. For more information, contact MISOSYS Inc., P.O. Box 239, Sterling, VA 22170, 703-450-4181.

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CoCo Music

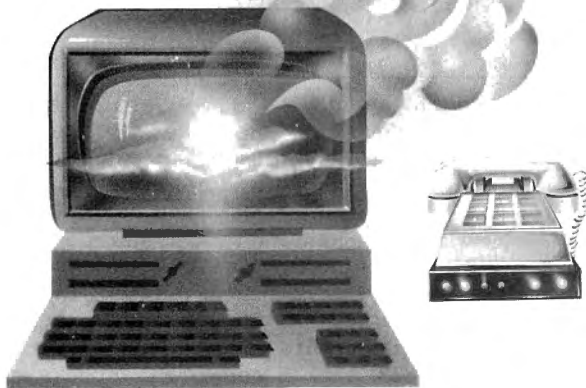
Intercomp Sound now has available three new products that interface the Color Computer with MIDI (musical instrument digital interface) technology.

The Color MIDI Connection (\$98) is an interface that plugs into the CoCo's cartridge slot. It contains three MIDI outputs, one MIDI input, and a female connector for the disk controller (no Y-cable is required).

SYNTRAX 1.00 (\$75) is a sequencer that lets you control your MIDI system. It includes 16 polyphonic tracks, interactive editor, 30,000 bytes for note storage, independent repeats for any track, all-MIDI channel control data (program changes, channel number, velocity, pitch wheel, and so forth), and internal/external synchronization for MIDI drum machines (or another sequencer). Other features in-

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Now the power of GENie stands ready to bring a little magic into the life of PC owners just like you. And for potentially much less than other on-line information services.

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	SIGs/User Groups	Electronic Mail	CB Simulator	Computing News	Games	2400 baud access	Registration fee	Monthly minimum	Non-prime time rates	
									300 baud	1200 baud
GENie*	X	X	X	X	X	X	\$18.00	none	\$5.00	\$5.00
CompuServe	X	X	X	X	X	X	\$39.95	none	\$6.25	\$12.75
The Source	X	X	no	X	X	X	\$49.95	\$10.00	\$8.40	\$10.80

*Rates and Services shown in effect 12/85. Non-prime time rate applies Mon–Fri, 6pm–8am local time, all day Sat., Sun., and nat'l. holidays. Subject to service availability. Additional surcharge applies for 2400 baud service.

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- Organize a local, regional or national get-together in one of GENie's 40 "conference rooms" with GENie's **Business Band Real-Time Conferencing**.
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Sign Up From Your Keyboard Today 4 Easy Steps:

1. Have ready your VISA, MasterCard or checking account number to set up your personal GENie account.
2. Set your modem for half duplex (local echo)—300 or 1200 baud.
3. Dial 1-800-638-8369. When connected, enter HHH
4. At the U# = prompt, enter XJM11946, GENIE then RETURN.

No Modem Yet? Need more information or assistance? We can help! Call 1-800-638-9636, ext. 21.

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General Electric Information Services Company, U.S.A.

clude programmable tempo, complex rhythms, and chords. It requires 64K, a disk drive, and the Color MIDI Connection.

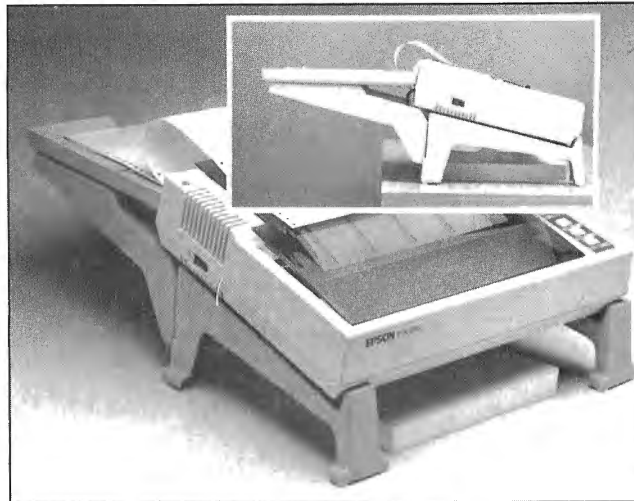
SYNTRAX 2.00 (\$125) has all the features of SYNTRAX 1.00 plus real/step time record (notes, velocity, program changes, and controllers), input filtering, and programmable split points. It also lets you punch in/out and edit MIDI data quickly and easily. SYNTRAX 2.00 supports J & R's 512K upgrade, increasing the recording storage capacity. Customers that already have SYNTRAX 1.00 can upgrade to version 2.00 for \$50.

For more information, contact Intercomp Sound, 129 Loyalist Ave., Rochester, NY 14624, 716-247-8056.

Circle 552 on Reader Service card.

Printer Pedestal

The Space-Saving Universal Printer Stand from Curtis Manufacturing securely holds any printer, regardless of car-



Curtis Manufacturing Co.'s space-saving printer stand.

riage size. Constructed of high-impact materials, the modular stand features a removable paper tray that neatly catches and stacks printouts. The tray is suspended cantilever-style from the stand, thereby freeing desk space. The stand stores paper underneath to accommodate center-

feed and rear-feed printers. The unit can double as a stand for portable computers.

The price with full lifetime warranty is \$19.95. For more information, contact Curtis Manufacturing Co., 305 Union St., Peterborough, NH 03458, 603-924-3823.

Circle 562 on Reader Service card.

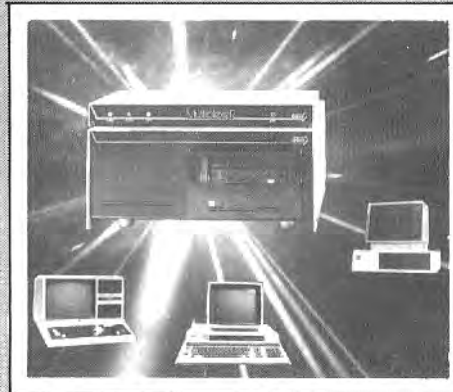
Software Selector

The Educational Products Information Exchange (EPIE) has added more than 2,500 entries to the 1986 edition of *The Educational Software Selector (TESS '86)*. The expanded catalog features over 7,500 listings of software for every major computer used in schools. Each listing describes how the program fits into an educational curriculum, what is required to use it, which company produced it, what it costs, and how to get it. The multiple index organizes entries by subject, grade level, title, and computer.

TESS '86 also includes a new software supplier section listing subjects, grade levels, and computers for which more than 700 suppliers produce courseware. The supplier section lists addresses, phone numbers, and policies for speedy purchasing and indicates whether a program comes with a backup copy, may be previewed before pur-

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- TRSDOS 6
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MODEL 11/12 SYSTEMS —

- DP 11
- TRSDOS 2.0 with Racet HSDS
- CPM — Hard Disk Support

MODEL 16 —

- Xenix Support

MODEL 1000/1200/2000 —

- MS-DOS, PC-DOS

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chase, and carries a producer's warranty.

TESS '86 costs \$59.95, including postage. To order, send check or money order to Educational Products Information Exchange Institute, P.O. Box 839-R, Water Mill, NY 11976, 516-283-4922.

Circle 556 on Reader Service card.

How-To Help

Howard W. Sams & Co., a division of Macmillan Inc., offers the *Computerfacts* series of technical service manuals for Tandy/Radio Shack products. Separate manuals are available for the Models I, III, Color Computer, and Color Computer 2, as well as for the DMP-120 printer and the 26-1160/61 and 26-1164A disk drives. The company is working on a manual for the Model 4 that it plans to release soon.

Each manual contains standard-notation schematics created by a computer-aided design (CAD) system, reproductions of waveform



The Computerfacts series of technical manuals from Howard K. Sams & Co.

photos taken from test equipment, preliminary service checks, troubleshooting tips, and lists of replacement parts. The *Computerfacts* manuals can be bought at bookstores, computer retailers, electronic distributors, or directly from the company.

The manuals are priced at \$39.95 and \$19.95. For more information, contact Teri Brown, Howard W. Sams & Co., Dept. R14, 4300 W. 62nd St., Indianapolis, IN 46268, 317-298-5409. To order by phone, dial 800-428-SAMS.

Circle 568 on Reader Service card.

Seasonal Help

Children learning to read the calendar may be helped by a new, arcade-style reward game from Gameco Industries. The Calendar drills young students in calendar skills, teaching them the names of the seasons, days, and months. It also helps them identify special days and holidays.

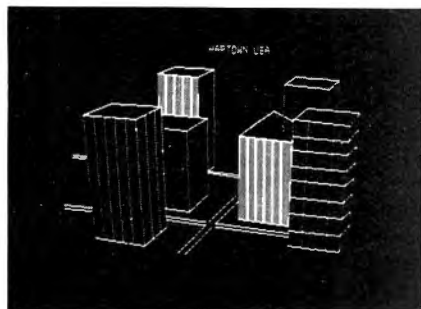
The software presents students with multiple-choice and fill-in-the-blank questions and gives them three opportunities to answer correctly. After a third incorrect answer, the correct one is displayed. At the end of each run of questions, the program provides the student with a performance summary. Scoring a certain percentage allows the student to play an arcade-style game or to work another lesson.

The Calendar is designed as an educational tool to be administered by teachers. It includes a student manage-

Circle 464 on Reader Service card.

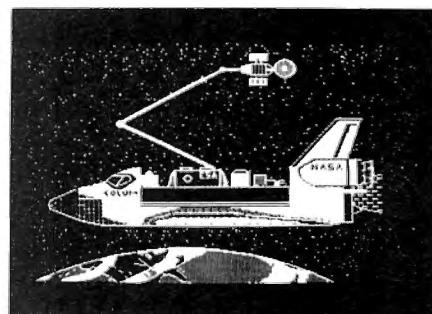
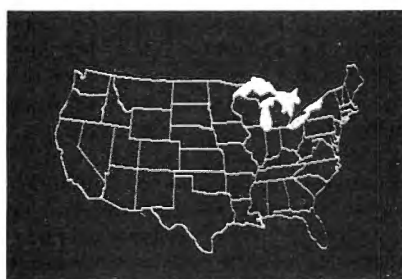
Grafyx Solution™ Save \$100.00

Hi-Resolution Graphics for Mod 4/4D/4P/III



Superior Hardware. The Grafyx Solution provides 153,600 pixel elements which are arranged in a 640 x 240 or on the Model III a 512 x 192 matrix. Hundreds of new business, personal, engineering, and educational applications are now possible. The hi-res display can be shown on top of the standard display containing text, special characters, and block graphics. This simplifies program debugging, text labeling, and upgrading current programs to use graphics. The Grafyx Solution fits completely within any tape or disk based Model 4, 4D, 4P, or III. Installation is easy with the plug-in, clip-on Grafyx Solution board.

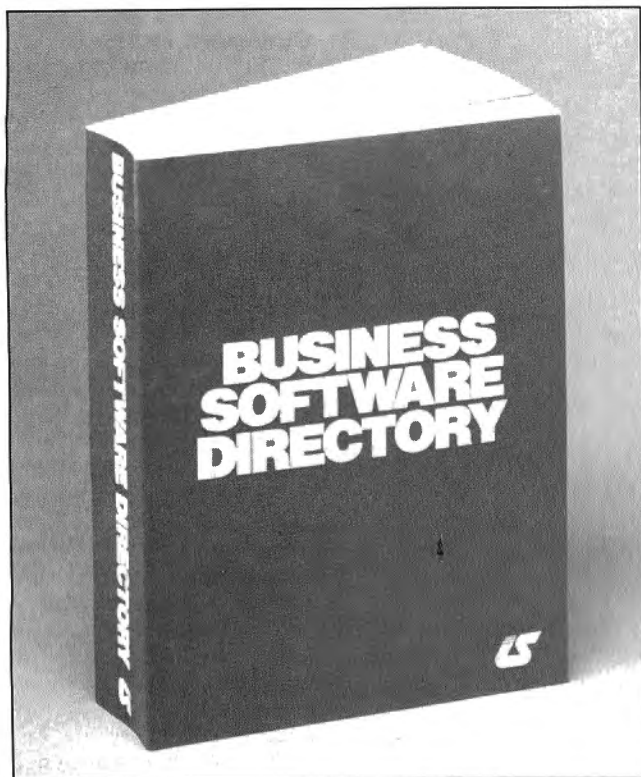
Superior Basic. Over 20 commands are added to the Basic language. These commands will set, clear or complement points, lines, boxes, circles, ellipses, or arcs. The hi-res screen can be printed on any of 30 popular printers or saved or loaded to disk without leaving Basic. Areas may be filled in with any of 256 patterns. Sections of the screen may be saved and then put back using any of five logical functions. Labels can be printed in any direction. The viewing area can be changed. The entire screen can be complemented or cleared. Graphics Basic provides dot densities of 640 x 240, 320 x 240, 160 x 240, and 160 x 120, all of which can be used in the same display.



Superior Software. The board comes with over 40 programs and files which make it easier to use, serve as practical applications, demonstrate its capabilities, and serve as programming examples. The software works with TRSDOS 1.3, 6.1.2, 6.2; DOSPLUS 3.4, 3.5, 4; LDOS; and Newdos80. The Grafyx Solution is also supported by over 20 optional applications programs: Draw, Bizgraph, xT.CAD, 3D-Plot, Mathplot, Surface Plot, Chess, Slideshow, etc.

The Grafyx Solution package is shipped complete for \$199.95 (reduced from \$299.95). The manual only is \$12. Payment may be by check, Visa/MC, or COD. Domestic shipping is free on pre-paid orders. Texas residents add 5% tax.

MICRO-LABS, INC. 214-235-0915
902 Pinecrest, Richardson, Texas 75080



The Business Software Directory lists over 7,000 software packages and services.

ment system that records student names, the lesson completed, the raw score, and the percent correct. The system holds as many as 200 student files in alphabetical order. Teachers may view, print, or delete any or all files.

The Calendar runs on the Models III and 4 and also on the TRS-80 network. The price of the program for a single disk is \$39.95. For more information, contact Gameco Industries Inc., Box 1911, Big Spring, TX 79721, 800-351-1404.

Circle 559 on Reader Service card.

Down to Business

The *Business Software Directory* from Information Sources Inc. lists over 7,000 software packages and services for accounting, general ledger, CAD/CAM, spreadsheets, word processing, and numerous other applications. Listings include detailed product descriptions and are indexed by vendor, program title, application, and system.

The price of the *Business Software Directory* is \$175. For more information, con-

tact Ruth Koolish, Information Sources Inc., 1807 Glenview Road, Glenview, IL 60025, 312-724-9285.

Circle 564 on Reader Service card.

CoCo Games

Computerware offers two new games for the Radio Shack Color Computer: Pro Golf and Omniverse.

Pro Golf is a simulation golf game for both beginners and pros. Incorporating vivid graphics, the program offers a 36-hole course with real-life obstacles, such as wind, water, sand traps, roughs, and trees. Players select their clubs, adjust their swings, and aim shots in accordance with wind and other factors. For beginners, the game offers practice sessions with a putting green and driving range.

Pro Golf requires 32K, one disk drive, and Extended Color Basic. The package costs \$29.95 plus \$2 for shipping.

With Omniverse, users travel through a new dimension in space and time to uncover a plot by alien beings to conquer the universe. Players must survive the perils of fro-

zen wastelands, scorching deserts, torrid rain forests, and other obstacles.

Omniverse has animated graphics and can be equipped for sound with the Radio Shack Speech and Sound Cartridge. The software is available on cassette for \$24.95 and on disk for \$27.95. Add \$2 for shipping and handling.

For more information, contact Computerware, Box 668, Encinitas, CA 92024, 619-436-3512.

Circle 555 on Reader Service card.

Stylus Appearance

Stylus is a word processor that lets you combine text with animated graphics. Using Basic and 11K of machine language, the program is equipped with a brush stylus that lets you draw over the entire screen. Special features for beginners and experts include auto-repeat of commands, visible block moves, Basic print compiling, and hexadecimal dump utilities.

Stylus runs on the Models I, III, and 4 (III mode) under TRSDOS 1.3 and 2.3. The cost is \$64.50. For more information, contact Donald W. Ady, 56 Oak Ridge Ave., Summit, NJ 07901, 201-277-3365.

Circle 553 on Reader Service card.

Your Bid

Bridge players can brush up on their playing with Bridge-86, a new program from Recreational Mathemagical Software. The package allows you to bid on hands played against the computer. Many popular card play conventions are included. The documentation provides a summary of the basic rules of bridge.

The program is written in listable Basic and is not copy-protected. Bridge-86 runs on the Models III, 4, and MS-DOS computers and is available on cassette or disk for \$18.95.

To order, send check or money order to Recreational Mathemagical Software, 129 Carol Drive, Clarks Summit, PA 18411, 717-586-2784. Be sure to include your return address and specify computer model when ordering.

Circle 558 on Reader Service card.

Power Protection

A 40-page catalog describing products for microcomputer protection is available from Electronic Specialists Inc. The catalog lists uninterruptible power supplies, line conditioners, modem protection devices, spike suppressor/filter combinations, equipment isolators, and ac power interrupters. Tutorial sections describe various problem situations and corrective steps.

The catalog (number 861) is free and can be obtained by writing Electronic Specialists Inc., 171 S. Main St., Natick, MA 01760, 800-225-4876.

Circle 560 on Reader Service card.

Insurance Measures

Safeware, an insurance agency based in Columbus, OH, offers coverage for computers, word processors, and other computer-related equipment. Types of systems covered and a checklist of coverage features are detailed in a free brochure. Included is a rate table for selecting coverage amount and corresponding premium, plus an application form on a business reply card.

For a copy, write to Safeware, The Insurance Agency Inc., 2929 N. High St., P.O. Box 02211, Columbus, OH 43202, 800-848-3469. Ohio residents call 614-262-0559.

Circle 561 on Reader Service card.

Letter Perfect

Juki Office Machine Corp. introduces its fastest letter-quality printer, the Juki 6500. With a maximum print speed of 60 characters per second (cps), the Juki 6500 comes with a 3K buffer memory (expandable to 15K), 10/12/15 pitch, and proportional spacing.

Special print features include superscript, subscript, underlining, boldface, shadow printing, and graphics capability. The printer uses bidirectional carriage motion and is equipped with both a standard Centronics parallel interface and a standard RS-232C serial interface. The machine has a full 16-inch platen and weighs 37 pounds.



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Please specify which model when ordering.

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Ask about DATA SHUFFLER . . . \$34.95

All purpose Sort/Merge program.

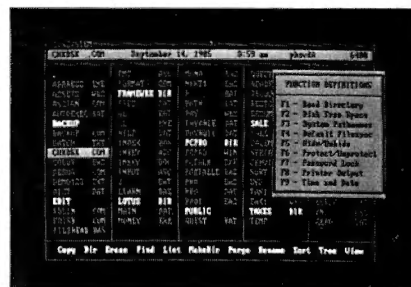


**Interactive
DOS Utility**

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Add \$5 handling,
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**Resident program gives
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and instant return to
where you were!**



**Reduce time searching for
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Commands.** See up to 85 files per
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at a glance. Get quick and easy
display of contents.

**Make your DOS commands
easier to use.** Pop-up windows
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Take full control of your printer.
Call up printer output window from
inside any program and give necessary
printer commands.

"WindowDOS quickly established itself as an
indispensible part of my PC environment.

I can't imagine working without it."

Paul Bonner, Reviewer, PC Week

★★★★★
Winner of 5 Stars
in 80 Micro Magazine's
Software Review!

**Compatible with:
Tandy 1000 & 1200
IBM PC, XT, AT**

and true compatibles. Requires DOS 2.0 or
newer and 80 column display. Uses only 40K of
memory.

The suggested retail price of the Juki 6500 is \$1,395. For more information, contact Juki Office Machine Corp., Printer Division, 20437 S. Western Ave., Torrance, CA 90501, 800-325-6134.

Circle 563 on Reader Service card.

Managing Your Money

Multiplan users can learn how to use the program to handle their finances by reading *Personal Money Management with Multiplan* (ISBN 0-8104-6486-1), a new paperback from the Hayden Book Company. Written by Ruth K. Witkin, a well-known author and computer consultant, the book illustrates how to be a financial planner and meet personal financial goals using a computer and the Multiplan spreadsheet program. Step-by-step instructions are given on organizing records, setting goals, gathering information, formulating strategies, and putting plans into action.

Personal Money Management with Multiplan costs \$18.95 and is available in bookstores. For more information, contact the Hayden Book Company, 10 Mulholland Drive, Hasbrouck Heights, NJ 07604, 201-393-6303.

Circle 566 on Reader Service card.

In Tune

ISoft has announced Tune-up, a collection of musical selections for Basic programs

running on the Model 4. Along with the music, you can select the speed of delivery and the duration of the sound. Musically inclined users can compose their own selections and recall them with a keystroke.

Tuneup costs \$14.95 and requires TRSDOS 6.x.

ISoft also offers IBanners, a software package for the Model III and Model 4. The program lets you generate banners up to 255 characters long with 8-inch-high letters and symbols. IBanner costs \$9.95.

To order either package, send check or money order to ISoft, 19 Fairland St., Lexington, MA 02173.

Circle 567 on Reader Service card.

About Face

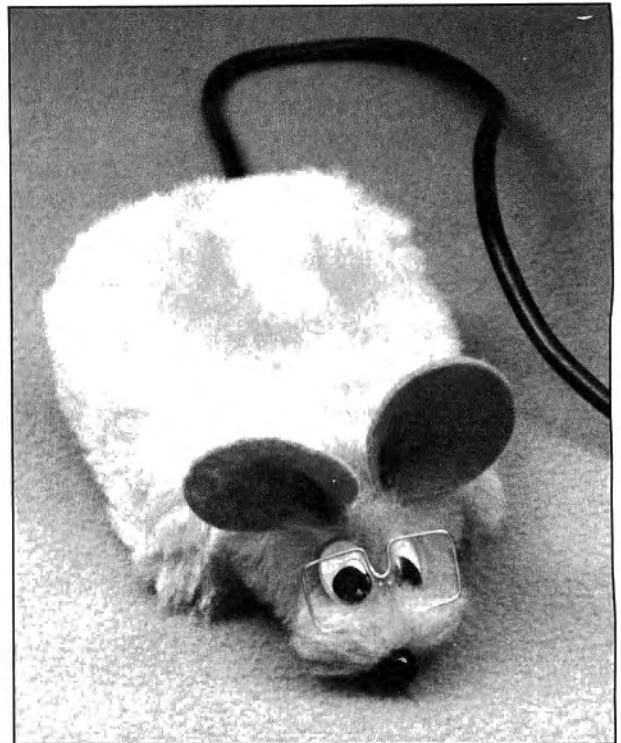
The Model 750 Interface Converter from Nu Data Corp. provides fully bidirectional, full-duplex electrical and mechanical conversion of signals between RS-232/V.24 and RS-422/X.27 interfaces, allowing continuous use of RS-232 equipment in upgraded networks.

The device has a DB-25S connector to interconnect to the RS-232 port and a DB-37S connector for the RS-422. Each port is customer-programmable and might be set up as either a terminal (DTE) or modem (DCE).

For product and pricing information, contact Nu Data Corp., P.O. Box 125, Little Silver, NJ 07739, 201-842-5757.

Circle 580 on Reader Service card.

DIFFERENT TRACK



MouseTop brings new life to the desktop.

Mouse Trappings

H & H Enterprises introduces MouseTop, a protective cover for mouse devices that gives them a look to match their name. The furry cover is designed to protect a computer mouse from dirt and grime. It fits most popular mice and comes in two varieties: one with wire-rimmed granny glasses and another with 20/20 vision.

The bespectacled version retails at \$5.95; the mouse with perfect vision costs \$5.49. For further information on mousewear, contact H & H Enterprises, Box 2672, Corona, CA 91718, 714-737-1376.

Circle 569 on Reader Service card.

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New Products listings are based on information supplied in manufacturers' press releases. 80 Micro has not tested or reviewed these products and cannot guarantee any claims.

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SOFTWARE

Joe Lynn's Payroll System for all TRS-80 III/4 and all IBM compatibles. \$49.95 1-800-243-8563

POPULAR WORD SEARCH PUZZLE GENERATOR. Create infinite number \$12.95 MyLoan Program. Calculate payments and amortize loans. \$10.95. III/IV J&J HomeSoft, Box 272, Beech Grove, IN 46107.

CLOSE OUT. Tape-disk BIB/RITE: Bibliography Writer on tape. \$14.95. 432 Cottage, Vermillion, SD 57069. 605-624-2948. Visa-MasterCard.

SIGNS AND BANNERS. Model III/4's. Complete keyboard AND lowercase, 18k, \$27.95. Caps & No.'s 10k, \$19.95. R.B. SERVICES, Box 924, N. Chelmsford, MA 01863.

Home Rentals Software Complete home, apartment locator system. Training, support. RENTALSOFTE (805) 682-3721

WiziGalc TRS-80 III/IV \$25. Box 6036, Harrisburg, PA 17112

Profile III+/4+ Users! PROAID III+/4+ provides full page reports and more. \$65. Clay Watts Software, 68C North Loop, Cedar Hill, TX 75104. 214-291-1171.

Custom TRS-80 software. All models. Newman Computer, 2 Briarmills, Brick, NJ 08724.

MS-DOS Users-Free Catalog of ALPS software products for Tandy 1000, 1200, 2000, 3000, IBM PC, RAMDISK, backup system, 29 different user tools. Call or write today. ALPS, 1502 Country Rd. 25, Box 6100, Woodland Park, CO 80866, 303-687-1442.

BIBLE SEARCH. Study entire KJV Bible on disks. Lots of extras. Model III/IV sample disk \$6. Write Scripture Software, Dept. 8M, Box 531131, Orlando, FL 32853.

HARDWARE

MODEMS, PRINTERS, TERMINALS. Distributor pricing to end users and dealers—FREE SHIPPING CALL 1-800-833-2600 for catalog.

MEGABYTE BOARD FOR THE TANDY 1000, 1200. Multifunction board includes 1 meg RAM, DMA controller, clock/calendar, serial expansion port, software for up to 768K; rebootable RAM-disk for \$555. Halfmeg \$395. New—Expansion chassis for Tandy 1000. Matthew Electronics, Inc., 386 Avenida Vereda, Ojai, CA 93023 805-684-5464.

CONVERSION SERVICES

Media Conversion for Tandy Models to over 500 systems including Mag-tape, Micro Computers, Mini Computers, Word Processors and Type-setters. Pivar Computing Services, Inc., 165 Arlington Hgts. Rd., Number 80, Buffalo Grove, IL 60089. 312-459-6010.

NEWSLETTERS

NORTHERN BYTES newsletter: Specific information for Models I/III/4(D/P). Sample \$2.00. TASIO, 704 North Pennsylvania, Lansing, Michigan 48906. 1-800-253-3200 ext. 700

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Micrographic Imagination

The Panel of Selectors couldn't agree on first place for our graphics shortie contest, so they've awarded top prize to two programmers. Each receives an 80 Micro T-shirt.

The MS-DOS faction insisted that Ian Davis (Walnut Creek, CA) did a nice job of cramming GW-Basic's powerful graphics commands into a fun two-liner, while the TRSDOS lobby favored a multi-lined masterpiece by Sergio Cabrera of Guatemala City.

Early Compressionism

Davis' program (Program Listing 1) uses the numeric keypad to control the cursor; 2, 4, 6, and 8 move the cursor orthogonally (IBM-style), while 1, 3, 7, and 9 move it diagonally. Both the Caps and Num Lock keys must be on. The M key switches between drawing and nondrawing cursor modes, and T toggles between white and black (erase). The program uses the medium-resolution, four-color mode 1, but only one color and black are available. To vary the color, change the number (1-3) assigned to variable C.

You can create lines (L), boxes (B), and circles (C), in addition to filling in shapes (P). Pressing S sets the first end of a line, corner of a box, or center of a circle. N clears the screen and Q ends the program. To print the screen, press shift-print on the Tandy 1000, or shift-PrtSc on the 1200, 3000, and IBM. You must first run Graphics.COM from DOS with the parameters for your printer.

Cabrera's Model I/III program (Program Listing 2) sends screen drawings to disk or to an Epson printer. The screen-save and load functions require NEWDOS/80 version 2.0. Both drawing and printing work with TRSDOS.

This mini-GEM either draws or erases; there's no neutral, and you draw by moving the cursor while pressing the enter key. For input, Cabrera uses a PEEK to the memory location that stores the special keys' status (including the arrow and enter keys), which lets you read several keys at once. You can draw diagonally by holding down two arrow keys at the same time. The clear key clears the screen.

You can save the screen to a file named GRAF by pressing the up and down arrows with the space bar; holding down the left and right arrows and space bar loads GRAF into memory and onto your display. With NEWDOS/80's CMD"DUMP" command, you can use the saved screens in other programs. Press the

space bar and enter key together to start the graphics printer routine.

Two entries get honorable mention. Greg Collins (Simi Valley, CA) and John Kirkaldy (Ancaster, Ontario) submitted programs for different TRSDOS machines (Models I/III versus 4) but with similar features. We've listed one—the Model 4 program—for variety.

Kirkaldy's entry (Program Listing 3) effectively uses the keypad to do drawings. Numbers 1-9 (except 5) indicate eight directions of movement, and zero moves the cursor in and out of neutral. The three function keys put you in the draw, erase, or complement modes, the last of which resets set pixels and sets clear pixels. You enter the three characters after zero in the INSTR() function in line 2 using the three function keys. There's no clear-screen function.

The program saves graphics screens to a buffer when you press enter, but you must save the buffer to disk with the CMD"DUMP filespec (S=60544,E=62463)" command after leaving the program. Likewise, the CMD"LOAD filespec" command loads a screen from disk to buffer. Running the program and pressing the period (.) key moves the buffer to the screen. The Clear statement in line 1 protects the buffer in RAM.

As usual, you must type in this program using the edit mode. The Print

statement must be abbreviated with a question mark (?). The integer-division symbol is a backslash (\) and must be typed with clear-? in line 1. The exponentiation symbol is a caret (^) and must be typed with clear-;

Your Valuable Input

This month's contest calls for your best Basic keyboard input routine. We won't set line limits—there's no need to cram—but please make it short for the sake of space. The rules:

1. Owners of all TRS-80 and Tandy systems with the exception of the Pocket Computers are eligible. We'll consider degree of difficulty when comparing solutions created on different machines.
2. The deadline will always be the 15th of the issue month. Thus, this month's deadline is July 15. We realize that this doesn't give everyone the same amount of time to come up with their entries (we apologize to our overseas readers especially), but postponing the deadline any longer would add another month to our publishing the answers.
3. The answers will appear three issues from the issue in which the problem appears. Thus, this month's winners will make their appearance in the October 1986 issue.
4. Employees of CW Communications are not eligible.
5. Send your entry to: 80 Micro, Fine Lines, 80 Pine St., Peterborough, NH 03458. We will not, unfortunately, be able to return entries.
6. Specify your T-shirt size. ■

Program Listing 1. Ian Davis' MS-DOS graphics program.

```
1 T=3:WHILE A<18:WHILE A=0 OR A=17:SCREEN 1:KEY OFF:X=POINT(0):Y=POINT(1):R=X:S=
Y:A=1:WEND:D=POINT(X,Y):PSET(X,Y),3-D:D=D*M+C*M:A=INSTR(" 14789632TCBLPNMSQ",I
NKEYS):C=ABS(-(A=10)*T-C):N=ABS(-(A=16)-M):IF A=11 THEN CIRCLE(R,S),SQR((X-R)^2+
(Y-S)^2),C
2 IF A=12 THEN LINE(R,S)-(X,Y),C,B:GOTO ELSE IF A=13 THEN LINE(R,S)-(X,Y),C:GOT
O ELSE IF A=14 THEN PAINT(X,Y),C:GOTO ELSE IF A=15 THEN CLS:RUN ELSE PSET(X,Y)
,D:X=X+(A>1 AND A<5)-(A>5 AND A<9):Y=Y+(A>3 AND A<7)-(A=2)-(A>7 AND A<10):WEND:S
CREEN 0
```

End

Program Listing 2. Sergio Cabrera's Model I/III graphics program.

```
1 DEFINTB-E:A=PEEK(14400)/8:B=A:C=C-(B=10RB=50RB=9)*(C>128)-(B=20RB=60RB=10)*(C+
128<6144))*128-(B>3ANDB<7)*(C>0)+(B>7ANDB<11)*(C<6143):C=C+(C=6144):D=C/128:E=C-D*
128:SET(E,D):RESET(E,D):IFA-B=1.25SET(E,D)ELSEIFA=25CLSELSEIFA=19CMD"DUMP GRAF,15
360,16384"
2 IFA=28CMD"LOAD GRAF":GOTOELSEIFA=16.125LPRINTCHR$(27)"A"CHR$(3):FOR=0TO47:LPR
INTCHR$(27)"*CHR$(0)CHR$(0)CHR$(1):;FORE=0TO127:B=POINT(E,D)*7:LPRINTCHR$(B)CHR$(
B):;NEXTE:LPRINT:NEXTD:LPRINTCHR$(27)"@":GOTOELSE1
```

End

Program Listing 3. John Kirkaldy's Model 4 graphics program.

```
1 CLEAR,-4993:CLS:V=2944:PRINT CHR$(15):POKE 120,134:WHILE 1:D=D-5*(D=0):Y=Y+(Y<
71)*(D<4)-(Y>0)*(D>6):D=D MOD 3:X=X+(X<159)*(D=0)-(X>0)*(D=1):P=80*(Y<3)+X<2-204
8:C=PEEK(P):B=2^(2*Y MOD 6+X MOD 2):C=C*(C>127)*(C<192)AND-1+B*(M=2)OR 128-B*(M=
1)XOR-B*(M=3)
2 POKE P,C XOR B:A$=INKEY$:D=VAL(A$):N=INSTR("0XXX."+CHR$(13),A$)+(A$=""):POKE P
,C:WHILE N>4:U=V*(M=6):V=V-U:FOR I=-2048 TO-129:POKE I-U,PEEK(I-V):NEXT:IF U TH
EN POKE 120,135:PRINT CHR$(14)ELSE N=1:WEND:IF D+N THEN M=N+(N>0)-M*(N=0):WEND E
LSE 2
```

End

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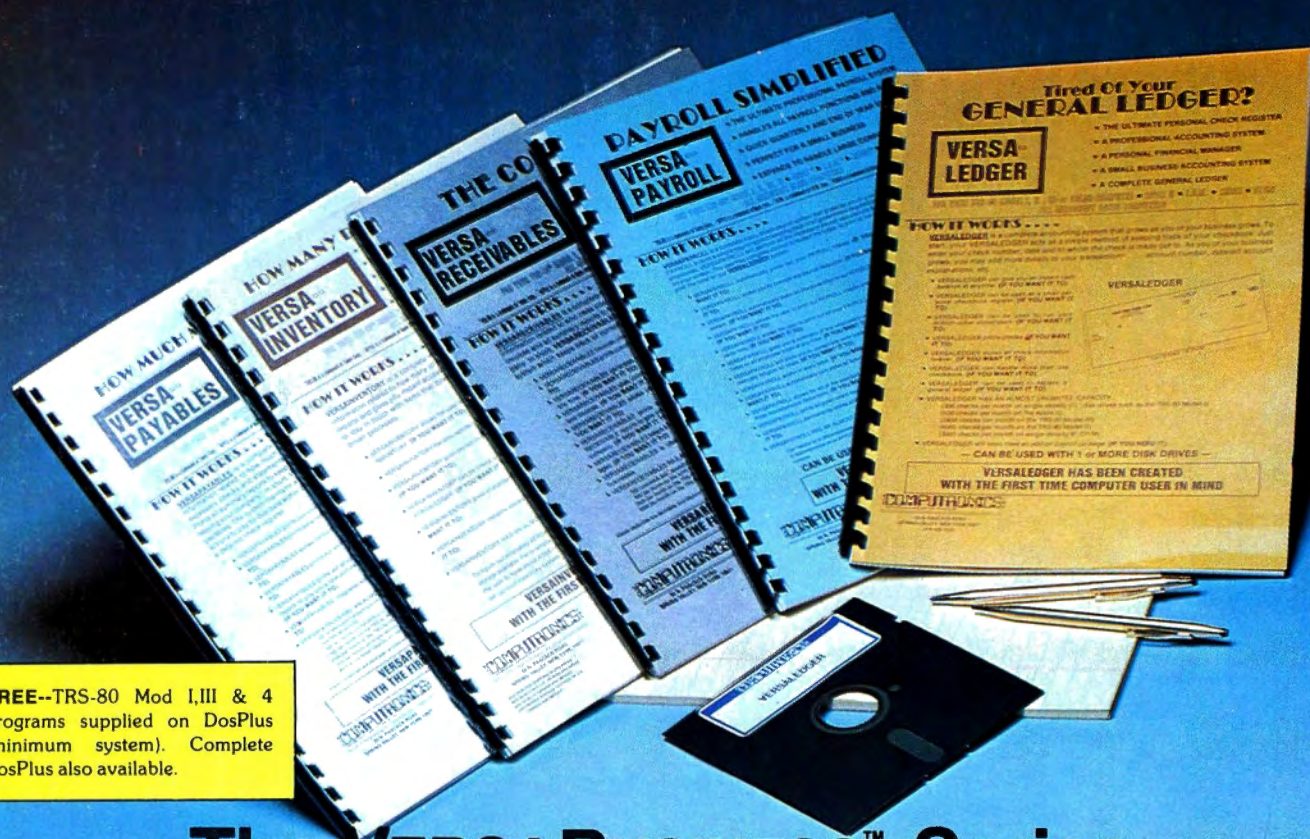
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