

Inside: Christmas  
Gift for Modem Users

# WOT

# CoCo

A CWC/I PUBLICATION  
DECEMBER 1984  
USA \$2.95 CAN \$3.50

THE MAGAZINE FOR TRS-80 COLOR COMPUTER® AND MC-10® USERS.

## FIRST AID For Your Disk Drive

*Time It, Fix It, Clean It*

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### Free Inside

A Complete  
Database Manager

---

### Reviewed

Worlds of Flight—  
Seat-of-the-Pants  
Flying at Its Best  
.....

Workbase—A Workhorse  
For the Professional

---

Plus: Scott Norman on DynaStar,  
Charles Santee on Educational  
Software, and More



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A perfect gift for the whole family that will keep on giving for years to come! The Color Computer 2 is ideal for anybody who wants to enjoy games in a system that can be used for many other household, business and educational tasks. It's great for beginners who want a computer to learn on—but won't limit them later on. And it's perfect for hobbyists who want a full-featured system with the opportunity for advanced graphics and programming expansion.

## **Ready to Use**

Just attach the Color Computer 2 to any TV. Our "pop-in" Program Pak™ cartridges let you battle starships in outer space, run a maze, play baseball—and lots more. But playing games is only the beginning. You can set up a budget or monitor your investments. Your kids can learn math or typing, enjoy literary classics or make glorious computer "paintings"

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The 16K Color Computer 2 with the Standard Color BASIC language is perfect for beginning programmers. An entertaining 185-page learning manual is included. Or pick the 16K Color Computer 2 with Extended Color BASIC for advanced programming capabilities. Create high-resolution color graphics using simple one-line commands. You can even choose the Standard version and upgrade to Extended BASIC later on.

## **Expand Easily**

Your Color Computer 2 can grow with you, too. Add a pair of joysticks, a printer and a modem for telephone communications. Upgrade with more memory and up to four disk drives, too.

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The ultra-compact CGP-115 Color Graphics Printer lets you create a variety of graphic designs from charts to computer-generated "doodles." The CGP-115 uses easily replacable ink cartridges to

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## Save Programs and Data on Cassette Tape

The CCR-82 recorder is especially designed for loading and recording programs and data. The CCR-82 features a volume control with a pre-set marker that makes it easy to find the right setting, time after time.

## Increase Your Children's Vocabulary Skills

You also get our popular Vocabulary Tutor programs on cassette tape—the fun way to learn new words. Kids in grades 3-5 can match words with their definitions and place the words in appropriate sentences.

## Come in Today!

Take advantage of either of these super holiday offers at your local Radio Shack. A Color Computer 2 is one present that will pay off in the future—for everyone in the family!

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




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 This symbol indicates the program's placement on the Instant CoCo loader, available on cassette. See our Instant CoCo ad for details. TRS-80 is a trademark of Radio Shack, a division of Tandy Corp.



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# Telewriter-64™

## the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

### THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

...one of the best programs for the Color Computer I have seen...

— Color Computer News, Jan. 1982

### TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

### 64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

### 64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command. The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

### RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple. Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

### FEATURES & SPECIFICATIONS:

**Printing and formatting:** Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminus, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

**File and I/O Features:** ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

**Editing features:** Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

...truly a state of the art word processor...  
outstanding in every respect.

— The RAINBOW, Jan. 1982

### PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs \$49.95 on cassette, \$59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

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✓ 121

Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited.

(Add \$2 for shipping. Californians add 6% state tax. Allow 2 weeks for personal checks. Send self-addressed stamped envelope for Telewriter reviews from CCN, RAINBOW, 80-Micro, 80-U.S. Telewriter owners: send SASE or call for information on upgrading to Telewriter-64. Telewriter-compatible spelling checker (Spell 'n Fix) and Smart Terminal program (Colorcom/E) also available. Call or write for more information.)

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**C**olor Computers are remarkably durable. *HOT CoCo* puts its fleet of machines through many ordeals each month producing the material for each issue. In the process, unintentional abuses occur: Cocos and peripherals are left on for days, cables are yanked from sockets, and "sick" equipment is ignored until it stops working entirely.

Judging from our experiences, the average user's Color Computer system should last a lifetime with proper care and maintenance. And a lifetime is about how long the average user intends to keep his or her CoCo.

To help you reach that lifetime-ownership goal, I'd like to make some suggestions:

- Get covers for your CoCo and major peripherals. Radio Shack recently reduced prices on all covers, ranging from \$2.95 for the CCR-81 cassette deck to \$4.95 for some printers. It's well worth the investment, especially if there are smokers in your household.

- Place your system in a permanent place where cables seldom need to be disturbed. Cables do "wear out" if you handle them frequently.

- Keep clutter away from your system. If you are in the habit of stacking books and papers on your computer and peripherals, you are probably blocking ventilation slots that dissipate heat. Heat is a big enemy of many of your computer's components.

- If something sounds wrong, find out why. When your disk drive makes grinding sounds, don't ignore them because your disks still boot. A repair bill is almost always cheaper than a replacement bill.

- Keep things that might damage your system away from it. This includes food, drink, magnets, cigarette smoke, and pets.

This issue contains several articles on maintaining your system that go into greater detail. If you have anything you can add to this list, let us know.

Taking care of your computer system is usually a matter of common sense. Treat it well, and your Color Computer and peripherals will serve you indefinitely.

### A Curious Note

The September 24 issue of *ComputerWorld* relates an interesting event that occurred last year. It seems that some FBI agents were following a group of Polish diplomats when they entered a Radio Shack store. After the Poles left, the agents learned from the clerk that they had bought a number of Color Computers, using their diplomatic passports to avoid the sales tax.

I wonder how long it will take them to form a user's group.—*Michael E. Nadeau* ■

*HOT CoCo* is a member of the CW Communications/Inc. group, the world's largest publisher of computer-related information. The group publishes 52 computer publications in 19 major countries. Members of the group include: Argentina's *Computerworld/Argentina*; Australia's *Australia Computerworld*, *Australian Micro Computer Magazine*, *Australian PC World* and *Directories*; Brazil's *DataNews* and *MicroMundo*; China's *China Computerworld*; Denmark's *Computerworld/Danmark* and *MicroVerden*; Finland's *Mikro*; France's *Le Monde Informatique*, *Golden* (Apple) and *OPC* (IBM); Germany's *Computerwoche*, *Microcomputerwelt*, *PC Welt*, *Software Markt*, *CW Edition/Seminar*, *Computer Business* and *Commodore Magazine*; Italy's *Computerworld Italia*; Japan's *Computerworld Japan* and *Perso ComWorld*; Mexico's *Computerworld/Mexico* and *CompuMundo*; Netherland's *CW Benelux* and *Micro/Info*; Norway's *Computerworld Norge* and *MikroData*; Saudi Arabia's *Saudi Computerworld*; Singapore's *The Asian Computerworld*; Spain's *Computerworld/Espana* and *MicroSistemas*; Sweden's *ComputerSweden*, *MikroDatorm* and *Min Hemdator*; the UK's *Computer Management* and *Computer Business Europe*; United States: *Computerworld*, *HOT CoCo*, *inCider*, *InfoWorld, jr*, *MacWorld*, *Micro MarketWorld*, *Microcomputing*, *PC World*, *PC Jr. World*, *RUN*, *73 Magazine* and *80 Micro*.

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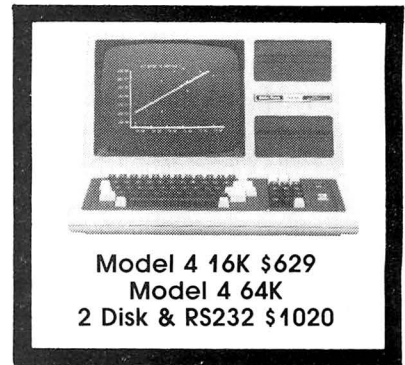
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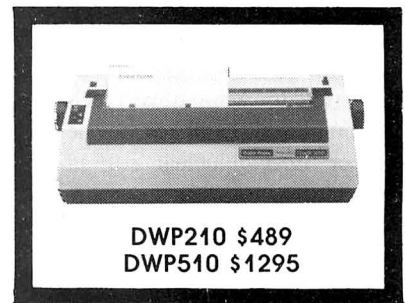
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DC Modem I	89
DC Modem II	160
DC Modem 2212	315

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Silver Reed EXP550 D.W. Ser.	430
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Amdek Video 300 Amber	159
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## Back Issues

Yes, back issues of *HOT CoCo* are available for all months. Here's a short list of some of the best of what we've published in the past:

**June 1983**—The CoCo Word Processor, a serial-to-parallel interface project, and a tutorial on tape reliability

**July 1983**—How to upgrade your CoCo to 64K

**August 1983**—Speech synthesis without hardware

**September 1983**—Disk utilities, character generator

**October 1983**—Animation techniques, build a biofeedback device

**November 1983**—Nuclear submarine simulation

**December 1983**—Education issue

**January 1984**—Programs for the investor and businessman

**February 1984**—Simulate Extended Color Basic on Color Basic CoCos

**March 1984**—How a disk stores information, create your own word-search puzzles

**April 1984**—Peripherals Buyer's Guide, how to shop for a disk drive

**May 1984**—OS-9 review, Financial Transactions Tracker program

**June 1984**—Simulations issue, how to build an Atari joystick interface

**July 1984**—Build your own lowercase modification

**August 1984**—Your disk drive as a graphics tool

**September 1984**—Buyer's Guide to Educational Software

In each back issue, you'll also find our regular features, reviews of popular software and hardware, and dozens of useful programs that are yours for the typing in.

Each back issue costs \$3.50 plus \$1 shipping and handling. On orders of 10 or more back issues, there is a flat \$7.50 shipping and handling fee. Send your orders to *HOT CoCo*, Attn.: Back-Issue Orders, 80 Pine St., Peterborough, NH 03458.

# Instant CoCo

This directory lists all programs available on *HOT CoCo's Instant CoCo* cassette. See our ad on page 80 for more details.

## Side A

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<b>A Matter of Timing/Goodwin</b> <i>Keep your drives tuned with this utility.</i>	40	TIMER(m)	32K disk
<b>Master Your Data/Bonnell</b> <i>Satisfy your databasing needs.</i>	48	FILES	32K disk
<b>Tach It Up, Tach It Up, Buddy</b>			
<b>Gonna Shut You Down/Ainscough</b> <i>This simulation is so realistic you'll smell the burning rubber.</i>	54	DRAGRACE	32K ECB
<b>To Edit, or Not to Edit/Bonnell</b> <i>Here's an easy way to manipulate your text.</i>	58	EDITOR	32K disk
<b>Battle at Sea/Ottum</b> <i>Match wits with your computer in this classic.</i>	62	SHIP	16K ECB

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<b>Timpist/Wood</b> <i>Arcadians will enjoy this one.</i>	68	TIMPIST	16K ECB
<b>Interrupt Processing/Bussell</b> <i>Stop programs in process with this technique.</i>	74	PAUSE	16K/32K
<b>Doctor ASCII/Eposito and Jackson</b> <i>Burn up the paper with this screen-dump program.</i>	88	SDUMPX2	32K ECB

## Bonus Program

<b>Upper-/Lowercase Driver/Goodwin</b>	----	LOWCA16K(m)	16K ECB
<b>Upper-/Lowercase Driver/Goodwin</b>	----	LOWCA32K(m)	32K ECB

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## Tips on Entering Our Programs

Having trouble entering our listings from the magazine? Here are a few tips that might help.

First, we print all our Basic listings in the CoCo's 32-column format. This means that each line should appear the same on the screen as it does in the magazine. If a line on your screen does not match the same line in the magazine, reread what you typed; you might have made an error.

Second, make sure the program is for your computer. Read the System Requirements box. The information in this box represents the minimum system configuration needed to run that particular program. Also, read the article thoroughly before typing in the program. Sometimes the article contains instructions vital to making the typed-in listing work. For instance, some CoCos will not accept the high-speed POKE (POKE 65495,0). The article for a program using this POKE will tell you to change those POKES to 65494,0 if your computer will not work at the faster speed.

Anyone who owns the new CoCos with the

1.2 ROMs, have noticed poor keyboard response in some published programs. To solve this, you can insert this line: FOR Z=1TO4:POKE340+Z,255:NEXT after any line that makes reference to PEEK 338-345.

This loop will slow down a Basic program. Another way is to directly insert a POKE xxx,255, where xxx is any keyboard location between 338 and 345. Example: IF PEEK(341)=251 THEN Y=Y-1. Change to: IF PEEK(341)=251 THEN POKE341,255:Y=Y-1.

Assembly listings usually require an editor/assembler to enter them into your CoCo. The two most common editor/assemblers are Radio Shack's EDTASM+ and The Micro Works' SDS80C. An Assembly listing assembled using the SDS80C will probably not run under EDTASM+.

If all the above fails, send us a printout or a detailed description of the problem you experience along with any error messages. We'll try to work it out for you. We cannot help you if you have modified the original program

The up-arrow indicates exponentiation on your Color Computer. However, our printer does not have an up-arrow and prints a caret instead. When entering programs from *HOT CoCo*, please change all carets to up-arrows.

**Article submissions** from our readers are welcomed and encouraged. Inquiries should be addressed to: *HOT CoCo* Submissions Editor, 80 Pine Street, Peterborough, NH 03458. Include an SASE for a copy of our writer's guidelines. Payment for accepted articles is made at a rate of approximately \$50 per printed page; all rights are purchased. Authors of reviews should contact the *HOT CoCo* Review Editor, 80 Pine Street, Peterborough, NH 03458.

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Entertainment Pack I is a collection of programs written in Basic09 for the OS-9 Operating System. The package consists of games and other interesting programs that are not only entertaining but serve as excellent instructional examples of Basic09 programming techniques. All programs include complete source files and can be easily edited to run on standard alphanumeric or graphics terminals.

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The complete, unabridged OS-9 manual set direct from Microware. This three manual set contains complete information on writing device descriptors, disk drivers and full explanations of how OS-9 works. A great addition to the serious OS-9 programmers library.

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# Feedback

## In Search Of: Art

I'm doing an introductory unit on computer fine-art graphics during the 1984-85 school year, and would appreciate any Color Computer or MC-10 art samples (on tape, please) that anyone out there can send.

Jack Bowman  
Art/Photo Department  
Piqua High School  
Indian Trail  
Piqua, OH 45356

## In Search Of: The National MC-10 User's Group

*Eds. note—In the August 1984 Feedback, we published an address for the National MC-10 User's Group in Tempe, AZ. Since then we have received word that letters sent to that address were returned marked "Moved, left no address."*

*If anyone knows where the club has gone, please let us know. And please don't phone the Bill Gordons who is listed with the Tempe information operator—he's not and never has been connected with the MC-10 User's Group.*

## Crystal Software

We were pleased to see our products in *HOT CoCo's Guide to Educational Software* (September 1984), but you didn't include our address. Here it is:

Crystal Software  
6591 Dawsey Road  
Rock Creek, OH 44084

We appreciate your efforts to provide product information to your readers.

David A. Kalman  
Crystal Software

## In Search Of: Equipment Donations

The Southwest Virginia Christian Academy is a small, Christian-oriented school for grades K-12, and we're organizing a computer class. We are asking for help from anyone who cares to donate computer equipment or programs of any type. We have a few TI 99/4As and Vic 20 cassette-based systems.

Richard Miller  
Southwest Virginia Christian Academy  
Glade Spring, VA 24340

## On-Line With Color Term + Plus +

Many thanks for your informative review, "Six Smart Ways to Go On-Line" (*HOT CoCo*, August 1984, p. 22/September 1984, p. 20). As a Color Term + Plus + owner, I've often wondered whether one of the other programs you covered would have been a better choice. I was happy to discover that I had indeed picked one of the better programs for my needs.

I was, however, disappointed that Mr. Banta, the reviewer, hadn't found why he couldn't use Color Term + Plus + to upload to an IBM mainframe. I encountered a similar problem and discovered that it was on the receiving end: The host system (an IBM 4341 running VC/CMS) used an in-house file-transfer routine that only opened a one-line (80-character) receiving buffer.

When the system was busy, I would often be sending data when the host wasn't ready for it. Fortunately, the system programmers helped me add a prompt feature (using the @), after which the upload routine worked just fine.

Mr. Banta didn't mention a couple of other deficiencies that Color Term + Plus + apparently shares with most of its competitors. One is the inability to filter out incoming control characters. I accidentally discovered an easy solution to this problem—just save the buffer and load it into Telewriter-64. Then all the unwanted characters will be gone. Use Telewriter's ASCII routines to save the file again, and you'll have a clean text.

Another deficiency shared by similar programs is that XON/XOFF commands (control/S to stop transmission, control/Q to restart) are not recognized. MCI Mail uses this protocol, so I hope all terminal packages will soon incorporate the feature. In the meantime, I use Color Term + Plus +'s single-line send feature with a short pause between lines to avoid buffer overflow.

Color Term + Plus + is a fine program; I have yet to encounter a system that I can't access with it.

Richard Woytowich  
Staten Island, NY

## Personalizing "Hi-Tech Shape-Up"

Thanks for a first-rate magazine. Your helpful and interesting articles have kept my Color Computer out of the closet and on my desk where I can use it often.

Mick McGuire based his exercise program, "High-Tech Shape-Up" (*HOT CoCo*, Septem-

ber 1984, p. 30) on a person weighing 150 pounds. He used the variable F as a symbol for the calories that a 150-pound person burns per hour.

I substituted ((F/150)\*W) for F in lines 230-270. W is the weight that you enter at the beginning of the program, and the following changes cause the program to calculate the data according to that weight:

```
230 PRINT"YOU BURN ";  
((F/150)*W);" CAL./HR."  
240 PRINT"YOU ACTUALLY  
BURNED ";INT(((F/150)*W)*H);  
" CAL."  
250 PRINT"AND LOST ";  
(((F/150)*W)*H)/3500;" POUNDS."  
265 PRINT"YOU COULD LOSE ";  
INT((((F/150)*W)*H)/3500)*(D*52);"  
POUNDS."  
270 PRINT"OR ";INT(((F/150)  
*W)*H)*(D*52);" CALORIES PER  
YEAR."
```

Line 260 stays the same.

Margie Rutter  
Phoenixville, PA

## Python via Joystick

The following line changes will give you joystick control in the game, Python (*HOT CoCo*, July 1984, p. 63):

```
340 X = JOYSTK(0)  
341 Y = JOYSTK(1)  
350 IF X > 55 THEN DI = 4  
360 IF X < 10 THEN DI = 3  
370 IF Y > 55 THEN DI = 2  
380 IF Y < 10 THEN DI = 1
```

Wayne R. Leduc  
Fall River, MA

## Up-Arrow Exponentiation In Platinum Worksaver

Even though the up arrow controls the cursor in Platinum Software's Worksaver (Platinum Software Inc., P.O. Box 833, Plattsburg, NY 12901, 518-643-2650), you can use the key for exponentiation. Type PRINT CHR\$(94) which will display an up arrow on the screen. Then move the cursor over the arrow and re-define a rarely used key to take the place of the up arrow. The newly defined key will function just as the up arrow did.

Leonard C. Eifel, Jr.  
Cleveland, OH 44111

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## Feedback

### In Search Of: Adventure Writers

I would like to hear from anyone interested in writing adventure games in Basic.

Jonathan Davidson  
3453 Dutch Village Road  
Halifax, NS B3N 2S7

You might also like to look at T.A.G. (The Adventure Generator) from JARB Software (1636 D Ave., Suite C, National City, CA 92050, 619-474-8982, \$34.95 tape, \$39.95 disk). We reviewed it in our September 1984 issue.

And Delton T. Horn's book, Golden Flutes and Great Escapes (Dilithium Press, 8285 S.W. Nimbus, Suite 151, Beaverton, OR 97005, 503-646-2713, \$9.95) leads you step by step through adventure writing. We reviewed it last month.—eds.

### CoCo + Desktop Calculator

The Color Computer is somewhat limited as a small-business machine due to its lack of a numeric keypad. I'd appreciate any information on hooking the CoCo up to a desktop calculator to enter numbers. I have a TI-5100 with a bad display that I'd like to use.

I also have a DMP-120 printer that sometimes misses the first letter in a line when I print forms. Does anyone out there know how to correct this?

Steve Kinsell  
Silver Lane Hybrids Inc.  
418 West Division St.  
Remington, IN 47977

### DMP-120 Superscripts

My DMP-120 printer does not have a special CHR\$ function to print superscripts. If anyone can tell me how to do so using VIP Writer, please write to me.

Also, POKE 113,0:EXEC 40999 will clear memory and cold start your machine and you don't have to remove the disks from the drive.

Fred R. Orth  
7 West Coulter Ave.  
Collingswood, NJ 08108

### Response to Silver CoCo ≠ White Drive

In your July 1984 Feedback section, you published a letter entitled "Silver CoCo ≠ White Drive" (p. 12). Sheffield Wilds had written in to say that he couldn't use his new white disk drive and controller (1.1 Disk Basic ROM) with his old silver CoCo (1.1 ROM). Switching the 1.1 for a 1.0 Disk Basic ROM in his controller solved the problem.

However, I've been using a white drive and controller with 1.1 Disk Basic ROM with my silver, E-board CoCo for four months with no problem at all.

In your April 1984 article, "The Disk Decision" (HOT CoCo, p. 69), Martin Goodman states that "the Color 2 Disk Kit 0 is compatible with all the older-style Color

Computers, but the older disk-drive system is not compatible with the CoCo 2, unless you use a Radio Shack Multi-Pak Interface (\$179.95)."

David Harouche  
Fresh Meadows, NY

### CHROUT Color Combos

Thomas Rokicki's CHROUT routine ("Give Your Computer Some Character," HOT CoCo, September 1983, p. 104) seems to have many possibilities for screen color combinations. According to Mr. Rokicki, the following POKES will alter the bit map to produce a black screen with green letters:

POKE &H7D72,0	(32114,0)
&H7D73,0	(32115,0)
&H7CBF,0	(31935,0)
&H7CC0,0	(31936,0)
&H7DE6,&H25	(32230,37)

These values are for addresses in which CHROUT is assembled starting at 31919 (DEC).

Does anyone out there know how to further alter the program to create a black screen without the green border?

Add POKE 32021,248 to the above—the results are great.

Thanks for an exceptional utility program.

Wayne Johnson  
Jefferson City, MO

### Getting Everybody Into the Spool

Frank Tipps' otherwise excellent print-spooler ("Everybody Into the Spool!" HOT CoCo, October 1984, p. 30) will not run on RS DOS 1.1. At least it won't run on my 64K E-board CoCo with a new white drive with 1.1 ROM.

However, if you change CB4A in line 570 (Assembly version) to CC1C and D7BC in line 860 to D8AF, the program will work fine.

The article didn't contain the information necessary to run the program on a 600-baud printer. To do so, change the #1 in line 210 of the Assembly version to #87, and change the last 01 in line 20 of the Basic version to 57.

It would be very helpful if the HOT CoCo editors and authors were careful to note which of the growing number of CoCo configurations will or will not support a particular program.

Harold Dowda, Jr., PhD  
Columbia, SC

We were aware of the incompatibility. Unfortunately, we failed to make note of it in the System Requirements box. Thank you for the changes. Our readers will appreciate it.—eds.

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# The Basic Beat

## ARRAY FOR GAMES, EDUCATION, AND BUSINESS

by James W. Wood

**T**his month I'll look at the array way of storing information. Program Listing 1 enters five numbers; assigns them to the variables A, B, C, D, and E; and then adds all five.

Program Listing 2 accomplishes the same thing, but it assigns numbers to the variables W(1), W(2), W(3), W(4), and W(5). Listing 1 is easier to understand but not as flexible. How would it appear if you had to enter 50 numbers? To handle 50 numbers in Listing 2, you need only change the fives in lines 10 and 40 to 50s and add another line: 5 DIM W(50). DIM is short for dimension.

When you turn on the CoCo, single-dimension arrays (e.g., W(A)) cannot have a number larger than 10 or smaller than zero in the parentheses. If you want to use numbers greater than 10, the first line in the program must contain the DIM statement.

Program Listing 3 adds and averages up to 50 numbers. When you want to stop entering values, type in a -1. I used -1, although you can choose another value. Line 40 keeps a running total of entered values. Line 50 tallies the number of entries, and line 60 prints their average. Line 70 lists all entered values so you can check your work.

How else can you use arrays? Program Listing 4 searches a group of numbers for the largest one. Lines 30-40 enter five numbers, and lines 50-70 compare the values. JW(1) is compared to L; if JW(1) is larger than L, then L becomes the value of JW(1). This process continues for JW(2), JW(3), and so on.

You could encounter an error in Listing 4 if L, as all variables, becomes equal to zero when you run the program. If all the entered values are less than zero (negative), then the

program would print "LARGEST IS 0". Therefore, add line 45 L = JW(1) to kill the bug.

As Program Listing 5 shows, arrays can have one dimension, A(0); two dimensions, B(0,0); three dimensions, C(0,0,0), or more. It is best to DIM all arrays larger than one dimension. I seldom use more than two dimensions and can't remember ever needing more than three. Line 60 prints the correct answer, 123456.

Program Listing 6 bounces a ball around the screen borders. Line 10 creates the color of border and ball, lines 20-40 draw the border, line 50 selects a random starting point for the ball, and line 60 selects its initial direction. The X increment is -1 if RND(2) generates a one, and +1 when RND(2) generates a two. Thus the X and Y increments are initially either +1 or -1.

Line 70 adds the increments to the X and Y coordinates. Line 80 sets, or lights, the dot. Line 90 reverses the direction of the dot in case it hits a left or right border. Line 100 reverses the dot's direction when it hits a top or bottom border. Line 110 turns off the dot and the program continues to loop from line 70-120. But could you change the program to have not one but a chain or snake of five moving dots?

The arrays in Program Listing 7 improve the game and use an array to create five moving dots. Lines 20-40 again draw the border, line 60 determines the initial coordinates of X(1), Y(1), line 70 determines the ini-

tial direction, and line 100 is the big difference between Listings 6 and 7. It sets the coordinates of each trailing-dot SET position equal to the coordinates of the dot ahead. This changes the dot in front and erases the one in the rear to give a nice illusion of a moving chain of dots.

It seems like you could make a game out of this graphic delight. Of course, you've got to decide on the rules first. How will you play the game, and what does it take to win? Well, you could move the bottom border, which will control the snake's movement to some degree. I'll add a stationary dot of snake food and then see how quickly I can get the snake to it. There's a penalty point each time the snake bounces off a border, so the object is to score low.

Program Listing 8 reworks Listing 7 to make the game. The SX and SY in line 10 are the coordinates of the food dot. SET commands draw the borders. Line 50 creates a graphics string to move the bottom border rapidly. I will elaborate on graphics strings in a future column.

Lines 210-230 and 250-260 control the bottom border's movement. Line 10 defines U\$ as the result of pressing the up arrow, and D\$ as the result of pressing the down arrow.


When you try to move the border upward, the program checks to be sure the border will not move above any part of the snake. The program must also erase the border's previous position and draw its new one, or you'll get a series of bottom borders.


Program Listing 9 creates a three-question quiz, with the questions always in the same order. But what if you want to shuffle the questions?

Program Listing 10 uses arrays of strings to list the questions and answers. Lines 80-120 determine the order of the questions. As in Listing



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```

10 INPUT A
20 INPUT B
30 INPUT C
40 INPUT D
50 INPUT E
60 PRINTA+B+C+D+E

```

Program Listing 1

```

10 FOR A=1 TO 5
20 INPUT W(A)
30 NEXTA
40 FOR A=1 TO 5
50 T=T+W(A):NEXTA:PRINTT

```

Program Listing 2

```

10 DIM A(50)
20 INPUT A(S)
30 IF A(S)=-1 THEN 60
40 T=T+A(S):PRINT"TOTAL=";T
50 S=S+1:GOTO20
60 PRINT:PRINT"AVERAGE=";T/S
70 FOR B=0 TO S-1:PRINTA(B);:NEXT
T

```

Program Listing 3

```

10 CLS:PRINT"GIVE ME FIVE NUMBER
S."
20 PRINT"I WILL FIND THE LARGEST
."
30 FOR A=1 TO 5
40 INPUT JW(A):NEXTA
50 FOR A=1 TO 5
60 IF JW(A)>L THEN L=JW(A)
70 NEXT A
80 PRINT"LARGEST IS";L

```

Program Listing 4

```

5 DIM A(0),B(0,0),C(0,0,0)
6 DIM D(0,0,0,0),E(0,0,0,0,1)
10 A(0)=12
20 B(0,0)=123
30 C(0,0,0)=1234
40 D(0,0,0,0)=12345
50 E(0,0,0,0,1)=123456
55 E(0,0,0,0,1)=3
60 PRINTE(0,0,0,0,0)

```

Program Listing 5

```

10 CLS:INPUT"COLOR (1-8)";C
20 FORA=0TO63:SET(A,0,C):NEXTA
30 FORA=0TO31:SET(0,A,C):SET(63,
A,C):NEXTA
40 FORA=0TO63:SET(A,31,C):NEXTA
50 X=10+RND(40):Y=2+RND(20)
60 XI=3-2*RND(2):YI=3-2*RND(2)
70 X=X+XI:Y=Y+YI
80 SET(X,Y,C)
90 IF X=1 OR X=62 THEN XI=-XI
100 IF Y=1 OR Y=30 THEN YI=-YI
110 RESET(X,Y)
120 GOTO70

```

Program Listing 6

```

10 CLS:INPUT"COLOR (1-8)";C
20 FORA=0TO63:SET(A,0,C):NEXTA
30 FORA=0TO31:SET(0,A,C):SET(63,
A,C):NEXTA
40 FORA=0TO63:SET(A,31,C):NEXTA
50 FORA=2TO6:X(A)=1:Y(A)=1:NEXTA
:REM PREVENT ERASE UPPER LEFT
60 X(1)=10+RND(40):Y(1)=2+RND(20)
)
70 XI=3-2*RND(2):YI=3-2*RND(2)
80 X(1)=X(1)+XI:Y(1)=Y(1)+YI
90 SET(X(1),Y(1),C)
100 FORA=6TO2STEP-1:X(A)=X(A-1):
Y(A)=Y(A-1):NEXTA

```

```

110 IF X(1)=1 OR X(1)=62 THEN XI
=-XI
120 IF Y(1)=1 OR Y(1)=30 THEN YI
=-YI
130 RESET(X(6),Y(6))
140 GOTO80

```

Program Listing 7

```

10 US=CHRS(94):DS=CHRS(10):LP=2
8:L=448:SX=RND(60)+1:SY=RND(26)+
1
20 FORA=1TO31:DA$=DA$+CHRS(128):
NEXTA
30 CLS:INPUT"COLOR (1-8)";C
40 ABS=CHRS(128+16*(C-1)+10)+LEF
T$(DA$,30)+CHRS(128+16*(C-1)+5)
50 FORA=0TO63:SET(A,0,C):NEXTA
60 FORA=0TO27:SET(0,A,C):SET(63,
A,C):NEXTA
70 FORA=2TO6:X(A)=1:Y(A)=1:NEXTA
:REM PREVENT ERASE UPPER LEFT
80 FORA=1TO30:AS$=AS$+CHRS(128+16*
(C-1)+3):NEXTA
90 AS$=CHRS(128+16*(C-1)+11)+AS+C
HRS(128+16*(C-1)+7)
100 PRINT@448,AS;
110 X(1)=10+RND(40):Y(1)=2+RND(2
0)
120 XI=3-2*RND(2):YI=3-2*RND(2)
130 X(1)=X(1)+XI:Y(1)=Y(1)+YI
140 IF SX=X(1) AND SY=Y(1) THEN
GOTO 270
150 SET(SX,SY,C)
160 SET(X(1),Y(1),C)
170 FORA=6TO2STEP-1:X(A)=X(A-1):
Y(A)=Y(A-1):NEXTA
180 IF X(1)=1 OR X(1)=62 THEN XI
=-XI:B=B+1
190 IF Y(1)=1 OR Y(1)=LP THEN YI
=-YI:B=B+1
200 RESET(X(6),Y(6))
210 PS=INKEYS
220 IF PS=US THEN GOSUB250
230 IF PS=DS THEN GOSUB 260
240 GOTO130
250 IF L<128 OR Y(4)+5>LP THEN R
ETURN ELSE L=L-32:LP=LP-2:PRINT@
L+32,DA$;:POKEL+1024+63,128:PRIN
T@L,AS;:RETURN
260 IF L>448 THEN RETURN ELSE L
=L+32:LP=LP+2:PRINT@L-32,AB$;:PR
INT@L,AS;:RETURN
270 CLS:PRINT"YOUR SCORE,";B;"BO
UNCES"

```

Program Listing 8

```

10 CLS
20 PRINT"IN WHAT CITY IS THE EMP
IRE STATE BUILDING";:INPUT AN$
30 IF AN$="NEW YORK" THEN NC=NC+
1:PRINT"CORRECT" ELSE PRINT"SORR
Y, IT IS NEW YORK"
40 PRINT
50 PRINT"IN WHAT COUNTRY WAS GUN
POWDER INVENTED";:INPUT AN$
60 IF AN$="CHINA" THEN NC=NC+1:P
RINT"CORRECT" ELSE PRINT"SORRY,
IT IS CHINA"
70 PRINT
80 PRINT"WHAT STATE IS THE LARGE
ST";:INPUT AN$
90 IF AN$="ALASKA" THEN NC=NC+1:
PRINT"CORRECT" ELSE PRINT"SORRY,
IT IS ALASKA"
100 PRINT
110 PRINT"YOU ANSWERED";NC;"CORR
ECTLY"

```

Program Listing 9

```

10 CLS
20 QUS(1)="IN WHAT CITY IS THE E
MPIRE STATE BUILDING"
30 CA$(1)="NEW YORK"

```

```

40 QU$(2)="IN WHAT COUNTRY WAS G
UNPOWDER INVENTED"
50 CA$(2)="CHINA"
60 QU$(3)="WHAT STATE IS THE LAR
GEST"
70 CA$(3)="ALASKA"
80 FOR NQ=1TO3
90 A=RND(3):IF W(A)=1 THEN90 ELS
E W(A)=1
100 PRINTQU$(A);:INPUT AN$
110 IF AN$=CA$(A) THEN NC=NC+1:P
RINT"CORRECT" ELSE PRINT"SORRY,
IT IS ";CA$(A)
120 NEXTNQ
130 PRINT"YOU ANSWERED";NC;"CORR
ECTLY"

```

Program Listing 10

```

10 CLS:DIM MS(12)
20 PRINT"MONTHLY DATA GRAPHER"
30 FOR M=1TO12
40 PRINT"MONTH #";M;"'S SALES";:
INPUT MS(M)
50 NEXTM
60 W=1:FOR M=1TO12:IF MS(M)>W TH
EN W=MS(M)
70 NEXT M
80 FOR M=1 TO 12
90 MS(M)=MS(M)*55/W
100 NEXTM
110 CLS
120 PRINT@0,"MONTH"
130 FORA=32 TO 384 STEP 32:PRINT
@A,A/32;:NEXTA
140 FORA=35TO291STEP32:PRINT@A,C
HRS(143);:NEXT
150 FOR A=1 TO 12
160 FOR B=8 TO 8+MS(A)
170 SET(B,A*2+1,8)
180 NEXT B,A
190 GOTO190

```

Program Listing 11

```

10 DIM A(4,10):CLS
20 INPUT"STARTING PAY";SP
30 PRINT"INCREMENT FOR YEARS EXP
ERIENCE":INPUT Y
40 PRINT"INCREMENT FOR YEAR OF C
OLLEGE":INPUT C
50 A(0,0)=SP
60 FOR J=1 TO 4
70 A(J,0)=A(J-1,0)+C:NEXTJ
80 FOR D=0 TO 4
90 FOR W=1TO10
100 A(D,W)=A(D,W-1)+Y:NEXTW,D
110 CLS
120 FOR W=0 TO 10
130 FOR J=0 TO 4
140 PRINTA(J,W);:NEXTJ:PRINT:NEX
TW

```

Program Listing 12

```

10 CLS:DIM AA(4,13),AB(52):PRINT
"SHUFFLING"
20 FORA=1TO52
30 S=RND(4):C=RND(13)
40 IF AA(S,C)=1 THEN 30 ELSE AA(
S,C)=1:AB(A)=S*100+C
50 NEXTA
60 FOR A=1 TO 5
70 IF AB(A)>400 THEN PRINT AB(A)
-400;"OF CLUBS":GOTO110
80 IF AB(A)>300 THEN PRINT AB(A)
-300;"OF HEARTS":GOTO110
90 IF AB(A)>200 THEN PRINT AB(A)
-200;"OF SPADES":GOTO110
100 PRINTAB(A)-100;"OF DIAMONDS"
110 NEXTA

```

Program Listing 13

## The Basic Beat

4, all variables equal zero when you run the program. Line 90 picks a random number (W). If W equals one, which it wouldn't, then the program chooses another question number. Thus, once you use a question, the program locks it out from being used again.

Add line 5 POKE 383,158 to disable the LIST command, and you have a quiz machine that won't give students a sneak peek. POKE 383,0 restores LIST. There are more efficient ways to get the questions and answers into the program, but I'll keep the lesson simple for now.

Program Listing 11 is a business-type program that graphs sales or income for a 12-month period. An array holds the numbers as entered in lines 30-50 for 12 months. Lines 60-70 find the largest monthly income, and lines 80-100 use this data to scale each month's income so a line that extends fully across the screen represents the largest income and the others are drawn to a proportionate scale.

*"This business-type program graphs sales or income for a 12-month period."*

Line 130 numbers the months, and line 140 draws green squares so that the single-digit months line up with two-digit months. Lines 150-180 draw the graph. The eight is added to the monthly sales amount to start the graph to the right of the numbers representing the months.

Program Listings 12 and 13 are examples of two-dimensional arrays. Listing 12 is a program to determine a salary schedule. It includes a bonus step across for each year of college and one down for each year of experience, up to 10 years. If the salaries go over four digits, however, the screen becomes difficult to read,

because the columns extend past the end of the 32-column screen and wrap around.

Program Listing 13 shows how to use the two-dimensional array to shuffle a deck of cards. The AA array has room for four suits of 13 cards each. The AB array keeps track of 52 cards. Line 40 uses the same method as Listing 10 so that once you pick a card, you can't choose it again. The AA array must be transferred to a one-dimensional array so that the cards are dealt one at a time. Lines 60-100 deal the cards to the screen. The five in line 60 can be any number up to 52.

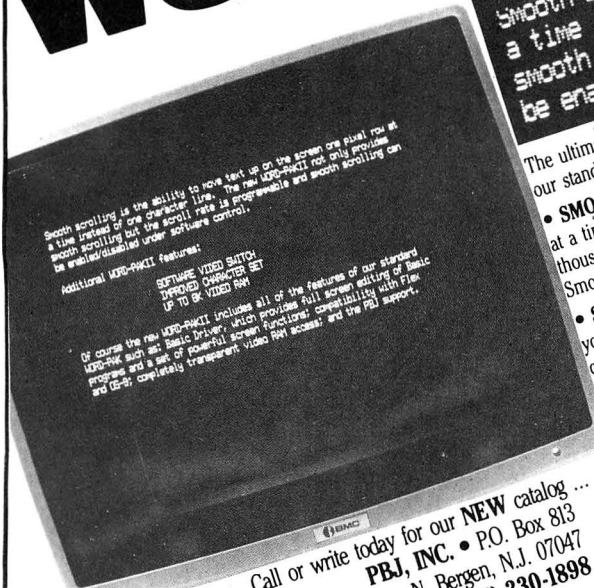
Okay, so now you can shuffle. Try writing a card game. At least change the program so that it prints the "jack of hearts" instead of the "11 of hearts." ■

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REVIEW

BY SCOTT L. NORMAN

# FLY THE FRIENDLY SKIES

Pilots and would-be pilots will find Worlds of Flight realistic and entertaining.

**Worlds of Flight**  
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With Worlds of Flight, Tom Mix Software lets us would-be pilots experience the joys and frustrations of flying an ultralight aircraft over a variety of terrain. It's beautifully done, and while it makes some compromises with reality, there's plenty to get you involved in the simulation.

And simulation is the right word. This isn't a game: It's a full graphics simulation in which you can learn about lightplane control, practice some navigation and aerobatics, and—most difficult of all—sharpen your skills by making precise landings. Nobody will be shooting at you, and there are no points to rack up. All the rewards come from increasing your expertise in the operation of the imaginary little aircraft.

The worlds of the title comprise

nine different scenes over which you can fly, each one approximately 31 statute miles (27 nautical miles) square. They are arranged in a three-by-three grid, and the outermost boundaries are mathematically wrapped around, so when you fly out of one world you enter another.

There are a variety of mountains, rivers, and man-made objects to contend with, and each world contains a runway with control tower, fire station, and refueling locations. (World 5, in the center of the grid, is a practice area consisting of nothing but an airstrip.) You can specify the weather (wind speed and direction, and ceiling) in each of the worlds at the start of a session.

The cockpit display is the one feature that should attract the most attention. After you have set up weather conditions and specified the world in which you want to begin, the lower half of the screen displays the instrument panel, while the upper half shows your view down the runway.

The outside picture changes as you move, so you see all the features of your little world in the proper perspective as you fly about. The scene needs a little imagination to become real: The view changes in steps (no more than once per second) and consists of PMODE 4 stick figures for mountains and buildings. But in many

respects this is an extraordinary simulation.

Man does not live by visual flight rules alone, however. You can switch the out-the-window scene for a radar view of the terrain at any time. This has its own unique "zoom lens" feature, and can be your major navigational tool, especially if you choose to go flying around above the cloud deck.

### The Airplane

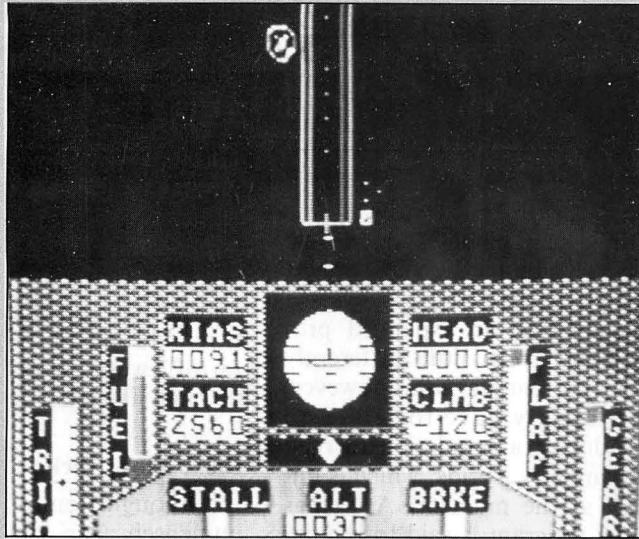
Your trusty steed is something of an oddball: a 600-pound, 40-horsepower, low-wing monoplane with pusher prop, bubble canopy, flaps, and retractable tricycle landing gear. These characteristics were apparently chosen to add spice to the simulation.

The low weight and modest power mean that you must carefully consider wind effects. The display doesn't have to show the pusher prop ticking over, the canopy guarantees a superb view, and all that ironmongery beneath the wings has a demonstrable, instructive effect on the flight path. Besides, looking after it keeps you occupied.

The instrument panel bears little resemblance to that of a real aircraft. The major simulated instrument is the artificial horizon and its associated sideslip indicator. There are vertical tape-type indicators for elevator trim, fuel supply, and flap and gear posi-

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Games



tions, and digital readouts for everything else: indicated airspeed and ground speed, compass heading, tachometer, altitude, and climb/dive rate. Stall-warning and wheel-brake indicators occupy their own little boxes.

Since the instruments have non-standard shapes, it should come as no *surprise* that the panel layout is non-standard as well; the conventional scanning pattern that pilots learn will not necessarily help the Worlds of Flight devotee. But not much can be done about this.

The principal controls are the two joysticks: the right one for elevators and ailerons, the left one for throttle and rudder (or nosewheel, when you are on the ground). This is the way it should be. Real airplanes aren't flown exclusively from keyboards.

If you have spring-loaded joysticks you will have to disengage at least the y-axis centering springs on the left one. You'll want the throttle to stay put! I also recommend disengaging the y-axis spring on the right stick, in order to retain maximum flexibility for trimming the aircraft in level flight. The x-axis springs can be useful for centering the ailerons and rudder, however.

Individually, the joystick buttons control elevator trim, but when pressed simultaneously at the beginning of a simulation they start the en-

gine (which responds to the throttle with appropriate sounds). All other flight and display controls require the keyboard. The break key toggles the brakes (what else?), the space bar and minus sign lower and raise the flaps, and the shifted vertical arrows do the same for the gear.

On the display side, the shifted clear key toggles between out-the-window and radar displays. Z and X "zoom" the radar, and the unshifted arrow keys change your viewpoint for looking through the canopy. You can scan around the horizon in four 90-degree steps, and shift your gaze up or down by eight degrees at a time.

The W key calls up a 5-second readout of weather conditions in the world over which you are flying. As a final touch, you can toggle between light lines on a dark background, and vice-versa.

All in all, the Worlds of Flight cockpit can be a satisfactorily busy place.

### The Worlds

The nine worlds comprise the practice field, three mountain worlds having various isolated and connected peaks as the only topography, and five other scenes. The latter feature a mix of land and water, with mountains and man-made structures to avoid. They are called Arabian Gulf,

Panama City, Dahlgren (Virginia), Power Line River, and Island Bay, but that scarcely matters; I'm sure that a great deal of artistic license went into the layouts.

The worlds provide a good deal of variety. Some of the airfields are located in challenging spots—sandwiched between two mountains, for example—and there are many opportunities to test your skill and nerve.

Consider the Potomac just northeast of the Dahlgren runway: There's a bridge carrying U.S. Highway 301 across the river at a height of 512 feet, and not an FAA inspector in sight should you decide to fly under it! Just watch the power plant and smokestack on the east bank as you make your approach.

Lunacy aside, you can set up some nice navigational problems for yourself. Worlds of Flight is unstructured; *you* decide where you want to begin and end your flight segments, and you pick the weather conditions. Try different wind conditions and ceilings in adjacent worlds, and try to plan your fuel consumption accurately, for a real challenge. The Flight Manual helps out with adequately detailed maps and tables of useful conversion factors.

My own feeling is that while seat-of-the-pants flying is great fun, things really get interesting when you do a little planning with paper, pencil, and calculator before starting that engine. Aviation is something of a mathematical art.

A bonus: in the future, registered Worlds of Flight purchasers will be able to buy additional world scenes at reduced rates. There's certainly room; the present 22-page manual looks lost

# HA

# HA

# HA.

*“Your 40-h.p. wonder has a certain degree of aerobatic capability.”*

in its three-ring binder, and a few more maps would hardly make a dent in the empty space.

I imagine that an expanded program will behave a little differently from the current version, however. It will probably have to return to the disk during a simulation to read data for any new worlds, which is unnecessary at the moment. As things stand, the program is said to require almost all of the RAM in a 32K computer, but at least it all fits. Once you've loaded it you can remove the copy-protected master disk from your drive.

### The Flying Experience

In a word, terrific. All flight exercises start on the runway of a world of your choice, so you must start the engine, take off and get the airplane cleaned up, and then get on with the business of climbing to altitude and setting your course.

What would you like to do? You can tool around in a single world, looking at the scenery and getting acquainted with the response of the airplane, set off on a cross-country flight, practice landings, or even do some aerobatics.

Surprisingly, your 40-h.p. wonder has a certain degree of aerobatic capability. You can roll it, fly upside down, and stall—intentionally or not. The external scenery behaves properly during maneuvers; when you're inverted, the mountains appear to be hanging down from above you. I only wish the plane had enough power to pull through a loop.

Landings are the most demanding parts of the simulation. There are a lot of things to keep track of when you are moving in three dimensions. I find it especially easy to get throttled back and all lined up on my final heading, only to discover that I can't shed altitude fast enough to get down to the runway without exceeding the structural limits of the airplane.

That means crashing. All I can say is keep at it; simulations do have cer-

tain advantages over live training.

Worlds of Flight's sound effects are excellent. The tempo of the engine responds to the throttle setting, and you can even hear the engine overspeeding if you leave the throttle alone and go into a steep dive. There is an audible stall warning, together with cues that let you know when you're raising or lowering the landing gear.

Successful landings are accompanied by the squeal of the tires on the runway, and crashes result in fearsome explosions. The only peculiar touch is the sound you hear when you pull into a refueling area and gas up: It reminds me of the flushing of some far-off water closet, as transmitted through elderly pipes.

### Pick, Pick, Pick

Although I enjoy Worlds of Flight immensely (can you tell?), I want to point out that the speed and processing capability of the Color Computer do impose some limitations on the realism of the simulation. I have already mentioned the stick-figure approach to scenery, which I don't find terribly objectionable; you should also realize that even PMODE 4 graphics cannot represent an arbitrary object as seen from a continuously changing viewpoint. A rectangular building or runway will sometimes jump from a trapezoidal shape to an elongated triangle and then resume a *more familiar* form as you circle it. That's the way it is with matrix-addressed video.

Other limitations arise. Suppose you specify a 1,500-foot ceiling; you can still see all of a mountain that is considerably higher—until you climb through 1,500 feet. Then your outside view blanks out, and you must rely on radar to navigate. This is probably a reasonable compromise; I suspect it would require an awful lot of extra computation to get the geometrical cutoffs right.

I have only noticed one departure from realism in the flying characteristics of the aircraft itself. In level flight, putting the rudder hard over without changing any other control setting will cause the plane to just sit in one spot, executing a flat two-degree-per-second rotation at constant altitude. Try *that* in real life!

These are pretty minor beefs. Worlds of Flight is the best out-the-window simulation available for the CoCo, and provides a great addition to the Tom Mix line. The rest of you Walter Mitty types should check it out—or get checked out in it. ■

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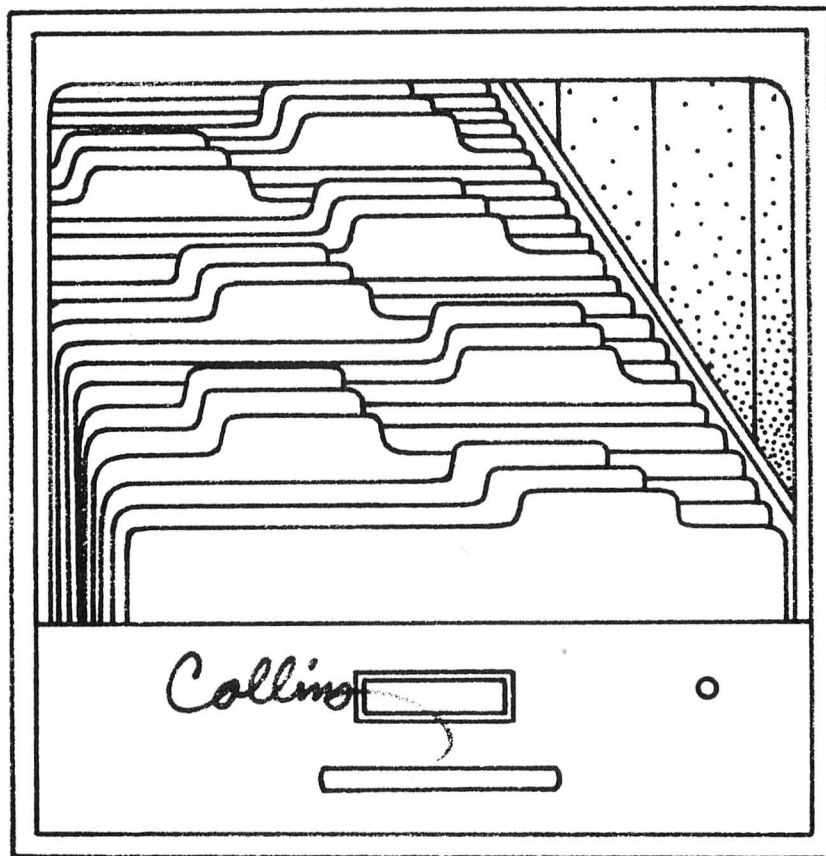


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ager, it can deal with multiple files containing information about the same subjects, or records. It is oriented toward the needs of the small business or other organization, as opposed to the individual who just needs a quick and dirty system for keeping track of miscellaneous facts.

While it will certainly handle text, the system's calculation and report-generation facilities seem best suited to manipulate numerical data. Despite

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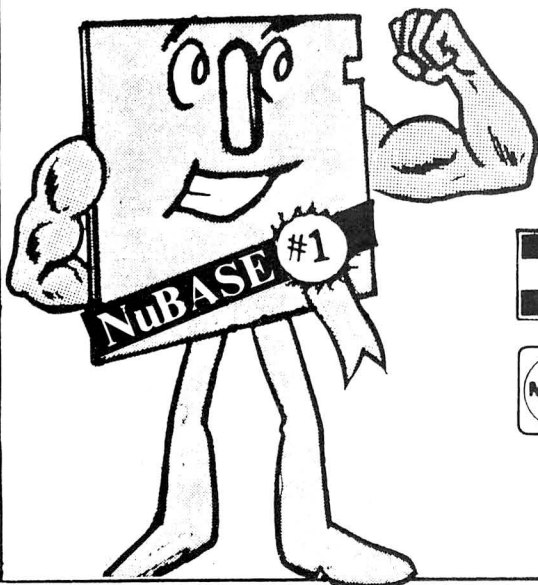
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a few peculiarities in its operation, Workbase should be of interest to anyone faced with a need to organize and summarize this sort of information.

Workbase retains much of the style of Homebase, a more consumer-oriented data manager from the same vendor. Workbase is no rehash, however, but a new data manager aimed at a substantially different market: It should be judged in that light.

### Taking It From the Top

The question of how well a given piece of applications software will work in a single-drive disk system is always a ticklish one. While the judicious use of overlays can increase the amount of RAM available for data, it doesn't ease the problem of limited data-storage space on the disk. After all, the program and data must share the same storage surface.

Workbase I indeed functions with a single drive; the price you pay is an upper limit of 400 records in any one data file. Since the program modules themselves occupy 56 granules of storage, there is room for probably only one such file on a working disk.

A small data file, a couple of report definitions, and the index and sorting files that Workbase itself creates can easily use up the remaining 12 gran on a CoCo disk. Users intending to manage several collections of data with one drive must make several copies of the program disk.

The message is that two drives—one for the program, one for data—are better. Even so, the Workbase I user is limited to 400-record files. An enlarged version, Workbase II, lets you stuff 1,200 records into an individual file for a price of \$115. In either case, individual records can be up to 255 bytes long and can contain as many as 50 data items or fields.

I tested Workbase I on a two-drive system, which immediately gave me the opportunity to encounter a couple of peculiar features. The program disk must be in drive 0 when you boot the system, as is usual, but once you've loaded the program, it instructs you to move the program disk to drive 1 and insert the data disk in drive 0. This is odd, and takes a little getting used to.

Once you've made the switch, you must attend to a few more matters before you can set to work. First, you must specify the type of printer you'll be using. Workbase includes control codes for several popular brands—

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*“The Workbase manual does a good job of leading you through the choices you must make in setting up a data file and working with stored information.”*

---

Epson, Gemini, C. Itoh, Radio Shack, and so on—that let you use boldface, condensed print, and other features. It also lets you type in the codes for any other machine you may have on hand.

You must also identify the speed at which you want to send information to the printer: 600, 1,200, 2,400, or 9,600 baud.

You must furnish this information whenever you start a Workbase session. There's not much to it if you have a standard printer (just two numbers to type in), but in other cases it can become a little wearisome. The program would benefit if you could construct a permanent “personality” module on disk.

### Defining and Manipulating Files

The Workbase manual does a good job of leading you through the many choices you must make in setting up a data file and working with stored information. It's a hefty document, filling a 1½-inch, three-ring binder, so I'll discuss only a few of the program's many details.

Workbase comprises six modules, each of which uses several disk files. The six are as follows:

- Data Management, which provides facilities for creating, updating, and reorganizing your files;
- Calculations, which updates the database through computations that can involve both data fields and numerical constants and variables;
- Standard Reporting, the module that prepares reports in tabular or columnar format;
- Custom Reporting, with which you can produce reports incorporating data from a Workbase file and text;

● Data Utilities, which can create new files, merge or summarize existing ones, and perform other housekeeping functions; and

● Homebase Conversions, which can convert a Homebase file to Workbase format.

You select these major functions from a main menu, after you inform Workbase about your drives and printer. Subsequent choices lead to either other brief menus or to data-entry screens, all of which use the CoCo's conventional 32-by-16 text display.

The first task is file definition, of course, which you should design by spending some time with paper and pencil before you ever boot Workbase. It is necessary to specify the name of each data field, its length, and the kind of information it will contain.

You can specify seven data types: text, integer, amount (includes dollar sign and two decimal places), other numeric (three decimal places), date, time, and telephone number (seven digits). All except text have a fixed storage requirement of 5 bytes per field.

You have the opportunity to specify the maximum length of a record when you first set up a file. It is tempting to be elegant and reserve just enough space to accommodate the data fields you think you will need, but I recommend caution. Set aside a little more space: Workbase will let you add fields to an existing file later, if you do. (Of course, this option isn't available if your original definitions exhaust the 255-byte limit.)

Once you've defined the file structure, you can add some records. Here, as elsewhere in Workbase, the prompts appear on a simple scrolling list; there are no preformatted data-entry screens. This means that the cursor won't skip fields that programmed calculations will fill, so you must give those fields null entries (i.e., just the enter key) at this time.

A calculator mode is available in case you have to do a little calculation before entering data into an amount, other, or integer field. The calculator is similar in concept to a feature found on most spreadsheets, but is restricted to one mathematical operation per entry.

You must place the operation to be performed in the first position of the entry, followed by the value to be used in performing the operation on the current value of the data field you

are entering. Thus, to enter 3.5 × 1.67 into an initially empty field, you must perform the following two steps:

+3.5  
\*1.67

Workbase offers very complete facilities for selecting, moving, or editing fields and records. The operation is very much like that of Homebase, in that neither records nor fields occupy privileged positions in the process.

Suppose you want to examine some information in a file. After working your way through the list option of the data-management menu, you will receive a "list name = >" prompt. If you answer with the name of a record, the next prompt will be "name = >". Typing the name of a data field displays just that field for the selected record; a null entry, however, displays all the data for the record.

The important point is that this also works in reverse. You can begin by specifying the name of a field and then identify one record for display or give a null response to see the value of that field for every record in the file.

You get the impression that Workbase encourages you to browse through your data, rather than attempting to isolate you from it. Another helpful feature is the built-in screen dump. You can print out any screen display by pressing the shifted clear key in response to the standard flashing question mark prompt.

Sorting and selection operations are equally simple. For example, to reorder a file you need merely specify the name of the field on which you wish to sort, and whether the records are to be put into ascending or descending order. (You can also sort according to record names.)

You can restrict examination of the text-field values to a portion of the field length; you can sort on the third through seventh characters of pieces of text, for instance, should your needs be strange enough.

As for selecting subsets of a file for further use, Workbase offers three options: select either records or data fields according to their names, or select records according to the values of specific data fields. Equality and inequality criteria are available, as are a blanket "all" criterion, a range test (you furnish high and low values), and a generic test (satisfied whenever Workbase finds the designated character string anywhere in the name or data value being searched).

There is still more flexibility in the system: You may specify that records or fields that satisfy your criteria be included in, or excluded from, the resulting data set.

You can issue any number of selection commands in sequence, in order to construct a very specific window into your data. Workbase must act upon each command before you enter the next, though; you cannot set up a long, complicated expression beforehand.

In general, subsequent processing (printing, moving, listing, changing, and so on) will only affect the items last selected. Items that fail to meet a

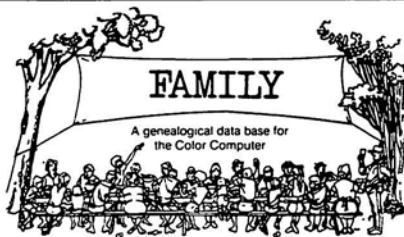
selection criterion are not actually deleted, of course. They are flagged in a special index file, and you can bring your data back together at any time with an appropriate "include" command. In fact, it is a good idea to get into the habit of beginning every Workbase session with an "include-all" statement, just to get everything in line.

### Calculations and Reports

I have already mentioned the program's ability to do simple arithmetic when you're entering data.

You can also use the so-called "tally mode" to compile some useful

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statistics about the file in use. It computes the total, count (number of items), average, and the highest and lowest values in a given field, or in all fields, in a data file. It also identifies the records that contain the high and low entries.

Then there is the major calculations module I mentioned earlier. This is Workbase's most flexible computational feature, able to construct procedures that you can execute immediately or store for use with any file containing the appropriately named data fields. Operands can be fields, records, constants, or variables, and you can build record- or field-selection criteria into a procedure.

You can't use parentheses, but you can enter several calculation steps at the same time so you can obtain and use intermediate results. The maximum number of entries (steps) in a single procedure is 50.

A simple example: I concocted a compilation of statistics about European automobiles, and I thought it appropriate to let Workbase handle the metric-to-English conversions. I had set up the file with entries in fields named "LENGTH, m" and "WEIGHT, kg" (these are all legal characters), and I defined empty fields called "LENGTH, ft." and "WEIGHT, lbs."

My little calculation procedure looked like this:

```
LENGTH, ft. = LENGTH, m/0.305  
WEIGHT, lbs. = WEIGHT, kg*2.2
```

Notice that you refer to the operand fields by name, rather than by an identification number, so that programming such a procedure is like programming in a very simplified Basic.

Once stored on disk, a procedure like mine could be invoked to do the same calculations for any other file: one about aircraft, perhaps, or animals. This is one reason why Workbase is a true database manager: It has the ability to work with more than one file, assuming you've stored the right sort of information.

Calculations can take a while; it took more than 25 seconds to carry out the two conversions I wanted on a 20-record file. Workbase spent most of the time reading and rewriting the disk files, however, and not in the actual computations.

The system lets you create two general types of reports: standard and custom. Both permit a degree of cus-

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*"You produce  
custom reports with  
Workbase's  
own text editor."*

---

tomization in that you can specify which fields are to appear, and in which order. You can also use all of Workbase's power to select and sort records. The difference, in Workbase terminology, is that standard reports consist primarily of rows and columns of data (although mailing labels and business statements also fall into this category), while you produce custom reports by merging information from a database with text to produce form-letter-like documents.

A staggering number of formatting options are available. For example, a standard report definition gives you 14 parameters to play with. These specify such attributes as margins, print size, whether or not to calculate subtotals according to the value of some key field, and so on.

One little touch that I especially appreciate: You can select and sort records according to the value of a field that does not appear itself in the final report. It may sound like a minor point, but I have used mainframe programs that did not have this degree of flexibility.

You produce custom reports with Workbase's own text editor. You use it to write a document into which the values of various data fields will be placed.

Unfortunately, the Workbase editor is rather awkward when compared with conventional text processors. There are separate modes for text entry, deletion, and insertion, and a variety of imbedded codes for controlling the printer. You can certainly do everything you might need with the editor, but somehow it seems a little tougher than need be.

There is also a quick-print facility for obtaining a printout of all the data for one record, or all the records in the file. You can't get fancy formats, but you can call for condensed print. Workbase sets up a well-organized layout, with each record occupying as many lines as the data require. This is the most convenient way to get a summary of all the information you have on hand.

## Conclusions, and a Few Criticisms

Workbase has many other features that should appeal to the business user. For example, there is the Utilities module, with its options for merging and copying files, posting updated fields in one file to corresponding fields in another, and so forth. This is the sort of feature one might expect from a true database manager, and it's a pleasure to see it included here.

There is a corresponding complexity to the calculation and report-generation modules, although "complexity" doesn't necessarily mean difficulty. Workbase is no harder to learn than many other comprehensive applications programs, and easier than several that I can think of.

The manual helps. Each command menu gets a separate tabbed section in the book, and step-by-step instructions, an explanation of possible error messages, and hints for the more advanced user explain every option.

The proofreading could use some work, though. There are many typos, and while none of them is likely to lead you astray, they can be annoying.

Even more bothersome is the fact that you must furnish all that system-specific information at the beginning of each working session. That should be fixed; I'll bet it isn't necessary to move the system disk in a two-drive setup, either.

Finally, you must consider the limited file size. While 400 records are more than ample for any of my own household or small-business applications, this might be an important consideration for other prospective users. Of course, there is always Workbase II with its 1,200-record capacity.

Within the limitations I've just mentioned, however, Workbase I performs very well. If you can live with these restrictions, you might find it very appealing. ■

*After preparing this review, I received an update: a detailed 29-page tutorial insert for the Workbase manual. It leads the new user through all the steps required to create a database, perform calculations on it, and print reports; only the Data Utilities and Homebase Conversions modules are left unaddressed. The tutorial takes things one step at a time, and provides plenty of information about the computer's responses at every point. It should be a welcome addition to the documentation.—S.N.*

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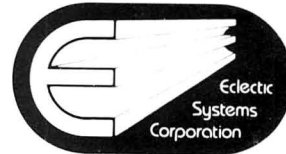
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# END THOSE KEYBOARD BLUES

Coke on your keyboard? Grime, dust, and cracker crumbs crippling your CoCo? Clean it yourself.

---

**Y**ou have just spilled your favorite soft drink on your keyboard—or someone's grubby little hands have left melted chocolate on the enter key, crippling it. Here's how to repair the damages. (These instructions are for the standard CoCo keyboard, not the replacement models.)

Check Table 1 for the items you'll need for the job and collect them before you start.

Unplug all peripherals at the computer and wall outlet. Turn the computer over on the towel and back off the seven screws (the seventh is under the 90-day warranty sticker in the center) until they click repeatedly. *Do not remove them.* Place a small piece of masking tape over each hole and turn the computer over again. Lift off the top part of the case and set it aside.

Grasp the keyboard at both ends and lift slightly, noticing how it just rests on the plastic posts without being held by screws. A short ribbon cable connects it to the main circuit board.

Lift the keyboard off the pegs and pull it slowly toward you. To remove the ribbon cable from the main board, support the keyboard with one hand and nudge the connector free with the other.

Now, flip the keyboard and remove the cable. (I recommend that you experiment with how it reattaches at both ends, or mark it somehow.) Place the cable in the bottom front of the case, replace the top of the case and put the computer aside.

Remove the towel and place the two books about a keyboard-width apart with spines facing away from you. Lay the keyboard on the books by the tabs only so that the keys face down, number keys toward you. Tape the tabs to the books with masking tape, being careful not to get any tape across the tan part. Open a pill bottle, remove all the small Phillips-head screws *one at a time*, and place them in the pill bottle. Close the lid and set it aside. The tan board should now be

raised slightly. Lift it off and set it aside.

The small golden spring contacts are delicate, so use tweezers. Start from the end near your tweezer hand and rest the edge of that hand on the empty spaces as you remove contacts. Grasp them by one of their raised hooks as shown in Fig. 1. (Notice that when the keys are facing down, the hooks are up and a little cutout on the contact matches a bump in its depression on the black board.) This work is tedious but not difficult. Use the other hand to hold the other open pill bottle near the tweezers and drop each contact into it. Close the lid and set it aside.

Now lift off the black board and look under it. You should see what I call little grey hats either on the back of the actual keys or stuck to the piece you are holding. These hats give the keys their distinctive tactile feedback. Try one between thumb and finger. Carefully and slowly flip the black





Illustration by Jamie Hogan

board over and remove any hats and put them in the jar. Set the hat board aside, remove the rest of the hats from the keys and put them in the jar also.

Next, put all the keys in a bowl and remove the U-shaped stabilizer wires from keys that have them. Untape the bezel (the part the keys were in) from the books and take it, the hat board, the hats, and the keys to the kitchen sink along with the toothbrush and empty bowl.

Put a couple of drops of dish soap in the Mason jar, fill it halfway with warm water, and put the lid on. Shake the jar vigorously for a minute or so. Remove the lid, snap out the center, and replace it with the mesh cloth. Put the lid ring on the jar and dump out as much soapy water as possible through the cloth. Fill halfway with warm water again, swish, and rinse. Repeat this until no suds form, then twice more. Put the hats in the empty bowl and set up the hair dryer on the kitchen table (NOT on the counter

next to the sink!). Aim it to blow over, but slightly into the bowl. Turn the dryer on to lowest heat and lowest airflow. Return to the sink.

You are now going to wash the bezel and the hat board by putting a few drops of dish soap in a couple inches of warm water. Dunk them often while brushing soapy solution into every hole and crevice, paying particular attention to the buildup of dirt in the square key holes. The toothbrush should fit nicely through them but keep it down in the sink because the bristles flick soap and dirt during this procedure. When you're convinced it's clean, rinse it under the tap and do the hat board. Place both behind the bowl of hats so the air strikes them. If you don't have a hair dryer, both boards and hats can be air-dried, but remove the hats from the bowl and place them on a lint-free cloth or paper towel. Now for the keys.

Get your soft cloth, spray cleaner,

towel, and bowl of keys. Find a comfortable place to sit and spread the towel in your lap. Dump the keys into the towel and wipe out the bowl. (It will probably be gritty.) Spray a little of the cleaner on the cloth and, one at a time, wipe the dirt off the five surfaces with a wet part of the cloth, then a dry part. Inspect and rewipe if necessary, then place back in the bowl. When you finish, the hats and plates should be dry. Take the keys, bezel and hat board back to the work area.

Tape the bezel securely to the books as it was before, with the distinctive enter key hole to your right. *This is important.* Now look at Fig. 2. This is the position of the keyboard as you are looking at it. Start with the red break key. Hold it between your thumb and index finger with the word under your finger and your thumb on the bottom. With your other hand, get a cotton swab, dab it in the Vaseline, and roll the tip against the inside

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of the jar to mush down the cotton. Put a very light coating of Vaseline on the four sides of the key near the bottom lip only.

Hold the key so you can read the word, roll it toward you and drop it in the lower right-corner hole. This red key will aid you in orienting the rest. Notice the slant of the bottom lip. All the keys will slant this way. Place the white keys and the space bar, adding the stabilizer wires. Your speed will increase as you get adept at greasing the keys. Remember to use a light coating.

Once you place the keys, lift both book covers almost straight up but not too far, and make sure you can read the keyboard. Symmetrical alphabet keys (like O and I) and arrow keys were confusing and I had to make a couple swaps. When all is well, lower the book covers.

Get the bowl of hats and insert them into the keys with the large outer circles and central stems up. When these are in, put the hat board on, circular-depression side down, rectangular-depression side up. If *all* of the stems aren't visible through the holes, find out why. Either the plate is wrong end-for-end or hats are out of position. When all hat stems are centered in the plate's holes, it is right. Now comes the tedious part again.

Open the pill bottle containing the contacts and shake out a few on the end of the board opposite your tweezer hand. With the tweezers, carefully position each clip in a depression, making sure the hooks are up and the cutout matches the bump. Again, handle these gently only with the tweezers. Once all of them are in

*"If you don't already own one, I recommend that you invest in a keyboard cover."*

place, slide the books and keyboard aside.

With a clean space in front of you, pick up the tan board and flip it over. This is the circuit board. Notice the copper dots in a kind of X pattern. Chances are these are oxidized and exhibit a dull finish. Hook the white plastic clip (near the board's ribbon cable connector) over the edge of the table nearest you so the board lays flat and rub the eraser in an X fashion across each pattern of dots until they all shine brightly. *Do not* touch them after they're shiny since acids in your skin are corrosive. When you're done, slide the books and keyboard back in front of you.

Take one last look at your hooked contacts to make sure they're all in place. Flip the circuit board over and carefully lower it onto the contacts. Make sure it is oriented correctly (ribbon cable connector toward you) and don't slide it after it is on. Open the

pill bottle with the tiny screws and, working from the center to the ends, press down lightly and install a screw all the way. When you have finished with the rest, lay the assembled keyboard aside and retrieve the patient.

Remove the top of the case. Plug the short cable (remember which end?) onto the keyboard pins first. Then place the whole keyboard slightly in front of and above the posts. Line up the cable plug with the pins on the main circuit board. Tilt the keyboard away from you a little with one hand and with the fingertips of the other hand push the cable end the rest of the way onto the pins. Check their alignment and make sure the plug didn't shift left or right. Rest the keyboard on the posts and test.

Plug the computer power cord into the wall. Plug the video cable into the computer. Turn on the TV. Turn on the computer. Touch every key for proper response. When satisfied, turn everything off and unplug the video line and power cord.

Lay the towel beside the computer. Inspect the insides and the ribbon cable (is it fully seated?) and replace the top of the case. Turn the computer upside down onto the towel and remove the seven pieces of masking tape. Seat the screws and tighten. Roll it back over, connect all cables and peripherals and plug it in. You'll notice a new vitality in the keys and fewer entry errors to debug.

One last thing. If you don't already own one, I recommend that you invest in a keyboard cover. You can slit it up the side for the disk controller. Use it faithfully. ■

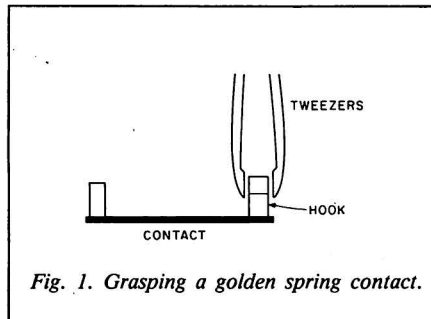


Fig. 1. Grasping a golden spring contact.

Address correspondence to Bruce Goshorn, VA-304 QA NAS, Alameda, CA 94501.

- one towel
- tweezers
- two old pill bottles (clean and dry)
- old toothbrush
- hair dryer
- cotton-tipped swabs
- Vaseline
- medium and small-tip Phillips screwdrivers
- masking tape
- rubber eraser
- spray cleaner
- Mason jar with lid
- two cereal bowls
- two hardcover books (encyclopedia type)
- a piece of mesh cloth 4 inches square
- soft cotton cloth
- strong light for work area

Table 1. Materials

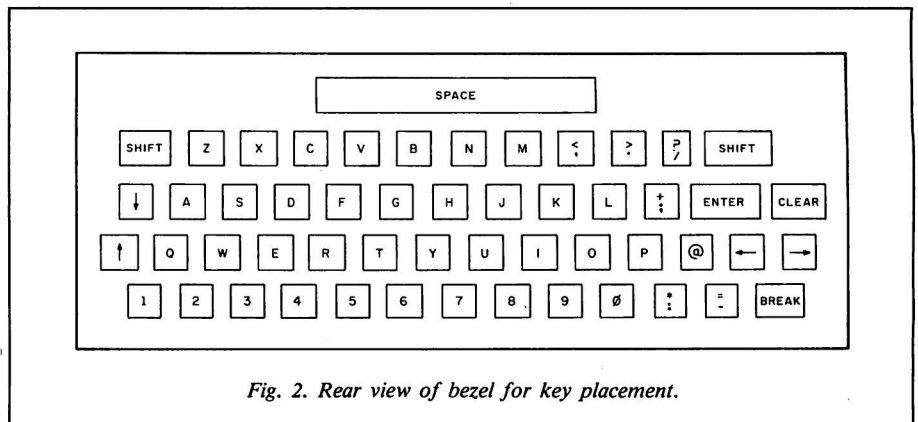
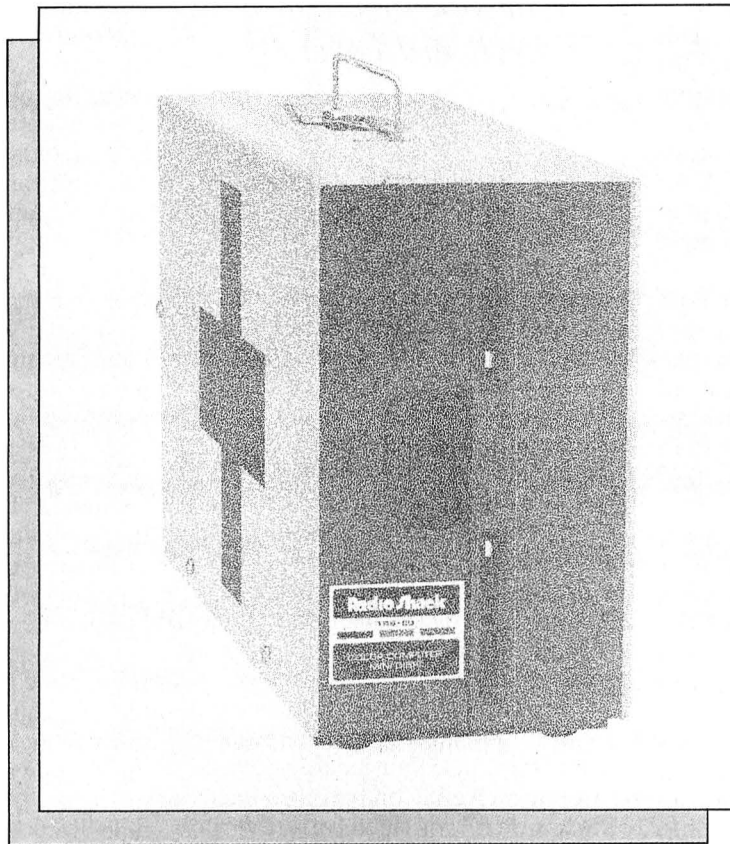


Fig. 2. Rear view of bezel for key placement.



# Disk Drive First Aid Techniques

Peaceful coexistence with your disk drive is a matter of simple solutions to common problems.

Owning a disk drive has its high points and its low points. The two major problems with the CoCo disk-drive system are cables and the radiation of radio frequency interference (RFI) from the hardware. As a guide to disk-drive survival, this article gives you some solutions to these and other problems.

## Causes of RFI

Radio frequency interference is generated any time you switch current in your computer and disk drive on and

off rapidly. You can show mathematically that a 0.89 MHz square wave (your CoCo's clock) consists of frequencies from 0.89 MHz to the range of TV frequencies. These higher-frequency components (harmonics) put lines on your TV and can superimpose spurious signals on the signals to and from your disk drive.

Television interference comes from the radiation of signals into frequencies where VHF TV channels broadcast. Channel 3 broadcasts on 60-66 MHz and channel 4 on 66-72 MHz. In the

frequencies covered by these channels your CoCo can generate voltages several thousandths of a volt strong. These millivolt-strength signals might not sound like much, but consider this.

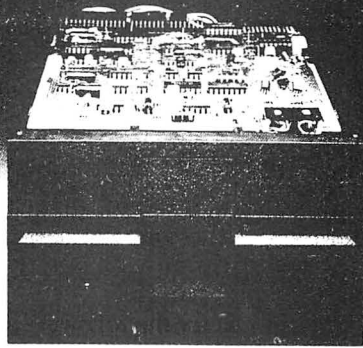
Television receivers are designed to produce a good picture from signals 50 times weaker. Also, the TV output from your CoCo is of the same magnitude as the spurious signals generated by switching circuits within the computer and disk drive. If the two signals mix together, interference results. The spurious signals superimposed on the signals

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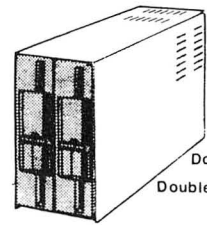
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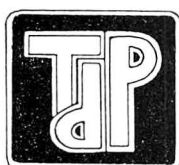
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to and from the disk drive can be several volts, causing your drive to act erratically and your CoCo to receive faulty data. It results in the familiar I/O error. You can't do much to reduce the generation of these signals (except perhaps never POKE 65495,0). Successfully containing the energy is the solution.

Ham radio transmitters radiate signals with TV frequency harmonics of a few microvolts per square meter (a microvolt is 0.000001 volt) or less. At the same time the desired signal transmitted might be many volts per square meter in the vicinity of a TV antenna. This suppression of unwanted signals involves good transmitter design, filters that pass desired frequencies and suppress unwanted signals, properly soldered connections, enclosing the transmitter in a metal shield, and good grounding of the transmitter.

Your CoCo can generate TV frequencies. Measure your disk-drive cable. It is about 36 inches long, as are efficient antennas for channels 3 and 4. The soldered connections within your CoCo are good, but your drive is connected to the TV, disk drive, and other equipment with connectors. One connector in particular, the ROM-pack plug-in, is like a cold solder joint.

A cold solder joint acts as a diode, which multiplies the strength of radiated unwanted signals many times. In fact, diodes are sometimes purposely used to create higher-frequency signals from a lower-frequency one. These cold joints also create intermittent conditions.

You contain unwanted signals by enclosing the transmitter in a conductive box. The CoCo enclosure is plastic. The disk drive is in a metal box, but paint insulates the bottom plate from the top enclosure. What grounding there is in the computer system is through the power cords. Only small-diameter wires connect the CoCo ground circuits to the ROM pack and the ROM pack to the drive.

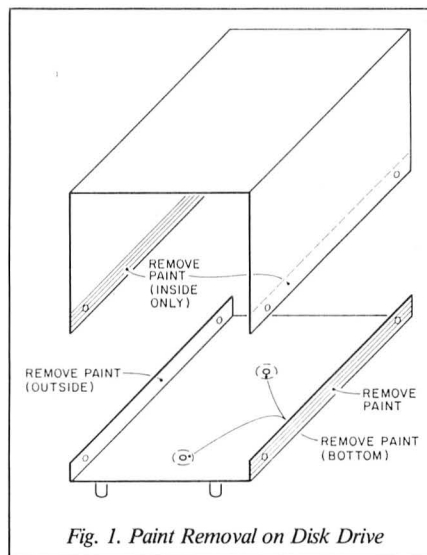
These are marginally acceptable for low frequencies but useless at higher frequencies. The TV is purposely ungrounded to prevent shock, and is also in a plastic box. Hence, a typical CoCo hookup is prone to RFI problems.

Overload also contributes to a poor TV picture. Feeding too strong a signal to your TV (even a pure TV signal) causes the picture to go crazy by overloading circuits within the TV. They then generate unwanted signals by themselves.

## RFI and Overload Cures

To clean up your screen, deal first with ground connections. Have Radio Shack install ROM-pack grounding clips and a keyboard shield to your CoCo, since earlier models come with neither. Check for them inside your ROM-pack slot. If you see wide clips on either side of the connector, you have these modifications. If not, Radio Shack installs them free.

You can also try the following. Open your disk-drive case by removing the two screws on either side of the case. Paint prevents a metal-to-metal contact between the base and enclosure, and most paints are insulators. Therefore, the nice-looking metal box around your disk drive is useless as a shielded enclosure.



Remove this paint with sandpaper and steel wool. (See Fig. 1.) As you do this, enclose the rest of your drive in a plastic bag, making sure you clean away all paint dust before removing the plastic bag. Also remove paint from beneath the two bottom screws. Reassemble the drive leaving out one of the bottom plate screws.

Next, make a ground strap from about 3 feet of RG-58 or RG-59 coaxial cable. (Radio Shack stores sell this by the foot.) Slit the plastic sheath with a razor blade and remove it. Push off the braid. Flatten one end and poke a hole large enough to accept the bottom plate screw from your drive. Now solder around the hole to make a lug. (See Fig. 2.)

Screw this ground strap to the underside of the drive and place the drive beside your CoCo in its usual position. Stretch the braid until it reaches the

CoCo TV signal output jack. Cut off excess braid and solder the ground strap to the exterior metal portion of the TV cable connector plug, making sure the cable connector can be reinserted into the computer.

*Do not connect any ground wires to the TV chassis. TVs have one side of the ac power line connected directly to the chassis. You can kill yourself or destroy your computer with such a connection.*

This is why anything that protrudes from the TV is made of an insulating material.

The cable and TV switch box supplied by Tandy is next to replace. The cable is long and lacks an adequate shield. Though there are several clean-screen replacements for this cable

*“Do not connect any ground wires to the TV chassis. TVs have one side of the ac power line connected directly to the chassis. You can kill yourself or destroy your computer with such a connection. This is why anything that protrudes from the TV is made of an insulating material.”*

on the market, you can make a cheaper one with a video recorder cable like Radio Shack's 15-1535. If your TV has a cable input, then you'll also need a female-RCA-to-male-type-F adapter (Radio Shack cat. no. 278-255).

Assemble the cable and adapter and connect one end to your CoCo and the other to the cable input jack of your TV. If you don't have a cable input, you'll also need a matching transformer that matches the 75-ohm cable impedance to the 300-ohm TV twin-lead impedance. Impedance matching is necessary to eliminate ghosts, reduce spurious signal pickup, and maximize signal transfer between your CoCo and TV.

If these steps still don't clean up your TV screen, you can try two more things. First, make sure your CoCo TV channel switch is set on an unused channel. If you have a local channel 4 and you set your CoCo and TV to it, the interference between the two can cause lines on your screen.

You might also need to reduce the signal input to your TV. Too strong a signal can produce the overload problem discussed earlier. The solution is an attenuator, an electronic circuit that decreases the input signal while maintaining an impedance match. Figure 3 shows circuits you can use. Attenuators reduce the signal into your TV by a factor of approximately 10. You can make them on a small piece of perfboard. Figure 4 shows the proper connection of

and don't try future read/writes until you fix the problem. (Table 1 lists sources for the items in the survival kit.)

Input/output errors (I/O errors) usually occur at the worst possible moment. Preventative maintenance, like periodic cleaning of the disk head and cable connections, can minimize them. Though it is helpful to use a VERIFY ON all the time, the drive head hovers only microinches above the disk surface during read and write, and dust, fingerprints, or anything on the surface can result in bad data. Cleanliness and care in disk handling are very important.

There are other ways to get I/O errors, such as destroying the directory. The directory is on track 17 in the middle of the disk to minimize head motion when writing or reading. The head is

number of files using this method.

If you don't know the file names, use your disk-rescue program to look at the directory tracks. If the directory appears to be intact, then you can probably rescue all but one file. After you've recovered all the files you can, get rid of the disk. You might succeed in reinitializing it, but probably you will get a bad track error from it in the future. You can demagnetize all the disks you buy, before each reinitialization, with the bulk tape eraser from your survival kit.

### More Unusual Programs

Your drive needs a very accurate speed of revolution, and accurate positioning of the read/write head. If either is out of specification tolerances, you

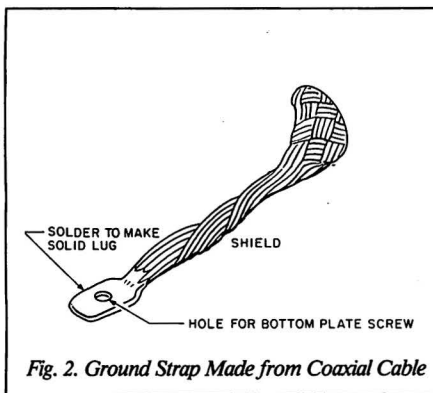


Fig. 2. Ground Strap Made from Coaxial Cable

either type to your TV. Experiment first. If it works, make a final version in a box with appropriate connectors.

Corroded ROM-pack, solder-plated fingers can be a prodigious source of RFI and can cause your drive to operate erratically. If you don't want to buy gold-plated finger connectors, clean the originals once a week with liquid tape-head cleaner (Radio Shack cat. no. 44-1010) and cotton swabs. You might have to disassemble your ROM pack by unscrewing the one screw located under the label. Clean both sides of each connector.

These RFI solutions have worked for my hookup. The ground strap was so effective that grounding clips were unnecessary. It was possible to hook up a Y-cable to the CoCo disk port and attach a voice synthesizer without adding to the RFI problem.

### Other Problems

Your disk drive survival kit should contain a disk-head cleaner kit, a disk-crash rescue program, a bulk tape eraser, and one rule: If you get an I/O error, put a write-protect tab on the disk

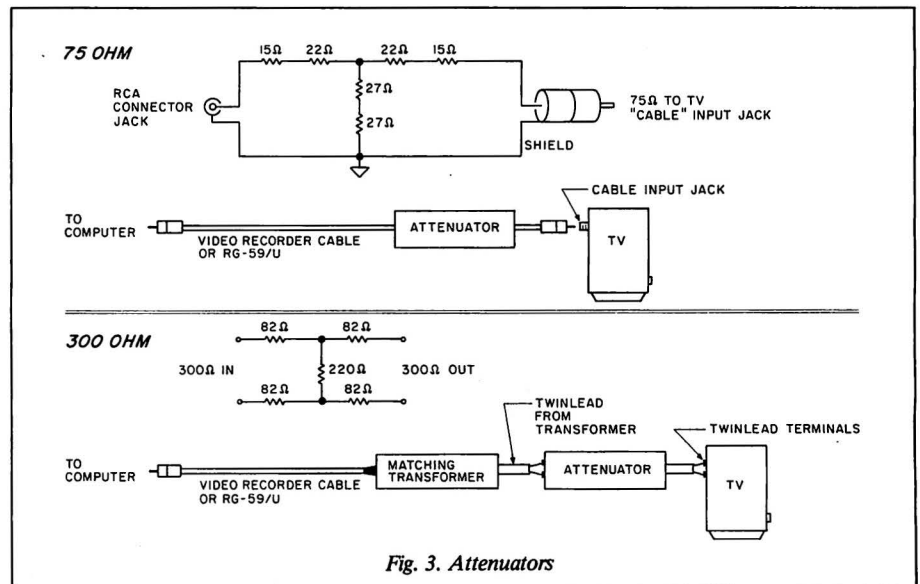


Fig. 3. Attenuators

positioned most often above the directory. Consequently, if anything goes wrong it usually clobbers the directory.

You can also get I/O errors with machine-language programs that don't function properly. When you use a new machine-language program that doesn't need to access the drive, turn the drives off. Another preventative measure is to use a program that writes a spare directory on some other track.

I/O errors make up the bulk of problems listed in Table 2. Assuming you have cured the RFI problem, there are other sources of this problem. The simplest is trying to read or write to an uninitialized disk. The fix is to DSKINI it. You can't fix a dirty track, and the disk behaves as though it is empty. If you know the files on the disk, you can sometimes simply copy them to another disk. Sometimes you can rescue a large

have problems. Check that the drive motor is running at the correct speed with a speedometer program. There are a number available that tell you how fast the disk is rotating. They also indicate disks that have more drag than others since these show up as a lower speed on the speedometer and might cause future problems.

To check the motor speed another way, remove the case of the drive. On the drive motor side you'll see a strobe sticker on the motor flywheel. There are usually two rings of marks, one for 60 cycles and one for 50 cycles. In the United States, power lines have a frequency of 60 cycles per second. Position a fluorescent lamp next to the drive and initialize a blank disk. If the speed is correct you should see a stationary pattern on the flywheel. If it's not, there is a small potentiometer control on the

circuit board below the flywheel. First, mark its present position with a pencil mark. Then turn it slightly one way or the other until the strobe pattern freezes.

If the drive doesn't shut off, you've clobbered an address in the computer with a machine-language program. Reset the computer. If this doesn't work, clean the connectors. If that doesn't work, take your drive to the service center. It is a good idea to verify that the write-protect feature of your drive works. It is possible that the screws holding the microswitch, which does the protecting, have come loose, or that the switch position was not set properly.

If it does not work, remove the case and examine the area near the front panel. You'll see a small switch with a

could be written to or read from normally.

It turned out that drive 0's read/write head was misaligned. It mistook track 20 for track 17, and worked fine until it tried to read a disk written on a drive that was properly aligned. Drive 1 was aligned properly. A misaligned head should be fixed by a service shop.

I had just installed a 64K modification for a fellow who then purchased a Telewriter-64 program. After telling it to run, the computer printed an infinite loop of SN errors. It turned out that the disk operating system he was using (non-Radio Shack) would not let him LOADM or CLOADM the program from within a Basic driver program. Beware of the compatibility problem and carefully check any non-Radio Shack DOS before you buy it.

- Always use VERIFY ON. This precludes writing bad data to the file in the first place.

- Programs that are useful naturally migrate to several disks. They don't need a backup.

- Programs smaller than nine tracks reside on one sector and can be easily rescued. They need no backup. If they are that small and cannot be recovered, then they can be reentered.

- Very few of my programs and files are so important that I couldn't live without them. If I can't live without them, then I back them up.

- Once a month list all the directories on the printer along with the directory byte information. This gives you a headstart on reconstructing the disk should it crash.

**Disk Head Cleaner Kit:**

Radio Shack catalog number 26-407, \$29.95

**Disk Crash Rescue Program:**

The Disk Doctor, Superior Graphic Software, 406 Little Mountain Road, Waynesville, NC 28786, \$40

**Bulk Eraser:**

Radio Shack catalog number 44-232, \$30

*Table 1. Disk Drive Survival Kit*

finger that drops into the write-protect slot when you don't have a write-protect tab on the disk. Insert a disk with a write-protect tab. You should hear a single click. If you determine that the microswitch isn't operating, slightly loosen both screws and position the switch so that it operates. Retighten the screws. Insert and withdraw a protected and nonprotected disk several times until you are sure the switch is operating properly. Confirm this adjustment by trying to write to a write-protected disk and a nonwrite-protected disk.

One owner had a brand new second drive that wouldn't read his old disks. The first drive didn't work properly when the second one was plugged in. There were several problems. First, he didn't remove the termination resistor from drive 0 when adding drive 1.

The termination resistor looks like an integrated circuit and is located near the back of the printed circuit board. It should only be in place in the last drive of your system. Once this was removed, drive 0 behaved normally, but drive 1 couldn't read disks written on drive 0. Drive 1 initialized disks correctly and

Problem	Source	Fix
I/O Errors	RFI	See article
	Corroded contacts	Clean
	Unformatted disk	DSKINI
	Bad directory	Rescue/spare directory
	Dirty disk	Rescue and discard
	Drive speed off	Calibrate speed
	Head dirty	Clean it
	Misaligned head	Have service center align
	Saved w/o VERIFY ON	VERIFY ON always
	Dirty head	Clean head
Bad data	Clobbered address	Reset button
	Bad controller	Have service center fix
	Misaligned microswitch	Align switch
Drive won't shut off	Non-RS DOS	?
	Drive behaves erratically	
	Drive won't read disks written on other drives	
Drive behaves erratically	Corroded contacts	Clean
	Controller bad	Return to service center
	Termination resistor in	Remove (all but last drive)
	Misaligned head	Return to service center

*Table 2. Disk Drive Troubleshooting Chart*

**Backups**

Backup files can be a lifesaver. They spare you the agony of reconstructing files from a crashed disk. What to back up is one problem, and how to keep your backups current is another. My backup philosophy is determined exclusively by the cost issue. For example, if you had 50 disks you would need at least another 50 for backups, amounting to another \$100-\$150 that could be better spent.

The other consideration is time. An outdated backup is not much better than none. Many people don't have the time to do the clerical work involved with extensive backups. I have a number of rules that establish when to back up files and when not to.

- Back up expensive programs. The purpose of these rules is to save money, so don't buy programs that can't be backed up or don't have a reasonable replacement policy.

- Write data-management programs so that they don't destroy input files. The first program operation should be to create backups of the input file if you're going to rewrite it later with the same file name.

These rules are just an example of one man's solution to the backup problem. They should help you formulate your own. ■

*Address correspondence to Brian H. Alsop, 113 Boone Road, Trafford, PA 15085.*



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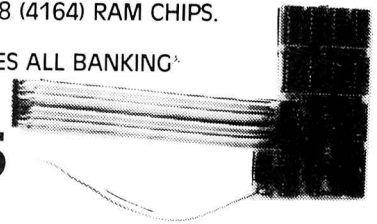
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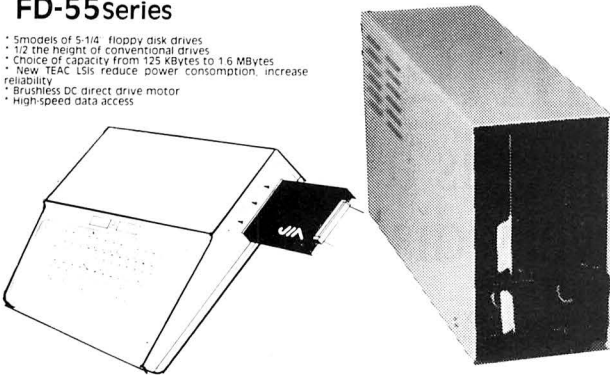
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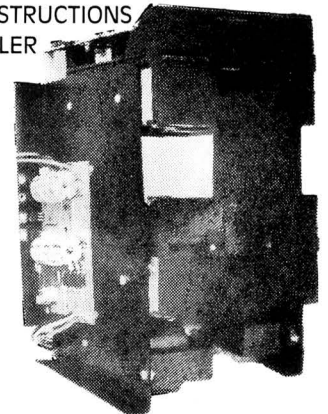
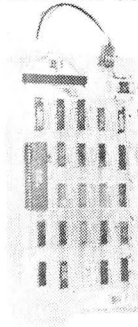


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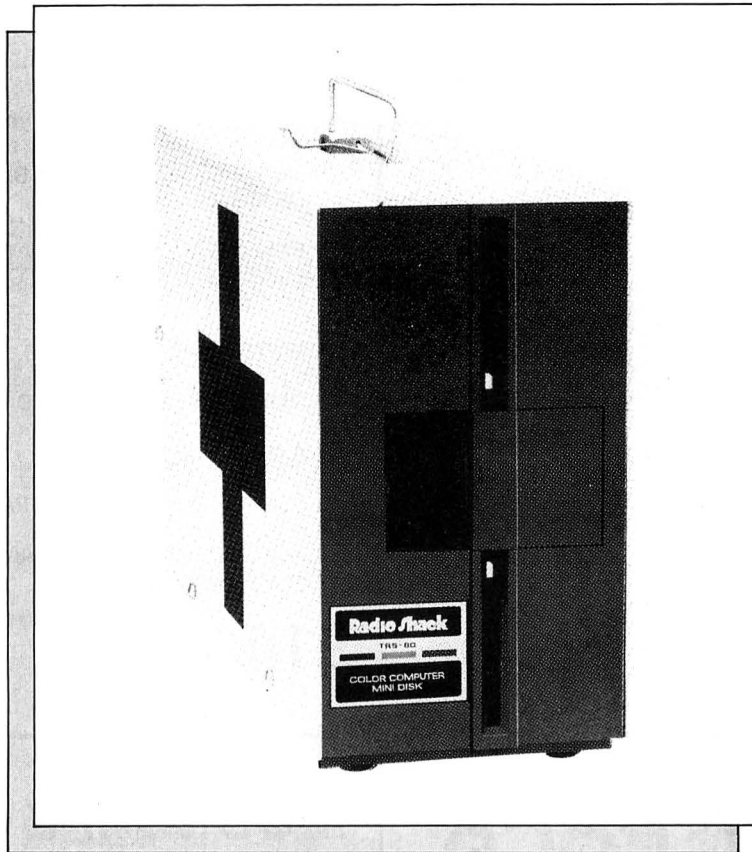
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# A Matter Of Timing

Color Disk Timer is a  
necessary utility for every disk owner.

Improperly timed disk drives can cause frequent and oftentimes fatal disk input/output (I/O) errors. These disk I/O errors include incorrect formatting, CRC errors, record-not-found errors, and write faults. Because these errors can cause major data losses, every disk drive should be periodically checked for timing problems. Color Disk Timer (Program Listings 1 and 2) presents a real-time display of a disk drive's spin rate.

## Timing a Disk Drive

Even though the Color Disk Timer program is quite long, the

method it uses to time a drive is extremely simple. First, all 5¼-inch disk drives spin at a rate of 300 revolutions per minute (rpm). However, this 300-rpm spin rate can vary by plus or minus 1.5 percent over extended periods of time. A disk drive can spin from 295.5 rpm to 304.5

rpm and still operate properly.

Color Disk Timer must be able to determine a disk drive's spin rate. To accomplish this, Color Disk Timer uses the floppy disk controller's (FDC) ability to sense a disk's index hole. Ah, but what's an index hole?

Upon examination of a disk, you will note two round holes in the disk jacket. The most obvious of these two holes is the large hole in the center of the disk jacket. This large center hole is used by the disk drive to spin the disk. The second of these two round holes is much smaller and is located near the large center hole. If you grasp the disk by placing two fin-

---

### System Requirements

32K RAM

Disk Color Basic

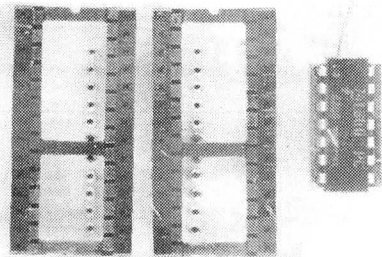
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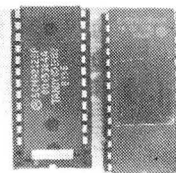
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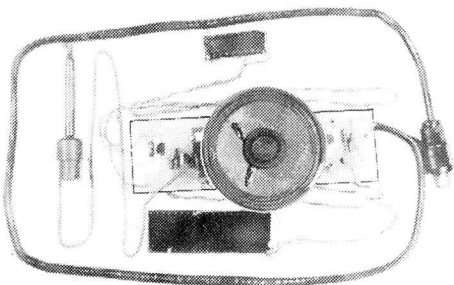
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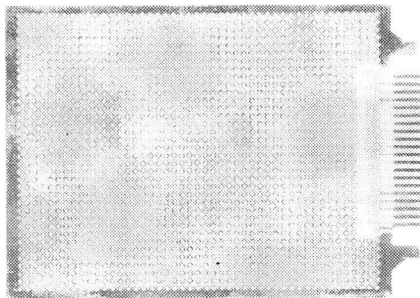
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gers in the center hole and gently turn it, a very small hole will eventually appear inside the disk jacket's small hole.

This very small hole is the disk's index hole. Whenever the index hole appears, an optical sensor in the disk drive tells the FDC that the index hole is present. The FDC uses this sensing of the index hole to time the disk read/write operations.

Color Disk Timer ascertains the index hole's status by setting the FDC to a type I command status and reading the FDC's status register. A type I command status is present during movement of the disk drive's read/write head. However, Color Disk Timer forces a type I command status by giving the FDC a RESET command by

sending a value of \$D0 to memory location \$FF48.

Once Color Disk Timer has sent the RESET command to the FDC, the FDC status register can be read at memory location \$FF48. Bit 1 of the status register value indicates whether or not the index hole is present. If bit 1 of the status register is set, then the index hole is present. If bit 1 of the status register is reset, then the index hole isn't present.

The FDC should indicate the index hole's presence 300 times per minute. However, Color Disk Timer can display a disk drive's speed by timing only one revolution. Color Disk Timer accomplishes this by first waiting until the index hole is present. Once the index hole appears, the Color Disk Timer

program starts counting.

While it is counting, the program constantly monitors the index hole's status. When the index hole reappears, the counting process stops and Color Disk Timer compares the counter value to a table of expected values. From this table of expected values, Color Disk Timer converts the counter value to a cursor position for a real-time display of the disk drive's speed.

### Assembling the Program

You can easily assemble Color Disk Timer with any editor/assembler. Simply type in each part of the program as they appear in the listings. However, be very careful entering Listing 1.

All data values must be correct for

Program Listing 1. Color Disk Timer, Part 1

00160	CNT1	EQU	\$0000		
00170	CNT2	EQU	\$0001		
00180	CNT3	EQU	\$0002		
00190	LSTX	EQU	\$0003		
00200	LSTY	EQU	\$0004		
00210	DRV	EQU	\$0005		
00220	IPLG	EQU	\$0006		
00230	PNT	EQU	\$0007		
00240	VPOS	EQU	\$0008		
00250	SFT	EQU	\$000A		
00260	MSK1	EQU	\$000B		
00270	MSK2	EQU	\$000C		
00280	VID	EQU	\$1000		
00290	CTAB	EQU	\$2D03		
00300	DTAB	EQU	\$2A42		
00310	M1	EQU	\$2900		
00320	M2	EQU	\$2928		
00330	M3	EQU	\$29E5		
00340	M3A	EQU	\$29ED		
00350	M4	EQU	\$29FB		
00360	M4A	EQU	\$2A12		
00370	M5	EQU	\$2A14		
00380	M6	EQU	\$2A3A		
00390	MTAB	EQU	\$2CE3		
00400	TAB1	EQU	\$2A46		
00410	TAB2	EQU	\$2AE0		
00420	TAB3	EQU	\$2AF1		
00430	TAB4	EQU	\$2BD1		
00440	TAB5	EQU	\$2C41		
00450	ORG		\$2E7F		
00460	*				
00470	* Program Initialization Routine				
00480	*				
00490	INIT	ORCC	#\$50	Disable the interrupts	
00500	LDS	#\$2900		Initialize the stack	
00510	LDA	#\$7E		A=JMP instruction	
00520	STA	\$010C		Put it in the IRQ vector	
00530	LDX	#\$IRQ		X=New IRQ routine address	
00540	STX	\$010D		Put it in the IRQ vector	
00550	LDD	#\$FFFF		D=Double blanks	
00560	LDX	#\$VID		X=Start of video memory	
00570	INIT0	STD	,X++	Display the blanks	
00580	CMPX	#\$VID+6144		Screen cleared?	
00590	BLO	INIT0		Loop if it isn't	
00600	STA	#\$FPC6		Tell	
00610	STA	#\$FPC8		SAM	
00620	STA	#\$FPCA		where	
00630	STA	#\$FPCD		video	
00640	STA	#\$FPCE		memory	
00650	STA	#\$FFD0		starts	
00660	STA	#\$FFD2			
00670	STA	#\$FFC0		Select	
00680	STA	#\$FFC3		the G6R	
00690	STA	#\$FPC5		display mode	
00700	LDA	#\$FF22		A=Current VDG value	
00710	ANDA	#\$7		Preserve the first three bits	
00720	ORA	#\$248		Mask it for G6R	
00730	STA	#\$FF22		Set the VDG	
00740	LDU	#\$TAB1		Set the	
00750	LDY	#\$TAB2		table pointers	
00760	INIT1	LDX	,Y++	X=Video memory pointer	
00770	BEQ	INIT6		Jump if end of table	
00780	LDB	#\$7		B=Number of rows	
00790	STB	CNT1		Save it	
00800	INIT2	LDB	#\$2	B=Loop counter	
00810	STB	CNT2		Save it	
00820	INIT3	LDB	,Y	B=Loop counter	
00830	STB	CNT3		Save it	
00840	INIT4	PULU	D	D=Graphics characters	
00850	STD	,X++		Display them	
00860	DEC	CNT3		Row done?	
00870	BNE	INIT4		Loop if it isn't	
00880	LDD	1,Y		D=Pointer offsets	
00890	ABX			Bump X to the next row	
00900	DEC	CNT2		Loop complete?	
00910	BEQ	INIT5		Jump if it is	
00920	LEAU	A,U		Backup the table pointer	
00930	BRA	INIT3		Loop	
00940	INIT5	DEC	CNT1	Word done?	
00950	BNE	INIT2		Loop if it isn't	
00960	LEAY	3,Y		Adjust the table pointer	
00970	BRA	INIT1		Loop	
00980	INIT6	LDX	#\$M1	X=Message pointer	
00990	LBSR	DISM		Display it	
01000	LDD	#\$E220		D=X and Y values	
01010	STD	LSTX		Save the ending values	
01020	LDD	#\$1E02		D=X and Y values	
01030	LBSR	HLINE		Display the line	
01040	LDD	#\$1E21		D=X and Y values	
01050	LBSR	HLINE		Display the line	
01060	LDD	#\$1E03		D=X and Y values	
01070	LBSR	VLINE		Display the line	
01080	LDD	#\$E203		D=X and Y values	
01090	LBSR	VLINE		Display the line	
01100	LDU	#\$TAB3		U=Table pointer	
01110	INIT7	LDD	,U++	D=Character masks	
01120	BEQ	INIT8		Jump if end of table	
01130	STA	MSK1		Save the first mask	
01140	STB	MSK2		Save the second mask	
01150	LDX	#\$INIT7		X=Return address	
01160	PSHS	X		Save it	
01170	LDD	,U++		A=Character,B=Shift value	
01180	STB	SFT		Save the shift value	
01190	LDX	,U++		X=Video memory pointer	
01200	PSHS	A,B,X,U		Save the registers	
01210	LBRA	DCHR1		Display the character and loop	
01220	INIT8	LDD	#\$PB4E	D=X and Y values	
01230	STB	LSTY		Save the last Y value	
01240	INIT9	ADDA	#\$12	Adjust the X value	
01250	LDB	#\$72		B=Starting Y value	
01260	LBSR	VLINE		Display the line	
01270	CMPA	#\$247		1's lines done?	
01280	BNE	INIT9		Loop if not	
01290	LDA	#\$1		A=Starting X value	
01300	INIT10	ADDA	#\$12	Adjust the X value	
01310	LDB	#\$75		B=Starting Y value	
01320	LBSR	VLINE		Display the line	
01330	CMPA	#\$241		.5's lines done?	
01340	BNE	INIT10		Loop if not	
01350	LDA	#\$4		A=Starting X value	
01360	INIT11	ADDA	#\$6	Adjust the X value	
01370	LDB	#\$77		B=Starting Y value	
01380	LBSR	VLINE		Display the line	
01390	CMPA	#\$244		.5's lines complete?	
01400	BNE	INIT11		Loop if not	
01410	LDD	#\$5449		D=X and Y values	
01420	STD	LSTX		Save the ending values	
01430	LDD	#\$4A2B		D=X and Y values	
01440	LBSR	HLINE		Display the line	
01450	LDA	#\$73		A=X value	
01460	LBSR	VLINE		Display the line	
01470	LDD	#\$B52B		D=X and Y values	
01480	LBSR	VLINE		Display the line	
01490	LDA	#\$141		A=X value	
01500	STA	LSTX		Save the last X value	
01510	LDD	#\$712B		D=X and Y values	
01520	LBSR	HLINE		Display the line	
01530	LDD	#\$B42E		D=X and Y values	
01540	STD	LSTX		Save the ending values	
01550	LDD	#\$AA2B		D=X and Y values	
01560	LBSR	HLINE		Display the line	
01570	LDD	#\$7F28		D=X and Y values	

proper program operation. Once you've assembled both parts of the Color Disk Timer, combine them into one object-code file by loading both parts into memory and typing SAVEM "TIMER", &H2900, &H3218, &H2E7F to save the combined program.

### Using Color Disk Timer

Once you've correctly loaded and executed Color Disk Timer, press a key from zero to three to time a corresponding drive. For example, press two to time drive 2. If you want to exit the program and return to Basic, press any key except zero to three. Because Color Disk Timer uses the index hole to perform the timing, a disk must be in the drive before the timing starts. If a disk isn't present in the se-

lected drive, the program displays an error message. The program also displays an error message if the selected drive isn't ready. You can return to the menu after an error message or stop a timing by pressing any key.

Adjusting a disk drive's speed is simple. The first step in adjusting a Radio Shack Color Disk Drive is to unplug the drive. With the power disconnected, remove the two screws on each side of the drive's case. (See Fig. 1.) Then gently lift the drive's case straight up until it is clear of the drive.

Now you can perform the speed adjustment. Turn on the computer and the disk drive. After loading and executing Color Disk Timer, select the drive to be timed. Referring to Fig. 2, locate the small circuit board on the

left side of the drive. Using a small flat-blade screwdriver and observing the Color Disk Timer display, gently turn the spindle-speed control until it is right on 300 rpm. Once you have adjusted the disk drive to the proper speed, turn off the computer and drive. Finally, reassemble the disk drive's case.

Even though Color Disk Timer can help alleviate timing problems, there are many other electromechanical problems that can interfere with proper disk read/write operations. Therefore, I strongly suggest that a qualified technician periodically checks all your disk drives. By properly maintaining your drives, they should provide you with many years of dependable service. ■

```

01580 LBSR VLINE Display the line
01590 LDD #S4747 D=X and Y values
01600 LBSR SET Set the point
01610 LDA #75 A=X value
01620 LBSR SET Set the point
01630 LDA #179 A=X value
01640 LBSR SET Set the point
01650 LDA #183 A=X value
01660 LBSR SET Set the point
01670 LDD #S4848 D=X and Y values
01680 LBSR SET Set the point
01690 LDA #74 A=X value
01700 LBSR SET Set the point
01710 LDA #180 A=X value
01720 LBSR SET Set the point
01730 LDA #182 A=X value
01740 LBSR SET Set the point
01750 *
01760 * Menu Routine
01770 *
01780 MENU LBSR DRVOFF Turn off the drive
01790 LBSR PCLS Do partial screen clear
01800 LDX #M2 X=Message pointer
01810 LBSR DISM Display
01820 LBSR DISM the
01830 LBSR DISM messages
01840 LBSR DISM
01850 LBSR DISM
01860 LBSR DISM
01870 LBSR DISM
01880 MENU0 JSR [SA000] Scan the keyboard
01890 BEQ MENU0 Loop if no key pressed
01900 SUBA #S30 Is if a '0' to '3'?
01910 BLO MENU1 Jump if it isn't
01920 CMPA #3 Is it a 0 to 3?
01930 BLS TEST Jump if it is
01940 MENU1 CLR <S0071 Flag coldstart
01950 JMP [SFFFE] Do RESET
01960 *
01970 * Select and Test Drive Routine
01980 *
01990 TEST STA DRV Save the drive number
02000 LBSR PCLS Do partial screen clear
02010 LDA DRV A=Drive number
02020 LDX #DTAB X>Select mask table pointer
02030 LDA A,X A=Drive select mask
02040 CLR IFLG Clear the IRQ flag
02050 TEST0 LDB $FF48 B=Disk status
02060 STA $FF40 Select the drive
02070 ROLB Motors already on?
02080 BCC TEST3 Jump if they were
02090 LDB #6 B=Loop counter
02100 TEST1 LDX #SDA81 X=.5 second delay value
02110 TEST2 LEAX -1,X Delay done?
02120 BNE TEST2 Loop if not
02130 DECB 3 seconds up?
02140 BNE TEST1 Loop if not
02150 BRA TEST0 Loop
02160 TEST3 LDX #0 X=Loop counter
02170 LDA #SD0 A=Reset FDC command
02180 STA $FF48 Reset the FDC
02190 EXG A,A Delay for
02200 EXG A,A the FDC
02210 TEST4 LEAX -1,X Decrement the count
02220 BEQ TEST8 Jump if no diskette
02230 LDA $FF48 A=FDC status
02240 ANDA #2 Index hole present?
02250 BNE TEST4 Loop if it is
02260 TEST5 LEAX -1,X Decrement the count
02270 BEQ TEST7 Jump if the drive isn't ready
02280 LDA $FF48 A=FDC status
02290 ANDA #2 Index hole present?

02300 BEQ TEST5 Loop if it isn't
02310 LEAX -1,X Decrement the count
02320 TEST6 BEQ TEST8 Jump if no diskette
02330 LDA $FF48 A=FDC status
02340 ANDA #2 Index hole present
02350 BNE TEST6 Loop if it is
02360 BRA TIME Jump
02370 TEST7 LDA DRV A=Drive number
02380 ADDA #S30 Make it ASCII
02390 STA M3A Save it in the message
02400 LDX #M3 X=Error message pointer
02410 BRA TEST9 Jump
02420 TEST8 LDA DRV A=Drive number
02430 ADDA #S30 Make it ASCII
02440 STA M4A Save it in the message
02450 LDX #M4 X=Error message pointer
02460 TEST9 LBSR DISM Display the error message
02470 LDX #M5 X=Message pointer
02480 LBSR DISM Display the message
02490 DRVOFF Turn off the drive
02500 TEST10 JSR [SA000] Scan the keyboard
02510 BEQ TEST10 Loop if no key pressed
02520 LBRA MENU Loop
02530 *
02540 * Time the Drive Routine
02550 *
02560 TIME LDX #M6 X=Message pointer
02570 LBSR DISM Display the message
02580 LDX #VID+3502 X=Video memory pointer
02590 LDU #TAB4 U=Table pointer
02600 LDA DRV A=Drive number
02610 LDB #28 B=Multiplier
02620 MUL D,U D=Table offset
02630 LEAU D,U Adjust the table pointer
02640 LDB #7 B=Number of rows
02650 PSHS B Save it
02660 TIME0 LDB #4 B=Loop counter
02670 PSHS B Save it
02680 TIME1 LDD ,U D=Graphic characters
02690 STD ,X Display them
02700 LDD 2,U D=Graphic characters
02710 STD 2,X Display them
02720 LEAX 32,X Adjust X to the new row
02730 DEC ,S Inner loop done?
02740 BNE TIME1 Loop if it isn't
02750 LEAS 1,S Clean up the stack
02760 LEAU 4,U Adjust the table pointer
02770 DEC ,S Number done?
02780 BNE TIME0 Loop if it isn't
02790 LEAS 1,S Clean up the stack
02800 LDU #926 U=Cursor position
02810 LDX #M5+2 X=Message pointer
02820 LBSR DISM0 Display the message
02830 TIME2 JSR [SA000] Scan the keyboard
02840 LBNE MENU Loop if a key was pressed
02850 LDX #0 Clear the counter
02860 ORCC #S50 Disable the interrupts
02870 TIME3 LDA $FF48 A=FDC status
02880 ANDA #2 Index hole present?
02890 BNE TIME3 Loop if it is
02900 TIME4 LDA $FF48 A=FDC status
02910 ANDA #2 Index hole present?
02920 BEQ TIME4 Loop if it isn't
02930 TIME5 LEAX 1,X Bump the count
02940 LDA $FF48 A=FDC status
02950 ANDA #2 Index hole present?
02960 BNE TIME5 Loop if it is
02970 TIME6 LEAX 1,X Bump the count
02980 LDA $FF48 A=FDC status
02990 ANDA #2 Index hole present?
03000 BEQ TIME6 Loop if it isn't
03010 ANDCC #S4F Enable the interrupts

```

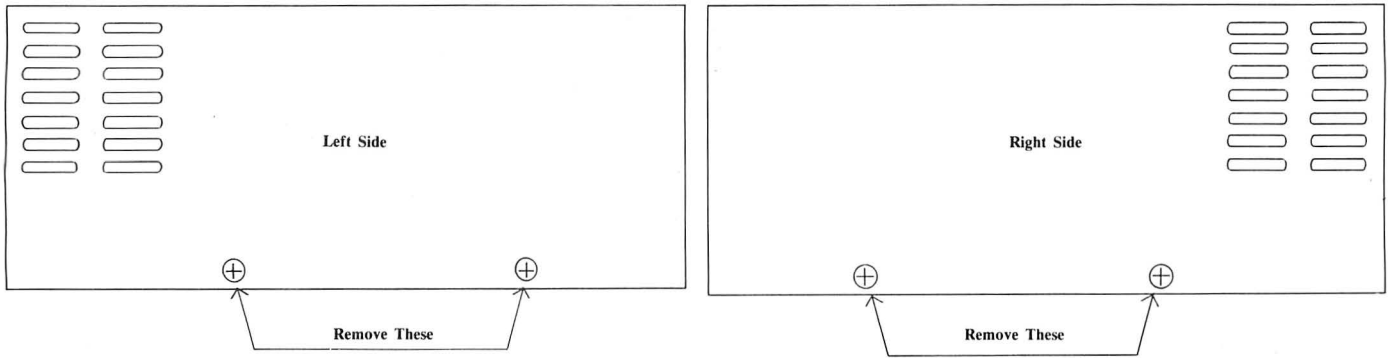


Fig. 1. The Disk Case

```

03020      LDU      #TAB5      U=Comparison table pointer
03030      CLRA
03040      DECA
03050  TIME7  INCA          Bump the count
03060      CMPX      ,U++      Is the value in range?
03070      BHS      TIME8      Loop if it isn't
03080      CMPU      #TAB5+162  End of the table?
03090      BNE      TIME7      Loop if it isn't
03100  TIME8  PSHS      A          Save the count
03110      ASLA
03120      ADDA      ,S+        A=Count * 2
03130      ADDA      #7          A=X value
03140      PSHS      A          Save it
03150      LDA      PNT          A=Last X value
03160      LDB      #80         B=Starting Y value
03170  TIME9  BSR      RESET      Reset the point
03180      INCB
03190      CMPB      #88         Needle erased?
03200      BNE      TIME9      Loop if it isn't
03210      PULS      A          Get the new X value
03220      STA      PNT          Save it
03230      LDB      #80         B=Starting Y value
03240  TIME10 BSR      SET        Set the point
03250      INCB
03260      CMPB      #88         Needle done?
03270      BNE      TIME10     Loop if it isn't
03280      BRA      TIME2      Loop
03290 *
03300 * Display Horizontal Line Routine
03310 *
03320 HLINE  BSR      SET        Set the point
03330      INCA          Bump the X value
03340      CMPA      LSTX       Line done?
03350      BLS      HLINE      Loop if not
03360      RTS
03370 *
03380 * Display Vertical Line Routine
03390 *
03400 VLINE  BSR      SET        Set the point
03410      INCB          Bump the Y value
03420      CMPB      LSTY       Line done?
03430      BLS      VLINE      Loop if not
03440      RTS
03450 *
03460 * Reset Pixel Routine
03470 *
03480 RESET  PSHS      A,B,X      Save the registers
03490      LDA      #1          A=Reset flag
03500      BRA      SET0       Jump
03510 *
03520 * Set Pixel Routine
03530 *
03540 SET    PSHS      A,B,X      Save the registers
03550      CLRA          A=Set flag
03560 SET0   PSHS      A          Save the mode flag
03570      LDX      #VID        X=Start of video memory
03580      LDA      #32         A=Number of bytes per row
03590      MUL
03600      LEAX      D,X        Adjust the memory pointer
03610      LDA      1,S        A=X value
03620      TFR      A,B         B=X value
03630      LSR      A           A=X value / 2
03640      LSR      A           A=X value / 4
03650      LSR      A           A=X value / 8
03660      LEAX      A,X        Adjust the memory pointer
03670      LDA      #80         A=Starting mask
03680      ANDB      #7         B=Loop counter
03690 SET1   BEQ      SET2      Jump if the mask is done
03700      LSR      A           Shift the mask
03710      DECB
03720      BRA      SET1       Loop
03730 SET2   LDB      ,S+        B=Mode flag
03740      BNE      SET4       Jump if reset
03750      COMA
03760      PSHS      A          Save it
03770      LDA      ,X          A=Current byte
03780      ANDA      ,S+        Strip the bit
03790 SET3   STA      ,X        Display the new byte
03800      PULS      A,B,X,PC    Return
03810 SET4   PSHS      A          Save the mask
03820      LDA      ,X          A=Current byte
03830      ORA      ,S+        Set the bit
03840      BRA      SET3       Jump

03850 *
03860 * Display Message Routine
03870 *
03880 DISM   LDU      ,X++      U=Cursor position
03890 DISM0  STU      VPOS      Save the cursor position
03900      LDA      ,X+        A=Next character
03910      BEQ      DISM1      Jump if done
03920      BSR      DCHR       Display the character
03930      LEAU     1,U        Bump the cursor
03940      BRA      DISM0      Loop
03950 DISM1  RTS
03960 *
03970 * Display Character Routine
03980 *
03990 DCHR   PSHS      A,B,X,U    Save the registers
04000      LDD      VPOS      D=Cursor position
04010      LDX      #VID-256    X=Starting video pointer
04020 DCHR0  LEAX      256,X    Bump X to the next line
04030      SUBD      #51        Line figured?
04040      BCC      DCHR0      Loop if not
04050      ADDB      #51        Number of characters in the 1
04060      PSHS      B          Save it
04070      LSRB
04080      LSRB
04090      LSRB
04100      PSHS      B          Save the column offset
04110      ASLB
04120      ASLB
04130      TFR      B,A        A=Column * 4
04140      ADDB      ,S+        B=Column * 5
04150      LEAX      B,X        Adjust the video pointer
04160      ASLA
04170      SUBA      ,S+        A=Remaining chars
04180      NEGA
04190      ASLA
04200      ASLA
04210      LDU      #MTAB      U=Table pointer
04220      LEAU     A,U        Adjust it
04230      LDD      ,U++      D=Video offset and shift coun
04240      LEAX      A,X        Adjust the video pointer
04250      STB      SPT        Save the shift count
04260      LDD      ,U        D=Masks
04270      STA      MSK1       Save the first mask
04280      STB      MSK2       Save the second mask
04290 DCHR1  LDB      ,S        B=Character to display
04300      SUBB      #S20      Adjust it
04310      CLRA
04320      ASLB
04330      ROLA
04340      ASLB
04350      ROLA
04360      LDU      #CTAB      U=Table pointer
04370      LEAU     D,U        Adjust it
04380      LDB      #8          B=Row counter
04390      CLRA
04400      PSHS      A,B        Save the flag and the counter
04410 DCHR2  LDB      SPT        B=Shift value
04420      PSHS      B          Save it
04430      COM      1,S        Ms Nibble?
04440      BEQ      DCHR3      Jump if not
04450      LDA      ,U        A=Character value
04460      ANDA      #SFO      Mask it
04470      BRA      DCHR4      Jump
04480 DCHR3  LDA      ,U+      A=Character value
04490      ASLA
04500      ASLA
04510      ASLA
04520      ASLA
04530 DCHR4  CLR      4 places
04540 DCHR5  DEC      ,S        Shifting done?
04550      BEQ      DCHR6      Jump if it is
04560      LSR      A           Shift the character
04570      RORB
04580      BRA      DCHR5      Loop
04590 DCHR6  LEAS      1,S      Clean up the stack
04600      PSHS      D          Save the character value
04610      LDD      ,X        D=Current bytes
04620      COMA
04630      COMB
04640      ANDA      MSK1      Mask the 1st byte
04650      ANDB      MSK2      Mask the 2nd byte
04660      ORA      ,S+        Set the 1st byte
04670      ORB      ,S+        Set the 2nd byte

```

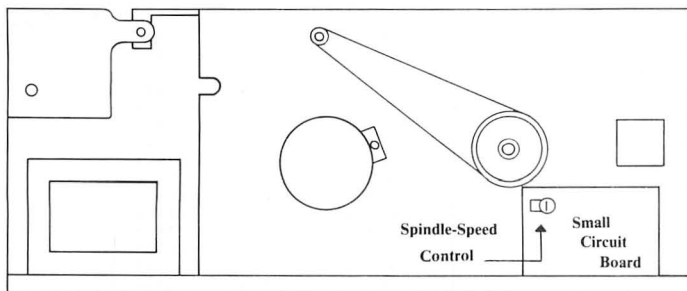


Fig. 2. The Circuit Board

```

04680      COMA          Invert the 1st byte
04690      COMB          Invert the 2nd byte
04700      STD          ,X      Display the new character
04710      LEAX         32,X     Adjust X for the next row
04720      DEC          1,S     Character done?
04730      BNE         DCHR2    Loop if not
04740      LEAS        2,S     Clean up the stack
04750      PULS        A,B,X,U,PC Return
04760 *
04770 * Clear Partial Screen Routine
04780 *
04790 PCLS   LDX      #VID+2560      X=Starting video pointer
04800      LDD      #FFFFF D=Double blanks
04810 PCLS0  STD      ,X++      Display the blanks
04820      CMPX     #VID+6144      End of the screen?
04830      BLO     PCLS0    Loop if not
04840      RTS
04850 *
04860 * Turn Off Drives Routine
04870 *
04880 DRVOFF PSHS   A          Save A
04890      ANDCC   #SAF      Enable the interrupts
04900      LDA     #120     A=2 second delay count
04910      STA     IPLG     Save it
04920      PULS   A,PC      Return
04930 *
04940 * 16.667 mS IRQ Routine
04950 *
04960 IRQ    LDA     $FF03    16.667 interrupt?
04970      BPL     IRQ0      Jump if not
04980      LDA     $FF02    Clear the interrupt
04990      LDA     IPLG     A=IRQ count
05000      BEQ     IRQ0      Jump if done
05010      DEC     IPLG     Decrement the count
05020      BNE     IRQ0      Jump if done
05030      CLR     $FF40    Turn off the drives
05040 IRQ0  RTI
05050      END     INIT

```

Program Listing 2. Color Disk Timer, Part 2

```

00160 VID   EQU     $1000
00170      ORG     $2900
00180 *
00190 * Program Messages
00200 *
00210 M1     FDB     160
00220      FCC     'Copyright (c) 1984 By Mark D. Goodwin'
00230      FCB     0
00240 M2     FDB     635
00250      FCC     'Menu'
00260      FCB     0
00270      FDB     715
00280      FCC     '0 - To time drive 0'
00290      FCB     0
00300      FDB     745
00310      FCC     '2 - To time drive 2'
00320      FCB     0
00330      FDB     766
00340      FCC     '1 - To time drive 1'
00350      FCB     0
00360      FDB     796
00370      FCC     '3 - To time drive 3'
00380      FCB     0
00390      FDB     868
00400      FCC     'Press the indicated key to time the
00410      FCB     0
00420      FDB     924
00430      FCC     'Press any other key to exit the program
00440      FCB     0
00450 M3     FDB     628
00460      FCC     'Drive '
00470 M3A    FCB     32
00480      FCC     " isn't ready"
00490      FCB     0
00500 M4     FDB     627
00510      FCC     'No diskette in drive '
00520 M4A    FCB     32
00530      FCB     0
00540 M5     FDB     671
00550      FCC     'Press any key to return to the menu'

```

```

00560      FCB     0
00570 M6     FDB     635
00580      FCC     'Drive'
00590      FCB     0
00600 *
00610 * Drive Select Masks Table
00620 *
00630 DTAB   FCB     $29
00640      FCB     $2A
00650      FCB     $2C
00660      FCB     $68
00670 *
00680 * COLOR DISK TIMER Graphics Table
00690 *
00700 TAB1   FDB     $F03F
00710      FDB     $FFF0
00720      FDB     $FFFF
00730      FDB     $FFF9
00740      FDB     $E79F
00750      FDB     $FFF9
00760      FDB     $FFF9
00770      FDB     $FFF9
00780      FDB     $CFE7
00790      FDB     $07F9
00800      FDB     $FE07
00810      FDB     $E43F
00820      FDB     $CFFC
00830      FDB     $F3F3
00840      FDB     $FCF3
00850      FDB     $E19F
00860      FDB     $9FF9
00870      FDB     $F3F3
00880      FDB     $F9F3
00890      FDB     $E7FF
00900      FDB     $9E79
00910      FDB     $E7E7
00920      FDB     $F9E7
00930      FDB     $CFFF
00940      FDB     $C0FC
00950      FDB     $0F81
00960      FDB     $FC0F
00970      FDB     $9FFF
00980      FDB     $C03F
00990      FDB     $E7FF
01000      FDB     $FF9F
01010      FDB     $F39F
01020      FDB     $FFFF
01030      FDB     $FF3F
01040      FDB     $E79F
01050      FDB     $0FF0
01060      FDB     $1F39
01070      FDB     $E73F
01080      FDB     $CFE7
01090      FDB     $FE67
01100      FDB     $CF3F
01110      FDB     $9FF0
01120      FDB     $FE1F
01130      FDB     $CE7F
01140      FDB     $3FFE
01150      FDB     $7CCF
01160      FDB     $00FC
01170      FDB     $0F80
01180      FDB     $FCF3
01190      FDB     $FE01
01200      FDB     $FE7F
01210      FDB     $FFFF
01220      FDB     $FFFF
01230      FDB     $FFCF
01240      FDB     $FFFF
01250      FDB     $FFFF
01260      FDB     $FFFF
01270      FDB     $FFCF
01280      FDB     $F0F9
01290      FDB     $99F8
01300      FDB     $1F21
01310      FDB     $FF9F
01320      FDB     $FCFE
01330      FDB     $6673
01340      FDB     $FC0C
01350      FDB     $FF9F
01360      FDB     $F9FE
01370      FDB     $6660
01380      FDB     $1F3F
01390      FDB     $FF3F
01400      FDB     $F3FC
01410      FDB     $CCFE
01420      FDB     $FE7F
01430      FDB     $FF3F
01440      FDB     $C0F9
01450      FDB     $99F0
01460      FDB     $3CFF
01470 *
01480 * COLOR DISK TIMER Display Values Table
01490 *
01500 TAB2   FDB     VID+164
01510      FCB     4
01520      FCB     -8
01530      FCB     24
01540      FDB     VID+173
01550      FCB     3
01560      FCB     -6
01570      FCB     26
01580      FDB     VID+180
01590      FCB     4
01600      FCB     -8
01610      FCB     24
01620      FDB     0
01630 *

```





04900	FDB	\$8880
04910	FDB	\$6996
04920	FDB	\$9960
04930	FDB	\$6997
04940	FDB	\$1240
04950	FDB	\$0660
04960	FDB	\$6600
04970	FDB	\$0660
04980	FDB	\$6240
04990	FDB	\$1248
05000	FDB	\$4210
05010	FDB	\$F0
05020	FDB	\$F000
05030	FDB	\$8421
05040	FDB	\$2480
05050	FDB	\$6912
05060	FDB	\$4040
05070	FDB	\$6915
05080	FDB	\$B960
05090	FDB	\$699F
05100	FDB	\$9990
05110	FDB	\$E99E
05120	FDB	\$99E0
05130	FDB	\$6988
05140	FDB	\$8960
05150	FDB	\$E999
05160	FDB	\$99E0
05170	FDB	\$F88E
05180	FDB	\$88F0
05190	FDB	\$F88E
05200	FDB	\$8880
05210	FDB	\$698B
05220	FDB	\$9960
05230	FDB	\$999F
05240	FDB	\$9990
05250	FDB	\$E444
05260	FDB	\$44E0
05270	FDB	\$1111
05280	FDB	\$1960
05290	FDB	\$99AC
05300	FDB	\$A990
05310	FDB	\$8888
05320	FDB	\$88F0
05330	FDB	\$9FD9
05340	FDB	\$9990
05350	FDB	\$9DDD
05360	FDB	\$BB90
05370	FDB	\$F999
05380	FDB	\$99F0
05390	FDB	\$E99E

05400	FDB	\$8880
05410	FDB	\$6999
05420	FDB	\$DA50
05430	FDB	\$E99E
05440	FDB	\$CA90
05450	FDB	\$6986
05460	FDB	\$1960
05470	FDB	\$E444
05480	FDB	\$4440
05490	FDB	\$9999
05500	FDB	\$9960
05510	FDB	\$9999
05520	FDB	\$9660
05530	FDB	\$9999
05540	FDB	\$BF90
05550	FDB	\$9966
05560	FDB	\$9990
05570	FDB	\$9964
05580	FDB	\$4440
05590	FDB	\$F124
05600	FDB	\$88F0
05610	FDB	\$7444
05620	FDB	\$4470
05630	FDB	\$8842
05640	FDB	\$1110
05650	FDB	\$E222
05660	FDB	\$22E0
05670	FDB	\$6900
05680	FDB	0
05690	FDB	0
05700	FDB	\$F0
05710	FDB	\$6420
05720	FDB	0
05730	FDB	\$61
05740	FDB	\$7970
05750	FDB	\$88E9
05760	FDB	\$99E0
05770	FDB	\$78
05780	FDB	\$8870
05790	FDB	\$1179
05800	FDB	\$9970
05810	FDB	\$69
05820	FDB	\$F870
05830	FDB	\$698E
05840	FDB	\$8880
05850	FDB	\$79
05860	FDB	\$7170
05870	FDB	\$88E9
05880	FDB	\$9990
05890	FDB	\$40C4

05900	FDB	\$44E0
05910	FDB	\$1011
05920	FDB	\$1960
05930	FDB	\$889A
05940	FDB	\$CA90
05950	FDB	\$4444
05960	FDB	\$4440
05970	FDB	\$9F
05980	FDB	\$D990
05990	FDB	\$E9
06000	FDB	\$9990
06010	FDB	\$69
06020	FDB	\$9960
06030	FDB	\$E9
06040	FDB	\$E880
06050	FDB	\$79
06060	FDB	\$7110
06070	FDB	\$AD
06080	FDB	\$8880
06090	FDB	\$78
06100	FDB	\$61E0
06110	FDB	\$44E4
06120	FDB	\$4420
06130	FDB	\$99
06140	FDB	\$9960
06150	FDB	\$99
06160	FDB	\$9660
06170	FDB	\$99
06180	FDB	\$BF90
06190	FDB	\$99
06200	FDB	\$6990
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06230	FDB	\$F2
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06250	FDB	\$1224
06260	FDB	\$2210
06270	FDB	\$4440
06280	FDB	\$4440
06290	FDB	\$8442
06300	FDB	\$4480
06310	FDB	\$5A00
06320	FDB	0
06330	FDB	END

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## System Requirements

- 32K RAM
- Disk Color Basic
- 1 Disk Drive
- Printer

## Program Operation

To start the program type RUN "FILES". The first time the program runs it loads the machine-language sort routine from DATA statements. Table 2 shows the menu from which you choose an option by typing the number or first letter and hitting enter.

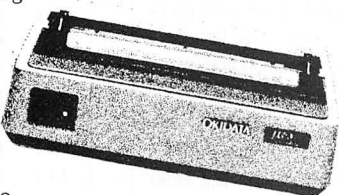
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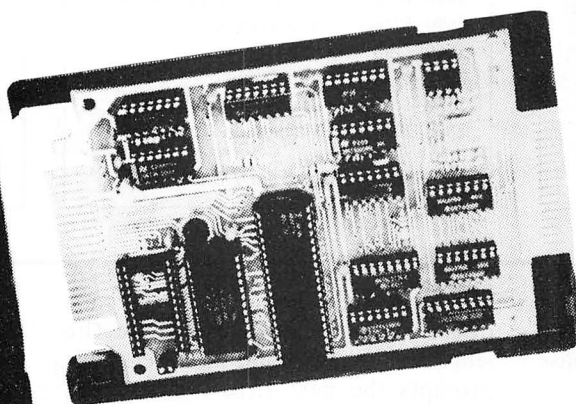
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**Database:** A collection of structured data. This program creates fixed-length records with fixed-length fields and stores them in a direct-access file.

**Record:** One of many equal-sized units in the database. Each record contains the same data fields.

**Field:** A fixed number of bytes of data in the same relative position in each record.

**Link:** A field in a record pointing to another record, usually the next or previous record in index field sequence.

**Index:** A sequence of record numbers in some data field sequence.

**Record Definition:** How the data fields are structured in the record.

Table 1. Definitions

1. Menu driven
2. Machine-language sort and indexing
3. Forward and backward linked records
4. Search by field or string
5. Directory of databases
6. Kill database files
7. General multipage screen format
8. General multiline report format

Table 2. Menu Selections

←: Left arrow means display the previous indexed record. If the file is not indexed, it returns to the menu. The first record wraps backward to the last record.

**Q:** Quit and return to the main menu.

**#:** Display a new record by number.

**U:** Update the current record. The prompt "which field" is displayed at the bottom of the screen. The name and dots for field length appear. The new value is typed under the dots.

**R:** Replace all the data in the current record. When the last field is typed, the program returns to the display mode. Using the enter key keeps the old value of a field.

**A:** Add records to the end of the file.

**D:** Delete the current record. The record is marked as deleted by setting it equal to CHR\$(0). Deleted records can be found by searching for a null string.

**N:** Display the next sequential record number.

**L:** Display the last sequential record number.

**S:** Go to search menu.

→: Right arrow means display the next indexed record. The last record wraps around to the first record.

Table 3. Record Prompt Definitions

40-220	Main menu
240-690	Create record definition
710-880	Open DAT file and define
900-960	Add records
980-1080	Update records
1100-1290	Add or replace records
1310-1360	Which record to display
1380-1610	Display record and menu
1620-1670	Kill DEF and DAT file
1690-1940	Search logic
1960-2190	Index logic
2210-2510	Report logic
2530-2780	Directory and kill logic
2800-2970	Machine-language sort

Table 4. Program Description

<b>AS</b>	Answer to prompt
<b>DV</b>	Device number for output
<b>E</b>	Intermediate in calculating starting position of field in record
<b>ES</b>	Ending position of string on screen
<b>F</b>	Field number
<b>FS</b>	Full file name with extension
<b>FS()</b>	Field name
<b>FIS</b>	File name padded with zeros
<b>FR</b>	First index record
<b>IX\$()</b>	Index array
<b>K</b>	Page of screen correction
<b>KF</b>	Kill file switch
<b>L</b>	Record length total
<b>L()</b>	Length of field (I)
<b>LA</b>	Last index record #
<b>LI</b>	Length of indexing field
<b>LO</b>	Last sequential record # in file
<b>LP</b>	Lines per page of printer report
<b>LX</b>	Line of printer report
<b>N</b>	Number of fields
<b>NN</b>	Subscript of 1st variable to be sorted
<b>NNS</b>	File name in directory and kill function
<b>O</b>	Option #
<b>OS</b>	Option string
<b>P()</b>	Position of field I in record
<b>PG</b>	Page #
<b>PS</b>	Print position of field name on screen
<b>RL</b>	Record length
<b>SS</b>	I/O buffer field string
<b>S()</b>	Start position of field in buffer
<b>SS</b>	Print position of field value on screen
<b>SSS</b>	Search string
<b>SW</b>	Update switch
<b>TS</b>	Temporary field string accumulator in update/add
<b>TB()</b>	Width of field or field name (I). TB(0) is total length of print line on report
<b>TT\$</b>	Temporary buffer
<b>UD\$</b>	Field to update
<b>V\$</b>	Field input string
<b>X</b>	Position of end of file name in Files function
<b>ZZ</b>	Has effect of LSET when using string functions

Table 5. Variable Functions

character name. The eighth character of the name should be a zero for the file option (9) to identify database files properly.

Each application creates two disk files named FN000000/DEF and FN000000/DAT. The first file contains the record structure and the second contains the actual data records.

Option 1 gives you the choice of reviewing an existing definition or creating a new one. If you choose to create, a field number and question mark appear. Type the field name and hit enter.

On the right half of the screen a question mark appears. Type the length of the field and hit enter. This prompts the next field number and length.

If you type zero or enter for a field length, the program prompts again for the same field name. If you hit enter in response to a field name, the input to the definition is terminated and the screen displays the definition. (See Fig. 1.)

The program calculates and displays the total record length, which must be less than 256. At this point

you can review and correct the fields. Hitting enter causes the definition to be stored in FN000000/DEF.

You can review a record definition at any time and can change or add fields. Changing field names has no effect on the database. Changing field lengths changes the way the data is displayed and reported as long as the total length of the record is not changed. If you have already entered data, the record length should not be changed or garbage results.

Define the last two fields in a definition as pointers of three characters

Field	Length
1 ? Name	? 20
2 ? Address	? 25
3 ? City	? 10
4 ? State	? 5
5 ? Zip	? 5
6 ? Phone	? 7
7 ? Area Code	? 3
8 ? Comment	? 25
9 ? Previous	? 3
10 ? Next	? 3
11 ?	

File Test0000/Def Field Review

1 Name	20
2 Address	25
3 City	10
4 State	5
5 Zip	5
6 Phone	7
7 Area Code	3
8 Comment	25
9 Previous	3
10 Next	3
record length =	106
Field # to Correct or <enter>?	

Fig. 1. Field Definitions

File Name Test0000/Def.  
 First Index Rec. = 3  
 Last Index Rec. = 1  
 record#? 1

record# 1

1 Name: William Bonnell  
 2 Address: 239 Mason Ave.  
 3 City: Rochester  
 4 State: N.Y.  
 5 Zip: 14626  
 6 Phone: 2253037  
 7 Area Code: 716  
 8 Comment: Author of Database  
 9 Previous: 2  
 10 Next: 3  
 enter -Q#URADPNLS-  
 ? A  
 record 5  
 Name: .....

Fig. 2. Sample Record

each. The index option uses these fields to store the linked list of pointers to the next and previous records. If these are forgotten, the index option overwrites the last six characters of the record.

It is a good idea to pad the record with some extra space for forgotten fields at the time the definition is created. This allows the addition or expansion of fields at a later date. You can define 20 fields for a record and 400 records per database. This is determined by the DIM statement in line 2950. The arrays dimensioned to 20

Report of File Test0000/Def. page 1

Name	Address	City	State	Zip	Phone
Area Code	Comment	Previous	Next		
William Bonnell	239 Mason Ave.	Rochester	NY	14626	22530
37 716	Author of Database	3 4			
HOT CoCo	Pine Street	Peterborou	NH	03458	92492
71 603	Good Magazine for CoCo	4 3			
W.T. Door	254 Somewhere	Anytown	NY	14458	
714		2 1			
A.B. Dick	454 Thurston	Rochester	NY	?	22525
25 716		1 2			

Fig. 3. Database Report

are for fields. IX\$(400) is the index of records. You can modify these.

Option 2 (A) causes records to be added to the database. The record number appears at the top of the screen and the field name and question mark appear with a series of dots indicating the length of the field.

Type your data over the dots using the backspace key to correct errors. Hit enter to record the field. The next field prompt appears and the process continues until the record is filled.

If you type the enter key alone, the last value of the field from the previous record is entered into the field. If this is the first record, data should be typed to initialize each field before using the enter key.

If more than 14 fields have been defined the program uses multiple screens to display a record. Typing "quit" on any line switches to display mode on the last record added.

Option 3 (V) asks for a record number. If the file has been previously indexed, the first and last indexed record numbers are displayed. The chosen record is then displayed as in Fig. 2. Note the prompt at the end of the record: enter -Q#URADPNLS-. Table 3 defines each element of this prompt.

In Fig. 2 the A display option is selected. Record 2 appears at the top of the screen and the field prompts appear followed by dots showing the field length. Records are added in this way until you type "quit" into any field. The last record added is then displayed.

Option 4 (K) prompts for a file name, double checks, and then kills the FN000000/DEF and FN000000/DAT files. It displays all database files and marks those named as killed.

Option 5 (S) displays the search

menu. The program displays the numbered fields and asks "which field to search or all." "All" means look for the search string in any field. The program then asks for the search string. Typing enter with "all" finds deleted records.

The final prompt asks whether to start the search on the first record or at the current record. If a match is found the record is displayed. The prompt "Q to end search or enter" means go into display mode on the current record or search for the next match.

At the end of the file the prompt "Menu, View or Search" appears. "Menu" means go to the main menu. "View" means display the last match record and "Search" means go to the search menu for another search.

The index menu is similar to the search menu. You can index a file on more than one contiguous field by specifying a length corresponding to the sum of the desired fields. You need to consider this when making a record definition. Place those fields for sorting next to each other.

You can add logic for concatenating noncontiguous fields for indexing. A length of less than an entire field results in faster processing and typing enter uses the entire field length.

Option 7 (R) produces a report of all the fields in all the records in index order. Index the file before running reports. If the record length is greater than the width of the printer, the line folds at the right margin. This report is designed to be useful and easy—not necessarily the most aesthetic. (See Fig. 3.) Each column is equal to the width of the field or the width of the variable name, whichever is larger, plus two.

Program Listing 1. Database Manager

```

10 GOTO 2940
20 'DATABASE MANAGER, W.BONNELL
239 MASON AVE, ROCHESTER, NY,
14626 - COPYRIGHT 7/7/83
30 '
40 UNLOAD:RUN
50 DV=-2:CLS:PRINT"menu"
60 PRINT"1. DEFINE FILE FIELDS"
70 PRINT"2. ADD RECORDS"
80 PRINT"3. VIEW, MODIFY RECORDS"
90 PRINT"4. KILL A DATABASE"
100 PRINT"5. SEARCH FOR FIELD"
110 PRINT"6. CREATE AN INDEX"
120 PRINT"7. REPORTS"
130 PRINT"8. QUIT"
140 PRINT"9. FILES"
150 INPUT"CHOOSE";O$:O=VAL(O$)
160 IF O=0 THEN O=INSTR(1,"DAVKS
CRQP",O$)
170 IF O<0 THEN 50
180 IF O>20 THEN 50
190 IF O<8 THEN INPUT "FILE NAME
(7 OR LESS CHARACTERS)";F1$
200 F1$=LEFT$(F1$+"00000000",8)
210 ON O+1 GOTO 50,240,910,1300,
1630,1690,1960,2210,1610,2530
220 GOTO 50
230 '
240 'create file definition
250 '
260 F$=F1$+"/DEF"
270 K=0:SW=0
280 GOTO 380
290 IF I-K=>15 THEN CLS:K=I-1
300 PRINT@0,"FIELD"TAB(16)"LENGT
H
310 PRINT@32*(I-K),I;
320 INPUT F$(I)
330 IF F$(I)="" THEN N=I-1:RETUR
N
340 PRINT@32*(I-K)+16,"";
350 INPUT L(I):IF L(I)=0 THEN 31
0
360 SW=1
370 RETURN
380 INPUT"REVIEW OR CREATE";A$
390 IF A$="R" THEN 420
400 CLS
410 I=I+1:GOSUB 290:IF F$(I)=""
THEN 430 ELSE 410
420 CLS:GOSUB 750
430 CLS
440 RL=0
450 K=0
460 FOR I=1 TO N
470 IF I-K=15 THEN EXEC 44539:K=
I:CLS
480 P(I)=RL+1
490 PRINT@0,"FILE "F$;" FIELD RE
VIEW
500 PRINT@32*(I-K),USING"## ";I;
:PRINT F$(I);TAB(16)L(I)
510 RL=RL+L(I)
520 NEXT
530 PRINT "record length="TAB(16
)RL
540 K=0
550 INPUT"FIELD # TO CORRECT OR
<ENTER>";A$
560 I=VAL(A$):IF A$="" THEN 620
570 IF I=0 THEN 550
580 CLS:K=I:GOSUB 310
590 IF I>N THEN N=I
600 CLS:GOTO 440
610 '
620 'save on disk
630 IF SW<1 THEN 40
640 UNLOAD:OPEN "O",#1,F$
650 WRITE #1,FR,LA,N
660 FOR I=1 TO N
670 WRITE #1,F$(I),L(I),P(I)
680 NEXT
690 GOTO 40
700 '
710 'open file and define
720 CLS
730 F$=F1$+"/DEF"
740 PRINT@0,"FILE NAME ";F$
750 OPEN"1",#1,F$
760 INPUT #1,FR,LA,N
770 PRINT "FIRST INDEX REC="FR
780 PRINT "LAST INDEX REC="LA
790 L=0:FOR I=1 TO N
800 INPUT#1,F$(I),L(I),P(I):L=L+
L(I)
810 S(I)=E+1:E=S(I)+L(I)-1
820 NEXT
830 UNLOAD
840 RETURN
850 OPEN "D",#1,F1$+"/DAT",L
860 FIELD 1,L AS S$
870 LO=LOP(1)
880 RETURN
890 '
900 'add records
910 GOSUB 720:GOSUB 850
920 J=LO
930 J=J+1
940 GOSUB1100
950 IF V$="QUIT"THEN J=J-1:LO=J:
GOTO1380
960 GOTO 930
970 '
980 'update records
990 GOSUB 1510
1000 INPUT"enter field# to updat
e";UD$
1010 I=VAL(UD$):
1020 IF I=0 THEN 1380
1030 IF I>N THEN 1000
1040 PRINT STRING$(L(I),"."):TT$
=SS:LINEINPUT V$
1050 ZZ=L(I)-LEN(V$)
1060 IF ZZ>0 THEN V$=V$+STRING$(
ZZ," ")
1070 MID$(TT$,S(I),L(I))=V$:T$=T
T$:GOSUB 1260
1080 GOTO 1380
1090 '
1100 'add or replace records
1110 CLS:PRINT"record"J
1120 K=0
1130 FOR I=1 TO N
1140 PS=32*(I+K):ES=32*(I+K)+LEN
(F$(I))+L(I):SS=ES-L(I):K=K+IN
T((ES-PS)/32)
1150 IF ES>480 THEN CLS:K=-I:GOT
O 1140
1160 PRINT@PS,F$(I);":";STRING$(
L(I),"."):PRINT@SS,"":LINEINPUT
V$
1170 IF V$="" THEN V$=MID$(SS,S(
I),L(I)):PRINT@SS,V$:GOTO 1240
1180 IF V$="QUIT" THEN RETURN
1190 ZZ=L(I)-LEN(V$)
1200 IF ZZ<0 THEN 1230
1210 IF ZZ=0 THEN 1240
1220 V$=V$+STRING$(ZZ,32)
1230 V$=LEFT$(V$,L(I))
1240 T$=T$+V$
1250 NEXT
1260 LSET S$=T$
1270 PUT #1,J
1280 T$=""
1290 RETURN
1300 '
1310 'which record
1320 GOSUB 720
1330 GOSUB 850
1340 INPUT"record#";J
1350 IF J>LO THEN1340
1360 IF J<=0 THEN 40
1370 '
1380 GOSUB 1510
1390 PRINT "enter <-Q#URADPNLS->
"
1400 A$=INKEY$:IF A$="" THEN 140
0
1410 IF A$="S" THEN 1710
1420 IF A$=CHR$(8)THEN J=VAL(MID
$(SS,LEN(SS)-5,3)):GOTO 1350
1430 IF A$="P" THEN PRINT #DV,"R
ECORD"J:FOR I=1 TO N:PRINT#DV,F$
(I)":MID$(SS,S(I),L(I)):NEXT I
1440 IF A$=CHR$(9)THEN J=VAL(RIG
HT$(SS,3)):GOTO 1350
1450 IFA$="L"THENJ=J-1:GOTO1350
1460 IFA$="N"THENJ=J+1:GOTO1350
1470 IFA$="U"THEN1340
1480 ELSEIFA$="R"THEN1460
1490 ELSEIFA$="A"THEN920
1500 ELSEIFA$="Q"THEN40
1510 ELSEIFA$="D"THEN1480
1520 ELSE 1400
1460 GOSUB 1110
1470 GOTO 1380
1480 LSET S$=CHR$(0):GOSUB1270:G
OTO 1380
1490 '
1500 'display record
1510 GET #1,J
1520 CLS
1530 PRINT"record#";J
1540 K=0
1550 FOR I=1 TO N
1560 PS=32*(I+K):ES=32*(I+K)+LEN
(F$(I))+L(I):SS=ES-L(I):K=K+IN
T((ES-PS)/32)
1570 IF ES>480 THEN EXEC44539:CL
S:K=-I:GOTO 1560
1580 PRINT@PS,USING"## ";I;:PRIN
T F$(I)":";MID$(SS,S(I),L(I))
1590 NEXT
1600 RETURN
1610 UNLOAD:STOP
1620 '
1630 'kill data base
1640 INPUT"ARE YOU SURE(YES/NO)"
;A$
1650 IF A$<>"YES" THEN 50
1660 KF=1
1670 GOTO 2560
1680 '
1690 'search
1700 GOSUB720:GOSUB850
1710 CLS:FOR I=1 TO N
1720 PRINTUSING"## ";I;:PRINT F$
(I)
1730 NEXT
1740 INPUT"WHICH FIELD SEARCH OR
ALL";A$
1750 F=VAL(A$)
1760 INPUT"ENTER SEARCH STRING";
SS$
1770 IF SS$="" THEN SS$=CHR$(0)
1780 LO=LOP(1):CLS

```

Option 8 (Q) is obvious. Option 9 (F) displays free granules and database files (those with zero as the eighth character of the file name) on the disk.

The Program

The program is written in block structure with each block corresponding to a menu function. Line 10 transfers control to the end of the program for initialization. Line 2950 checks to see if the machine-language sort has been loaded.

If it is not loaded, it loads from

DATA statements into memory at &HE02. The 2 bytes at &HE00 are the starting element of the array. Credit for this sort routine belongs to William Barden, "Machine Language Sort, Part II," *TRS-80 Microcomputer News*, June 1982, p. 13. Table 4 shows the program structure. Table 5 shows the functions of the main program variables. ■

Address correspondence to William Bonnell, 239 Mason Ave., Rochester, NY 14626.

```

1790 INPUT"CURRENT OR FIRST RECO
RD";A$:
1800 IF A$="C" AND J>0 THEN JJ=J
ELSE JJ=1
1810 FOR II=JJ TO LO
1820 GET#1,II:PRINT@0,"RECORD"II
"
1830 IF F=0 THEN 1860
1840 IF MID$(S$,S(F),LEN(SS$))=S
S$ THEN J=II:GOSUB 1510 ELSE 1900
0
1850 GOTO 1870
1860 IF INSTR(S$,SS$)<>0 THEN J=
II:GOSUB1510 ELSE 1900
1870 PRINT"Q TO END SEARCH ELSE
ENTER"
1880 A$=INKEY$:IF A$="" THEN 188
0
1890 IF A$="Q" THEN II=LO
1900 NEXT
1910 PRINT@480,"MENU/VIEW/SEARC
H";
1920 A$=INKEY$:IF A$="" THEN 192
0
1930 O=INSTR(1,"MVS",A$)
1940 ON O+1 GOTO 1920,40,1350,17
10
1950 '
1960 'index
1970 GOSUB720:GOSUB850
1980 CLS:FOR I=1 TO N:PRINTUSING
"##";I;
1990 PRINT F$(I)
2000 NEXT
2010 INPUT"WHICH FIELD TO INDEX
BY";F:IF F=0 THEN F=1
2020 INPUT"ENTER LENGTH FOR INDE
X OR ENTER";LI:IF LI=0 THEN LI=L(
F)
2030 LO=LOF(1)
2040 FOR I=1 TO LO
2050 GET#1,I
2060 IX$(I-1)=MID$(S$,S(F),LI)+R
IGHT$( " "+STR$(I),3)
2070 NEXT
2080 GOSUB2810
2090 IX$(LO)=IX$(0)
2100 FOR I=1 TO LO
2110 J=VAL(RIGHT$(IX$(I-1),3))
2120 GET #1,J:TS=S$
2130 MID$(TS,LEN(TS)-2,3)=RIGHT$(
IX$(I),3)
2140 IF I-2>=0 THEN MID$(TS,LEN(
TS)-5,3)=RIGHT$(IX$(I-2),3) ELSE
MID$(TS,LEN(TS)-5,3)=RIGHT$(IX$(
LO-1),3)
2150 LSET S$=TS
2160 PUT #1,J
2170 NEXT
2180 UNLOAD
2190 LA=VAL(RIGHT$(IX$(LO-1),3))
:FR=VAL(RIGHT$(IX$(0),3)):GOTO64
0
2200 '
2210 'printer report
2220 GOSUB 720:GOSUB 850
2230 GOSUB 2450
2240 PG=1
2250 GOSUB 2360
2260 FOR J=1 TO LO
2270 IF J=1 THEN GET #1,FR ELSE
GET #1,VAL(RIGHT$(S$,3))
2280 FOR I=1 TO N
2290 PRINT#DV,USING"%" +STRING$(
TB(I),32)+"%";MID$(S$,S(I),L(I))
;
2300 NEXT I
2310 PRINT#DV
2320 LX=LX+1
2330 IF LX=LP THEN GOSUB 2430:PG
=PG+1:GOSUB 2360:LX=0:
2340 NEXT J
2350 GOTO 40
2360 'HEADER
2370 PRINT#DV,"REPORT OF FILE "F
$" page"PG
2380 PRINT#DV
2390 FOR II=1 TO N:PRINT#DV,USIN
G"%" +STRING$(TB(II),32)+"%";F$(
II);
2400 NEXT II

```

```

2410 PRINT#DV
2420 RETURN
2430 'FOOTER
2440 FOR I=1 TO 3:PRINT#DV:NEXT:
RETURN
2450 'TAB
2460 FOR I=1 TO N
2470 IF LEN(F$(I))>L(I) THEN TB(
I)=LEN(F$(I))ELSE TB(I)=L(I)
2480 TB(0)=TB(0)+TB(I)
2490 NEXT I
2500 LP=60/(INT(TB(0)/80+.999))
2510 RETURN
2520 '
2530 CLS
2540 'directory and kill files
2550 PRINT FREE(0)"GRANULES FREE
"
2560 FORI=3TOLL
2570 DSKI$0,17,I,A$,B$
2580 FOR J=0 TO 3
2590 C$=MID$(A$,J*32+1,12):D$=MI
D$(B$,J*32+1,12)
2600 IF LEFT$(C$,1)=CHR$(255) TH
EN 2740
2610 IF LEFT$(C$,1)=CHR$(0) THEN
2670
2620 X=INSTR(C$," "):IF X=0 THEN
X=8 ELSE X=X-1
2630 IF MID$(C$,8,1)<>"0" THEN 2
670
2640 NN$=LEFT$(C$,X)+"/"+MID$(C$
,9,3):K=K+1
2650 IF KP=1 THEN IF LEFT$(NN$,8
)=F1$ THEN KILL NN$:PRINT NN$" K
ILLED":GOTO 2670
2660 PRINT NN$
2670 IF LEFT$(D$,1)=CHR$(255) TH
EN 2740
2680 IF LEFT$(D$,1)=CHR$(0) THEN
2740
2690 X=INSTR(D$," "):IF X=0 THEN
X=8 ELSE X=X-1
2700 IF MID$(D$,8,1)<>"0" THEN 2
740
2710 NN$=LEFT$(D$,X)+"/"+MID$(D$
,9,3):K=K+1
2720 IF KP=1 THEN IF LEFT$(NN$,8
)=F1$ THEN KILL NN$:PRINT NN$" K
ILLED":GOTO 2740
2730 PRINT NN$
2740 NEXT J
2750 NEXT I
2760 PRINT"HIT ANY KEY TO CONTIN
UE"
2770 EXEC 44539
2780 GOTO 40
2790 '
2800 'sort routine w.barden trs8
0 news
2810 A=0:NN=0
2820 DEFUSR0=&H0E02
2830 NN=VARPTR(IX$(0))
2840 POKE &H0E00,INT(NN/256)
2850 POKE &H0E01,NN-INT(NN/256)*
256
2860 A=USR0(0)
2870 RETURN
2880 FOR ADDR=&H0E02 TO &H0E68:R
EAD A$:POKE ADDR,VAL("&H"+A$):NE
XT
2890 DATABE,0E,00,34,10,EE,E4,AE
,5E,30,1F,4F,34,12,A6,C4,27,2A,A
6,C4,E6,45,A0,45,24,02,E6,C4,34
,01,AE,42,10,AE,47,6D,45,26,04,32
,61,20,29,A6,80,A0,A0,27,04,32,6
1,20,05,5A,26,F3,35,01,23,18,AE,
42,10,AE,47,AF,47,10,AF,42,A6,C4
,E6,45,E7,C4,A7,45,EA,45
2900 DATABE,A4,E7,E4,33,45,AE,61
,30,1F,AF,61,26,B0,A6,E4,32,63,2
6,A1,32,62,39
2910 RETURN
2920 '
2930 ' initialize
2940 PMODE:PCLEAR1:CLEAR10000
2950 IF PEEK(&HE02)<>190 THEN GO
SUB 2880
2960 DIM F$(20),L(20),S(20),P(20
),IX$(400),TB(20)
2970 GOTO 50

```

END

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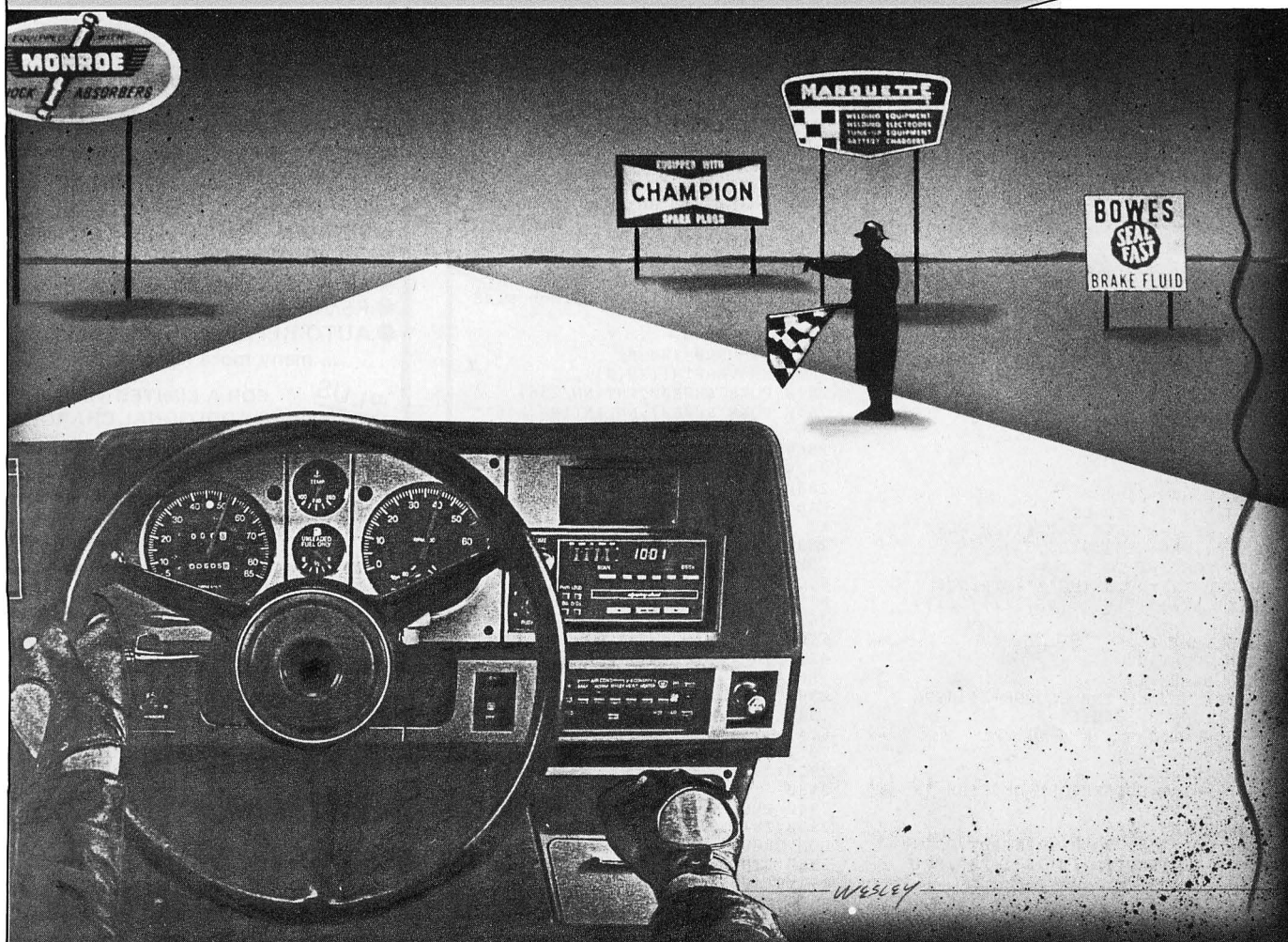


GAME

BY ROB AINSCOUGH

# TACH IT UP, TACH IT UP, BUDDY,

Illustration by Carl Wesley





# GONNA SHUT YOU DOWN

At last—a CoCo game that combines decision making and graphics to make you a world-class drag racer.

**D**rag Race is not your typical computer game; it has something the others lack: variety. You custom make each game of Drag Race, choosing what equipment your car will have. When it's time to race, a graphics screen appears and the cars take off.

One or two can play Drag Race. You choose what type of body, engine, drive train, differential, transmission, fuel system, and turbo system that your car

## System Requirements

32K RAM  
Extended Color Basic

C\$	Stores the values of each car
E\$	Contains various sizes of engines
B\$	Contains various body types
DR\$	Contains various drive trains
DF\$	Contains various differentials
T\$	Contains various transmissions
CBS	Contains various fuel systems
TBS	Contains various turbo systems
P1 & P2	Contain graphics dots of cars (G,P)
PS & IP	Contain reset dots of cars
NP	Number of players
TIME	How many times the cars went through the movement loop
TS	Top speed of car 1
TSP	Top speed of car 2

Table 1. Program Variables

will have. Each equipment list is numbered, and each item is priced according to performance. Be careful making your selections. You don't have enough money to buy the best of everything. Choose the item you want by pressing the appropriate number key. Once you have entered your cars, the menu appears.

The menu contains the following six options: 1) Player one, purchase new parts; 2) Player two, purchase new parts; 3) Generate a new computer car; 4) Start race; 5) Print out cars; 6) Start game over. Input four to start the race.

The screen draws the quarter-mile drag strip and the starting lights, and flashes the blue light to start the race. The first car to cross the finish line wins, the race is completed, and the program returns you to the menu. If there is one player against the computer, the computer will automatically generate a new car after every race.

Following each race, the computer

states the winner, cash awarded, time of completion, and top speed for each player. It is also possible that your car has been damaged. If you receive too much damage, you cannot race. At this point you may or may not receive a loan. If you do, it appears on the screen.

The race still continues, but the damaged car doesn't move. During every race both players run the risk of damage to their cars. A damaged car, although it doesn't move, coasts to the finish line and can be damaged that way.

When you purchase replacement parts, you have no trade-in value for the old parts, and you must have enough cash. After 20 races or \$50,000, the player who wins the most races is the National Champion. If you are challenging the computer, you must have the best time, speed, race percentage, and most total cash printed on the screen to win. If there is a tie, neither player receives this honor. ■

*continued*

Address correspondence to Rob Ainscough, 708 Cheyenne Drive, Walnut Creek, CA 94598.

80-220	Dimension and read DATA lines, which are stored in an array
370-950	List the characteristics of each section and input the players' choice of parts
970-1180	Assess each car and draw the drag strip, start race, determine winner
1200-1230	Randomly generate computer car
1240-1400	Compute time and top speed, and check for damage from race
1420	Menu, which processes each player's input
1450-1600	Print out the characteristics of each car and assign burnt up parts to those cars damaged
1870-2080	Print out instructions if requested
2090-2360	Print the best times and speeds of each player at the end of the championship, along with the winner and percentages of races won
2370-2480	Issue a loan to those players who have a large amount of damage and can't race

Table 2. Drag Race Line Descriptions

Program Listing. Drag Race

```

70 CLS: CLEAR 0: CLEAR 1000
80 DIM C$(2,25), E$(12,3), B$(13),
DR$(5,3), DF$(5,3), T$(5,3), CB$(6,
3), TB$(5,3), IP(14,16), P1(14,16),
P2(14,16), PS(14,16)
90 DATA 590,14000,10,500,12000,9
,490,11500,9,465,11000,8,455,110
00,9,454,10900,8,427,10000,7,400
,9200,7,351,9000,6,350,9000,6,30
2,7500,5,289,3000,2
100 DATA CHEVELLE,PINTO,CAPRI.LA
MBOURGHINI,PORSCHE,TOYOTA,CORVET
TE,JEEP,TRANS AM,2-28,280Z,BMW,F
ERARRI
110 DATA ALUMINUM ALLOY,4000,5,M
ETAL ALLOY,3000,4,WIDE PERFORMAN
CE SHAFT,2500,3,THIN PERFORMANCE
SHAFT,2000,2,RACING SHAFT,1000,
1
120 DATA CUSTOM POSY HIGH-LOW,60
00,3, POSY MID TORQUE,4000,2, POSY
HIGH TORQUE,3500,2, POSY LOW TOR
QUE,2000,1, RACE TORQUE,1000,0
130 DATA 5-SPEED SHIFT LINKAGE,7
000,7,4-SPEED SHIFT LINKAGE,6500
,6,3-SPEED SHIFT LINKAGE,6000,5,
5-SPEED (HP),5000,3,4-SPEED (HP)
,5000,4
140 DATA DUEL INJECTION+NITRO,80
00,8,DUEL FUEL INJECTION,4000,5,
8 SINGLE BBL,3500,4,2 4BBL HOLLE
Y,3000,3,4BBL HOLLEY,2000,2,4BBL
,1000,1
150 DATA 4 DUEL LINKED TURBOS,20
00,5,2 TURBO (HP),1500,4,1 TURBO
(HP),1000,3,1 TURBO,500,1
160 FOR A=1 TO 12:FOR B=1 TO 3:R
EAD E$(A,B):NEXT B,A
170 FOR A=1 TO 13:READ B$(A):NEX
T A
180 FOR A=1 TO 5:FOR B=1 TO 3:RE
AD DR$(A,B):NEXT B,A
190 FOR A=1 TO 5:FOR B=1 TO 3:REA
D DF$(A,B):NEXT B,A
200 FOR A=1 TO 5:FOR B=1 TO 3:RE
AD T$(A,B):NEXT B,A
210 FOR A=1 TO 6:FOR B=1 TO 3:RE
AD CB$(A,B):NEXT B,A
220 FOR A=1 TO 4:FOR B=1 TO 3:RE
AD TB$(A,B):NEXT B,A
230 C$(1,24)=STR$(100):C$(2,24)=
STR$(100)
240 PRINT@164, "WELCOME TO DRAG
RACE"
250 PRINT@228, "HIT ANY KEY TO S
TART"
260 A$=INKEY$:IF A$="" THEN A=RN
D(12):B=RND(6):GOTO 260
270 CLS:PRINT@225, "WOULD YOU LIK
E INSTRUCTIONS":INPUT IN$
280 IF LEFT$(IN$,1)="" THEN GOT
O 1870
290 CLS
300 PRINT:INPUT "ENTER NUMBER OF
PLAYERS(1-2)":NP
310 IF NP=1 GOSUB 1190
320 IF NP>2 OR NP<1 THEN 290
330 CLS
340 FOR D=1 TO NP:C$(D,23)=STR$(
(RND(10)*1000)+19000):PRINT"PLAY
ER "D" HAS "C$(D,23)" DOLLARS":N
EXT D
350 FOR A=1 TO 1500:NEXT A
360 CLS
370 FOR D=1 TO NP
380 PRINT "PLAYER "D
390 INPUT"ENTER NAME":C$(D,0):CL
S
400 IF CH>0 THEN D=CH:CLS
410 PRINT "body type"
420 FOR A=1 TO 13:PRINT A;B$(A):
NEXT A
430 INPUT "ENTER #":B:IF B=0 THE
N CLS:GOTO 450
440 C$(D,1)=B$(B):CLS

```

```

450 PRINT "engine size"
460 PRINT "CASH="C$(D,23)
470 FOR A=1 TO 12:PRINT:PRINT A;
:FOR B=1 TO 2:PRINT E$(A,B) " ";:N
EXT B,A
480 PRINT:INPUT "ENTER #":E
490 IF E=0 THEN CLS:GOTO 530
500 IF VAL(E$(E,2))>VAL(C$(D,23)
) THEN GOTO 480
510 I=VAL(C$(D,23)):J=VAL(E$(E,2
)):H=I-J:C$(D,23)=STR$(H)
520 C$(D,2)=E$(E,1):C$(D,3)=E$(E
,2):C$(D,4)=E$(E,3):CLS
530 PRINT "drive train"
540 PRINT "CASH="C$(D,23)
550 FOR A=1 TO 5:PRINT:PRINT A;:
FOR B=1 TO 2:PRINT DR$(A,B) " ";:
NEXT B,A
560 PRINT:INPUT "ENTER #":DR
570 IF DR=0 THEN CLS:GOTO 610
580 IF VAL(DR$(DR,2))>VAL(C$(D,2
3)) THEN 560
590 I=VAL(C$(D,23)):J=VAL(DR$(DR
,2)):H=I-J:C$(D,23)=STR$(H)
600 C$(D,5)=DR$(DR,1):C$(D,6)=DR
$(DR,2):C$(D,7)=DR$(DR,3):CLS
610 PRINT:PRINT"differential"
620 PRINT "CASH="C$(D,23)
630 FOR A=1 TO 5:PRINT:PRINT A;:
FOR B=1 TO 2:PRINT DF$(A,B) " ";:
NEXT B,A
640 PRINT:INPUT"ENTER #":DF
650 IF DF=0 GOTO 690
660 IF VAL(DF$(DF,2))>VAL(C$(D,2
3)) THEN 640
670 I=VAL(C$(D,23)):J=VAL(DF$(DF
,2)):H=I-J:C$(D,23)=STR$(H)
680 C$(D,8)=DF$(DF,1):C$(D,9)=DF
$(DF,2):C$(D,10)=DF$(DF,3)
690 CLS
700 PRINT:PRINT"transmission"
710 PRINT "CASH="C$(D,23)
720 FOR A=1 TO 5:PRINT:PRINT A;:
FOR B=1 TO 2:PRINT T$(A,B) " ";:N
EXT B,A
730 PRINT:INPUT "ENTER #":T
740 IF T=0 THEN CLS:GOTO 780
750 IF VAL(T$(T,2))>VAL(C$(D,23)
) THEN 730
760 I=VAL(C$(D,23)):J=VAL(T$(T,2
)):H=I-J:C$(D,23)=STR$(H)
770 C$(D,11)=T$(T,1):C$(D,12)=T$(
T,2):C$(D,13)=T$(T,3):CLS
780 PRINT:PRINT"fuel system"
790 PRINT "CASH="C$(D,23)
800 FOR A=1 TO 6:PRINT:PRINT A;:
FOR B=1 TO 2:PRINT CB$(A,B) " ";:
NEXT B,A
810 PRINT:INPUT "ENTER #":CB
820 IF CB=0 THEN CLS:GOTO 860
830 IF VAL(CB$(CB,2))>VAL(C$(D,2
3)) THEN 810
840 I=VAL(C$(D,23)):J=VAL(CB$(CB
,2)):H=I-J:C$(D,23)=STR$(H)
850 C$(D,14)=CB$(CB,1):C$(D,15)=
CB$(CB,2):C$(D,16)=CB$(CB,3):CLS
860 PRINT:PRINT"turbo system"
870 PRINT "CASH="C$(D,23)
880 FOR A=1 TO 4:PRINT:PRINT A;:
FOR B=1 TO 2:PRINT TB$(A,B) " ";:N
EXT B,A
890 PRINT:INPUT "ENTER #":TB
900 IF TB=0 THEN CLS:GOTO 940
910 IF VAL(TB$(TB,2))>VAL(C$(D,2
3)) THEN 890
920 I=VAL(C$(D,23)):J=VAL(TB$(TB
,2)):H=I-J:C$(D,23)=STR$(H)
930 C$(D,17)=TB$(TB,1):C$(D,18)=
TB$(TB,2):C$(D,19)=TB$(TB,3):CLS
940 IF CH>0 THEN GOTO 1420
950 NEXT D
960 GOTO 1420
970 CLS:PRINT@228, " ";:INPUT"ARE
YOU READY (Y/N)":AN$:IF AN$<>"Y
" THEN 970

```

```

980 XX=0:YY=0:W=0:Z=0:TIME=0
990 FOR A=1 TO 2:V1=VAL(C$(A,4))
:V2=VAL(C$(A,7)):V3=VAL(C$(A,10)
):V4=VAL(C$(A,13)):V5=VAL(C$(A,1
6)):V6=VAL(C$(A,19)):TV(A)=V1+V2
+V3+V4+V5+V6
1000 IF TV(A)<13 THEN CLS: PRINT
@224, "PLAYER"A"CAN'T RACE; TOO S
LOW.":FOR DE=1 TO 1500:NEXT DE:G
OSUB 2370
1010 NEXT A
1020 IF TV(1)<13 AND TV(2)<13 TH
EN GOSUB 2450:GOTO 1420
1030 CLS:PMODE 3,1:PCLS:SCREEN 1
,0
1040 LINE(0,72)-(255,72),PSET:LI
NE(0,136)-(255,136),PSET:LINE (2
28,72)-(228,136),PSET
1050 FOR A=0 TO 255 STEP 8:LINE(
A,104)-(A+4,104),PSET:NEXT A
1060 LINE(2,76)-(5,79),PSET,B:LI
NE(0,80)-(13,87),PSET,B:LINE (2,
88)-(5,91),PSET,B:LINE(10,78)-(1
1,79),PSET,B:LINE(10,88)-(11,89)
,PSET,B:GET(0,0)-(14,16),PS,G:GE
T(0,76)-(13,91),IP,G
1070 PUT(0,116)-(13,131),IP,PSET
:PAINT(8,84),2,4:PAINT(8,124),3,
4:GET(0,76)-(13,91),P1,G:GET(0,1
16)-(13,131),P2,G
1080 PAINT(128,160),3,4
1090 K1$="C1G3E3D10L4R8":KL$="L4
R8D4L8D4R8C4"
1100 LINE(20,12)-(48,60),PSET,B:
PAINT(128,28),3,4:DRAW"BM7,60;"+
K1$:DRAW "BM7,142;"+KL$:CIRCLE(3
4,22),7:PAINT(34,22),4,4:SOUND 1
00,5:CIRCLE(34,36),7:PAINT(34,36
),2,4:SOUND 100,5:CIRCLE(34,48),
7:PAINT(34,48),3,4:SOUND 150,5
1110 W=XX:Z=YY:TIME=TIME+1
1120 X=RND(4)+8:Y=RND(4)+8:XX=XX
+TV(1)-X:YY=YY+TV(2)-Y
1130 IF XX<0 THEN XX=0
1140 IF YY<0 THEN YY=0
1150 PUT(W,76)-(W+13,91),PS,PSET
:PUT(Z,116)-(Z+13,131),PS,PSET
1160 PUT(XX,76)-(XX+13,91),P1,PS
ET:PUT(YY,116)-(YY+13,131),P2,PS
ET
1170 IF XX+13>=228 OR YY+13>=228
THEN GOTO 1260
1180 GOTO 1110
1190 REM COMPUTER GENERATED CAR
1200 C$(2,0)="COMPUTER CAR"
1210 A=RND(13):C$(2,1)=B$(A):A=R
ND(12):C$(2,2)=E$(A,1):C$(2,3)=E
$(A,2):C$(2,4)=E$(A,3):A=RND(5):
C$(2,5)=DR$(A,1):C$(2,6)=DR$(A,2
):C$(2,7)=DR$(A,3):A=RND(5):C$(2
,8)=DF$(A,1):C$(2,9)=DF$(A,2):C$(
2,10)=DF$(A,3)
1220 A=RND(5):C$(2,11)=T$(A,1):C
$(2,12)=T$(A,2):C$(2,13)=T$(A,3)
:A=RND(6):C$(2,14)=CB$(A,1):C$(2
,15)=CB$(A,2):C$(2,16)=CB$(A,3):
A=RND(4):C$(2,17)=TB$(A,1):C$(2,
18)=TB$(A,2):C$(2,19)=TB$(A,3)
1230 A=RND(9):C$(2,21)=STR$(A):B
=RND(10):C=A+B:C$(2,22)=STR$(C):
C$(2,20)=STR$(C):C$(2,23)=STR$(0
)
1240 IF CH>0 THEN GOTO 1420
1250 RETURN
1260 FOR A=1 TO 1000:NEXT A
1270 IF TS>TT THEN C$(1,25)=STR$(
TS)
1280 IF PTS>TU THEN C$(2,25)=STR
$(PTS)
1290 I=((XX/TIME)-32)*-1:J=((YY/
TIME)-32)*-1:K=VAL(C$(1,24)):L=V
AL(C$(2,24)):TM=I:TL=J
1300 TS=(XX/I)*3.9+35:PTS=(YY/J)
*3.9+35:TT=VAL(C$(1,25)):TU=VAL(

```

Listing continued

```

C$(2,25))
1310 IF I<K THEN C$(1,24)=STR$(I
)
1320 IF J<L THEN C$(2,24)=STR$(J
)
1330 SCREEN 0,0:CLS
1340 CH=0
1350 IF XX>YY THEN A=1:B=2:GOSUB
1450
1360 IF XX<YY THEN A=2:B=1:GOSUB
1450
1370 IF XX=YY THEN CH=4:GOTO 158
0
1380 IF NP=1 THEN GOSUB 1190
1390 FOR A=1 TO 2 :I=VAL(C$(A,22
)):J=VAL(C$(A,23))
1400 IF I=20 OR J>=50000 THEN GO
TO 2100
1410 NEXT A
1420 CLS:PRINT@109,"menu":PRINT"
1. PLAYER 1 PURCHASE NEW PARTS":
PRINT"2. PLAYER 2 PURCHASE NEW P
ARTS":PRINT"3. NEW COMPUTER CAR"
:PRINT"4. START A RACE":PRINT"5.
PRINT OUT CARS":PRINT"6. START
OVER"
1430 INPUT "ENTER CHOICE";CH:IF
CH=0 THEN 1420
1440 ON CH GOTO 400,400,1190,970
,1610,70
1450 IF A=2 AND NP=1 THEN PRINT
@ 105,"COMPUTER WON":I=VAL(C$(1,
20)):J=I+1:C$(1,20)=STR$(J):I=VA
L(C$(1,22)):J=I+1:C$(1,22)=STR$(
J):I=VAL(C$(1,23)):J=I+500:C$(1,
23)=STR$(J):GOTO 1510
1460 PRINT@9,"PLAYER "A" WON":I
=VAL(C$(A,20)):J=I+1:C$(A,20)=ST
R$(J):I=VAL(C$(A,21)):J=I+1:C$(A
,21)=STR$(J):I=VAL(C$(A,22)):J=I
+1:C$(A,22)=STR$(J):I=VAL(C$(B,2
0)):J=I+1:C$(B,20)=STR$(J):I=VAL
(C$(B,22)):J=I+1:C$(B,22)=STR$(J
)
1470 CA=RND(5)*1000
1480 PRINT
1490 PRINT "PLAYER "A" RECEIVES
$"CA:I=VAL(C$(A,23)):J=I+CA:C$(A
,23)=STR$(J)
1500 PRINT "PLAYER "B" RECEIVES
$ 500":I=VAL(C$(B,23)):J=I+500:C
$(B,23)=STR$(J)
1510 PRINT:PRINT"PLAYER 1'S TIME
IS ";:PRINT USING"###.##";TM:PRI
NT USING"TOP SPEED=###.##";TS:PR
INT "PLAYER 2'S TIME IS ";:PRINT
USING"###.##";TL
1520 PRINT USING"TOP SPEED=###.#
#";PTS
1530 REM DAMAGE CHECK
1540 GOSUB 1760
1550 PRINT@457,"PRESS ANY KEY"
1560 A$=INKEY$:IF A$="" THEN A=R
ND(6):GOTO 1560
1570 RETURN
1580 PRINT@224,"YOU HAVE TIED!
STAND BY FOR A REMATCH."
1590 FOR A=1 TO 1000:NEXT A
1600 GOTO 970
1610 CLS
1620 FOR A=1 TO 2
1630 CLS:PRINT
1640 FOR B=0 TO 18
1650 IF B=4 OR B=7 OR B=10 OR B=
13 OR B=16 THEN 1690
1660 PRINT C$(A,B) " ";
1670 IF B=0 OR B=1 THEN PRINT
1680 IF B/3=INT(B/3) THEN PRINT
1690 NEXT B
1700 PRINT"EXPERIENCE="C$(A,20):
PRINT"RACES WON="C$(A,21):PRINT"
TOTAL RACES="C$(A,22):PRINT"TOT
AL CASH="C$(A,23)
1710 PRINT "PRESS TO CONTINUE"
1720 A$=INKEY$:IF A$="" THEN RJ=
RND(20):GOTO 1720
1730 NEXT A
1740 IF EG=1 THEN GOTO 2130
1750 GOTO 1420
1760 FOR A=1 TO 2
1770 H=RND(18)

```

```

1780 IF H<14 THEN 1850
1790 H=(RND(6)*3)-1:HZ=H
1800 IF C$(A,H)="BURNT UP" OR C$
(A,H)="" THEN 1850
1810 PRINT "UNFORTUNATELY PLAYER
"A" RUINED HIS/HER "C$(A,H):C$(
A,H)="BURNT UP":C$(A,H+1)="" :C$
(A,H+2)=STR$(0)
1820 IF H<18 THEN 1850
1830 H=(RND(6)*3)-1:IF HZ=H THEN
1830
1840 PRINT"PLAYER"A"ALSO LOST HI
S/HER "C$(A,H):C$(A,H)="BURNT UP
":C$(A,H+1)="" :C$(A,H+2)=STR$(0
)
1850 NEXT A
1860 RETURN
1870 CLS:PRINT"THIS GAME MAY BE
PLAYED BY 1 OR 2 PLAYERS. IF ONE
PLAYER IS SELECTED, THEN THE CO
MPUTER WILL AUTOMATICALLY CREAT
A RANDOM CAR. IF 2 PLAYERS ARE S
ELECTED, THEN EACH PLAYER IS GIV
EN A RANDOM AMOUNT OF CASH."
1880 PRINT"THE PLAYERS MUST DECI
DE, BEFORE HAND, WHO WILL BE PLA
YER 1 AND WHO WILL BE PLAYER 2.
IF THERE IS JUST 1 PLAYER THEN T
HE COMPUTER BECOMES PLAYER 2."
1890 PRINT:PRINT"PRESS ANY KEY T
O CONTINUE"
1900 A$=INKEY$:IF A$="" THEN A=R
ND(6):GOTO 1900
1910 CLS:PRINT"EACH PLAYER WILL
BUY THE PARTS HE/SHE WISHES, ASS
UMING HE/SHE HAS ENOUGH MONEY. I
F THE PLAYER DOESN'T HAVE ENOUGH
MONEY OR WANTS TO SKIP THE SECT
ION THEN PRESS enter. THERE ARE
7 CATAGORIES TO PICK FROM; BODY
TYPE IS FREE."
1920 PRINT"IF A PLAYER DOESN'T P
ICK A PART OR HAS A PART BURNT U
P, THEN HIS/HER CAR'S PERFORMANC
E WILL DECREASE."
1930 PRINT:PRINT"PRESS ANY KEY T
O CONTINUE"
1940 A$=INKEY$:IF A$="" THEN A=R
ND(12):GOTO 1940
1950 CLS:PRINT"IF ANY PLAYER WIS
HES TO PURCHASE A NEW PART, PRES
S 1 OR 2 ON THE MENU. THIS WILL
ASK THE SAME QUESTIONS AT THE BE
GINING OF THE GAME. IF YOU WISH
TO SKIP A SECTION PRESS enter."
1960 PRINT"IF 3 IS SELECTED FROM
THE MENU, THEN A COMPUTER CAR W
ILL BE GENERATED. MAKE SURE YOU
ARE IN PLAYER 1 MODE WHEN DOING
SO."
1970 PRINT:PRINT"PRESS ANY KEY T
O CONTINUE"
1980 A$=INKEY$:IF A$="" THEN A=R
ND(20):GOTO 1980
1990 CLS:PRINT"IF YOU SELECT 4,
THEN THE RACE WILL START. IF YO
UR CAR HAS TOO MUCH DAMAGE TO RA
CE, THE COMPUTER WILL TELL YOU S
O. AFTER EACH RACE THE COMPUTER
WILL AUTOMATICALLY GENERATE A NE
W COMPUTER CAR. YOUR CAR MAY ALS
O BE DAMAGED."
2000 PRINT"YOU MAY STILL RACE WI
TH DAMAGED PARTS, BUT THIS WILL
DECREASE YOUR CARS PERFORMANCE.
IF YOU SELECT 6, THE GAME WILL S
TART OVER. THE CHAMPIONSHIP WILL
END AFTER 20 RACES OR THE FIRST
TO $50000."
2010 PRINT "PRESS ANY KEY TO CON
TINUE"
2020 A$=INKEY$:IF A$="" THEN A=R
ND(18):GOTO 2020
2030 CLS
2040 PRINT"THE WINNER WILL BE TH
E PERSON WITH THE MOST RACES WON
. IF A CAR IS BADLY DAMAGED, THE
RE IS A CHANCE THE PLAYER(S) WIL
L RECEIVE A LOAN. IF BOTH PLAYE
R S CARS ARE UNABLE TO RACE THEN,
THE COMPUTER WILL RETURN YOU TO

```

```

THE menu."
2050 PRINT"KEEP TRYING TO RECEIV
E A LOAN BY SELECTING 4 ON THE M
ENU. GOOD LUCK!!!"
:PRINT
2060 PRINT"PRESS ANY KEY TO CONT
INUE"
2070 A$=INKEY$:IF A$="" THEN A=R
ND(6):GOTO 2070
2080 PRINT
2090 GOTO 290
2100 CLS:PRINT@230,"END OF CHAM
PIONSHIP":EG=1
2110 FOR DE=1 TO 1000:NEXT DE
2120 GOTO 1610
2130 CLS
2140 FOR A=1 TO NP
2150 J=VAL(C$(A,21)):K=VAL(C$(A,
23)):I=J/20
2160 PRINT"PLAYER"A"PERCENT OF R
ACES WON IS ";:PRINT USING"###.#
";I*100:PRINT "WITH TOTAL AMOUNT
OF CASH"K
2170 NEXT A
2180 PRINT:PRINT"PRESS ANY KEY T
O CONTINUE"
2190 A$=INKEY$:IF A$="" THEN A=R
ND(20):GOTO 2190
2200 CLS
2210 IF NP=1 THEN 2320
2220 J=VAL(C$(1,21)):K=VAL(C$(2,
21)):CLS
2230 IF J>K THEN 2290
2240 IF J=K THEN PRINT"YOU'VE BO
TH TIED; I'M AFRAID WE CAN'T GIV
E AWAY TWO CUPS, SO I SUGGEST A
REMATCH":PRINT:GOTO 2300
2250 PRINT "PLAYER 2 IS THEN NAT
IONAL CHAMPION DRAG RACER. BETTE
R LUCK NEXT TIME PLAYER 1.":PRIN
T
2260 PRINT "PLAYER 2'S BEST TIME
";:RT=VAL(C$(2,24)):PRINT USING
"###.##";RT:RT=VAL(C$(2,25)):PRIN
T USING"BEST TOP SPEED=###.##";R
T:PRINT"PLAYER 1'S BEST TIME "
";:RY=VAL(C$(1,24)):PRINT USING"###
.##";RY
2270 RT=VAL(C$(1,25)):PRINT USING
"BEST TOP SPEED=###.##";RT
2280 GOTO 2340
2290 PRINT "PLAYER 1 IS THE NATI
ONAL CHAMPION DRAG RACER. BETTER
LUCK NEXT TIME PLAYER 2.":PRINT
2300 PRINT "PLAYER 2'S BEST TIME
";:RY=VAL(C$(2,24)):PRINT USING
"###.##";RY
2310 TY=VAL(C$(2,25)):PRINT USIN
G"PLAYER 2'S BEST TOP SPEED=###.
##";TY
2320 PRINT "PLAYER 1'S BEST TIME
";:RX=VAL(C$(1,24)):PRINT USING
"###.##";RX
2330 TX=VAL(C$(1,25)):PRINT USIN
G"PLAYER 1'S BEST TOP SPEED=###.
##";TX
2340 INPUT "WOULD YOU LIKE TO PL
AY AGAIN";PL$
2350 IF LEFT$(PL$,1)="Y" THEN 70
2360 END
2370 I=RND(6):J=RND(6):H=I+J
2380 TV(A)=8
2390 IF H>7 THEN GOSUB 2410
2400 RETURN
2410 CLS:PRINT@192,"FORTUNATELY,
PLAYER"A"HAS RECEIVED A LOAN OF
";
2420 LO=(RND(6)*1000)+1000:PRINT
LO:I=VAL(C$(A,23)):J=I+LO:C$(A,
23)=STR$(J)
2430 FOR DE=1 TO 1000:NEXT DE
2440 RETURN
2450 CLS:PRINT "YOU BOTH WERE U
NABLE TO RACE, SO I SUGGEST YOU
KEEP TRYING UNTIL YOU RECEIVE A
LOAN."
2460 PRINT@322,"PRESS ANY KEY TO
CONTINUE"
2470 A$=INKEY$:IF A$="" THEN PP=
RND(6):GOTO 2470
2480 RETURN

```

# To EDIT, OR NOT TO EDIT

**S[ave]** Save a file to a device Try saving a file to

I appreciate an editor that is easy to use, consistent with convention in command syntax, and powerful in its function. This editor is similar to the line-oriented editors used on IBM mainframe computers operating under CMS or TSO, and it includes some powerful global functions.

Use it to create or edit Basic, Assembly or data source files in the ASCII format or as a word processor. It executes commands quickly and handles files up to about 400 lines or 20K in a 32K disk system. The program works in a 16K system by adjusting the DIMENSION and CLEAR statements (lines 60 and 2380). You increase the DIM statement at the expense of string space CLEARED. You can optimize this for the type and size of files that you normally edit. Delete program comments to get the maximum memory space.

Table 1 lists the program's commands. The brackets mean that the parameter is optional. Do not type the brackets. You can enter one-letter commands in upper- or lowercase.

This editor can delete spaces, trace program flow by locating GOSUB and GOTO commands, and find the

Table 1. Editor Commands

<b>H[elp]</b>	Gives a brief description of each command on the screen.
<b>T[nN]</b>	Type n lines to the screen. The n can be an * meaning type remaining lines or it can be omitted meaning type the current line. The N is optional and means to number the lines as they are listed. Hitting enter stops the listing. Hitting it again starts it. Any other key followed by enter aborts the listing. The cursor moves to the last line typed.
<b>P[nN]</b>	Same as T command but send to printer.
<b>TO[P]</b>	Move line pointer to top of file.
<b>B</b>	Move line pointer to end of file.
<b>U[n]</b>	Up n lines.
<b>D[n]</b>	Down n lines.
<b>n</b>	Similar to U or D. The n can be + or -. The line pointer is moved relative to the current location.
<b>:n</b>	Put the line pointer on the nth line of the file. The top of the file is line 1.
<b>E[dit]</b>	Edit a file. Program prompts for file name, input device number, load or append (merge files). Devices are: -2 = printer, -1 = cassette, 0 = keyboard, 1 = disk files.
<b>S[ave]</b>	Save a file to a device. Try saving a file to device 0 (screen) or -2 (printer).
<b>L /abc[/] or F /abc[/] or /abc[/]</b>	Locate the next occurrence of string abc on the current line or anywhere below the current line pointer. F /abc and /abc are synonymous. Line and column pointers move. The cursor points to the first character.
<b>C /abc/def[/]</b>	Change abc to def on the current line anywhere right of the current cursor position. The cursor position is updated.
<b>C /abc/def/*</b>	Change the next occurrence of abc anywhere in the file to def.
<b>C /abc/def/**</b>	Change all remaining occurrences of abc to def starting on the current

## System Requirements

32K RAM  
Disk Extended Color Basic  
Printer (optional)

Whether you're altering a program or composing a letter, this program's features make it easier.

device 0 (screen) or -2 (printer). L /abc[/] or F /abc[

line at the cursor. Use this form of the command to find all occurrences of a particular string by changing it to itself, e.g., C /abc/abc/\*\* lists lines on which abc is found.

<b>CF</b>	Move the column pointer to column 1 of the current line.
<b>DEL[n]</b>	Delete the next n lines.
<b>DEL a,b</b>	Delete from line a to line b.
<b>A</b>	Add lines to the end of the file. The optional prompt for line size puts delimiters on the screen. This is useful in word processing for keeping margins. A /* on a line by itself terminates Add mode.
<b>I[n]</b>	Insert n lines after the current line.
<b>Xabc</b>	Extend the current line with the string abc.
<b>Rabc</b>	Replace the current line with the string abc.
<b>Z</b>	Zap or truncate the current line at the current column position.
<b>COPY a,b,c</b>	Copy lines from line a to line b and insert after line c. Line b must be greater than a. Line c must not be in the range <a,c>. Line c may be line 0. This allows lines to be copied to the top of the file. The variable MS, currently set to 10, is the maximum number of lines to move or copy. The cursor points to the first line of the copied section after the copy.
<b>Move a,b,c</b>	Same as copy but deletes the old lines.
<b>QUIT</b>	End the program. CONT restarts it if no errors have been made between QUIT and CONT. GOTO 2050 also restarts without losing text in memory.
<b>ENTER</b>	The enter key causes the last command to be executed again. This feature allows stepping through the file n lines at a time, e.g., T10 ENTER ENTER. . . types 10 lines and waits until the enter key is pressed, then it does it again. L /abc/ ENTER ENTER . . . continues finding the next occurrence of abc until the end of the file.
<b>DIR[P]</b>	List the directory of drive 0 and the number of free granules. DIRP sends DIR to printer.

<b>AS()</b>	The file buffer
<b>BS()</b>	The move/copy buffer
<b>CS</b>	The command string
<b>CL</b>	The current line
<b>DL\$</b>	The command delimiter
<b>DV</b>	The device number for I/O
<b>E</b>	The end line number for a command
<b>ER</b>	Error switch
<b>FS</b>	File-name specification
<b>F1</b>	First line number specified in command
<b>F2</b>	Second line number specified in command
<b>I</b>	Index variable
<b>LW</b>	Line width for add mode
<b>MS</b>	Maximum number of lines to move/copy
<b>N</b>	Number of lines in the file
<b>NL</b>	Number of lines to move pointer up/down
<b>NM\$</b>	Line number switch
<b>NSS</b>	Value to change OS\$ to in change command
<b>OC</b>	The old value of line pointer
<b>OCS</b>	The last command
<b>OSS</b>	Search string or change string
<b>P</b>	Position of blank in command string
<b>P1</b>	Position of first delimiter in command
<b>P2</b>	Position of second delimiter in command
<b>P3</b>	Column pointer
<b>PP</b>	Controls end of line delimiter in add mode
<b>Z</b>	Number of bytes of I/O

Table 2. Program Variables

continued

locations of variables used in a Basic program. It is best to delete spaces before and after Basic keywords to avoid deleting spaces inside quotes, e.g.:

```
C/ GOSUB /GOSUB/** etc.
```

Some Basic keywords require a space to follow them so the computer recognizes the accompanying variables. ELSE, TO, and THEN are some examples.

The program works well for transferring ASCII files between different devices. When you use the edit and save options, the number of bytes and lines transferred are calculated and displayed.

## The Program

I wrote the program in block structure with each block performing an editing function. Lines 10-80 initialize the program to the appropriate memory size. Control is transferred to line 2050 where commands are decoded and executed and where control returns after the command. You can easily customize the program to use different syntax or add commands. The important variables appear in Table 2.

To run this editor on a 32K cassette system, change lines 350 and 600 to read DV = -1. To run it on a 16K Extended Color Basic cassette system make these line changes:

```
60 DIMA$(100),B$(MS)
350 DV = -1
600 DV = -1
2380 PCLEAR 1: CLEAR5000,16383: GOTO 50
```

This program uses standard Basic syntax and is easily adapted to other types of computers. It runs with very few changes on the IBM PC and is much more functional than the ED-LIN program supplied with the operating system. On an 80-column screen with a tab key, it makes a very good word processor. ■

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# Locate the next occurrence of string abc o

Program Listing. Line Editor with Global Commands

```

10 'W.S. BONNELL GLOBAL EDITOR
   COPYRIGHT 12/29/83 VERSION 1.4
20 CLS
30 PMODE#
35 GOSUB 1080
40 GOTO 2380
50 MS=10
60 DIMA$(400),B$(MS)
70 CL=1:P3=1
80 GOTO2050
90 '
100 'global search L /abc/
110 P=INSTR(C$, " ") + 1
120 DL$=MID$(C$, P, 1)
130 P1=INSTR(P+1, C$, DL$)
140 IF P1=0 THEN P1=LEN(C$)+1
150 OSS=MID$(C$, P+1, P1-P-1)
160 FOR I=CL TON
170 P3=INSTR(P3+1, A$(I), OSS)
180 IF P3<>0 THEN PRINT A$(I): CL=I: R
   ETURN
190 NEXT I
200 PRINT "NOT FOUND"
210 RETURN
220 '
230 'list or print file
240 E=VAL(MID$(C$, 2))
250 IF N<1 THEN N=1: A$(1)="": DV=#: R
   ETURN
260 IF INSTR(C$, "*") > 0 OR CL+E > N T
   HENE=N-CL+1
270 NM$=RIGHT$(C$, 1)
280 B$="": FOR I=CL TO CL+E-1
290 A$=INKEY$: IFA$<>" " THEN LINEIN
   PUT B$
300 IF B$<>" " THEN I=N: GOTO340
310 IF NM$="N" THEN PRINT#DV, USING"
   ### "; I;
320 PRINT#DV, A$(I)
330 NEXT
340 CL=I-1: IF CL>N THEN CL=N
350 DV=#
360 RETURN
370 '
380 'move line pointer up/down
390 IF MID$(C$, 2, 1) = " " THEN CL=VAL
   (MID$(C$, 3)): GOTO430
400 NL=VAL(MID$(C$, 2))
410 IF NL=# THEN NL=1
420 CL=CL+NL: P3=1
430 IF CL>N THEN CL=N
440 IF CL<1 THEN CL=1
450 PRINT A$(CL): P3=1: RETURN
460 '
470 'save file to device#
480 INPUT "ENTER FILENAME "; F$
490 INPUT "DEVICE# "; DV
500 Z=#
510 AUDIOON: OPEN "O", #DV, F$
520 FOR I=1 TON
530 PRINT#DV, A$(I)
540 Z=Z+LEN(A$(I))
550 NEXT
560 CLOSE
570 PRINT Z "BYTES"
580 PRINT N "LINES"
590 PRINT INT(Z/N) "BYTES/LINE"
600 DV=#
610 RETURN
620 '
630 'read file from a device#
640 INPUT "LOAD(L) OR APPEND(A) ";
   A$
650 INPUT "INPUT DEVICE# "; DV
660 IFA$="A" THEN I=N: Z=N ELSE I=#:
   Z=#
670 LINEINPUT "FILENAME "; F$
680 AUDIOON
690 OPEN "I", #DV, F$
700 IF EOF(DV) THEN 770
710 I=I+1
720 LINEINPUT#DV, A$(I)
730 Z=Z+LEN(A$(I))
740 IF DV=# AND A$(I)=CHR$(92) THEN I
   =I-1: Z=Z-1: GOTO700
750 IF I=400 THEN PRINT "BUFFER FULL
   ": GOTO770
760 GOTO700
770 CL=1: PRINT "AT TOP OF FILE"
780 N=I
790 PRINT Z "BYTES"
800 PRINT N "LINES"
810 PRINT INT(Z/N) "BYTES PER LIN
   E"
820 CLOSE
830 RETURN
840 '
850 'change C /abc/def/**
860 P=INSTR(C$, " ") + 1
870 DL$=MID$(C$, P, 1)
880 P1=INSTR(P+1, C$, DL$)
890 IF P1=0 THEN PRINT "SYNTAX ERROR
   ": GOTO1040
900 P2=INSTR(P1+1, C$, DL$)
910 IF P2=0 THEN P2=LEN(C$)+1
920 OSS=MID$(C$, P+1, P1-P-1)
930 NSS=MID$(C$, P1+1, P2-P1-1)
940 IF P3=0 THEN P3=1
950 I=CL
960 IF RIGHT$(C$, 1) = "*" THEN FOR I=C
   L TON
970 P3=INSTR(P3, A$(I), OSS)
980 IF P3=0 THEN P3=1: GOTO1040
990 A$(I)=LEFT$(A$(I), P3-1)+NSS+
   MID$(A$(I), P3+LEN(OSS))
1000 PRINT USING "### "; I;
1010 PRINT A$(I)
1020 P3=P3+LEN(NSS)
1030 IF RIGHT$(C$, 2) <> "*" THEN CL=
   I: I=N: GOTO1040
1040 IF P3>LEN(A$(I)) THEN P3=1: GOT
   O1040 ELSE IF RIGHT$(C$, 1) = "*" GOT
   O970
1050 IF RIGHT$(C$, 1) = "*" THEN NEXT
1060 PRINT
1070 CLS
1080 '
1090 'help
1100 PRINT "editing commands: [ ]
   OPTIONAL"
1110 PRINT "TOP - TOP"; TAB(16); "B
   - BOTTOM"
1120 PRINT "CF CURSOR COL.1"; TAB(
   16); "[N:++n] DOWN/UP"
1130 PRINT "S SAVE"; TAB(16); "E ED
   IT"
1140 PRINT "T[nN] TYPE(NUM)"; TAB(
   16); "L /abc[/]LOCATE"
1150 PRINT "C /A/B/[*[*]]"; TAB(1
   6); "DEL[a,b OR n]"
1160 PRINT "MOVE A,B,C"; TAB(16);
   "COPY A,B,C"
1170 PRINT "H HELP"; TAB(16); "xabc
   EXTEND"
1180 PRINT "I[n] INSERT"; TAB(16);
   "A ADD[/* END]"
1190 PRINT "P[nN] PRINT(NUM)"; TAB
   (16); "<ENTER> AGAIN"
1200 PRINT "U[n] UP"; TAB(16); "D[n
   ] DOWN"
1210 PRINT "Rabc REPLACE"; TAB(16)
   ; "QUIT"

```

Listing continued

Listing continued

```

121# PRINT"Z ZAP @ CURSOR";TAB(1
6);"F SAME AS L"
122# PRINT:n POINT TO n";TAB(16
)"DIR[P]-DIRECTORY"
124# RETURN
125# '
126# 'delete lines
127# P=INSTR(1,C$, " ");IFP=0THEN
P=4
128# P1=INSTR(P,C$, ",");IFP1=0TH
ENE=VAL(MID$(C$,4)):GOTO136#
129# P2=LEN(C$)
130# F1=VAL(MID$(C$,P,P1))
131# F2=VAL(MID$(C$,P1+1,P2))
132# IFP2>N THENF2=N
133# IFP1>F2 THENPRINT"SYNTAX ER
ROR":P3=1:RETURN
134# CL=F1
135# E=F2-F1+1
136# IFRIGHT$(C$,1)="*"THENN=CL-
1:CL=CL-1:GOTO143#
137# IFE=0THENE=1
138# '
139# FORI=CL TON-E+1
140# A$(I)=A$(I+E)
141# NEXTI
142# N=N-E
143# IFN<1THENN=1:CL=1:A$(1)="*
144# IFCL>N THENCL=N
145# P3=1:RETURN
146# '
147# 'add lines
148# IFN=LANDA$(N)="*THENN=0
1485 INPUT"LINE WIDTH";LW
149# N=N+1
150# PRINTCHR$(128);TAB(LW+1);CH
R$(128);;PP=PEEK(137)-(LW+1):IF
PP<0 THEN PP=PP+256:POKE 136,PEE
K(136)-1:POKE 137,PP ELSE POKE 1
37,PP
151# LINEINPUTA$(N)
152# IFA$(N)="/*"THENN=N-1:RETUR
N
153# GOTO149#
154# '
155# 'copy lines COPY A,B,C
156# P=INSTR(1,C$, " ")
157# IFP=0THEN162#
158# P1=INSTR(P,C$, ",")
159# IFP1=0THEN162#
160# P2=INSTR(P1+1,C$, ",")
161# IFP2<>0THEN163#
162# PRINT"ERROR-NO MOVE/COPY":E
R=1:RETURN
163# F1=VAL(MID$(C$,P,P1))
164# F2=VAL(MID$(C$,P1+1,P2))
165# IFP1>F2 THEN162#
166# IFP2-F1>MS THENPRINT"TOO MA
NY LINES":GOTO 162#
167# CL=VAL(MID$(C$,P2+1)):OC =
CL
1675 IF CL>=F1 AND CL<F2 THEN 16
2#
168# IFCL<F2ANDCL>=F1 THENCL=1:G
OTO162#
169# IFCL>N THENCL=N
170# FORI=F1 TOP2
171# B$(I-F1)=A$(I)
172# NEXT
173# E=F2-F1+1
174# FORI=N+1TOCL+1STEP-1
175# A$(I+E)=A$(I)
176# NEXT
177# FORI=CL+1TOCL+E
178# A$(I)=B$(I-CL-1)
179# NEXT
180# N=N+E
181# P3=1:RETURN
182# '
183# 'insert lines
184# IFN=0THENN=1
185# E=VAL(MID$(C$,2)):IFE=0THEN
E=1
186# FORI=N+1TOCL+1STEP-1
187# A$(I+E)=A$(I)
188# NEXT
189# FORI=CL+1TOCL+E
190# PRINTCHR$(128);
191# LINEINPUTA$(I)
192# NEXT
193# N=N+E
194# P3=1:RETURN

```

```

195# '
196# 'move lines
197# GOSUB156#
198# IF ER=1 THEN RETURN
199# IFCL<F1 THENCL=F1+E ELSECL=
F1
200# GOSUB138#
201# IFOC<F1 THENCL=OC+1 ELSECL=
OC-E+1
202# RETURN
203# '
204# 'enter commands
205# IFCL>N THENCL=N
2051 IF CL<1 THEN CL=1
2052 ER=0
206# PRINT"cursor(";CL";";P3";"
";LINEINPUTC$
207# IFC$<"*THENAC=ASC(LEFT$(C$
,1)):IFAC>96THEN AC=AC-32:MID$(C
$,1,1)=CHR$(AC)
208# IFVAL(C$)<>0THENNC$="N"+C$
209# IFLEFT$(C$,1)="F"THENMID$(C
$,1,1)="L"
210# IFC$="*"THENNC$=OC$
211# OC$=C$
212# IFLEFT$(C$,1)="Z"THENAS$(CL)
=LEFT$(A$(CL),P3-1):P3=1:PRINTA$
(CL):GOTO205#
213# IFLEFT$(C$,1)="R"THENAS$(CL)
=MID$(C$,2):P3=1:PRINTA$(CL):GOT
O205#
214# IFLEFT$(C$,1)="A"GOSUB148#;
GOTO205#
215# IFLEFT$(C$,1)="U"THENNC$="N-
"+MID$(C$,2):IFVAL(MID$(C$,2))=0
THENNC$="N-1"
216# IFLEFT$(C$,2)="CF"THENP3=1:
GOTO205#
217# IFLEFT$(C$,2)="TO"THENCL=1:
PRINTA$(CL):P3=1:GOTO205#
218# IFLEFT$(C$,1)="B"THENCL=N:P
RINTA$(CL):P3=1:GOTO205#

```

```

219# IFLEFT$(C$,1)="*":THENC$="N"
+C$
220# IFLEFT$(C$,1)="N"GOSUB39#;G
OTO205#
221# IFLEFT$(C$,1)="S"THENGOSUB4
8#;GOTO205#
222# IFLEFT$(C$,1)="E"THENGOSUB6
4#;GOTO205#
223# IFLEFT$(C$,1)="T"THENDV=0:G
OSUB24#;GOTO205#
224# IFLEFT$(C$,1)="/"ORLEFT$(C$
,1)="L" OR LEFT$(C$,1)="F" THENG
OSUB11#;GOTO205#
225# IFLEFT$(C$,1)="I"GOSUB184#;
GOTO205#
226# IFLEFT$(C$,2)="DI"THENPRINT
FREE(0)"GRANS FREE":IFRIGHT$(C$,
1)="P"THENPRINT#-2,FREE(0)"GRANS
FREE":POKE111,254:DIR:POKE111,0
:GOTO205# ELSE DIR:GOTO205#
227# IFLEFT$(C$,3)="DEL"GOSUB127
#;GOTO205#
228# IFLEFT$(C$,1)="D"GOSUB39#;G
OTO205#
229# IFLEFT$(C$,4)="MOVE"GOSUB19
7#;GOTO205#
230# IFLEFT$(C$,4)="COPY"GOSUB15
6#;GOSUB201#;GOTO205#
231# IFLEFT$(C$,1)="C"GOSUB86#;G
OTO205#
232# IFLEFT$(C$,1)="H"GOSUB109#;
GOTO205#
233# IFLEFT$(C$,1)="P"THENDV=-2:
GOSUB24#;GOTO205#
234# IFLEFT$(C$,1)="X"THENAS$(CL)
=A$(CL)+MID$(C$,2):P3=1:PRINTA$(
CL):GOTO205#
235# IFC$="QUIT"THENSTOP
236# PRINT"INVALID COMMAND"
237# GOTO205#
238# PCLEAR 1:CLEAR19#0#0#,32767:G
OTO 5#

```

END



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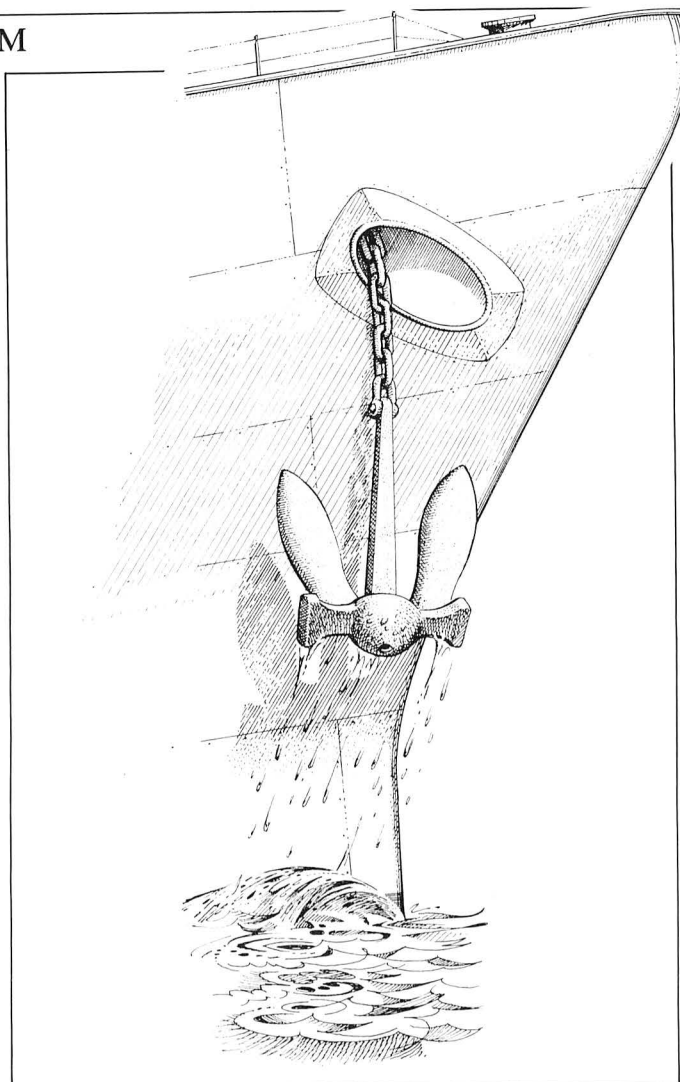
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BY JOSEPH A. OTTUM



# Battle at Sea

Put yourself at the helm of your nation's fleet, as you navigate through enemy-infested waters.

In grade school we often played Battle ship—often without the blessings of our teacher. I'm not sure why we called it Battleship, since we used a variety of vessels. The version I used for this program includes an aircraft carrier, a battleship, a destroyer, a submarine, and a patrol gunboat.

It also permits ships to lie horizontally, vertically, and diagonally. To speed things up, the computer randomly generates the initial ship positions. The basis of the heuristic logic that the computer choice algorithm uses is the several search and attack phases.

## Search and Attack

When searching for a ship, the pro-

gram picks a random untried grid location and then tests it to ensure that it has not your tried at least one adjacent grid. The smallest ship occupies two grids, so it makes little sense to choose one that is isolated.

One the search phase locates a ship, the program employs attack phase 1. Surrounding any nonborder grid location are eight adjacent grids. During this phase, the program randomly selects one of these boundary grids. With each try,

the probability of a successful hit increases.

With two successful hits, the general position of the vessel becomes known. Attack phase 2 selects grids along the line intersecting the two successful hits. A worksheet cleanup section examines the possible grid selections to ensure that the program avoids nonproductive choices. The patrol gunboat, having a length of two grids, never requires this attack phase.

## Worksheet

The heart of the selection process is the worksheet, array C(4,12). The first variable indicates the ship: 0 for the carrier, 1 for the battleship, 2 for the de-

## System Requirements

16K RAM  
Extended Color Basic



Program Listing. Battleship

```

50 CLEAR 1000
60 GOTO 1850
70 '
80 ' sub
90 I=I4+X-4
100 J=J4+X-4
110 ON C(T,10) GOTO 120,140,160,
170
120 I=I4
130 GOTO 170
140 J=J4
150 GOTO 170
160 I=I4+4-X
170 RETURN
180 '
190 ' sub
200 FOR X=338 TO 345
210 I=PEEK(X)
220 IF I=255 THEN 250
230 IF I=254 AND X>338 THEN I=X-
339:GOTO 270
240 IF I=253 AND X<341 THEN I=X-
331:GOTO 270
250 NEXT X
260 GOTO 200
270 FOR X=338 TO 345
280 J=PEEK(X)
290 IF J=255 THEN 320
300 IF J=239 THEN J=X-338:GOTO 3
40
310 IF J=223 AND X<340 THEN J=X-
330:GOTO 340
320 NEXT X
330 GOTO 270
340 RETURN
350 '
360 ' determine search/attack ph
ase
370 FOR T=0 TO 3
380 IF C(T,9)=2 THEN 620 ELSE NE
XT
390 FOR T=0 TO 4
400 IF C(T,9)=1 THEN 560 ELSE NE
XT
410 '
420 ' search phase
430 I=RND(10)-1
440 J=RND(10)-1
450 IF D$(147+J*32+I)=CHR$(207)
THEN 430
460 '
470 ' look at boundaries
480 FOR I4=I-1 TO I+1
490 FOR J4=J-1 TO J+1
500 IF I4=I OR J4=J OR I4<0 OR J
4<0 OR I4>9 OR J4>9 THEN 520
510 IF D$(147+J*32+I)<>CHR$(207)
THEN 770
520 NEXT J4,I4
530 GOTO 430
540 '
550 ' attack phase 1

```

```

560 I=INT(C(T,4)/10)+RND(3)-2
570 J=C(T,4)-INT(C(T,4)/10)*10+R
ND(3)-2
580 IF I<0 OR J<0 OR I>9 OR J>9
THEN 560
590 IF D$(147+J*32+I)=CHR$(207)
THEN 560 ELSE 770
600 '
610 ' attack phase 2
620 I4=INT(C(T,4)/10)
630 J4=C(T,4)-I4*10
640 S=RND(2)*2-3
650 S=-S
660 X=4
670 X=X+S
680 IF C(T,X)=-1 OR X<0 OR X>8 T
HEN 650
690 IF C(T,X)>0 THEN 670
700 GOSUB 90
710 IF I<0 OR J<0 OR I>9 OR J>9
THEN 650
720 IF D$(147+J*32+I)<>CHR$(207)
THEN 770
730 C(I,J)=-1
740 GOTO 670
750 '
760 ' determine type again
770 IF D$(147+J*32+I)=CHR$(175)
THEN 1120
780 FOR T=0 TO 4
790 IF C(T,11)=ASC(D$(147+J*32+I
)) THEN 800 ELSE NEXT
800 IF C(T,9)=2 THEN 1030
810 IF C(T,9)=1 THEN 900
820 '
830 ' change search to attack1
840 C(T,9)=1
850 C(T,4)=I*10+J
860 C(T,12)=C(T,12)-1
870 GOTO 1100
880 '
890 ' change attack1 to attack2
900 C(T,9)=2
910 I4=INT(C(T,4)/10)
920 J4=C(T,4)-I4*10
930 IF I=I4 THEN CA=1:GOTO 960
940 IF J=J4 THEN CA=2:GOTO 960
950 IF SGN(I-I4)=SGN(J-J4) THEN
CA=4 ELSE CA=3
960 C(T,10)=CA
970 C(T,12)=C(T,12)-1
980 IF CA=1 OR CA=3 THEN C(T,4+J
-J4)=10*I+J ELSE C(T,4+I-I4)=10*
I+J
990 IF C(4,12)=0 THEN C(4,9)=3
1000 GOTO 1100
1010 '
1020 ' update attack2
1030 C(T,12)=C(T,12)-1
1040 I4=INT(C(T,4)/10)
1050 J4=C(T,4)-I4*10
1060 IF C(T,10)=1 OR C(T,10)=3 T
HEN C(T,4+J-J4)=10*I+J ELSE C(T,
4+I-I4)=10*I+J

```

```

1070 IF C(T,12)=0 THEN C(T,9)=3
1080 '
1090 ' update display/grid
1100 POKE 65314,13
1110 PLAY"V10;CECEC;V31;CECEC"
1120 D$(147+J*32+I)=CHR$(207)
1130 PRINT@147+J*32+I,CHR$(207);
1140 '
1150 ' clean up work grid
1160 ' first pass
1170 FOR T=0 TO 3
1180 IF C(T,9)<>2 THEN NEXT:GOTO
1300
1190 CA=C(T,10)
1200 I4=INT(C(T,4)/10)
1210 J4=C(T,4)-I4*10
1220 FOR X=0 TO 8
1230 IF C(T,X)=-1 THEN 1270
1240 GOSUB 90
1250 IF I<0 OR J<0 OR I>9 OR J>9
THEN C(T,X)=-1:GOTO 1270
1260 IF D$(147+J*32+I)=CHR$(207)
AND C(T,X)=0 THEN C(T,X)=-1
1270 NEXT X
1280 '
1290 ' second pass
1300 IF C(0,9)<>2 THEN 1390
1310 IF C(0,0)>1 THEN FOR T=5 TO
8:C(0,T)=-1:NEXT:GOTO 1390
1320 IF C(0,8)>1 THEN FOR T=0 TO
3:C(0,T)=-1:NEXT:GOTO 1390
1330 IF C(0,1)>1 THEN C(0,6)=-1:
C(0,7)=-1:C(0,8)=-1
1340 IF C(0,7)>1 THEN C(0,0)=-1:
C(0,1)=-1:C(0,2)=-1
1350 IF C(0,2)>1 THEN C(0,7)=-1:
C(0,8)=-1
1360 IF C(0,6)>1 THEN C(0,0)=-1:
C(0,1)=-1
1370 IF C(0,3)>1 THEN C(0,8)=-1
1380 IF C(0,5)>1 THEN C(0,0)=-1
1390 IF C(1,9)<>2 THEN 1460
1400 IF C(1,1)>1 THEN C(1,5)=-1:
C(1,6)=-1:C(1,7)=-1:GOTO 1460
1410 IF C(1,7)>1 THEN C(1,1)=-1:
C(1,2)=-1:C(1,3)=-1:GOTO 1460
1420 IF C(1,2)>1 THEN C(1,6)=-1:
C(1,7)=-1
1430 IF C(1,6)>1 THEN C(1,1)=-1:
C(1,2)=-1
1440 IF C(1,3)>1 THEN C(1,7)=-1
1450 IF C(1,5)>1 THEN C(1,1)=-1
1460 FOR T=2 TO 3
1470 IF C(T,9)<>2 THEN 1520
1480 IF C(T,2)>1 THEN C(T,5)=-1:
C(T,6)=-1:GOTO 1520
1490 IF C(T,6)>1 THEN C(T,2)=-1:
C(T,3)=-1:GOTO 1520
1500 IF C(T,3)>1 THEN C(T,6)=-1
1510 IF C(T,5)>1 THEN C(T,2)=-1
1520 NEXT
1530 '
1540 ' test for win
1550 FOR X=0 TO 4

```

Listing continued

stroyer, 3 for the submarine, and 4 for the patrol gunboat. See Table 1 for a description of the second variable.

The program stores the first successful hit in C(I,4) as I\*10+J. It stores subsequent hits around this. A negative 1 stored in positions 0-8 indicates a grid where the vessel could not lie. Array O(I,J) contains either a 0, a 9, or the ASCII value of a vessel. The 0 indicates an untried grid that does not contain a ship. A 9 indicates a grid that has been hit. This array prepares the display and stores the location of the computer's vessels during the game. Your ships are visible to you on your TV screen, but I promise the computer will not cheat and

peek at them. Of course, the computer's ships are not visible to you, hence you need O(I,J).

### Program Description

The first subroutine (lines 90-170) produces a tentative second choice when it knows the first choice. The player-input section uses the second subroutine (lines 200-340) to enter your grid selection. I could have used INKEY\$ for this, but I elected not to prevent the occasional lockup that would result from frequent variable garbage cleanup. The second purpose of this subroutine is to make it difficult for you to make an erroneous entry.

The computer play uses lines 370-1590. Lines 370-400 determine the most

profitable search/attack phase. Lines 430-740 store these phases. Assuming a successful hit, lines 770-810 obtain the appropriate phase for that vessel. Lines 840-1070 update the variables, and lines 1100-1130 update the screen. Line 1100 produces a temporary orange tint, which remains until the next print statement. The cleanup section resides in lines 1170-1520. Lines 1550-1590 test for a computer win.

The player section is much shorter, since you will provide the logic (lines 1620-1820). Lines 1850-1960 produce the title page, while line 1990 randomizes the random-number generator sequence. Line 2000 sets the tempo for subsequent play functions, and line 2010 dimensions the arrays. Lines

Listing continued

```

156Ø IF C(X,9)<>3 THEN 162Ø ELSE
NEXT
157Ø '
158Ø ' goto winners circle
159Ø GOTO 312Ø
160Ø '
161Ø ' player input
162Ø SOUND 2ØØ,5
163Ø GOSUB 2ØØ
164Ø IF I<Ø OR I>9 OR J<Ø OR J>9
THEN 162Ø
165Ø IF O(I,J)=9 THEN 162Ø
166Ø IF O(I,J)=Ø THEN 171Ø
167Ø POKE 65314,13
168Ø PLAY"V1Ø;CECEC;V31;CECEC"
169Ø PRINT@132+32*J+I,CHR$(O(I,J));
170Ø GOTO 172Ø
171Ø PRINT@132+32*J+I,CHR$(2Ø7);

172Ø O(I,J)=9
173Ø '
174Ø ' test for win
175Ø FOR I=Ø TO 9
176Ø FOR J=Ø TO 9
177Ø IF O(I,J)=Ø THEN 179Ø
178Ø IF O(I,J)<>9 THEN 37Ø
179Ø NEXT J,I
180Ø '
181Ø ' goto winners circle
182Ø GOTO 312Ø
183Ø '
184Ø ' title page
185Ø CLS
186Ø PRINT@42,"BATTLE SHIP"
187Ø PRINT@1Ø1,"SHIPS SYMBOL
GRIDS"
188Ø FOR X=Ø TO 4
189Ø READ QS
190Ø W=359-32*X
191Ø PRINT@W,QS;
192Ø PRINT@W+8,LEFT$(QS,1);
193Ø PRINT@W+16,X+2-SGN(INT(X/2));
194Ø NEXT
195Ø PRINT@487,"ONE MOMENT PLEASE"
196Ø DATAPG,SS,DD,BB,CV
197Ø '
198Ø ' intialization
199Ø I=RND(TIMER)
2ØØØ PLAY"T2Ø"
2Ø1Ø DIM O(9,9),C(4,12),D$(511)
2Ø2Ø ' O(,) ocean array
2Ø3Ø ' C(,) work sheet
2Ø4Ø ' D$() display
2Ø5Ø '
2Ø6Ø ' build display
2Ø7Ø FOR X=Ø TO 511
2Ø8Ø D$(X)=CHR$(128)
2Ø9Ø NEXT
210Ø FOR X=42 TO 52
211Ø READ D$(X)

```

```

212Ø NEXT X
213Ø DATA b,a,t,t,l,e,|,s,h,i,p
214Ø FOR X=1ØØ TO 1Ø9
215Ø D$(X)=CHR$(X-3)
216Ø NEXT
217Ø FOR X=Ø TO 9
218Ø V$=RIGHT$(STR$(X),1)
219Ø D$(131+32*X)=V$
220Ø NEXT
221Ø FOR X=Ø TO 4
222Ø D$(97+X*32)="c"
223Ø NEXT X
224Ø FOR X=Ø TO 3
225Ø D$(289+X*32)="b"
226Ø NEXT X
227Ø FOR X=Ø TO 2
228Ø D$(126+X*32)="d"
229Ø D$(254+X*32)="s"
230Ø NEXT X
231Ø D$(382)="p"
232Ø D$(414)="p"
233Ø '
234Ø ' build random ship positions
235Ø T=1
236Ø GOSUB 244Ø
237Ø FOR I=Ø TO 9
238Ø FOR J=Ø TO 9
239Ø IF O(I,J)=Ø THEN V$=CHR$(175)
ELSE V$=CHR$(O(I,J))
240Ø D$(147+J*32+I)=V$
241Ø D$(132+J*32+I)=CHR$(175)
242Ø NEXT J,I
243Ø T=Ø
244Ø FOR I=Ø TO 9
245Ø FOR J=Ø TO 9
246Ø O(I,J)=Ø
247Ø NEXT J,I
248Ø ' carrier
249Ø V=67:W=5:GOSUB 259Ø
250Ø ' battleship
251Ø V=66:W=4:GOSUB 259Ø
252Ø ' destroyer
253Ø V=68:W=3:GOSUB 259Ø
254Ø ' submarine
255Ø V=83:GOSUB 259Ø
256Ø ' patrol gun boat
257Ø V=8Ø:W=2:GOSUB 259Ø
258Ø IF T=1 THEN RETURN ELSE 283Ø
259Ø S=RND(2)*2-3
260Ø C(1,1)=RND(1Ø)-1
261Ø C(2,1)=RND(1Ø)-1
262Ø CA=RND(4)
263Ø FOR X=2 TO W
264Ø C(1,X)=C(1,1)+S
265Ø C(2,X)=C(2,1)+S
266Ø ON CA GOTO 267Ø,269Ø,271Ø,272Ø
267Ø C(2,X)=C(2,1)
268Ø GOTO 272Ø
269Ø C(1,X)=C(1,1)
270Ø GOTO 272Ø
271Ø C(2,X)=C(2,1)-S
272Ø IF S<Ø THEN S=S-1 ELSE S=S+1

```

```

273Ø NEXT
274Ø IF C(1,W)<Ø OR C(1,W)>9 OR
C(2,W)<Ø OR C(2,W)>9 THEN 259Ø
275Ø FOR X=1 TO W
276Ø IF O(C(1,X),C(2,X))<>Ø THEN
259Ø ELSE NEXT
277Ø FOR X=1 TO W
278Ø O(C(1,X),C(2,X))=V
279Ø NEXT
280Ø RETURN
281Ø '
282Ø ' finish display
283Ø FOR X=49Ø TO 5Ø1
284Ø READ Y
285Ø D$(X)=CHR$(Y)
286Ø NEXT X
287Ø DATA 66,89,128,74,128,65,128,
79,84,84,85,77
288Ø '
289Ø ' print display
290Ø CLSØ
291Ø FOR X=Ø TO 51Ø
292Ø PRINT@X,D$(X);
293Ø NEXT
294Ø '
295Ø ' prepare work sheet
296Ø FOR I=Ø TO 4
297Ø FOR J=Ø TO 1Ø
298Ø C(I,J)=Ø
299Ø NEXT J
3ØØØ READ C(I,11),C(I,12)
3Ø1Ø IF I>Ø THEN C(I,Ø)=-1:C(I,8)=-1
3Ø2Ø IF I>1 THEN C(I,1)=-1:C(I,7)=-1
3Ø3Ø NEXT I
3Ø4Ø C(4,2)=-1
3Ø5Ø C(4,6)=-1
3Ø6Ø DATA 67,5,66,4,68,3,83,3,8Ø,
2
3Ø7Ø '
3Ø8Ø ' choose 1st player
3Ø9Ø IF RND(2)=2 THEN 37Ø ELSE 162Ø
310Ø '
311Ø ' winners circle
312Ø PLAY"CEGBCEGBGEC"
313Ø FOR X=Ø TO 1ØØ:NEXT
314Ø QS=INKEY$
315Ø PRINT@49Ø,"another";CHR$(128);"game";
316Ø QS=INKEY$:IF QS=" " THEN 316Ø
317Ø IF QS="Y" THEN RUN
318Ø CLS
319Ø END

```

Position(s)	Description
0-8	Record of successful hits = -1 Selection Ruled Out = I*10+J, I & J Denote Grid
9	Search/Attack Phases =0 Search =1 Attack Phase 1 =2 Attack Phase 2 =3 Attack Complete
10	Line of Position =1 Vertical =2 Horizontal =3 Diagonal NW-SE =4 Diagonal NE-SW
11	ASC Value of Vessel
12	Number of Unhit Grids

Table 1. Description of the Second Variable

2070-2320 start the display, while lines 2350-2800 produce the ship positions and update the display. The pass through lines 2440-2580 is first as a subroutine and second as a routine. Lines 2830-2930 finish and print the display array.

Lines 2960-3060 initialize the worksheet, which the program uses to record and decide the computer moves. Line 3090 randomly selects the first player, and lines 3120-3190 handle the winner's circle and the next game option.

You can delete remarks used throughout the program.

### How to Play

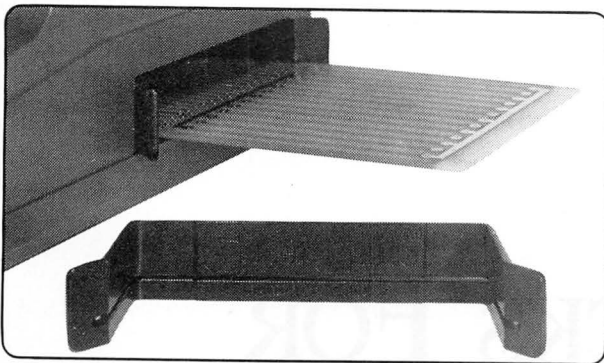
First run the program and wait for the initialization. (If you own a 16K

Color Computer, type PCLEAR1 before loading.) Shortly, the program will display two arrays. The one on the left hides your opponent's ships. On the right, your ships are visible. The program randomly determines the first player.

After the single tone, it is your turn. Enter the letter, followed by the number of your chosen grid. With each successful hit on an enemy ship, a portion of that ship appears. With each successful hit on one of your ships, that portion of your ship disappears. Any successful hit momentarily produces an orange tint on the screen. The vessels being hunted appear as a reminder on the sides of the screen. You can use this reminder to recall the ships' length. ■

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# NEW TRICKS FOR DISK SCRIPSIT

You can squeeze a little more versatility out of Disk Scripsit with just a few simple tricks.

Color Disk Scripsit has a few limitations, including the inability to use the special printing features of some printers and the lack of special characters. But you Color Scripsit owners can overcome these problems.

## Alien Control Codes

If your new printer offers more features than the underline and extended print supported by Color Disk Scripsit, you are probably looking for a way to use them. Cheer up, you can make Scripsit support other printer control codes.

Scripsit accepts four printer com-

mand sequences entered on the Change Standards menu, key 7. They are designated "start underline," "end underline," "start elongation," and "end elongation." Each control accepts a sequence of up to three characters, which you enter in decimal.

The trick is that these control sequences do not have to represent the designations assumed by Scripsit. They can be anything you want within certain limitations. For example, the underline code can just as well be used for italics, if your printer supports that function.

The only limitation Scripsit imposes is that when it accepts the editing code to "start elongated," all characters on the line following the code are displayed, and counted, as doubly spaced characters in formatting the line length. This creates a problem if the printed characters are not actually elongated.

You may have noticed an apparent bug in Scripsit: the need to place a separate "start elongation" code in each line to be elongated. Otherwise the line displays normally and counts as singly spaced characters. This can be used effectively for boldface or shadow print at the start of a paragraph if the "start" code is inserted as the last character before a carriage return in the previous line.

Although the control codes are normally paired, i.e., one starts a particular print function and the other ends

Hex	Meaning	symbol
\$5B	left bracket	[
\$5C	backslash or slant line	\
\$5D	right bracket	]
\$5E	caret or circumflex	^
\$5F	underline or ellipsis	—
\$60	grave accent (single quote)	'
\$7B	left brace	{
\$7C	horizontal line	
\$7D	right brace	}
\$7E	tilde	~

Table 1. New Scripsit Characters

## System Requirements

32K RAM  
Disk Color Basic  
Disk Color Scripsit

Shown	Printed
[inverse bracket]	[
[inverse backslash]	\
[inverse bracket]	]
[inverse up arrow]	^
[inverse back arrow]	—
[inverse @ ]	'
[bracket]	{
[backslash]	
[bracket]	}
[up arrow]	~

Table 2. The Displayed vs Printed Characters

it, some features may be more versatile. On the Juki 6100, for example, bold and shadow print options are terminated by the same control sequence. Printers supporting sub- and superscript have codes that execute half line feeds in both backward and forward directions. You can obtain both functions from the two control codes.

Finally, if a backspace is included as one of the options, you can use overstrikes or accent marks in the text. (The codes for accent characters may have to be entered in the text using a Basic program, since they are not available from the keyboard in Scripsit.)

Incidentally, since Scripsit inserts the effective control characters when it prints to a disk spool file, you can change the control codes on a page-by-page basis.

### Special Characters

There are 10 normally printable characters that you cannot access from the keyboard when using Scripsit. Five of them cannot be obtained from the CoCo keyboard at all. Although most

```

10 A=1: 'DISK FILE,-1 FOR TAPE
20 OPEN"O",#A,"CHAR/TEXT"
30 FOR I=&H5B TO &H60
40 A$=A$+CHR$(I)
50 NEXT
60 FOR I=&H7B TO &H7E
70 A$=A$+CHR$(I)
80 NEXT
90 PRINT#A,A$
100 CLOSE #A

```

*Program Listing. Routine to Create Additional Characters*

are not usually missed, their unavailability can be a real limitation when you need them.

The characters in question are shown with their hex codes in Table 1. Check your printer's manual to determine exactly what you will print.

To make these available in Scripsit, type in and save the Program Listing. The program generates a small text file on disk that you can append to Scripsit text. (For a tape system change the value of A in line 10 to -1.) You can then copy these characters into text using Scripsit's copy command, BREAK:

Unfortunately, Scripsit displays only [, \, and ] as they will be printed. The other characters will look quite different. In fact, the graphics mode of the disk version does not distinguish them from lowercase letters, so I always use the nongraphics mode when sprucing up the final text. Table 2 shows what the screen displays for the characters that will be printed. ("Inverse" refers to green-on-black characters.)

To increase ease of use, I also save a long string of inverse back arrows on disk under the file name UNDERLIN/TXT to avoid using a series of minus signs to delineate tables. Otherwise, my printer doesn't start underlining until the first real character (and stops with the last one), ignoring leading or trailing spaces. The underline file draws a much neater line than you can achieve by faking an underline by typing a period as the first and last dummy character of the line. ■

*Address correspondence to Damon Swanson, 4030 Baker Road, Hopkins, MN 55343.*

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# TIMPIST

X-weapon? What's an X-weapon?  
 Look into the chamber. Here comes one now.

In this copy of a popular arcade game your mission is to position your zapper above the advancing weapon and destroy it before it destroys you. Timpist has one screen, no super zapper, no simultaneously advancing weapons, and no rapidly spinning control.

The Timpist screen is rectangular as shown in Fig. 1. The upper left corner gives a graphic display of your remaining zappers and the upper middle number is your score. Figure 2 shows the various shapes of weapons and their point values.

The more complicated patterns are worth fewer points because the computer takes longer to draw them, but they don't seem slower during play.

Weapons move from the center to the edge within one of the 16 sectors. There are four positions on which they land within each sector. Before a score reaches 500 the weapons land on each position four times. Between 500 and 1,000 points they land on each one two times, and after 1,000 points the weapons only jump once on each of the four positions. The game's speed increases after 500 and 1,000 points.

Joystick readings are mathematically manipulated so your square zapper can only be positioned around the outside of the rectangular playing field. You destroy any weapon in the sector beneath your zapper by pushing the fire button.

Warning—in Timpist few live far beyond 1,000 points. ■

*Address correspondence to James W. Wood, 424 North Missouri, Atwood, IL 61913.*

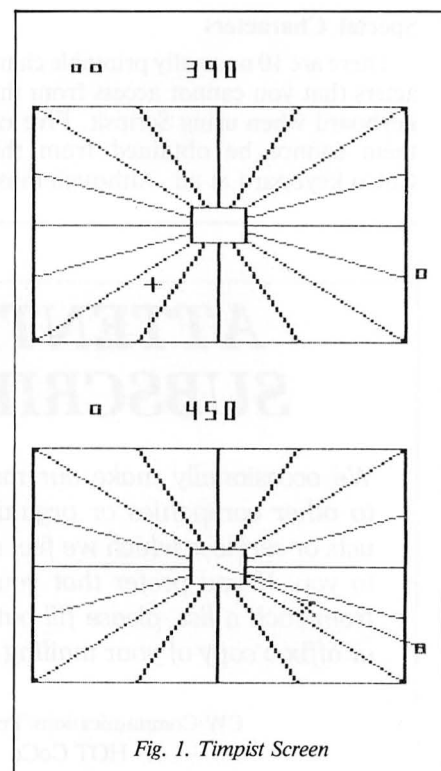


Fig. 1. Timpist Screen

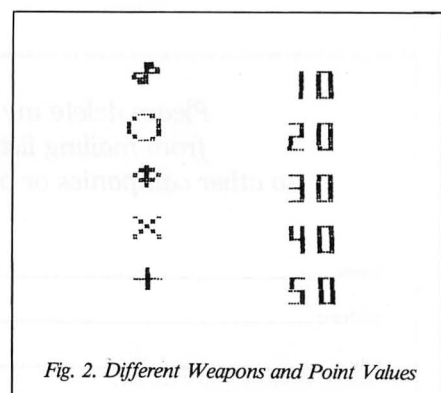
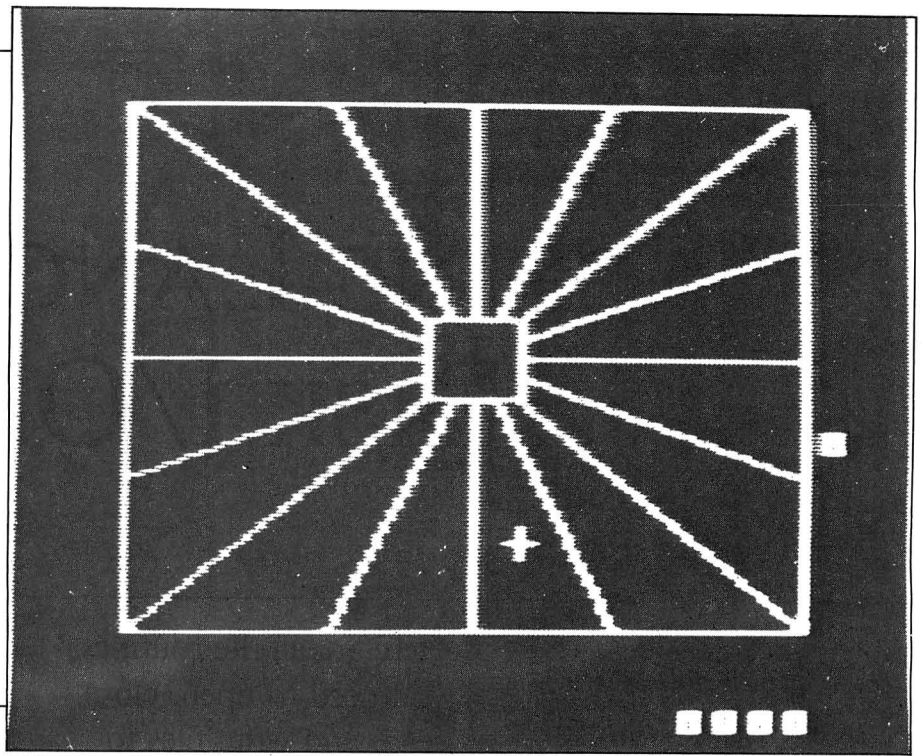


Fig. 2. Different Weapons and Point Values

### System Requirements

16K RAM  
 Extended Color Basic  
 Joystick



```

10 REM JAMES W. WOOD.424 N. MISS
OURI, ATWOOD, IL,61913
20 CLS:PRINT:PRINT" USE RIGHT JO
YSTICK TO DESTROY":PRINT" THE AD
VANCING WEAPONS.":PRINT" THE STI
CK MUST BE POSITIONED":PRINT" AG
AINST THE OUTER EDGE OF":PRINT"I
T'S CASE. FIRE WITH BUTTON !!"
30 PRINT:PRINT" THE GAME SPEEDS
UP A":PRINT" 500 AND A" 1000
POINTS."
40 PRINT:PRINT"PRESS ANY KEY TO
CONTINUE"
50 IN$=INKEY$:IFIN$=""THEN50
60 CLEAR2000:DIMPS(16.4):CLS0:PL
AY"L25503"
70 FORA=1TO16:FORB=1TO4
80 READXS,Y$:PS(A,B)="BM"+XS+", "
+Y$:NEXTB,A
90 DA"A96,82,80,74,62,66,46,58,9
6,94,80,92,62,88,46,84,96,102,80
,104,62,108,46,112,96,114,80,122
,62,130,46,138,104,120,92,132,78
,144,64,156,120,120,116,132,112,
144,108,156,132,120,136,132,140,
144,144,156,148,120,160,132,174,
144,188,156
100 DA"A156,114,172,122,188,130,
204,138,156,102,172,104,188,108,
204,112,156,94,172,92,188,88,204
,84,156,82,172,74,188,66,204,58,
148,76,160,64,174,52,188,40,132,
76,136,64,140,52,144,40,120,76,1
6,64,112,52,108,40,104,76,92,64
,78,52,64,40
110 TS(1)="U4R2D2R2D2L8D2R2D2R2U
4"
120 TS(2)="BU4R2F3D4G3L4H3U4E3R2
"
130 TS(3)="U4F4G4H4E4D8"
140 TS(4)="E4G8E4H4F8"
150 TS(5)="U4D8U4R4L8"
160 AS(0)="R5D10L5U10"
170 AS(1)="BR5D10"
180 AS(2)="R5D5L5D5R5"
190 AS(3)="R5D5L5R5D5L5"
200 AS(4)="D5R5U5D10"
210 AS(5)="R5L5D5R5D5L5"
220 AS(6)="D10R5U5L5"
230 AS(7)="R5D10"
240 AS(8)="R5D10L5U5R5L5U5"
250 AS(9)="R5D10U5L5U5"
260 NZ=5:S1=4:SS=3:SC=0
270 PMODE2,1:PCLS:SCREEN1,1

```

```

280 FORA=20TO100STEP20
290 ACS=STR$(A):DRAW"BM100,"+ACS
+TS(A/20):DRAW"BM150,"+ACS+AS(A/
20):DRAW"BM160,"+ACS+AS(0):NEXTA
300 FORT=1TO1500:NEXTT:PMODE2,1:
PCLS
310 LS(1)="R8D2L3D8L2U8L3U2":LS(
2)="R2D10L2U10":LS(3)="R8D10L2U8
L1D1L2U1L1D8L2U10":LS(4)="R8D6L6
D4L2U10BF2R4D2L4U2BH2":LS(5)=LS(
2):LS(6)="R8D1L7D4R7D5L8U1R7U3L7
U6":LS(7)=LS(1):AS="S5BR30"
320 FORA=2TO4:SCREEN1,1:SL=4*A:S
L$="S"+STR$(SL):TIS$="" :XL=20-A*4
:XL$=STR$(XL):YL=100-A*8:YL$=STR
$(YL)
330 FORB=1TO7
340 TIS=TI$+SL$+L$(B)+AS:NEXTB
350 DRAW"BM"+XL$+", "+YL$+TIS:FOR
T=1 TO 190:NEXTT:SCREEN0,0:CLS0
360 PMODE2,1:PCLS:NEXTA
370 SCREEN0,0:CLS0:PMODE2,1:PCLS
380 DRAW"BM30,30S4R195D135L195U1
35"
390 DRAW"BM112,88R28D20L28U20"
400 LINE(30,30)-(225,165),PSET
410 LINE(30,165)-(225,30),PSET
420 LINE(30,68)-(225,128),PSET
430 LINE(30,128)-(225,68),PSET
440 LINE(84,30)-(168,165),PSET
450 LINE(168,30)-(84,165),PSET
460 DRAW"BM30,98R195"
470 DRAW"BM127,30D135"
480 LINE(114,89)-(139,107),PRESE
T,BF
490 FORA=1TO5:LINE(10+A*10,5)-(1
5+A*10,10),PSET,B:NEXTA
500 SCREEN1,1
510 PCOPY1TO3:PCOPY2TO4
520 R=RND(16):Q=RND(5)
530 J0=JOYSTK(0):J1=JOYSTK(1)
540 IFJ0>61THENJW=1:X=230:Y=J1*2
.4+20:IFY<68THENJJ=12ELSEIFY<98T
HENJJ=11ELSEIFY<128THENJJ=10ELSE
JJ=9
550 IFJW=1THEN610
560 IFJ0<2THENJW=1:X=20:Y=J1*2.4
+20:IFY<68THENJJ=1ELSEIFY<98THEN
JJ=2ELSEIFY<128THENJJ=3ELSEJJ=4

```

```

570 IFJW=1THEN610
580 IFJ1<2THENJW=1:X=J0*4:Y=20:I
FX<84THENJJ=16ELSEIFX<127THENJJ=
15ELSEIFX<168THENJJ=14ELSEJJ=13
590 IFJW=1THEN610
600 IFJ1>61THENX=J0*4:Y=170:IFX<
84THENJJ=5ELSEIFX<127THENJJ=6ELS
EIFX<168THENJJ=7ELSEJJ=8
610 SS=SS+1:S=INT(SS/S1):IFS=5TH
ENNZ=NZ-1:PMODE2,3:SCREEN1,1:LIN
E((5-NZ)*10+10,5)-((5-NZ)*10+15,
10),PRESET,B:SCREEN0,0:FORA=0TO8
:CLSA:PLAY"O1DFAO3":NEXTA:GOTO78
0
620 DRAW PS(R,S)+TS(Q):PLAY"G"
630 IFNZ<1 THEN GOTO810
640 LINE(X,Y)-(X+5,Y+5),PSET,B
650 PE=PEFK(65280):IFPE=126ORPE=
254THENLINE(X+2,Y+2)-(127,97),PS
ET:PLAY"CEA":IFJJ=R THENSENSUND100
,1:SC=SC+10*TRND(Q):GOTO690
660 PCOPY3TO1:PCOPY4TO2
670 JW=0
680 GOTO530
690 SC$=STR$(SC):LL=LEN(SCS)-1
700 SC$=RIGHT$(SCS,LL)
710 PMODE2,3:SCREEN1,1
720 LINE(110,3)-(200,13),PRESET,
BF
730 PCOPY3TO1:PCOPY4TO2
740 FOR A=1TOLL
750 XN=100+A*10:XNS=STR$(XN)
760 DRAW"BM"+XNS+",3"+AS(VAL(MID
$(SCS,A,1)))
770 NEXTA
780 PMODE2,1:SCREEN1,1
790 IF SC<500 THEN S1=4:SS=3 ELS
E IF SC<1000 THEN S1=2:SS=1 ELSE
S1=1:SS=0
800 GOTO520
810 PRINT@200,"SCORE=";SC;
820 IF SC>HS THEN HS=SC
830 PRINT@262,"HIGH SCORE=";HS;
840 PRINT:PRINT:PRINT"PLAY AGAIN
(Y/N)";
850 IN$=INKEY$
860 NIS=INKEY$:IFNIS=""THEN860
870 IFNIS="Y"THEN GOTO 260 ELSE
IF NIS="N"THEN END ELSE GOTO 860

```

Program Listing. Timpit

# MACHINE-LANGUAGE DISK I/O

Although the *Color Computer Disk System Manual* contains valuable information about machine-language disk input/output (I/O), it overlooks the fact that disk owners would want to know how to open, close, read, and write files to disk with

Here are all the routines you need to open, close, read, and write files to disk with ML programs.

machine-language programs.

The Disk Extended Color Basic ROM has all the routines necessary to perform these operations. So why not enlighten disk owners as to the location and use of these routines?

Table 1 lists the disk I/O routines. Both of the OPEN routines refer to the device control block (DCB), which is at memory location \$094C. Before a file is opened, the DCB must contain the information necessary to open the file correctly. Table 2 lists the information, which should be placed in the DCB before an OPEN routine is called.

All disk owners probably know that Disk Extended Color Basic uses a portion of RAM that both Color Basic and Extended Color Basic leave free. This portion of memory is the disk communications area and starts at memory location \$0601.

The number of file buffers and the amount of reserved buffer space determine the size of this area. This area doesn't interfere with normal Basic program operation. However, the disk communications area causes problems with machine-language programs that use this same portion of memory.

The accompanying Program Listing, Tapedisk, will save any machine-language program on disk, although its main purpose is to save programs that

OPEN"O"	(C956) opens a disk file for output. Before calling this routine, the DCB must contain the necessary information to open the file.
OPEN"I"	(C959) opens a disk file for input. Before calling this routine, the DCB must contain the necessary information to open the file.
WRITDISK	(CB52) writes a byte of data on the currently open disk file. This byte must be in register A before this routine is called.
READDISK	(CCE2) reads a byte from the currently open disk file and then returns it to register A.
CLOSE	(A42D) will close all open disk files.

Table 1. Disk Input/Output Routines

Byte Number	Contents
0-7	File Name: Left-justified and blank filled.
8-10	File Name Extension: Left-justified and blank filled.
11	File Type: 0—Basic Program 1—Basic Data File 2—Machine-Language Program 3—Text Editor Source File
12	ASCII Flag 0—Binary File FF—ASCII File
13-31	These bytes should all be equal to zero.

Table 2. The Disk Device Control Block



Fig. 1. CLOADM Tape Format

### System Requirements

**16K RAM**  
**Disk Basic**  
**SDS80C Editor/Assembler**



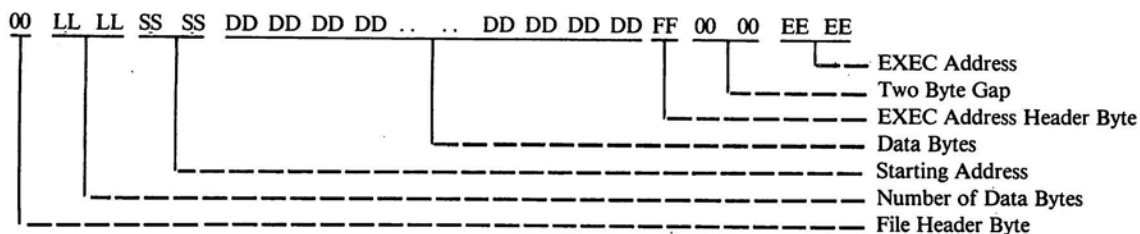


Fig. 2. LOADM Disk Format

use the same portion of memory as the disk communications area. Once Tapedisk has saved the program, you can load it with the LOADM command.

Before I discuss the program's method of operation, I'll examine the problems a Basic error can create. Whenever you use a ROM routine in a machine-language program, you should always consider the possibility of the ROM routine causing a Basic error.

All the disk input/output routines can cause a Basic error. Therefore, a machine-language program must intercept the Basic error-handling routine. Failure to do so can result in a program crash anytime an error occurs.

The Color Basic error-handling routine starts by calling a link to Extended Color Basic and Disk Extended Color Basic. This link is at memory location

appropriate error message and then scans the keyboard until you press a key.

Once you do so, the error-handling routine restarts Tapedisk.

Always include an error-handling routine in your own programs if they use any ROM routines. Even if a pro-

gram is perfect in all other respects, it will be a piece of junk if Basic errors continually cause it to crash.

Now that these errors won't get in the way, Tapedisk simply reads a machine-language program from the cassette recorder into a buffer area.

CLS	(A928) clears the screen and homes the cursor.
KEYINP	(A390) accepts input from the keyboard and places the input in a buffer area. On exit from this routine, register X points to the start of the input minus one. \$00 terminates the input. Furthermore, pressing the break key sets the carry flag.
MOVFNAM	(A590) moves the file name with a starting address in register X and a length in register B to the cassette file-name buffer.
FINDFILE	(A648) will locate the file with a file name in the cassette file-name buffer on the cassette.
FMERR	(A4CD) is the entry point for the Basic FM error routine.
CSRDON	(A77C) is the same as [A004]. See page 270 of the Color Basic manual.
BLKIN	(A70B) is the same as [A006]. See page 269 of the Color Basic manual.
IOERR	(A4FB) is the entry point for the Basic IO error routine.
CSRDOFF	(A7E9) turns off the cassette motor.

Table 3. The Program's ROM Routines

*"Tapedisk reroutes any Basic errors to the error-handling routine in lines 157-181."*

\$018E. On entry to this link, the Basic error code is in register B.

In order to intercept the Color Basic error-handling routine, the program must place a JMP to its own error-handling routine. Tapedisk performs this link with the Color Basic error-handling routine in lines 6-9. Once the program has intercepted this, it will reroute any Basic errors to the error-handling routine in lines 157-181.

This routine in Tapedisk simply ensures that the disk and the cassette are off. Additionally, it sets the current output device to the video display and resets a few values in the disk communications area.

As soon as it accomplishes these tasks, it locates and displays the ap-

Program Listing

```

0001 0600          NAM TAPEDISK
0002 094C          FILE EQU $094C
0003 0600          ORG $1000
0004 1000 10FF1222 START STS STACK          SAVE STACK
0005 1004 7FFF40   CLR $FF40          TURN OFF DISK
0006 1007 867E    LDA #$7E          A=JMP OPCODE
0007 1009 B7018E  STA $18E          SAVE JMP OPCODE
0008 100C 8E1189  LDX #ERROR       X=ERROR ADDRESS
0009 100F BF018F  STX $18F          SAVE ERROR ADDRESS
0010 1012 8E01D1  LDX #$1D1        X=FILENAME BUFFER
0011 1015 6F80    CLR ,X+           ZERO IT
0012 1017 8620    LDA #32          A=SPACE
0013 1019 A780    STA ,X+           SAVE SPACE
0014 101B 8C01DA  CMPX #$1DA       LOOP TILL
0015 101E 26F9    BNE A@           DONE
0016 1020 BDA928  JSR $A928        CLEAR SCREEN
0017 1023 8E11D3  LDX #M1          X=MESSAGE ADDRESS
0018 1026 17019F  LBSR DISM        DISPLAY MESSAGE
0019 1029 BDA390  JSR $A390        GET INPUT
0020 102C 25D2    BCS START        JUMP IF BREAK PRESSED
0021 102E 3001    BEA X@           BUMP INPUT POINTER
0022 1030 A684    LDA ,X           GET CHARACTER
0023 1032 8120    CMPA #32         CHECK FOR SPACE
0024 1034 27F8    BEQ B@           LOOP IF SPACE
0025 1036 5F      CLR B            ZERO LENGTH
0026 1037 3410    PSHS X           SAVE INPUT POINTER
0027 1039 6D80    TST ,X+         CHECK FOR END OF NAME
0028 103B 2703    BEQ D@           JUMP IF END OF NAME
0029 103D 5C      INCB            BUMP LENGTH
0030 103E 20F9    BRA C@           LOOP TILL END FOUND

```

Listing continued

Listing continued

0031	1040	C108	D@	CMPB #8	COMPARE LENGTH WITH 8
0032	1042	2302		BLS E@	JMP IF LENGTH <= 8
0033	1044	C608		LDB #8	B=LENGTH
0034	1046	3510	E@	PULS X	GET INPUT POINTER
0035	1048	BDA590		JSR \$A590	MOVE FILENAME
0036	104B	0F78		CLR <\$0078	FLAG FILE NOT OPEN
0037	104D	BDA648		JSR \$A648	LOCATE FILE ON TAPE
0038	1050	B601E2		LDA \$1E2	GET FILE TYPE
0039	1053	8102		CMPA #2	CHECK FOR CLOADM
0040	1055	10269474		LBNE \$A4CD	FM ERROR IF NOT
0041	1059	FC01E5		LDD \$1E5	D=EXEC ADDRESS
0042	105C	FD1224		STD EXEC	SAVE EXEC ADDRESS
0043	105F	7D01E4		TST \$1E4	CHECK FOR BINARY FILE
0044	1062	10269467		LBNE \$A4CD	FM ERR IF NOT
0045	1066	FC01E7		LDD \$1E7	D=STARTING ADDRESS
0046	1069	FD1226		STD STADD	SAVE STARTING ADDRESS
0047	106C	8E1242		LDX #BUFF	X=BUFFER ADDRESS
0048	106F	9F7E		STX <\$007E	SAVE AS CBUFAD
0049	1071	BDA77C		JSR \$A77C	READ LEADER
0050	1074	BDA70B	F@	JSR \$A70B	READ BLOCK
0051	1077	10269480		LBNE \$A4FB	JMP IF IO ERROR
0052	107B	9F7E		STX <\$007E	SAVE CBUFAD
0053	107D	0D7C		TST <\$007C	CHECK BLKTP
0054	107F	10279478		LBEQ \$A4FB	JMP IF FILE HEADER
0055	1083	2AEF		BPL F@	LOOP IF DATA BLOCK
0056	1085	BF1228		STX ENDADD	SAVE ENDING ADDRESS
0057	1088	BDA7E9		JSR \$A7E9	TURN OFF MOTOR
0058	108B	BEL1226		LDX STADD	X=STARTING ADDRESS
0059	108E	8C1242		CMPX #BUFF	CMP WITH BUFFER
0060	1091	242F		BHS H@	JMP IF >= BUFFER ADDRESS
0061	1093	BF1234		STX REL1+1	SAVE STARTING ADDR
0062	1096	BEL1224		LDX EXEC	X=EXEC ADDRESS
0063	1099	BF1240		STX REL3+1	SAVE EXEC ADDRESS
0064	109C	BEL1228		LDX ENDADD	X=ENDING ADDRESS
0065	109F	BF123B		STX REL2+1	SAVE ENDING ADDRESS
0066	10A2	BF122E		STX N3	SAVE ENDING ADDRESS
0067	10A5	CEL230		LDU #RELOC	U=BLOCK MOVE ROUTINE
0068	10A8	A6C0	G@	LDA ,U+	GET BYTE
0069	10AA	A780		STA ,X+	SAVE IT
0070	10AC	11831242		CMPU #BUFF	LOOP TILL
0071	10B0	26F6		BNE G@	DONE
0072	10B2	1F10		TFR X,D	D=ENDING ADDRESS
0073	10B4	831242		SUBD #BUFF	FIGURE LENGTH
0074	10B7	FD122C		STD N2	SAVE LENGTH
0075	10BA	8E1242		LDX #BUFF	X=STARTING ADDRESS
0076	10BD	BF122A		STX N1	SAVE STARTING ADDRESS
0077	10C0	2012		BRA I@	JUMP
0078	10C2	BF122A	H@	STX N1	SAVE STARTING ADDRESS
0079	10C5	FC1228		LDD ENDADD	D=ENDING ADDRESS
0080	10C8	831242		SUBD #BUFF	FIGURE LENGTH
0081	10CB	FD122C		STD N2	SAVE LENGTH
0082	10CE	BEL1224		LDX EXEC	X=EXEC ADDRESS
0083	10D1	BF122E		STX N3	SAVE EXEC ADDRESS
0084	10D4	8620	I@	LDA #32	A=SPACE
0085	10D6	8E094C		LDX #FILE	X=START OF DCB
0086	10D9	A780	J@	STA ,X+	SAVE SPACE
0087	10DB	8C0957		CMPX #FILE+11	LOOP TILL
0088	10DE	26F9		BNE J@	FILENAME DONE
0089	10E0	8602		LDA #2	A=BIN FILETYPE
0090	10E2	A780		STA ,X+	SAVE FILETYPE
0091	10E4	6F80	K@	CLR ,X+	ZERO DCB
0092	10E6	8C096C		CMPX #FILE+32	LOOP TILL
0093	10E9	26F9		BNE K@	DCB DONE
0094	10EB	BDA928		JSR \$A928	CLEAR SCREEN
0095	10EE	8E1208		LDX #M2	X=MESSAGE ADDRESS
0096	10F1	1700D4		LBSR DISM	DISPLAY IT
0097	10F4	BDA390		JSR \$A390	GET INPUT
0098	10F7	1025FF05		LBSC START	JMP IF BREAK PRESSED
0099	10FB	3001		LEAX 1,X	BUMP INPUT POINTER
0100	10FD	CE094C		LDU #FILE	U=START OF DCB
0101	1100	A680	L@	LDA ,X+	GET CHARACTER
0102	1102	271E		BEQ N@	JMP IF END OF INPUT
0103	1104	812E		CMPA #'.	CHECK FOR EXTENSION
0104	1106	2727		BEQ O@	JMP IF EXTENSION
0105	1108	812F		CMPA #'/'	CHECK FOR EXTENSION
0106	110A	2723		BEQ O@	JMP IF EXTENSION
0107	110C	A7C0		STA ,U+	SAVE CHARACTER IN DCB
0108	110E	11830954		CMPU #FILE+8	LOOP TILL
0109	1112	26EC		BNE L@	FILENAME DONE
0110	1114	A680	M@	LDA ,X+	GET CHARACTER
0111	1116	270A		BEQ N@	JMP IF END OF INPUT
0112	1118	812E		CMPA #'.	CHECK FOR EXTENSION
0113	111A	2713		BEQ O@	JMP IF EXTENSION
0114	111C	812F		CMPA #'/'	CHECK FOR EXTENSION
0115	111E	270F		BEQ O@	JMP IF EXTENSION
0116	1120	20F2		BRA M@	LOOP TILL DONE
0117	1122	CC4249	N@	LDD #\$4249	D=BI
0118	1125	FD0954		STD FILE+8	SAVE BI AS EXTENSION
0119	1128	864E		LDA #'N	A=N
0120	112A	B70956		STA FILE+10	SAVE N AS EXTENSION
0121	112D	200F		BRA Q@	JUMP
0122	112F	CE0954	O@	LDU #FILE+8	U=START OF EXTEN
0123	1132	A680	P@	LDA ,X+	GET CHARACTER
0124	1134	2708		BEQ Q@	JMP IF END OF INPUT
0125	1136	A7C0		STA ,U+	SAVE CHARACTER

Listing continued

Once it has loaded the program into the buffer area, Tapedisk checks to see if the program interferes with the disk communications area. If the program doesn't interfere, Tapedisk writes it on disk as a LOADM file. If it does interfere, Tapedisk adds a short block-move routine onto the end of the program.

Furthermore, Tapedisk gives the program a higher starting address and a new EXEC address. Next, it writes the slightly modified program on disk as a LOADM file.

Because of the higher starting address, LOADM loads the program into a higher-than-normal memory location. When you've typed EXEC, the block-move routine properly relocates the program and then JMPs to the normal EXEC address.

There are sufficient comments in the Program Listing to help you under-

*“You can  
easily assemble  
a Tapedisk  
with any  
editor/assembler.”*

stand Tapedisk's operation. Except for the disk I/O routines, Table 3 lists the ROM routines used by Tapedisk. Figures 1 and 2 illustrate the CLOADM tape format and the LOADM disk format.

You can easily assemble a Tapedisk with any editor/assembler. Simply type in the program and check for typos. Then make a few copies of the object code.

Before leaving the editor/assembler, be sure you make a few copies of the source code. This could save a lot of time in case you missed any typos.

Although Tapedisk only demonstrates the disk output routines, you can easily implement the disk input routines into a program. All the disk I/O routines are quite easy to use and should make any machine-language programming effort much easier. ■

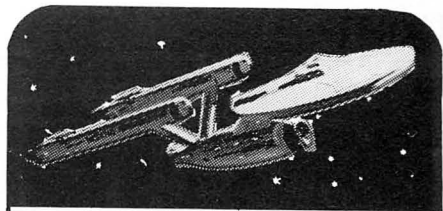
*Write to Mark D. Goodwin at Star  
Route 79, Box 103, Orland, ME 04472.*

*Ed. Note: If you try to assemble this  
program in memory, you will get an  
ERROR-OBJ. You must assemble the  
source code to tape.*

Listing continued

0126	1138	11830957		CMPU #FILE+11	LOOP TILL
0127	113C	26F4		BNE P@	EXTENSION DONE
0128	113E	BDC956	Q@	JSR \$C956	OPEN DISK FILE
0129	1141	4F		CLRA	A=FILE HEADER
0130	1142	BDCB52		JSR \$CB52	WRITE FILE HEADER
0131	1145	FC122C		LDD N2	D=LENGTH OF FILE
0132	1148	BDCB52		JSR \$CB52	WRITE MSB OF LENGTH
0133	114B	1F98		TFR B,A	A=LSB OF LENGTH
0134	114D	BDCB52		JSR \$CB52	WRITE LSB OF LENGTH
0135	1150	FC122A		LDD N1	D=STARTING ADDRESS
0136	1153	BDCB52		JSR \$CB52	WRITE MSB OF STADD
0137	1156	1F98		TFR B,A	A=LSB OF STADD
0138	1158	BDCB52		JSR \$CB52	WRITE LSB OF STADD
0139	115B	8E1242		LDX #BUFF	X=START OF BUFFER
0140	115E	10BE122C		LDY N2	Y=LENGTH OF FILE
0141	1162	A680	R@	LDA ,X+	A=DATA BYTE
0142	1164	BDCB52		JSR \$CB52	WRITE DATA BYTE
0143	1167	313F		LEAY -1,Y	LOOP TILL
0144	1169	26F7		BNE R@	FILE WRITTEN
0145	116B	86FF		LDA #\$FF	A=EXEC HEADER
0146	116D	BDCB52		JSR \$CB52	WRITE FILE HEADER
0147	1170	4F		CLRA	ZERO A
0148	1171	BDCB52		JSR \$CB52	WRITE GAP
0149	1174	4F		CLRA	ZERO A
0150	1175	BDCB52		JSR \$CB52	WRITE GAP
0151	1178	FC122E		LDD N3	D=EXEC ADDRESS
0152	117B	BDCB52		JSR \$CB52	WRITE MSB OF EXEC
0153	117E	1F98		TFR B,A	A=LSB OF EXEC
0154	1180	BDCB52		JSR \$CB52	WRITE LSB OF EXEC
0155	1183	BDA42D		JSR \$A42D	CLOSE DISK FILE
0156	1186	16FE77		LBRA START	JUMP TO START
0157	1189	3404	ERROR	PSHS B	SAVE ERROR CODE
0158	118B	7FFF40		CLR \$FF40	TURN OFF DISK
0159	118E	0F6F		CLR <\$006F	DEVNUM=VIDEO
0160	1190	0FEB		CLR <\$00EB	ZERO CURRENT DRIVE
0161	1192	BDD148		JSR \$D148	RESET VALUES
0162	1195	BDA7E9		JSR \$A7E9	TURN OFF CASSETTE
0163	1198	860D		LDA #13	A=CARRIAGE RETURN
0164	119A	AD9FA002		JSR [\$A002]	DO CARRIAGE RETURN
0165	119E	3504		PULS B	GET ERROR CODE
0166	11A0	8EC242		LDX #\$C242	X=ERR MESSAGE TABLE
0167	11A3	C136		CMPB #\$36	JMP IF DISK
0168	11A5	240A		BHS A@	BASIC ERROR CODE
0169	11A7	8E88D9		LDX #\$88D9	X=ERR MESSAGE TABLE
0170	11AA	C132		CMPB #\$32	JUMP IF EXTENDED
0171	11AC	2403		BHS A@	BASIC ERROR CODE
0172	11AE	8EABAF		LDX #\$ABAF	X=ERR MESSAGE TABLE
0173	11B1	3A	A@	ABX	X=ERR MESSAGE LOCATION
0174	11B2	EC84		LDD ,X	D=ERROR MESSAGE
0175	11B4	8E1218		LDX #M3	X=MESSAGE ADDRESS
0176	11B7	ED84		STD ,X	SAVE ERROR MESSAGE
0177	11B9	8D0D		BSR DISM	DISPLAY IT
0178	11BB	AD9FA000	B@	JSR [\$A000]	GO SCAN KEYBOARD
0179	11BF	27FA		BEQ B@	LOOP TILL KEY PRESSED
0180	11C1	10FE1222		LDS \$TACK	GET STACK POINTER
0181	11C5	16FE38		LBRA START	START OVER
0182	11C8	A680	DISM	LDA ,X+	GET CHARACTER
0183	11CA	2706		BEQ A@	JMP IF END OF MESSAGE
0184	11CC	AD9FA002		JSR [\$A002]	DISPLAY CHARACTER
0185	11D0	20F6		BRA DISM	LOOP TILL DONE
0186	11D2	39	A@	RTS	RETURN
0187	11D3	5441504544	M1	FCC "TAPEDISK V1.0	
0188	11E0	0D		FCB 13	
0189	11E1	4259204D41		FCC "BY MARK D. GOODWIN	
0190	11F3	0D		FCB 13	
0191	11F4	4341535345		FCC "CASSETTE FILENAME: "	
0192	1207	00		FCB 0	
0193	1208	4449534B20	M2	FCC "DISK FILENAME: "	
0194	1217	00		FCB 0	
0195	1218	2020204552	M3	FCC " ERROR	
0196	1220	0D00		FCB 13,0	
0197	1222	0000	STACK	FDB 0	
0198	1224	0000	EXEC	FDB 0	
0199	1226	0000	STADD	FDB 0	
0200	1228	0000	ENDADD	FDB 0	
0201	122A	0000	N1	FDB 0	
0202	122C	0000	N2	FDB 0	
0203	122E	0000	N3	FDB 0	
0204	1230	8E1242	RELOC	LDX #BUFF	
0205	1233	CE1226	REL1	LDU #STADD	
0206	1236	A680	A@	LDA ,X+	
0207	1238	A7C0		STA ,U+	
0208	123A	8C1228	REL2	CMPX #ENDADD	
0209	123D	26F7		BNE A@	
0210	123F	7E1224	REL3	JMP EXEC	
0211	1242	00	BUFF	FCB 0	
0212	1243			END START	
BUFF	1242	DISM	11C8	ENDADD	1228 ERROR 1189
EXEC	1224	FILE	094C	M1	11D3 M2 1208
M3	1218	N1	122A	N2	122C N3 122E
REL1	1233	REL2	123A	REL3	123F RELOC 1230
STACK	1222	STADD	1226	START	1000

END



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BY ROBERT P. BUSSELL

# INTERRUPT PROCESSING

With this routine you can pause during a game, answer the phone, and then go back to the game.

While watching a commercial for the new Atari game machine, I noticed a Pause feature that allows you to freeze a game in progress. You can then do something else and later return to the game. I thought, "This is exactly what I need!" It seems that every time I get my score on Polaris to a decent number, the phone rings. After I answer it, only to find it is for one of my kids, I return to my game and discover the message, "Game Over." To prevent this from happening again, I wrote the short utility program included as Program Listing 1 of this article.

## The Interrupt Process

This program is based on the interrupt-processing capabilities of the MC 6809E microprocessor. The microprocessor recognizes two hardware interrupts that can be controlled from software. These are the interrupt request (IRQ) and the fast interrupt request (FIRQ). Some examples of these are the horizontal sync interrupt, the field sync interrupt, and the cartridge interrupt.

When an IRQ interrupt occurs, the microprocessor saves the contents of all the registers on the stack and transfers control to the address contained in the hardware vector table at addresses \$FFF8 and \$FFF9 hex. The processor executes the machine-language instructions beginning at the address to which the vector table points.

The processor continues to process this sequence of instructions until it encounters a return-from-interrupt instruction, RTI \$3B hex. At this time the microprocessor restores all registers to the values contained in them prior to the interrupt and returns control to the interrupted program.

The FIRQ interrupt operates in a similar manner with the following exceptions:

- FIRQ saves only the program counter (PC) and condition code register (CC).
- It transfers control to the address contained in vector addresses \$FFF6 and \$FFF7 hex.
- Upon execution of a return from interrupt instruction, it restores only the PC and CC registers.

If you examine memory at addresses \$FFF8 and \$FFF9, the IRQ vector, you will find the value \$10C hex. This is the address that the program executes when it encounters an interrupt. Address

\$10C contains a \$7E that is a jump to the address contained in the next 2 bytes of memory. For Extended Basic, this address will be \$894C hex or \$A9B3 for Basic. I assume a different value will be stored in these two locations for Disk Basic. Each of these is the starting address of the Microsoft interrupt-processing routine for that version of Basic.

## Making the Pause Routine Work

To implement the Pause routine, I intercepted the IRQ processing routine with a small routine to look for a shifted clear key. I wanted to keep the computer in a very tight loop when that key was pressed until it was pressed again. If at the time of an interrupt the shifted clear key has not been pressed, the Pause routine transfers control to the interrupt-processing routine.

The five instructions at lines 320-360 look for the shift key. If that key has been pressed, they look for the clear key; otherwise, they continue with the interrupt processing.

When the routine finds the shift/clear combination, it jumps to the routine at label PAUSE where it stays in a tight loop until the shifted clear key is pressed again. The two small program loops at labels P2 and P3 provide key debounce to allow you time to remove your fingers from the keys.

### System Requirements

16K/32K RAM  
Editor/Assembler (optional)

Write to \$FF02								
Column	0	1	2	3	4	5	6	7
Row 0	@	A	B	C	D	E	F	G
Row 1	H	I	J	K	L	M	N	O
Row 2	P	Q	R	S	T	U	V	W
Row 3	X	Y	Z	↑	↓	←	→	sp
Row 4	0	1	2	3	4	5	6	7
Row 5	8	9	:	;	,	-	.	/
Row 6	ent	clr	brk	nu	nu	nu	nu	shift
Row 7	Not used							

ent = Enter clr = Clear brk = Break nu = Not Used

\*Note: Shifted characters use the same matrix plus the shift key.

Table 1. Keyboard Matrix

A Peripheral Interface Adaptor (PIA) interfaces the keyboard to the Color Computer. You can access the PIA for keyboard operations by writing to address \$FF02 hex and reading the results from address \$FF00 hex.

The keyboard scan routine works by writing a bit 0 to the column that contains the key for which the routine is testing. It then tests the row the key is in for a zero. If it finds zero, it means that the tested key has been pressed.

You may notice that I did not test columns 2 and 8 in the same operation. If I had, pressing either the shift or the clear key would cause a branch to the Pause routine.

You can select another key for the Pause routine, but you must remember that you are responsible for determining whether you are looking for a normal or a shifted key. For example, the numeric keys represent special keys when you press the shift key. Table 1 illustrates the keyboard matrix.

The program is very easy to use. I produced Listing 1 with the Radio Shack EDTASM+ Editor/Assembler, but you can use any Color Computer assembler. This version of the program was written for a 32K computer and can be used with a 16K machine by changing the value of the ORG statement in line 00180 from \$7E00 to \$3E00.

```

00100 *      PAUSE UTILITY
00110 *      COPYRIGHT FEB. 1983
00120 *      BY
00130 *      ROBERT P. BUSSELL
00140 *
00150 *      THIS ROUTINE ALLOWS A PROGRAM TO BE PAUSED
DURING EXECUTION      00160 *      BY USING THE SHIFT-CLEAR KEY AND BE RESTARTED
LATER USING
7E00      00170 *      THE SAME KEY.
          A000 00180      ORG $7E00
          010D 00190 POLCAT EQU $A000
          FF00 00200 IRQ   EQU $10D
          010D 00210 PIA0  EQU $FF00
7E00 BE 010D 00220 INIT   LDX IRQ GET ORIGINAL VECTOR
7E03 AF 8D 000F 00230      STX TEMP,PCR AND SAVE IT
7E07 8E 7E18 00240      LDX #START SET UP FOR
7E0A BF 010D 00250      STX IRQ NEW VECTOR
7E0D 39          00260      RTS
7E0E AE 8D 0004 00270 TERM LDX TEMP,PCR RESTORE ORIGINAL VECTOR
7E12 BF 010D 00280      STX IRQ
7E15 39          00290      RTS
7E16      894C 00300 TEMP  PDB $894C ORIGINAL VECTOR ADDRESS
          00310 *
7E18 86 7F      00320 START LDA #$7F CHECK COLUMN 8 FOR SHIPT KEY
7E1A B7 FF02    00330      STA PIA0+2 OUTPUT TO PORT
7E1D B6 FF00    00340      LDA PIA0 CHECK INPUT FOR
7E20 84 40      00350      ANDA #$40 ROW 7 SET
7E22 26 0C      00360      BNE IRQD1 JP IF SHIPT NOT SET
7E24 86 FD      00370      LDA #$FD CHECK COLUMN 2 FOR CLEAR KEY
7E26 B7 FF02    00380      STA PIA0+2 OUTPUT TO PORT
7E29 B6 FF00    00390      LDA PIA0 CHECK INPUT FOR
7E2C 84 40      00400      ANDA #$40 ROW 7 SET
7E2E 27 06      00410      BEQ PAUSE PAUSE IF SHIPT-CLEAR SET
7E30 AE 8D FFE2 00420 IRQD1 LDX TEMP,PCR CONT. WITH INTERRUPT PROCESSING
7E34 6E 84      00430      JMP ,X EXIT
7E36 8E A000    00440 PAUSE  LDX #$A000 DELAY FOR KEY BOUNCE
7E39 30 1F      00450 P2    LEAX -1,X DEC. DELAY COUNTER
7E3B 26 FC      00460      BNE P2 LOOP TIL DONE
7E3D 86 7F      00470 PAUSE1 LDA #$7F LOOK FOR SECOND PRESS
7E3F B7 FF02    00480      STA PIA0+2 OF SHIPT-CLEAR KEY
7E42 B6 FF00    00490      LDA PIA0
7E45 84 40      00500      ANDA #$40
7E47 26 F4      00510      BNE PAUSE1
7E49 86 FD      00520      LDA #$FD
7E4B B7 FF02    00530      STA PIA0+2
7E4E B6 FF00    00540      LDA PIA0
7E51 84 40      00550      ANDA #$40
7E53 26 E8      00560      BNE PAUSE1
7E55 8E A000    00570      LDX #$A000
7E58 30 1F      00580 P3    LEAX -1,X DELAY FOR KEY BOUNCE
7E5A 26 FC      00590      BNE P3
7E5C 20 D2      00600      BRA IRQD1 CONT. WITH INTERRUPT PROCESSING
          00610 *
          00620      END INIT
00000 TOTAL ERRORS
INIT      7E00
IRQ       010D
IRQD1     7E30
P2        7E39
P3        7E58
PAUSE     7E36
PAUSE1    7E3D
PIA0      FF00
POLCAT    A000
START     7E18
TEMP      7E16
TERM      7E0E

```

Program Listing 1. Pause Utility

If you do not have an assembler, I have included a Basic program to load the program and save it to tape (see Pro-

gram Listing 2). To use this program in a 16K computer, make the following changes:

Line 20 FOR A=&H3E00 TO &H3E5D

Line 110 Change all 7Es to 3Es

```

10 CHKSUM=0
20 FOR A=&H7E00 TO &H7E5D
30 READA$:N=VAL("&H"+A$)
40 POKE A,N
50 CHKSUM=CHKSUM+N
60 NEXT A
70 IF CHKSUM <> 10740 THEN CLS:PRINT@32,"BAD DATA VALUE. CHECK & REENTER":END
80 CLS:PRINT@32, "GOOD DATA LOAD"
90 PRINT"DO YOU WANT AN OBJECT T APE"
100 Q$=INKEY$:IF Q$="N"THEN END ELSE IF Q$<>"Y"THEN 100
110 PRINT"PUT TAPE IN RECORD MODE PRESS ENTER WHEN READY":INPUT Q$:CSAVEM"PAUSE",&H7E00,&H7E5C,&H7E00:END
120 DATA BE,01,0D,AF,8D,0,0F,8E,7E,18,BF,01,0D,39,AE,8D,0,04
130 DATA BF,01,0D,39,89,4C,86,7F,B7,FF,02,B6,FF,0,84,40,26,0C
140 DATA 86,FD,B7,FF,02,B6,FF,0,84,40,27,06,AE,8D,FF,E2,6E,84
150 DATA 8E,A0,0,30,1F,26,FC,86,7F,B7,FF,02,B6,FF,0,84,40
160 DATA 26,F4,86,FD,B7,FF,02,B6,FF,0,84,40,26,E8,8E,A0,0
170 DATA 30,1F,26,FC,20,2D

```

Program Listing 2. Basic Leader for Assembly-Language Programs.

Once the program has been assembled or loaded from the Basic program and saved to tape, it is ready to run. You can invoke it from Basic by entering the command EXEC &H7E00 from 32K or &H3E00 from 16K. If you want to use the Pause function with an Assembly-language program, you should execute it prior to loading the Assembly-language program, because many Assembly-language programs have an autostart feature.

Now you are ready to run your program. Load and execute it in the normal manner. Anytime you want to halt the program, press shift/clear, and that halts the program until you press the shifted clear key again. When you don't need the Pause function, you should execute the command EXEC &H7E0E from 32K or &H3E0E from 16K to restore the interrupt pointer to its normal value.

This Pause function works with all Basic programs and many Assembly-

language programs. I have found that it works with about 50 percent of the games I own. It will not work with programs that have taken control of the interrupt processing themselves. It also will not work with programs that have disabled external interrupts.

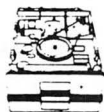
You can easily tell if a program has taken over the interrupt processing by examining memory addresses \$10D and \$10E hex after running the program. If the contents of these addresses are not \$7E18 or 3E18 hex, then the program is performing interrupt processing.

It is more difficult to tell if the program you are using is locking out interrupts. To find this, you need to search the program for an ORCC #50 instruction that is a \$1A50 hex. This instruction disables the normal interrupt and the fast interrupt.

One other item that must be considered is timing. The Pause program, while it is in use, slows or stops the updating of the Basic variable TIMERS and should not be used with programs that use the TIMER function. ■

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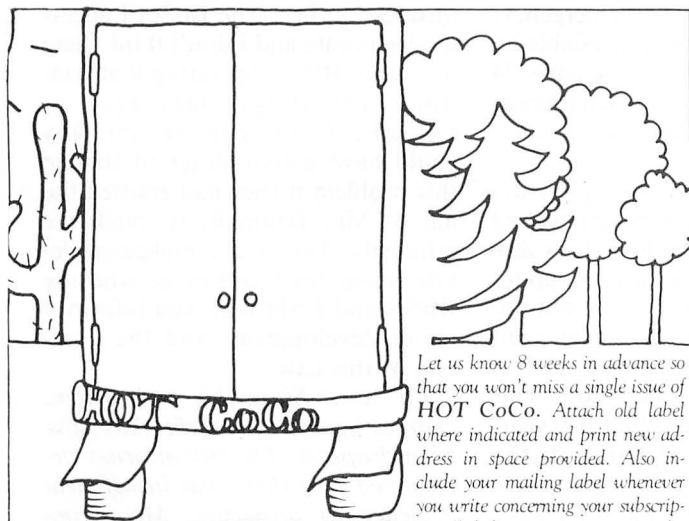
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# 6809 On Line

As this issue of *HOT CoCo* hits the newsstands, the holidays will be well on their way. And so, I present my gift to you for the holidays: a form you can use to keep track of your BBS activities! Also, it's time for a database update, so I have some new information and some thoughts for our SYSOPs.

## Update

Two interesting services have become available since I last wrote you concerning this subject. Over 2,000 information utilities or databases now exist serving ever-increasing needs. I will keep you abreast of the more interesting and valuable services but, of course, I cannot cover them all.

The first new service should interest everyone. Searchmart Corp., in North Palm Beach, FL now offers free access to the On-Line Software Library. By dialing 305-845-6466 or 305-84-LOGON and answering a few questions, you can search for software products to suit many machines and needs.

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The New Software Products file might be available by the time you read this. Here the shopper can find out what's new in software products. Color Computer software vendors who want to know more about this service or anyone with questions in general can contact the Searchmart Corp., 745 U.S. Highway One, North Palm Beach, FL 33408. The voice telephone line is 305-845-2996.

## A GIFT TO MY READERS

by Bobby Ballard

The second new information-retrieval service, offered by Secure-America Corp., provides voice (and soon computer) access to important personal information to authorized individuals to protect you, your children, and your property. Known as Secure 24, this service provides important medical, insurance, and personal belongings information to the appropriate people in times of need. Secure 24 will even contact relatives and friends in case of emergency. This service will soon be available on Tymnet, according to Secure 24 news releases. You can reach them at 1-800-USA-2400 24 hours a day, seven days a week.

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## SYSOPs Beware!

In southern California, Tom Tcimpidis, owner and SYSOP of the MOG-UR Board, was arrested and his computer equipment confiscated on charges initiated by Pacific Telephone. The Granada Hills SYSOP faces charges of telephone fraud because callers left stolen telephone credit-card numbers and other long-distance access numbers on his BBS. This case will have a great effect on

SYSOPs across the nation, and I think hackers will find more and more undercover police activity in an effort to stem telephone and information fraud.

Often the BBS has been compared to a bulletin board where space is provided to post a variety of information. Those who put the messages on the board are held responsible for the nature and results of the messages. In this case, the owner of the board has been arrested and the violators are still free. This case poses questions about First Amendment rights and freedom of the press, as well as questions about freedom of expression and the privacy of the individual.

Certainly I don't condone telephone fraud or the use of BBSes to aid in defrauding anyone. But I don't approve of the telephone company entering the law-enforcement business, either. The BBSes I access are legitimate and I don't think there are many BBSes operating that condone any illegal messages or uploads. The telephone company could have gotten closer to solving this problem if they had enlisted the aid of Mr. Tcimpidis to catch the criminals. This is a complicated development for those of us who use BBSes and I will keep you informed about developments and the progress of this case.

*Ed. note: Since this was written, charges against Mr. Tcimpidis have been dropped. The city attorney determined that there was insufficient evidence to prosecute. Mr. Tcimpidis is considering a civil suit against Pacific Bell. Readers interested in this case should refer to the June 19 and July 16 issues of InfoWorld.*

My advice to SYSOPs is to watch your message bases very closely and, if possible, use an authorized-access program, deleting those individuals who post illegal messages, upload copyrighted programs, or crash the board. If hackers insist on causing so much trouble, the day will soon





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I don't like to think that this would happen, and I think *HOT CoCo* readers feel the same as I. If you have a favorite board, you might offer a contribution of your time or money to the SYSOP to help keep the board running and "clean." Continued abuse could lead to sweeping legislation and will definitely lead to higher telephone bills as companies pass on the cost of investigations.

Speaking of the telephone company, next month we will look at one year of phone deregulation. With the beginning of 1985, AT&T marks their first anniversary without government interference, and they face some new and fierce competition.

**The (Un) Yule Log**

The log in Fig. 1 will help you burn up the boards, so to speak, as you access different BBSes. This form should help you keep track of passwords, baud rates, and other pertinent data with speed and accu-

racy. It is my gift to *HOT CoCo* readers in hopes that it will make your life, and the SYSOP's, easier and more pleasurable.

This form was developed out of personal need and a desire to keep track of my calls and organize my activities. The idea evolved into *The BBS Log Book*, which was released in July 1984. If you wish to order the complete *BBS Log Book*, send \$5.95 plus \$2 shipping and handling to Atmospheres, 1207 Eighth Avenue, Brooklyn, NY 11215.

To get started, make enough copies of Fig. 1 for your personal use.

To begin, the top of the page has spaces for noting your name (or company, department name, and so on), origination number (your telephone number), and the month and year. Although you might not need these slots, some of you will want to keep a separate sheet for different accounts, companies, or departments under the name heading. Those who travel might wish to keep a different sheet for each different origination number. Others will start

a new sheet each month, facilitating a quick chronological search.

After you're off line, you can enter the information into your database program for future reference. The pages you generate with this form can be the basis for a log book of all your contacts.

I designed this form for my specific notation system. It is part of *The BBS Log Book*, mentioned above, which includes a Personal Directory and Telephone Log in addition to the BBS Log form.

Modify this form for your own personal system. You can give the columns different titles or combine columns to suit your needs. Most users find it adequate for their needs, and I think you'll find it thorough. I hope you enjoy telecommunicating even more using the BBS Log Form, and I hope you have a wonderful holiday season. Enjoy! ■

*Address correspondence to Bobby Ballard, 1207 Eighth Ave., 4R, Brooklyn, NY 11215.*

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# The DOSsier

## MORE ON DYNASTAR AND THE VIRTUES OF DYNAFORM

by *Scott L. Norman*

It's funny how these columns seem to stretch out into continuing sagas. No sooner do I send one off to the editorial offices when I find the answer to some problem I've just written about. Maybe that's because it takes a couple of months to become familiar with all the ins and outs of a complex piece of software, or maybe it's just because I tend to write about things I'm exploring at the moment, and The DOSsier reflects my own learning curve.

Last month I described my first impressions of DynaStar, the Flex/OS-9 word processor out of Dynasoft Ltd., via the Frank Hogg Lab. Although I liked the overall feel of the product, a few things did bother me. I've now cleared up a couple of them.

Not that I'm taking credit for any great insights, mind you. The solutions were there all the time, and all I did was make a phone call or two and noodle around a bit.

### Into the Code

One of the things that bothered me when I began to use DynaStar was the inordinate length of time required to scroll the video display. Everything went well while I was entering text, until I got to the bottom line of the screen. Once I had finished that, however, I could go to the kitchen for a sandwich while DynaStar rewrote the display.

Even worse, the program had a tendency to lose any characters typed in while the rewrite was in progress. That's the sort of thing that can dry up the creative juices and slow you down.

I was (and am) using release 2.2 of the CoCo Flex edition of DynaStar; not the OS-9 or standard Flex ver-

sions. The other two fail to share all the problems I encountered, although I suspect they have peculiarities of their own.

Something would have to be done about the scrolling problem if DynaStar were to live up to its promise. I also wanted the ability to display more text than the standard 51-character lines allow. This certainly seemed like a job for the PBJ Word-Pak.

At this point I bailed out and called DynaStar author Allan Jost, who does business out of Windsor Junction, Nova Scotia. Allan was amazingly civilized, considering that the hour was late and he was still jet-lagged from a trip to London, and he confirmed my suspicions.

The best hope for tweaking up the display, he felt, would be to modify, reassemble, and splice an Assembly-language "terminal personality" module called GOTOXY. (That should be read as "go to x,y.") The folks at PBJ soon confirmed this.

I approach this sort of task with all the enthusiasm most people reserve for root canal work; nevertheless, this job was so straightforward that even I had little opportunity to go wrong. Before long I had a full 80-by-25 version of DynaStar running, and at good speed. Here's how.

The DynaStar master disk contains several files; you must have the following ones on your working disk:

● DS.CMD—the program that you

call from the command line or from a startup file to get into DynaStar;

- DYNASTAR.SYS—the actual text editor, written in p-code;
- INTERP15—the Dynasoft Pascal p-code interpreter; and
- GOTOXY.SYS—a personality module that tells the system how to do cursor addressing and establishes other parameters of the video terminal.

(There are other files associated with the DynaForm text formatter, but that would just cloud matters for now.)

GOTOXY.SYS is the name the system expects to see for the assembled version of whichever personality module you use. My master disk also included GOTOXY.TVI and GOTOXY.TXT, which turned out to be source-code files for a Tele-video terminal and for the CoCo, respectively.

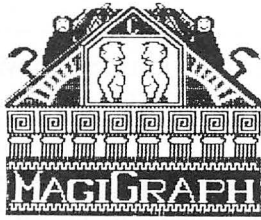
As received, GOTOXY.SYS was the assembled edition of GOTOXY.TXT. It assumed a 51-by-24 display, the everyday FHL Flex format. To use the program with Word-Pak, it was necessary to change only this to allow for 80 characters and 25 lines, and to append the 80-column Word-Pak driver to Flex in the usual way.

It all came down to a matter of altering two lines of source code, which are thoughtfully identified in the excellent DynaStar documentation. The number of lines per page, and the number of characters per line, are specified in a pair of fcb instructions in the fifteenth and sixteenth lines of the module:

fcb 24 number of lines

fcb 51 number of characters

(fcb, or "form constant byte," is an



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## The DOSSier

Assembly pseudo-operation that generates numerical data—somewhat like a DATA statement in Basic.)

All I had to do was change the numbers to 25 and 80, respectively, with a text editor and reassemble. I happened to use TED, the tiny editor that comes with FHL Flex, but I could have used anything—even DynaStar itself. Then I deleted the old GOTOXY.SYS file and assembled the modified code, calling it GOTOXY.BIN.

Why not just name it GOTOXY.SYS and be done with it? Well, it turns out that there is one slightly tricky thing about this whole process: The final, executable copy of GOTOXY.SYS must be in a special relocatable format. There's no need to fret about that, since SAVE-SYS.COMD, one of the other files on the DynaStar master disk, takes care of the final installation.

All you have to know are the initial and final assembled addresses, and you can read those from the Assembly listing or crib them from the manual as I did: For the CoCo, they happen to be \$0100 and \$0132.

Thus, if the Assembly output is on drive 1 and the working disk you are building is on drive 0, the final steps are as follows:

```
GET 1.GOTOXY.BIN
SAVESYS 0.GOTOXY.SYS,0100,0132
```

Now, at last, DynaStar is ready to fly.

### Zip!

The 80-column patch makes all the difference in the world. Now when I get to the bottom of the screen I can keep typing with impunity; scrolling is very fast, and there doesn't seem to be any way to beat the type-ahead buffer. As a practical matter, I am unable to enter material fast enough to lose characters while the display is being pushed up.

All by itself, this improvement makes DynaStar a serious candidate for my mainstream Flex word processor. I'm in no position to explain the speed increase, although it clearly has to do with the way Word-Pak does its thing. Additional evidence: When I used an unmodified copy of DynaStar with FHL's 64-column font (the X6424BW file on the Flex disk), things were even slower than they were with the original 51 columns.

Clearly, the Word-Pak/DynaStar combination is the way to go if you are going to use Flex. OS-9 people don't have this option, but can console themselves with the special version of FHL's O-Pak that comes with OS-9 DynaStar. This lets you construct lines up to 255 characters long. The video display becomes a window that scrolls horizontally over a long line, much as it does in Stylograph. I understand that vertical scrolling is pretty speedy, too.

### A Bit More on Technique

A fair number of keystrokes are necessary to get DynaStar text into the format you desire. That's inherent in the program's vocabulary, and has nothing to do with the presence or absence of Word-Pak.

Let's say you want 65-character, right-justified lines. After firing up DynaStar and getting into the edit mode, you first set the right margin to 65 with a control/K/R sequence (I discussed the various control letter command families in last month's DOSSier).

Next, you turn on justification with control/K/J. This also activates wordwrap, and so it appears to leave you prepared to compose a nicely formatted piece of text.

Not quite. If you just begin to type, you'll see the cursor flitting all over the place after you enter every character. Even worse, the material will not be justified on the screen; you might even lose an occasional character, and avoiding that is what this column is supposed to be about.

The answer lies in remembering to

activate justification with a control/K/A sequence before you start to type. This is the sort of command that you would normally issue when changing margins or alignment in the middle of an existing piece of text, and it's easy to forget about it when you're first starting on a new piece of work. Don't.

### And More on DynaForm

Last month, I briefly mentioned DynaForm, the print formatter that forms a vital complement to DynaStar. I continue to be impressed. The thing has such advanced features as a simple way to print different headers or footers on odd and even pages (very handy for book manuscripts), and can automatically generate an index of the material in a text file. If you have ever had to index a long manuscript by hand, you will appreciate this.

Like many formatting programs, DynaForm is controlled by "dot commands" at the left margin of a piece of text. All the standard margin-setting, page-length specification, and line-spacing commands are included, along with a few extra goodies that I especially like. For instance, the conditional page-break command (.CP n) starts a new page of printout if there is insufficient space for n lines on the current one.

This lets you keep an awkward single line from a new paragraph from showing up at the very bottom of a page, and is a handy way of guaranteeing that you won't have tables split across two pages.

The following two commands handle the odd/even page heading gambit:

```
.IFE ab = Execute command ".ab" if page is even
```

```
.IFO cd = Execute command ".cd" if page is odd.
```

Each of the commands .ab and .cd can be a separate header definition, or something even more complex. DynaForm supports macros, which are user-defined command sequences up to 6,000 characters long. Thus, you can get pretty fancy when it comes to letting the machine make complex formatting decisions.

To build an index, the command .DXT must first identify each potential entry. Here, t is a "tag character." You can use several different

---

### Vendors mentioned in this month's DOSSier

**Frank Hogg Laboratory Inc.**  
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315-474-7856

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201-330-1898

---

# The DOSsier

tag characters within a single document to set up different indices, and you can print an index with the entries ordered either alphabetically or by page number.

Items to be indexed are not identified where they actually fall in the text, but on separate lines where they can be prefixed by the .DX; like other dot commands, these must begin in the first print column to be properly interpreted.

The best technique, I find, is to insert the necessary identifying line as soon as possible after each item appears in the text. In that way, you can pin down your index candidates while the creative juices are still flowing. The printer ignores the .DX command lines themselves; they move to the macro pool area of RAM until a command to print the index calls them up.

Here is an example of a piece of text that contributes to two different indices. The first, with tag character 1, is a partial listing of pieces of software I have discussed to date in The DOSsier, while the second (tag 2) con-

sists of the names of some items I have not yet discussed at any length. Again, the lines beginning with a .DX serve to cue the index-generation package, and are not printed with the text:

Among the software packages I have reviewed thus far are Stylograph, DynaStar, TSC Extended Basic,  
 .DX1 Stylograph  
 .DX1 DynaStar  
 .DX1 TSC Extended Basic  
 and various disk utilities. I have not yet described Tabula Rasa, Bizpack, or any of the Computerware Business Software packages.  
 .DX1 Disk Utilities  
 .DX2 Tabular Rasa  
 .DX2 Bizpack  
 .DX2 Computerware Business Software

Each .DX command takes in whatever string follows it. Notice how I can mix subjects for the two indices (.DX1 and .DX2 items) in any order. These are independent dot commands.

The command to print index #t in alphabetical order is .XAt n. Here n is optional and specifies the column in which DynaForm should print the

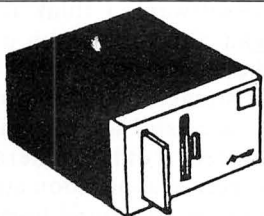
number of the manuscript page on which each item is found. If you want the printed index ordered according to page number, the command is .XNt n. Multiple items found on the same page are sorted in alphabetical order anyway.

These commands do not disturb any existing format settings (margins, line spacing, etc.), so it's a simple matter to run off a neat index at the end of a piece of writing. Just compose any title you might want, put an .XA or .XN into the spot where you want the listing to begin, and stand back.

DynaForm has all the other features you might expect of a complete text formatter, such as a mail-merge package for producing form letters and similar documents. A spelling checker, DynaSpell, rounds out the product line. ■

*Address correspondence to Scott Norman, 8 Doris Road, Framingham, MA 01701.*

## Saguaro Software



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# The Educated Guest

## SOFTWARE WITH PROMISE

by Dr. Charles H. Santee

**C**reative Technical Consultants recently sent me a batch of programs, two of which caught my eye because of their skillful programming, impact, and format.

### Alphabet Soup

Alphabet Soup impressed me because it lets up to five players, with different skill levels, compete against one another. What a great idea. After all, the computer can be a terrific evaluator and equalizer.

Before the game begins each individual establishes their personal level of ability. This concept is excellent, but implementation here is rough and needs some refining. It takes some experimentation to determine difficulty levels and no guidelines are provided.

Once set up the game presents each player with a list of randomly selected letters. It is up to the player to create as many words as possible in a predetermined amount of time. A bonus is given if you create a screenful of words. The lower a player's difficulty level, the fewer letters appear on the screen and the longer the time limit. The higher a player's difficulty level, the more complex is the letter selection.

One program drawback is that a player must wait until the time limit is up even after all possible words are exhausted. It is also possible to get a set of letters from which no word can be created. This happens because as the difficulty level increases the probability of getting a vowel decreases. Unfortunately, the programmer did not ensure that a vowel would always be present.

One further criticism: The program uses the term "turkey" for anyone who uses the same word twice. Although I'm not offended by

cute, but sarcastic comments, they can be avoided.

Alphabet Soup demonstrates that players of different levels of ability can compete in the same game of skill and still have a good chance at winning.

### Musical Strings

The gem of the collection, Musical Strings, combines a solid presentation with follow-up material—in this case a book to be used once the computer lesson is completed. This is another idea I find attractive. Support materials, such as this book, complement instructional programs and the combination is effective.

The program carries a student through the presentation of the concept (what is a string?) using analogies and demonstrations.

The author presents an analogy of a piece of string being lengthened, shortened, or changed. He then demonstrates how a string of characters can be altered similarly. Pieces of the string are highlighted as the discussion progresses and sound is used effectively.

Alteration of the string is illustrated and animated. To reinforce the lessons the learner is next allowed to create musical strings. Instructions for composing is shown by highlighting keys on a keyboard as information is supplied.

This is a nice touch. There is, however, a problem. When composing a song it is possible to enter string segments that cause an FC error and a return to Basic. Even

though the correct responses are displayed on the screen, incorrect responses should be screened so FC errors are prevented.

Other suggestions to improve the program would be to let the student control the instruction flow. As it is now, movement from one learning frame to the next is computer controlled. I think a better system would be to let the student prompt the program for a new lesson segment by pressing a key. Occasional short review questions and time to let a student play with the concept at intervals would also be pluses.

This program fully uses 16K and requires a PCLEAR1 for operation on some machines. Therefore, my suggestions might require a 32K version or perhaps separating the composition segment of the program into separate software. I think the advantages gained will be worth using one of these alternatives.

The major strengths of this program are its successful use of analogies to proceed from a general concept to a specific application and its combination of structured learning with opportunities to play with a concept. (Suggested reading: *CAI Sourcebook*, Robert L. Burke, Prentice-Hall Inc., 1982.)

### A Little About Logo

Musical Strings presents the learner with the elements needed for creating something, shows how to combine those elements, and then gives an opportunity to play with those elements. Although Logo also lets you play with concepts, the four versions I have seen provide little in the way of structured learning that enhances creative play.

I would like to see a program or instructional text that provides a



# The Educated Guest

structured format for learning commands, a structured learning experience that lets children alter commands for creative purposes, and also analogies that can be used as bridges from problem solving in Logo to problem solving in other areas. I've seen Logo texts that address the first two areas, but I haven't found any that address the third.

## Ideas for the Programmer

Here are some program possibilities that combine structured learning with play for those of you who are looking for a challenge.

- Word problems have been the bane of many a teacher. How about a program that demonstrates the impact of particular words such as "difference," "sum," or "area" with a graphic display. You can demonstrate the impact of those same words on the solution of a word problem or let a student select key words or values to substitute in a word problem.
- How about developing a program

that teaches map-interpreting skills? Such a program might demonstrate the concepts of distance, direction, and scale using a map. Or the program might let students substitute values for distance and to move a figure across a map, or show how these concepts might apply to the construction of a scale model.

- You can teach language concepts by providing definitions and examples of types of words or by letting students substitute or rearrange words in a sentence. Another option would be to let students see a graphic representation of a sentence as words are substituted, or to let students select a word or phrase that matches a graphic presentation.
- You can develop a program that demonstrates a particular problem-solving strategy and then show how altering steps in the strategy lead to different conclusions.

## Anniversary Time

This month's column caps off a full year of Educated Guests. I hope

you've enjoyed them. In coming months I'll be spending some time writing about new subjects including:

- Supportive activities that can be used to enhance computer-aided or computer-managed instruction.
- Alternate hardware configurations that can be appropriate for educational purposes.
- Humor's place in the educational program.
- And the use and instructional possibilities of the computer as a living/learning tool.

I hope you'll follow along. ■

*Creative Technical Consultants' address is 16-8 Sangre de Cristo, P.O. Box 652, Cedar Crest, NM 87008. Alphabet Soup costs \$15.95, cassette. Musical Strings costs \$17.95, cassette.*

*Address correspondence to Dr. Charles H. Santee, 8 South, 045 Grant St., Westmont, IL 60559.*

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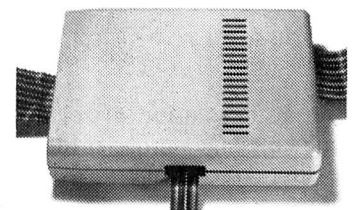
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# Doctor ASCII



by Richard E. Esposito, Jesse W. Jackson, and Ralph E. Ramhoff

*Having technical difficulties? Consult the Doctor for an answer. Due to the volume of mail Doctor ASCII receives, we cannot guarantee that your query will be published. Please send a self-addressed, stamped envelope with all letters to Doctor ASCII c/o HOT CoCo, Pine St., Peterborough, NH 03458.*

**Q.** This is in reference to your answer to P.D. Fran-kenfield in the April 1984 *HOT CoCo*, relative to your program for a screen print for graphics to a Gemini printer. I too have a problem, but the print does not come out backwards, it comes out with a shift of 90 degrees.

Now for problem number two. I understand by your comment in the same issue that a 40-track, double-sided disk is the way to go. I am interested in using OS-9 (I think) and maybe the C language. As I think I need a DOS to match, where do I go? My local Radio Shack has only single-sided, 35-track drives.

*Roy Hansen  
Sunriver, OR*

**A.** As listed in the September 1983 *HOT CoCo*, the dump will be shifted 90 degrees around the z axis on the display, and then 180 degrees around the y axis, so that it is rotated and then mirrored. Referring to the original program, replace lines 1020 and 1040 with these:

```
1020 FOR R = 31 TO 0 STEP - 1  
1040 FOR C = 6111 + R TO R STEP - 32
```

As a consolation prize, this column contains a machine-language screen-print program that really burns the paper! See Robert A. Chavez's letter and reply for details.

As for problem number two, Radio Shack does not currently support anything more than 35-track drives for the CoCo. Too bad—35-tracks are a major limitation for the serious user of advanced operating systems, such as Flex and OS-9. The C language is a very concise, high-level language that gives Assembly-language performance, but the compiler and its library eat up disk space. Running a full C system in Flex or OS-9 on two double-sided, 40-track drives is barely acceptable to me; three are comfortable, a 40-track for compatibility and two 80s even better, but I'm a serious user.

OS-9 is a nice operating system, but I see it as a user's system; you just plug in application and business software and run it. Flex, however, has made a believer out of me. It is appropriately named. It is flexible, easy to use, well documented, and has a vast reservoir of software you can tap into. Flex is both a user's and a programmer's delight, applications and business software

are plentiful, and program development is a cinch with abundant utilities, editors, assemblers, and languages (C, Fort, Pascal, Fortran, etc).

Drives with more than 35 tracks work fine under RS DOS (Disk Extended Basic), but the tragedy is that RS treats them as 35-track, single-sided drives, so more than half of your drive won't be used under RS DOS. You can buy from a number of distributors. Search through the advertisements in this and other magazines.

I recommend Tandon or Teac (*not* TEC) drives, they are both fine instruments, and you can get a double-sided, 40-track drive with case and power supply for about \$275 if you shop comparatively. You'll also need a disk controller (one serves all drives). It costs about \$150 and is available through several sources. If you shop around, you may get a package deal of drive, cable, and controller at an excellent price. For about \$700, you'll have two 40-track, double-sided drives (with controller and cable), the storage equivalent of more than four Radio Shack 35-track, single-sided drives (about \$1,000 at Radio Shack).

Ask the supplier to configure your drives and CoCo. He will need to know that you want the side-select signal to use DS3 (drive select 3) on the cable. For instance, if you buy two drives, tell him you want them configured as drives 0 and 1, with DS3 as the side-select signal.

**Q.** I have a Gemini-10X printer. I also have a Radio Shack DMP-100 printer that I use for graphics dumps. I have just purchased the RS Graphics Pack (it plots charts and graphs). The program works fine with my RS printer. It's a different story, however, when I want to use my Gemini-10X. Can you provide me with a listing to print graphics screens on my Gemini-10X?

*Robert A. Chavez  
Mission Viejo, CA*

**A.** Many people are asking for a screen-dump program—some novices, others real hackers. I have something for all of you! SDUMPX2 (see Listing) is a graphics-dump program to print a PMODE 4 screen at twice the size RS's SCRPRPT gives you. It is fast and offset loadable. It also checks for printer off, and you can modify it to work with any printer that prints 8-bit, dot-addressable graphics. It also smokes the printhead in comparison to Basic dump programs!

Due to the coordinate systems of both the graphics screen and the printer dot width, it was necessary to turn the picture sideways. The graphics screen is 256 wide by 192 high, while the Gemini's is 480 dots wide and 528 high. To maximize the size of the picture, it must be turned sideways. The left side of the graphics display appears at the top of the page, and the top of the display is on the right side of the paper.

You can change the control codes in the DATA state-

ment to adapt the program to work with printers other than the Gemini. Run your graphics program and press the break key when your graphics are complete, then type RUN"SDUMPX2". SDUMPX2 will run in either tape-or disk-based systems, and it is position independent, so you can offset load it. The default addresses are &H7A00-&H7C2A, and the EXEC value is &H7A00.

**Q.** I have a 32K CoCo with an E board. I installed a Basic 1.1 ROM when I upgraded from 4K. I understood this would allow graphics on my Line Printer VII. It still doesn't work. My AUDIO ON function also no longer works since the upgrade. I have since installed a Basic 1.2 ROM, which has made no difference. What is the difference between the Basic 1.1 and

Basic 1.2? I'm considering upgrading from 32K to 64K. Will this be a simple changing of the chips, or will it involve rewiring?

*Paul D. Keaton  
Eielson AFB, AK*

**A.** You didn't mention what graphics print software you were using. It must be capable of sending the proper commands to the LP VII to put it in graphics mode. Radio Shack graphics codes are not compatible with Epson, Gemini, Okidata, etc. Also, be sure the switch on the rear of the LP VII is in the 8-bit position.

As for your problem with AUDIO ON, it's probably not related to either of your Basic ROMs. You should have taken your computer back to where you had it upgraded and had them repair it. EXP AUDIO ON,

```

5 'PUT PICTURE IN PMODE4 SCREEN
6 'THEN RUN THIS PROGRAM
1Ø FOR I= 31232 TO 31786
2Ø READ X
3Ø POKE I,X
4Ø NEXT I
6Ø DATA 26, 8Ø, 52, 119, 15, 11
1, 127, 255
7Ø DATA 64, 23, 1, 23, 23, Ø, 1
59, 16
8Ø DATA 38, Ø, 92, 23, 1, 13, 2
3, 1
9Ø DATA 24, 23, Ø, 231, 158, 18
6, 49, 137
1ØØ DATA 23, 224, 95, 127, 124,
44, 23, Ø
11Ø DATA 2ØØ, 23, 1, 45, 31, 35
, 52, 4
115 ' to print negative picture
(white on black),
116 ' change the 67 in line 12Ø
to 18
12Ø DATA 166, 165, 67, 125, 124
, 44, 38, 12
13Ø DATA 23, Ø, 55, 189, 162, 1
91, 189, 162
14Ø DATA 191, 22, Ø, 9, 23, Ø,
73, 189
15Ø DATA 162, 191, 189, 162, 19
1, 49, 168, 224
16Ø DATA 16, 156, 186, 42, 219,
31, 5Ø, 23
17Ø DATA Ø, 169, 53, 4, 125, 12
4, 44, 38
18Ø DATA 6, 124, 124, 44, 22, 2
55, 191, 92
19Ø DATA 193, 32, 38, 183, 23,
Ø, 114, 53
2ØØ DATA 119, 57, 52, 4, 198, 4
, 247, 124
21Ø DATA 43, 95, 72, 36, 2, 2Ø2
, 3, 122
22Ø DATA 124, 43, 16, 39, Ø, 5,
88, 88
23Ø DATA 22, 255, 239, 31, 152,
53, 4, 57
24Ø DATA 52, 4, 198, 4, 247, 12
4, 43, 95
25Ø DATA 71, 36, 2, 2Ø2, 192, 1
22, 124, 43
26Ø DATA 16, 39, Ø, 5, 84, 84,
22, 255
27Ø DATA 239, 31, 152, 53, 4, 5
7, 182, 255
28Ø DATA 34, 132, 1, 16, 39, Ø,
41, 23
29Ø DATA Ø, 1Ø5, 23, Ø, 136, 17
3, 159, 16Ø
3ØØ DATA Ø, 16, 39, Ø, 9, 129,
89, 16
31Ø DATA 39, Ø, 19, 22, 255, 22
4, 23, Ø
32Ø DATA 136, 142, 128, Ø, 48,
31, 38, 252
33Ø DATA 23, Ø, 126, 22, 255, 2
23, 28, Ø
34Ø DATA 57, 48, 141, Ø, 3, 22,
Ø, 31
345 ' line 35Ø is printer reset,
if you're printer
346 ' doesn't have that functio
n, change the 27 to 255
35Ø DATA 27, 64, 255, Ø, Ø, Ø,
Ø, Ø
36Ø DATA Ø, 48, 141, Ø, 3, 22,
Ø, 15
365 ' line 37Ø puts the printer
in graphics mode
366 ' change the data statement
s to those your printer needs
367 ' be sure to terminate the
data with a 255 for the last byt
e
368 ' you can use up to the thi
rd Ø in line 38Ø
37Ø DATA 27, 75, 128, 1, 255, Ø
, Ø, Ø
38Ø DATA Ø, Ø, Ø, 48, 141, Ø, 1
5, 166
39Ø DATA 128, 129, 255, 16, 39,
Ø, 6, 189
4ØØ DATA 162, 191, 22, 255, 242
, 57
4Ø5 ' line 41Ø returns printer t
o text mode and sets 1/8" line f
eed
4Ø6 ' if your printer has no sim
ilar code,
4Ø7 ' replace the first 27 with
255
4Ø8 ' you may use up to the thir
d Ø in line 42Ø
41Ø DATA 27, 9Ø, Ø, 27, 65, 8,
255, Ø, Ø, Ø
42Ø DATA Ø, Ø, Ø, 142, 4, Ø, 2Ø
4, 96
43Ø DATA 96, 237, 129, 14Ø, 6,
Ø, 38, 249
44Ø DATA 57, 48, 141, Ø, 51, 16
6, 128, 129
45Ø DATA 255, 16, 39, Ø, 7, 173
, 159, 16Ø
46Ø DATA 2, 22, 255, 241, 57, 4
8, 141, Ø
47Ø DATA 141, 166, 128, 129, 25
5, 16, 39, Ø
48Ø DATA 7, 173, 159, 16Ø, 2, 2
2, 255, 241
49Ø DATA 57, 142, 4, Ø, 166, 13
2, 136, 64
5ØØ DATA 167, 128, 14Ø, 6, Ø, 3
8, 245, 57
51Ø DATA 32, 32, 32, 32, 32, 32
, 32, 32
52Ø DATA 32, 32, 32, 32, 32, 32
, 71, 69
53Ø DATA 77, 73, 78, 73, 32, 32
, 32, 13
54Ø DATA 1Ø, 13, 1Ø, 32, 32, 32
, 32, 32
55Ø DATA 32, 32, 32, 32, 32, 71
, 82, 65
56Ø DATA 8Ø, 72, 73, 67, 83, 32
, 68, 85
57Ø DATA 77, 8Ø, 13, 1Ø, 13, 1Ø
, 32, 32
58Ø DATA 32, 32, 32, 32, 32, 32
, 32, 67
59Ø DATA 79, 8Ø, 89, 82, 73, 71
, 72, 84
6ØØ DATA 32, 49, 57, 56, 52, 13
, 1Ø, 13
61Ø DATA 1Ø, 32, 32, 32, 32, 32
, 32, 32
62Ø DATA 32, 74, 69, 83, 83, 69
, 32, 87
63Ø DATA 46, 32, 74, 65, 67, 75
, 83, 79
64Ø DATA 78, 13, 1Ø, 13, 1Ø, 25
5, 32, 32
65Ø DATA 32, 32, 32, 32, 32, 32
, 32, 32
66Ø DATA 32, 8Ø, 82, 73, 78, 84
, 69, 82
67Ø DATA 32, 79, 7Ø, 7Ø, 32, 13
, 1Ø, 13
68Ø DATA 1Ø, 32, 32, 32, 32, 32
, 32, 32
69Ø DATA 32, 32, 82, 69, 84, 85
, 82, 78
7ØØ DATA 32, 84, 79, 32, 66, 65
, 83, 73
71Ø DATA 67, 63, 13, 1Ø, 13, 1Ø
, 32, 32
72Ø DATA 32, 32, 32, 32, 32, 32
, 32, 89
73Ø DATA 69, 83, 32, 79, 82, 32
, 78, 79
74Ø DATA 32, 6Ø, 89, 47, 78, 62
, 13, 1Ø
75Ø DATA 13, 1Ø, 255, Ø, Ø, 96,
77, 83
76Ø ' end SDUMPX2

```

Program Listing. SDUMPX2



SOUND, and JOYSTK are Basic commands that you should experiment with to isolate your problem. If you have problems with all, check chips U4 (6821) and U8 (6821). (The references are for D and E boards.) If JOYSTK works but not SOUND or AUDIO ON, check U9 (14529B), U4 (6821), and U5 (LM1285-8). If only AUDIO ON doesn't work, check U9 (14529B) and U8 (6821). Look for broken connections, bent pins, or bad solder joints.

The various upgrades of Color Basic are attempts to fix bugs or improve Color Basic. Here is a list of fixes or changes in the Color Basic ROMs:

### Version 1.1:

- Revised reset routine to allow initializing the SAM (74LS683) for 64K RAM chips. (This is why you must have 1.1 for 32K nonpiggybacked or 64K RAM).
- Fixed problem where pressing the joystick fire button caused characters to be printed on screen.
- Changed printer serial routine from 7 to 8 bits to permit sending graphics data to printer.

### Version 1.2:

- Changed to floating-point addition to fix bug.
- Switched to dual-rate mode on the SAM (74LS683) to speed execution of code. Most of the other changes are to compensate for this speedup.
- Changed baud rate and serial routines.
- Changed POLCAT and INKEY\$ routines.

The following is how to configure for 64K RAM, if you have an E board only. If you have an E board with 32K RAM and it is not piggybacked (i.e., you have 4164 64K RAM chips installed), you must add three wires. If you have a piggybacked 32K, you must switch to the 64K RAM chips and have Basic 1.1 or 1.2. It's a good idea to get 32K running in that configuration before you go all the way to 64K. If you have done that, and if you can solder, you're ready for 64K! First, I recommend buying spare 74LS02s and 74LS138s (just in case you make a mistake).

Remove the ground from U11 on pin 5 (74LS138) by *carefully* taking it out of the socket and bending pin 5 up to remain horizontal when the IC is plugged in. Next, *carefully* unplug U29 (74LS02) and bend pins 4, 5, and 6 to remain horizontal when the IC is plugged in. Wire pin 4 of U29 to pin 5 of U11, pin 6 of U29 to pin 8 of U29, and pin 5 of U29 to TP1 (read/write test point). You might need to bend pins 5 and 6 of U29 up slightly more than horizontal to keep them from contacting the aluminum chassis. Put some electrical tape on the chassis next to pins 4, 5, and 6 to be safe. Inspect your work very carefully before you power up. When you do, see the March 1984 Doctor ASCII, p. 136 (and the corrections on p. 13 in the May 1984 Feedback) for a program to test your 64K.

**Q.** I have a 32K cassette-based Color Computer and a G.E. 3304 printer. The Radio Shack Screen Print Routine, cat. #26-3021, worked just fine with my previous LP VIII, but will not work with my G.E. printer.

Tallie J. Crocker  
Waynesboro, VA

**A.** Consult your manual for the control-code sequences that enable it to send graphics characters. See Robert A. Chavez's letter and the Program Listing for a flexible screen-dump program into which you can insert the codes your printer requires.

**Q.** I have a 64K CoCo with a 14-inch USI color monitor. I installed Computerware's Video-Plus circuit to drive the display. I used this setup for about three months with no problems. I recently added a Radio Shack CGP-115 printer, and now after about a half-hour to an hour of using my computer, the monitor screen goes blank! Turning the monitor off and then on again restores the display, but only for about a half-hour. I hooked up my monitor and the TV set simultaneously, and when the monitor blanks the TV display remains OK. What could be the problem?

D.R. Smith  
Duluth, GA

**A.** You did not mention whether or not you removed your CGP-115 cable and had the problem, though I suspect it is merely a coincidence (providing the printer has no defect and the cable connections are proper). An incorrectly wired or defective interface could be loading your computer power supplies down just enough to affect the video, but not the computer logic circuitry (I'll elaborate later). Check the +5 and +12 voltages with a digital voltmeter, Video-Plus and the CGP-115 removed, then add them one at a time and check the supplies again. (*Always turn off power when adding or removing accessories to your system.*)

If any of the supplies drop more than a tenth of a volt, there exists an excessive load. Also, check the installation of your Video-Plus board. Be sure the ICs are seated in their sockets securely (with no bent pins). Check for a snug connection to the computer: a bad connection between the computer and Video-Plus could be the culprit. Since the computer's TV video output uses the +12v supply, I'm betting on a problem in the Video-Plus board's connections to power or ground.

Many monitors accept a composite video signal in the range of 0.5 to 1.5 volts. If your output is on the low side, you could observe the symptoms listed below under too little signal.

Now to elaborate on the supply problem: The computer's circuitry operates according to the manufacturer's specs when the supply voltage is between +4.75 and +5.25 volts. The analog composite video circuits could suffer from a small drop in the supply-line voltage causing the level to fall from 0.7v to below 0.5v, while the computer's digital circuitry continues to operate normally.

Finally, here are some tips for troubleshooting monitor problems:

- Try a different monitor, computer, or connecting cable. A defective cable can cause symptoms of too little signal.
- Too little signal can cause no display, lack of synchronization resulting in vertical rolling or horizontal tearing, or portions of the display to disappear.
- Too much signal can cause slanted characters, a distorted display, or blotted characters. ■

# Reader's Forum

## CoCo Multiplication

Despite the fact that the Color Computer is good at mathematical operations because its Basic was designed for flexibility, it cannot be perfect for all needs. For this reason I wrote Program Listing 1 to multiply two numbers, each of which can be up to 255 characters including minus signs and decimal point. It handles positive and negative whole and decimal numbers and returns the answer to the screen.

The program inputs the numbers as strings and then checks to see if either number is negative, setting a flag, FL, to a nonzero number if one but not both of the numbers is negative. If both are negative, the flag automatically cancels itself. The minus signs are removed as they are no longer necessary for the calculation.

It then calculates the position of the decimal point from its position in the factors and stores it. The decimal points are removed leaving only numbers in the strings. An algorithm performs up to 65,025 multiplications of single-digit numbers and stores the result in an array.

The array values are then adjusted to leave successive digits in the final answer in successive positions in the array. Then the array is printed out backwards with minus sign and decimal point placed according to previous calculations.

The execution time of the program is slow because it is in Basic and because of the large number of individual calculations necessary to produce the answer, but the time is of little consequence when a precise answer is required or the numbers involved are too large for the Basic interpreter to handle.

Richard Turk  
Overland Park, KS

## Varied Files with Disk

Disk Basic allocates a part of the RAM locations dynamically for file buffers and file control blocks. The start of the graphics pages varies according to the setting of the FILES command. The default setting of FILES on startup is FILES 2,256, making the start address of the four default graphics pages.

To save these memory locations on disk type SAVEM "file name", 3584,9727,0. Get them back with LOADM "file name."

Depending on the purpose of your program you can reset these defaults by the FILES command using less or more space for file buffers and control blocks. The first number of the FILES command is the number of file buffers, the second number is the total bytes occupied by these buffers.

Table 1 shows the graphics video memory (GVM) start addresses as a result of different settings of the FILES command.

When you use FILES 0,0 you can save the graphics pages with SAVEM "file name", 2816,8959,0.

When you do a PCLEAR0 there will be zero graphics pages and the address in the table is the start address of the Basic program.

Type POKE 25,14:POKE 26,0:NEW on startup for a PCLEAR0.

Fred de Soet  
Amsterdam, Holland

Program Listing 1.

```

10 CLEAR 775
20 DIM N(525)
30 INPUT"NUMBERS:";X$,Y$
40 IF LEFT$(X$,1)="-" THEN FL=FL
-1:X$=RIGHT$(X$,LEN(X$)-1)
50 IF LEFT$(Y$,1)="-" THEN FL=FL
+1:Y$=RIGHT$(Y$,LEN(Y$)-1)
60 DX=INSTR(1,X$,"."):DY=INSTR(1
,Y$,".")
70 IF DX=0 THEN GOTO 90
80 X$=LEFT$(X$,DX-1)+RIGHT$(X$,L
EN(X$)-DX)
90 IF DY=0 THEN GOTO 110
100 Y$=LEFT$(Y$,DY-1)+RIGHT$(Y$,
LEN(Y$)-DY)
110 IF DX=0 THEN DX=LEN(X$)+1
120 IF DY=0 THEN DY=LEN(Y$)+1
130 FOR Y=1 TO LEN(Y$)
140 C=Y
150 FOR X=1 TO LEN(X$)
160 N(C)=N(C)+VAL(MID$(Y$,LEN(Y$
)-Y+1,1))*VAL(MID$(X$,LEN(X$)-X+
1,1))
170 C=C+1
180 NEXT X
190 NEXT Y
200 FOR C=1 TO (LEN(X$)+LEN(Y$))
210 N(C)=N(C)+HN
220 NC$=STR$(N(C))
230 NC$=RIGHT$(NC$,LEN(NC$)-1)
240 HN=VAL(LEFT$(NC$,LEN(NC$)-1)
)
250 N(C)=VAL(RIGHT$(NC$,1))
260 NEXT
270 IF FL<>0 THEN PRINT"-";
280 FOR C=(LEN(X$)+LEN(Y$)) TO 1
STEP -1
290 IF LEN(X$)+LEN(Y$)-C=(DX+DY-
2) THEN PRINT".";
300 PRINT RIGHT$(STR$(N(C)),1);
310 NEXT
320 PRINT:PRINT
330 RUN

```

FILES 1,0	—	FILES 1,68	
FILES 0,350	—	FILES 0,605	3328
FILES 1,69	—	FILES 1,324	
FILES 2,0	—	FILES 2,43	
FILES 1,325	—	FILES 1,580	3584
FILES 2,44	—	FILES 2,299	
FILES 3,0	—	FILES 3,18	DEFAULT
FILES 2,300	—	FILES 2,555	3840
FILES 3,19	—	FILES 3,274	
FILES 3,275	—	FILES 3,530	4096
FILES 4,0	—	FILES 4,249	
FILES 4,250	—	FILES 4,505	4352
FILES 5,0	—	FILES 5,224	
FILES 4,506	—	FILES 4,761	4608
FILES 5,225	—	FILES 5,480	
FILES 6,0	—	FILES 6,199	
FILES 5,481	—	FILES 5,736	4864
FILES 6,200	—	FILES 6,455	
FILES 7,0	—	FILES 7,174	
FILES 6,456	—	FILES 6,711	5120
FILES 7,175	—	FILES 7,430	
FILES 8,0	—	FILES 8,149	

Table 1. Graphics video memory start addresses.

# REVIEWS

**Programmer's Sketch Pad**  
**Syntactics**  
 Redcrest, CA 95569  
 707-722-4280  
 \$12

by **Michael E. Nadeau**  
 HOT CoCo staff

The Programmer's Sketch Pad is a mylar sheet that lets you design graphics or text screens for your Color Computer. One side divides the video screen into PRINT@ locations with values for each location, color, and graphics character. The other has a grid showing SET graphics locations with the values for each location and color, as well as an example of the SET command's syntax.

You draw using a felt-tip, overhead-projection pen, though any felt-tip pen should work. The kit includes the pen, two Sketch Pads, and instructions with sample programs for beginners.

When I first looked at the Programmer's Sketch Pad, I thought: "You can do the same thing with graph paper." True. But the Syntactics product lets you experiment in your programming without having to start over if you make a mistake. You just wipe off any offending marks with a cloth, saving portions you wish to keep. Spilled coffee is no longer a problem, either.

This represents convenience and time saving for the casual or professional programmer. But this product will be invaluable in programming classes. Not only is the Sketch Pad easier to use than graph paper, but having the values printed on the sheet in the appropriate locations enhances the learning process.

Many people won't need anything more than the Sketch Pad and a pen to get started. The documentation is for those who are just starting to

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*edited by Mark E. Reynolds*

learn Basic programming. It explains the syntax for the PRINT@ statement and the SET command, how to generate graphics characters, and how to use this new-found knowledge in larger programs. Sample programs further demonstrate how the novice can use the Sketch Pad.

Twelve dollars will buy a lot of graph paper, but I'd much rather see the Programmer's Sketch Pad in my Christmas stocking. ■

*"The Sketch Pad represents convenience and time saving."*

	organization thoroughness	production readability	quality
10			
9			
8			
7			
6			
5			
4			
3			
2			
1			

Books

*Micro Adventure No. 1—Space Attack*  
 by Eileen Buckholtz and Ruth Glick  
 Parachute Press  
 Scholastic Inc.  
 730 Broadway  
 New York, NY  
 \$1.95 123 pages

by **Richard Ramella**

This space adventure book with eight Basic programs will appeal to elementary-school youngsters who are beginning Basic. The writing is tight, lively, and humorous, although kids weaned on more sophisticated game listings available in magazines might find the programs unexciting.

The story is written in the second person. The reader is a "you" who is taken to a secret space station to help thwart the evil intentions of a foe named BRUTE. The well-written story moves quickly.

The eight programs are written in a generalized Basic. Line changes are given to make them work on different computers, so it's often necessary to refer to the reference manual at the back to get changes for the CoCo. Program lengths range from 10 to 34 lines, and because of the "one-size-fits-all" approach, the programs are simple and lack graphics and movement.

I found a game-killing bug in pro-

gram seven on page 85. If you have this book, insert a line 315 RETURN, else the game does not work correctly.

This is an excellent attempt to teach a bit of Basic to computer starters. In my tests, an 8-year-old got more pride out of keying in these programs alone than amassing a 30,000 score at Miner 2049er. The reference section is informative, and Basic tips are included as part of the fast-moving plot. The book just might spur youngsters to begin their own programming efforts. ■

	ease of use	documentation
	performance	error handling
10		
9		
8		
7		
6		
5		
4		
3		
2		
1		

Application Software

**Do-File and Fix-File**

**Solid Software**

**P.O. Box 712**

**Levittown, PA 19058**

**800-334-0854**

**32K, Extended Color Basic**

**\$29.95 (\$2 shipping) cassette or disk**

**by Gary W. Clemens**

If you have lists taped up everywhere, or even have lists of your lists, Do-File can organize that information and keep track of most any records you need to store, such as your book, record, and software libraries, or all those articles published in *HOT CoCo*.

Do-File and Fix-File are companion programs designed to function as a cassette-based record-keeping system that you can also use with

*"I have used Do-File for several applications and have had very few problems."*

disk. Do-File creates a multiple-record, multiple-field, fixed-length database (lists of information in which each main item has several descriptive facts recorded with it). Each main item is called a record, and each of the associated facts are assigned to fields within the record.

Both the program and the entire working file are memory-resident, so file size is somewhat limited. The data is stored in sequential files on either tape or disk.

Fix-File is a utility provided with Do-File to help you when you change your mind. Fix-File lets you expand a field length or add more fields to each record.

The package contains a cassette containing Do-File, Fix-File, a sample data file, and a 35-page instruction manual/tutorial. Both programs are written in Basic so you can examine or modify either one, and neither is copy protected.

**Performance**

Your files can contain up to 300 records or 16,500 characters, whichever comes first. For example, a name and address file using four lines (fields) of 20 characters each will require 80 characters per address (record). Therefore, you can enter 206 name/address records formatted this way.

In order to get this much capacity, however, you must manually clear out the graphics pages before running the program, a feature that the program should include. Fix-File has more memory capacity, so you shouldn't need to clear the graphics pages.

You are also limited to 255 characters per record but, as far as I know, you are not limited to any specific number of fields per record. However, the total number of characters in all of the fields added together can't exceed the 255-character limit per record, and each field is limited to 31 characters.

Neither program is completely bugproof (more about that later), but both are reliable. The documentation even provides line numbers to GOTO in case you crash the program. I have used Do-File for several applications and have had very few problems, but it does have some idiosyncrasies.

Do-File has several commands that help you organize your data, but it's not as flexible as a full database manager. Do-File can, however, change/add records, find a specific record, delete a record, list the file to screen or printer, and load or save to cassette or disk. Other features let you sort up to three fields, list the sorted file, sum up a numeric field, and search the file for a specific string of characters.

Both programs are very easy to use. Do-File has a help screen that contains an abbreviated explanation of each command and Fix-File explains each of the two options on the selection screen. The documentation explains each option in great detail and gives examples of using each command. Most of the commands are self-explanatory, and it shouldn't take long to learn them. Another big help is the prompting that guides you through each of the various steps for each command.

When you first run Do-File, it asks you to select a printer baud rate from 300-9,600 (the default) and the printer line width (the default is 132 characters). Next, you can set the page length, with fixed top and bottom page margins.

The program controls these options, so Do-File will work with any printer that you can use with the CoCo. You also select either cassette or disk I/O during the initialization routine.

You can change any field in a record by stepping through the fields one at a time and typing over any that need changing, or you can blank out the whole field with a clear key. However, you can't step backwards through the record or jump to a specified field in the record. Both would be helpful in a record with many fields.

The "record" command lets you look at the entire record, six fields at a time. You can't make any modifications, but if you are just looking, it's a quick way to step through your data.

When you list the entire file (or part of it) to the screen or printer, scrolling continues until you stop it, and then it always stops with the first file of a record at the top of the screen (not where it was when you stopped it).

You can also list the file as a continuous printout, or as one that skips the page perforations. If a record requires less than the line width you specified in the initialization routine, the printout will list the fields side by side.

You can't load a file from cassette and later save it to disk. Operations are all cassette or all disk; you can't use both. Therefore, if you have a cassette system now, and later upgrade to disk, you will have to use a tape-to-disk-transfer program to get your files on disk.

If you have previously sorted the file, you can save either the sorted version or the original. Do-File will renumber the sorted version and close any gaps caused by deleted files, but it won't do so when you save the original version.

You can get a total of all the numbers in a field, but if you later add or delete files or change a value in that field, you'll have to retotal. Beware of including nonnumeric values in fields you want to total, or you might get incorrect results.

You can search the file for a specific string of any length in from one to three fields at a time. Since the search is a Boolean AND, the string has to be in each of the fields specified to be listed.

*"You can add a new field anywhere in the record and fill the new field with a string of characters."*

### Fix-File

Fix-File lets you sleep at night knowing that you won't have to start over if you later discover that you need a longer field or more fields in your file. Like its counterpart, Fix-File is thoroughly prompted, so using it is easy.

If you need to lengthen a field, this utility displays the number of characters in each field and lets you add additional spaces either at the beginning or end of one (within the 31-character limit). Input checking is nicely handled in this routine. The program rejects obviously erroneous entries.

You can add a new field anywhere in the record and fill the new field with a string of characters. However, you must count accurately when using this routine, because this is one of the few areas in either program that doesn't do most of the error checking for you. The field name and the fill string must both be the same length as, or shorter than, the field length.

Both routines verify the saved file and return to the program at the I/O prompt if the save is faulty.

### Error Handling

Both programs easily tolerate careless fingers and reject invalid entries. The break, clear (sometimes), and reset keys are live, so watch what you are pushing. When using disk, use DAT as a default extension or be sure that you type the correct extension. Neither program remembers the file name/ext. that you loaded, and both will crash if you give the wrong extension.

The "new" command, with which you initialize a file, has a nice safety feature. Once you've used the command to define a file, "new" turns off until you've saved the file. This keeps you from wiping out hours of work if you forget to save that file.

You also can't load a new file unless you have saved the previous one, which can prevent some serious mistakes. The VERIFY command is always on when you save to disk, and an I/O error returns you to Basic. You can verify cassette saves by exiting the program, using the SKIPF command, and then returning to the program. Neither method will lose your data.

Both programs mark a saved file with your previous selection of tape or disk, so it is impossible to save it to the wrong device, but sometimes a choice would be better.

### Bugs and Problems

My Do-File and Fix-File cassettes load properly, run for a few lines, and then crash, indicating a syntax error. However, retyping the line exactly as it is in the program and re-saving it cures the problem. Trying a new computer and a new copy of the programs yielded the same results.

You get an out-of-memory (OM) error if you use Fix-File and then return to Do-File unless you first perform a cold start. You also get an OM error if you exceed the maximum file size. The program should have prompts to remind you of the space left.

I found it somewhat annoying that I often had to press enter twice after some of the routines in order to proceed to the next step. And some of the routines have a "push any key" prompt that responds only when you press the enter key.

Also, after you use certain routines, the program returns you to the beginning of the last record on which you worked—not the command line. Therefore, you have to step through that record (and use the double enter) to get to the command line.

The list command doesn't display field names with the records. If your record contains several similar items (e.g., dates or numbers), the listing can be confusing. The screen also displays three lines of as many fields as will fit, followed by a blank line, and then three more lines of fields. Your eye naturally expects each group of three lines to be a unit, but the third line might be the beginning of a record that continues in the next group of three lines.

Although both programs are designed primarily for cassette-based



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3. FREQUENCY OF ISSUE MONTHLY	3A. NO. OF ISSUES PUBLISHED ANNUALLY 12	3B. ANNUAL SUBSCRIPTION PRICE \$24.97
4. COMPLETE MAILING ADDRESS OF KNOWN OFFICE OF PUBLICATION (Street, City, County, State and ZIP Code) (Not printers) 80 Pine Street, Peterborough, N.H., Hillsborough County 03458		
5. COMPLETE MAILING ADDRESS OF THE HEADQUARTERS OF GENERAL BUSINESS OFFICES OF THE PUBLISHER (Not printers) 80 Pine Street, Peterborough, N.H., Hillsborough County 03458		
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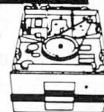
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systems, they do come on disk also, and, therefore, should include some of the usual disk I/O niceties. As they are now, you can't use more than one drive, you can't get a directory of files from within the program, there isn't any prompt to tell what file name was loaded previously, and there isn't any automatic save routine.

## Documentation

The *User Guide for Do-File and Fix-File* is one of the best manuals I have seen. The text is clear, concise, and easy to understand, and functions more as a tutorial than a reference. You get instructions about the program, plus a thorough discussion of each command, with examples and a page of helpful hints.

It would be helpful if the documentation included a reference card to help you remember the commands. The help screen has each of the major commands, but some routines have optional features, and you can only find out about them in the manual.

## Is It for You?

Do-File and Fix-File are definitely one of the better cassette-based datafile packages. Of course, you can get more comprehensive database managers for a disk system, but you'll also pay more for them. If you don't need to manipulate the database (combining files, splitting files, merging with spreadsheets or word processors, and so on), then this program is worth your consideration. ■

*“The Peeper offers six functions: memory window, graphics mode, speed, breakpoint, trace, and examine. Performance and the transition from one function to another is very smooth.”*

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Application Software

**The Peeper**  
**SpectroSystems**  
**11111 N. Kendall Drive, Suite A108**  
**Miami, FL 33176**  
**305-274-3899**

**16K**  
**\$21.95 cassette**  
**\$24.95 with Assembly listing**

by **Stephen G. Stone, III**

The Peeper gives you total control of your Color Computer while another Basic or Assembly-language program is running. This utility is an outstanding program-development and debugging tool. It lets you look at RAM by the screenful, display the contents of any address in RAM or ROM, and change the contents of any RAM location.

You can slow down or stop the action in the program you are monitoring and you can follow the flow of a program by requesting an address trace of each machine-language instruction as it is executed.

## Performance

The Peeper offers six functions: memory window, graphics mode, speed, breakpoint, trace, and examine. Performance and the transition from one function to another is very smooth.

The memory window lets you scroll through memory a "page" at a time. A page equals 512 bytes; therefore, depending on the graphics mode you are in, you can see from one to several pages on the screen at a time.

You can use the window to see what goes on behind the scenes while another program is running. For example, you can watch what is happening on a graphics page that is not

currently displayed during an arcade game.

You can also run the Basic trace while running a graphics-dominated program. While the trace-line numbers are filling the text screen, you can scroll through memory to the graphics pages and monitor the program as if trace was not even running.

Note, however, that you can only use the memory window to look at RAM. The Peeper comes with a separate program, ROMPEEP, that provides a window to ROM.

CoCo owners who have nonstandard (i.e., piggybacked) 32K upgrades should be aware of the fact that the Peeper can only access 16K of your RAM. This is serious because the status screen that is necessary to the breakpoint, trace, and examine commands (described below) is located in this inaccessible portion of memory.

You can, however, make a minor hardware modification to display the upper 16K. SpectroSystems will send you the instructions if you include a self-addressed, stamped envelope with your request.

The graphics-display function is a neat little number that lets you look at any area of RAM in any of the 13 documented graphics-display modes (see page 262 of *Getting Started with Color Basic*). Pressing the shifted D key cycles you through them. Pressing the shifted Q toggles between the two color sets.

The random patterns you find in RAM can produce interesting displays when viewed in the various graphics modes. You can also use this function to evaluate the display-resolution/memory-usage tradeoff when you are developing a graphics display.

The speed command gives you the ability to slow down the execution of a program by any of seven degrees, or even freeze the action, during which time you can single-step by pressing the space bar.

You can specify up to three breakpoints in a program. A breakpoint is an address that pauses execution (similar to Basic's STOP command). You can resume execution with a single shifted keystroke.

Breakpoint addresses remain in effect until you remove them. They will keep pausing the program at the

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## COMING NEXT MONTH

Next month is *Hot CoCo's* annual Business and Finance Issue. Last year's January issue generated so much positive response that we've decided to make this theme a regular event.

And what's a business issue without a spreadsheet program? Adrian Rose provides a surprisingly versatile one called Homespread. You'll find it handy at home or in the office.

Perhaps you dabble in the stock market. If so, you'll find Carl Christensen's article and program on stock charting invaluable for keeping track of Wall Street's ups and downs.

Jim Barbarello's "ROM Hacker" series returns in January, too. He'll begin discussion on converting Radio Shack's Armatron to computer control.

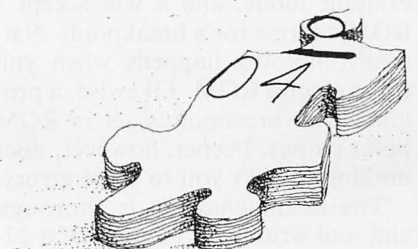
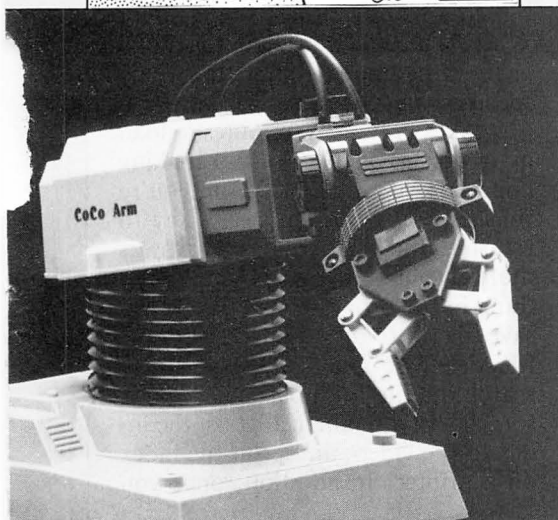
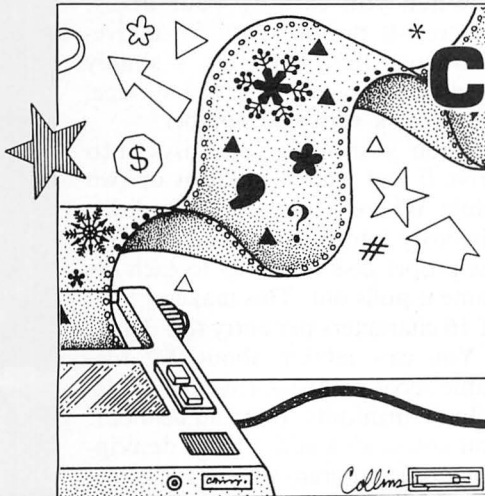
Small-businesspeople, professionals, job seekers, or just about anyone should read R.W. Smith's piece on creating custom letterheads and enhancing text with graphics using a dot-matrix printer.

Also featured is a program by

Bruce Ellis that turns your CoCo into an intelligent calculator capable of statistical analysis. This program has hundreds of uses in business, science, and education.

January also marks the first installment of a new column that should prove to be very popular. Veteran CoCo writer Terry Kepner teams with Linda Tiernan to write CoCo for Hire, which will give you ideas for making money with your Color Computer and help you avoid many of the pitfalls involved.

Next month we guarantee you'll get your money's worth from *HOT CoCo*. ■



same place while you make adjustments to the code or variables and observe the results. Only breakpoints in RAM can be set.

The Peeper lets you run both address and register traces. To get a full trace of either type, you must be running at the slowest speed. The faster the speed, the coarser the trace. You can display or print out the trace output.

The examine mode displays the contents of any address in memory, again, even during program execution. It also lets you change the contents of any location in RAM. Thus, you can make modifications while a program is running and see the results immediately.

For you Basic programmers who want to run the Assembly-language programs in *HOT CoCo*, the examine mode offers a relatively painless way to enter short machine-language listings.

As stated earlier, the Peeper's memory window does not extend to ROM. However, the ROMPEEP program rectifies this shortcoming. ROMPEEP lets you look at the ROM in your CoCo and in ROM packs (after a simple modification so the ROM packs won't autostart).

### Ease of Use

The Peeper is easy to use. Most commands require only a single shifted keystroke. The rest take single, unshifted keystrokes. The command-summary card makes using the commands even easier. I found rare occasions in which the Peeper ignored a command, but the second attempt always brought results.

### Error Handling

Error handling is limited. The Peeper has no formal error messages. Input is edited to the extent that Peeper won't accept nonhex characters when it requires hex input.

The program does appear to accept a ROM address change in the examine mode, and it will accept a ROM address for a breakpoint. Naturally, nothing happens when you try to change ROM. Likewise, a program with breakpoints set in ROM never pauses. Peeper, however, does nothing to alert you to these errors.

The documentation is thorough and well written. It consists of a 27-

page manual and a command-summary card. You can also get an Assembly listing for an additional \$3 at time of purchase or \$4 later.

The documentation includes a section called, "A Guided Tour Through CoCo's Memory" that uses the Peeper's features to examine several locations that Basic uses to keep track of all the odds and ends necessary for a well-run machine. It examines things like the cursor's flash control, the timer, the keyboard rollover table, the joysticks, variable storage, and array handling.

Several pages of documentation tell you how to make arcade games compatible with Peeper, because the utility is interrupt-driven and might not operate in conjunction with the interrupt schemes of some games.

Included instructions tell you how to patch almost 50 games so they will run with Peeper. For games not covered in the documentation, another program, Find, is provided to help you find the interrupt-related instructions so you can make the necessary patches.

The documentation here falters a little, but you can learn what you need if you read the section on Find and the one titled "Using the Peeper with Arcade-Style Games."

There are two glaring oversights in the otherwise good documentation. The first is the lack of a table of contents. I spent much time looking for particular information.

The second is important only to us owners of nonstandard 32K machines. Neither the documentation nor the advertising tell you that the inaccessible upper 16K contains the all-important status page. If you have such a machine and you're not willing to make the necessary hardware modification, you'll be able to use less than half of the Peeper's functions.

### Summary

On the whole, Peeper is a valuable, well-written and documented utility. If you only buy commercial software and don't care how it, or your CoCo, works, you won't need the Peeper. But if you are interested in what goes on inside your CoCo, if you are a Basic programmer (especially if you program graphics), or if you develop Assembly-language software, the Peeper deserves a place in your utility library. ■

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Application Software

### Where's-It

JARB Software

1636 D Ave., Suite C

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619-474-8982

\$19.95 32K/64K disk

by Terry Kepner

How do those of you who are looking for that one program that's lost among several hundred on 20-30 disks spell relief? How about "Where's-It," a menu-driven Basic program that catalogs all your files and programs and helps you find the one you want in seconds?

When you catalog your disks, Where's-It prompts you for a five-character disk identifier. I simply used numbers and put a small label on the disk with that number.

Then you slide your disk into drive 0 and wait a moment or two while Where's-It loads your disk's directory into memory and appends the proper disk identifier to each file name it pulls out. This makes a total of 16 characters per entry (8 + 3 + 5).

You can catalog about 972 file-name records, or six pages of triple-column printouts. It would be nice if you could also add a brief description of the program with its file name, but this would reduce the number Where's-It could track in memory and increase the amount of time you would spend adding or updating entries.

It takes only a few minutes to load in a dozen or two disks, making hundreds of entries. When you're finished, press the up-arrow key to return to the menu. (The up arrow is the bail-out key for almost everything in the program.) Now you can save the file to disk, add a disk to the file, delete or update a disk's entries, search the file for a particular entry, sort the list alphabetically, list the index to the video, and print the index on a printer. In addition, once you

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**Old English Cartoon Gay Nineties**

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**Broadway**

Broadway  
Broadway-reduced  
Broadway-reverse  
Broadway-reverse/reduced

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**Business**

Business  
Business-reduced  
Business-reverse  
Business-reverse/reduced

**Old Style**      **Antique**  
**Old Style**      **Antique**

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Old Style-reduced  
Old Style-reverse  
Old Style-reverse/reduced

Antique  
Antique-reduced  
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Antique-reverse/reduced

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have a data file on disk, you can load it in from the main menu. You can actually have several different data files, segregated by purpose.

The delete function erases one disk's entries from the file, while update deletes them and rereads the disk into the file (prompting you to put the disk in drive 0, of course).

The search function searches by either file name or by disk. File name is an in-string search, and displays any matches (e.g., searching for BAS matches BASEBALL.BIN, TESTBASE.DAT, and PROGRAM.BAS). Disk searching (retrieving all the programs on a disk) must match the identifier exactly. The screen displays matches in blocks of 10.

The sort is machine-language and very fast but still requires several minutes if you have 900 records (you won't notice the slow-down until you exceed 400 records). Having the filename list in alphabetical order makes it easier to find particular programs when examining the index rather than searching it.

The video index listing is in blocks of 10, which wastes time if you have 900 records and want a program that starts with "X". It would've been nice if you could specify the beginning letter for listing the index.

The only real problem with the program is the print section. The program is designed to operate with an Epson FX-80 and the Botek serial-to-parallel interface (set at 9,600 baud). JARB does provide instructions on how to modify the program to match your own hardware setup, but they should set the program to the Radio Shack standard of 600 baud, without inserting special printer codes (such as expanded print and top-of-form).

Instructions on modifying the program to your hardware is a good idea, but these aren't complete: They tell you to change the baud rate for printing, but don't tell you what values you can use to get the required baud rates. While a technical person may know what to do, a novice won't.

JARB also provides instructions on which program line to change if you want to use a drive other than 0 when adding/deleting disk entries. Since I have the Micro R.G.S. hard disk, I changed line 302 by adding

D = VAL(D\$) and altering DSKI\$0 to read DSKI\$D. This lets me specify the proper hard-disk drive number for cataloging, and uses that drive specifier as both the disk identifier and the drive control number (which ranges from 0-31 on my system).

All in all, Where's-It is an efficient and fast method of keeping track of your files and programs. ■

	organization thoroughness	production readability	quality
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Books

**How to Get the Most Out of CompuServe**

by Charles Bowen and David Peyton  
Bantam Books  
666 Fifth Avenue  
New York, NY 10103  
\$12.95

by Terry Kepner

If you want to learn about CompuServe and how to navigate its vast and complex waters, you need this book.

The authors of this 275-page, spiral-bound book are system operators for two of the many special interest groups (SIG) available on CompuServe, and they've tapped their experience as CompuServe users and operators to guide novices through the complex system. They recall the problems they encountered as novices and explain the shortcuts and tricks that took them months to learn. They also both happen to be writers.

The combinations are powerful: The book is written in an easy, conversational style that keeps you entertained while providing reams of information.

You use *How to Get the Most Out of CompuServe* as a road map to guide you through CompuServe.

You can use the book as an on-line tour book, following the instruc-

*"You use How to Get the Most Out of CompuServe as a road map to guide you through CompuServe. You can use the book as an on-line tour book, following the instructions as you wend your way across the system."*

tions as you wend your way across the system.

For example, follow the book's steps to sign on. Then the text explains most of the important areas of CompuServe, starting with the menu system (how everything is organized), how to send email (electronic mail), and how to access the news and weather bulletins. All this takes about an hour of your time on-line.

Next, the book introduces you to CB, the Citizens Band Emulator, with which you can communicate with CompuServe members. Then you return to CompuServe for a brief sample of CB, and on the way you learn how to pick up your waiting email.

Your third and fourth sessions cover the National Bulletin Board System (just like the one at the grocery store, except it's nation-wide), the public-access database of free programs (donated by other members), and your personal programming area (where you can create and store programs of your own).

The next tours cover setting up your terminal defaults (how CompuServe expects your terminal to behave) and using the SIGs for communication and data gathering. (Four chapters, almost 50 pages, cover this aspect.) Brief chapters discuss Comp-U-Store, banking via CompuServe, stocks and bonds access (not about the Dow Jones information service), the Electronic Mall (where you can buy stuff, mail-order style), games (gives one-paragraph

# REVIEWS

descriptions of 34 games you can play on CompuServe), and information for the advanced user.

The final section of the book is the On-Line Survival Kit, 40-some pages of reference information, so you can quickly find help should you get lost on CompuServe or forget a key command. This last section is definitely worth the price of the book, as it will quickly pay for itself the first couple of times you have to look up instructions on what you're doing. In some ways, the survival section contains more information than other parts of the book covering the same topics.

A comprehensive index rounds out the book.

Even though *How to Get the Most Out of CompuServe* is aimed at CompuServe novices, it should also be useful for the more experienced user, especially in view of the On-Line Survival Kit. The entire text is a good tutorial. It doesn't cover every aspect of the system, but it does deal with those areas that seem to get the most activity. ■

	performance	ease of use	documentation	error handling
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Application Software

**CoCo Calligrapher**  
**Sugar Software**  
**2153 Leah Lane**  
**Reynoldsburg, OH 43068**  
**614-861-0565**  
**32K, Extended Color Basic,**  
**bit-mode printer**  
**\$24.95 cassette**  
**\$29.95 disk**

by **Graham L. Heywood**

The CoCo Calligrapher gives your bit-mode printer (e.g., Epson, Gemini 10X, Okidata, Line Printer

VII, or DMP-100) a few lessons in the art of beautiful handwriting, so you can produce signs, letterheads, or whatever in one of three attractive type styles.

The program is essentially a very simple word processor that lets you print a maximum of 17 lines of text. You can center each line and perform simple line editing.

The available typefaces include an over-serifed Old English, a Gay Nineties playbill face, and a bold, blobby cartoon style. (See Figs.) All three come in both upper- and lowercase. Unfortunately, you only get these characters in a 36-point type size (letters about 1/2-inch high), although the Gemini and Epson printers will let you print condensed characters.

The fact that you get only one type size—and that a relatively large one—makes creating attractive letterheads a bit of a design problem. Too many of these large characters can easily overwhelm the page. Also, you can only load in one type style at a time. This can be a plus, however,

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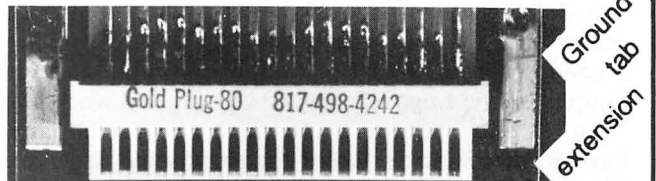


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216

# REVIEWS

because mixing such different type styles on the same page could easily yield some unattractive results. ■

	ease of use	documentation	performance	error handling
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Application Software

**LOGO Starter**  
**B&B Software**  
**P.O. Box 210**  
**Jenkintown, PA 19046**  
**16K cassette**

by **Richard Ramella**

Some kids learn to ride a bicycle with training wheels. Other kids just learn to ride a bicycle. The latter group might suffer a few more scrapes in this exhilarating experience, but they learn balance, guidance, and self-assurance in a realistic way.

The analogy seems apt when comparing Color Logo aided by Logo Starter to Color Logo alone. For reasons I'll explain, I think putting training wheels on Logo may defeat its educational purpose.

But first, there are a few necessary points to clarify: What is Logo, and how does Logo Starter work in tandem with it? Why does B&B say it is a good program? What is the philosophy of the Logo language?

To use Logo Starter, you must have Radio Shack's Color Logo. The Radio Shack product is a ROM pack in which the main ingredient is a "turtle" cursor that you can command to turn and travel, leaving trails that form designs. The cartridge also includes multiple turtles, a doodle mode for nonreaders, color choices, and simple word processing. Logo Starter focuses on turtle graphics.

In Color Logo (and other Logos) a series of turns and travels can be grouped as a "procedure," which you name (e.g., box, triangle, whirling, or tree). When you call a pro-



cedure, the series of turtle commands forms the shape stored in the procedure, and, in this way, you're actually programming.

If a procedure doesn't produce the desired effect, you can use the edit mode to change it (a form of debugging a program).

In Logo, except for its simple commands, you alone define the right and wrong of its products, and this debugging process leads to discoveries about the physical world: circles, angles, lines, rectangles, dodecahedrons, and so on. The process sows the seeds of concepts in such fields as math, art, engineering and design—in short, the workings of the physical world.

You load Logo Starter after you've inserted the Logo cartridge. B&B Software's documentation is simple and effective, and the program works well.

Accompanying the cassette are some paper strips that you can tape to the keyboard. These redefine many keys, so that you need only tap a key and press enter to see an entire preprogrammed procedure occur on the screen (e.g., a large crosshatch design, a triangle, and circles). In the run mode, you can clear the screen, relocate and reposition the turtle, and give it a new angle using a single entered keystroke.

The doodle mode lets you use the top row of keys to create shapes that you can store as a procedure.

The Logo Starter program stores about 200 commands or procedures.

B&B Software's documentation claims this "is a computer program that introduces children to Logo." It states the program "makes a child's first computer experience both exciting and instructive. . . . By using Logo Starter, you won't have to learn the Logo language or type any program statements. . . . Logo Starter combines the fundamental Logo movements (forward, backward, turn) with a collection of pre-programmed figures that the child can draw with a single keystroke. There's more than enough to keep a child interested for weeks."

In a closing statement, the documentation notes, "Once the child learns to command the computer to do as he wishes, he will never grow up with a fear of computers. . . . We hope that Logo Starter will whet your appetite and that you and your child will turn to the instruction manual and explore the marvelous features of Radio Shack Color Logo. Whether you go further is your choice. For now, explain Logo Starter to your child and let him explore and learn."

Now it's my turn:

I found Logo Starter to be of genuine interest to the four children, ages 4 to 8, who tested it for me. The two older children already knew how to make simple Logo programs. "It's got built-in procedures," the 8-year-old realized. After a brief time with the program, she preferred to return to her own programming efforts. The two younger children still enjoy the program after perhaps eight sessions each, and they regard it as a more complex version of the doodle mode.

But I must take the spotlight in this matter. The central idea of Logo is discovery. A preprogrammed procedure that draws a triangle is hardly worth the same feat created by a young programmer through trial and error. The learning aspect is left out. And in this sense, simplifying Logo by offering premixed procedures thwarts the educational and philosophical intent of the originals.

I think Color Logo—as it is—is what it should be. It doesn't need training wheels. This is a purely subjective judgment, and it should not in any way reflect on the technical achievement of the program Logo Starter, which is excellent. ■



# REVIEWS

	ease of use	documentation
performance	error handling	
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Application Software

**The Pond**  
**Sunburst Education**  
**Room AB**  
**39 Washington Ave.**  
**Pleasantville, NY 10570**  
**800-431-6616**  
**32K, Extended Color Basic**  
**ages 7-adult**  
**\$39.95 disk**

by **Mark E. Reynolds**  
**HOT CoCo staff**

**T**he Pond is an educational one- or two-player problem-solving game in which the Color Computer randomly generates a pattern of lily pads. A frog sits at one end of the pattern, waiting for you to tell him how to cross.

Although several pads comprise the puzzle, you must break the whole down into two, three, or four simple steps that repeat themselves from one end of the frog's path to the other. Your task is to look at all, or part of, the puzzle and enter the steps that you feel are hidden there.

Then the frog will hop according to the pattern you've selected. If he hops into the water, you've made a mistake and must start over.

The mechanics of playing the game are simple enough. The screen displays about one-seventh of the total puzzle, with the available options in a row at the bottom. You use the right and left arrow keys to move the cursor to your choice and then press enter.

There are six levels of play, and each level is comprised of three puzzles. On the first level, a simple two-step pattern repeats itself from beginning to end. For example, the frog might need to jump three pads right and four down over and over until he reaches his goal. You must

find that pattern, enter it, and send the frog on his way.

The second level is again a two-step pattern, but this time several extra lily pads are thrown in to make the pattern harder to find. At level 3, the pattern becomes a three-step one, and at level 4, extra pads appear. Level 5 presents a four-step pattern, and level 6 is the most difficult—a four-step pattern hidden among several additional pads.

You begin with a 35-move allotment. It costs you moves when you make a mistake, take a sneak look at the entire puzzle, or hop a short way along the lily pads to see what lies ahead. But you get 35 more moves when you advance to a new group of ponds, and to that you can add whatever moves were left over from the previous 35-move allotment.

All you need do to win is complete the three Twister Ponds on level 6, but you'll find that almost impossible on only 35 moves. Since you see only one-seventh of the puzzle to start, there is often no way to discern the pattern without spending moves to hop ahead or taking a sneak look at the whole puzzle. Therefore, judicious use of your moves is as important as being able to find hidden patterns.

As I work my way through The Pond, I find myself thinking in much the same way as I do when I play chess. That's not to say that this game is as difficult as serious chess, but it can be quite challenging. You've got to look at several possibilities to choose the one set of moves among

them that will work. And you've got to think several steps ahead, too. Will the decision that works at first be equally successful farther along the line?

But I most appreciate the fact that The Pond sometimes requires you to step beyond straightforward, obvious logic to find solutions that are less obvious. Even when you're looking at the entire puzzle, there are times when an answer seems impossible.

The steps that you *must* enter to get the frog started will hop him into the water later on, unless you consider some less likely alternatives like backtracking to eliminate those extra lily pads, or entering two sets of moves in the same direction. The Pond encourages children to look beyond what appears rational at first toward a less obvious, but more practical solution.

The documentation is a well illustrated, well written, and nicely designed booklet that leads you step by step into the game. It takes you beyond the computer screen by making suggestions for discovering patterns in other aspects of daily life.

The packaging also reflects the quality of this fine software. A sturdy, plastic-covered case keeps both the disk and the documentation together and well protected.

The Pond offers a great game and effective graphics supported by superior documentation and packaging. What more could you want? And the little frog even winks at you each time you complete a puzzle—now that's cute. ■



*The Pond*

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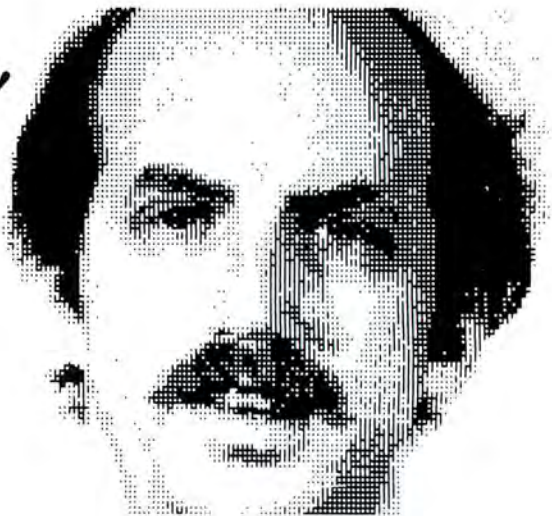
And, TALKHEAD is a real snap to use in Basic, thanks to a new command that we give you: SAY. Type SAY 'ANYTHING YOU WANT' and Talkhead instantly appears and speaks ANY text—it has an unlimited vocabulary!

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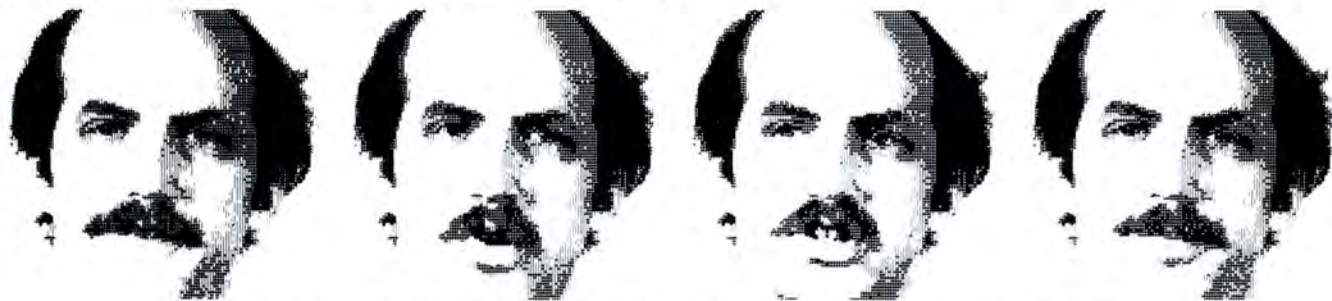
'TALKHEAD' is available on cassette or disk (please specify) for **only \$29.95**. The cassette version can be transferred to disk in case you ever upgrade. TALKHEAD requires 64K of memory and a Colorware 'REAL TALKER' voice pak.

PROGRAM BY TIM JENISON

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We originally planned to sell this major piece of programming for about \$40.00 but decided it was so useful that no 'Real Talker' user should be without it. Besides, it really shows off the capability of 'Real Talker'.

Also included with 'Real Talker' is our unique Phoneme Editor program. It allows you to explore and create artificial speech at the phoneme level. Phonemes are the fundamental sounds or building blocks of word pronunciation. There are 64 different phonemes, as well as 4 inflection levels at your disposal. Creating and modifying speech at the phoneme level is both fascinating and educational. The Phoneme Editor may also be used to customize the pronunciation of speech produced by the Text-to-Speech program.



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# Tips

## Dungeon Drop

In Radio Shack's Dungeons of Daggorath, I've found that if you drop extra items in your cell and wait there, the creatures that come to attack will first pick up the items, giving you time to strike several blows.

*Bob Leet  
Phoenix, AZ*

## Dungeon Rumors

Here are a few tips for Dungeons of Daggorath players, and a few questions.

A good dictionary will give helpful clues to the incantations of all flasks and rings. You can only use a ring three times before its power is gone.

Certain creatures on the third level are invisible under normal torchlight. Have you ever heard a "psst!" that preceded your mysterious death? As with the magic doorways, such creatures will appear somewhat indis-

tinctly under lunar torchlight and quite clearly under solar torchlight. Don't be foolish enough to try the third level without one or the other.

Do the flasks work differently in different situations? How do you kill the wizard clone on the third level? Is there a level beyond the third? Has anyone out there ever killed the real wizard? If you'd like to share a few tips, please write.

*Brian Ibbot  
5440 Reed Court  
Arvada, CO 80002*

# High Scores

Name	Game	Score	Name	Game	Score
Tony Galavan Cassidy, BC	Defense	128,385	Stephane Asselin Hauterive, Quebec	Bloc Head	337,800
Michael McDonough Marietta, GA	Clowns and Balloons	47,000		Cubix	11,640
Woody Woodrum Garrettsville, OH	Klendathu	652,760		Solo Pool	81
Oliver Banta Lincoln, NE	Tut's Tomb	84,420		Junior's Revenge	36,200
	Ms Gobbler (level 15)	22,630		Wacky Food	105,100
Ray Gallantry Brampton, Ontario	Keys of the Wizard (level 1)	632	Matt Bender Centerport, NY	Death Trap	70,214
Dan Shargel Arroyo Grande, CA	Whirlybird Run	78,450	Randy Goebel Troy, MI	UFO	206,250
Greg Burke Kenora, Ontario	Colorpede	1,376,460		Space Assault	216,750
	Doodle Bug	1,470,200		Qubix	22,930
	Zaksund	556,780		Star Traveler	313,860
	Ninja Warrior	74,500		Venturer	1,253,300
	Frog Trek	14,700		Android Attack	26,390
M.A. Brickles Allen Park, MI	Scarfman	121,600	Mark Goebel Troy, MI		
Peter Stumpf McHenry, IL	Robottack	1,080,000	Victor Capton Troy, MI	Zaxxon	401,350
	Doodle Bug	880,000		Polaris	33,132
	Trapfall	75,000	Michael Capton Troy, MI	Time Bandit	45,460
	Cosmic Invaders	100,000	Rene Gilbert Rouyn-Noranda, Quebec	Shooting Gallery	38,710
	Berserk	9,150	Mike Snyder Columbus, OH	Doubleback	120,640
Eric W. Lund Millington, NJ	Grabber	42,850	Tracey Knapp Hyde Park, NY	Megabug	79,691
	Firecopter	65,280	Malcolm Bixby Newburyport, MA	Slay the Nereis (level 6)	105,876
	Pinball	48,700		Canyon Climber (3 men)	488,900
	Bird Attack	54,900		Monster Maze	104,770
	Moon Hopper	61,870	Helene Gilbert Rouyn-Noranda, Quebec		
	Planet Invasion	79,200	Pierre Dubois Rouyn-Noranda, Quebec	Clowns and Balloons	68,920
	Invader's Revenge	16,300	Tony Bloomfield Baulkham Hills, Australia	Lancer	148,650
Mark E. Reynolds Bennington, NH	Mudpies	113,800	Paul Sanecki Abbotsford, B.C.	Maze Panic	12,080
Peter Paplaskas Pembroke, NH	Bag It Man	46,800		The King	675,000
Bradwers Omaha, NE	Buzzard Bait	673,280		The Frog	38,210
	Donkey King	196,250		Galactic Attack	48,520
	Foodwar	73,065		Quasar Commander	114 (expert level)
	Sands of Egypt	112 turns		Color Cubes	9:32
Scott Ihle Jacksonville, FL	Shark	174,000		Bustout	8,200
Greg Gallo East Hartford, CT	Katepil Attack	9,451	Bruce Johnson Vavenby, B.C.		
Ronald Purdue Byron, MN	Lunar Rover Patrol	181,400	Bob Essig Ashtabula, OH	Poltergeist	4,810
	Color Trek (level 5)	3,656	Harold R. McQueen Queensland, Australia	Reactoid	29,255
Kenneth Dey Kansas City, MO		220 pts., 136 turns		Ghost Gobbler	182,370
Pete Crandall Towanda, PA	Frogger	56,500	Chris Anderson Mobile, AL	Microbes	112,950
Larry Blenenfeld Ft. Lauderdale, FL	Mr. Dig	1,700,000			



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## REVIEWS

Well, I've completed *Dungeons of Dagonath*, with the help of advice from a HOT CoCo reader named David Dawson from Omaha, NE. Here's what he told me, and it works.

Bob Leet's strategy is a good one. As you go through the dungeon, you can accumulate a lot of stuff that has no apparent value (extra swords, shields, burnt torches, empty flasks, etc.). Put a pile of junk in front of you to really slow attacking monsters—and when you move to a new level, take the stuff with you.

However, the ploy isn't foolproof. If you move to a lower level, drop your junk pile, and wait, you may find several formidable foes lining up to take a crack at you. But they can only come one at a time. And be careful: Monsters you kill might drop something valuable into your junk. Don't overlook it.

You'll meet some tough cookies down there, but save your rings for the really big showdowns. The junk-pile strategy should get you over most tough spots.

The third level is a rough one. First time around, those giant bat creatures will pick up all the junk you can drop and still keep coming—don't forget how to attack and run. And don't even think about going near the wizard's clone. Whenever you hear him coming, it's time to split—you won't find him much interested in your junk pile.

Kill everything you can find on the third level (except the clone) and then go back up to the other two. Kill everything you can find there until you're strong enough to meet the wizard's clone. Then hope you've got a good strong ring and the necessary flasks. If you manage to kill the clone, you're in for a surprise, so make sure you've got your two most valuable items in hand.

Oh yes, when you're strong enough, you might find some protection in those spiders that at one time could kill you. Let them into your cell now—they won't be able to do any damage, and there's only room in there for one monster at a time.

If you ever make it to the real wizard, you should be experienced enough to deal with him. But don't think it will be easy.—M.E.R.

### The Survivors

The Survivors is a little group of Madness and the Minotaur (Radio Shack) players. Our combined efforts have earned us many points, but we've never been able to get out of the Great Forest before losing to the madness.

We do, however, have quite a lot of information on secret rooms and tunnels, valuable items, and so on. If anyone is interested in joining our group, send a self-addressed, stamped envelope and any information (no matter how minor) you have about the maze.

Gail W. McMichael  
Survivors  
P.O. Box 1343  
Seminole, OK 74868

### Starblaze Tip And Challenge

I, Fleet Commander Morgan Toal, and Stellar Navigator First Class Wayne Benhart combined our efforts to amass a high score of 6,700 on level five of Radio Shack's Starblaze. I piloted the ship while Benhart controlled the galaxy map and warp-drive system.

We discovered that not only does the fire button launch torpedoes, but the A, B, C, D, E, F, G, and H keys do also. Therefore, both of us could fire the ship's weapons.

We will accept any challenge to best our accomplishments on the game.

Fleet Commander Morgan Toal  
Stellar Navigator First Class  
Wayne Benhart  
545 S 8th  
Burlington, IA

### Sanctum Paralysis

I'm paralyzed in a dark room in Mark Data's Black Sanctum. Can anyone help me out?

Matt Bane  
Indianapolis, IN

I've made it through Black Sanctum, and I can't say that overcoming such paralysis is part of the solution. I hope you've saved the game somewhere before you went that far. As with most adventures, it's unwise to wander around in the dark without some way to see what you're doing.—M.E.R.

### And Even More Pyramid Puzzles

After you climb the plant in Radio Shack's Pyramid, how do you move the block that stops your passage? And after you climb the plant, what do you do in the room in which you can't see the ceiling? And what about the room with the sand and the unreachable exit?

How do you get past the dog in Radio Shack's Bedlam?

A reader who didn't put  
his name on his letter

How do you get up the dome in Pyramid? When I have the gold nugget I get "The dome is unclimbable."

Ricky Pizur  
Moscow, PA

Do you have a hot tip on a game, or need one? Share your discoveries and frustrations here.

## Subscription Problem?

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# BUT... CHECKERBOARDS ARE FOR TABLECLOTHS!

## THE LOWERKIT III FROM GREEN MOUNTAIN MICRO

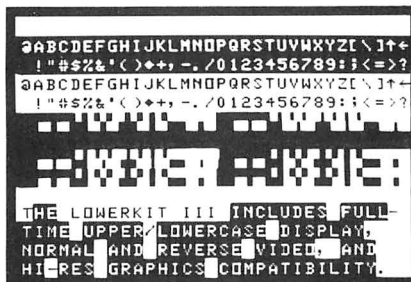
**S**till cloaking your Color Computer in a checkerboard tablecloth? Since 1981, thousands of Color Computer users have uncovered their computer by discovering the Lowerkit — the first and best full-time lowercase and special symbols generation system for your Color Computer.

Why a Lowerkit? Because uppercase-only display is a relic of the user-unfriendly past. And because you can't really read a checkerboard excuse for lowercase display. Sure, software lowercase comes with a handful of commercial programs. But software lowercase gobbles up over 6,000 bytes of your precious memory. Even if you have 64K, you'll give up 10% of it for a simple lowercase display. And software lowercase vanishes when you change programs or turn off your computer.

Take 15 minutes. Put the Lowerkit in. A Lowerkit is simple, reliable — and it's always there. You flip on your machine, and Lowerkit's bold lettering greets you.

No tapes, disks or cartridges to load first. No compatibility problems; when you don't want it, you switch it off.

And now, the new Lowerkit III includes a reverse screen switch as well. Big, bright green letters on a black background.



Original Color Computer Display



LOWERKIT III Display (reverse video, too)

Three years ago, the Lowerkit made history and set the standard in Color Computer lowercase. For example, game and education programs from Sugar Software have Lowerkit display options. Spectrosystems' ADOS supports the Lowerkit; so does Cer-Comp's TextPro. Cartridge Scripsit looks beautiful with a Lowerkit. Spectrum Projects, Cheshire Cat and many others have developed beautiful alternate character sets which you can download from Micronet, burn into an EPROM, and snap into your Lowerkit.

Pull the checkerboard tablecloth off your Color Computer with a **Lowerkit**. The original. The standard.

## Set New Standards with the New Lowerkit III

- Lowerkit III, assembled and tested, \$79.95
- Lowerkit III, complete kit of parts, \$49.95
- Lowerkit III, printed circuit board, \$20.00

*Be sure to specify Color Computer or Color Computer 2.*

## ALSO AVAILABLE FROM GREEN MOUNTAIN MICRO

**Color Burner** with software, \$69.95 / \$56.95 kit

**Micro Language Lab "Learning the 6809"**, \$99 (plus \$3.50 shipping and handling)

**CoCoPort** interface, \$49.95 / \$39.95 kit

**RAM/ROM** pack, \$29.95 / \$19.95 kit

**64K** Color memory upgrade kit, \$49.95 with *NEW* Memory Tester, \$54.95

**Color Quaver**, Software Music Synthesizer, \$19.95

**Scroll-A-Roll** software video text display, \$24.95

**TV Buff II\***, improved to handle virtually all monitors, \$14.95

*(Add \$2.50 shipping and handling)*

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# PRODUCT NEWS

edited by Celeste Wrenn

Information used in the Product News section is supplied through manufacturers' press releases. *HOT CoCo* has not tested or reviewed these products and cannot guarantee any manufacturer's claim.

## New Utilities For OS-9 Systems

Interactive Micro Systems has introduced two new products for Color Computers using OS-9.

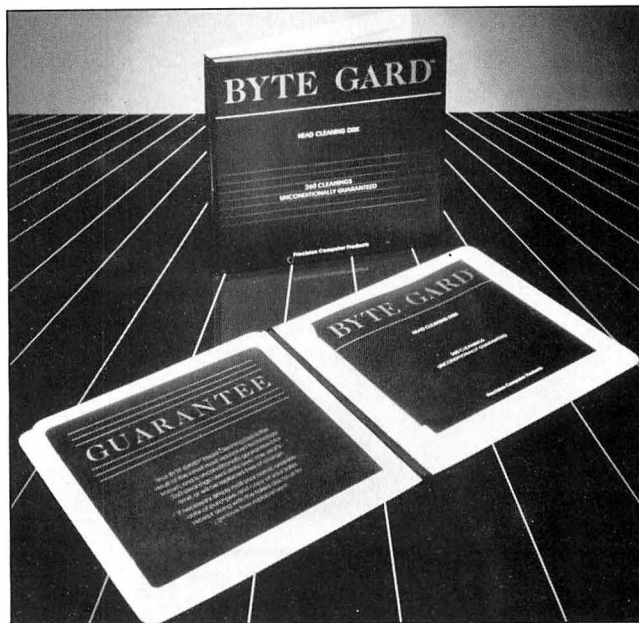
**B-XREF** is a utility designed to create a sorted cross-reference of a Basic-09 program. All variable names, data types, procedure names, and label references will appear in the cross-reference along with the line numbers in which the variable or label is referred. The report may be directed to any valid OS-9 device or file. The cross-reference report aids the programmer by providing a map that shows where each variable is used. This map is a valuable guide to debugging and is a necessary part of the program's documentation.

**Key-Wiz** is a utility that permits databases containing textual information to be stored, searched, and sorted. It is designed to quickly search a text database and find all entries that match a profile of keywords. The keywords are specified along with logical operators such as AND, OR, and NOT in order to provide a very selective and precise search criteria. There is no need to build complicated indexes or tables, since every word within the text file is automatically searchable. Selected entries are displayed on the screen and may be written to an output file or printer.

The text files are created by using any text editor or word processor. Key-Wiz also accepts data files created by other utilities or user-written application programs. A special sort utility, Sort-Wiz, is included with the package.

B-XREF costs \$19.95 and Key-Wiz costs \$24.95 plus \$2 shipping. They are available from Interactive Micro Systems, P.O. Box 21007, Columbus, OH 43221. 614-846-0902.

Reader Service ✓ 559



Floppy head cleaning disk guaranteed for 260 head cleanings

## Byte Gard Floppy Head-Cleaning Disk

The new Byte Gard head-cleaning disk from Precision Computer Products guarantees 260 cleanings for less than 15½ cents each. Used daily for up to 30 seconds, Byte Gard removes dirt, dust and oxide deposits from floppy read/write heads. The polishing action extends the head life by reducing scratches from debris and loose oxide particles. The user simply inserts the cleaning disk in the drive for one initialization cycle. No alcohols or other fluids are needed.

The Byte Gard 5¼-inch cleaning disk costs \$39.95 and is unconditionally guaranteed for 260 cleanings or one year (five working days a week). For more information contact Precision Computer Products, 770 Welch Road, Palo Alto, CA 94304. 1-800-321-2840. In California call collect 415-324-1024.

Reader Service ✓ 567

## MD Clears and Simplifies Your Life

Mark Data has introduced two new products for the Color Computer.

The Universal Video Driver enables your Color Computer to operate with a video monitor instead of a television set for a sharp, interference-free display.

The Video Driver adapts all Color Computer models to a monochrome or color monitor and comes complete with an audio connector. Easy-to-follow instructions are included for fast, simple installation. No soldering is required. The Driver costs \$29.95.

The Easy-File data management system makes data managing easy with single-key menu selections, extensive error-handling procedures, a demonstration data file, and a detailed instruction manual. This new program automatically enhances the monitor screen to a 51-character by 24-line display with full upper- and lowercase text characters. Easy-File allows up to 30 data fields in each data record and provides password file protection, selectable numeric totaling, complete data searching and editing capabilities, and much more. You can quickly enter, locate, review, and modify transfer records.

Easy-File requires 32K, a printer with 80 columns or greater, and at least one disk

drive. The master disk and instructions are supplied in a three-ring binder for \$59.95.

For more information on both products contact Mark Data Products, 24001 Alicia Parkway, #207, Mission Viejo, CA 92691. 714-768-1551.

Reader Service ✓ 552

## Many Happy Returns

Now the CoCo can help you do your taxes. Taxaid from Alpha Byte prepares and prints federal schedules A, B, C, D, E, F, G, and Child and Dependent care. No special forms are needed. The program also calculates data for the 1040 form and prints it by line number.

Taxaid includes the tax law changes for 1984. It is expected that yearly updates will be available at modest cost.

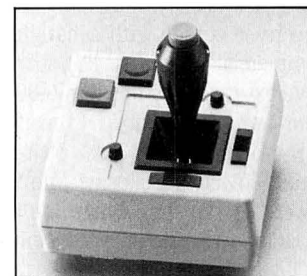
Taxaid is available for all Color Computer configurations. It costs \$19.95 on cassette and \$24.95 on disk plus \$1.50 shipping. Contact Alpha Byte, 1008 Alton Circle, Florence, SC 29501. 803-662-9500.

Reader Service ✓ 550

## Accurate Shooting

CH Products has introduced their second-generation Mach II and Mach III Joysticks. These controllers incorporate a new side-switch spring-disconnect feature that requires no stick deflection, and rotary trims that are four times more precise than conventional slide trims.

Additional features include: spring centering or positive true positioning modes of operation,



The Mach III Joystick



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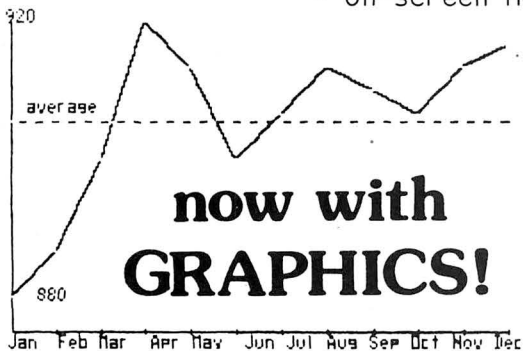
"Eat your heart out, Lotus 1-2-3!"  
Scott Norman, HOT CoCo, October, 1984.

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## PRODUCT NEWS

electrical trims for each axis, two fire buttons on the deck of the control, and a stainless steel ball as the main pivot for added precision and durability. The Mach III Joystick has an additional fire button on the stick handle.

The Mach II costs \$44.95 and the Mach III costs \$54.95. For more information contact CH Products, 1558 Osage St., San Marcos, CA 92069. 619-744-8546.

Reader Service ✓ 563



EPROM programming and reading device

### Auto Run 64

Sugar Software has announced that Auto Run 64 is now available for use with programs that run on 64K Color Computers.

Auto Run 64 is a cassette utility that builds a machine-language loader that is combined with your own Basic or machine-language programs. Once combined, simply typing CLOADM loads the Auto Run loader and optionally displays a title screen. The loader then starts itself executing, loads your program, and starts it.

Before the Auto Run loader loads your program, it will enable 64K mode and move the Ex-

tended Basic higher in memory. This frees up an additional 8K of memory for your own program. Now you can load larger programs that previously got OM errors, or allow more room for data, arrays, and variables.

Auto Run 64 works with all ROMs. The reset button will not disable the 64K mode. If your program is loaded on a non-64K CoCo, it will still run, but the additional memory will not be available.

Auto Run 64 requires 16K Ex-

tended Basic. The price is \$24.95 plus \$1 shipping. Contact Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068. 614-861-0565.

Reader Service ✓ 554

### The Burner +

The Burner+ is an EPROM (erasable programmable read only memory) programming and reading device. It is menu driven and requires no understanding of Assembly language.

Its many features include compatibility with a wide variety of EPROMs, a high-quality ZIF socket and gold-plated edge connector, 50ms and 2ms programming modes, the ability to exchange EPROMs without computer memory loss, 8K of free space with a disk and 16K without, and an exchangeable ROM at the flick of a switch.

The Burner+ comes fully guaranteed. It costs \$157 Canadian and \$119 U.S. including postage. To order write Pollak Electronics, 13761 Grosvenor Road, Surrey, B.C., Canada V3R 5E5. 604-585-2108.

Reader Service ✓ 558

### More OS-9

Computerware is offering a new group of OS-9 utilities called Textools for manipulating text files. The use of meta characters make them especially powerful. The utilities include CAT, Time, QSort, Lower, Split, Unpack, Pack, and Upper.

For more information contact Computerware, Box 668, 4403 Manchester Ave., Suite 102, Encinitas, CA 92024. 619-436-3512.

Reader Service ✓ 555

## NEW! For Your TRS-80 Color Computer 320 Full-time Audio Talk/Tutor Programs!

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**ABC'S IN COLOR**

In the ABC program, all 26 letters spring up in color to the familiar ABC tune. Then, colorful detailed pictures depicting each individual letter of the alphabet appear one by one. Your child's fascination will mount as he or she correctly presses the letter on the keyboard and is rewarded with a musical tune before the next detailed picture is drawn line by line onto the screen: AIRPLANE for A, BUS for B, CLOWN for C and so on to ZEBRA for Z. Truly a must program for the preschool to first grade age group!



CoCo 16K ECB . . . . . Tape: \$19.95 Disk: \$25.95

**CRISS—CROSS MATH**

As the program begins, your child is presented with a nine square playing board. It is your choice as to which square you choose. After a choice is made, a MATH PROBLEM appears in the square. You score your first X by answering the problem correctly. If your answer is incorrect, the square clears and your opponent is allowed his choice of squares. The game is over when three squares vertically, horizontally, or diagonally are won by the same player. When playing against the computer, every answer you get wrong is won by the computer. Multi-level ADDITION AND SUBTRACTION program.

CoCo 16K . . . . . Tape: \$12.95

**FRACTIONS**

SIDE ONE: Fraction Lessons, explains fractions with the aid of graphics. Child studies the different ways fractions can be represented. Lessons include:

- IMPROPER FRACTIONS
- MIXED FRACTIONS
- PROPER FRACTIONS

Many educators have praised the use of motion and color to display the fractional equivalents.

SIDE TWO: Fraction practice, offers a random computer generated quiz.

Atari 16k . . . . . Tape: \$19.95

CoCo 16k . . . . . Tape: \$19.95

**JOYSTICK DRAW**

Joystick Draw is the simple way to explore your artistic talents! Program operation is easy enough for a child to use, but effective enough that TCE uses it to design many sophisticated high-resolution graphic screens. Joystick Draw's design allows you or your child to save those masterpieces for future revisions or for use in other programs (instructions included). Your child will spend many hours enjoying this program and at the same time improving his or her eye hand coordination! You will find Joystick Draw to be an easy way to design those more sophisticated graphics for your own programs!

CoCo 16K ECB . . . . . Tape: \$16.95

**SPELL BOMBER**

As captain of your ship, you must destroy the enemy bomber by spelling the mystery word. In this exciting and educational game the bomber gets closer with each inaccurate letter. You have only EIGHT tries to guess the mystery word or your ship will be bombed! If you guess the word correctly, GENERAL QUARTERS will sound and your ship will fire a missile to destroy the bomber. Three levels are available: EASY, MEDIUM, and HARD. Challenging for all ages!

Atari 16K . . . . . Tape: \$18.95

CoCo 16k ECB . . . . . Tape: \$18.95 Disk: \$22.95

Vic 20 13k . . . . . Tape: \$18.95

**SPELLING BEE**

The word is pronounced vocally and it is up to you to type in the correct spelling. If wrong, the computer will be your friend and flash the word on the screen for just an instant. OK! Try typing the word in again. STILL WRONG! The computer wants success and allows you to see the word again this time a little longer. If you just can't spell the word, the computer realizes you need to learn to spell the word and leaves the word on the screen for you to copy. Try your best and the computer has a surprise for your reward!

SPELLING BEE I . . . GRADE 1 & 2      SPELLING BEE III . . . GRADE 5 & 6

SPELLING BEE II . . . GRADE 3 & 4      SPELLING BEE IV . . . GRADE 7 & 8

CoCo 16k ECB . . . . . TAPE: \$16.95 Each

**TC—INVENTORY**

Many insurance companies offer a discount for policy holders which have complete inventories on file. TC — Inventory is designed to help you organize, maintain, and compile the personal belongings of your home. Program is user friendly and menu driven. TC — Inventory allows input for location of item, price of item, serial number of item, date of purchase, and a text written description of the item. Don't put off recording your personal belongings until its too late. Requires printer for hard copy.

CoCo 32k ECB . . . . . Tape: \$16.95

**TEACHING CLOCK**



Torn between teaching time on a digital or a conventional (face and hands) clock? Well, this program combines the two using high resolution graphics and prompts! Your child will learn to tell time with the aid of a specially designed CLOCK! Child enters the time, if wrong, the center of the clock displays a graphic aid. If the child is correct a musical reward is heard. Program offers three levels: hours, quarter hours, and five minute intervals.

Apple 48k . . . . . Disk: \$19.95

Atari 32k . . . . . Tape: \$16.95

CoCo 16k ECB . . . . . Disk: \$19.95 Tape: \$16.95



**Additional Educational Software available  
for Color Computer, TDP 100, Atari<sup>®</sup>,  
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# The HJL-57 Keyboard

Now available for all models,  
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## Compare it with the rest. Then, buy the best.

If you've been thinking about spending good money on a new keyboard for your Color Computer, why not get a good keyboard for your money?

Designed from scratch, the HJL-57 Professional Keyboard is built to unlock ALL the potential performance of your Color Computer. Now, you can do real word processing and sail through lengthy listings...with maximum speed; minimum errors.

At \$79.95, the HJL-57 is reasonably priced, but you can find other CoCo keyboards for a few dollars less. So, before you buy, we suggest that you compare.

### Compare Design.

The ergonomically-superior HJL-57 has sculptured, low profile keycaps; and the three-color layout is identical to the original CoCo keyboard.

### Compare Construction.

The HJL-57 has a rigidized aluminum baseplate for solid, no-flex mounting. Switch contacts are rated for 100 million cycles minimum, and covered by a spill-proof membrane.

### Compare Performance.

Offering more than full-travel, bounce-proof keyswitches, the HJL-57 has RFI/EMI shielding that eliminates irritating noise on displays; and four user-definable function keys (one latchable), specially-positioned to avoid inadvertent actuation.

### Free Function Key Program

Your HJL-57 kit includes usage instructions and decimal codes produced by the function keys, plus a free sample program that defines the function keys as follows: F1 = Screen dump to printer. F2 = Repeat key (latching). F3 = Lower case upper case flip (if you have lower case capability). F4 = Control key; subtracts 64 from the ASCII value of any key pressed. Runs on disc or tape; extended or standard Basic.

### Compare Installation.

Carefully engineered for easy installation, the HJL-57 requires no soldering, drilling or gluing. Simply plug it in and drop it right on the original CoCo mounting posts. Kit includes a

new bezel for a totally finished conversion.

### Compare Warranties.

The HJL-57 is built so well, it carries a full, one-year warranty. And, it is sold with an exclusive 15-day money-back guarantee.

### Compare Value.

You know that a bargain is a bargain only so long as it lasts. If you shop carefully, we think you will agree...The HJL-57 is the last keyboard your CoCo will ever need. And that's real value.

### Order Today.

Only \$79.95, the HJL-57 is available for immediate shipment for either the original Color Computer (sold prior to October, 1982) or the F-version and TDP-100 (introduced in October, 1982), and the new 64K CoCo. Now also available for CoCo 2.

**Call Toll Free**  
**1-800-828-6968**

In New York 1-800-462-4891



**PRODUCTS**

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Ordering Information: Specify model (Original, F-version, or CoCo 2). 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 for Canada). New York state residents add 7% sales tax. Dealer inquiries invited.