

HOT CoCo

A CWCI PUBLICATION
SEPTEMBER 1984
USA \$2.95 CAN \$3.50

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

Everyone's Learning With Computers

Buyer's Guide

Hundreds of Educational Programs

Megadisk

5 Megabytes, Mini Price



New Column: 6809 On Line



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Make Radio Shack's best TRS-80 Color Computer 2 the heart of an advanced color graphics system and double your programming power! Easy-to-use one-line commands make detailed color graphics simple to create. Features 256 x 192 screen resolution (49,152 pixels)—perfect for drawings, designs, business charts, engineering diagrams, even animation. You can write your own sophisticated programs, too.

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Computer 2

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Cover art by Mort Drucker

 This symbol indicates the program's placement on the Instant CoCo loader, available on cassette. See our Instant CoCo ad for details.
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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 (LPV11/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:

Cognitec
704 N. Nob St.
Del Mar, CA 92014

✓ 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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EDITORIAL OPERATIONS MANAGER

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ADVERTISING: 1-800-441-4403

Sales Manager: Raino E. Wirein

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DIGRESSIONS

SHOP (AND LEARN) AT HOME

Tandy Corporation is not known for being innovative in marketing its computer line. Yet a recently announced consumer service and the formation of a new division could change that image.

Tandy Home Education Systems, the new division, goes directly to the consumer with packaged systems for home and education applications. The emphasis is on households with preschool or school-aged children. The base package consists of a 64K Color Computer 2, one disk drive, deluxe joysticks, a modem, and training sessions for two family members at the nearest participating Radio Shack Computer Center. The customer can also choose two of six software groupings. The cost is under \$1,500, and a printer and word processor can be added for an extra charge.

This program begins in early July in 13 cities: Dallas/Fort Worth, TX; Atlanta, GA; Baltimore, MD; Charlotte and Raleigh, NC; Chicago, IL; Philadelphia, PA; Denver, CO; Tampa, FL; Phoenix, AZ; Washington, DC; San Diego, CA; and New York, NY. The program will cover the rest of the nation within three years.

All the consumer has to do is contact a participating Radio Shack Computer Center to set up an in-home demonstration. A representative will show how the system works and discuss specific needs.

This is a true customer service. Sure, it will be an effective sales tool as well. But the customer wins too. In-home demonstrations ensure that the customer knows what he or she is buying and how to use it. It also removes much of the anxiety of choosing the right configuration that many families experience.

Tandy will gain more than just sales, too. The formation of this new division will help dissolve the perception of many that Radio Shack is a parts depot for electronics buffs and a vendor of inexpensive radios. The one-on-one contact also instills a feeling of trust with the company; customers will know that they can go back to Radio Shack for service and technical help.

I hope the general press gives this new service its due. Tandy is having a hard time being heard over the hype and flash of Apple, IBM, and Commodore. In-home demonstrations are much more productive, for both Tandy and the consumer, than mass giveaways to schools and scare tactics aimed at parents fearful for their children's future.

If you want more information on the new division or you want to let a friend know about it, write: Tandy Home Education Systems, 1301 West 22nd St., Suite 400, Oak Brook, IL 60521—M.N. ■

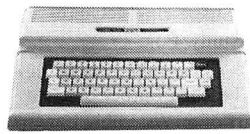
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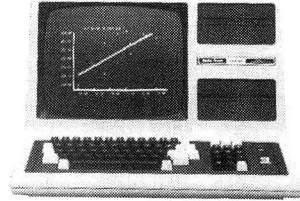
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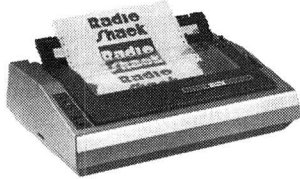
Model 100 8K \$495
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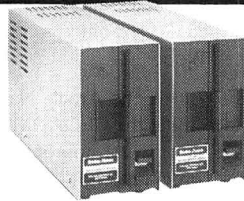
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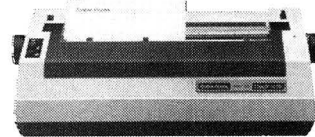
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Silver Reed EXP550 D.W. Ser.	525
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CGP220 Ink Jet	545
DMP110	305
Toshiba 1340 (24 wire head)	779
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Gemini Powertype	345
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Prowriter 8510	345
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** CRASH (32K)	\$24.95	\$27.95
* WORLDS OF FLIGHT (32K)	\$29.95	\$32.95
* SR-71 (32K Ext. Basic)	\$28.95	\$31.95
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** INTRACOLOR GRAND PRIX (32K)	\$34.95	\$34.95

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(Ext. Basic Req.)

SUPER SCREEN MACHINE

(Ext. Basic Req.)

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* JUNIOR'S REVENGE (32K)	\$28.95	\$31.95
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*Requires Joystick **Joystick Optional

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SELECTED SOFTWARE

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Fridley, MN 55432

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Instant CoCo

This directory lists all programs available on HOT CoCo's September Instant CoCo cassette. See our ad on page 34 for more details.

SIDE A

ARTICLE NAME/AUTHOR	FILE	PAGE #	SYSTEM
Copyright Statement	TITLE	—	All
Hi-Tech Shape-Up/McGuire	EXERCISE	30	4K
Market Study/Pole	MRKTSTDY	36	16K
PCLEAR 1 before loading on a 16K machine			
Typing Teacher/Barber	TYPTEACH	68	16K Ext.
Anatomy of an Assembly Language Game— Part 4/Meehan (m)	CROAKER4	70	32K Ext.

SIDE B

Time and Time Again/Campbell	TIMER	76	16K Ext.
The Educated Guest/Santee	MULTICHK	88	16K Ext.
The Educated Guest/Santee	EDITR	88	16K Ext.
The Educated Guest/Santee	EDITI	88	16K Ext.
The Educated Guest/Santee	SPELLCHK	88	16K Ext.
The Educated Guest/Santee	ARTQUIZ	88	16K Ext.
Geoshapes/Wood	GEOSHAPE	35	16K Ext.

The symbol (m) in the Article Name column indicates the program is machine-language and must be loaded using the CLOADM command. Additional preparatory commands are listed under the article name where appropriate. CSAVEM addresses are listed for your use with the machine-language programs.

If Our Programs Don't Work

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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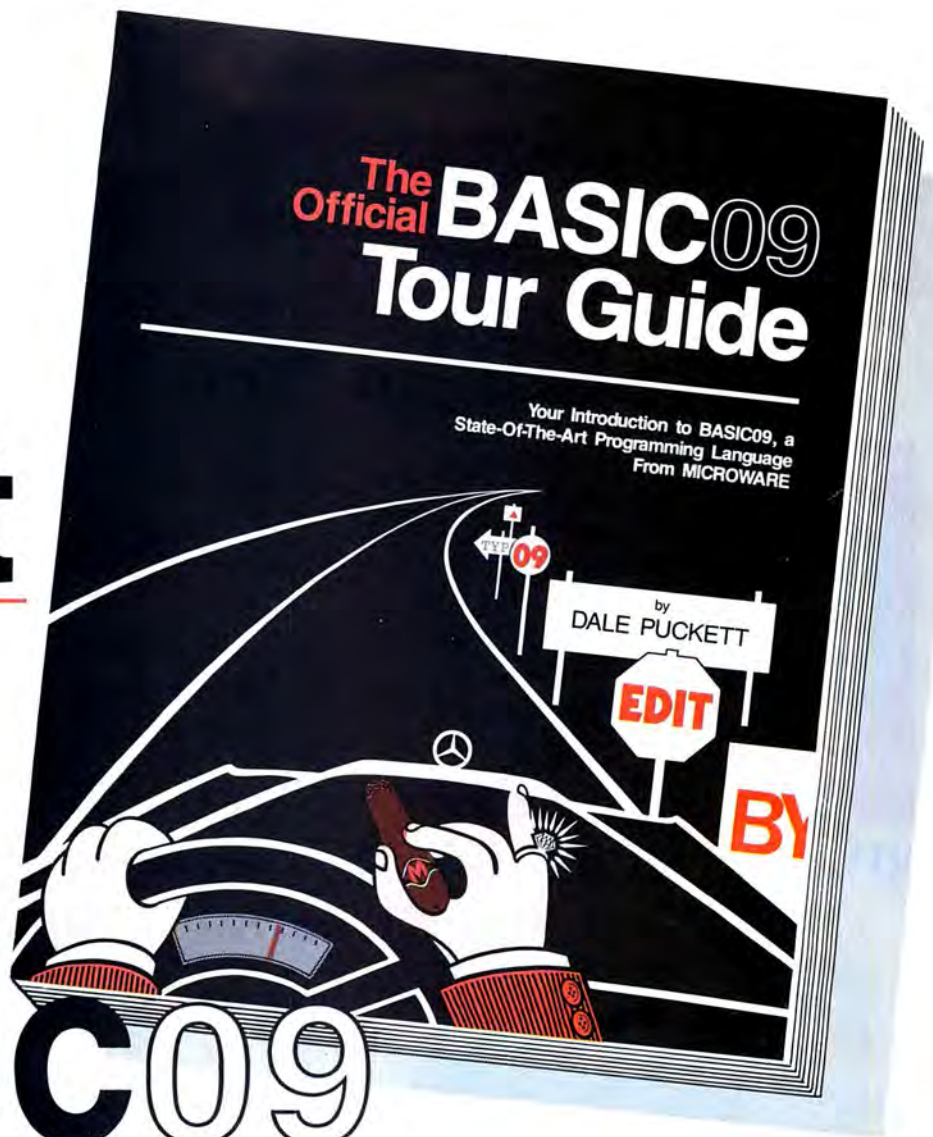
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SPELLING BEE I . . . GRADE 1 & 2 SPELLING BEE III . . . GRADE 5 & 6

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Feedback

More on The CoCo Coupler

I'd like to add a few corrections to the CoCo Coupler review that appeared in your July 1984 issue (p. 103).

First, Mr. Kepner states that the CoCo will support 18 124-byte sectors per track in the Omikron Model I CP/M format. Actually, the cartridge supports 18 128-byte sectors, and this applies only to single-density disks—double density allows considerably more storage.

The review also says that having CP/M in memory leaves 40K for you to use. Actually, you have just over 53K available. CP/M itself takes up almost 7K, and the display and keyboard area use another 4K.

We went to extra trouble and expense to put gold-plated edge connectors in the CoCo Coupler. They are not copper. We've also added ground tabs to the new cartridges to mate with the grounding on the disk controller or expansion unit. And you can now order Multiform, the utility that will let you read from and write to 12 different disk formats.

*Gary Gonnella
Wayne Technology
P.O. Box 5196
Anaheim, CA 92804-1196
714-772-5757*

Wordsearch Update

We've received several letters from readers who have had problems with the Wordsearch article (*HOT CoCo*, March 1984, p. 62). Most of the difficulties come from printer incompatibility, so we've come up with possible solutions to some of these problems.

Both the Basic and machine-language versions have options to print out large and small characters. Both options were written to work with the Radio Shack Line Printer VII, which uses character codes with decimal values of 30 and 31 for large and small letters, respectively.

If you're using another type of printer that has large/small character capability, then check your printer

manual for a list of all available control codes. Then substitute the correct codes in lines 1290, 1330, 1360, 1370, 1500, and 1560 in the Basic version, or lines 5660, 6450, and 7030 in the machine-language version.

If your printer allows only one character size, then delete all the above lines in the Basic version and substitute a nonprinting character code in the machine-language version.

Also, both programs assume an 80-column printer width. If yours is narrower (i.e., the TRS-80 CGP-115 or TP-10), then you must tailor the PRINT#-2 lines to your printer. The Basic version has the following output formats:

- The heading is printed in line 1330 with a TAB(30) preceding. If your printer prints fewer than 80 columns across, replace line 1330 with PRINT#-2, TAB((XX-LEN(B\$))/2); B\$ where XX is the number of columns on your printer. This will center the heading according to your page width.

- The Wordsearch matrix has 20 columns interleaved with single spaces for large characters and double spaces for small characters (C\$ in line 1410) as well as an indented margin (zero spaces for large characters and 13 spaces for small characters (D\$ in line 1420). Hence, with these formats you'll need $20 + 2 \times 20 + 13 = 73$ columns for small letters or $20 + 1 \times 20 + 0 = 40$ columns for large letters. Note: The larger letters take two character widths; therefore, the 40 letters need 80 columns.

To make the matrix fit your printer, adjust lines 1410 and 1420 by reducing the number of spaces. If you have only one letter size, then define C\$ and D\$ without the IF...THEN...ELSE statements in lines 1410 and 1420.

- The list of words output in groups of five, tabulated according to line

1530. For example, if you have a 40-column printer, only three words of 13 letters will fit on a line, so adjust lines 1520 and 1530 as follows:

```
1520 FOR I=1 TO Q STEP 3
1530 PRINT#-2,G$(I);TAB(13);G$(I+1);
TAB(26);G$(I+2)
```

When the CoCo sends a line of Basic to the printer, it automatically inserts a line-feed character unless you append a semicolon. This is either a decimal value of 10 or 13 on the Line Printer VII. Some printers may need different combinations of carriage-return (CR) and line-feed (LF) characters that you could insert as PRINT#-2, CHR\$(NN) where NN is the CR or LF decimal code. If the lines on your printout are "following on," then try inserting a CR or LF, or both, directly after each PRINT#-2 statement that does not end in a semicolon.

In the machine-language version, the lines LDA #13 (or LDA #10) and JSR (CHROUT) accomplish the CR/LF function.

Check the CR/LF codes in your printer manual and, if necessary, amend these lines. The Line Printer VII interprets both codes 10 and 13 the same; therefore, I used either when I needed a new line. Some printers such as the DWP-210 use only 10 for LF and 13 for a combined CR/LF. If that's the case with your printer, then always use 13.

Some computers will not work in the fast mode. If yours is one of these, delete all POKE 65495,0 statements in the Basic version.

A few readers have also found problems with the X command. From the portions I've seen of their listings, it appears that they've assembled their programs at locations that are slightly less than mine, probably because they left out parts of the text or rearranged it with different spaces.

As I interpret the problem, the program is only half used until you press the X. This then initiates the print routine. If there is a bug in it, it could easily crash.

I wrote the program on a 32K machine, and there could be a problem

Send your letters to Feedback, HOT CoCo, 80 Pine St., Peterborough, NH 03458.

for those who try to run it on 16K, although this doesn't seem likely, because I used addresses \$1000-\$1D68, and EDTASM pointers are adjusted outside this range.

Those who are assembling the Wordsearch program might find it useful to follow the 10 steps in the article and replace step 10 with A/IM/WE/AO/NL/LP in order to get a listing of the label addresses. Otherwise, suggested addresses are as follows:

WRDSER	1000
START	1059
NUMBIN	1472
MATRIX	1541
BOXCHK	1629
RANDOM	178A
TITLE	1C4B
PRIMAT	1C97
TXTCI	1D4C

*Frank and Martin Tichborne
Avon, England*

Revenge Of The Gremlins

In the July 1984 issue of HOT CoCo (p. 63), the program Python was attacked by Gremlins. Delete the apostrophes in lines 280, 510, 640, 730, 910, 1035, and 2050.—eds.

The Line To Knossos

Eds. note—Four readers have written in about a problem they found in the June 1984 Elmer's Arcade ("Knossos Labyrinth," HOT CoCo, p. 17). Evidently, when you use the joystick option, you can't get the firecracker to blow a hole in the wall.

The following line will correct the problem:

```
575 GOTO 530
```

*Steve Swearingen
Fort Smith, AR*

More MC-10 Printer Patch

John Cullings' printer patch for the MC-10 (*HOT CoCo*, June 1984, p. 110) is an excellent way to print out BBS data.

The printer dump isn't limited to the buffer contents, either. By changing line 25 to $S = P * 512$ you can examine and print entire 65,536 [pages 0-132] memory locations in ASCII. And by changing line 125 to LPRINT M; you can get a decimal dump.

As an example, by printing page 112 (\$E000 or 57344) you can examine the beginning of the Basic ROM monitor that lists all the Basic command tokens.

Thanks for a very useful article. I sure would like to see more from Mr. Cullings. I'm sure such articles are a real help to information-starved MC-10 owners.

*Vincent Messino
Wayne, NJ*

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16K Racetrack

I think *HOT CoCo* has the best programs available for the Color Computer, and I like the 32-character listings.

I enjoyed the "Racetrack" article (*HOT CoCo*, June 1984, p. 50) and have converted it to run on my 16K Extended Color Basic machine. Others can do so by making the following changes:

- Change the IF...THEN...GOTOs to IF...GOTO.
- Change all ELSE...GOTOs to ELSE.
- Delete all remarks, the printout section at the end of the program, and the print option from the menu.
- Change the INPUT "===" to INPUTX "===".
- Renumber the lines by one, beginning with the first line.
- Insert a high-speed POKE (65495,0) if your machine can take it.
- Change line 60 to 60 DIMH\$(40),

DIMH(40,15),J(10,4),R(4,4),RN(20,4),SC(5,4),BE(4,3).

These changes only save memory, they do not affect the way the program runs. Be sure to POKE 25,6:NEW before you run or save the program to avoid the dreaded OM error.

*Jon Alchin
Lompoc, CA*

An Extra Word On Word-Pak

This is to thank you for the Word-Pak review (*HOT CoCo*, July 1984, p. 96) and for your continual support of our company.

We have made a few changes to Word-Pak, and perhaps you would like to pass them along to your readers. First, we've changed the Basic-driver software to include full-screen editing for Basic programs. By simply moving the cursor to any location on the screen, you can insert, delete, or overtype characters. This is quite an improvement over the Color Computer's standard editor.

Second, we can now supply the Basic driver not only on cassette or disk, but also on an EPROM installed on the Word-Pak. Once it's in, all you have to do is turn on your computer, and Word-Pak is right there. EPROMs are available for both cassette- and disk-based systems.

The disk version requires an expansion bus (the C-C bus or Multi-Pak) and 64K.

We also have patches for FHL Flex and for Data Comp Flex.

*A.R. Alberto
PBJ Inc.
911 Columbia Ave.
North Bergen, NJ 07047
201-330-1898*

OK CSAVE

If you want to know if you've made a good tape copy of a program, CSAVE it, rewind the tape, and enter SKIPF"name". Then press the play button on your recorder. If your CoCo skips over the program and gives an OK prompt, you have a good copy.

*Robert Toscani
Philadelphia, PA*

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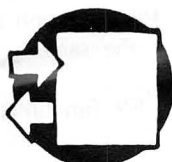
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The Basic Beat

REM, A FEW MATH OPERATIONS, AND A GAME

by James W. Wood

When the Color Computer has the proper software, it is capable of doing almost anything. Program Listing 1 does nothing. The computer ignores any part of a line after REM. Or, you can use an apostrophe in place of REM.

A REM (remark) simply indicates a note you've made to yourself in a program. You might want to remember what a certain part of a program does, or you might need to indicate where a program originated (i.e., 10 REM HOT COCO, DEC 1983). However, if you put quotation marks around REM, the computer won't ignore the rest of the line.

Remark lines do use memory. Type PRINT MEM with Listing 1 in the machine. Then type NEW and PRINT MEM again. In the future, if a program gets an OM (out of memory) error, you can remove the REMs to free more memory.

Your computer can do math. Program Listing 2 shows the symbols for addition, subtraction, multiplication, division, and exponentiation. The little inverted V in line 50 represents the up arrow. It means six raised to the third power, or 6^6 . Color Basic computers cannot run this line.

The Color Computer can come up

with its own numbers, via its handy random-number generator. Program Listing 3 prints numbers between 1 and 10. Remember the purpose of the semicolon in line 30? Try the listing without it, and the program will continue forever, unless you press break or a shifted @.

Program Listing 4 uses A as the random number. C keeps track of how many variables are printed, and T stands for the total of the random numbers. It prints 10 values between 1 and 10 but doesn't print the total. That's okay. The program didn't tell the computer to print T.

Program Listing 5 is the completed version of Listing 4. Variable C increases by one each time through line 20. Line 30 picks a random number. Line 45 keeps a running total. $T = T + A$ would not look reasonable to an old-time algebra teacher, but in Basic it means the new T equals what T used to equal, plus A.

Line 50 checks to see if 10 variables have been printed, and if they have, the program goes to line 70 and prints an underline and the total. Otherwise, it goes back to line 20 to increase the count and pick more random numbers.

Program Listing 6 uses two random numbers to create addition problems. It prints the values of A and B with a plus sign between them. The INPUT command causes the computer to wait until you type and enter something. The variable AN is given the value entered.

Line 60 is an example of IF, THEN, ELSE. When the IF condition is true,

the program executes the THEN statement. When it's false, the program uses the ELSE statement. You could change Listing 6, to give only a certain number of problems. Or you could rewrite it to give two chances to enter a correct answer. You might use the symbols < and > (less than, greater than) to give a clue after the first incorrect answer. For example, IF $A + B > AN$ THEN PRINT "YOUR GUESS IS TOO SMALL".

Program Listings 7 and 8 show two methods of using INPUT. Line 10 of Listing 8 performs the same function as do lines 10 and 20 of Listing 7.

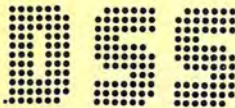
What if you don't want a random number between one and something? Program Listing 9 prints random numbers from 10 to 20. RND(11)'s smallest value is 1 ($9 + 1 = 10$). RND(11)'s largest possible value is 11 ($9 + 11 = 20$).

Program Listing 10 flashes random colors on the screen. There are many ways to combine various commands. Lines 20-40 create a loop that slows the flashing so you can see each screen color. The program must go through this loop 10 times before changing screen color, because the value of A increases by one each time through, until it reaches 10. At that time, line 50 resets A to zero so the program can begin another count. Someday, maybe in my next column, I'll show you an easier way to achieve the same goal with a FOR...NEXT loop.

Speaking of work, it's fun time. I thought I'd put together a game using only the commands covered this month and in July's issue. Movement across the screen is difficult, if not impossible, without SET, PRINT@, or

System Requirements

4K RAM
Color Basic
(Extended Basic
needed for some listings)



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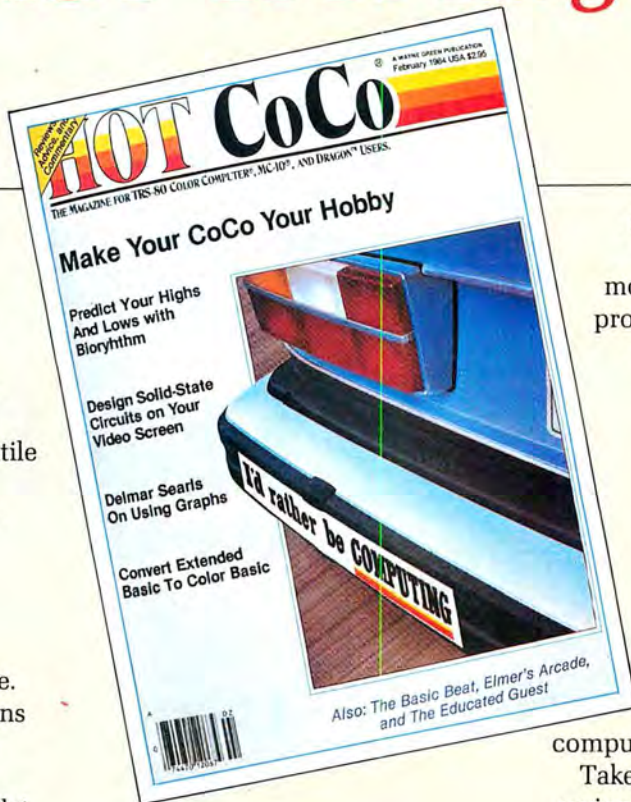
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The Basic Beat

POKE, so I created Program Listing 11. The graphics are stationary and not even necessary, but they do aid in visualizing a sub hiding in a three-dimensional ocean. The ocean's three coordinates can be any number from one to six. You must enter the depth and eastward and northward coordinates. For example, to guess four units down, three east, and five north, type 4, 3, 5.

Lines 110-130 determine the actual depth, actual east, and actual north coordinates. Lines 310-330 compare your guesses to the actual values. Line 340 determines if all three are correct. (Yes, I could have used IF N=AN AND E=AE AND D=AD THEN GOTO 380, but I haven't taught the AND command yet.)

Program Listings 12 and 13 show

there are times you cannot trust your computer. Listing 12 begins by printing the number 1, adds .1, and continues to increase each sum by .1 (i.e., 1, 1.1, 1.2, etc.). Instead of printing the expected 3.7, the computer prints 3.69999999. Later, the machine makes up for this by printing 9.80000001 instead of 9.8.

You must have Extended Color Basic to run Program Listing 13. Line 10 prints the value 10, but line 20, which theoretically would print zero, comes up with 3.7252903E-09. This is scientific notation. Changing this number to nonscientific notation involves moving the decimal point nine places to the left, resulting in an answer of .0000000037252903, which isn't exactly zero.

Line 40 tries to tell you that $10^2 =$

$100 = .0000000596046448$. Interesting! If your computer would lie to you about a thing like that, can you trust it to do anything important? Only if your programmer is careful.

Stay tuned next time as I add more commands to begin to put color animation on the screen. It is a Color Computer, isn't it? ■

Address correspondence to James W. Wood, 424 N. Missouri, Box 507, Atwood, IL 61913.

```
10 REM THIS PROGRAM DOES NOTHING
```

Program Listing 1

```
10 PRINT6+3
20 PRINT6-3
30 PRINT6*3
40 PRINT6/3
50 PRINT6^3
```

Program Listing 2

```
10 CLS
20 A=RND(10)
30 PRINTA;
40 GOTO20
```

Program Listing 3

```
10 CLS
20 C=C+1
30 A=RND(10)
40 PRINTA
45 T=T+A
50 IF C=10 THEN END
60 GOTO20
```

Program Listing 4

```
10 CLS
20 C=C+1
30 A=RND(10)
40 PRINTA
45 T=T+A
50 IF C=10 THEN 70
60 GOTO20
70 PRINT"--"
80 PRINTT
```

Program Listing 5

```
10 CLS
20 A=RND(10)
30 B=RND(10)
40 PRINTA;"+";B;"=";
50 INPUT AN
60 IF A+B=AN THEN PRINT "GOOD" E
LSE PRINT "SORRY, IT IS";A+B
70 GOTO20
```

Program Listing 6

```
10 PRINT"GIVE ME A NUMBER";
20 INPUT A
30 PRINT"YOUR NUMBER TIMES 2 EQU
ALS"
40 PRINTA*2
```

Program Listing 7

```
10 INPUT"GIVE ME A NUMBER";A
30 PRINT"YOUR NUMBER TIMES 2 EQU
ALS"
40 PRINTA*2
```

Program Listing 8

```
10 A=9+RND(11)
20 PRINTA;
30 GOTO10
```

Program Listing 9

```
10 CLS RND(9)-1
20 A=A+1
30 IF A=10 THEN 50
40 GOTO20
50 A=0
60 GOTO10
```

Program Listing 10

```
100 GU=1
110 AD=RND(6)
120 AE=RND(6)
130 AN=RND(6)
140 CLS
150 PRINT"      6-----"
160 PRINT"      5      : FIND"
170 PRINT"      4      : THE"
180 PRINT"      3      : HIDDEN"
190 PRINT"      2      : SUB'S"
200 PRINT"      1      : SPOT."
210 PRINT"0123456 : "
220 PRINT"1      : GUESS"
230 PRINT"2      : IT'S"
240 PRINT"3      : DEPTH,"
250 PRINT"4      : EASTWARD,+"
260 PRINT"5      : NORTHWARD"
270 PRINT"6-----: COORDINATES."
280 PRINT"PUT A COMMA BETWEEN CO
ORDINATES"
290 PRINT"QUESS#";GU;
300 INPUTD,E,N
310 IF D=AD THEN PRINT "DEPTH OK"
" ELSE IF D>AD THEN PRINT "TOO D
EEP" ELSE PRINT "DEEPER"
320 IF E=AE THEN PRINT"NORTH OK"
" ELSE IF E>AE THEN PRINT "TOO FA
R EAST" ELSE PRINT "MORE EAST"
330 IF N=AN THEN PRINT "NORTH OK"
" ELSE IF N>AN THEN PRINT"TOO NO
RTH" ELSE PRINT"MORE NORTH"
340 IF N=AN THEN IF E=AE THEN IF
D=AD THEN GOTO 380
350 GU=GU+1
360 INPUT"PRESS (ENTER) TO CONTI
NUE.";JWS
370 GOTO140
380 PRINT"YOU SUNK THE ENEMY SUB
IN"
390 PRINT"      ";GU;" TRIES."
"
```

Program Listing 11

```
10 CLS
20 A=1
30 A=A+.1
40 PRINTA
50 GOTO30
```

Program Listing 12

```
10 PRINTSQR(100)
20 PRINTSQR(100)-10
30 PRINT10^2
40 PRINT10^2-100
```

Program Listing 13

BY W. C. BANTA

Li

SIX SMART WAYS TO GO

Eds. note—Last month W. C. Banta looked at the tape and ROM pack versions of Softlaw's VIP Terminal, Computerware's Color Connection, and Eigen Systems' Colorcom/E. This month he continues with an assessment of Cer Comp's Data Pack, Double Density Software's Colorterm + Plus+, and PXE Computing's Autoterm. Two tables at the end of this review offer a quick comparison of the tape and ROM pack versions of all six packages.

Mr. Banta will finish this series with a look at the disk versions of these smart terminals in a future issue of HOT CoCo.

Here are three more smart-terminal packages that will give you some impressive features for going on line.

ber and the whole command system to be quicker and more convenient than any menu, once I got the hang of it. Don't accidentally enter >BA, though, or the Data Pack will vanish without

form more slowly than 32-column block letters, but much faster than those of VIP Terminal. The Data Pack's huge logo uses an excessive five lines of text at the top of the screen.

You can select nine different line lengths, from 28 to 255 characters. Line lengths over 64 characters are illegible, but you can use them for viewing graphs and other complicated print-outs. You can return from the hi-res screen to the CoCo's own 32-column display. Even if you kill the hi-res screen (and get 6K more buffer space), you can get it back again without reloading—a nice feature.

The screen reverses to white on black to let you know that the buffer is full. You can't get back to the normal display until you clear the text buffer, nor can you close the buffer; you have to live with reversed letters once it's full. You can, however, toggle from one screen color to another.

The backspace doesn't erase the screen characters in graphics mode, but it does on the low-res screen and in command mode. There is no word mode in the graphics mode, but you have one on the low-res screen. You can't turn it off.

The response time is quick, even in the graphics mode. You won't lose data, either, because the Data Pack stores everything, even if it comes in faster than the CoCo can get it onto the screen. You can even elect to keep or erase the backlog of undisplayed buffer. And you can transmit all 128 control characters, as well as a line break.

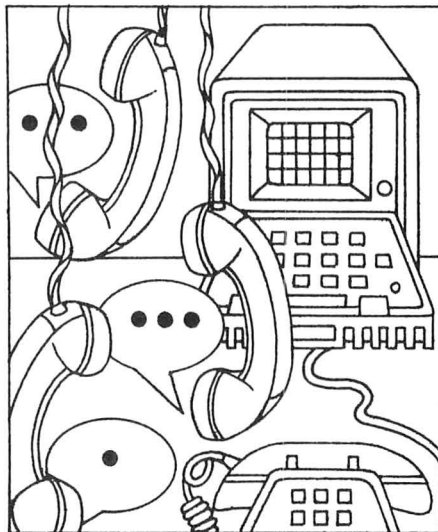
The buffer system is always open; Data Pack stores whatever it receives. The buffer is displayed from the oldest to the newest data. It rushes by on the screen, and you stop it by pressing any key.

You can also set the buffer to hold control characters, even backspace.

There is a line editor for the buffer. You can add or delete characters within a line, leap forward or backward 10

	ease of use	documentation	performance	error handling
10				
9				
8				
7				
6				
5				
4				
3				
2				
1				

Application Software



The Data Pack II v. 1.1

Cer-Comp
5566 Ricochet Ave.
Las Vegas, NV 89110
702-452-0632
\$34.95 cassette
\$44.95 disk

The Data Pack is among the least expensive and most powerful of the terminal programs. It is substantially improved over earlier versions, and if you own one of the older ones, I recommend you take advantage of the liberal refund policy.

The Data Pack is not menu driven; you enter commands as two-letter codes. I found the codes easy to remem-

even an "Are you sure?" prompt.

Entering a blank line lists most of the commands on the screen. It's too bad the commands are not entirely self-explained. For example, you will need the instruction book to know that BR 2 sets the baud rate to 1,200.

The default display is an attractive, east-to-read 51-column graphics set without true descenders. The characters

ON LINE—PART II

lines at a time, or all the way to either end.

The buffer loads and writes ASCII files from tape. You can't freeze the buffer, and you might find unwanted buffer contents uploaded with the tape file unless you edit out the lines. A handy SD command lets you save or print only the parts of the buffer that were downloaded.

To upload, you can set both a timer (zero seconds to two minutes) and prompt characters, as needed. Setting the upload delay delays the buffer screen display, too—a bug that needs fixing. Another annoyance is that the buffer is transmitted without output to the screen, so you can't see what's being sent.

The Data Pack flunked the upload test, because I never was able to upload anything to my demanding half-duplex IBM system. There is a delay feature to pause between transmitted lines.

The printer system works fine; and you can set the baud rate from 110 to 9,600 baud, using a code given in the instruction book.

The Data Pack's price and features make this package one that will appeal to many users.

Eds. note—Cer-Comp has informed us that they have released a new version, 2.2, of the Datapack II. They've improved the burst- and upload-transmission timing on Echoplex systems and the on-line display speed.

Versions of Datapack II are available for use with the Radio Shack Deluxe RS-232 Program Pak (#26-2226) and the PBJ Dual Serial Port 2SP-PAK. All of the current versions support the PBJ Parallel Printer Port P-C PAK by selecting a 7-bit printer baud rate.

The Data Pak II also supports Word-Pak, the 80-column card from PBJ. The disk version of Data Pak II includes versions of the graphics-screen and the Word-Pak. The tape version supports

the 80-column card, but you must request this when ordering.

Cer-Comp also says that a soon-to-come version of the Data Pak II will include an auto log-on command processor. Since the package contains its own editor, you can create, edit, save, and load log-on files without leaving the program.

	performance	ease of use	error handling	documentation
10				
9				
8				
7				
6				
5				
4				
3				
2				
1				

Application Software

**Colorterm + Plus +
Double Density Software**
920 Baldwin St.
Denton, TX 76201
817-566-2004
\$29.95 cassette
\$39.95 ROM pack, disk

This is fine software, good for most applications on most host computers. It's also inexpensive, compared to its competition. I saw the ROM pack version. According to the manufacturer, it's essentially identical to the tape version.

The Colorterm + Plus+ is menu driven with well designed submenus that explain (in most cases) all you need to know without having to look in the instruction manual. But there are eight "secret keys" used in the communications mode and nine when you are editing the buffer, so you will need the instructions nearby for at least the first few sessions.

Unfortunately, not all the menu commands work when you are using lower-case letters, which is a needless annoy-

ance. Nor is there a way to tell how much memory you have left in the buffer, and this is a more serious deficiency.

You push the clear key to reach the main menu from the communications mode. I wish other software authors would copy this handy feature. When you come back to the communications mode after wandering about in the rest of the program (looking at the buffer, for example), the screen is just as you left it. I loved this feature and missed it when I used some other software packages. In VIP Terminal, for example, you lose the contents of the screen when you look at the buffer, and it's not always easy to remember what you were doing last.

Colorterm + Plus+ offers the usual settings and an exceptional selection of baud rates to handle most of the common host computers. You can even use an incredible 19,200 baud, provided your host computer and modem can handle data that fast.

At very high baud rates, you use a high-speed-communications mode. This displays the incoming or outgoing data in one little spot that changes from one character to another at blistering speed. To read what you've downloaded, you display the buffer.

There is no hi-res graphics mode, which limits the display to the familiar 32-column format. You can, however, reverse the screen to light on dark, and there is an interesting feature that gives you up to nine lines at the top of the screen on which you may write anything you please. It stays put while the rest of the screen scrolls by, and you can display it in reverse while the rest of the screen is dark on light, or vice-versa.

The buffer system is one of the better of those available. A single keypress displays it, and you can move up or down one page at a time. Once you're at the bottom of the buffer, however, you can't go back up: You are sent to the main menu, no matter what you do. I

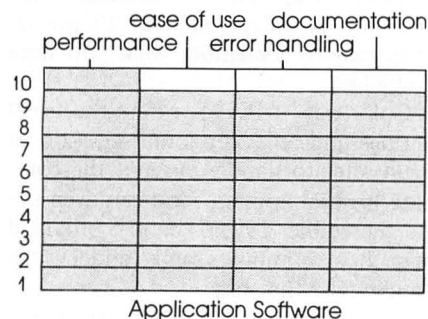
thought this was an unnecessary restriction.

Colorterm +Plus+ offers a coding feature that converts the contents of your buffer into cryptographic gibberish that only you or a friend with the Colorterm +Plus+ and a password can recover.

There is a line-by-line editor, so you can make changes in the buffer. It's not a handy editor, though. As you page through the buffer, you can see only one line at a time, so you can sometimes forget where you are. There is a feature that allows you to type to the buffer.

I had trouble uploading data to the demanding IBM half-duplex system using Colorterm +Plus+. The host computer never seemed to know that I was transmitting data. The Colorterm +Plus+ permits line-by-line upload, but you can't use control characters for the prompt.

The high-speed communications mode fared no better, even at 300 baud. If you must upload to a variety of computers other than the standard bulletin-board services, maybe you'd better consider one of the other packages.



Autoterm
PXE Computing
11 Vicksburg Lane
Richardson, TX 75080
214-699-7273
\$39.95 cassette
\$49.95 disk

Autoterm is billed as "The World's Smartest Terminal"—and that's no idle boast, either. Consider these features:

- A full-screen text editor.
- A separately *programmable* text buffer for automatic two-way communications with a host computer while you go do something else.
- A buffer through which you can scroll up or down, even while you are on line and receiving information into the buffer.

Autoterm is conveniently menu-command-driven, and there's a help option for some of the principal commands. Some commands have their

own explanations built in. For example, to delete a block of text from the buffer, you enter a shifted clear/D, and a prompt appears explaining the next step at the top of the screen where it won't bother you once you learn the routine.

Autoterm can handle almost any host computer, but I was annoyed at being unable to turn off transmitted control

characters from the host. One, for example, transmits control characters that appear as reversed 3's and 1's on the screen, making text difficult to read at times.

You can display a user menu from which you can choose different three-letter-code options that easily change parameters.

Table 1. Quick Comparison Chart

Features	VIP Terminal	Color Connection	Data Colorcom/E	Pack	Colorterm	Autoterm
Available: T = Tape, D = Disk, R = ROM pack	D,R ¹	T,D	D ² ,R	T,D	T,D	T,D
Revision number	?	IIV5.0	C4	II.V1.1	2.3	1.0
Date of last revision	1983	1983	2/84	1983	8/83	1983
Next revision due	?	?	?	?	2/84	3/84 ³
Price ⁴						
Tape	-	\$34.95	-	\$34.95	\$29.95	\$39.95
Disk	\$49.95	\$39.95	\$49.95	\$44.95	\$39.95	\$49.95
ROM pack	\$49.95	-	\$49.95	\$44.95	-	-
shipping/handling	\$3	\$2	\$3	\$2.50	\$2	\$2
Automatic memory sense?	Y	Y ⁵	Y	Y	Y	Y ⁵
Cost for update approximate	\$20	\$5-8	?	\$30	\$13-21	N/C ⁶
Use 64K?	Y	N	Y	Y	N	N ⁷
Files Read A = ASCII, M = ML, B = Binary	A,B,ML ⁸	A	A	A	A,M ⁹	A,ML,B
Files written	A,B	A	A	A	A,M ⁹	A,ML,B
Output to printer?	Y	N	Y	Y	Y ¹²	Y ¹³
Upload: Extra-delay option?	Y	Y ¹⁰	Y	Y ¹¹	N	N
Upload: Special characters for upload prompt?	Y	Y ¹²	Y	Y ¹²	Y ¹³	Y
Upload: Simultaneous output to screen?	Y	Y ¹⁴	Y	N ¹²	Y ¹⁵	N
Autobuffer open/close?	Y	Y ¹⁶	Y	Y	N	Y
Selective character trap?	Y	N	Y	Y	N	N
Send line break?	Y	Y ¹⁷	Y	Y	N	Y
Buffer: Jump to top and bottom?	N	N ¹⁸	Y	N	N	Y
Buffer: Select page break?	N	N	Y	Y	Y	Y
Edit buffer?	N	N	N	Y	Y	Y
Edit: Full-screen?	-	-	-	N	N	Y
Code/decode transmit buffer?	N	N	N	N	Y	N
Word mode?	Y	Y	Y	N ¹⁹	Y	Y
Turn off word mode?	Y	Y	Y	N	Y	Y
Graphics mode?	Y ²⁰	Y	Y	Y	N	N
True descenders?	Y	N	N	N	-	-
Kill graphics?	Y	N	Y	Y ²¹	-	-
Line lengths—how many/range	32-85	1/51	32-3/64	28-9/ 255 ²²	1/32	1/32
Screen restored on return? ²³	N	N	Y	Y?	Y	Y
Menu driven?	Y	Y	N	N	Y	Y
Help command?	N	N	Y	Y	N	Y ²⁴
Reverse video?	Y	Y	N	N ²⁵	N	N ²⁶
Selectable screen colors	2	1	1	2	1	1
Window protected from scrolling available?	N	N	N	N	Y	N
Autodial?	Y	Y	Y	?	N	Y

Table 1 continued

Compared to the screen displays of other terminal packages, Autoterm's is pretty mundane. You're limited to the CoCo's own 32 columns and block letters, with a single line of text at the top for command information. You can select all capitals, or you can choose to have the uppercase letters reversed out instead of lowercase—a nice feature.

There is a key beep that you can turn on or off, which is a help to us hunt-and-peck typists who watch the keyboard instead of the screen. The beep slows down the key-response time, so you pay for the convenience if you use it.

The Autoterm buffer system is the most sophisticated—and one of the easiest to use—of all the CoCo terminal

programs. The buffer is open by default, but can be closed. The buffer capacity is displayed on the screen in communications mode, and you can return to text that has scrolled off the screen. You can even look at what was said earlier and receive information simultaneously.

The most remarkable part of Autoterm is its full-screen editor for the buffer. Arrow keys move you around in the buffer and you can insert and delete characters. There's a block-delete feature that lets you clear any part of the buffer you like. To transmit the buffer, you mark the two ends of the part you want to transmit, then push a key. You can send the buffer all in one gulp, or line by line with prompt characters and delays, as needed.

The text processor is limited, compared to standard text processors. There's no line-insert feature, for example, and the letters are sometimes slow to form. But I found it extremely handy, because I could download a program or text, use the full screen editor to work on it, and then upload the changed text back to the host. It's like having a full-screen mainframe computer terminal.

You transmit the buffer from the command mode, and there is no simultaneous output to the screen, so you can't see what you're uploading. I think that's an unnecessary inconvenience. You can transmit line by line using prompt characters, including control characters, but there's no provision for a timed delay between lines, which could be a problem on some rare host computers.

Another of Autoterm's remarkable features is the buffer for the PF-key definitions. You can use almost as many PF keys as there are keys on the keyboard. Furthermore, the PF-key definitions are programmable, and they can call on previous PF-key definitions as subroutines.

The routines can transmit control characters, move the cursor, or even wait for a specific response from the host. Key definitions can branch, conditionally or unconditionally, and even issue commands to alter Autoterm's user-definable parameters.

A single PF key can sign you on to CompuServe, and even answer the user-ID prompt. You can also program a PF key to sign on and read any number of messages from a bulletin-board service into your buffer while you go do something else.

You can use the PF keys in both the communications or the text-edit mode.

Table 1 continued

Features	VIP	Color	Data			
	Terminal	Connection	Colorcom/E	Pack	Colorterm	Autoterm
Baud rates	110- 9,600	300	300- 9,600	300- 9,600	300- 19,200	300- 1,200
Selectable stop bits	9	2	2	9	2	9
Duplex: F = full, H = half	F,H	F,H	F,H	F,H ²⁷	F,H	F,H
PF keys programmable	10	4	0	9 ²⁸	0	- ^{28 29}
Instruction book						
1 = excellent, 5 = poor	1	2 ³⁰	3	4	3	1
Overall quality						
1 = excellent, 5 = poor	2	2	2	3	2	1

¹The ROM pack is being discontinued and sold on a "while they last" basis.

²The disk version differs significantly.

³The disk version is being revised. It will have a hi-res screen, according to the manufacturer.

⁴Sales tax not included.

⁵Remaining buffer capacity displayed constantly in communication mode—a good idea.

⁶Disk owners will be charged only postage for the new disk version. Owners of the Autoterm tape version will be charged \$23 to upgrade to the new disk version, when it appears.

⁷Only the disk version can use 64K.

⁸Passes over tape files without ?IO errors until file is opened—very useful.

⁹Binary read/written on disk version only.

¹⁰Setting the upload character disables buffer display.

¹¹I could not make this feature work on all the systems tested.

¹²I could not make this feature work.

¹³Control characters cannot be used for upload prompt.

¹⁴First part of line lost during upload.

¹⁵No screen output when you use the high-speed output at extreme baud rates.

¹⁶Not tested.

¹⁷Line break not documented; pressing CLEAR-A-S simultaneously will transmit a break.

¹⁸You can jump from the top to the bottom, or vice-versa, but not from mid-buffer to either end.

¹⁹Word mode in low-res screen only.

²⁰You must kill the graphics screen and turn off word mode at baud rates >300 or you will lose data.

²¹Graphics may be killed reversible for 6K more space.

²²10, including low-res screen.

²³That is, when you come back to the communications mode from the command mode, is the screen cleared or can you still see what you wrote last?

²⁴Also provides help automatically before many entries.

²⁵Screen reverses when buffer is full.

²⁶Upper-/lowercase letter display can be reversed in color.

²⁷Duplex setting lost when you leave communication mode.

²⁸PF keys unusually versatile.

²⁹Almost any key can serve as a PF key; PF keys can be programmed to be interactive with the host.

³⁰Comes with a free tutorial program on communications systems.

³¹Output to printer remarkably versatile.

With a full-screen editor, programmable PF keys, printer controls, and load/save commands, you have a decent word processor, copy program, and terminal software in one elegant package.

True, you have to give up things to have a program that does so much. It's a grade B word processor. You don't have graphics letters. If you download a graph or other host-generated material requiring line lengths over 32, you'll have to print it to see it properly. You can't see what you are transmitting as you send it out.

But these shortcomings are easily fixed, especially on machines larger than 16K. I suspect that the next generation of terminal software for the Color Computer and its descendants will take its inspiration from the first of that new generation: Autoterm.

If you often use your CoCo with mainframe computers, and if you seldom need line lengths over 32, Autoterm might be the terminal program for you, and it's the cheapest terminal program around. And if you appreciate the artistic aspects of computer programming, you might want a copy of Autoterm just to admire. ■

Application	VIP Terminal	Color Connection	Data Colorcom/E	Data Pack	Colorterm	Autoterm
Use on many different systems	E	G	E	G	G	E
Viewing graphs and charts	G	F	E	E	P	P
Use with small RAM (16K)	G	G	G	F	G	F
Send many different long lines repeatedly (PF keys)	F	P	N/A	G	N/A	E
Edit buffer	N/A	N/A	N/A	G	F	E
Print buffer	G	N/A	G	G	G	E
Use of buffer to review what's said	F	P	G	F	F	E

E = Excellent G = Good F = Fair P = Poor N/A = Not Available

Table 2. General Ratings

These keys represent a substantial advance over the competition and might be reason enough for many users to consider buying the Autoterm.

Autoterm also has a remarkable number of printer commands available. You can choose from 12 different print parameters, including all four page

margins, page length, word wrap, and a pause command that lets you put on paper.

The excellent 78-page instruction book is extremely detailed and pleasant to read. It contains numerous tutorials, examples, and troubleshooting sections.

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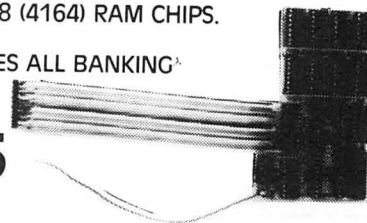
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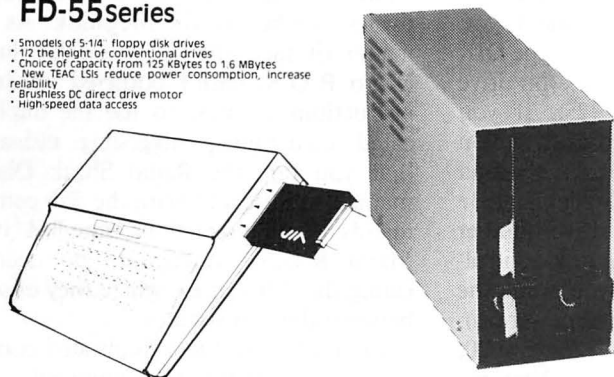
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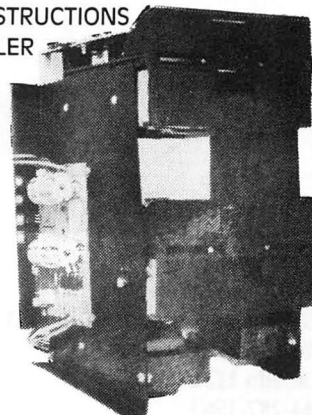


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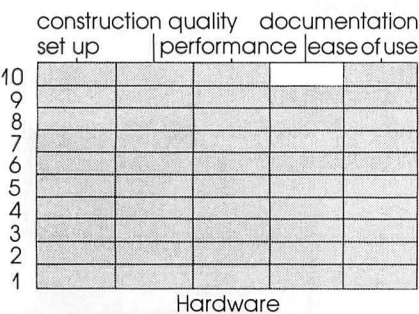
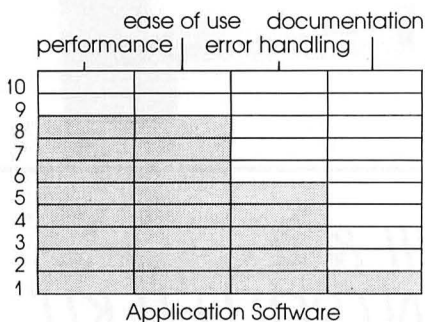
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Finally, hard-disk drives are available for the Color Computer, and at a reasonable price. John Kunze, for Mi-

cro R.G.S., has developed a Winchester 5-megabyte drive with a Color Computer ROM pack controller cartridge, including all the necessary circuitry and built-in software. Just plug it in, turn it on, and start working.

Typing DIR gives you the directory of "drive 0." Typing PRINT FREE(0) tells you how many free grans are on that drive (maximum 68).

"What!" you say, "Only 68 grans for an entire 5-megabyte disk?" Well, not quite.

From a user's point of view, the hard disk is actually 32 floppies numbered 0-31, all on line at the same time. If you want the directory of drive 30, type DIR 30. If you want the free space on drive 25, type PRINT FREE (25). If you want to save a program to drive 7, you type SAVE "FILENAME:7. To load from drive 3, type LOAD"file name:3.

If you don't specify a drive number with these commands, the disk controller ROM pack assumes you want the current default drive (zero at power up). To change the default drive to drive 20, for example, type DRIVE 20. You can easily include this command in a Basic

program to dynamically change drives to separate input data from output data.

The ROM Pack Operating System

If you're familiar with the Color Computer disk system, then using the Megadisk system is a snap. Almost all the disk commands are the same (see Table 1 for a list of identical commands).

The Megadisk ROM pack was deliberately designed to duplicate many of the Radio Shack Disk ROM pack commands to make it easy for a disk-system owner to adapt to the Megadisk. As a matter of fact, they're so similar that Micro R.G.S. hasn't bothered writing instructions on how to use the duplicated commands, suggesting instead that you buy the Radio Shack Disk manual and use it to learn the disk commands. The instructions supplied by Micro R.G.S. concentrate on delineating the differences, where they exist, between the two systems.

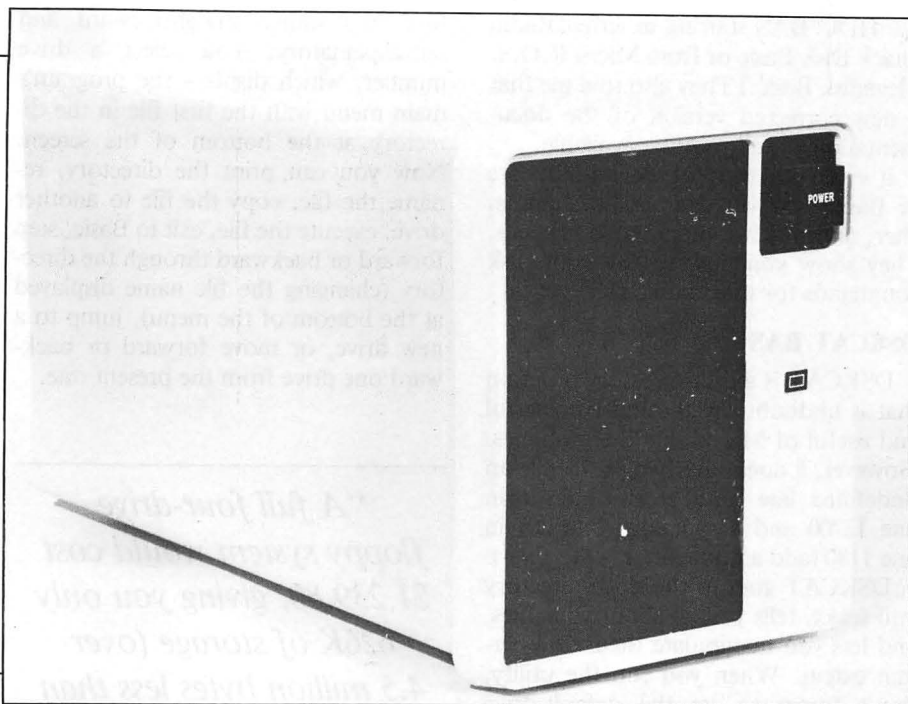
In addition to these duplicated commands, you get five new commands:

- DUP duplicates one Basic line num-

BACKUP	CLOSE	COPY	CVN
DIR	DSKIS	DSKO\$	DRIVE
EOF	FIELD	FILES	FREE
GET#	INPUT#	KILL	LINE INPUT#
LOAD	LOADM	LOC	LOF
LSET	MERGE	MKN\$	OPEN
PRINT\$	USING	PUT#	RENAME
RESET	RUN	SAVE	SAVEM
VERIFY	WRITE#		

Table 1. Megadisk Commands that Duplicate Radio Shack Disk Commands

The Micro R.G.S. Megadisk



ber to another (it prompts for original and target line numbers);

- COLD performs a cold system restart (resets to original system power-on parameters);

- MRUN loads and executes machine-language programs;

- DTT transfers a file from disk to tape; and

- TTD transfers a tape file to disk.

The major differences between the Radio Shack disk commands and those for the Megadisk are due to the large number of floppies that the unit emulates. Normal Disk Extended Color Basic allows only one character as input for the drive number for the SAVE, LOAD, and COPY commands. As a result, you must use a special formula to access those hard-disk "drives" from 10-31.

This formula actually derives from the ASCII character set, standard with all Color Computers. Take the drive number you want (say number 13), add 48 to it ($13 + 48 = 61$), and use CHR\$ to generate the character to follow the file name (CHR\$(61) is the equal sign, so you would type "file name:=").

Why 48? Because it is the ASCII code for zero ($0 + 48 = 48$). This means that the last drive, number 31, uses the ASCII character O as the drive number.

You should never use the Radio Shack command DSKINI. If you want to reformat the drive, use the utility FMT/BIN.

Utility Programs

The Megadisk is already formatted when you get it, and drive 0 should con-

tain 16 utility programs. If it doesn't, you'll find them on a cassette in the shipping box (this cassette lets you use the Megadisk system even if you don't have a floppy-disk drive).

When you first get the drive, check drive 0 for the utilities. If they're there, use the BACKUP command (BACKUP 0 to 5) immediately. I didn't, and promptly erased drive 0 while experimenting with the utilities.

Megadisk comes with the following files:

- CLEAR/BAS prompts you for the start and end drive numbers, then clears them and everything between them by filling all the bytes with character 255.

- DIR/BAS displays the directories of all the drives on the hard disk as a continuous screen scroll.

- CLRBITS/BAS is the same as CLEAR/BAS, except you can restrict the clearing to specific tracks in each drive's space.

- HDTF1 (should be HDTF10) moves files on and off the hard disk to a floppy and is the source-code file for HDTF1/BIN.

- MAP + /BAS displays the number of free grans in each drive, then the total free grans, sectors, and bytes on the entire disk.

- MAP/BAS displays the same information as MAP + /BAS, but in a more compact format.

- FMT is the source-code file for FMT/BIN.

- DSKCAT/BAS is an extensive and powerful directory-displaying program (more on this one later).

- HDTF is the source-code file for

HDTF/BIN.

- EPROM+5 is the source-code file for the 5-megabyte EPROM.

- DTHD5/BIN (for 64K machines) copies ROM to RAM and operates the same as HDTF, only it doesn't require ROM (a last-ditch, save-your-rear utility in case you fry your computer, literally). It works with everything blown except your PIA and CPU.

- HDTF1 is a program for transferring an entire floppy disk of information to a 10-megadisk drive, or vice-versa. If you have standard floppies, this is the only way to transfer programs or files between your 5¼-inch disks and the Megadisk, an entire disk at a time.

- HDC/BAS is a copy utility for moving files around on the Megadisk (more about this later).

- HDTF/BIN is the same as HDTF1/BIN, but for the 5-megabyte system.

- FMT/BIN formats your Megadisk.

- FMT5/BIN is the same as FMT/BIN, only expressly for the 5-megabyte Megadisk.

There is a problem with all these utilities, though: They don't have any instructions. To figure them out, I had to load and execute each one of them, which is how I managed to erase all the utilities on drive 0. I was trying to use HDTF1/BIN to move a floppy disk onto the hard-disk drive 10, and for some reason it put the floppy on drive 0, overlaying and erasing all the utilities. Of course, I didn't know that until it was too late.

Fortunately, Software Support was understanding and sent me a floppy disk containing all the utilities. (You can

use HDC/BAS starting in either Radio Shack Disk Basic or from Micro R.G.S. Megadisk Basic.) They also told me that a new corrected version of the documentation would soon be available.

It's nice that most of these utilities are in Basic, so you can easily examine, alter, and butcher them to your needs. They show you how to use your disk commands for maximum effectiveness.

DSKCAT/BAS

DSKCAT is a disk-directory program that is undoubtedly the most powerful and useful of Megadisk's Basic utilities. However, it does have two problems: an undefined line number (UL) error in line 12700 and a syntax error (SN) in line 1180 (add a quote after >9 to fix it).

DSKCAT goes to the drive directory you select, tells you all about your files, and lets you manipulate them to a certain extent. When you run the utility, don't forget to set the default-drive number to the drive containing the utilities or specify a drive extension with the file name.

The following is a list of some of the main menu options:

- Directory prompts for the drive number and name, then displays the name, format (data or program), type (machine language or Basic), and gran size of each active file in that drive's directory. Then it displays the total number of free grans left on the drive. The utility automatically pages the display and then stops and asks you to press enter whenever the display is filled. This keeps information from scrolling off the screen.

- Super Directory is the same as the Directory option, but it also displays the data; sector count; file length in bytes; start, end, and execution addresses of machine-language files; and the actual disk granules each file occupies.

- Granules displays a directory granule-allocation table. Zeros indicate an empty granule, S indicates the starting granule for a file, and numbers in sequence indicate the other occupied granules.

- Location gives the start, end, and execution addresses (in decimal) of the specified machine-language file. (You're prompted for the file name.)

- Recover File lets you recover a blown directory or restore a killed file.

- Catalog Files gives an out-of-memory (OM) error in a 32K computer, but it is supposed to present the files in categories.

HDC/BAS

This is a hard-disk copy program with which you can manipulate your

files. It's rather straightforward and self-explanatory: You select a drive number, which displays the program's main menu with the first file in the directory at the bottom of the screen. Now you can print the directory, rename the file, copy the file to another drive, execute the file, exit to Basic, step forward or backward through the directory (changing the file name displayed at the bottom of the menu), jump to a new drive, or move forward or backward one drive from the present one.

“A full four-drive floppy system would cost \$1,239.80, giving you only 626K of storage (over 4.5 million bytes less than Megadisk at a price difference of \$60.15).”

It would've been easy to combine DSKCAT and HDC/BAS, but there probably wasn't enough room left in memory for the combined program.

Documentation

The only real complaint against the Megadisk is the lack of adequate documentation, which currently consists of six typed pages, none of which covers the utility programs. Neither does it explain Megadisk's error codes. I received an ID error at one point, and ID isn't one of Radio Shack's disk error messages, so I had to keep guessing and changing things until the error disappeared.

The startup instructions also fail to mention that you must wait 20 seconds after turning on the Megadisk before you turn on your Color Computer. Not doing so makes the system lock up. After several phone calls to Software Support, I drove down and learned that you have to wait for the hard disk to load the drive head before turning on the computer.

The documentation mentions one file that isn't supplied, HDOS/SCR. It's supposed to be a listing of machine-language locations and the main driver routine for the Megadisk ROM pack, so you could see how the code was designed and could integrate your own machine-language programs with it. Instead, you get the source-code files for the machine-language utilities and

ROM pack EPROM, which is actually much more than the HDC file could have provided.

Considerations

Programs can't span across drives. For example, if you're saving an 18K program (8 grans), and the drive only has 4 grans left, you get a disk full (DF) error. Similarly, using WRITE# and PRINT# crash with DF errors when you fill the drive. And PUT# gives a bad record number (BN—number is too large or less than one) error when you reach sector number 613. All these errors are the same as with standard floppies.

It is possible to replace the error code hook in ROM with your program's error routine and thereby make files span drives. Thus, when these errors occur, your program can close the file on that drive and automatically reopen it on another. This takes programming skill, though.

Finally—and this isn't Megadisk's fault—HDTF/BIN can't transfer copy-protected disks to the hard disk, so you can't store most machine-language games on the hard disk. Ditto for some of the business and word-processing programs.

There is one other point to consider: Megadisk alters the reset vector so that pressing the reset button doesn't disable the unit. For programs that put their own addresses over the reset vector, such as Telewriter-64, you must change the reset vector back to the Megadisk vector, or pressing the reset button will disable the hard disk ROM pack and drive.

Summary

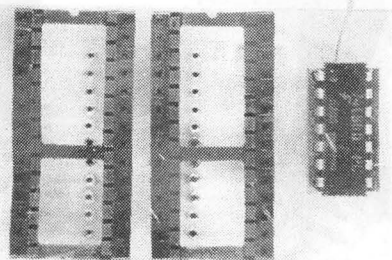
Without a doubt, the Micro R.G.S. Megadisk is currently the best hard-disk buy on the market. It comes complete with all the hardware and software you need, but the current documentation is terrible, although the manufacturer promises better documentation soon.

Fortunately, since the Megadisk operating system so closely emulates the Radio Shack disk system, the poor documentation isn't that great a handicap if you get Radio Shack's disk manual. As for the utilities, you can use this article as a guide to them and avoid many of the problems I had.

Overall, the Megadisk System is fantastic. The 5-megabyte system costs .025 cents per byte, compared with a standard drive's cost of .255 cents per byte. A full four-drive floppy system would cost \$1,239.80, giving you only 626K of storage (over 4.5 million bytes less than Megadisk, at a price difference of \$60.15). ■

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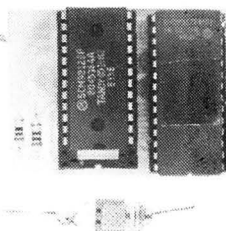
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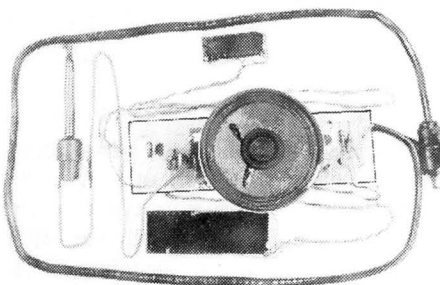
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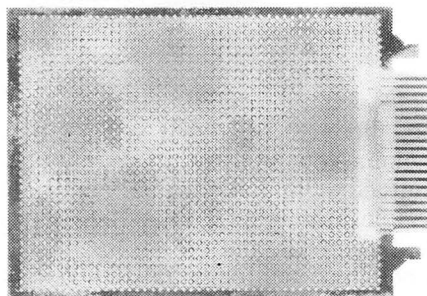
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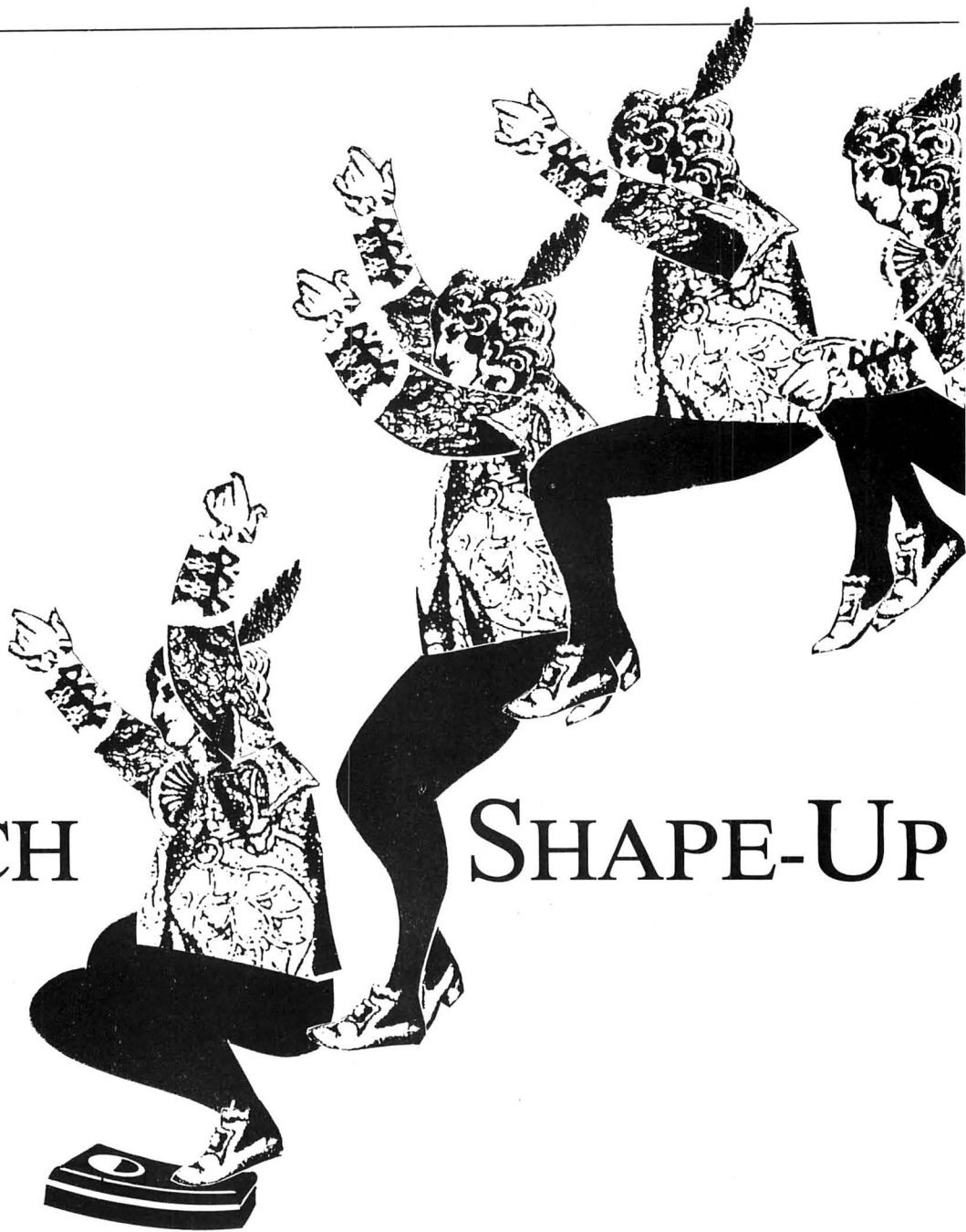
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BY MICK MCGUIRE



HI-TECH

SHAPE-UP

Behind every good body there is an exercise program. Your body needs exercise and suffers without it. Your muscular and cardiovascular systems need to be worked vigorously and regularly, and there is nothing better for fitness than breaking a sweat. If you're confused about how to exercise, reluctant to start, or if the most exercise you get today is typing in this program, maybe it's time to use your Color Computer as your personal fitness coach.

This exercise program is based on my goals of weight loss and maintenance, and factors such as available exercise time, preferred types of exercise, and calories burned per hour by a person of

It won't compete with Jane Fonda in tights, but this program makes your CoCo your own fitness coach.

average weight (150 pounds). Since sports such as swimming, jogging, and tennis appeal to me, I have gathered data in that general area.

The Program Listing is the result of converting calorie-burn rates into real-world terms, customized by the computer for you as an individual.

Exercise uses only Color Basic commands and runs on 4K or less. If you want to cut down on your typing, delete line 35, line 3000, and all lines after 3000. The full listing, including all arrays, occupies about 4,160 bytes. A ver-

System Requirements

**Color Computer or MC-10
4K RAM
Color Basic or
Micro Color Basic**



sion without instructions and background (lines 3000 and above) occupies only 2,285 bytes. You can cut the longer version slightly to fit into 4K.

The program is menu driven. Enter the entire program and you will need no further explanation. There are several tricks I have used to keep the main program simple and efficient. I use numbers *instead* of letters in the menu. Since I dislike long lists of IF... THEN statements after menus, I use the Basic statements ASC and VAL (lines 180 and 185) to trap errors and branch to other parts of the program.

VAL lets you use INKEY\$ (line 170) for item selection, and converts the

string variable to a number that the Basic statement ON... can use (line 190). The IF... THEN statement using ASC (line 180) prevents you from using anything other than the requested numbers.

If you don't like the sports I use, the first menu item (number 0) is for you. You can use this feature if you know how many calories per hour a person weighing 150 pounds burns while exercising. (This information is available from many sources.)

One problem I discovered while testing the early version of Exercise was that many people would select jogging instead of walking or running, and in-

put speeds for the wrong exercise. To solve this I placed some error traps in the running, jogging, and walking subroutines that branch you to the correct exercise if the mph is out of limits for the selected exercise.

You will also find added to the tennis subroutine a value for play against a wall, since this is often a much harder workout. And remember, before you embark on this or any exercise program, you should check with your doctor. ■

Address correspondence to Mick McGuire, 2234 George Wythe Road, Orange Park, FL 32073.


```

10 CLS:PRINT"EXERCISE BY J.M. MC
GUIRE"
30 FOR T=1 TO 1000:NEXT T
35 INPUT"INSTRUCTIONS (Y/N)";Q$:
IF Q$="Y" THEN GOSUB 3000
40 CLS:PRINT
50 PRINT"WHAT IS YOUR CURRENT WE
IGHT"
55 RESTORE:FOR X=1 TO 9:READ A$(
X):NEXT X
60 INPUT"IN POUNDS ";W
70 CLS:PRINT"P I C K O N E:"
75 PRINT"0 YOUR OWN"
80 PRINT"1 BICYCLING"
90 PRINT "2 CROSS COUNTRY SKIING
"
100 PRINT"3 JOGGING"
110 PRINT"4 RUNNING"
120 PRINT"5 JUMPING ROPE"
130 PRINT"6 RUNNING IN PLACE"
140 PRINT"7 SWIMMING"
150 PRINT"8 TENNIS"
160 PRINT"9 WALKING"
170 AS=INKEY$:IF A$="" THEN 170

```



```

180 IF ASC(A$)<48 OR ASC(A$)>57
THEN 70
185 A=VAL(A$):IF A=0 THEN GOSUB
1000:GOTO200
190 ON A GOSUB1100,1200,1300,140
0,1500,1600,1700,1800,1900
200 PRINT"NUMBER OF HOURS YOU EX
ERCISE?"
205 INPUT"USE WHOLE NUMBERS OR D
ECIMALS ";H
206 PRINT"HOW MANY DAYS A WEEK W
ILL YOU"
207 INPUT"EXERCISE ";D
220 CLS:PRINT"WHEN ";A$(A)
230 PRINT"YOU BURN ";F;" CAL./HR
"
240 PRINT"YOU ACTUALLY BURNED ";
INT(F*H);" CAL."
250 PRINT"AND LOST ";(F*H)/3500;
" POUNDS."
260 PRINT:PRINT"IF DONE ";D;" DA
YS A WEEK,"
265 PRINT"YOU COULD LOSE ";INT((
(F*H)/3500)*(D*52));" POUNDS,"

```

```

270 PRINT"OR ";INT(F*H)*(D*52);"
CALORIES PER YEAR,"
275 PRINT"ASSUMING THAT YOU DO N
OT","INCREASE YOUR CALORIC INTAK
E"
276 PRINT"DURING THE YEAR. MOST
WILL","FIND THAT THEY WILL BE EA
TING"
277 PRINT"EVEN LESS WHEN THEY EX
ERCISE","REGULARLY."
280 X$=INKEY$:IF X$="" THEN280
285 RUN
1000 CLS
1010 PRINT"TO USE THIS YOU MUST
KNOW HOW"
1020 PRINT"MANY CALORIES YOU BUR
N PER HOUR"
1030 PRINT"WHILE EXERCISING."
1040 PRINT"USE ZERO (0) IF YOU D
ON'T KNOW."
1050 INPUT"HOW MANY CAL/HR ";F
1060 INPUT"NAME OF EXERCISE ";A$
(0)
1070 RETURN
1100 CLS:A$(A)="BICYCLING":PRINT
"BICYCLING"
1110 INPUT"MPH (6 AND UP) ";M
1120 IF M<6 THEN 1100
1130 F=M*40:RETURN
1200 CLS:A$(A)="SKIING":PRINT"SK
IING"
1210 F=700:RETURN
1300 CLS:A$(A)="JOGGING":PRINT"J
OGGING"
1310 INPUT"MPH (5 TO 7.5) ";M
1320 IF M<5 THEN 1900
1325 IF M>7.5 THEN 1400
1330 F=M*134:RETURN
1400 CLS:A$(A)="RUNNING":PRINT"R
UNNING"
1410 INPUT"MPH (7.6 AND UP) ";M
1420 IF M<7.6 THEN 1300
1430 F=M*128:RETURN
1500 CLS:A$(A)="JUMPING ROPE":PR
INT"JUMPING ROPE"
1510 F=750:RETURN
1600 CLS:A$(A)="RUNNING IN PLACE
":PRINT"RUNNING IN PLACE"
1610 F=650:RETURN
1700 CLS:A$(A)="SWIMMING":PRINT"
SWIMMING"
1710 INPUT"AVERAGE YARDS PER MIN
UTE ";M
1720 F=M*11:RETURN
1800 CLS:A$(A)="TENNIS":PRINT"TE
NNIS"
1810 PRINT"SELECT ONE"
1820 PRINT"(S)INGLES, (D)OUBLES,
(W)ALL"
1830 B$=INKEY$:IF B$="" THEN 183
0
1840 IF B$="S" THENF=400:RETURN
1850 IF B$="D" THENF=300:RETURN
1860 IF B$="W" THENF=475:RETURN
1870 GOTO 1800
1900 CLS:A$(A)="WALKING":PRINT"W
ALKING"
1910 INPUT"MPH (1 TO 4.9) ";M
1920 IF M<1 THEN 1900
1925 IF M>4.9 THEN 1300
1930 F=M*115:RETURN
2000 DATA BICYCLING,SKIING,JOGGI
NG,RUNNING,JUMPING ROPE,RUNNING
IN PLACE
2010 DATA SWIMMING,PLAYING TENNI
S,WALKING
3000 CLS
3010 PRINT"THIS PROGRAM IS BASED
UPON AN"
3020 PRINT"ARTICLE IN THE MAGAZI
NE navy"
3030 PRINT"lifeline WHICH IS PRI
NTED BY"
3040 PRINT"THE U.S. GOV. PRINTIN
G OFFICE"
3050 PRINT"AND WAS AUTHORED BY S
HILA POHL"
3060 PRINT"AND DR. STEPHEN HAVAS
."
3062 PRINT:PRINT:PRINT"ANY KEY T

```

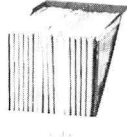
```

O CONTINUE..."
3065 IF INKEY$="" THEN 3065
3066 CLS
3070 PRINT:PRINT"THE PROGRAM TAK
ES YOUR CURRENT"
3080 PRINT"WEIGHT, AND CALCULATE
S HOW MANY"
3090 PRINT"CALORIES YOU WOULD BU
RN IF YOU"
3100 PRINT"EXERCISE REGULARLY. I
T DOES"
3110 PRINT"NOT TAKE INTO ACCOUNT
DAILY OR"
3120 PRINT"MONTHLY WEIGHT LOSS W
HICH"
3130 PRINT"COULD HAVE AN EFFECT
UPON THE"
3140 PRINT"AMOUNT OF CALORIES YO
U BURN"
3150 PRINT"EACH TIME YOU EXERCIS
E. THE"
3160 PRINT"LESS YOU WEIGH, THE F
EWER CAL."
3170 PRINT"YOU WILL BURN OFF FOR
EACH"
3180 PRINT"HOUR OF EXERCISE. THE
REVERSE"
3190 PRINT"IS TRUE ALSO. YOU WON
'T OF"
3200 PRINT"COURSE LOSE ANY WEIGH
T IF YOU"
3210 PRINT"INCREASE YOUR CALORIC
INTAKE"
3215 IF INKEY$="" THEN 3215
3216 CLS
3220 PRINT"TO MATCH THE CALORIES
YOU ARE"
3230 PRINT"BURNING OFF WITH EXER
CISE."
3240 PRINT"YOU MAY ELECT TO MAIN
TAIN YOUR"
3250 PRINT"CURRENT WEIGHT BY EXE
RCISING TO"
3260 PRINT"JUST BURN OFF EXTRA C
ALORIES"
3270 PRINT"CONSUMED ON YOUR LATE
ST FOOD"
3280 PRINT"BINGE. BE CAREFUL OF
THIS! YOU"
3290 PRINT"MUST OF COURSE BE ON
A GOOD"
3300 PRINT"BALANCED MAINTENANCE
DIET TO"
3310 PRINT"UTILIZE THIS PROGRAM
THIS WAY."
3320 PRINT:PRINT"ANYWAY YOU CHOO
SE TO USE THIS"
3330 PRINT"PROGRAM, YOU SHOULD R
EMEMBER"
3340 PRINT"THAT A GOOD BALANCED
DIET IS"
3345 IF INKEY$="" THEN 3345
3346 CLS
3350 PRINT"JUST AS IMPORTANT AS
A GOOD"
3360 PRINT"EXERCISE PROGRAM. ALS
O, BE"
3370 PRINT"SURE YOU CONSULT YOUR
DOCTOR"
3380 PRINT"BEFORE STARTING ANY P
HYSICAL"
3390 PRINT"FITNESS PROGRAM."
3400 PRINT:PRINT"YOU MAY CHOOSE
ANY OF THE"
3410 PRINT"LISTED EXERCISES OR O
NE OF YOUR"
3420 PRINT"OWN. IF YOU CHOOSE ON
E OF YOUR"
3430 PRINT"OWN, YOU MUST FIRST K
NOW HOW"
3440 PRINT"MANY CALORIES ARE BUR
NED PER"
3450 PRINT"HOUR BY A 150 LB PERS
ON. THE"
3460 PRINT"COMPUTER WILL TAKE IT
FROM"
3470 PRINT"THERE. HAVE A GOOD TI
ME!"
3490 IF INKEY$="" THEN 3490
3500 RETURN

```



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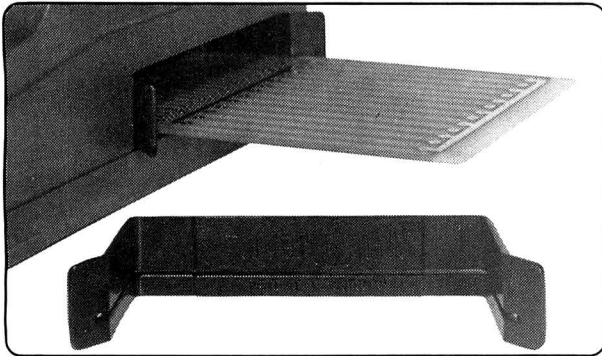
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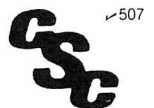
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GEOSHAPES

Teach simple geometry concepts with this program either at home or in the classroom.

Geoshapes is a geometric shape-recognition program. The program first describes the shapes or number of sides of nine geometric figures. This is followed by a quiz. The quiz requires the user to point to the top, bottom, left, or right side of the screen with the arrow keys, depending on which position contains the named figure.

Used in a classroom, the program will not tie up the computer with one student for an excessive amount of time. Maybe someone can expand Geoshapes to contain more information. ■

Address correspondence to James Wood, 424 North Missouri, Box 507, Atwood, IL 61913.

```

20 PCLEAR4: CLEAR255: DIMLS(27): CL
S: PRINT@200, "GEOSHAPES": FORT=1 TO
300: NEXT
50 PRINT: PRINT "YOU ARE TO IDENTI
FY VARIOUS": PRINT "GEOMETRIC SHAP
ES. USE THE ARROW": PRINT "KEYS TO
POINT TO THE SIDE OF": PRINT "THE
SCREEN WHICH CONTAINS THE": PRIN
T "NAMED SHAPED."
60 PRINT: PRINT "RIGHT TRIANGLE--3
SIDES,"
70 PRINT "                1 RT
. ANGLE": PRINT
80 PRINT "ISOCELES TRIANGLE--2 SI
DES EQUAL"
90 PRINT "PARALLELOGRAM--OPPOSITE
SIDES": PRINT "                PA
RALLEL"
100 INPUT "PRESS (ENTER) TO CONTI
NUER": JW$
110 CLS: PRINT "SQUARE--4 EQUAL SI
DES,"
120 PRINT "                4 RIGHT ANGL
ES."
130 PRINT: PRINT "RECTANGLE-- 4 RI
GHT ANGLES": PRINT "                OPPO
SITE SIDES EQUAL.": PRINT
140 PRINT "TRAPEZOID--4 SIDES,"
150 PRINT "                ONE SET PARA
LLEL,"
160 PRINT "                OTHER TWO E
QUAL."
170 PRINT "PENTAGON---5 SIDES."
180 PRINT "HEXAGON---6 SIDES."
190 PRINT "OCTAGON---8 SIDES."
200 PRINT: PRINT " YOU WILL BE ASK
ED EACH SHAPE": PRINT "ONLY ONCE!!
1"
210 PRINT: INPUT "PRESS (ENTER) TO
CONTINUE": JW$: CLS
230 US=CHR$(94): DS=CHR$(10): RS=C
HR$(9): LS=CHR$(8)
240 GOSUB540
250 FORA=1 TO9: READDS(A): NEXTA
260 DATA RIGHT TRIANGLE, ISOCELES
TRIANGLE, PARALLELOGRAM, SQUARE, R
ECTANGLE, TRAPEZOID, PENTAGON, HEXA
GON, OCTAGAN
270 PMODE3, 1: PCLS: R=RND(9)
290 IFZ(R)=1 THEN270 ELSEZ(R)=1
300 P=RND(4)
310 FORA=1 TOLEN(D$(R))
320 IFASC(MID$(D$(R), A, 1))=32 THE
NST$=LS(27) ELSEST$=LS(ASC(MID$(D
$(R), A, 1))-64)
330 PO=55+10*A: POS=STR$(PO)
340 DRAW "S3BM"+POS+" , 130"+ST$: NE
XTA
360 IFF=4 THENA=120: B=0
370 IFF=2 THENA=200: B=80
380 IFF=3 THENA=120: B=140
390 IFF=1 THENA=0: B=80
400 XX=R: GOSUB820
410 RA=RND(9): RB=RND(9): RC=RND(9)
): IFRA=R OR RB=R OR RC=R OR RA=R
B OR RA=RC OR RB=RC THEN410
420 IFF=4 THENA=200: B=80: XX=RA: GO
SUB820: A=120: B=140: XX=RB: GOSUB82
0: A=0: B=80: XX=RC: GOSUB820: GOTO46
0
    
```

```

430 IFF=2 THENA=120: B=0: XX=RA: GOS
UB820: A=120: B=140: XX=RB: GOSUB820
: A=0: B=80: XX=RC: GOSUB820: GOTO460
    
```

```

440 IFF=3 THENA=120: B=0: XX=RA: GOS
UB820: A=200: B=80: XX=RB: GOSUB820:
A=0: B=80: XX=RC: GOSUB820: GOTO460
450 IFF=1 THENA=120: B=0: XX=RA: GOS
UB820: A=200: B=80: XX=RB: GOSUB820:
A=120: B=140: XX=RC: GOSUB820
460 SCREEN1, 0: IN$=INKEY$
470 AS=INKEY$: IFA$=" " THEN470
480 IFF=4 ANDAS=US ORP=2 ANDAS=R$ OR
P=3 ANDAS=D$ ORP=1 ANDAS=L$ THENNC=N
C+1: FL=1
490 CLS: IFFL=1 THENPRINT@200, "COR
RECT" ELSEPRINT@192, "WRONG, SHOUL
D HAVE PRESSED THE": GOSUB1020
500 FL=0: NQ=NQ+1: PRINT: INPUT "PR
ESS ENTER TO CONTINUE": E$: CLS: IF
NQ=9 THENCLS: PRINT: PRINT "YOU GOT"
: NC: "OUT OF 9 CORRECT": ENDELSGO
TO270
510 GOTO510: STOP
540 LS(1)="U8R8D4L8BR8D4BR4"
550 LS(2)="U8R6F2D2L8BR8D2G2L6BR
12"
560 LS(3)="U8R8BD8L8BR12"
570 LS(4)="U8R6F2D4G2L6BR12"
580 LS(5)="U8R8BD4L8BD4R8BR4"
590 LS(6)="U8R8BD4L8BD4BR12"
600 LS(7)="U8R8BD4L4BR4D4L8BR12"
    
```

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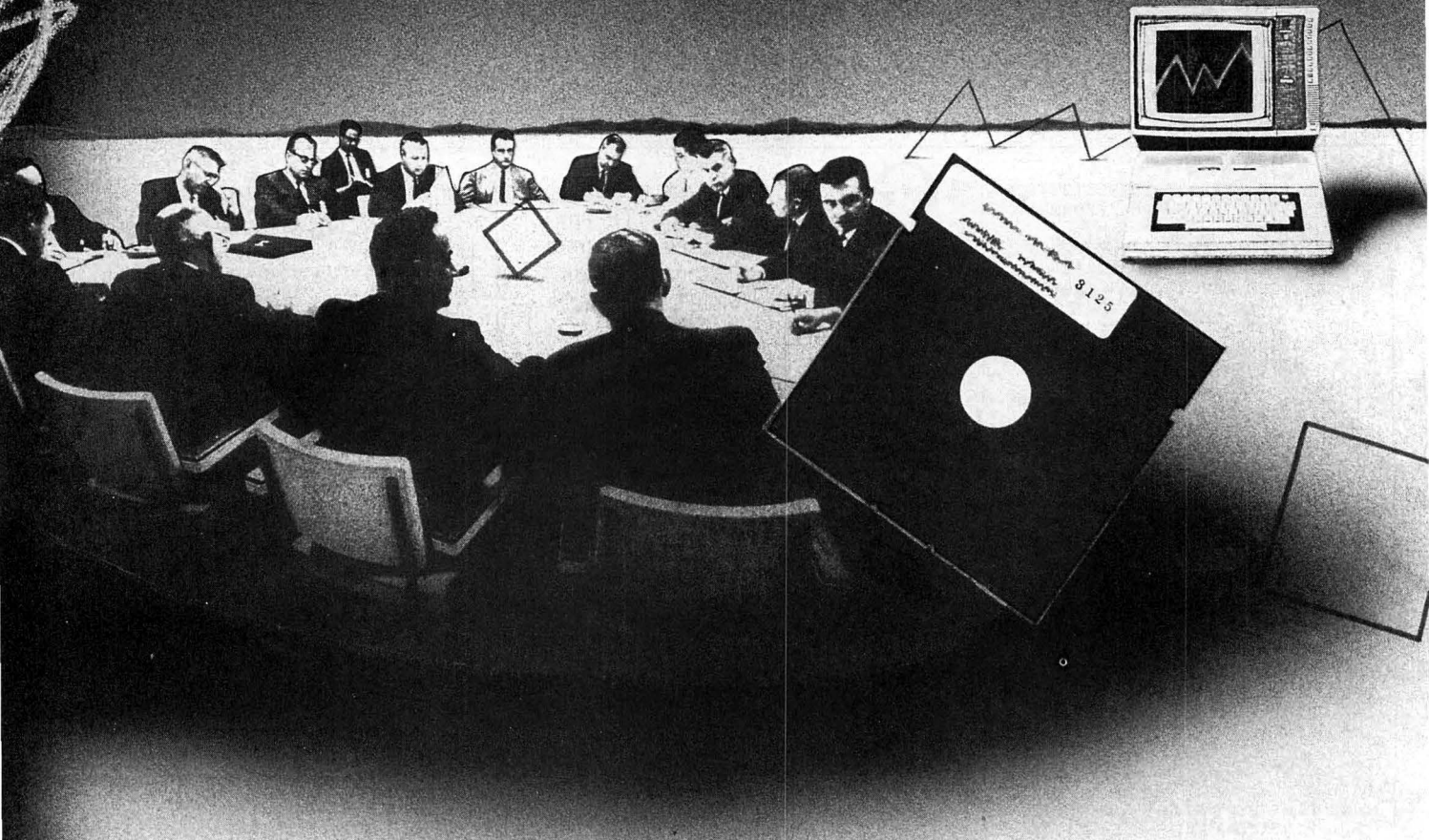
610 LS(8)="U8BR8D8BU4L8BD4BR12"
620 LS(9)="BU8R8BL4D8BL4R8BR4"
630 LS(10)="U4BU4BR8D8L8BR12"
640 LS(11)="U8BR8G4L4BR4F4BR4"
650 LS(12)="U8BD8R8BR4"
660 LS(13)="U8F4E4D8BR4"
670 LS(14)="U8F8U8BD8BR4"
680 LS(15)="U8R8D8L8BR12"
690 LS(16)="U8R8D4L8BD4BR12"
700 LS(17)="U8R8D8H4BG4R8BR4"
710 LS(18)="U8R8D4L8BR4F4BR4"
720 LS(19)="BU4U4R8BD4L8BR8D4L8B
R12"
730 LS(20)="BU8R8BL4D8BR8"
740 LS(21)="U8BR8D8L8BR12"
750 LS(22)="BU8D4F4E4U4BD8BR4"
760 LS(23)="U8BR8D8H4G4BR12"
770 LS(24)="E8BL8P8BR4"
780 LS(25)="BU8F4E4BG4D4BR8"
790 LS(26)="BU8R8G8R8BR4"
800 LS(27)="BR12"
810 RETURN
820 ONXX GOSUB840, 860, 880, 900, 92
0, 940, 960, 980, 1000: RETURN
840 LINE(A, B)-(A+20, B+30), PSET: L
INE-(A, B+30), PSET: LINE-(A, B), PSE
T: PAINT(A+2, B+6), 4, 4
850 RETURN
860 LINE(A, B)-(A+30, B+15), PSET: L
INE-(A, B+30), PSET: LINE-(A, B), PSE
T: PAINT(A+2, B+4), 4, 4
870 RETURN
880 LINE(A, B)-(A+20, B), PSET: LINE
-(A+30, B+15), PSET: LINE-(A+10, B+1
5), PSET: LINE-(A, B), PSET: PAINT(A+
4, B+4), 4, 4: RETURN
900 LINE(A, B)-(A+25, B+25), PSET, B
F: RETURN
920 LINE(A, B)-(A+30, B+15), PSET, B
F: RETURN
940 LINE(A+10, B)-(A+20, B), PSET: L
INE-(A+30, B+15), PSET: LINE-(A, B+1
5), PSET: LINE-(A+10, B), PSET: PAINT
(A+14, B+2), 4, 4
950 RETURN
960 LINE(A+10, B)-(A+25, B), PSET: L
INE-(A+30, B+15), PSET: LINE-(A+17,
B+23), PSET: LINE-(A, B+15), PSET: LI
NE-(A+10, B), PSET: PAINT(A+14, B+2)
, 4, 4: RETURN
980 LINE(A+15, B)-(A+25, B), PSET: L
INE-(A+35, B+15), PSET: LINE-(A+25,
B+30), PSET: LINE-(A+15, B+30), PSET
: LINE-(A+5, B+15), PSET: LINE-(A+15
, B), PSET: PAINT(A+18, B+2), 4, 4: RET
URN
1000 LINE(A+15, B)-(A+30, B), PSET:
LINE-(A+40, B+10), PSET: LINE-(A+40
, B+25), PSET: LINE-(A+30, B+35), PSE
T: LINE-(A+15, B+35), PSET: LINE-(A+
5, B+25), PSET: LINE-(A+5, B+10), PSE
T: LINE-(A+15, B), PSET: PAINT(A+18,
B+2), 4, 4: RETURN
1020 IFF=4 THENPRINT " UP": ELSEIFF
=2 THENPRINT " RIGHT": ELSEIFF=3 THE
NPRINT " DOWN": ELSEIFF=1 THENPRINT
" LEFT"
1030 PRINT " ARROW": SOUND30, 5: FO
RT=1 TO700: NEXTT: SCREEN1, 1: FORT=1
TO900: NEXTT: CLS: RETURN
    
```

System Requirements

16K RAM
Extended Color Basic

END

MARKET STUDY



No element of sales has the mystery and glamour of market research. Market researchers are the alchemists of modern business, mixing raw ideas and statistics in some mystical way and transforming them into the reality of the marketplace. Survival in today's business world demands it. Only by properly researching markets can the small entrepreneur hold his ground against his larger competitors. Happily, the Color Computer can come to the rescue.

I needed preliminary, or ball-park estimates of how certain geographical markets would respond to new products. The company I worked for had a mainframe at the head office and busi-

ness computers in branch operations. They regularly prepared market reports, but it took time to get the results, and I had a lot of original ideas that I wanted to test before I involved anyone else. So, I coupled my Color Computer with what I know of market research and developed an effective market-modeling tool, the program I call Market Study.

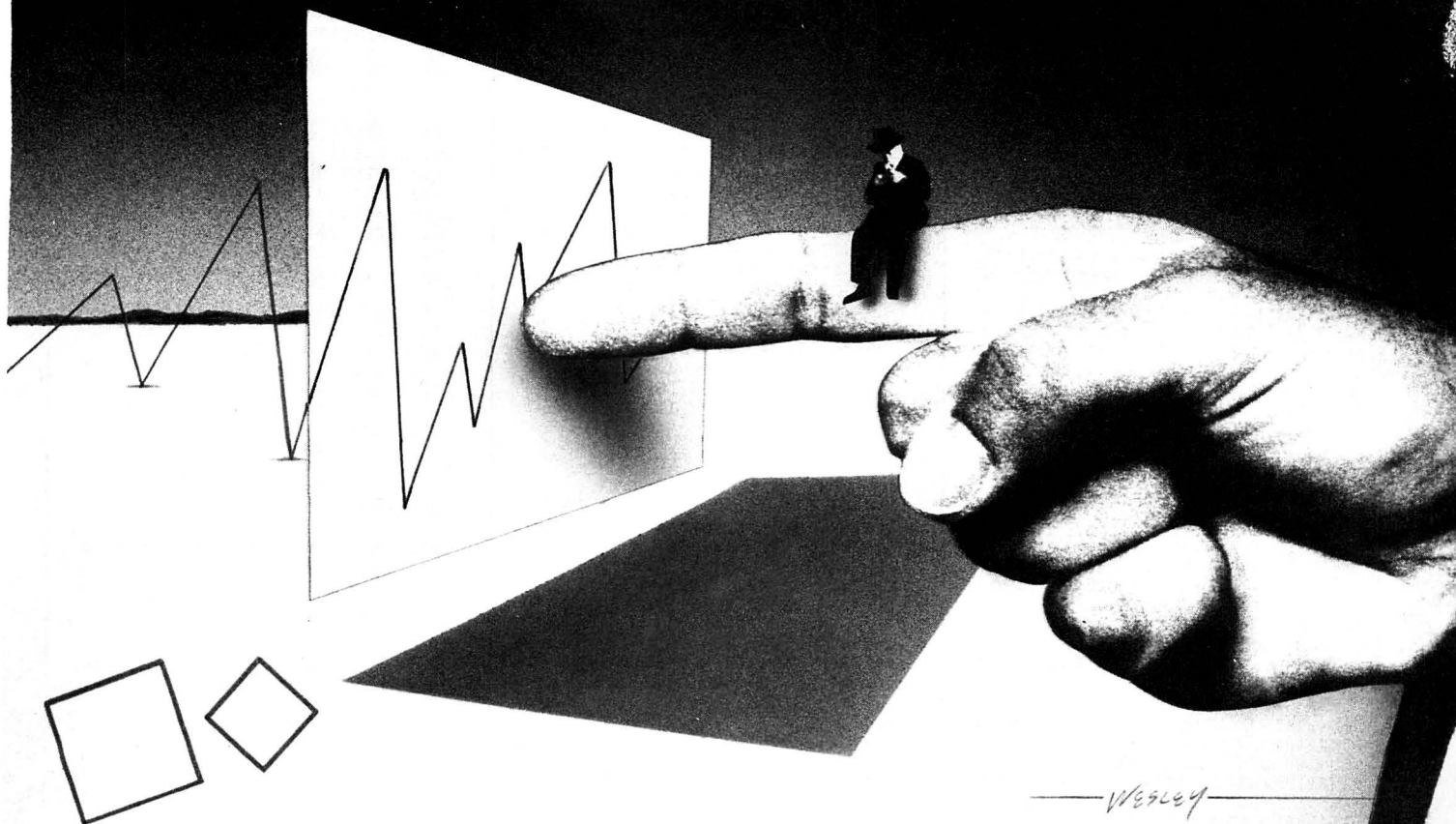
You can run Market Study on any 16K machine, but execute a PCLEAR1 before loading. It uses data representative of Canada's 10 provinces, although a menu option lets you set up custom markets.

Ideally, you would select your largest potential market area and break it into

manageable pieces as I have done with Canada. Census statistics, available from local or federal governments or the chamber of commerce, should supply the data you need.

Market Study is based on the Canadian provinces as of January 1983. With this data you can update quickly by changing the population figures (value 2) by themselves in the subroutines branched to at line 1150. Since other data is made up of percentages based on population, it will automatically change as well.

You can update more accurately by altering all or part of the market data and customizing one or all of the markets by either rewriting each branch of



Take raw ideas and statistics and transform them into reality for the business marketplace.

BY DANIEL POLE

line 1150, or adding an original market.

To customize a market on a one-shot basis, press enter instead of a numerical selection when asked the menu choice. This skips the subroutine for specific markets and requests that you customize the input data. Use Table 1 to calculate the information. For any ongoing requirement, a name change in the menu at line 1110 and subsequent data changes in the subroutines branched to from line 1150 is preferable.

A caveat is in order. Market Study does not create comprehensive market models. The data is assembled by percentage calculations, causing a large bias, or deviation. In addition, only 26 demographic factors are correlated. Re-

member, you are just getting rough figures to make a yes or no evaluation of an idea. If there is potential in your project (in Market Study that means a return of 20 percent on capital), contact a marketing research firm to do an in-depth analysis.

Market Study requires no knowledge of marketing, although the better you know your fixed (or overhead) and variable (or marginal, unit) costs, the more accurate your results will be. It is the old "garbage in, garbage out" rule.

After the program asks for initializing information, you select the market (in the custom option you will then have to load in the market data). Market Study takes over, asking simple ques-

tions about the type of people you expect will buy, and what you would like to sell in the first year. It calculates the unit prices and compares them with what you already know about the market price.

It takes about two minutes to run a complete study. The result, when printed, indicates the market segment selected and what volume and dollar sales would be. It also furnishes some information about the market area. The program calculates the return on the capital you will invest, and then, if it is 20 percent or better, suggests it is viable. ■

Address correspondence to Daniel Pole, 780 Montgomery St., Apt. 505, Fredericton, N.B. E3B 2Y1, Canada.

Program Listing, Market Study

```

10 REM MARKET STUDY
11 REM MARKETSTUDY COPYRIGHT DAN
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05 FREDERICTON NB E3B 2Y1 TELEHO
NE 506-454-7623 MODEM AVAILABLE
15 REM VERSION THREE/PRINTING SU
BS PLUS VIABILITY REPORT 83 07 3
0
20 CLS:PRINT @196,"*** $$ WELCOM
E TO $$ ***"
25 PRINT @416,"COPYRIGHT DANIEL
POLE 83.02.14"
30 PRINT @264,"**marketstudy**";
SOUND 89,4:SOUND 176,4:SOUND 89,
4:SOUND 176,8
40 CLS:PRINT"marketstudy IS A RE
PORT PROGRAM WHICH WILL IDENTIFY
THE TARGET MARKET FOR YOUR PRO
DUCT, AND THERETURN POSSIBLE OVE
R
41 PRINT@117,"ONE YEAR"
50 PRINT:PRINT"YOU WILL NEED:
      1. A CUP OF COFF
      2. PAPER AND PEN
      3. FIVE MINUTES
OF
51 PRINT@275," YOUR TIME"
60 PRINT:PRINT"TO ENTER ANSWERS
OR CONTINUE THEPROGRAM, PRESS en
ter. IF AT ANY TIME YOU WANT TO
START AGAIN,
61 PRINT@414      ,"PRESS break AND
TYPE 'GOTO 1000'"
70 INPUT ZZ$:CLS:SOUND 89,2:GOTO
1000
1000 CLS:PRINT      "m
arketstudy WILL FIRST ASK FOR S
OME INFORMATION ABOUT YOU AND Y
OUR PRODUCT, THEN ABOUT THE
1001 PRINT@94,"TARGET MARKET SEG
MENTS. WHEN WE ARE FINISHED, YOU
CAN REQUEST A WRITTEN REPORT."
1010 PRINT:PRINT"PLEASE TYPE YOU
R NAME:":INPUT A$
1015 SOUND 89,2
1020 PRINT"NOW THE DATE:":INPUT
B$
1025 SOUND 89,2
1030 PRINT"THE PRODUCT NAME:":IN
PUT C$
1035 SOUND 89,2:CLS
1040 GOSUB 1050
1045 GOTO 1100
1050 PRINT"marketstudy - "C$
1060 PRINT B$ BY "A$
1080 PRINT"-----"
1090 RETURN
1100 PRINT"THE MARKET:CHOOSE FRO
M LIST:"
1110 PRINT"
      1.ALL CANADA
      2.NEWFOUNDLAND
      3.NOVA SCOTIA
      4.NEW BRUNSWICK
1111 PRINT@257      ,"      5.PRINCE
EDWARD"
1120 PRINT      "
      8.MANITOBA
      9.SASKATCHEWAN
      10.ALBERTA
1121 PRINT@388,"11.BRITISH COLOM
BIA"
1135 INPUT DD:SOUND 89,2:CLS
1140 IF DD=0THEN1800:GOTO1150
1150 ON DD GOTO 1200,1700,1250,1
300,1350,1400,1450,1500,1550,160
0,1650
1200 REM CANADA MARKET DATA
1210 A=.497:B=.503:C=.35:D=.26:E
=.23:F=.12:G=.03:H=3190:I=3.1:J=
7225:K=.62:L=.38:M=.01:N=.74
1220 O=.037:P=.585:Q=.074:R=.044
:S=.614:T=.256:U=.13:V=.44:W=.03
:X=.755:Y=.245:Z=23681000
1230 E$="CANADA"
1240 GOTO 2000
1250 REM NOVA SCOTIA DATA
1260 A=.5:B=.5:C=.37:D=.24:E=.11
:F=.19:G=.09:H=2973:I=3.3:J=5816

```

```

:K=.72:L=.28:M=.01:N=.71
1270 O=.02:P=.46:Q=.17:R=.06:S=.
927:T=.044:U=.029:V=.34:W=.03:X=
.558:Y=.442:Z=848000
1280 E$="NOVA SCOTIA"
1290 GOTO 2000
1300 REM NEW BRUNSWICK DATA
1310 A=.501:B=.499:C=.38:D=.23:E
=.09:F=.16:G=.14:H=2779:I=3.5:J=
5524:K=.72:L=.28:M=.012:N=.69
1320 O=.05:P=.47:Q=.14:R=.03:S=.
64:T=.33:U=.03:V=.33:W=.03:X=.52
3:Y=.477:Z=701000
1330 E$="NEW BRUNSWICK"
1340 GOTO 2000
1350 REM P.E.I. DATA
1360 A=.502:B=.498:C=.45:D=.13:E
=.09:F=.16:G=.17:H=2929:I=3.5:J=
5073:K=.77:L=.23:M=.014:N=.69
1365 O=.03:P=.45:Q=.16:R=.05:S=.
928:T=.55:U=.017:V=.37:W=.03:X=.
371:Y=.629:Z=123000
1370 E$="P.E.I."
1380 GOTO 2000
1400 REM QUEBEC MARKET DATA
1410 A=.495:B=.505:C=.35:D=.25:E
=.11:F=.18:G=.11:H=3056:I=3.2:J=
6563:K=.5:L=.5:M=.004:N=.74
1420 O=.05:P=.48:Q=.16:R=.05:S=.
128:T=.8:U=.072:V=.39:W=.03:X=.7
91:Y=.209:Z=630300
1430 E$="QUEBEC"
1440 GOTO 2000
1450 REM ONTARIO MARKET DATA
1460 A=.496:B=.504:C=.33:D=.24:E
=.11:F=.19:G=.13:H=3177:I=3.1:J=
7927:K=.64:L=.36:M=.01:N=.72
1470 O=.03:P=.48:Q=.17:R=.04:S=.
781:T=.056:U=.163:V=.42:W=.027:X
=.812:Y=.188:Z=850600
1480 E$="ONTARIO"
1490 GOTO 2000
1500 REM MANITOBA MARKET DATA
1510 A=.497:B=.503:C=.35:D=.23:E
=.1:F=.19:G=.13:H=2842:I=3:J=698
8:K=.66:L=.34:M=.003:N=.73
1520 O=.04:P=.47:Q=.16:R=.06:S=.
712:T=.054:U=.234:V=.42:W=.019:X
=.699:Y=.311:Z=1031000
1530 E$="MANITOBA"
1540 GOTO 2000
1550 REM SASK.MARKET DATA
1560 A=.496:B=.504:C=.36:D=.2:E=
.09:F=.19:G=.1:H=3269:I=3.1:J=68
82:K=.76:L=.24:M=.013:N=.7
1570 O=.04:P=.48:Q=.15:R=.03:S=.
77:T=.03:U=.2:V=.42:W=.01:X=.555
:Y=.455:Z=956000
1580 E$="SASKATCHEWAN"
1590 GOTO 2000
1600 REM ALBERTA MARKET DATA
1610 A=.493:B=.507:C=.34:D=.23:E
=.1:F=.15:G=.18:H=3827:I=3.1:J=7
563:K=.65:L=.35:M=.034:N=.66
1620 O=.02:P=.4:Q=.2:R=.04:S=.8:
T=.02:U=.18:V=.41:W=.01:X=.75:Y=
.25:Z=2006000
1630 E$="ALBERTA"
1640 GOTO 2000
1650 REM B.C. MARKET DATA
1660 A=.5:B=.5:C=.32:D=.23:E=.1:
F=.15:G=.09:H=3528:I=2.9:J=9058:
K=.65:L=.35:M=.014:N=.72
1670 O=.02:P=.45:Q=.19:R=.06:S=.
83:T=.05:U=.155:V=.39:W=.04:X=.
769:Y=.231:Z=2568000
1680 E$="BRITISH COLOMBIA"
1690 GOTO 2000
1700 REM NFLD MARKET DATA
1710 A=.508:B=.492:C=.44:D=.24:E
=.1:F=.15:G=.07:H=2487:I=4.1:J=5
047:K=.81:L=.19:M=.01:N=.64
1720 O=.07:P=.42:Q=.13:R=.02:S=.
978:T=.005:U=.017:V=.26:W=.04:X=
.59:Y=.41:Z=574000
1730 E$="NEWFOUNDLAND"
1740 GOTO 2000
1800 CLS:PRINT"this routine wil
l customize      your marketstudy

```

```

"
1805 PRINT"RE-TYPE CUSTOM VALUES
EXACTLY AS THE LINES TO BE SH
OWN.      WHEN FINISHED PRESS e
nter,THEN TYPE goto 1850.WHY NO
T
1806 PRINT@183      ,"WRITE THAT DO
WN. READY?(PRESS enter)"
1810 INPUT DD:SOUND 89,2:CLS
1820 LIST 1850-1851
1850 A=00:B=00:C=00:D=00:E=00:F=
00:G=00:H=00:I=00:J=00:K=00:L=00
:M=00:N=00:O=00:P=00:Q=00:R=00:S
=00:T=00:U=00:V=00:W=00:X=00:Y=0
0
1851 Z=00:E$="XXXXXXXXXXXXXXXXXX
X"
2000 CLS:GOSUB 1050
2010 PRINT      "
ARE YOU INTERESTED IN:
      1.ALL "E$
2020 PRINT      "
      2.URBAN "E$
2030 PRINT      "
      3.RURAL "E$
2040 PRINT      "
      (1,2, OR 3?)"
2050 INPUT ZZ:SOUND 89,2:ON ZZ G
OTO 2095,2070,2085
2070 AA=Z*X
2075 AB$="URBAN"
2080 GOTO 2100
2085 AA=Z*Y
2090 AB$="RURAL"
2091 GOTO 2100
2095 AB$="ALL"
2097 AA=Z
2100 CLS:GOSUB 1050
2105 PRINT"DO YOU WANT TO SELL T
O:
      1.INDIVIDUALS (THEI
R OWN USE)
      2.HOUSEHOLDS (COMMO
N USE)
      (1 OR 2?)"
2110 INPUT ZZ:SOUND 89,2
2120 ON ZZ GOTO 2150,2180
2150 AC$="INDIVIDUALS"
2160 GOTO 2200
2180 AA=AA/I
2190 AC$="HOUSEHOLDS"
2200 CLS:GOSUB 1050
2210 PRINT "THE CUSTOMERS SEX:
      1.DOES NOT MATTE
E
2211 PRINT@230      ,(1,2 OR 3?)"
2220 INPUT ZZ:SOUND 89,2
2230 ON ZZ GOTO 2290,2250,2270
2250 AA=AA*A
2260 AD$="MALE"
2261 GOTO 2300
2270 AA=AA*B
2280 AD$="FEMALE"
2281 GOTO 2300
2290 AD$="BOTH MALE AND FEMALE"
2300 CLS:GOSUB 1050
2310 PRINT      "WH
AT AGE GROUPS INTEREST YOU:
      1.ALL AGES
      2.ADULTS ONLY(OVER 20)
2311 PRINT@197,"3.YOUTHS AND TEE
NS ONLY
      4.AGES 20-45 ON
LY
      5.AGES ABOVE 45
ONLY
      (1,2,3,4,OR5?)"
2320 INPUT ZZ:SOUND 89,2
2330 ON ZZ GOTO 2390,2350,2360,2
370,2380
2350 AA=AA*(D+E+F+G)
2355 AE$="ADULTS ONLY(OVER 20)"
2356 GOTO 2400
2360 AA=AA*C
2365 AE$="TEEN/YOUTH ONLY"
2366 GOTO 2400
2370 AA=AA*(D+E)
2375 AE$="AGES 20-45 ONLY"
2376 GOTO 2400
2380 AA=AA*(F+G)
2385 AE$="AGES 45 AND UP"
2386 GOTO 2400
2390 AE$="ALL AGE GROUPS"
2400 CLS:GOSUB 1050
2410 PRINT"WILL EDUCATION PLAY A

```

```

ROLE: 1.NOT IMPORTANT
OR LESS 3.ONLY HIGH SCHO
2411 PRINT@209,"SECONDARY
(1,2, OR 3?)"
2420 INPUT ZZ:SOUND 89,2
2430 ON ZZ GOTO 2490,2450,2470
2450 AA=AA*(O+P)
2455 AF$="SECONDARY SCHOOL OR LE
SS"
2456 GOTO 2500
2470 AA=AA*(O+R)
2475 AF$="POST-SECONDARY ONLY"
2480 GOTO 2500
2490 AF$="SCHOOLING NOT RELEVANT
"
2500 CLS:GOSUB 1050
2510 PRINT "
WILL LANGUAGE BE A FACTOR?
1.NOT IMPORTANT
2.ENGLISH-SPEAKING ONLY
2511 PRINT@198,"3.FRENCH-SPEAKIN
G ONLY (1,2, OR 3?)"
2520 INPUT ZZ:SOUND 89,2
2530 ON ZZ GOTO 2590,2550,2570
2550 AA=AA*S
2560 AG$="ANGLOPHONE ONLY"
2565 GOTO 2600
2570 AA=AA*T
2575 AG$="FRANCOPHONE ONLY"
2576 GOTO 2600
2590 AG$="BOTH LANGUAGE GROUPS"
2600 CLS:GOSUB 1050
2610 PRINT "
ARE YOU INTERESTED IN:
1.ALL PERSONS
2.ONLY THOSE NOW WORKING
2611 PRINT@198,"(1 OR 2?)"
2620 INPUT ZZ:SOUND 89,2
2630 ON ZZ GOTO 2690,2650
2650 AA=AA*V
2655 AH$="EMPLOYED ONLY"
2660 GOTO 2700
2690 AH$="EMPLOYMENT NOT IMPORTA
NT"
2700 CLS:GOSUB 1050
2710 PRINT "
YOU WILL BE SELLING TO:
1.ALL RESIDENTS
2.ONLY THOSE RENTING
2711 PRINT@199,"3.ONLY HOMEOWNER
S (1,2, OR 3?)"
2720 INPUT ZZ:SOUND 89,2
2730 ON ZZ GOTO 2790,2750,2770
2750 AA=AA*L
2760 AI$="ONLY THOSE RENTING"
2761 GOTO 2800
2770 AA=AA*K
2775 AI$="ONLY HOMEOWNERS"
2776 GOTO 2800
2790 AI$="ALL RESIDENTS"
2800 CLS:GOSUB 1050
2810 PRINT "
NOW YOUR PRODUCT, "CS$."
2820 PRINT "
WHAT IS THE BASIC UNIT OF SALE
(LIKE PER 100, EACH, LITRE, ETC.)?":
INPUT F$:SOUND 89,2
2830 PRINT"HOW MANY "F$"'S WILL"
2840 PRINT "
EACH CUSTOMER BUY ANNUALLY?":INP
UT AJ:SOUND 89,2
2850 PRINT "
WHAT PERCENTAGE OF THE TOTAL
MARKET YOU IDENTIFIED DO YOU
PLAN TO TRAP IN YEAR ONE?":INPUT
AK:SOUND 89,2
2900 CLS:GOSUB 1050
2910 PRINT "
WHAT IS THE CURRENT MARKET PRICE
OF "CS$"'S PER "F$
2915 PRINT "IN DOLLARS?":INPUT A
L:SOUND 89,2
2920 PRINT "
WHAT IS YOUR FIXED OVERHEAD PER
YEAR (IN DOLLARS)?":INPUT AM:SOU
ND 89,2
2930 PRINT "
WHAT IS THE VARIABLE, OR UNIT
COST FOR EACH "F$ "CS"'S"

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```

2940 PRINT"BASED ON "AK/100*(AA*
AJ) " SALES"
2950 INPUT AN:SOUND 89,2
3000 REM REPORT SUB
3010 CLS:GOSUB 1050
3020 PRINT "
YOU HAVE COMPLETED YOUR ANALYSIS
AND ARE READY FOR THE REPORT. DO
YOU WANT IT:
3021 PRINT@200,"1.PRINTED
2.DISPLAYED
(1 OR 2?):INP
UTZZ:SOUND89,2
3030 ON ZZ GOTO 4000,3100
3100 CLS:PRINT @230,"** $$ marke
tstudy $$ **":SOUND 89,4:SOUND 1
29,2:SOUND 89,2:SOUND 129,4
3150 CLS:PRINT "
marketstudy "B$" P.1"
3160 PRINT"ANALYST--"AS:PRINT"PR
ODUCT--"CS:PRINT"MARKET--"E$
3165 PRINT "
*-*-*-*-*-*-*-*-*-*-*-*-*-*-*"
3170 PRINT"TARGETED MARKET":PRI
NT ABS:PRINT ACS:PRINT ADS:PRINT
AES:PRINT AF$:PRINT AG$:PRINT A
HS:PRINT AIS
3175 INPUT XX:SOUND 89,2
3200 CLS: PRINT "
"marketstudy P.2
"
3210 PRINT "
*-*-*-*-*-*-*-*-*-*-*-*-*-*-*"
3211 PRINT"UNIT AND MARKET CALCU
LATIONS"
3212 PRINT"TOTAL MARKET-"Z
3215 PRINT "
POSSIBLE CUSTOMERS-"AA:PRINT"MAR
KET SHARE-"AA*(AK/100)
3220 PRINT"SALES/CUSTOMER/YEAR-"
AJ
3221 PRINT"POSSIBLE SALES/YR.-"A
A*AJ
3222 PRINT"MARKET SHARE-"(AK/100
)*(AJ*AA)
3230 PRINT"ANNUAL GROWTH RATE-"M
"%":PRINT"PER CAPITA-"D
ISPOSABLE INCOME-"J:PRINT" RETA
IL SALES-"H
3240 INPUT XX:SOUND 89,2
3600 CLS:PRINT "
marketstudy P.3"
3610 PRINT "
*-*-*-*-*-*-*-*-*-*-*-*-*-*-*"
3619 PRINT"REVENUE BASED ON MARK
ET PRICE:"
3620 AO=AK/100*(AL*AA*AJ)
3621 AP =AM+(AN*(AK/100*(AA*AJ)
)
3622 AQ=AN+(AM/AO)
3623 AR=AL-AQ
3624 AS=AR*((AK/100)*(AA*AJ))
3625 IF ZZ=2 THEN GOTO 3630
3626 RETURN
3630 PRINT"MARKET POTENTIAL-"$AL
*AA*AJ
3640 PRINT"YOUR SHARE-"$AO
3650 PRINT"YOUR COSTS-"$AP
3660 PRINT"UNIT COSTS-"$AQ
3670 PRINT"conclusion"
3680 PRINT"YOUR PRODUCT, PER UNI
T, WILL":PRINT"EARN $"AR"."
3690 PRINT"ANNUAL PROFIT-"$AS
3700 INPUT ZZ:SOUND 89,2
3710 CLS:GOSUB 1050
3720 PRINT"DO YOU WANT TO TRY AG
AIN?":PRINT "1.YES":PRINT"
2.NO":INPUT ZZ:SOUND 89,2
3730 ON ZZ GOTO 1000,3850
3850 CLS:PRINT @230,"HAVE A GOOD
DAY!"
3860 END
4000 CLS:PRINT @230, "TURN ON PR
INTER AND PRESS enter FOR A REPO
RT. ALIGN PAPER TO TOP. IN CASE
OF MALFUNCTION, PRESS break AND
4001 PRINT@336,"GOTO 3010"."
4010 INPUT ZZ:SOUND 89,2
4020 CLS:PRINT#-2,"*****
***** MARKETSTUDY REPORT *****
*****"

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```

4035 PRINT#-2,"analyst = "AS
4040 PRINT#-2,"product = "CS
4050 PRINT#-2,"market = "E$
4060 PRINT#-2,"date = "B$
4070 PRINT#-2,"-----"
4080 PRINT#-2,"TARGETED MARKET:"
:PRINT#-2,"-----"
4090 PRINT#-2,ABS
4100 PRINT#-2,ACS
4110 PRINT#-2,ADS
4120 PRINT#-2,AES
4130 PRINT#-2,AF$
4140 PRINT#-2,AG$
4150 PRINT#-2,AH$
4160 PRINT#-2,AIS
4170 PRINT#-2,"-----"
4200 PRINT#-2,"The total market
you have defined consists of "Z"
possible customers."
4210 PRINT#-2,"Of these, "AA" CO
ULD buy "CS", but you feel that
only some"
4220 PRINT#-2,AA*(AK/100)" will
in the 12-months under study."
4230 PRINT#-2,"sales/customer/ye
ar = "AJ
4240 PRINT#-2,"potential sales
= "AA*AJ
4250 PRINT#-2,"your sales (ms)
= "(AK/100)*(AJ*AA)
4260 PRINT#-2,"Market growth per
annum "M"% , per capita disposab
le income $"J",
4270 PRINT#-2,"and retail sales
$"H"."
4280 PRINT#-2,"-----"
4290 GOSUB 3620
4300 PRINT#-2,"
REVENUE BASED ON MARKET PRIC
E
4310 PRINT#-2,"market potential
=$"AL*AA*AJ
4320 PRINT#-2," your share
=$"AO
4330 PRINT#-2," your costs
=$"AP
4340 PRINT#-2," unit costs
=$"AQ
4350 PRINT#-2,"*-*-*-*-*-*-*-*-*
*-*-*-* conclusion *-*-*-*-*
*-*-*-*-*"
4360 PRINT#-2,"Your product will
earn, per unit, $"AR
4370 PRINT#-2,"The annual return
in the first 12 months will be
$"AS"."
4371 PRINT#-2,"
4373 IF AS<(AM+AO)*.2 THEN GOTO
4500
4374 GOTO4600
4375 FOR ZZ=1 TO 25
4376 PRINT#-2,".
4377 NEXT ZZ
4378 PRINT#-2,"MARKETSTUDY IS A
COPYRIGHTED REPORT PROGRAM OF DA
NIEL POLE (83.02.15)
4380 CLS:SOUND 89,2
4390 PRINT @230,"DO YOU WANT TO
(1) TRY AGAIN, (2) GET ANOTHER R
EPORT COPY, (3) END ?":INPUT ZZ
4400 ON ZZ GOTO1000, 4000, 5000
4475 GOTO 4375
4500 PRINT#-2,"Using a suggested
return ratio of 20%, your proje
ct is NOT VIABLE."
4510 GOTO 4375
4600 PRINT#-2,"Since your projec
t has a return greater than 20%,
MARKETSTUDY recommends"
4610 PRINT#-2,"That you study th
is proposal in more depth as it
seems to be viable.":GOTO 4475
5000 CLS:PRINT @230, "HAVE A GOO
D DAY!"
5010 END

```


In the case of 2. or 3., above, you will need to know what each variable represents.
The following values will be percentages of the market population:

A = % Male
 B = % Female
 C = % Below 20 years old
 D = % Between 20 and 35
 E = % Between 35 and 45
 F = % Between 45 and 65
 G = % Over 65
 H = Per capita retail sales
 I = Number of persons per household
 J = Per capita disposable income
 K = % Owning their own home
 L = % Renting
 M = Growth rate of G.N.P. annually
 N = % Population over 15 years old

O = % of group "N" with less than 5 years of education
 P = % of group "N" with less than high school education
 Q = % of group "N" with less than full university education
 R = % of group "N" with university education or greater
 S = % Population English-speaking
 T = % Population French-speaking *
 U = % Population other languages
 V = % Population (total) working
 W = % Population (total) unemployed
 X = % Population urban
 Y = % Population rural
 Z = Total population
 e\$ = The name of the market chosen

*This data was based on the Canadian model. To alter for the predominant language groups in your market area, change the language choice in line 2510.

Table 1. Variables in Percentages of Market Population

System Requirements
Color Computer or MC-10
Color Basic or Micro Color Basic
16K RAM
Printer Optional

PERRY COMPUTERS

COLOR COMPUTERS

CALL TOLL FREE 1-800-248-3823

COLOR COMPUTER, DISK DRIVE AND PRINTERS

	LIST PRICE	OUR PRICE
26-3027 16K Color Computer 2	\$ 199.00	\$ 169.00
26-3127 64K Color Computer 2	\$ 259.00	\$ 220.00
26-3029 Disk Drive 0	\$ 399.00	\$ 310.00
26-3023 Disk Drive 1, 2, 3	\$ 279.95	\$ 230.00
26-1271 DMP-110	\$ 399.00	\$ 310.00
26-1255 DMP-120	\$ 499.00	\$ 400.00
26-1254 DMP-200	\$ 699.00	\$ 520.00
26-1257 DWP-210	\$ 799.00	\$ 630.00

COLOR COMPUTER SOFTWARE

	OUR PRICE
Telewriter 64 Tape	\$ 49.95
Telewriter 64 Disk	\$ 59.95
VIP Writer	\$ 59.95
VIP Speller	\$ 49.95
VIP Database	\$ 59.95
RADIO SHACK Software	15% Off
TOM MIX Software	\$ CALL
SPECTRAL ASSOCIATES	\$ CALL

OTHER PRINTERS AND ACCESSORIES

	OUR PRICE
EPSON Printer	\$ CALL
OKIDATA Printer	\$ CALL
STAR GEMINI 10X Printer	\$ 300.00
TRANSTAR Daisy Wheel Printer	\$ 465.00
C.I.TOH 8510 Prowriter Printer	\$ 380.00
BOTEK Serial to Parallel Interface	\$ 59.00

MONITORS

	OUR PRICE
COMREX 12" Monitor	\$ 95.00
COMREX 13" Color Monitor	\$ 285.00
AMDEK 300A Monitor	\$ 155.00
AMDEK Color I Plus	\$ 335.00
VIDEO PLUS Monitor Adaptor	\$ CALL
GORILLA Monitor	\$ 85.00

COLOR ACCESSORIES

	LIST PRICE	OUR PRICE
26-2226 RS-232 Program Pak	\$ 79.95	\$ 68.00
26-3012 Deluxe Joystick (EACH)	\$ 39.00	\$ 34.00
26-3017 64K RAM Kit	\$ 69.95	\$ 59.00
26-3025 Color Mouse	\$ 49.95	\$ 42.50
26-1173 Modem II	\$ 199.95	\$ 169.00

	LIST PRICE	OUR PRICE
26-3008 Joysticks	\$ 24.95	\$ 21.00
26-3016 Keyboard Kit	\$ 39.95	\$ 34.00
26-3018 Ext. BASIC Kit	\$ 39.95	\$ 34.00
26-1175 Modem I	\$ 99.95	\$ 85.00
Hayes Modems		\$ CALL

All prices and offers may be changed or withdrawn without notice. Advertised prices are cash prices. (Installation and shipping are not included in price.)

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1983 unit sales	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Average	Best	Worst		
Bach	136	139	119	161	130	104	84	121	95	115	75	161	1440	144	161	75		
Chalone	120	170	152	170	182	102	89	157	162	129	64	158		144	182	64		
Dolan	188	157	103	112	161	122	99	145	145	103				144	188	97		
Feagan	105	94	127	115	157	97	61	132	113					144	174	61		
Graham	135	135	183	116	151	104	86	149						144	183	63		
Harpel	134	102	190	161	180	85								144				
Jordan	105	109	188	171	120									144				
Latour	112	128	124	129										144				
Lucido	158	110												144				
Phelps	167													144				
Prats														144				
Schaeferle														144				
Taylor														144				
Torres					131								1620	135	177	105		
Turner				127	131								75	178	1635	136	190	75
Wehlen			145	142	154			137	125	106	60	151	1495	125	154	60		
	2312	2166	2387	2321	2401	1699	1439	2276	2242	2011	1318	2631	25203	2100				

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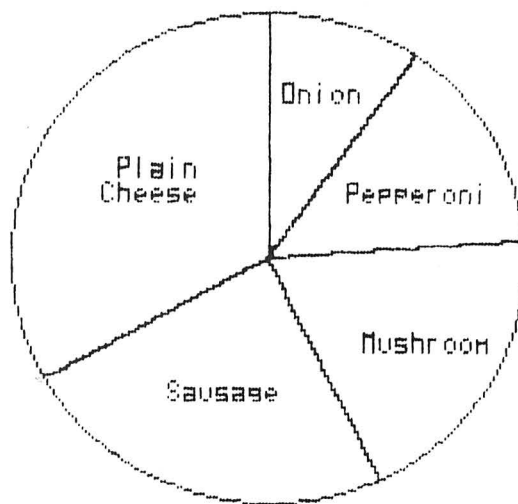


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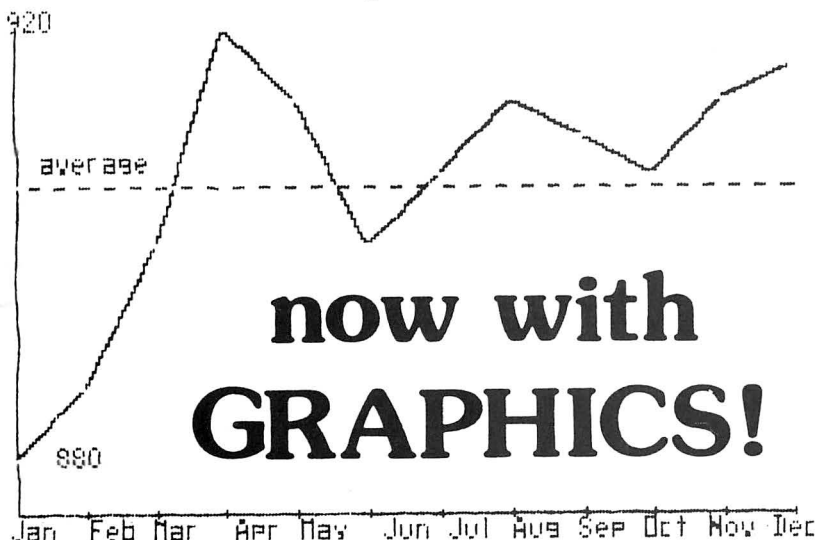


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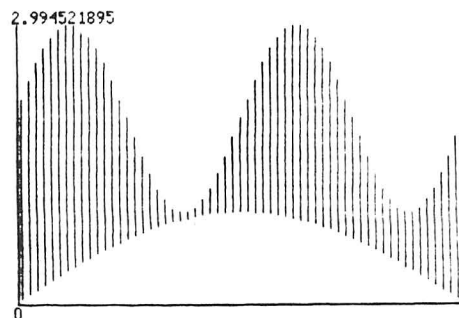
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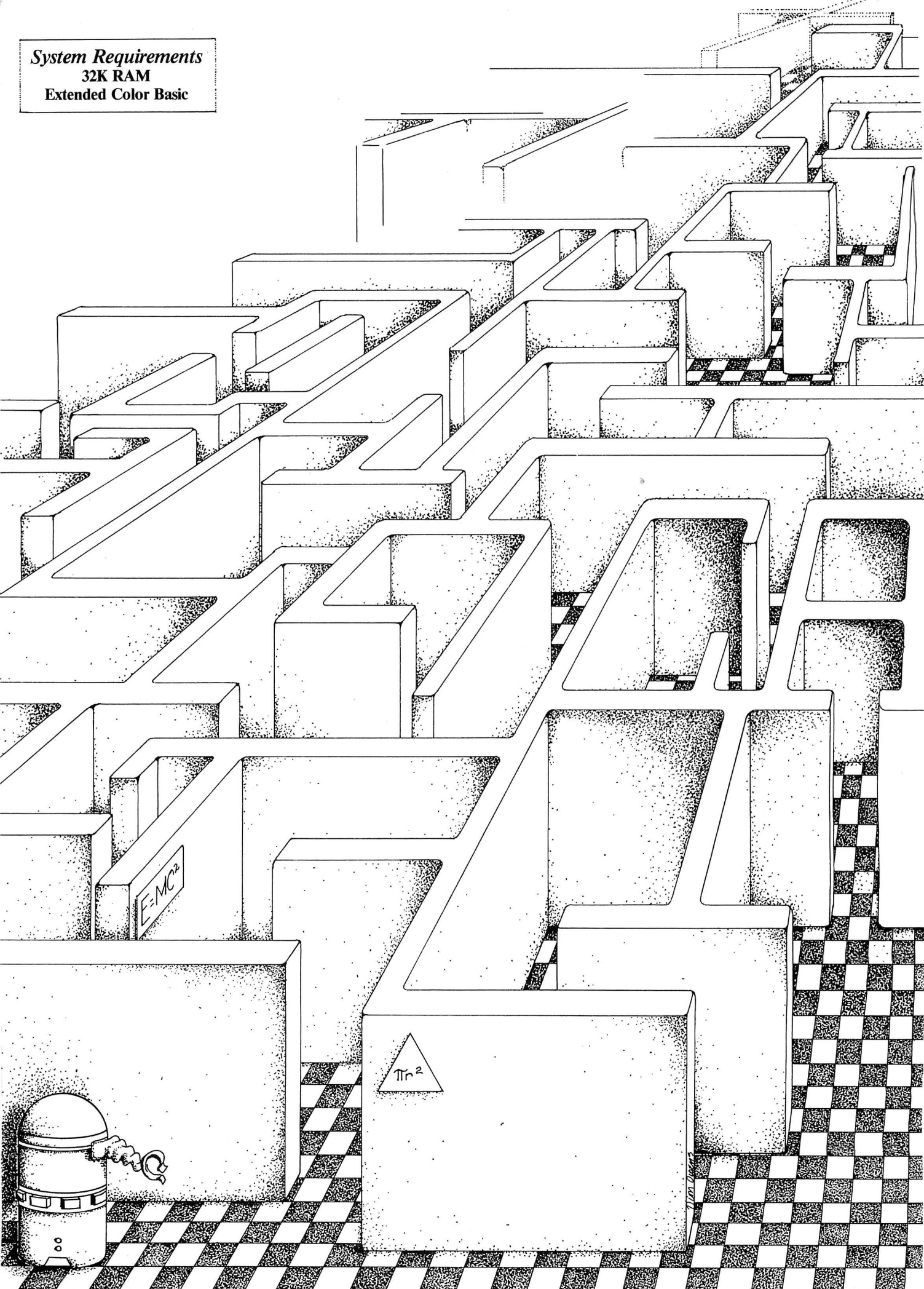


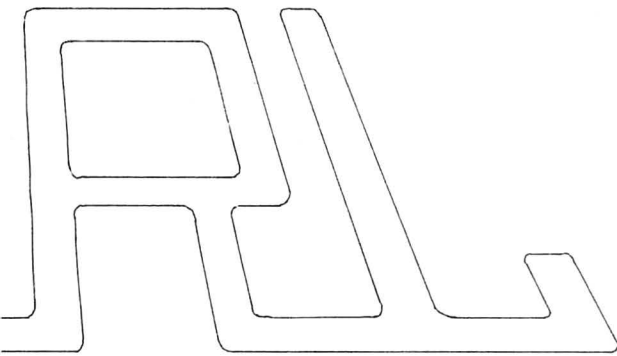
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System Requirements
32K RAM
Extended Color Basic





The Robot

PART I

BY DAVID MEREDITH

Let the robot show you the concepts of Basic programming by breaking it into its simplest elements.

Imagine a world in the shape of a large square bound on all four sides by impenetrable walls. Within these walls lives a robot named Carl. Carl is yours to command. You can tell Carl to walk forward or turn left or right. You can also give him complex commands. That is, you can program him. To make Carl walk counter-clockwise around a square five steps on a side, tell him: "Four times walk forward five steps then turn left."

Figure 1 shows a picture of Carl. He is standing one step north and five steps east of the southwest corner of his world, and he is facing west. The dots are one step apart. The asterisks are the walls bounding Carl's world on the

south and west.

Carl always knows which direction he is facing. To make Carl face north, you could tell him: "Keep turning left until you are facing north."

Example: Tell Carl to walk two steps north then five steps east.

Solution: Keep turning left until you are facing north.

Walk two steps.

Turn right.

Walk five steps.

Comment: Remember that Carl can't be told to walk north. He can only be told to walk a certain number of steps or to turn left or right. But you can make his actions conditional on the direction

he is facing. You can tell Carl to turn if he is not facing north, and to walk forward if he is facing north.

Problem 1: Tell Carl to walk four steps east. (Problem solutions are printed at the end of the article.)

Problem 2: Make Carl walk backwards 3 steps.

Carl's world is 15,000 steps long on each side.

Inside Carl's world there are walls just like the boundary walls. Carl can't walk through walls, but he can detect walls just before running into them. He understands conditional directions like: "If there is no wall immediately in front

of you walk forward one step, otherwise turn right." He also knows if there is a wall to his immediate right or left. Carl is shown facing a wall in Fig. 2. There is also a wall on his immediate right.

Carl's world also contains small signaling devices called beepers. Carl has a bag for carrying beepers. If he finds a beeper on the ground he can pick it up and put it in his bag. He can also take beepers out of his bag and put them on the ground. He knows if he is standing on a beeper, and he knows if his beeper bag is empty.

Unfortunately, the beepers don't signal very loudly. Carl can hear them only if they are at the same place he is. He can't tell if he is standing next to a beeper. He only knows if he is standing on one.

Carl can leave beepers on the ground to mark where he has been. Sometimes beepers are placed on the ground by his commander to indicate the end of a job.

A typical command to Carl is: "Walk forward until you find a beeper, then put it in your bag and stop." A more complex command would be: "Walk forward dropping beepers until either your bag is empty or you find a beeper. If your bag is empty then stop, otherwise pick up the beeper you found and stop."

Beepers in Carl's world are denoted by numbers in place of the dots Carl steps on. In Fig. 3, Carl is looking at three beepers just north of him. Carl's beeper bag is near the top right corner of the screen.

Example: Tell Carl to walk forward until he finds a wall.

Solution: Walk forward until there is a wall immediately in front of you, then stop.

Problem 3: Assume a wall is on Carl's right. Tell Carl to walk forward until the wall stops or he finds a beeper.

This month I will introduce you to a language for controlling the robot Carl. Next month I will give you a program called ShowCarl (mixed Basic and Assembly) that projects a picture of Carl and his world on your TV screen. With ShowCarl you can edit and run Carl programs. You can also create new worlds for Carl, erecting walls and leaving beepers for Carl to find. And you can save and reload both Carl programs and Carl worlds on tape.

ShowCarl can be used as an introduction to Basic programming. Carl is controlled by a language called Robot Talk that is similar to a primitive form of Basic. The programming

environment is also as close to CoCo Basic as I could make it. You enter, run, save, and load Carl programs while using ShowCarl just like you enter, run, save, and load Basic programs in CoCo Basic. When you see an OK prompt on the screen, don't assume you have accidentally hit the break key. ShowCarl prompts you with OK, too.

Carl is adapted from Richard Pattis's robot Karel. Pattis developed a robot language similar to Pascal for introducing students to programming in Pascal. He explained this language in an interesting book, *Karel the Robot* (Wiley, 1981). In addition to his book, Pattis wrote a 10,000-line Pascal program for interpreting and displaying Karel programs. Versions of Pattis's interpreter can be obtained from him for large computers, and a version is available for the Apple.

I have tried to do the same thing for Basic that Pattis did for Pascal. I am indebted to Pattis for the idea of a robot world with walls and beepers and for some of Carl's programming projects. However, I am solely responsible for the syntax of Robot Talk and for the program that appears here.

The Syntax of Robot Talk

The examples of robot programs given above are not really programs at all. They are a form of robot pseudo-code. Carl isn't smart enough to understand English commands. He must be addressed in his own Robot Talk, which looks remarkably like Basic. Each line of Robot Talk has a line number, and each line can do only one operation.

Here is a program to make Carl walk counter-clockwise around a square five steps on a side:

```
10 DO 4 TIMES
20 DO 5 TIMES
30 WALK
40 NEXT
50 TURN LEFT
60 NEXT
70 STOP
```

You don't have to tell Carl to stop at the end of a program, but he prefers it. He will give you an error

message if he runs out of program without being stopped.

Here is a program to make Carl face north:

```
10 IF FACING NORTH THEN 40
20 TURN LEFT
30 GOTO 10
40 STOP
```

Notice that the only command permitted after THEN is a line number.

Robot Talk contains three kinds of statements: action commands, unconditional control statements, and conditional control statements.

Action Commands

The action commands are given in Table 1. They all tell Carl to do something. If Carl cannot execute an action command, his program stops and an error message appears on the screen. For example, if he tries to pick up a beeper when none is present, his program stops and the message "No beeper here at line #" appears on the screen, where # is the line number that could not be executed.

Only Carl's Robot Talk program is stopped when an unexecutable command is encountered. The real computer program ShowCarl continues to operate, allowing you to correct the Robot Talk program and run it again.

Unconditional Control Statements

Carl understands five unconditional control statements, which are listed in Table 2. They work exactly like the analogous commands in Basic. The RETURN command always causes a jump to the program line immediately following the last GOSUB not yet returned from.

The scope of DO n TIMES is delimited by NEXT.

Robot Talk uses DO n TIMES instead of FOR because robot talk has no variables—more on that point later.

Carl's program will halt and an error message appears if you try to execute a GOTO or GOSUB with an undefined line number or if you use NEXT without a corresponding DO or RETURN without GOSUB. Errors are also created by nesting DO loops or GOSUBs too deeply. The maximum number of pending RETURNS is 20, and the maximum depth of nested DO loops is 10.

Conditional Control Statements

The conditional control statements are all of the same form: IF condition

THEN line number. Nothing may follow THEN but a line number. Conditional control statements cause a jump to the command at the given line number if the condition is true; otherwise they have no effect. The conditions that can be tested are listed in Table 3. You can check which direction Carl is facing, if he is next to a wall, if his beeper bag is empty, or if he is standing on a beeper. For each condition you can check, you can also check the negation.

If Carl's program tries to jump to an undefined line number, the program stops and an error message appears on the screen. Whenever Carl detects an error, he tells you the number of the line he couldn't execute.

Sample Robot Talk Programs and Problems

These sample programs and robot problems will help you understand Carl and show you how Carl might be used in a programming class. You don't need ShowCarl to solve these problems, but if you do acquire ShowCarl, you can try running your solutions to these problems.

Sample Program 1: Make Carl walk two steps north then five steps east.

Solution:
 10 IF FACING NORTH THEN 40
 20 TURN LEFT
 30 GOTO 10
 40 WALK
 50 WALK
 60 TURN RIGHT
 70 DO 5 TIMES
 80 WALK
 90 NEXT
 100 STOP

Problem 4: Make Carl walk four steps east.

Problem 5: Tell Carl to walk three steps backwards.

Sample Program 2: Walk forward until a wall is encountered.

Solution:
 10 IF FRONT IS BLOCKED THEN 40
 20 WALK
 30 GOTO 10
 40 STOP

Problem 6: Assume a wall is on Carl's right. Tell Carl to walk forward until the wall ends or he finds a beeper.

Problem 7: Make Carl go to the southwest corner of his world.

Sample Program 3:
 Assume Carl is facing a wall that is not connected to any other wall (Fig. 4). Make Carl walk around the left end of the wall.

Solution: With complex problems like this one, it is useful to begin with a pseudo-code solution.

```

Turn left
Repeat
  Walk
Until right is clear
Turn right
Walk
Turn right
Walk
Turn left
Stop
  
```

Then write the Robot Talk solution.

```

10 TURN LEFT
20 WALK
30 IF RIGHT IS BLOCKED THEN 20
40 TURN RIGHT
50 WALK
60 TURN RIGHT
70 WALK
80 TURN LEFT
90 STOP
  
```

Problem 8: Carl is facing the top of a T-shaped wall. Make him go to an inside corner (Fig. 5).

Sample Program 4: Make Carl follow a trail of beepers, picking them up as he goes and stopping when he comes to the end. Figure 6 shows the initial situation. The idea is to look on all four sides for a beeper. If you find one, move to it, pick it up, and repeat. Otherwise stop.

Crude solution: While next to beeper do
 Move to beeper
 Pickbeeper
 Endwhile
 Stop

Refined:
 Begin loop
 Walk
 If beeper not here then
 Step back
 Turn left
 Walk
 If beeper not here then
 Step back
 Turn left
 Walk
 If beeper not here then
 Step back
 Turn left
 Walk

```

If beeper not here then
  Stop
Pick beeper
Repeat loop
End loop
  
```

Robot Talk:
 10 WALK
 20 IF BEEPER HERE THEN 200
 30 GOSUB 800
 40 IF BEEPER HERE THEN 200
 50 GOSUB 800
 60 IF BEEPER HERE THEN 200
 70 GOSUB 800
 80 IF BEEPER HERE THEN 200

```

90 STOP
200 PICK BEEPER
210 GOTO 10
800 TURN LEFT
810 TURN LEFT
820 WALK
830 TURN RIGHT
840 WALK
850 RETURN
  
```

Lines 10-80 make Carl look one step in all four directions for a beeper. Lines 800-850 contain a subroutine that makes Carl take one step backwards, turn left, and walk one step forward.

Problem 9: Carl is in a room with a beeper at the door (Fig. 7). Make him go to the door and pick up the beeper.

Problem 10: Carl wishes to clean his house, which is a closed box. Teach him to pick up all the beepers in the house and put them in his bag.

Challenge Problems

These problems are more difficult than the preceding ones. Their solutions will be printed next month.

Challenge 1: Teach Carl to jump hurdles until he comes to a beeper on the ground (Fig. 8).

Challenge 2: Show Carl how to escape from a maze. Figure 9 shows a typical maze. Assume a beeper marks the end of the maze.

Challenge 3: A beeper was left somewhere in Carl's world. Find it without using the north or east boundary walls. (You can't treat Carl's world as a big room and use the solution to Problem 10. You need a subtler trick.)

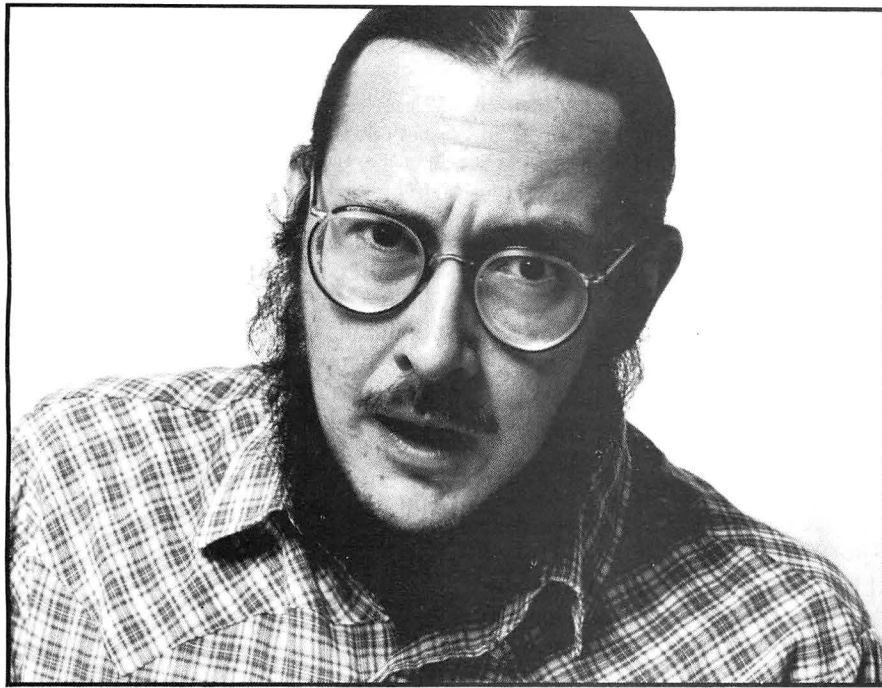
Challenge 4: Tell Carl how to go in a counterclockwise spiral, dropping beepers until he confronts a wall or his bag is empty. The letters in Fig. 10 show how he should go.

A Final Challenge

Robot Talk is theoretically a complete programming language. In technical terms, Carl is a Turing machine. He can execute the functional equivalent of any computer program whatever.

I must add a caveat to my claim of Robot Talk's completeness. Carl is a Turing machine only if you eliminate all restrictions on the depth of subroutine nesting and eliminate the northern and eastern boundaries of his world. I built these limitations into my implementation ShowCarl of Robot Talk as the most convenient compromise with the finiteness of my CoCo.

You may wonder how Robot Talk can be as complete a language as Basic (not to mention monster languages like PLI or Ada. Robot Talk doesn't even use variables. I won't prove that Robot



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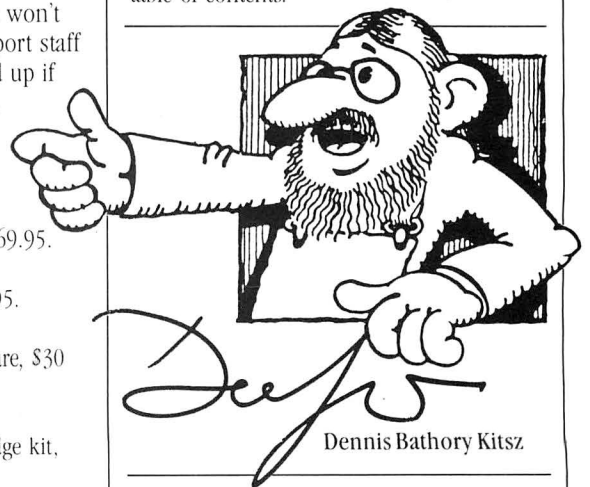
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Talk is complete, but I think I can convince you that it is. Remember, I'm not suggesting that Robot Talk is as fast or easy to use as Basic, only that it is functionally equivalent.

Robot Talk may lack variables, but in their place Carl has beepers that he can leave different places to remember different numbers. Robot Talk lacks nothing in the way of control statements. It has both conditional and unconditional GOTOS. From these all other control structures are built.

Consider the problem of adding two numbers. Suppose Carl is in the southwest corner of his world facing east, and that two beepers are located on the bottom row of dots. Each beeper is some number of steps in front of Carl. How can you tell Carl to walk forward a number of steps equal to the sum of the distances to the two beepers? Carl should pick up the two beepers he finds and place a beeper where he stops.

Remember that both beepers might be at the same place. One or both beepers might be at the southwest corner zero steps in front of Carl.

To solve this problem, consider some deceptively simple mathematics. Peano's definition of addition of positive integers, slightly modified, goes as follows: If $a = 0$ then $a + b = b$ else if $b = 0$ then $a + b = a$ else $a + b = 1 + ((a - 1) + (b - 1)) + 1$.

This is a *recursive* definition.

It calls on itself in a way that is almost circular. But the

WALK
TURN LEFT
TURN RIGHT
PICK BEEPER
PUT BEEPER
STOP

Table 1. Carl's Action Commands

GOTO
GOSUB
RETURN
DO n TIMES
NEXT

Table 2. Carl's Unconditional Control Statements

FACING NORTH	NOT FACING NORTH
FACING EAST	NOT FACING EAST
FACING SOUTH	NOT FACING SOUTH
FACING WEST	NOT FACING WEST
FRONT IS CLEAR	FRONT IS BLOCKED
RIGHT IS CLEAR	RIGHT IS BLOCKED
LEFT IS CLEAR	LEFT IS BLOCKED
BEEPER HERE	BEEPER NOT HERE
BAG EMPTY	BAG NOT EMPTY

Table 3. Conditions That Can Be Used in the Conditional Command: IF Condition THEN Line Number

definition is not circular. It defines addition of two numbers in terms of the sum of smaller numbers. It assumes only that the operation $a + 1$ is defined for all numbers a . Our Robot Talk program will also use recursion. Here it is:

```
10 GOSUB 100
20 PUTBEEPER
30 STOP
100 IF BEEPER HERE THEN 200
110 WALK
120 GOSUB 100
130 WALK
140 RETURN
200 PICKBEEPER
210 IF BEEPER HERE THEN 240
220 WALK
230 GOTO 210
240 PICKBEEPER
250 RETURN
```

Lines 100-250 contain a recursive subroutine. It calls itself from line 120. This subroutine takes Carl from wherever he is a distance equal to the sum of the distances to the next two beepers. It also causes Carl to pick up the beepers.

The main routine (lines 10-30) thus makes Carl move the sum of the distances to the next two beepers (picking them up as he goes) and then drop a beeper and stop. The problem is solved.

To see that the subroutine works as specified, see first that it works in the case that Carl is standing on one of the beepers. That is, the subroutine works when the distance to one of the next two beepers is zero. In that case (lines 200-250) Carl picks up the beeper he is standing on, walks to the next beeper, and picks it up.

Now look at what happens if Carl is not standing on a beeper (lines 110-140). He walks one step forward. Then he calls the subroutine recursively to walk the sum of the new, shorter distances to the next two beepers. Then he walks one step more. Thus the subrou-

tine embodies Peano's definition of addition.

Challenge 5: Teach Carl to multiply. Write a Robot Talk program that makes Carl move a distance equal to the product of the distances to the next two beepers.

I will give copies of ShowCarl to the first 10 people who send me correct solutions to the multiplication problem. Solutions must be easily legible and arrive in my mailbox before my copy of *HOT CoCo* containing the solution.

Next month I will show you the program ShowCarl, which will allow you to enter and run programs in Robot Talk. I'll also give you the solutions to the challenge problems, which you can test with ShowCarl. ■

Address correspondence to David Meredith, Department of Mathematics, San Francisco State University, San Francisco, CA 94132.

Solutions to Problems

- Keep turning left until you are facing east
four times walk
- Two times turn left
three times walk
two times turn left
- While right is blocked and beeper not here do walk
- 10 IF FACING EAST THEN 40
20 TURN LEFT
30 GOTO 10
40 WALK
50 WALK
60 WALK
70 WALK
80 STOP
- 10 TURN LEFT
20 TURN LEFT
30 WALK
40 WALK
50 WALK
60 TURN LEFT
70 TURN LEFT
80 STOP

6. 10 IF RIGHT IS CLEAR
 THEN 100
 20 IF BEEPER HERE
 THEN 100
 30 WALK
 40 GOTO 10
 100 STOP

7. 10 IF FACING WEST
 THEN 40
 20 TURN LEFT
 30 GOTO 10
 40 GOSUB 200
 50 TURN LEFT
 60 GOSUB 200
 70 STOP
 200 IF FRONT IS BLOCKED THEN
 230
 210 WALK
 220 GOTO 200
 230 RETURN

The subroutine 200-230 makes Carl walk to a wall.

8. 10 TURN LEFT
 20 IF RIGHT IS CLEAR THEN 50
 30 WALK
 40 GOTO 20
 50 TURN RIGHT
 60 WALK
 70 TURN RIGHT

80 IF FRONT IS BLOCKED THEN
 110
 90 WALK
 100 GOTO 80
 110 STOP

9. Remember, you don't know which side of the room has the door or which way Carl is facing. The idea is to make Carl find a wall and then walk along with his right hand on the wall until he finds the door.

10 IF FRONT IS BLOCKED THEN
 50
 20 WALK
 30 IF BEEPER HERE THEN 120
 40 GOTO 10
 50 TURN LEFT
 60 IF FRONT IS BLOCKED THEN
 50
 70 WALK
 80 IF BEEPER HERE THEN 120
 90 IF RIGHT IS BLOCKED THEN
 60
 100 TURN RIGHT
 110 WALK
 120 PICK BEEPER
 130 STOP

Line 30 guards against the possibility that while Carl gropes for a wall he walks right out the door. Line 80 is necessary in case a door is at the right end of a wall (as seen from inside the room).

10. The trick here is to go to a corner then to sweep out the room.

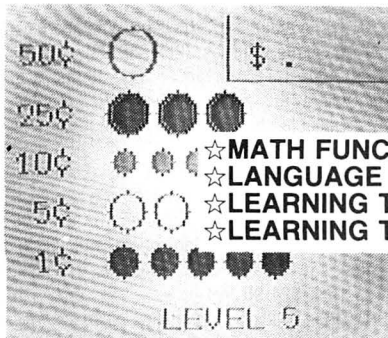
10 GOSUB 300
 20 TURN LEFT
 30 GOSUB 300
 40 TURN LEFT
 50 GOSUB 300
 60 IF LEFT IS BLOCKED THEN 160
 70 TURN LEFT
 80 WALK
 90 TURN LEFT
 100 GOSUB 300
 110 IF RIGHT IS BLOCKED THEN
 160
 120 TURN RIGHT
 130 WALK
 140 TURN RIGHT
 150 GOTO 50
 160 STOP
 300 IF BEEPER NOT HERE THEN
 320
 310 PICK BEEPER
 320 IF FRONT IS BLOCKED THEN
 350
 330 WALK
 340 GOTO 300
 350 RETURN

The subroutine at 300 takes Carl to a wall while picking up any beepers he finds. As he begins line 50, Carl is in a corner with walls at his back and right.

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CSPPOOL

Color Computer Print Spooler

Stop Waiting Around for the Printer! **CSPPOOL** allows you to use your printer and computer concurrently, takes only 26 bytes of Color Basic's memory, and gives you 32K of print buffer. It's like having two computers in one! By intercepting characters sent to the printer and storing them in the upper 32K of RAM, **CSPPOOL** allows you to run other programs while your printer is doing its job. **CSPPOOL** is FREE with the purchase of a 64K RAM UPGRADE KIT from The Micro Works, or it may be purchased separately on cassette or diskette for **\$19.95**. Requires 64K; not for FLEX or OS9.

64K MEMORY UPGRADE KIT: For Rev. levels E, ET, NC, TDP-100s, and Color Computer II. Eight prime 64K RAM chips, instructions, and **CSPPOOL**: **\$64.95**.

SYSTEMS SOFTWARE

MACRO-80C: DISK-BASED EDITOR, ASSEMBLER AND MONITOR—With all the features the serious programmer wants, this package includes a powerful 2-pass macro assembler with conditional assembly, local labels, include files and cross referenced symbol tables. **MACRO-80C** supports the complete Motorola 6809 instruction set in standard source format. Incorporating all the features of our Rompack-based assembler (**SDS-80C**), **MACRO-80C** contains many more useful instructions and pseudo-ops which aid the programmer and add power and flexibility. The screen-oriented editor is designed for efficient and easy editing of assembly language programs. **MACRO-80C** allows global changes and moving/copying blocks of text. You can edit lines of assembly source which exceed 32 characters. **DCBUG** is a machine language monitor which allows examining and altering of memory, setting break points, etc.

Editor, assembler and monitor—along with sample programs—come on one Radio Shack compatible disk. Extensive documentation included. By Andy Phelps. **\$99.95**

SDS-80C: SOFTWARE DEVELOPMENT SYSTEM—Our famous editor, assembler and monitor in Rompack. Like **MACRO-80C**, it allows the user to write, assemble and debug assembly language programs with no reloading, object patching or other hassles. Supports full 6809 instruction set. Complete manual included. **\$89.95**

MICROTEXT: COMMUNICATIONS VIA YOUR MODEM! Now you can use your printer with your modem! Your computer can be an intelligent printing terminal. Talk to timeshare services or to other personal computers; print simultaneously through a second printer port; and re-display text stored in memory. Download text to Basic programs; dump to a cassette tape, or printer, or both. **Microtext** can be used with any printer or no printer at all. It features user-configurable duplex/parity for special applications, and can send any ASCII character. You'll find many uses for this general purpose module! **ROMPACK** includes additional serial port for printer. **\$59.95**

MICRO WORKS COLOR FORTH

- Faster to program in than Basic
- Easier to learn than Assembly Language
- Executes in less time than Basic

The **MICRO WORKS COLOR FORTH** is a Rompack containing everything you need to run Forth on your Color Computer. **COLOR FORTH** consists of the standard Forth Interest Group (FIG) implementation of the language plus most of **FORTH-79**. It has a super screen editor with split screen display. Mass storage is on cassette. **COLOR FORTH** also contains a decompiler and other aids for learning the inner workings of this fascinating language. It will run on 4K, 16K, and 32K computers. And **COLOR FORTH** contains 10K of ROM, leaving your RAM for your programs! There are simple words to effectively use the Hi-Res Color Computer graphics, joysticks, and sound.

Includes a 112-page manual with a glossary of the system-specific words, a full standard FIG glossary and complete source listing.

MICRO WORKS COLOR FORTH ... THE BEST! From the leader in **FORTH**, Talbot Microsystems. **\$109.95**

MACHINE LANGUAGE

MONITOR TAPE: A cassette tape which allows you to directly access memory, I/O and registers with a formatted hex display. Great for machine language programming, debugging and learning. It can also send/receive RS232 at up to 9600 baud, including host system download/upload. 19 commands in all. Relocatable and reentrant. **CBUG TAPE:** **\$29.95**

MONITOR ROM: The same program as above, supplied in 2716 EPROM. This allows you to use the entire RAM space. And you don't need to reload the monitor each time you use it. The EPROM plugs into the Extended Basic ROM Socket or the Romless Pack I. **CBUG ROM:** **\$39.95**

SOURCE GENERATOR: This package is a disassembler which runs on the Color Computer and generates your own source listing of the BASIC interpreter ROM. Also included is a documentation package which gives useful ROM entry points, complete memory map, I/O hardware details and more. A 16K system is required for the use of this cassette. **80C Disassembler:** **\$49.95**

HARDWARE

PARALLEL PRINTER INTERFACE—Serial to parallel converter allows use of all standard parallel printers. **PI80C** plugs into the serial output port, leaving your Rompack slot free. You supply the printer cable. **PI80C:** **\$59.95**

SUPER-PRO KEYBOARD—**\$69.95** (For computers manufactured after Oct. 1982, add \$4.95)

ROMLESS PACKS for your custom EPROMS — call or write for information.

BOOKS

6809 ASSEMBLY LANGUAGE PROGRAMMING, by Lance Leventhal, **\$18.95**

TRS-80 COLOR COMPUTER GRAPHICS, by Don Inman, **\$14.95**

ASSEMBLY LANGUAGE GRAPHICS FOR THE TRS-80 COLOR COMPUTER, by Don Inman, **\$14.95**

STARTING FORTH, by L. Brodie, **\$17.95**

GAMES

ZAXXON—The real thing. Excellent. What more can we say? Cassette requires 32K. **\$39.95**

STAR BLASTER—Blast your way through an asteroid field in this action-packed Hi-Res graphics game. Available in **ROMPACK**; requires 16K. **\$39.95**

PAC ATTACK—Try your hand at this challenging game by Computerware, with fantastic graphics, sound and action! Cassette requires 16K. **\$24.95**

HAYWIRE—Have fun zapping robots with this Hi-Res game by Mark Data Products. Cassette requires 16K. **\$24.95**

ADVENTURE—*Black Sanctum and Calixto Island* by Mark Data Products. Each cassette requires 16K. **\$19.95** each.

CAVE HUNTER—Experience vivid colors, bizarre sounds and eerie creatures as you wind your way through a cave maze in search of gold treasures. This exciting Hi-Res game by Mark Data Products requires 16K for cassette version. **\$24.95**

THE MICRO WORKS

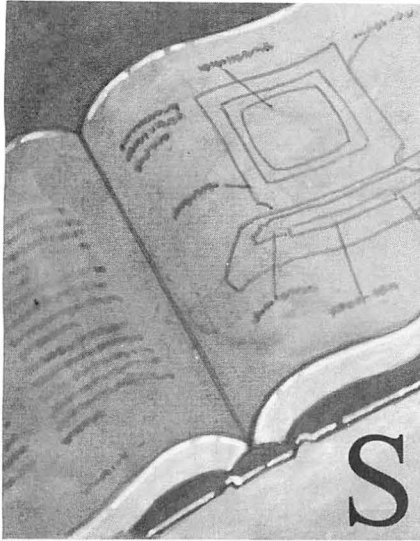
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HOT CoCo's



GUIDE TO EDUCATIONAL SOFTWARE

School opens soon and more than ever the Color Computer will take its place in the classroom. Computers make learning more enjoyable, more efficient, and can often reach those students who have never before been successful learners. The market offers plenty of software for home and classroom use, and to help you make the best choices, *HOT CoCo* has put together the "Buyer's Guide to Educational Software." With the information collected here, you as teachers, parents, students, and administrators who work with the Color Computer can find programs exactly suited to your educational needs.

This software is divided into subject areas including Language Arts, Math, Social Studies, Foreign Language, Music, Self Study, Computer Literacy, Reasoning and Problem Solving, Religion, Business Education, and Telling Time. Since the Language Arts and Math areas have so many programs available, they have been further divided into Preschool, Lower Elementary (grades 1-3), Upper Elementary (grades 4-6), Junior High School (grades 6 and 7), and Senior High School. Each program is listed by name and company and you will find the full address and phone number of each company at the end of the guide.

We have made every effort to make this guide as complete as possible. Due to the volume of software involved, however, some items may have been missed. Let us know of any additions, and we will publish an update within a few months. ■

HOT CoCo's

GUIDE TO EDUCATIONAL SOFTWARE

Business

Business Course Training
West Bay Company
Ages 12-18

Provides an illustration of controlling basic elements of inventory control for small business. Includes pricing and value control. Provides for student posting of data entries and maintenance of an inventory file. Gives students a feel for a real control of business inventory.

16K ECB; \$30 cassette

Computer Literacy

Color Computer Learning Lab
Radio Shack
All Ages

Self-teaching course in Standard Color Basic.

16K ECB; \$49.95 cassette, cat. no. 26-3153

Color Logo
Radio Shack

Ages preschool-adult

Learn to program with turtle graphics. Helps kids and adults grasp relationships and develop problem-solving skills.

16K ECB; \$49.95, cat. no. 26-2722

I Do Think

West Bay Company
Ages 8-18

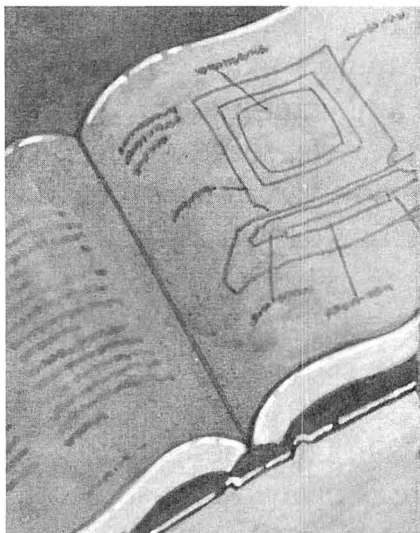
Addresses the question: Can computers think? Provides three programs, each displaying aspects of computer interaction and response to human questioning. Includes animal, poet, and computer.

16K ECB; \$12.50 cassette

Musical \$trings

Creative Technical Consultants
Ages 10-adult

This program is designed to stimulate musical creativity and teach string-variable concepts to students from third grade to



adult. It begins with a brief, animated presentation about string variables, then goes through examples of musical string variables for the Extended Color Basic PLAY command. Finally, it turns the keyboard into a piano so the students can create musical strings to listen to or to add to their own original programs. Instructions appear on the screen as they are needed.

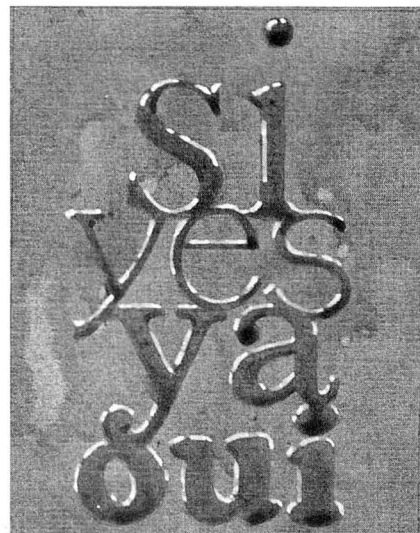
16K ECB; \$16.95 cassette

Foreign Languages

Mon CoCo Parle Francais!
Mi CoCo Habla Espanol!
Federal Hill Software
All Ages

Each language package contains two programs that teach 1,000 words using a game format. A list of vocabulary words for study guides or lesson plans is included.

16K ECB; \$24.95 cassette each, \$26.95 disk each, \$39.95 both on cassette or disk



French Baseball
Spanish Baseball
Computer Island
Ages 10-adult

Beginners can learn vocabulary in the baseball game format. Correct answers score a hit; wrong answers are out. Correct answers are given. Each game has nine innings. Scoring, graphics, and music are included. It comes with 200 words and is user modifiable.

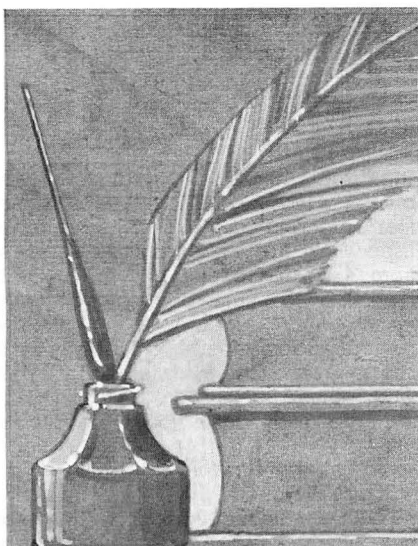
16K ECB; \$11.95 cassette

32K ECB; \$19.95 cassette (500 words)

Spanish One and Spanish Two
West Bay Company
Ages 10-18

These two programs provide self-teaching practice and drill in Spanish language vocabulary: Spanish to English or English to Spanish. The student selects program and words or phrases for either language. Spanish Two is a continuation of the first level.

16K ECB; \$12.50 cassette



Language Arts (All Ages)

Alphabet Soup

Creative Technical Consultants

This word-recognition and spelling program combines aspects of arcade and board games. One to five players or groups compete against each other and the clock to spell words from a "bowl" of up to 14 letters. With nine skill levels, older children and adults can compete with younger children. It is ideal for classroom group competition, especially with a large monitor.

16K ECB; \$15.95 cassette

Dr. Stan

Dee Pee Data Inc.

Dr. Stan teaches spelling using the student's own list.

16K; \$39.95 cassette, \$45.95 disk

Galactic Hangman

Sugar Software

This hangman game includes 700 words, and you can enter your own spelling or vocabulary lists. Play against the computer or a friend, uses color graphics, animation, and sound.

16K and 32K ECB; \$17.95 cassette

Jail

Mr. R's Software

This package contains three programs to enable the user to create word lists. Jail is a sophisticated hangman-type program, and in Scrambled Eggs the player tries to unscramble words. Hints are available. The user controls the words or names used, hence the degree of difficulty.

16K ECB; \$16.95 cassette

Magic Spells

Follett Library Book Co.

Merlapple the wizard has spelling and word scramble games for preschoolers to adults.

16K ECB cassette, 32K disk; \$33.95 cassette, \$38.95 disk

Punctuation

Micro-Ed

These eight programs provide drill and practice using a standardized test format. The computer randomly selects a problem sentence, and the student must identify where (if at all) a mistake occurs. The computer responds to the student's answer with the applicable rule. Each lesson covers from two to seven rules of punctuation. The program summarizes the student's performance at the end of each lesson.

32K; \$56 disk

Silly Syntax

Sugar Software

A story-creation game that emphasizes the parts of speech: noun, verb, adjective, adverb, and gerund. The reward is the story that you create. It can be used for remedial reading since the student is motivated to create the story. Using the create mode, the more gifted student can write his own stories for others to play. It comes with two miscellaneous stories, or a collection of story tapes is available. Each contains 10 stories and costs \$9.95. (Fairy Tales, Sing Along, X-Rated, Current Events, Adventure/Science Fiction, and Potpourri.)

16K ECB cassette, 32K disk; \$19.95 cassette, \$24.95 disk with two stories, \$49.95 disk with 62 stories

Speed Reading

B & B Software

Reading material appears on the screen at a user-selected rate. Speed can be varied while reading. Six text selections are available, as well as a drill to improve visual span and perception.

16K; \$17.95 cassette.

Spell-A-Tron

Speech Systems

This program lets the user build a dictionary of words. During testing, the words are spoken. Incorrect spelling of the spoken word causes it to be spoken again and spelled.

32K ECB; \$24.95 cassette

Spell Bomber

TCE Programs Inc.

Destroy the enemy bomber by spelling the mystery word. The bomber gets closer with each misspelled word. There are only eight tries to get the correct word. There are three difficulty levels.

16K ECB; \$18.95 cassette, \$22.95 disk

Spelling Bee (Kay "The Spelling" Bee)

Crystal Software

Spelling Bee is a one- or two-player word game using hi-res, animated graphics. You must help Kay Bee find the letters that make up the word hidden in the flower. Players input letters using the keyboard, and must be careful not to fill up too many beehives with incorrect letters. The game has music and graphics rewards, comes with a file of 260 words, has three variations and two skill levels. Players can also vary the difficulty by creating their own word files that can be saved on tape.

16K ECB; \$15.95 cassette

Spelling List

Triad Pictures Corp.

Enter any list of spelling words from school, the dictionary, or Triad's preprogrammed word packages. Students are guided through this learning experience with colorful graphics and frequent encouragement. You can save lists on cassette. Data cassettes are available from Triad for Spelling List in the following subject areas: Grades 1, 2, 3, and 4; and 1,000 commonly misspelled words (high school to adult).

16K ECB; \$12 cassette

Spelling Master

Spectral Associates

The pupil must correctly type in words after the computer says them. There is no limit to the number of words you can use.

16K ECB; \$17.95 cassette

Spelling Teacher

Custom Software Engineering Inc.

Spelling Teacher helps the pupil learn any list of up to 200 words. Lesson files can be saved on cassette or disk. Lessons are presented in a study mode, trial test, final test, and scrambled-word game. Misspelled words are retaught throughout to reinforce correct spelling. Accuracy is rewarded.

16K ECB; \$13.95 cassette

Spell 'N Win

Microcom Software

This program is designed to improve spelling and has four levels of proficiency: beginners, intermediate, advanced and expert. It includes 800 assorted spelling words.

16K ECB; \$16.95 cassette

Usage

Micro-Ed

This 15-program package focuses on common mistakes in usage, such as disagreement between subject and verb, double negatives, etc., through drill and practice. The computer informs the student whether the answer is right or wrong and displays the correct usage. Each lesson has 10 problems. A summary of the student's performance appears at the end of each lesson.

32K; \$99 disk

Vocabulary Management System

Tom Mix Software

This package of nine programs teaches and drills the student on as many as 300 words of the tutor's choosing. A full-feature data entry and edit program is included, and output to a printer is supported by three programs that allow creating of individual tests, word searches, and worksheets. There are five vocabulary/spelling learning games. Files can be saved on disk or cassette.

16K ECB (32K for printer); \$39.95 cassette, \$42.95 disk

Language Arts (Lower Elementary)

Hangword & Scramble B5 Software Ages 6-13

This program presents two word games. Hangword is a hangman-type game that gives blanks on the screen for students to fill in. Wrong guesses build a graphics display of the word "sorry." Scramble displays the word with the letters scrambled. Students must guess the word and spell it correctly. Input your own words or buy data tapes (listed below). Printer use is optional and the program will accept words with apostrophes, hyphens, and spaces. Word lists can be edited. Data tapes available:

- Dolch Words, \$8 (95-273 words used in primary grades with beginning readers).
 - Grade Level Spelling, \$8.95 per grade level (over 300 words appropriate to specific grade level).
 - Most Misspelled Words, \$8.95 (over 400 words).
 - Space Words \$8.95 (over 200 words for the advanced speller).
- 16K ECB, 32K disk; \$14.95 cassette, \$16.95 disk

Happy Birthday, Mr. Gift Teksym Corporation Ages 5-7

Children unwrap presents and unlock words, discriminating between pairs of one-syllable words with different vowels. Program features graphics, spoken messages, timed levels, music, and scoring machine. It comes with a 12-page manual. 16K ECB; \$16.95 cassette

Match It Bertamax Inc. Ages 4-6

This program teaches children to match upper- with lowercase letters, or lower- with uppercase letters. Played in a game setting, it provides practice in letter-recognition skills. It makes a good readiness activity for kindergarten-aged children or those just learning the alphabet. Graphics rewards are provided. 32K ECB; \$24.95 disk

Mickey's Alpine Adventure Radio Shack Ages 7-9

Learn with Mickey Mouse and Donald Duck about the sounds of vowels and consonants. You'll also learn important spelling rules. Hi-res screen graphics appear with displayed text, recorded narration and music, and immediate feedback for answers. Includes activities for increasing comprehension. 16K ECB; \$34.95 cassette, cat. no. 26-2534

Mickey's World of Writing Radio Shack Ages 8-11

Students learn sentence structure and writing skills with Mickey Mouse. The program uses hi-res screen graphics with dis-

played text, recorded narration and music, and immediate feedback for answers. Includes activities for increasing comprehension. 16K ECB; \$34.95 cassette, cat. no. 26-2532

Old McDonald's Farm Vowels Teksym Corporation Ages 5-7

Game-like program uses speech and color pictures of animals to drill long and short vowels. Program features graphics, spoken messages, timed levels, and a scoring machine. The reward is given in song. Includes a 12-page manual. 16K ECB; \$16.95 cassette

Parts of Speech 1 (Levels 3 and 4) Bertamax Inc. Ages 7-9 and 8-10

The objective of this program is to provide practice in recognition of parts of speech. Level 3 deals with nouns and verbs, Level 4 with nouns and verbs in context. The name of a part of speech appears in the box and the student must decide if the word beside the "eater" is used as that part of speech. If a match is made, students will see the word devoured. If not, the word will be kicked off the screen. It features 10 lessons per program, game-like setting, and the words incorrectly identified listed at the end of the lesson. 32K ECB; \$29.95 cassette or disk

Parts of Speech II (Level 3) Bertamax Inc. Ages 7-9

The objective of this program is to provide practice identifying parts of speech in a paragraph. The student underlines all words in the paragraph that are used as the part of speech indicated in the upper left corner. At level 4 the student first underlines all the nouns and then all the verbs. 32K ECB; \$29.95 cassette or disk

Plurals TCE Programs Inc. Ages 6-11

Side 1 teaches five rules of pluralization: regular plurals; ch, sh, s, ss, x, and z endings; f and fe endings; o endings; and y endings. Side 2 contains practice exercises reinforcing the lessons of side 1. 16K; \$18.95 cassette

Punctuation and Capitalization Levels 1-3 Bertamax Inc. Ages 8-10

This user-oriented series of programs enables students to edit sentences to correct errors in punctuation and capitalization. It requires no typing skills, and changes are made by selecting options from a menu of choices. The student moves the cursor under a letter to be capitalized. The computer responds to the user's command and capitalizes the letter. It uses the same method to insert correct punctuation. The program features a carefully graded sequence of skills, 10 lessons per level (Levels 1-8), complete user

control, automatic error checking, self-scoring, and examples. 32K ECB; \$34.95 cassette or disk

Spelling B5 Software Ages 6-13

This program lets you input your own choice of words and store them on tape files. You can also buy data tapes to be used with it. The words flash on the screen from .1 to 10 seconds, and the student types the word. The score appears after each entry. At the completion of the lesson the student receives a graphics and sound reward. The following data tapes work with the Spelling program:

- Grade Level Spelling, \$8.95 per grade level
 - Most Misspelled Words, \$8.95
 - Space Words, \$8.95
 - Keyboard Phonic Drill, \$8.95 (Children type letter, word, and sentence drills using common vowel and consonant combinations. It reinforces phonic structures.)
 - Dolch Words, \$8.95
- 16K cassette, 32K disk; \$16.95 cassette, \$18.95 disk

Spelling in Context, Level 1 Bertamax Inc. Age 6

Learning to spell a word in the context of a sentence helps to give the word meaning, which increases the chances it will be remembered. The user types the word and presses enter. If the word is correct, a positive message appears. If the word is misspelled, one of several corrective messages appears. Each misspelled word is recorded by the computer. If the user scores less than 90 percent correct on the lesson, the misspelled words are reviewed at the end of the regular lesson. 32K ECB; \$34.95 cassette or disk (Also available: Level 2, Age 7; Level 3, Age 8)

Story Mix 1-Ivan Bertamax Inc. Ages 5-7

Students compose their own story by selecting story parts from a menu of four choices. Each story part is a meaningful phrase. There are six parts to each story, four choices for each part, and each part includes a picture and story line. Stories are composed by choosing answers to questions. As each choice is made, a picture is displayed and a portion of the story appears below the picture. Individual programs focus on different themes. Other Story Mix programs include At The Zoo, Nursery Mix, Animal Mix, Going Places, and In and Out. These are also for ages 5-7, and the price is the same as Story Mix 1. 32K ECB; \$24.95 cassette or disk

Vocabulary Tutor Radio Shack Ages 8-10

Match words with their definitions and place words in the appropriate sentences. Comes in version 1 and version 2. 16K ECB; \$8.95 cassette each, cat. nos. 26-2568 and 26-2569, respectively

Language Arts (Upper Elementary)

Alphabetize TCE Programs Inc. Ages 9-14

The program randomly chooses words from memory for the pupil to alphabetize. This program is networkable.
16K; \$15.95 cassette

Antonym Match TCE Programs Inc. Ages 10-14

This program hides an antonym behind a colored door, and the pupil must match them all. The program is networkable.
16K; \$16.95 cassette

Beyond Words, Levels 1, 2, and 3 Computer Island

Ages 8-11, 12-14, and 14 and up
Each program contains three grade-appropriate subtests. They contain over 400 questions and use over 800 words. A printer option is included, and user modification directions are given.
32K ECB; \$19.95 cassette, \$22.95 disk

Context Clues Computer Island Ages 9-13

Each program contains 50 situational paragraphs with one key word missing. The child uses context clues to find missing answers in multiple-choice format. Specify for fourth, fifth, sixth, or seventh grade.
16K ECB; \$17.95 cassette

Dr. Adlib Dee Pee Data Inc. Ages 10-15

Let the student create his own sentences to learn parts of speech.
16K; \$19.95 cassette, \$25.95 disk

English Review TCE Programs Inc. Ages 10-14

This package contains practice sessions on nouns, verbs, adverbs, and adjectives. English Review can be used in a networked system.
16K; \$21.95 cassette, \$25.95 disk

Fun with Reading Radio Shack Ages 9-11

Each package includes an illustrated reader, a read-along cassette tape, and a computer tape with spelling and vocabulary exercises with immediate feedback:

- Dracula, cat. no. 26-2550
 - The Hound of the Baskervilles, cat. no. 26-2551
 - Moby Dick, cat. no. 26-2552
 - 20,000 Leagues Under the Sea, cat. no. 26-2553
- 16K ECB; \$19.95 each cassette

King Author's Tales Computer Island Ages 7-13

A creative writing tool allowing user to create and save original stories on file. Saves

optional questions and answers for each page, and title page picture as well. Rewrite, correction, review, and printer features make writing compositions a pleasure. Printer is optional.
16K ECB cassette, 32K disk; \$29.95 disk or cassette

Parts of Speech I, Levels 5 and 6 Bertamax Inc. Ages 9-11 and 10-12

This program gives practice in recognizing the part of speech of a given word. The name of a part of speech appears in the box and the student must decide if the word beside the "eater" is used as that part of speech. If a match is made, students will see the eater devour the word. If not, the word is kicked off the screen. It features 10 lessons per program in a game-like setting, with incorrectly identified words listed at the end of the lesson.
32K ECB; \$29.95 disk or cassette

Parts of Speech II, Levels 4, 5, and 6 Bertamax Inc. Ages 8-10, 9-11, and 10-12

This program gives practice identifying parts of speech in a paragraph. The student underlines all words in the paragraph that are used as the part of speech indicated in the upper left corner. At level 4 the student first underlines all the nouns, then all the verbs. It features 10 lessons per level, a story theme for each level, immediate reinforcement, and the final report gives total percent for each lesson and for each level.
32K ECB; \$29.95 cassette or disk

Punctuation and Capitalization, Levels 4, 5, and 6 Bertamax Inc. Ages 8-11, 10-13, and 11-14

This user-oriented series of programs enables students to edit sentences to correct errors in punctuation and capitalization. No typing skill is required since changes are made by selecting options from a menu of choices. The student moves the cursor under a letter to be capitalized and the computer responds. In a similar manner you can insert the correct punctuation where needed. The programs feature carefully graded sequence of skills, 10 lessons per level (levels 1-8), complete user control, automatic error checking, self scoring, examples, and it covers skills included in most standardized tests.
32K ECB; \$34.95 cassette or disk

Save the Fish TCE Programs Inc. Ages 8-12

The pupil has eight chances to spell the mystery word correctly before a whale eats the fish. The longer it takes to discover and spell the word, the closer the fish gets to the whale. The program has three levels of difficulty. In the third level, an opponent rather than the computer can enter mystery words.
16K ECB; \$18.95 cassette, \$22.95 disk

See & Spell TCE Programs Inc. Ages 7-12

See & Spell provides high-resolution drawings of people and things representing words. Blanks appear in place of letters above the picture. When a correct key is entered, a large, painted letter appears. When an incorrect key is pressed, the correct letter appears, but in outline form. If the word is spelled correctly, a musical tone sounds.
16K ECB; \$18.95 cassette, \$22.95 disk

Space Probe: Reading Radio Shack Ages 10-15

This outer-space adventure develops important reading comprehension skills. It has hi-res screen graphics with displayed text, recorded narration and music, and immediate feedback for answers. Includes activities for increasing comprehension.
16K ECB; \$34.95 cassette, cat. no. 26-2536

Spelling Bee TCE Programs Inc. Ages 8-13

This program speaks the word to be spelled. If you enter an incorrect spelling, the correct spelling appears on the screen for an instant and another chance is given. If it is still wrong, the correct spelling appears a little longer, and the pupil gets yet another chance. If after the third chance the word is still misspelled, the correct spelling stays on the screen for the pupil to copy and learn. There are four versions of Spelling Bee: Spelling Bee I, grades 1 and 2; Spelling Bee II, grades 3 and 4; Spelling Bee III, grades 5 and 6; and Spelling Bee IV, grades 7 and 8.
16K ECB; \$16.95 cassette each

Spelling in Context, Levels 4, 5, and 6 Bertamax Inc. Ages 9, 10, and 11

Teaches students to spell a word using the context of that word. The user types the word and presses the enter key. If the word is correct, a positive message appears. If it is misspelled, a corrective message appears. Each misspelled word is recorded by the computer. If the user scores less than 90 percent correct on the lesson, the misspelled words are reviewed at the end of the regular lesson.
32K ECB; \$49.95 disk

Super Speller Creative Technical Consultants Ages 7-16

Students learn by playing spelling games with their own lists of spelling words. Enter up to 25 words and an associated definition, synonym, or antonym, then store them on tape to study as often as needed. A menu offers a choice of three games to play with the word list: matching words and definitions, filling in missing letters, and unscrambling words.
16K ECB; \$15.95 cassette

Synonym Express
TCE Programs Inc.
Ages 10-14

This program teaches the concept of words that have similar meanings through example and practice exercises.
16K ECB; \$14.95 cassette

Torpedo Scramble
TCE Programs Inc.
Ages 8-12

The pupil must decipher a code by unscrambling letters in this learning game. If the word is unscrambled, a torpedo sinks the submarine.
16K; \$18.95 cassette

Vocabulary Builders, Levels 1, 2, and 3
Computer Island

Ages 8-11, 11-14, and 14 and up
Contains 200 vocabulary questions of appropriate grade levels in a four-part, multiple-choice format that uses 1,000 words. When mastered, the user can change words. Printer option included.
32K ECB; \$19.95 cassette, \$22.95 disk

Vocabulary
Micro-Ed
Ages 10-15

There are 72 lessons in this 24-program series. Each lesson deals with words commonly found in daily newspapers and weekly news magazines. Each problem presents a definition and a sample sentence. The student chooses the vocabulary word that best fits. A summary of the student's performance appears at the end of each lesson with a list of problem words.
32K; \$168 disk

Language Arts
(Junior High School)

Punctuation and Capitalization 7 and 8
Bertamax Inc.

Ages 12 and 13
This user-oriented series of programs enables students to edit sentences to correct errors in punctuation and capitalization. No typing skill is required since changes are made by selecting options from a menu. The student moves the cursor under a letter to be capitalized and the computer responds. In a similar manner you can insert the correct punctuation where needed. The programs feature carefully graded sequence of skills, 10 lessons per level, complete user control, automatic error checking, self scoring, examples, and they cover skills included in most standardized tests.
32K ECB; \$34.95 cassette or disk

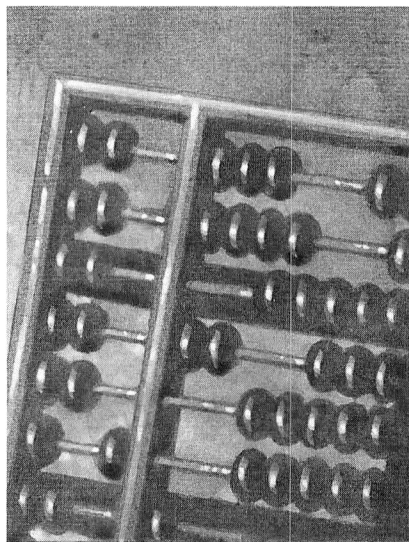
Spelling
Micro-Ed
Ages 7-12

A supplement to classroom instruction, this package comes in five levels of seven programs each for grades 2-6. Each program has five or six lessons available from a single loading. The entire series has 180 lessons. Each program is menu driven. Each

lesson lists 10 words to be used, and then displays a sentence with a word to be spelled missing. A summary of the student's performance appears at the end of each lesson.
32K; \$49.95 each disk, Levels A-E (grades 2-6)

Spelling in Context, Levels 7 and 8
Bertamax Inc.

Ages 12 and 13
Teaches students to spell a word using the context of that word. The user types the word and presses the enter key. If the word is correct, a positive message appears. If it is misspelled, a corrective message appears. Each misspelled word is recorded by the computer. If the user scores less than 90 percent correct on the lesson, the misspelled words are reviewed at the end of the regular lesson.
32K ECB; \$69.95 cassette or disk



Math
(Lower Elementary)

Borrow
B5 Software
Ages 7-9

This game allows the student to reinforce his subtraction skills. Problems appear in large graphics numerals. Small boxes above the numbers let you regroup. There are seven skill levels, graphics rewards.
16K ECB cassette, 32K disk; \$19.95 cassette, \$21.95 disk

Carry
B5 Software
Ages 7-9

This program helps students practice addition, and is set up in the same format as Borrow (listed above).
16K ECB cassette, 32K disk; \$19.95 cassette, \$21.95 disk

Digidots
Triad Pictures Corp.
Ages 5-7

Large colorful dots and numbers teach

addition and subtraction in a unique and entertaining way. This program teaches subtraction as an integral part of addition. A student gains related subtraction facts with each addition fact learned. With the computer's encouragement students advance at their own rate. Automatic replay of missed problems is a prime feature.
16K ECB; \$14 cassette

Dollars and Sense
Computer Island
Ages 7-10

Player learns to use money correctly by determining which coins and bills are needed to purchase various items. Ten times, different prices each time, solutions, and scoring are included. Program has graphics, music, and three levels of difficulty.
16K ECB; \$14.95 cassette

Essential Mathematics, Levels 1, 2, and 3
Bertamax Inc.

Ages 4-6, 5-7, and 6-8
The topics included in the lessons, in each strand such as addition, subtraction, or number concepts, have been carefully sequenced. The location of each skill has been the result of careful analysis of grade placement of topics in math texts. The programs feature drill and practice with immediate reinforcement, carefully graded sequence of skills, extra activities at the end of many of the lessons, teacher options for changing the length of lessons, and use classroom-proven techniques for mastery and retention.
32K ECB; \$39.95 each cassette or disk

Facts Match: Division, Multiplication, Subtraction, Addition
Bertamax Inc.

Ages 5-9
These are four different programs designed to teach mastery of math facts. Using a game-like program, students match numerals with word names and number combinations. Each program features three levels of difficulty, four speeds of motion, and graded sequence of facts. There is an optional manual control speed for slower or handicapped students.
32K ECB; \$24.95 each cassette or disk

Math Activities Level 3
Bertamax Inc.

Ages 7-9
These activities are selected from Essential Mathematics, and they are revised and improved to become separate games. Each encourages mastery of basic skills and includes five concept strands, 10 lessons in each strand, and four difficulty levels in each lesson.
32K ECB; \$34.95 cassette or disk

Mathfact
B5 Software
Ages 6-10

This program motivates students to learn their facts. All four operations—addition, subtraction, multiplication, and division—are in the program. Students can se-

lect the desired operation and then the desired addend, subtrahend, factor, and divisor, or they can request a mixed presentation within each operation. There are two skill levels. Level 1 has a graphics display of blocks to illustrate each problem. Level 2 presents only the facts with no block illustrations unless the student misses a problem. The blocks appear to help the student determine the answer. All drills are timed and scored. If all facts are answered correctly, students can play a quick number-guessing game for a reward.

16K ECB cassette, 32K disk; \$16.95 cassette, \$18.95 disk

Math Joy: Addition and Subtraction
Microcom Software
Ages 7-11

Math Joy offers drill and practice in completing various addition and subtraction exercises.

16K ECB; \$11.95 cassette

Money
B5 Software
Ages 7-9

Money provides children with the opportunity to count coins. The five skill levels range from counting only dimes, nickels, and pennies to counting various combinations of all coins that can total more than one dollar. The program uses graphics coins, and problems are presented in a series of three. If all three are answered correctly, a rocket ship ascends to the moon. If one or more in the series is missed, the rocket begins an ascent, but crashes.

16K ECB; \$19.95 cassette, \$21.95 disk

Mr. Bear Count
TCE Programs Inc.
Ages 3-8

A total of 12 counting objects appear on the screen. The child counts either colorful trains or faces. There are two levels of play: sequential order (easy) and random order (hard). Mr. Bear winks for a correct answer. The program is networkable.

16K; \$15.95 cassette, \$19.95 disk

Mr. Bear Math
TCE Programs Inc.
Ages 7-11

Add and subtract with Mr. Bear. The program gives a wink of approval to correct answers. In all nine levels, answers are entered from right to left. Mr. Bear Math is networkable.

16K; \$15.95 cassette, \$19.95 disk

Number Match
Bertamax Inc.
Ages 3-7

A program for remedial education, slow learners, or young learners. The student matches a numeral with a domino pattern or a set of figures. This program develops the concept of numbers and features three levels of difficulty in a game setting. At the easiest level the student matches numeral with domino pattern. At the most difficult level sets of objects are matched

with numerals and domino patterns.
32K ECB; \$24.95 cassette or disk

Number Match II
Bertamax Inc.
Ages 3-7

The second program in the series for young learners in number-concept development. There are two levels. In the first, the student is given a domino pattern and must type the appropriate numeral one through nine. At the second level the student presses the spacebar to make counters appear to match the numeral.

32K ECB; \$24.95 cassette or disk

Skip Counting
B5 Software
Ages 6-10

Skip Counting is a program designed to help children count. It lends itself to individualization because the user selects the parameters. The student or teacher chooses the number by which to count. He can select any number from 1-10, 15, 20, 25, 50, 100, or 1,000. For each lesson the user selects the beginning and ending number up to 9,999,999. For a real challenge, he can count backwards. It allows students to review multiplication products by counting various factors, or to practice mental addition and subtraction while counting forward or backward. Lessons feature music and graphics rewards.

16K ECB cassette, 32K disk; \$16.95 cassette, \$18.95 disk

Math
(Elementary and Higher)

Basic Math
Dee Pee Data Inc.
Ages 6-12

This program teaches addition, subtraction, multiplication, and division.

16K; \$19.95 cassette, \$25.95 disk

Bumble Games
Follett Library Book Co.
Ages 3-10

Bumble Games teach essentials of graphing positive numbers using color. One or two players find secret numbers, Bumble's hiding place, a lost butterfly, and Bumble's cousin's spaceship. Children can also play tic-tac-toe or draw.

16K ECB cassette, 32K disk; \$39.95 cassette, \$44.95 disk

Color Math Quiz
Creative Technical Consultants
Ages 7-18

CMQ is a noncompetitive math drill program designed to help individual students improve their math skills. It combines a multiple-choice answer format and personalized screen messages with entertaining graphics and music. It offers a menu of six math operations: two-number addition, three-number addition, subtraction, multiplication, division, and decimal addition, with five skill levels. The answer format encourages intuitive reasoning.

16K ECB; \$15.95 cassette

Decimal Math Quiz
Creative Technical Consultants
Ages 10-18

DMQ is a math drill program for the individual student featuring the four basic math operations: addition, subtraction, multiplication, and division with decimal numbers. The five skill levels produce a wide variety of problem difficulties. At skill level 1 problems are made up of small numbers with only one decimal place, and the answers are randomly generated, while at levels 4 and 5 the numbers are larger with two to four decimal places, and the incorrect answers presented are very close to the correct ones. It has graphics rewards.

16K ECB; \$15.95 cassette

Estimate
Tom Mix Software
Ages 7-12

This is a practice program that lets children estimate answers to addition, subtraction, multiplication, and division. Up to five students can use it at the same time, and there are five user-modifiable skill levels. The program uses a timer for answers. If an incorrect answer is given, the program tells the pupil by what percentage he was off. A second incorrect answer causes the correct answer to appear on the screen. A report is given at the end of each problem set.

16K ECB; \$19.95 cassette, \$22.95 disk

Frac Pac I
Frac Pac II
Micro-Ed
Ages 8-15

Frac Pac I teaches the basic concepts of fractions and is suitable for home or school use. Each user can determine the level of difficulty. If the student cannot answer in a few tries, the computer provides the correct response. A final score appears at the end of each lesson, and a graphic reward appears for a perfect score. There are four programs: Kinds of Fractions, Mixed Numbers to Fractions, Fractions to Mixed Numbers, and Ratio and Proportion. Frac Pac II teaches addition, subtraction, multiplication, and division of fractions. Its four programs are: Adding Fractions, Subtracting Fractions, Multiplying Fractions, and Dividing Fractions.

32K; \$29.95 cassette, \$24.95 each disk

Fraction Math Quiz
Creative Technical Consultants
Ages 8-18

FMQ is a multiple-choice math drill that provides students with practice in working with fractions. The math operations available include reducing to lowest terms, adding, subtracting, multiplying, dividing, converting mixed numbers to improper fractions, and converting fractions to decimals. It has five skill levels, music and graphics, and personalized prompts to make it suitable for students of all ages and abilities.

16K; \$15.95 cassette

Heroes and Trolls: A Math Facts Adventure Game
Cognitive Development Co.
Ages 8-15

This math adventure teaches addition, subtraction, multiplication, and division. The student chooses which to practice along with one of three skill levels. The student guides his player through a hi-res maze in search of trolls, heroes, and dragons. If he correctly answers the math problem that appears at each encounter, he adds to his point total.
32K ECB; \$29.95 cassette or disk

Math Drill
Tom Mix Software
Ages 7-14

Math Drill is a practice program for addition, subtraction, multiplication, and division. Up to six pupils can use the program at the same time. Answers for addition, subtraction, and multiplication are written from right to left, and commas may be included in answers. There are 10 user-modifiable skill levels that automatically adjust to the student's ability level. The program also keeps track of the amount of time a student takes to answer the question. If the pupil gives an incorrect answer, the correct answer appears on the screen. Correct answers are rewarded with a smiling face.
16K ECB; \$19.95 cassette, \$22.95 disk

Math Quiz
West Bay Company
Ages 8-18

Provides self-teaching practice and drill in basic mathematics. Addition, subtraction, multiplication, and division problems included. Students select numbers and types of problems. Scoring is also included.
16K ECB; \$8 cassette

Math Tutor
Custom Software Engineering Inc.
Ages 6-15

This package contains five programs that provide practice in basic math skills. Drill is used for numbers up to 12. The Addition, Subtraction, and Multiplication programs each require all regrouping possibilities to be considered. The Division program provides a trial quotient that can be changed as many times as needed. Each program guides the student digit by digit, and they show the correct answer and how it was derived if the student does not correct his error within three attempts. 16K ECB; \$14.95 cassette

Math Word Problems
Creative Technical Consultants
Ages 10-18

This program makes up its own word problems from lists of subjects and objects entered by the student, with often humorous results. It features five skill levels and a choice of four types of problems: weights and measures, trips, money, and time.
16K ECB; \$16.95 cassette

Metric Mind
Creative Technical Consultants
Ages 7-17

A drill program designed to improve the student's metric skills, including direct conversion between metric and English systems and estimating measurements in metric units. There are five skill levels, music, graphics, and personalized prompts.
16K ECB; \$15.95 cassette

Roman Numerals
Creative Technical Consultants
Ages 8-16

A drill program designed to help students learn conversion between Roman and Arabic numerals. It is menu-driven with five skill levels, music, and personalized prompts and rewards.
16K ECB; \$15.95 cassette

Speed Math
West Bay Company
Ages 6-18

Speed Math is a game and a challenge. The user competes against a timer to complete a desired number of problems to add, subtract, multiply, divide, or a combination of all.
16K ECB; \$8 cassette

Story Problems
Tom Mix Software
Ages 7-14

Story Problems presents lessons in addition, subtraction, multiplication, and division in a story format. Stories can be custom designed by the tutor to suit the pupil's needs. Up to five students can use the program at the same time, and there are four user-modifiable skill levels.
16K ECB; \$19.95 cassette, \$22.95 disk

Teasers by Tobbs
Sunburst Communications
Ages 8-adult

This program helps your children practice arithmetic while developing thinking skills. Working through the puzzles helps them learn how to break down a problem into its component parts, select the part to solve first, and then find the solution.
32K; \$39.95 disk

Math
(Upper Elementary)

Bumble Plot
Follett Library Book Co.
Ages 7-13

These games teach the concepts of graphing positive and negative numbers. Children trap and guess secret numbers, trap a bumblebug, find hidden treasure and a surprise, draw, and catch a bank robber. One or two can play.
16K ECB cassette, 32K ECB disk; \$39.95 cassette, \$44.95 disk

Division Tutor
Computer Island
Ages 9-12

This tutorial takes the user step by step through the example. There are four difficulty levels, or you can input your own ex-

amples. Help command, graphics, cursor aids, and scoring included.
16K ECB; \$14.95 cassette

Essential Mathematics, Levels 4, 5, and 6
Bertamax Inc.
Ages 7-9, 8-10, and 9-11

The topics included in the lessons, in each strand such as addition, subtraction, or number concepts, have been carefully sequenced. The location of each skill has been the result of careful analysis of the grade placement of topics on math textbooks. The programs feature motivational drill and practice with immediate reinforcement, carefully graded sequence of skills, extra activities at the end of many of the lessons, teacher options for changing the length of lessons, simple record-keeping system, and the use of classroom-proven techniques for mastery and retention.
32K ECB; \$69.95 cassette or disk

Factors Tutor
Computer Island
Ages 10-13

Takes user step by step through each example. Four levels of difficulty, or choose your own example. Learn greatest common factor, prime numbers. Help command, graphics, music, and scoring included.
16K ECB; \$19.95 cassette

Fraction Destroyer
TCE Programs Inc.
Ages 10-13

The pupil is the captain of a destroyer. He must sink enemy submarines by adding two fractions together, finding the common denominator and resulting numerators. Side 2 has fraction subtraction.
16K; \$21.95 cassette, \$25.95 disk

Fractions
TCE Programs Inc.
Ages 9-12

Side 1 explains fractions with the aid of graphics. Lessons include improper fractions, mixed fractions, and proper fractions. Side 2 is a randomly generated quiz.
16K; \$19.95 cassette

Fractions Tutors
Computer Island
Ages 9-14

This tutorial takes the user step by step through each example. There are three difficulty levels, or you can input your own example. Help command, graphics, sound, and scoring are included. Available individually in Addition of Fractions, Subtraction of Fractions, and Multiplication of Fractions.
16K ECB; \$19.95 each cassette

Math Activities, Levels 4, 5, and 6
Bertamax Inc.
Ages 8-10, 9-11, and 10-12

Motivating activities selected from Essential Mathematics that have been revised, improved, and made available as separate games. Each game encourages mastery of basic skills. Contains five concept strands, 10 lessons in each strand,

four difficulty levels in each lesson.
32K ECB; \$34.95 cassette or disk

Math Adventures with Mickey
Radio Shack

Ages 9-13

Mickey Mouse and his friends teach effective methods for problem solving and how to use decimals. The program has hi-res screen graphics with displayed text, recorded narration and music, and immediate feedback for answers. Includes activities for increasing comprehension.
16K ECB; \$34.95 cassette, cat. no. 26-2535

Math Facts Games, Set 1
Bertamax Inc.

Ages 8-14

The purpose of each of these games is to motivate practice of the 400 math facts in addition, subtraction, multiplication, and division. The user can choose any operation or combination of operations at any one of four levels of difficulty. To play each game, the user must first correctly give a basic fact, then he can take his turn at the game of his choice. The user plays against the computer. Games include Count Down, in which students try to complete as many facts as possible before the computer counts down from 30 to 0; Secret Word, where the computer selects a math word that the student must guess (after each wrong guess he receives a hint until he can give the correct word); Tic-Tac-Toe, in which the student must beat the computer with the correct facts, using a strategy; and The Great Computer Challenge, a timed race against the computer.

32K ECB; \$34.95 cassette or disk

Math Facts Games, Set 2
Bertamax Inc.

Ages 8-14

This program functions in the same manner as Math Facts Games, Set 1, with the following games used: Stop the Fact (The student must stop the moving fact by typing the correct answer. The sooner it is stopped, the higher the score. 10 facts per lesson, 10 lessons.) Guide The Answer (Guide a moving answer to the correct combination. For one or two players.) Find the Answer (Move the pointer to the correct answer and see it move across the screen to join its matching combination. Score 10 points for a correct answer on the first try.) The Great Face Race (Type in the correct answers as fast as possible, playing against the computer or another player.)
32K ECB; \$34.95 cassette or disk

Math Flash Cards
Creative Technical Consultants
Ages 6-12

An inexpensive way for students to study math tables. The menu offers a choice of the four math operations and asks what range of numbers you want to work with. You also have a choice between studying the problems in random order or numerical order. The full-screen display with large numerals makes this program suitable for classroom use.
16K ECB; \$10.95 cassette

Math Invaders
Computer Island
Ages 6-12

A multi-level Space Invaders-type game to reinforce the four basic math operations (addition, multiplication, subtraction, and division). Problems get more difficult as you progress. Uses hi-res graphics. 16K ECB, joystick; \$17.95 cassette

Math Invasion
Crystal Software
Ages 8 and up

This program combines arcade-game excitement with learning math facts. Math problems disguised as aliens descend upon the planet. Your mission is to load your laser cannon with the correct answers and blast the Space Invaders before they land. If necessary, you can instruct the Computer Aided Defense System to assist you in making the proper calculations. All the math problems are composed of whole numbers/integers. Specific ranges are varied by selecting different skill levels. Invaders come from one of four galaxies: Addition, Subtraction, Multiplication, and Division. Each galaxy has three classes of aliens that require a different level of math expertise to fight against. The player uses a menu to select the type and difficulty of the invading math problems.
16K; \$19.95 cassette

McCoCo's Menu
Computer Island
Ages 7-12

The user learns to buy and add up purchases from a typical fast-food restaurant menu. Reinforces addition of decimals, and includes graphics, music, and scoring.
16K ECB; \$14.95 cassette

Multiplication Tutor
Computer Island
Ages 8-12

Takes the user step by step through each example. There are four difficulty levels, or you can input your own example. Help command, graphics, and cursor aids are included along with scoring.
16K ECB; \$14.95 cassette

Number Cruncher
Bertamax Inc.
Ages 8-15

Math texts have pictured "function machines" of various types, and now using a microcomputer, you can see how such a device works. This function machine accepts the number of user inserts. Then wheels turn and out pops a new number that the Number Cruncher made out of the old one. The user must guess the rule the Number Cruncher used to make the new number. It features a carefully graded set of rules and combinations, comprehensive teacher's manual, 10 lessons of five formulae each, three levels of difficulty, and 30 lessons. The program encourages reasoning and logical thinking, and functions range from simple linear $N+5$ in lesson 1 to quadratic in lesson 10.
32K ECB; \$49.95 cassette or disk

Number Power
Triad Pictures Corp.
Ages 8-12

A fun way to wean students away from counting on their fingers while gaining speed and accuracy in addition and subtraction. This powerful exercise presents a random order of problems at a selectable speed. Students progress at their own rate. The computer supplies encouragement and generous review of missed problems.
16K ECB; \$14 cassette

Pre-Algebra I Integers
Tom Mix Software
Ages 9-15

A series of four programs, this package gives students practice in addition, subtraction, multiplication, division, and the comparison of integers. Up to four students can use the program at the same time, and there are nine user-modifiable skill levels. Each student gets two chances to correctly answer a problem. A detailed report at the end of each lesson indicates how many answers were correct on the first try, the number wrong, total time used, and score in percentage.
16K ECB; \$29.95 cassette, \$32.95 disk

Problem Solving with Scrooge McDuck
Radio Shack
Ages 9-13

Discover the value of estimating with Scrooge McDuck and how to read graphs with Goofy. The program has hi-res screen graphics with displayed text, recorded narration and music, and immediate feedback for answers. Includes activities for increasing comprehension.
16K ECB; \$34.95 cassette, cat. no. 26-2531

Space Probe: Math
Radio Shack
Ages 7-14

In an interstellar atmosphere, students learn about word problems and the concepts of area and perimeter.
16K ECB; \$34.95 cassette, cat. no. 26-2537

Taxi
Radio Shack
Ages 7 and up

A cooperative strategy game, Taxi helps students learn to make change as they drive taxis through major cities.
16K ECB, joysticks; \$19.95 cassette, cat. no. 26-2509

Math
(Junior High School)

Essential Mathematics, Levels 7-8
Bertamax Inc.
Age 12

The topics included in the lessons, in each strand such as addition, subtraction, or number concepts, have been carefully sequenced. The location of each skill is the result of careful analysis of the grade placement of topics in mathematics texts. The six-disk set features drill and practice with immediate reinforcement, extra activities, techniques for mastery and retention, teacher options for changing the

length of lessons, and a simple record-keeping system.
32K ECB; \$225 disk

Math (Senior High School)

Statgraf (Math, Business, Economics)
Sugar Software
Ages 15 and up

This regressions-analysis and graph-plotting program can be used in higher math, chemistry, physics, and economics. Enter up to 250 pairs of (x,y) data. Transform data: logarithm, square root, inverse, exponential, additive. Plot multiple data sets on a single graph using any of five special figures or any text character as a plotting symbol. Calculate, display, and plot residuals; superimpose on the graph frame and regression line with 95-percent confidence limits.

32K ECB; \$24.95 cassette, \$29.95 disk

Miscellaneous

Audio Talk/Tutor Programs
Dorsett Educational Systems Inc.
All Ages

(Ed. note: Due to the number of programs that Dorsett offers, we must include them all in one general listing.)

Dorsett offers 320 educational programs for the Color Computer in the following categories: Language Arts (16), Reading (64), Comprehension (32), Phonics (32), English as a Second Language (32), Mathematics (64), Basic Algebra (16), Physics (16), Effective Writing (16), and History (32). All have easy-to-understand human narration. All text is in true upper- and lower-case, and graphics illustrate key concepts.

\$4.40 per program on cassette, \$8.80 for two, \$59.90 for 16 programs in an album

Color Computer Programs
Dilithium Press

Ages 7 and older

Designed specifically for the CoCo, here are 37 fully documented programs that are educational, fun, and practical. Each chapter of the book documents a program and is made up of eight sections: Purpose, How to Use It, Sample Run, Program Listing, Easy Changes, Main Routines, Main Variables, and Suggested Projects. A special color section shows you how the programs look on a color monitor. You can either type the program in yourself or buy the book/software package with the program ready-to-run on cassette.

16K, \$39.95 cassette

Education Combo
Brantex Inc.

Ages 7 and up

This four-program package includes Metric Converter, Peek 'N' Spell, Math Derby, and Change. Metric Converter translates gallons into milliliters, and yards into millimeters, as well as many other units of English and metric measure. Peek 'N' Spell

flashes a word or letter on the screen, and the pupil must accurately repeat it. Word lists can be stored on disk or cassette. Math Derby is a horse race in which the player's horse advances as math problems are correctly answered. Change teaches children how to handle money. The child visits several merchants and determines which ones do not give proper change.

16K ECB; \$24.95 cassette

Quiz All
Color Connection Software
Ages 8-adult

Quiz All lets you create quizzes in several different formats in any topic area. One option lets the computer generate multiple-choice answers. Quizzes can be taken on the computer with positive and negative responses or printed out for others.

16K ECB cassette, 32K disk; \$18.95 cassette, \$20.95 disk

Quizspin
Spectral Associates
All Ages

This is an educational game similar to TV's *Joker's Wild*. The program uses high-resolution graphics and offers five categories.

16K ECB; \$24.95 cassette, \$28.95 disk

Shoot to Spell and Flash Math
K & K Computers

Ages 7 and up

This package teaches spelling and elementary math.

16K ECB; \$15.95 cassette, \$19.95 disk

Superflash
Triad Pictures Corp.
Ages 7-adult

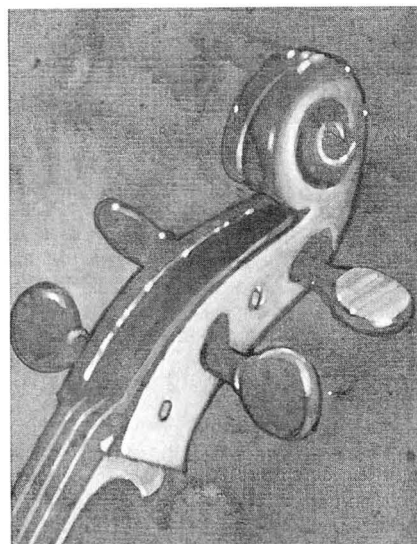
Computerized super flash cards. Students or teacher can enter lists of up to 300 items and save them on cassette. The computer compliments or corrects as students go. Score and completion time are both displayed with a replay of missed cards if desired. Data cassettes are available from Triad for Superflash in the following subject areas: Addition (one and two digit), Subtraction (one and two digit), Multiplication (through 12 by 12), Division, and Fractions equal decimals equal percent (equivalent values). Data cassettes are \$10 for the first and \$5 for each additional cassette on the same order.

16K or 32K ECB; \$14 cassette

Test-Aid Enhanced
Infotools
All Ages

Test-Aid is a database program that allows the creation of a large bank of multiple-choice test questions, editing the questions in the bank, selecting questions from the bank for inclusion on an exam or questionnaire, printing a formatted copy of the exam, and generating different orders of items for an exam. It is menu driven, and there is no limit on the number of tape or disk files or pool of questions from which items can be selected for an exam.

32K ECB; \$21 cassette, \$23 disk



Music

Music Drill
Computer Island
Ages 7-adult

Learn to identify the notes of many scales. Hi-res graphics display treble or bass clef in key of your choice. User identifies note shown. Scoring and timer. Mixed key option for greater challenge.

16K ECB; \$19.95 cassette

Preschool

ABCs in Color
TCE Programs Inc.
Ages 3-8

All 26 letters appear in color while the familiar ABC tune plays. Pictures of each letter appear one by one. A musical tune rewards correct answers before going on to the next letter. An airplane depicts the letter A, a bus for B, a clown for C, and so on.

16K ECB; \$19.95 cassette, \$25.95 disk

Alphabet Song
Petrocci Freelance Associates
Ages 3-6

Teach the alphabet as the familiar song plays. Three levels of play include: the entire alphabet sequence with song, steps with random letters where the child must enter the next letter in the sequence, and the child must enter the entire alphabet in order.

16K ECB; \$11.95 cassette

Alphabet Stew
Triad Pictures Corp.
Ages 18 months-7

This colorful stew of animated sights and sounds helps youngsters build keyboard familiarity and letter recognition. Each of 43 keys produces different animated pictures, geometric shapes, colors, and melodies. Children as young as 18 months can explore the keyboard and produce any of 70 different responses such as a volcano erupting, a soaring spaceship, a

flower blooming, fireworks, etc. Each letter key produces at least two responses. The number keys play musical notes, which are displayed on the screen.
32K ECB; \$22 cassette

Alpha Memory
TCE Programs Inc.
Ages 3-7

Behind each rainbow-colored door, the child will find a hidden upper- or lower-case letter. The child then tries to match them all. The program rewards success with a musical rainbow.
16K ECB; \$18.95 cassette

Alpha Search
Spectral Associates
Ages 3-6

This program teaches the alphabet. The child guides a spaceship up and down the screen collecting letters of the alphabet.
16K ECB; \$14.95 cassette, \$18.95 disk

Big Bird's Special Delivery
Radio Shack
Ages 3-6

A basic skills game. Match pictures to help Big Bird deliver his packages.
16K ECB; \$19.95 cassette, cat. no. 26-2525

Childpace
Computerose
3-60 mos.

This is a better-parenting program to help parents evaluate their children's physical and educational growth. With it you can evaluate dexterity, language and social skills of children. The program will soon be available for the Color Computer. Contact Computerose for more information.

Cookie Monster's Letter Crunch
Radio Shack
Ages 3-6

A basic skills game. Match letters and words to feed Cookie Monster cookies.
16K ECB, joysticks; \$19.95 cassette, cat. no. 26-2526

Early Games
Counterpoint Software Inc.
Ages 2½-6

This package contains nine games that teach children to match numbers, count, add, subtract, draw, match letters, learn the alphabet, spell their names, and compare shapes.
16K; \$29.95 disk or cassette

Early Letter Recognition and Kids' Choice
Software Specialists
Ages 3-6

Simple but absorbing programs to introduce preschoolers to letters and numbers, as well as keyboard association. The child must press one of the letter keys (Early Letter Recognition) or number keys (Kids' Choice) to elicit colorful animated graphics display based on that letter or number. Several of the displays motivate interactive activities involving shapes, sounds, etc. The emphasis of these programs is on fun, not repetition or drill-and-grill method-

ology. The bright, colorful, and unusual graphics foster a pleasurable first experience with computers for young children.
16K ECB; \$12.95 each or \$19.95 for both, cassette

Ernie's Magic Shapes
Radio Shack
Ages 3-6

A basic skills game. Help Ernie match shapes and colors in six different ways.
16K ECB; \$19.95 cassette, cat. no. 26-2524

First Games
Computer Island
Ages 3-5

Contains six menu-driven programs to delight and teach early learners. These games enrich learning of colors, numbers, lowercase letters, shapes, memory, counting, and visual discrimination.
32K ECB; \$24.95 cassette, \$27.95 disk

Grover's Number Rover
Radio Shack
Ages 3-6

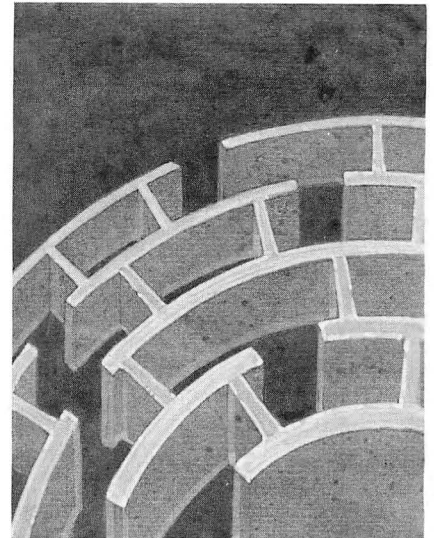
A basic skills game. Help Grover with numbers.
16K ECB; \$19.95 cassette, cat. no. 26-2522

Juggle's Rainbow
Follett Library Book Co.
Ages 3-7

Prepare children for school in math- and reading-readiness skills. These games teach spatial concepts, eye-hand coordination, matching colors, opposites, and using words to give directions. Graphics are used.
16K ECB cassette, 32K ECB disk, \$36.95 cassette, \$41.95 disk

Prereader
Sugar Software
Ages 3-6

Prereader has two levels, one for ages 3-4 and one for beginning readers. In level one, the child must learn to match colors, shapes, numbers, capital and small letters. In level two, the child must match a letter with the picture on the screen. The most difficult section has the child match a picture with the corresponding consonant blend. Prereader has three different rewards in graphics and music.
32K ECB, joystick; \$19.95 cassette, \$24.95 disk



Reasoning and Problem Solving

The Factory
Sunburst Communications
Ages 9-adult

Playing The Factory helps your children learn how to break down a problem into its parts and solve each part step by step. Designing an assembly line to solve the problem develops their ability to plan ahead and reason visually.
32K ECB; \$39.95 disk

Flip Side
Radio Shack
Ages 10 and up

A creative exploration game. Change as much of the board to your color as you can. Players learn to think and plan ahead.
16K ECB, joysticks; \$19.95 cassette, cat. no. 26-2529

Grobot
Radio Shack
Ages 10 and up

A creative exploration game. Challenging action in which players plant, protect, and harvest an outer space astrogarden. Encourages quick thinking and good planning.
16K ECB, joysticks; \$19.95 cassette, cat. no. 26-2527

Harold's Castle
Dee Pee Data Inc.
All Ages

This is a text adventure game that encourages logical thinking and imagination.
32K; \$19.95 cassette, \$25.95 disk

Logic 'N' Reason
Brantex Inc.
Ages 5-7

These four programs aid development of logic and relational reasoning skills. Maze features random array of obstacles, Puzzle teaches the players to think in terms of the effect of one action on another, Code teaches players to observe conditions and infer others, and Black Box aids in deductive reasoning.
16K ECB; \$21.95 cassette, \$25.95 disk

Moptown Parade
Moptown Hotel
Follett Library Book Co.
Ages 6-12

The residents of Moptown teach shape and color recognition, sequences, and other conceptual skills. Moptown Parade has eight games: Make My Twin, Who's Different?, What's the Same?, Who Comes Next?, Moptown Parade, Who's Next Door?, Change Me, and Club House. Moptown Hotel has three games: Secret Pal, Moptown Map, and Moptown Hotel. Moptown Parade: 16K ECB cassette, 32K disk; \$31.95 cassette, \$36.95 disk. Moptown Hotel: 16K ECB cassette, 32K disk; \$25.95 cassette, \$31.95 disk

Peanut Butter Panic
Radio Shack
Ages 7 and up

A cooperative strategy game. Players catch stars for points. 16K ECB, joysticks; \$19.95 cassette, cat. no. 26-2523

The Pond
Sunburst Communications
Ages 7-adult

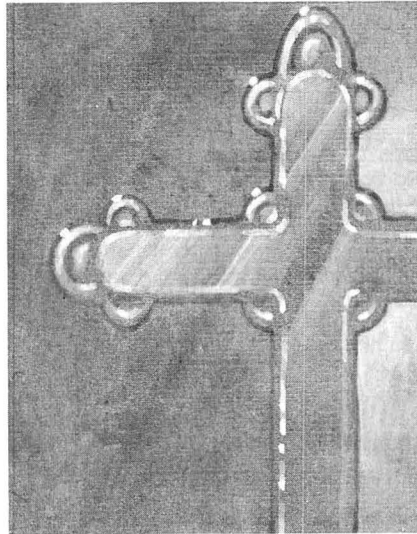
The Pond helps your children learn about experimentation. In playing the game, they gather information, make assumptions, and test their assumptions. Discovering a pattern through the lily pads develops their ability to recognize patterns, plan ahead, and reason visually. 32K ECB; \$39.95 disk

Recess Games
B5 Software
Ages 7-13

Recess Games consist of four games that make using higher-level thinking skills enjoyable. Users must solve problems and reason logically. Games include Treasure Hunt on a Grid, Guess That Number, Masterbrain, and Tic Tac Toe. Treasure Hunt uses letter coordinates, and Guess That Number has an optional use of a number line. Each game has graphics, is multi-leveled, and has a one- or two-player option. 16K cassette, 32K disk; \$19.95 cassette, \$21.95 disk

Star Trap
Radio Shack
Ages 7 and up

A cooperative strategy game. Players race through a maze to trap a slippery star before time runs out. 16K ECB, joysticks; \$19.95 cassette, cat. no. 26-2510



Religion

Bible Quiz
Brantex Inc.
Ages 5-7

Multiple-choice format quiz of various Bible facts from the Old and New Testaments. Suitable as a study aid for standardized Bible content tests. 16K ECB; \$15.95 cassette, \$19.95 disk

Books of the Bible
Brantex Inc.
Ages 5-10

This is a multiple-choice quiz program that tests the player's knowledge of the order of the Bible's books. 16K ECB; \$14.95 cassette, \$18.95 disk

School Administration

Colorgrade
Computer Island

An aid to teachers, this program records and calculates grades for up to six classes of up to 40 students. It uses number or letter grades, named or numerical periods, and gives a weighted average. A printer feature is included, but is optional. 32K ECB; \$29.95 disk

Teacher's Database
Tom Mix Software

This database keeps a file of a teacher's records on up to 100 or more students. Each student can have 20 or more data items on his record. The program is menu driven, and is compatible with either disk or cassette. Full editing features are available, and the teacher can sort by different criteria, such as test scores or student names. Output to a printer is supported. The program will perform a full statistical analysis of the data, and it will weight test scores. 32K ECB; \$39.95 cassette, \$42.95 disk

Self Study

Alpha Attack
TCE Programs Inc.
Ages 6-adult

Protect your headquarters from attacking letters. You must press the correct key to destroy each letter. Another wave appears when you have destroyed all the letters on the screen. Watch out for the storm trooper. The program has three levels of play. 16K; \$17.95 cassette, \$21.95 disk

Alphakey
Bertamax Inc.
Ages 4-5

This program teaches kindergarten and first grade children the location of letter keys on the keyboard, and to type them in alphabetical order. No attempt is made to teach finger position. The keyboard is presented on the screen with the letter to be typed flashing. A correct response is rewarded with a smiling face, which frowns when an error is made. 32K ECB; \$24.95 cassette or disk

Custom Flashcards
Creative Technical Consultants
Ages 10-adult

This program lets you create your own flashcard sets, store them on tape, and recall them for study as often as you wish. Each card is created with an A side and a B side, and contains whatever material you want to study. After you create a set you can instruct the computer to flip through either side, setting the clock for how long you want each card displayed. You can answer either verbally or to yourself, or type in the answer and have the computer check for the correct match. 16K ECB; \$16.95 cassette

Keyboard
B5 Software
Ages 6-13

Keyboard helps familiarize children with the location of keys on the computer. A graphics keyboard lets the user find keys quickly. Home keys are identified and

proper fingering can be taught to older children. Lessons are built around alpha-bet presentations and letter drills. A graphics reward completes each lesson. Adults can also use the program to brush up on typing skills. The 32K version has longer, timed drills. Data tape use is optional with both 16K and 32K versions and the following tapes are available for \$8.95 each: Keyboard Phonic Drill; Dolch Words; Grade Level Spelling; Most Misspelled Words; Space Words.
16K cassette, 32K cassette, 32K disk; \$19.95, \$24.95, \$26.95, respectively

**The Quizmaker
Computer Island
Ages 9-adult**

Enables teachers to create tests, or lets students study for tests in any subject area. Questions and answers can be saved, and the program accommodates short answer, fill-in, multiple choice, and true-false. Printer option for test printouts, or generation of homework. Program randomizes questions, keeps score, and provides a variety of testing formats.
32K ECB; \$24.95 cassette, \$27.95 disk

**Type Assault
Spectral Associates
All Ages**

This arcade-game typing teacher offers nine levels of difficulty. Your score increases with your typing skill.
16K ECB; \$24.95 cassette, \$28.95 disk



Social Studies

**Geography Pac
Spectral Associates
Ages 10 and up**

Geography Pac is a collection of five programs that display maps of the U.S.A., Europe, Africa, Asia, and South/Central America. Each program is available as a single game. An answer sheet is included.
16K ECB; \$32.95 cassette, \$36.95 disk

**Goofy Covers Government
Radio Shack
Ages 10-14**

Explore our government with Goofy. The program has hi-res screen graphics with displayed text, recorded narration and music, and immediate feedback for answers. Includes activities for increasing comprehension.
16K ECB; \$34.95 cassette, cat. no. 26-2533

**The Great USA
Sugar Software
Ages 9 and older**

A game of the 50 states for one to four players. The 32K version has colorful maps of the United States. Play these game for 16K: State Abbreviating; State Nicknames; Give the State when Given the Capital, or vice versa; or random combinations. The 32K version includes all the above plus state trees, flowers, and birds. This game is user modifiable and contains rewards for correct answers.
16K or 32K ECB; \$19.95 cassette

**History Game
Computer Island
Ages 10-17**

This Jeopardy-type game has rounds of five categories with five questions each. For one or two players. It checks your knowledge of American history using hi-res graphics.
32K ECB; \$14.95 cassette

**Know Your States
Computer Island
Ages 10-14**

Hi-res graphics portray each state for you to identify. The help command illustrates the state's position within the entire United States.
32K ECB; \$19.95 cassette

**Maps and Globes
Micro-Ed
Ages 6-adult**

This program poses questions about maps and geography. An accompanying booklet, *Skills for Understanding Maps and Globes*, complements the software. There is a program for every chapter in the booklet: A Map Is Made; Finding Our Way; Finding Other Directions; The Metric System; How Far Is It?; Finding Cities and Other Countries; Water, Water Everywhere; The Earth's Land Masses; The New World; The Old World; Guidelines on the Earth; Using the Earth's Guidelines; Flat Maps of a Round Earth; High Lands and Low; What's the Weather?; The World's Climate; What Grows on the Land?; People and Products; and Trade and Travel.
32K; \$136 disk (additional booklets cost \$2.97 each)

**The Presidents of the United States
Sugar Software
Age 11 and older**

This menu-driven program teaches about the presidents and their accomplishments. It includes a study mode since the material is difficult. There are two different games included. The easier is matching.

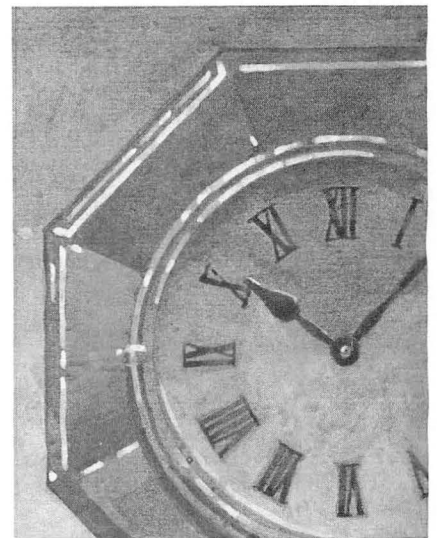
You are given a president's name and three clues and you must tell which clue matches that president. In the more difficult game you have a series of clues and you must guess which president is being described. It is user modifiable, rewards are given with patriotic songs, and you can use the program with Basic if you skip the autorun loader.
16K or 32K ECB; \$24.95 cassette, \$27.95 disk

**State Capitals Quiz
Brantex Inc.
Ages 9 and older**

This is a multiple-choice quiz program that tests the player's knowledge of the state capitals.
16K ECB; \$9.95 cassette, \$13.95 disk

**Time Bound
Radio Shack
Ages 10-adult**

A creative exploration game. Learn historical facts and use them to plan an escape for Anakron.
16K ECB; joysticks; \$19.95 cassette, cat. no. 26-2528



Telling Time

**Clock
B5 Software
Ages 6-9**

Clock is designed to help children practice telling time. There are four skill levels: hour intervals, quarter-hour intervals, five-minute intervals, and one-minute intervals. The large graphics clock has synchronized moving hands. Separate numerals for reading the minutes are optional. Another option is to use just the hour hand first and then call up the minute hand. For each correct answer entered, a small clock appears on the left margin of the screen. After 10 small clocks have appeared, a mouse ascends the screen and erases the clocks to the tune of "Hickory Dickory Dock."
16K cassette, 32K disk; \$24.95 cassette, \$26.95 disk

Teaching Clock
TCE Programs Inc.
Ages 3-8

This program teaches time telling on either a digital or conventional clock using hi-res graphics and prompts. If the child enters the wrong time, the clock displays a graphic aid. A musical reward sounds for a correct answer. The program has three levels: hours, quarter-hours, and five-minute intervals.
16K ECB; \$16.95 cassette, \$19.95 disk

Telling Time with Donald
Radio Shack
Ages 5-8

Learning to tell time is easy when Donald Duck tutors. Hi-res screen graphics with displayed text, recorded narration, and music. Immediate feedback for answers. Includes activities for increasing comprehension.
16K ECB; \$34.95 cassette, cat. no. 26-2530

Time Teacher
Crystal Software
Ages 5-11

Time Teacher displays both a traditional and a digital clock and shows the correlation between the two. The program reinforces and helps children learn how to tell time by having them convert the time displayed on the traditional clock into digits using the keyboard. You can use a joystick to set the hands on the clock, and this reverses the conversion process. There are two quiz modes and two practice modes, ample reward in audio and visual reinforcement, six skill levels, and detailed progress reports displayed on the screen or printer.
16K ECB; \$15.95 cassette

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Custom Software Engineering Inc.
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Dorsett Educational Systems Inc.
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HOME VS. CLASSROOM: IS THERE A DIFFERENCE?

Many vendors of educational software market their programs differently to schools than they do to the home user. This usually reflects a difference in the programs themselves: Some software is better suited for either the home or the school. But how do you, as a teacher or a parent, make that distinction when the company doesn't tell you?

I've made a list of differences between educational software for the home versus that for the school. I contacted a small number of vendors who sold educational products for their opinions, and to help me complete this list. While there was no hard and fast criteria for differences in the software, certain trends were apparent.

In the school, there seems to be a trend toward focusing on software as supportive material for a highly integrated general curriculum. One vendor concluded that school and home market were complementary. The company's policy is to offer unprotected software and to let schools review and return software if unsatisfied. He believes that schools provide a good advertising base for educational products, and that differences between the school and home markets would disappear as pricing policies became more reasonable.

Here is my list of differences between home and school software.

- School educational software requires more thorough documentation than the same type of software developed for the home. Some classroom software should be integrated into a total curriculum. Its documentation might include information on creating such an approach.

- Classroom software might include supportive materials and activities.

In the school setting, every child might not have immediate access to a computer. Supportive materials can enhance the limited computer time avail-

able for each child. On the other hand, a multisensory, multimedia approach is just as valid for the home as it is for the school. Additional materials can enhance and reinforce computer activities in any setting.

My suggestion is that supportive non-computer activities should be available for home and school, but those that increase the software cost should be included in separate packaging. It matters little whether the software or the printed text are considered as the major product. As long as both are well conceived, well executed, and where appropriate well integrated, the home and the school user will benefit.

- Classroom software should include a record-keeping procedure.

Formal educational programs are required either philosophically or by state and federal mandates to keep documentation of student progress. But there is a considerable number of parents who want a record of a child's educational activities in the home. Record keeping is a tedious process and can be highly technical. It is an activity well suited for the computer.

I would like to see more software (whether developed for the school or home) that includes a record-keeping strategy. Further, I would like to see at least three different options for reporting those records. The progress report should appear on the screen as feedback to the child but with sufficient information to understand the progress in achievement. An optional report should be prepared for the printer, and non-computer record keeping forms should be provided for those without a printer.

- Home educational programs should be more fun or game oriented while those for the schools should be more oriented toward important educational goals.

In general I do not agree with this

type of thinking. Enjoyment and sound educational content are important goals for both areas. On the other hand, parents might not want to tackle certain educational activities in a home setting. It is a real challenge for the developer of educational programs to make those activities sufficiently motivating so that the activity will "sell" in the home setting.

- There is a different strategy in marketing programs for the school and for the home.

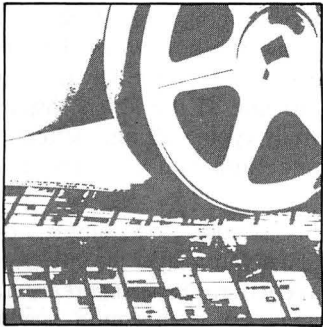
Obviously the successful marketing of a product includes a careful consideration of the target audience. The school market can be a difficult one to reach. It may involve direct mailings and direct person-to-person contact. To overcome the potential for widespread copying of programs in a school setting, it may involve a higher price structure or special licensing agreements.

The home market is more susceptible to a mass-media approach. Targeting for a special audience may have an unfortunate effect. The teacher or parent may not be fully aware of valuable programs that have been targeted for different audiences. Further, at least one vendor has found a more open, yet price conscious approach can be effective for both markets.

There are several ways to overcome the problem of narrow marketing strategies. Parents and teachers can form a joint software review panel to periodically evaluate software. Also, the school or the local computer consortium could sponsor computer fairs. Finally, school districts or libraries might set up a media center for teacher and parent review of software. ■

Address correspondence to Charles Santee, 8 South 045 Grant, Westmont, IL 60559.

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TYPING TEACHER

by

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Help your young computer users get
the hang of "the quick brown fox..."
and keyboard proficiency.

System Requirements 16K RAM Extended Color Basic
--

Need a simple game to teach little folks the keyboard? Give Typing Teacher a try.

This game consists of rounds during which the computer randomly selects nine letters. Using the reverse video of green letters against a black background, your computer displays these letters along the bottom of the screen. You must then type the key that corresponds to one of the letters displayed. Successfully typing all nine letters ends the round, and you can start a new round.

If this sounds too simple, don't worry. There are player incentives (penalties) to encourage speed and accuracy. First, you play each round against a timer. Only letters typed correctly within the allotted time add points to your score. This score then appears at the top of the screen to be updated following each round.

You can, however, choose the maximum amount of time given for each round. This is done once, during the game setup, and remains fixed for the rest of the game. Therefore, first-time players can start at the easy level and, as their ability improves, gradually work up to the fast setting.

If you fail to correctly type all nine letters before time runs out, you get penalty points that affect game play in two ways. First, they are subtracted from the timer prior to each round. This reduces the time allowed for each round. Second, penalty points make the game pyramid grow. This pyramid is the key to the game time remaining. It forms, one brick at a time, in the center of the screen, and for each letter not typed in a round, the program adds another brick. When the topmost layer is finished, the game is over.

To get high scores, you must coordinate hand-eye activity. Initially, you must recognize the letter. Then your hands must locate the corresponding key on the keyboard, all against the backdrop of a running timer. Touch typists should do very well, but remember, the game was written to help children learn the keyboard.

Table 1 summarizes the programming activity in each section, while Table 2 shows the variable assignments. Combined with the Program Listing, these help you follow the program logic.

The game uses two sets of POKEs. One pair is the speed-up POKE and its corresponding partner. These are clearly marked in the listing and you should

eliminate them if your computer cannot function properly in the high-speed mode.

The other set affects the screen print function. The POKE359,60 causes the computer to print text slowly. It also lets the computer stay in SCREEN 0,1, defeating the CoCo's tendency to auto-

matically execute a SCREEN 0,0 every time it executes a PRINT command. POKE359,126 returns everything to normal. Again, if problems arise, delete both of these POKES.

Typing Teacher has helped my children become much more adept at finding a specific key among the 54 possible

choices. Not only has this improved their scores, but it has increased their enjoyment of other computer games that require use of the keyboard. ■

Address correspondence to Wilfred H. Barber, 978 Cherry St., Winnetka, IL 60093.

Table 1. Program Divisions

Lines	Activity
-1000	Screen setup
1000-1999	Game loop
2000-2999	Subroutine to print reverse video
3000-3999	Subroutine that reads key pressed
4000-4999	Subroutine to randomly select letters
5000-5999	Subroutine to print pyramid
6000-6999	Pyramid data section
7000-7999	Play again? subroutine
8000-8999	Game introduction and instructions

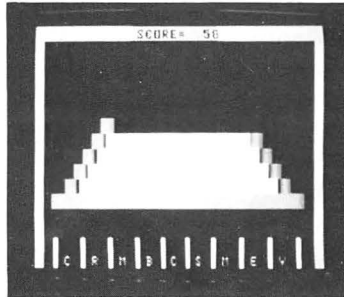


Table 2. Variable Assignments

Variable	Game Usage
N	General counter
Z\$	Graphics string
X\$	Keyboard input from INKEY\$
LX	Randomizer for letter selection
LR(N)	ASCII value of selected letter
TURN	Counter of letters typed per round
SPEED	Time allowed per round
SCORE	Player's score
PYRAMID	Number of letters missed and used to determine height of the game pyramid

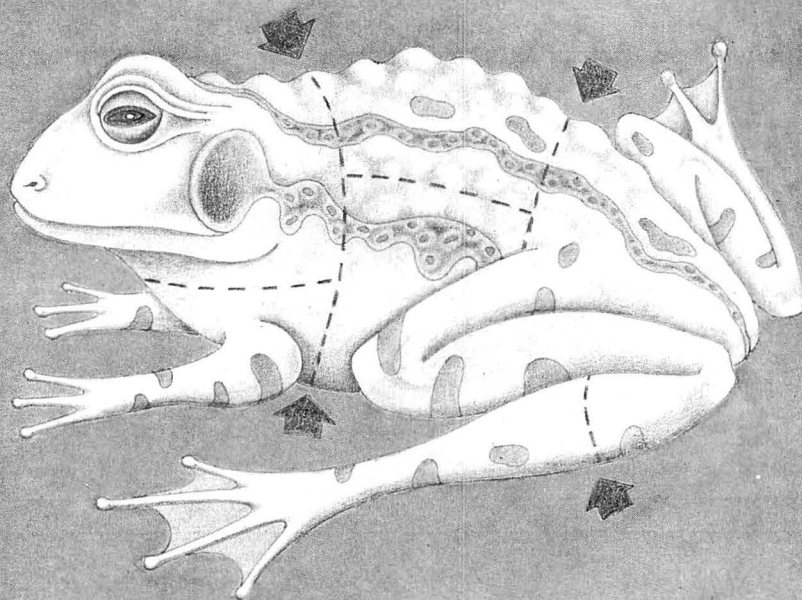
Program Listing. Typing Teacher

```

10 GOSUB8010
20 CLS
30 PRINTSTRINGS(32,255);
40 FOR N=1056 TO 1504 STEP 32
50 POKEN,255:POKEN+31,255
60 NEXT
70 Z$=CHR$(144)+CHR$(154)+CHR$(144)
80 FORN=1TO30 STEP 3
90 PRINT@448+N,Z$;
100 PRINT@480+N,Z$;
110 NEXT
120 PRINT@11,"SCORE=";
130 PRINT@422,"press"CHR$(128)"enter"CHR$(128)"to"CHR$(128)"start";
140 IF INKEY$<>CHR$(13) THEN140
150 PRINT@420,STRINGS(23,128);
160 'game loop
170 SCORE=0
180 GOSUB4000
190 GOSUB2000
200 GOSUB3000
210 PRINT@11,USING"SCORE=####";
SCORE;
220 TURN=TURN+9
230 PYRAMID=PYRAMID+TURN
240 FOR N=1TO9:LR(N)=207:NEXT
250 GOSUB2000
260 GOSUB5010
270 TURN=0
280 IF PYRAMID>197 THEN 701
290 PRINT@420,"press"CHR$(128)"enter"CHR$(128)"to"CHR$(128)"continue";
300 IF INKEY$<>CHR$(13) THEN 1140
310 PRINT@420,STRINGS(23,128);
320 GOTO1020
330 '*sub to print chr at bottom
340 SCREEN1,0
350 FORN=1TO9
360 PRINT@480+N*3,CHR$(LR(N));
370 NEXT
380 SOUND255,1
390 RETURN
400 'sub to read keyboard
410 TIMER=PYRAMID
420 X$=INKEY$
430 IF TIMER>SPEED THEN SOUND50,1:RETURN
440 IF X$="" THEN 302
450 FOR N=1TO9
460 IF ASC(X$)+32=LR(N) THEN LR(N)=143:GOSUB2000:SCORE=SCORE+1:TURN=TURN-1
470,207,207,207,207,175,170
480 DATA 165,175,143,143,143,143,143,143,175,170
490 DATA 165,175,239,239,239,239,9,175,170
500 'sub to play again
510 PRINT@395,"game"CHR$(128)"over";
520 PRINT@419,"press"CHR$(128)"enter"CHR$(128)"to"CHR$(128)"play"CHR$(128)"again";
530 PRINT@451,"press"CHR$(128)"break"CHR$(128)"to"CHR$(128)"stop"CHR$(128)"play";
540 IF INKEY$<>CHR$(13) THEN7040
550 RUN
560 'sub for heading
570 POKE359,60:'screen poke
580 SCREEN0,1
590 CLS
600 PRINT@39, "TYPING PRACTICE";
610 PRINT@129,"YOU WILL BE GIVEN NINE LETTERS ALONG THE BOTTOM OF THE SCREEN. AS YOU TYPE THESE LETTERS THEY WILL BE BLANKED AND ONE POINT SCORED. ANY LETTERS YOU DON'T TYPE BEFORE TIME EXPIRES WILL CAUSE THE PYRAMID TO GROW"
620 PRINT" WHEN THE PYRAMID REACHES THE TOP OF THE SCREEN, THE PRACTICE IS OVER."
630 PRINT:PRINT" PRESS ENTER TO CONTINUE";
640 IF INKEY$<>CHR$(13) THEN 8080
650 PRINT@129,"SELECT THE DIFFICULTY LEVEL THAT YOU WISH TO TRY--JUST PRESS THE NUMBER YOU WANT:
660 1. EASY
670 2. MEDIUM
680 3. FAST
690 FOR N=1376 TO 1535
700 POKEN,128
710 NEXT
720 SPEED=0
730 A$=INKEY$:IF A$="" THEN8140
740 IF A$="1" THEN SPEED=450
750 IF A$="2" THEN SPEED=350
760 IF A$="3" THEN SPEED=250
770 IF SPEED=0 THEN 8140
780 POKE 359,126:'reg screen
790 RETURN

```

END



ANATOMY OF AN ASSEMBLY-LANGUAGE GAME—PART IV

This month you'll find the routines used to set up the graphics screen (hi-res) and the score screen (low-res) of Croaker. First though, I want to clarify the terms register and accumulator, which might be throwing you off.

Until now, I have used the term register for X, Y, U, S, DP, CC, PC, A, B, and D. While it isn't wrong to call them registers, A, B, and D are most com-

monly referred to as accumulators. This label doesn't change the way A, B, and D function and it is only used to refer to A, B, and D. (The assignment of the two names is based on computer history.)

This month's program deals only with the subroutines used to set up the hi-res and low-res screens. Remember that the program is to be assembled independently and saved as a separate

program to be added to the rest of the parts at the end of the series.

Referring to the program, you'll notice that the first thing it does is to redefine the labels defined in previous parts that are required by Part 4. It then continues on to SETUP1, the subroutine used to set up the scoring screen (low-resolution).

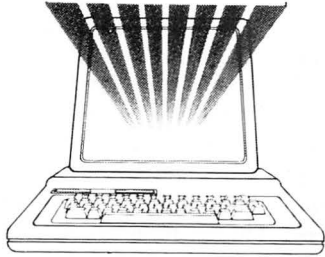
The first thing SETUP1 does is to clear the screen by storing a value of 32 (code for a space) in screen locations 1024 to 1536. It then prints the word "player" on the screen at four different positions. The subroutine PRINT1 in Part 3 of this series will show you how this works.

The routine then prints a 1, 2, 3, and 4 beside the appropriate player. The

System Requirements

**32K RAM
Extended Color Basic
Editor/Assembler**

SUPER SCREEN



- A big 51 character by 24 line screen.
- Full upper and lower case characters.
- Easily combine text with hi-res graphics.
- PRINT @ is completely functional on the big screen.
- The powerful ON ERROR GOTO is fully implemented.
- Auto-key repeat for greater keyboard convenience.
- Control codes for additional functions.
- Works with 16K, 32K or 64K computers.
- Available on disc or cassette.
- Works with extended and/or disc BASIC.

51 CHARACTERS BY 24 LINE DISPLAY

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COMBINE TEXT WITH HI-RES GRAPHICS

You can now write truly professional looking programs that combine text with hi-res graphics. Super Screen allows you to create graphics displays with the Basic LINE, DRAW and CIRCLE statements and then notate the graphics with descriptive text. You can even use PRINT @ if you wish for greater programming convenience. Super Screen's versatility will amaze you.

PRINT @ IS FULLY IMPLEMENTED

The PRINT @ statement is a valuable asset to the programmer when formatting text on the screen. The standard Color Computer will report an error if you specify a location higher than 511 but Super Screen allows locations all the way to 1223! You get a big screen and a powerful formatting tool as well. Of course, Super Screen also supports the CLS command allowing you to clear the big screen using standard Basic syntax.

ON ERROR GOTO

That's right! Super Screen gives you a full implementation of ON ERROR GOTO including the ERR and ERL functions. Now you can trap errors and take corrective action to prevent crashed programs and lost data using the same standard syntax as other computers. The ON ERROR GOTO capability overcomes a serious deficiency of Color Computer Basic and greatly improves your capability to handle sophisticated tasks. All well written, 'user friendly' programs use error trapping techniques and yours can too! Now that's power!

AUTO KEY REPEAT

No more frustration as you edit a long line in your Basic program; just hold the space bar down and automatically step to the desired position in the line. Need a line of asterisks? Hold the key down and auto repeat will give them to you. Those of you who spend many hours at your keyboard will appreciate this outstanding addition to Super Screen's long list of impressive capabilities.

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Super Screen recognizes several special control code characters that allow selection of block or underline, solid or blinking cursor and other functions. You can 'Home Up' the cursor or you may erase from the cursor to the end of a line or to the end of the screen just like many other computers. These special codes give you an extra dimension of versatility and convenience that put Super Screen in a class by itself.

AND MORE GOOD NEWS...

Super Screen comes with complete, well detailed instructions and is available on cassette or disc. It adjusts automatically to any 16K or greater, Extended or Disc Basic Color Computer or TDP-100 and uses only 2K of memory in addition to the screen memory reserved during power up. Guaranteed to be the most frequently used program in your software library...once you use it, you won't be without it! Super Screen's low price will really please you; only \$29.95 on cassette or \$32.95 on disc!

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The MDP system:

- Is accurate, user friendly and simple to use.
- Is easy to customize for specific user requirements.
- Produces a traceable invoice.
- Handles receivables as well as closed orders.
- Is capable of future expandability.

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- Is accurate, user friendly and simple to use.
- Is easy to customize for specific user requirements.
- Immediately updates the chart of accounts.
- Provides an audit trail.
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- Is capable of future expandability.

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codes for 1, 2, 3, and 4 are 49, 50, 51, and 52 when POKEd to the screen. Next, the scores appear on the screen below the players. PRINTS, which was also defined in Part 3, is used to accomplish this. After printing the scores, the routine retrieves the number of frogs each player has left (stored in addresses 16230 to 16233), adds a value of 48 to them to obtain the proper screen codes, and stores them to the right of the scores.

The routine proceeds to print the heading at the top of the screen stating the name, author, copyright notice, and Color Horizons Software. Part 2 of the series defined the codes for the heading. The program POKEs one line of the heading onto the screen and then jumps down to the next line to POKE more of the heading onto the screen. Accumulator A (there's that word) is used to determine when a line is finished. The number of characters in the line is loaded into A and A is decremented after each character is POKEd onto the screen. When A reaches zero, the computer jumps down to start the next line.

After the execution of SETUP1, the screen should be clear and the characters should look something like this:

```

          CROAKER
    BY: MIKE MEEHAN
    COPYRIGHT 1983
  COLOR HORIZONS SOFTWARE

PLAYER 1          PLAYER 2
0 000000         0 000000

PLAYER 3          PLAYER 4
0 000000         0 000000
  
```

SETUP2, the longer of the two sub-routines, sets up the graphics screen (hi-res). The portion of memory Croaker uses for its hi-res screen is from 1536 to 7680. Note that the code for white is zero, the code for green is 85, the code for blue is 170, and the code for red is 255.

The first thing the routine does is to put several horizontal bars of color down the screen. It puts 13 lines of green at the top, followed by 79 lines of blue. It adds 20 lines of red, 60 lines of white, and 20 lines of red to complete the screen.

If you're familiar with the arcade game, you know that the red areas will be used as resting places for the frog, the blue area will have logs and turtles floating in it, the white area will have cars moving in it, and the green area will

be used for the timer. You also know that there are five ports into which the frog can jump, and that there's an equal amount of white and blue area.

To this point, there have been 79 lines of blue to 60 lines of white. Those extra 19 lines of blue will be taken up with the ports. The next several lines of the program draw the ports. Several strange values are POKEd onto the screen to accomplish this. These values were obtained by drawing the ports in Basic and then PEEKing into screen memory to see what was there. The data for the rest of the drawings (cars, logs, etc.) was obtained the same way. Remember that there are 32 bytes of data per horizontal line.

The routine then draws a white T in the green area at the top of the screen and draws a white bar beside it to represent the amount of time left. The T is POKEd onto the screen first. Again, you obtain the data for the T by drawing it in Basic and PEEKing the memory values. The T is five vertical pixels (a pixel being one graphics dot) wide. The horizontal bar that goes with it is drawn next. It's only three pixels wide, but is very long. During the game, this line is shortened every so often to represent the amount of time left.

Next, a value of 20 is stored at address 16300. This address contains the number of units of energy left. Each frog starts with 20. The address 16299 is used later to determine when a unit of energy should be subtracted. Each time the items on the screen move, this address is decremented, and when it reaches zero, a unit of energy is subtracted.

A large amount of the routine is spent putting cars, logs, and turtles on the screen. Address 16325 contains the number of screens the present player has completed. The value in this address determines the number of cars, logs, and turtles to be put on the screen. The higher the screen level, the more cars and the less logs and turtles are put on the screen. Refer to last month's article to see an explanation of these routines.

Once these are all on the screen, you can move them in blocks with a routine I'll introduce next month. The only differences in the six cars are their colors. This adds some diversity to the screen.

The turtles in Croaker disappear underwater at intervals, so you have to know where the two sets of turtles are at all times. Addresses 16295 and 16297 contain these addresses. The routine

must store values in them to show where the turtles start. Also, the addresses 16293 and 16294 are used to determine when the turtles will disappear. These must be set to zero. By loading X with zero and storing it at 16293, both addresses are cleared to zero, as explained in last month's article.

The address 16291 stores an address for the location of the frog on the screen. The routine stores the point where the frog starts, then gets the data at that point and puts a frog there.

The program must also store left/right and up/down bounds as described last month. The left/right bound starts off as 15 while the up/down bound starts off as one.

The last thing the routine does is to

Program Listing. Croaker, Part 4

```

00010 *****
00020 *****CROAKER*****
00030 *****BY! MIKE MEEHAN*****
00040 *****COPYRIGHT! 1983*****
00050 *COLOR HORIZONS SOFTWARE*
00060 *****
00070 *****PART FOUR*****
00080 *****
00090          ORG          $2B7B
00100 LOG          EQU          $1P86      LABELS DEFINED
00110 BPROG        EQU          $2390      IN PREVIOUS
00120 TURTL        EQU          $23F4      PARTS THAT
00130 CAR1         EQU          $2444      ARE NEEDED
00140 CAR2         EQU          $246C      FOR PART FOUR
00150 CAR3         EQU          $2494
00160 CAR4         EQU          $24BC
00170 CAR5         EQU          $24E4
00180 CAR6         EQU          $250C
00190 WPROG        EQU          $2224
00200 BPROG        EQU          $22C4
00210 RPROG        EQU          $2184
00220 WUPRT        EQU          $23A4
00230 PLAYER      EQU          $1F2C
00240 PLOG         EQU          $26A8
00250 PTUR         EQU          $2686
00260 PCAR        EQU          $265E
00270 GET          EQU          $2762
00280 PUT          EQU          $2788
00290 BPROG        EQU          $2738
00300 PRINT1       EQU          $2B6E
00310 PRINTS       EQU          $2B5F
00320 NAME         EQU          $2534
00330 SETUP1      LDX          #1024      SET UP
00340              LDA          #32       SCORE
00350 LOOP0        STA          ,X+      SCREEN
00360              CMPX         #1536
00370              BNE          LOOP0
00380              LDX          #1187
00390              BSR          PRINT1
00400              LDX          #1205
00410              BSR          PRINT1
00420              LDX          #1315
00430              BSR          PRINT1
00440              LDX          #1333
00450              BSR          PRINT1
00460              LDA          #49
00470              STA          1194
00480              LDA          #50
00490              STA          1212
00500              LDA          #51
00510              STA          1322
00520              LDA          #52
00530              STA          1340
00540              LDX          #16353
00550              LDY          #1221
00560              BSR          PRINTS
00570              LDX          #16344
00580              LDY          #1239
00590              BSR          PRINTS
00600              LDX          #16338
00610              LDY          #1349
  
```

Listing continued

Listing continued

```

00620 BSR PRINTS
00630 LDY #16332
00640 LDY #1367
00650 LBSR PRINTS
00660 LDA 16230
00670 ADDA #48
00680 STA 1219
00690 LDA 16231
00700 ADDA #48
00710 STA 1237
00720 LDA 16232
00730 ADDA #48
00740 STA 1347
00750 LDA 16233
00760 ADDA #48
00770 STA 1365
00780 LDY #NAME
00790 LDY #1036
00800 LDA #7
00810 LP1 LDB ,Y+
00820 STB ,X+
00830 DECA
00840 BNE LP1
00850 LDY #1065
00860 LDA #15
00870 LP2 LDB ,Y+
00880 STB ,X+
00890 DECA
00900 BNE LP2
00910 LDY #1097
00920 LDA #14
00930 LP3 LDB ,Y+
00940 STB ,X+
00950 DECA
00960 BNE LP3
00970 LDY #1124
00980 LDA #23
00990 LP4 LDB ,Y+
01000 STB ,X+
01010 DECA
01020 BNE LP4
01030 RTS
01040 SETUP2 LDY #1536 SET UP
01050 LDA #85 GRAPHICS
01060 LOOP9 STA ,X+ SCREEN
01070 CMPX #1952
01080 BNE NCMP4
01090 LDA #170
01100 BRA LOOP9
01110 NCMP4 CMPX #4480
01120 BNE NCMP1
01130 LDA #255
01140 BRA LOOP9
01150 NCMP1 CMPX #5120
01160 BNE NCMP2
01170 LDA #0
01180 BRA LOOP9
01190 NCMP2 CMPX #7040
01200 BNE NCMP3
01210 LDA #255
01220 BRA LOOP9
01230 NCMP3 CMPX #7680
01240 BNE LOOP9
01250 LDY #1952
01260 LDA #0
01270 LOOP10 ADDA #1
01280 LDB #85
01290 STB ,X+
01300 STB ,X+
01310 LDB #86
01320 STB ,X+
01330 LDB #170
01340 STB ,X+
01350 STB ,X+
01360 LDB #169
01370 STB ,X+
01380 CMPA #5
01390 BNE LOOP10
01400 LDA #0
01410 LDB #85
01420 STB ,X+
01430 STB ,X+
01440 CMPX #2560
01450 BNE LOOP10
01460 LDA #1
01470 STA 1665
01480 LDA #69
01490 STA 1697
01500 STA 1729
01510 STA 1761
01520 STA 1763
01530 LDA #0
01540 LDY #1699
01550 LOOP56 STA ,X+
01560 CMPX #1720
01570 BNE LOOP56
01580 LDY #1731
01590 LOOP57 STA ,X+
01600 CMPX #1752
01610 BNE LOOP57
01620 LDY #1763
01630 LOOP58 STA ,X+
01640 CMPX #1784
01650 BNE LOOP58
01660 LDA #20
01670 STA 16300
01680 LDA #520

```

Listing continued

see if the present player has any frogs in the ports. If he does, the routine must put these frogs in their proper positions. It gets the number of the present player and then loads X with an address containing the data for whether the player has any frogs in the ports and in which ports they are located.

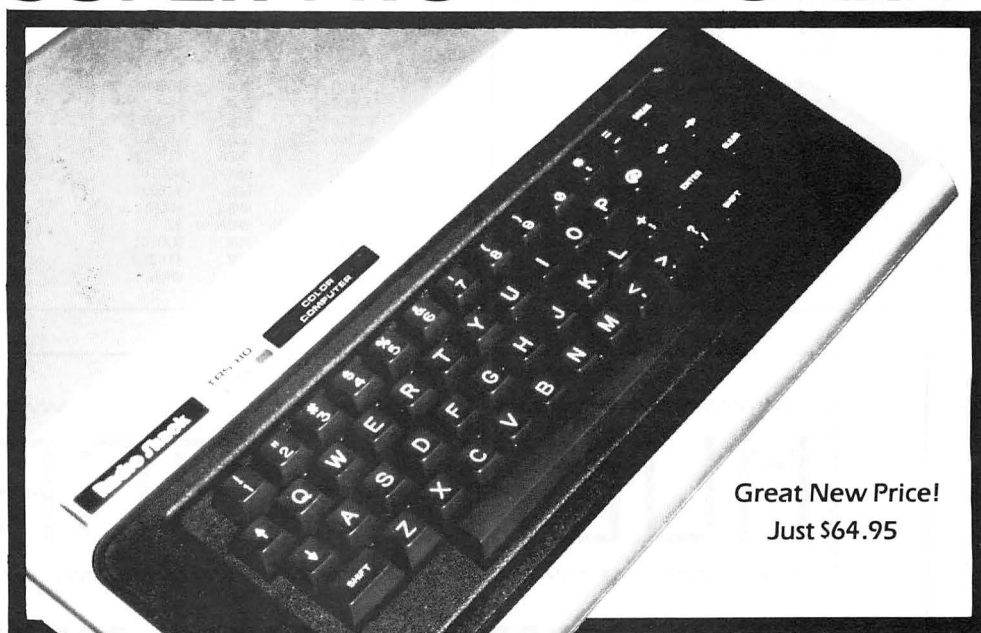
Each player has five addresses containing this information. The first address is the one loaded into X. Each address contains either a one (frog in port) or a zero (no frog in port). The first address represents the far left port, and consecutive addresses work their way right. The frogs are then put in their appropriate ports.

Address 16241 is used as a scratch because the routine PFROG changes the value of X. Any time that routine is called, X must be put aside for retrieval at the end of the routine. Finally, the address for the present position of the frog is restored and the routine returns.

Questions and comments are always welcome. Please include an SASE for responses. Next month I'll introduce the routine used to do all the actual moving on the screen. ■

Address correspondence to Mike Meehan, 1300 Fairfield Drive, Clearwater, FL 33546.

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Hot CoCo, August '83

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Rainbow, April '83

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Listing continued

01690	STA	16299	02180	JSR	PCAR	02670	NQU101	CMPA	#3
01700	LDX	#2561	02190	LDY	#CAR3	02680	BNE	BNE	NQU102
01710	JSR	PLOG	02200	LDX	#5781	02690	LDX	LDX	#16248
01720	LDX	#2892	02210	JSR	PCAR	02700	BRA	BRA	ENQU
01730	JSR	PLOG	02220	LDY	#CAR4	02710	NQU102	LDX	#16243
01740	LDX	#3541	02230	LDX	#6081	02720	ENQU	STX	16241
01750	JSR	PLOG	02240	JSR	PCAR	02730	PCAR	LDB	,X
01760	LDX	#3842	02250	LDY	#CAR5	02740	CMPB	#1	
01770	JSR	PLOG	02260	LDX	#6411	02750	BNE	NQU103	
01780	LDX	#3201	02270	JSR	PCAR	02760	LDY	LDY	#2115
01790	JSR	PTUR	02280	LDY	#CAR6	02770	STY	STY	16291
01800	LDX	#4172	02290	LDX	#6741	02780	LDY	#BFROGF	
01810	JSR	PTUR	02300	JSR	PCAR	02790	JSR	PFROG	
01820	LDA	16325	02310	LDA	16325	02800	NQU103	LDX	16241
01830	CMPA	#2	02320	CMPA	#4	02810	LDB	LDB	1,X
01840	BHI	NQMP5	02330	LBLO	NEQU7	02820	CMPB	#1	
01850	LDX	#2581	02340	LDY	#CAR2	02830	BNE	NQU104	
01860	JSR	PLOG	02350	LDX	#5441	02840	LDY	LDY	#2121
01870	LDX	#2902	02360	JSR	PCAR	02850	STY	STY	16291
01880	JSR	PLOG	02370	LDY	#CAR4	02860	LDY	#BFROGF	
01890	LDX	#3521	02380	LDX	#6101	02870	JSR	PFROG	
01900	JSR	PLOG	02390	JSR	PCAR	02880	NQU104	LDX	16241
01910	LDX	#3862	02400	LDY	#CAR6	02890	LDB	LDB	2,X
01920	JSR	PLOG	02410	LDX	#6721	02900	CMPB	#1	
01930	LDX	#3221	02420	JSR	PCAR	02910	BNE	NQU105	
01940	JSR	PTUR	02430	NEQU7	LDX	02920	LDY	LDY	#2127
01950	LDX	#4182	02440	STX	16297	02930	STY	STY	16291
01960	JSR	PTUR	02450	LDX	#4172	02940	LDY	#BFROGF	
01970	LDA	16325	02460	STX	16295	02950	JSR	PFROG	
01980	NQMP5	CMPA	02470	LDX	#0	02960	NQU105	LDX	16241
01990	BHI	NEQU3	02480	STX	16293	02970	LDB	LDB	3,X
02000	LDX	#2571	02490	LDX	#7215	02980	CMPB	#1	
02010	JSR	PLOG	02500	STX	16291	02990	BNE	NQU106	
02020	LDX	#2882	02510	JSR	GET	03000	LDY	LDY	#2133
02030	JSR	PLOG	02520	LDY	#RFROG	03010	STY	STY	16291
02040	LDX	#3531	02530	JSR	PFROG	03020	LDY	#BFROGF	
02050	JSR	PLOG	02540	LDA	#15	03030	JSR	PFROG	
02060	LDX	#3852	02550	STA	16290	03040	NQU106	LDX	16241
02070	JSR	PLOG	02560	LDA	#1	03050	LDB	LDB	4,X
02080	LDY	#TURKILE	02570	STA	16287	03060	CMPB	#1	
02090	LDX	#3211	02580	LDA	16330	03070	BNE	NQU107	
02100	JSR	PTUR	02590	CMPA	#1	03080	LDY	LDY	#2139
02110	LDX	#4162	02600	BNE	NQU100	03090	STY	STY	16291
02120	JSR	PTUR	02610	LDX	#16258	03100	LDY	#BFROGF	
02130	NEQU3	LDY	02620	BRA	ENQU	03110	JSR	PFROG	
02140	LDX	#5121	02630	NQU100	CMPA	03120	NQU107	LDY	#7215
02150	JSR	PCAR	02640	BNE	NQU101	03130	STY	STY	16291
02160	LDY	#CAR2	02650	LDX	#16253	03140	RIS		
02170	LDX	#5451	02660	BRA	ENQU	03150	END		END

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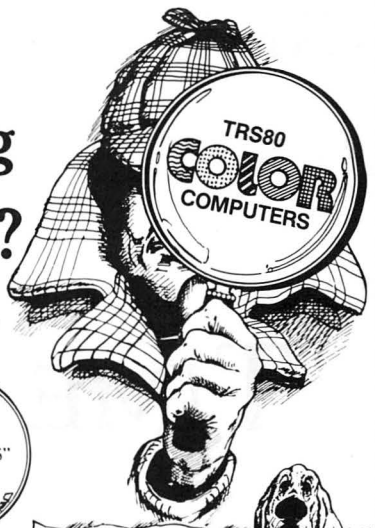
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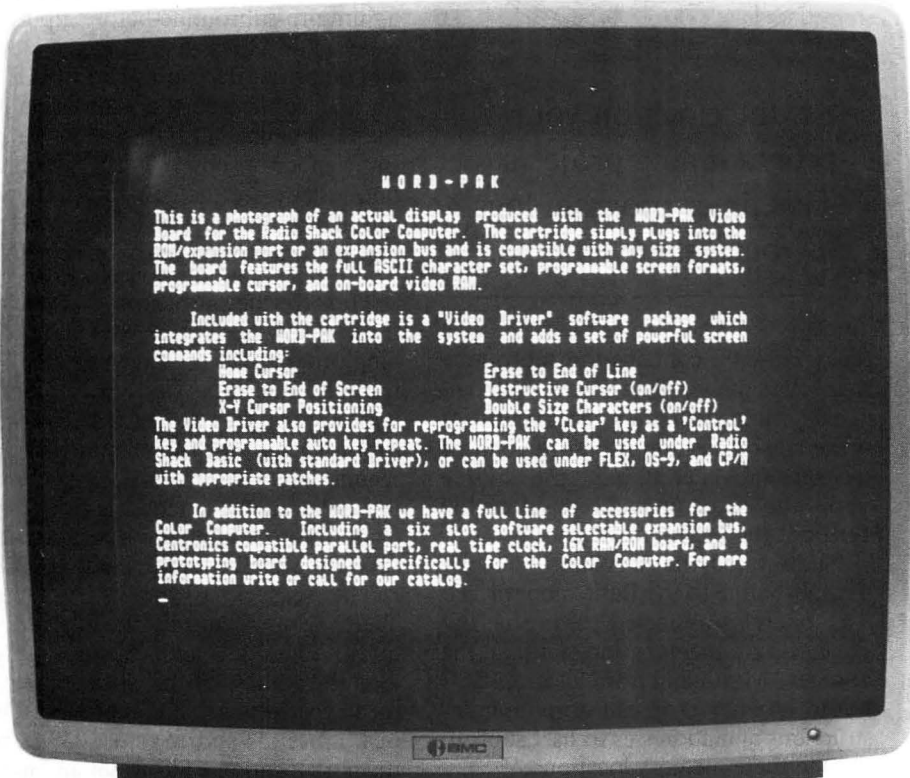
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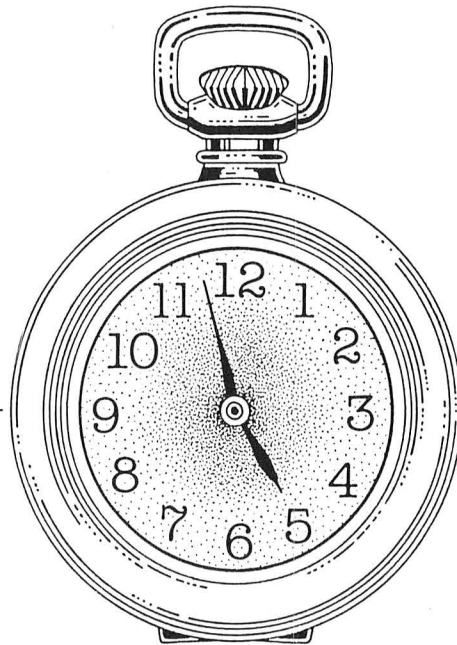
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BY RICK CAMPBELL

TIME AND TIME AGAIN



If your days are anything like mine, you probably don't get the time to complete a program in one sitting. Since it is so easy to lose track of the time spent on programming projects, I created a program that allows me to log in my computer-use time on a timer displayed on the screen.

If you want to skip the following technical explanation, just load and run Program Listing 1.

During the planning stages of the program, there were two major stumbling blocks. First, how do you display the clock without having the scrolling display constantly carrying the timer off the screen? Second, how can you make the clock continue to operate while writing and running programs?

To solve the problem of the scrolling screen, I wrote a routine that reduced the number of text lines from 16 to 15, allowing me to use the sixteenth line to display the clock. Program Listing 2

Set the clock on your programming projects. This timer program logs in your valuable hours.

(lines 278-448) contains the subroutine that solves the scrolling-screen problem.

The routine works by checking to see if the cursor position is past the end of the fifteenth line. If it is, the routine scrolls the screen up and repositions the cursor at the beginning of line 15.

I now faced the problem of linking the subroutine to the Basic monitor. To overcome this obstacle I used some Basic links, or memory locations in the lower RAM running from locations 15E hex to 1A5 hex. You can store jump instructions and addresses to user subroutines in these memory locations.

Before performing any major opera-

tion the Basic monitor checks to see if any detours are stored in the Basic link locations. The two particular links that I used are a jump-to-subroutine-before-print, located at 167 hex to 169 hex, and a jump-to-subroutine-before-input, located at 16A hex to 16C hex. Lines 50 and 60 of the Basic program POKE the starting address of the subroutine into the Basic links. With these now set, the Basic monitor jumps into the subroutine just before the computer inputs or outputs a character. This prevents the CoCo from writing over your clock.

To solve the problem of maintaining the clock while both writing and running programs, I used devices called interrupts. Interrupts perform a function indicative of their name. Once an interrupt is turned on, the computer will, at regular intervals, stop whatever it is doing, save all the internal registers, and jump into the interrupt service routine. (See Program Listing 2, lines 100-268.)

The section of the listing labeled TURNON will turn on the interrupt request. Lines 150 and 152 of Listing 2 load the address of the clock routine into a type of Basic link starting at 10D hex. Lines 154 and 156 store 35 hex into memory location FF03 to set an internal hardware clock that tells the computer

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16K RAM
Extended Color Basic
Editor/Assembler optional

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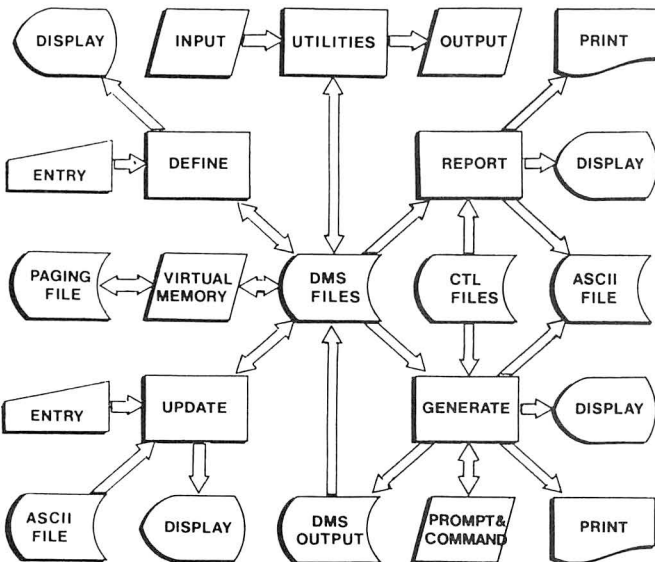
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"To solve the problem of maintaining the clock while both writing and running programs, I used devices called interrupts."

when it is time to service the interrupt routine. The hardware clock sends this message to the computer 60 times per second. Line 158 clears bit 4 of the condition code register to turn on the interrupt and start the software clock ticking. ■

Address correspondence to Rick Campbell, 33 King St., Apt. 1916, Weston, Ontario, Canada M9N 3R7.

```

10 CLEAR 256,&H3000
20 FOR L=12288 TO 12529
30 READ A:POKE L,A
40 NEXT L
50 POKE 360,&H30:POKE 361,&HC8
60 POKE 363,&H30:POKE 364,&HC8
70 DEFUSR0=&H3000
80 A=USR0(0)
90 DATA 142,5,224,204,143,143,23
7,129,140,6
100 DATA 0,38,246,204,84,73,253,
5,235,204
110 DATA 77,69,253,5,237,134,0,1
83,48
120 DATA 243,183,48,244,183,48,2
45,183,48,246
130 DATA 183,48,247,183,48,248,1
83,48,242,142
140 DATA 48,62,191,1,13,134,53,1
83,255,3
150 DATA 28,239,57,182,48,242,12
9,60,37,124
160 DATA 127,48,242,124,48,243,1
82,48,243,129
170 DATA 10,37,58,127,48,243,124
,48,244,182
180 DATA 48,244,129,6,37,45,127,
48,244
190 DATA 124,48,245,182,48,245,1

```

```

29,10,37,32
200 DATA 127,48,245,124,48,246,1
82,48,246,129
210 DATA 6,37,19,127,48,246,124,
48,247,182
220 DATA 48,247,129,10,37,6,127,
48,247,124
230 DATA 48,248,142,5,241,182,48
,248,139,112
240 DATA 167,128,182,48,247,139,
112,167,128,134
250 DATA 122,167,128,182,48,246,
139,112,167,128
260 DATA 182,48,245,139,112,167,
128,134,122,167
270 DATA 128,182,48,244,139,112,
167,128,182,48
280 DATA 243,139,112,167,132,182
,255,2,124,48
290 DATA 242,59,52,118,158,136,1
40,5,223,34
300 DATA 2,32,28,142,4,0,16,142,
4,32
310 DATA 236,161,237,129,140,5,1
92,38,247,159
320 DATA 136,204,143,143,237,129
,140,5,224,37
330 DATA 249,53,118,57,47

```

Program Listing 1. Timer

```

3000          30F2    00100    ORG     $3000
              00102    COUNT   EQU     $30F2
              30F3    00104    SEC1   EQU     $30F3
              30F4    00106    SEC2   EQU     $30F4
              30F5    00108    MIN1   EQU     $30F5
              30F6    00110    MIN2   EQU     $30F6
              30F7    00112    HOUR1  EQU     $30F7
              30F8    00114    HOUR2  EQU     $30F8
3000 8E      05E0    00116    LDX     #$5E0
3003 CC      8F8F    00118    SETUP  LDD     #$8F8F
3006 ED      81     00120    STD     ,X++
3008 8C      0600    00122    CMPX   #$600
300B 26      F6     00124    BNE    SETUP
300D CC      5449    00126    LDD     #$5449
3010 FD      05EB    00128    STD     $5EB
3013 CC      4D45    00130    LDD     #$4D45
3016 FD      05ED    00132    STD     $5ED
3019 86      00     00134    LDA     #00
301B B7      30F3    00136    STA     SEC1
301E B7      30F4    00138    STA     SEC2
3021 B7      30F5    00140    STA     MIN1
3024 B7      30F6    00142    STA     MIN2
3027 B7      30F7    00144    STA     HOUR1
302A B7      30F8    00146    STA     HOUR2
302D B7      30F2    00148    STA     COUNT
3030 8E      303E    00150    TURNON LDX     #TIME
3033 BF      010D    00152    STX     $10D
3036 86      35     00154    LDA     #$35
3038 B7      FF03    00156    STA     $FF03
303B 1C      EF     00158    ANDCC  #$EF

303D 39          00160    RTS
303E B6      30F2    00162    TIME   LDA     COUNT
3041 81      3C     00164    CMPA   #$3C
3043 25      7C     00166    BLO   NOTYET
3045 7F      30F2    00167    CLR    COUNT
3048 7C      30F3    00168    INC    SEC1
304B B6      30F3    00170    LDA     SEC1
304E 81      0A     00172    CMPA   #$0A
3050 25      3A     00174    BLO   TIMEON
3052 7F      30F3    00176    CLR    SEC1
3055 7C      30F4    00178    INC    SEC2
3058 B6      30F4    00180    LDA     SEC2
305B 81      06     00182    CMPA   #06
305D 25      2D     00184    BLO   TIMEON
305F 7F      30F4    00186    CLR    SEC2
3062 7C      30F5    00188    INC    MIN1
3065 B6      30F5    00190    LDA     MIN1
3068 81      0A     00192    CMPA   #$0A
306A 25      20     00194    BLO   TIMEON
306C 7F      30F5    00196    CLR    MIN1
306F 7C      30F6    00198    INC    MIN2
3072 B6      30F6    00200    LDA     MIN2
3075 81      06     00202    CMPA   #06
3077 25      13     00204    BLO   TIMEON
3079 7F      30F6    00206    CLR    MIN2
307C 7C      30F7    00208    INC    HOUR1
307F B6      30F7    00210    LDA     HOUR1
3082 81      0A     00212    CMPA   #$0A

3084 25      06     00214    BLO   TIMEON
3086 7F      30F7    00216    CLR    HOUR1
3089 7C      30F8    00218    INC    HOUR2
308C 8E      05F1    00220    TIMEON LDX     #$5F1
308F B6      30F8    00222    LDA     HOUR2

3092 8B      70     00224    ADDA   #$70
3094 A7      80     00226    STA   ,X+
3096 B6      30F7    00228    LDA   HOUR1
3099 8B      70     00230    ADDA   #$70
309B A7      80     00232    STA   ,X+
309D 86      7A     00234    LDA   $S7A
309F A7      80     00236    STA   ,X+
30A1 B6      30F6    00238    LDA   MIN2
30A4 8B      70     00240    ADDA   #$70
30A6 A7      80     00242    STA   ,X+
30A8 B6      30F5    00244    LDA   MIN1
30AB 8B      70     00246    ADDA   #$70
30AD A7      80     00248    STA   ,X+
30AF 86      7A     00250    LDA   $S7A
30B1 A7      80     00252    STA   ,X+
30B3 B6      30F4    00254    LDA   SEC2
30B6 8B      70     00256    ADDA   #$70
30B8 A7      80     00258    STA   ,X+
30BA B6      30F3    00260    LDA   SEC1

30BD 8B      70     00262    ADDA   #$70
30BF A7      84     00264    STA   ,X
30C1 B6      FF02    00266    NOTYET LDA   $FF02
30C4 7C      30F2    00267    INC    COUNT
30C7 3B          00268    RTI
30C8 34      76     00278    PSHS   U,X,B,A,Y
30CA 9E      88     00288    INTRPT LDX   $88
30CC 8C      05DF    00298    CMPX   #$5DF
30CF 22      02     00308    BHI   CRGRTN
30D1 20      1C     00318    BRA   OUT
30D3 8E      0400    00328    CRGRTN LDX   #$400
30D6 108E    0420    00338    LDY   #$420
30DA EC      A1     00348    AGAIN  LDD   ,Y++
30DC ED      81     00358    STD   ,X++
30DE 8C      05C0    00368    CMPX   #$5C0
30E1 26      F7     00378    BNE   AGAIN
30E3 9F      88     00388    STX   $88
30E5 CC      8F8F    00398    LDD   #$8F8F
30E8 ED      81     00408    CLEAR  STD   ,X++
30EA 8C      05E0    00418    CMPX   #$5E0
30ED 25      F9     00428    BLO   CLEAR
30EF 35      76     00438    OUT    PULS  A,B,X,U,Y
30F1 39          00448    RTS
              00458    END

0000
00000 TOTAL ERRORS

AGAIN 30DA
CLEAR 30E8
COUNT 30F2
CRGRTN 30D3
HOUR1 30F7
HOUR2 30F8
INTRPT 30CA
MIN1 30F5
MIN2 30F6
NOTYET 30C1
OUT 30EF
SEC1 30F3
SEC2 30F4
SETUP 3003
TIME 303E
TIMEON 308C
TURNON 3030

```

Program Listing 2. Screen Formatting and Interrupt Routines

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 * ME-4F . . . F or 285 computers to 64K \$79.95 *
 * ME-5 . . . 8-64K chips for CC-2 to 64K \$59.95 *
 * *
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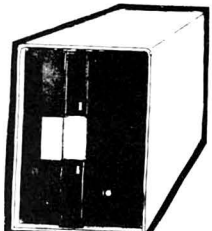
The HJL Keyboard is generally preferred by many touch typists in that it feels like many electric typewriter keyboards. It does require the cutting of one plastic post for installation but mounts in a nice recessed position. This is Jeff's favorite Keyboard. Please specify board revision on this model, or call us to help you determine it \$79.95



The Macotron Premium Keyboard is preferred by many programmers because it uses the Alps keys as used in the Model IV, as well as many other computers. This is Al's favorite keyboard because of that. This model requires no post cutting but the board revision should be known \$79.95



The Key-Ironic Keyboard is the newest keyboard from a very old Company. This keyboard has no comparison and is by far the best. No cutting required, no need to know your revision board. It is higher priced, and worth the extra cash \$89.95



Tandon Disk Drives are the best and most dependable drives known today. They are currently being used by the top micro-computer manufacturers including the one that made yours in their higher priced units. Double headed drives are set up to run like 2 physical drives on the Co-Co so they are fully compatible just like the single sided drives with your DOS. So if your in the drive market, try a little quality. You will be glad you did.

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6809 On Line

GOING ON LINE: WHAT'S IN IT FOR YOU?

by Bobby Ballard

Welcome, *HOT CoCo* readers! This month marks the beginning of a new column dedicated to helping you get the most out of your computer and modem. If you don't already telecommunicate with your computer (it's legal), then I urge you to start soon. No matter what your interest, there is something out there for you. From research abstracts and stock quotes to programs and on-line games, the variety and extent will amaze you.

Each month I'll look at databases, bulletin boards, and other services available to the Color Computer user. This month's column is an overview of the more prominent information utilities. You will also find information on some of the less-known services. I have included current prices where available and how to contact the services that interest you. Prices are subject to change.

CompuServe

Run by H & R Block Inc., CompuServe is the oldest and best-known of the databases, boasting a whopping 80,000 subscribers. You can sign up at your local Radio Shack. For \$19.95 you can buy the Universal Sign-Up Kit (cat. no. 26-2224), or you can buy a communications software package that includes the CompuServe sign-up.

CompuServe is menu driven and easy to use. After some practice you can use the expert level, saving time and money. The charges for connection time vary according to the time of access and your established baud rate. Prime service is currently 8 a.m. to 6 p.m. weekdays. The standard, lower-rate service is in effect 6 p.m. to 5 a.m. weekdays and all day weekends and announced holidays.

For prime service the 300-baud rate is \$12.50 per hour, and the 1,200-baud rate is \$15 per hour. Standard service at 300 baud is \$6 and at 1,200 baud \$12.50. If you live in an area without a local CompuServe number, you might have an additional charge through ei-

ther a long-distance call or a subscription to an access network such as Tymnet or Telenet. When you sign up, you also receive a year of *Online Today*, a monthly CompuServe publication.

CompuServe has over 600 services. You can send and receive electronic mail, check ski reports nationwide, access Dow Jones or the AP News Wire, or join a special interest group (SIG). These SIGs include one just for Color Computer users, The Color SIG. Just recently, another SIG was created for OS-9 users.

The Color SIG is the largest on-line CoCo club in the U.S., with programs to download, on-line conferences, and a message base for its subscribers. Other SIGs include the Telecommunications Industry, Author's SIG, Belmont Golf, Cooking, Educators, Firefighters, Programmers, Microsoft, Sports, Travel, and Legal.

Contact CompuServe at 5000 Arlington Centre Blvd., Columbus, OH 43220, 800-848-8990 or 614-457-8650.

Dow Jones News/Retrieval

Dow Jones has about 85,000 members, and it is geared to the investment community, including special services for executives. The Dow Jones Sign-Up is included with the Universal Sign-Up Kit. The account you open at CompuServe is separate from your account at Dow Jones.

Access of "The Dow" opens a world of financial information including current and historical stock quotes; corporate earnings disclosures and estimates (along with economic surveys); *Wall Street Journal* highlights; and news, weather, and sports. Canadian stocks are also listed on The Dow.

The Dow is available through Tymnet and Telenet in the U.S. and on Datapac in Canada. The connect-time charges vary with your baud rate and time of day, as with most services. The Dow also has standard, blue chip, and executive services for prime and non-prime times. Rates go from 20¢ to \$1.20 per minute, with additional charges for special areas of information.

Dow Jones continues to expand its services and just added MCI Mail to the list. I'll take a closer look at The Dow in a future column.

Contact Dow Jones at P.O. Box 300, Princeton, NJ 08540, 609-452-2000.

The Source

Hobbyists really go for The Source. Application programs are the featured item. The Source provides services and databases that include programs written in Cobol, Fortran, and Basic, among other languages. It also offers UPI services, investment information, stock quotes, and SourceMail, its electronic-mail system.

You pay a \$100 initiation fee plus \$20.75 per hour prime connect time, \$7.75 per hour nonprime time. There is a \$5-per-hour surcharge during prime time for 1,200-baud operation and \$3 per hour nonprime time.

The Source also has Source Plus, which keeps track of the futures markets throughout the nation including The Chicago Board of Trade and the Minneapolis Grain Exchange. Hundreds of over-the-counter stocks are listed as well as the international money-market scene. The Source covers travel, airline schedules, job and resume listings, plus electronic shopping through Comp-U-Card of America and various bulletin boards.

The Source has about 40,000 subscribers and is owned by the *Reader's Digest* publishers. For more information contact The Source, 1616 Anderson Road, McLean, VA 22102, 703-734-7500.

Dialog

Dialog Information Services Inc. provides over 175 databases for professionals and businesses and ranks as the largest of all the services based on the amount of information available. For example, the trademark and patent database contains nearly three-quarters of a million entries.

A division of Lockheed, Dialog charges no initiation fee, and connect-time charges vary from \$5 to over \$100 an hour depending on the abstracts or databases you are accessing. Dialog is more difficult to use, and you need a copy of *Guide to Dialog Searching* to find your way around.

Training seminars are available for beginners and veterans. The day-and-a-half System Seminar is for beginners and costs \$135 with lunch included on the full day. Advanced seminars cost \$45 for the half day and \$115 for a full-day session with lunch. Advanced seminar topics include patents, legal, science and technology, government documents, and search strategy. The seminars are scheduled frequently in all the major cities from Durham, NC, to Albuquerque, NM.

In certain cities you can preview Dialog and obtain private appointments with the Dialog staff. The demonstration is free, but you need advance reservations.

While on line with Dialog, you can order printed material of the abstracts or publications directly from the publisher, saving connect time and wear and tear on your printer. Dialog recently announced upcoming improvements, including a redesign of software and an increase in small-computer products and service.

An additional service is the Knowledge Index. Of particular interest to micro owners are the International Software database and the Microcomputer Database. The Knowledge Index connect fee is \$24 per hour; access hours are 6 p.m. to 5 a.m. Monday through Thursday, 6 p.m. to midnight Friday, 8 a.m. to midnight Saturday, and 3 p.m. to 5 a.m. Sunday. The startup fee is \$35 and it includes two free hours of connect time and the *User's Workbook*, a manual for the Knowledge Index. As with Dialog, copies of articles and documents are available for a fee.

Contact Dialog Information Services Inc. at 3460 Hillview Ave., Palo Alto, CA 94304, 415-858-2700.

"Next month, I'll look at the bulletin-board services available to the Color Computer. I'll survey the best along with some of the newest."

Delphi

Delphi, operated by General Videotex Corp., attracted hobbyists in the past, but it appears to be heading toward a business slant. Available services include U.S. Postal Service's E-Com, travel services such as the Official Airline Guide (AOG), and Visa Advisors, through whom you can apply for a travel visa. A complete on-line brokerage service is also available as well as financial advice, the Hollywood Hotline, the Software Emporium, a film library, and the Independent Record Release Index.

Delphi charges \$16 an hour for prime-time connection and \$6 an hour evenings, weekends, and holidays. There is no premium charged for access through Tymnet or at 1,200-baud operation. Delphi has just expanded its network capacity to include a VAX 11/750 facility in Cambridge, MA. The initiation fee was lowered to \$34.95 from \$49.95 in March to celebrate Delphi's first anniversary.

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

Newsnet

If you read newsletters, Newsnet might interest you. It features over 150 special newsletters, many of which are available only on Newsnet. The information is largely business oriented, and it includes the *Computer Cookbook* encyclopedia and updates. Other features include publishing, broadcasting, investment, management, public relations, government and regulatory, telecommunications, entertainment and leisure, advertising, and research and development.

Newsnet has no initiation fee, but there is a minimum \$15 monthly charge. Read rates vary according to whether you subscribe to the publication in hardcopy. You receive a

\$6-per-hour discount for evening use. Specialized services include NewsFlash, a personalized clipping service, and the Public Relations Newswire, updated every half-hour.

Contact Newsnet Inc. at 945 Haverford Road, Bryn Mawr, PA 19010, 215-527-8030.

Data-Net

Data-Net advertises itself as the "low-cost" videotex with connection-time charges at \$3.90 an hour, the least expensive price I know of. There is no initiation fee, but you receive a minimum \$5 monthly charge. Operation at 1,200 baud costs an additional \$1.80 an hour. Prime-time charges are higher.

Data-Net provides an on-line dictionary, audio/visual and computer newsletters, electronic buying/selling including real-estate listings, and a barter service. It supports languages such as Pascal, C, Basic, Cobol, and Fortran. You can send a Western Union Mailgram or an Arm Associates Postal-Gram through Data-Net. You can also take advantage of on-line software. Data-Net is now Unix compatible, and Unix and other manuals are available through Data-Net.

Data-Net is a subsidiary of Arm Associates Inc., 4515 Culver Road, Rochester, NY 14622, 716-244-9210.

Connexions

Professional Data Corporation runs Connexions as a full-time job-placement service for high-technology industries. Companies list job openings for two months, and callers pay \$15 for two hours' worth of searching. You must still forward your resume or credentials to the prospective employer. Connexions announced an expansion of their services in 1983 that would include a database on the West Coast and job listings in business, marketing and sales, and other industries. Companies pay a fee to list openings with Connexions.

Contact Connexions at 55 Wheeler St., Cambridge, MA 02138, 617-492-1690.

Colleague/After Dark

Biographical Research Service operates Colleague/After Dark from 6 p.m. to 5 a.m. weekdays and around the clock on weekends. The service is for small-computer users and includes the Academic American Encyclopedia and the Harvard Business Review

6809 On Line



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among its services. Broader topics include mathematics, education, psychology, chemistry, family planning, and health. The initiation fee is \$50, and hourly rates start at \$6 an hour with a monthly minimum of \$12. This service claims to be "a university library on line at home." BRS can be reached at 1200 Route 7, Waltham, NY 12110, 518-783-1161.

Phonet

A database for advertising agencies, publishers, and photographers, Phonet provides opinion-poll information, bulletin boards, electronic mail, and other services. The initiation fee is \$100 with connect times varying according to the service you use. This database, like so many in this expanding industry, is geared to an even more specific niche of the market than the other services covered here.

Contact Phonet Computer Corp. at 500 Park Ave., New York, NY 10022, 212-750-1386.

Sportel

Sports fans will appreciate Sportel, a database almost entirely dedicated to sports. It provides entertainment guides to Las Vegas, Reno, Lake Tahoe, and Atlantic City as well as show reviews, casino systems and methods, handicap aids, and an up-to-the-minute betting line. There are also databases of statistics, injury and weather reports, and exhibition baseball lines and scores. Over 25 racetracks and college sports are covered, as well. With a \$150 initiation fee, Sportel is for the serious fan. Connect fees vary.

Contact Sportel at P.O. Box 1182, Las Vegas, NV 89125, 702-871-6529.

Lexis, Nexis, and Lexpat

These three information utilities, operated by Mead Data Central, are specifically geared to lawyers and communication professionals. Nexis forms the news database covering over 100 papers, wires, newsletters, and magazines. Lexis is the legal service, and Lexpat is the patent-search service for patent lawyers and industry professionals.

You must own a Mead Data Central terminal for access, but you might see these services become available to small-computer users, as the rest of this industry has responded in this fashion.

*"...if you operate
a BBS or database
that HOT CoCo
readers can access, let me
hear from you."*

Contact Mead Data Central at 9393 Springboro Pike, P.O. Box 933, Dayton, OH 45401, 513-865-6800.

Huttonline

For E.F. Hutton clients, Huttonline lets you track your stocks for just a \$25 initiation fee and a \$17 monthly charge that gives unlimited use. Features include account access, electronic stock purchase, databases, and electronic mail.

Contact E.F. Hutton at One Battery Place Plaza, New York, NY, 212-745-5000.

Buy Phone

Los Angeles residents can access for free more than 10,000 entries under product information, theatre, movies, restaurants, and other commercial ventures. The caller pays only for the phone call; the advertiser supports the cost of service. The on-line number is 213-474-0270. On-line advertising is approaching fast with the Yellow Pages publisher L.M. Berry and CompuServe teaming up to provide electronic Yellow Pages in 1984.

NTC

National Telecomputing Inc. (NTC) is a new operation. For \$10 a month you can access NTC from 8 p.m. to 8 a.m. The Real-Estate Information Network operates NTC, and the grapevine has it that this service will support color graphics.

Contact NTC at P.O. Box 257, Nyack, NY 10960.

Next Month

I'll take a look at the bulletin-board services available to the Color Computer user. I'll survey the best along with some of the newest. I welcome your comments concerning this column, and if you operate a BBS or database that *HOT CoCo* readers can access, let me hear from you. ■

Write Bobby Ballard at 1207 Eighth Ave. 4-R, Brooklyn, NY 11215.



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COLOR COMPUTER SOFTWARE

SUPER SLEUTH DISASSEMBLER EACH \$99-FLEX, \$101-OS/9 interactively generates source on disk with labels, includes xref specify 6800,1,2,3,5,8,9/6502 version or Z-80/8080/85 version (OBJECT ONLY) EACH \$50-FLEX & OS/9, \$49-COCO DOS COCO DOS available in 6800,1,2,3,5,8,9/6502 version only

CROSS-ASSEMBLERS EACH \$50-FLEX, \$55-OS/9, ALL \$100 specify for 6800/1, 6502, 6805, Z-80, or 8080/48/85 OS/9 version requires Microware RMA or Lloyd OSM macro assembler FLEX version requires TSC ASMB or FHL ASM or OSM macro assembler

DEBUGGING SIMULATORS EACH \$75-FLEX, \$100-OS/9 specify 6800/1, 6805/146805, 6502, or (6809 OS/9 only)

OBJECT ONLY for COCO FLEX and COCO OS/9 users: \$50 each
6502 TO 6809 ASSEMBLER TRANSLATOR \$75-FLEX, \$85-OS/9 translates 6502 programs to 6809, noting inexact conversions

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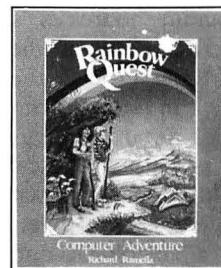
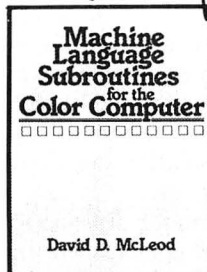
Specify Color Computer or other version of programs. Most programs provided in source form on diskette: specify O.S. Call or write for full catalog and dealer info. VISA and MASTER CARD accepted; US funds only. Add 5% for shipping software, but not for diskettes.

FLEX trademark Technical Systems Consultants. OS/9 trademark Microware.

BOOKS

BOOKS

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No more flipping through the Color Computer manuals to find information you need. Nanos System Reference cards are pocket-sized summaries for your quick, easy reference. Find such information as BASIC commands and instructions, ROM routines, reserved words, I/O instructions, hex conversions, screen line layout, and anything else you need to know to program your machine. **TRS-80 Color BASIC and Extended** FC1006 \$4.95

331

Machine-Language Subroutines for the Color Computer

A book of useful machine-language routines for use in your Color Computer programs. Both ROM and RAM subroutines are included, and all programs are on the cassette that comes with the book. The ROM subroutines come from the standard BASIC ROM and can be used with BASIC 1.0 or BASIC 1.1. The RAM subroutines are a collection of the author's routines. For each routine, you get entry requirements, exit conditions, error interpretation and program listings. Numeric conversions, data processing, keyboard input, text screen output, text output using high-resolution graphics, tape/disk I/O and multiple-precision routines are discussed at length. \$29.95 CC7404 300 pp.

Rainbow Quest for the Color Computer

A computer fantasy for young Color Computer users. **Rainbow Quest** is an adventure that combines fiction and programs. Readers must cross the planet Rainbow and master a series of challenges to succeed on the Quest. Each challenge is a program on cassette. Included are arcade games, puzzles, and mazes. Book and cassette sold together. \$24.97 CC7391 128 pp.

For credit card orders, call toll-free, 1-800-258-5473. Or send your order on a separate piece of paper to: Wayne Green Books, Retail Sales, Peterborough, NH 03458. Be sure to include the book title, order number, and price. Postage and handling is \$1.50 for the first book, \$1.00 for each additional book. Foreign air mail is \$10.00 per book. Check, money order, or complete credit card information must accompany your order. If you have questions about your order, write customer service at the above address. Orders payable in U.S. dollars only.

The DOSsier

In my first Re:FLEX column (January 1984), I described two popular high-level languages: Computerware's Random Basic and Technical Systems Consultant's (TSC) Extended Basic. Both are easy for Disk Color Basic users to learn when they finally make the move to Flex.

If you have recently switched, or if you are contemplating doing so, you should be aware of some of the Basic dialects available to your new operating system. Commercial applications software is fine, but who knows? You may want to write something of your own one day.

I'm going to spend most of this month's column looking at a TSC Extended Basic program in some detail. The language has some nifty features, which I'll demonstrate by working through a program that does something useful. Next month I'll follow up with a translation of the same routine for TSC's Extended Basic Pre-compiler.

Budgets Again

My sample program addresses a matter that keeps cropping up in the management of my R&D projects: the question of whether I'm going to run out of money before I run out of year. Each of my projects starts the fiscal year with a fixed budget against which my staff and I charge salaries, overhead expenses, travel, materials, and so on.

My main concern is with the rate at which we accumulate charges. As a result, one of my most common computing tasks is to extrapolate my recent spending history and compare the predicted outcome with the budget to see if it calls for any corrective action.

Readers of my old Color Key column in *80 Micro* may recall that in September of 1983 (p. 30) I published an Extended Color Basic program that produced a high-resolution budget graph, complete with the assigned target figure and a pair of extrapolations. But graphics are not a feature of TSC Extended Basic, so it's back to text screens for this exercise.

BACK TO (EXTENDED) BASICS

by Scott Norman

I designed the program to provide a transition vehicle for Color Basic programmers, showing off some of TSC Extended Basic's unique file-handling capabilities as well as providing a reasonable jumping-off place for some Precompiler work. I call it SEP, for Spending Extrapolation Program.

SEP assumes that you are interested in managing the cost of an activity that will last for a 365-day year, and it lets you enter as many as 51 expenditure reports during that year. The calculations are set up for period expenditures (i.e., you input just what you spent since the last entry, along with the reporting date), but the interval between entries is entirely up to you. I picked the size of the data array to let you record weekly reports, but you can enter information at other (irregular) intervals; unused regions of the data matrix don't interfere with anything.

The program creates a disk file for each project; initial contents are the starting date of the one-year period you wish to consider, and the budget figure. You can enter data when you first open a file, and you can update existing files at any time—in the sense of adding more recent expenditure information, that is. The only way to examine or change an item once you've stored it is to attack the data file with a text editor. It shouldn't be hard to add

sorting and editing functions to SEP, but remember that my original goals were a little more modest.

Like its Color Basic predecessor, SEP provides two different estimates of how your year-end costs will compare with the budget. The first extrapolation technique, the weighted-average method, assumes that spending will continue at the average rate calculated from your existing data. Graphically, this corresponds to drawing a line from the origin (the beginning of the fiscal year, when expenditures were zero) through the last reported point and extending it to the end of the year.

I have included a second technique that I call a last-two-points extrapolation. Here, the line joining the last two data points is mathematically extended to year-end; earlier data is ignored. This can be useful when there are significant, permanent changes in some of your expenses during the course of the year. Employee salaries are the largest part of my costs, for example, and the last-two-points method provides a more accurate estimate of the effects of midyear salary increases than the weighted-average technique does.

Into the Code

SEP is well commented, but there are a few stumbling blocks: pieces of code that different routines share, for instance. There's a reason for this: I want to show how you can clarify program structure when I get to the Pre-compiler version. For the moment, just think of SEP as an example of how easy it is for a simple program to become a little involved.

Let's get the easy text I/O stuff out of the way first. The CHR\$(2) that shows up in a few places is just control/B, the Flex command that clears the screen and homes the cursor.

TSC Extended Basic lets you imbed either single or double quotes within a literal PRINT statement; just use the one you *don't* want as the delimiter that sets off the print string. See program line 1010 for an example. There

System Requirements

64K RAM
Flex
TSC Extended Basic

The DOSSier

is also a versatile PRINT USING statement, simple examples of which appear in lines 3640 and 3680.

One of TSC Extended Basic's most appealing constructs, the virtual array, handles SEP's data storage. It is the simpler of the language's two forms of random file I/O. In effect, you specify that a one- or two-dimensional array of numeric or ASCII data should be set up on disk, almost exactly like it might be established in RAM. Of course, the disk file doesn't go away when you turn the computer off, but can be used again by SEP or another program.

TSC Extended Basic also has sequential file handling and a more complex form of random file manipulation called record I/O. That's the one to use if you want to mix ASCII and numeric data in one file.

Quantities stored in virtual arrays are referenced just like the data in conventional Basic arrays. You must first declare the array itself by a special form of DIM statement:

```
DIM #<num.>, <array name>(<dimensions>)
```

where num. is a number or a numerical expression that takes on a value between 1 and 12. It designates an internal I/O channel number, and there must be corresponding OPEN and CLOSE statements in a file-handling routine.

Here's a little routine that creates a virtual array for storing numbers on drive 1 and invites you to fill it from the keyboard:

```
100 OPEN "1.FILE-A" AS 1
200 DIM #1, XX(9)
300 FOR N%=0 TO 9
400 INPUT XX(N%)
500 NEXT N%
600 CLOSE 1
700 END
```

Notice that the name of the array in RAM (XX) need have nothing to do with the name of the corresponding disk file (FILE-A); the I/O channel number establishes the correspondence. TSC Extended Basic adds the suffix "/DAT" to a data file.

Arrays have a zero element: XX(9) can actually accommodate 10 numbers, just as in Color Basic. Finally, TSC Extended Basic recognizes integer variables, which can be useful for conserving memory and for speeding up some types of operations. The %

Program Listing. SEP. Note the 51-column format.

```
10 REM*****
20 REM
30 REM "DOSSIER" TEST PROGRAM *
40 REM *
50 REM XBASIC VERSION *
60 REM *
70 REM SCOTT NORMAN, MAY '84 *
80 REM *
90 REM*****
95 REM
100 PRINT CHR$(2): PRINT TAB(11) "SPENDING EXTRAPOLATION PROGRAM"
110 PRINT: PRINT TAB(3) "THIS PRORAM WILL HELP YOU MANAGE THE RATE AT"
120 PRINT "WHICH YOU SPEND MONEY. YOUR SPENDING PATERN WILL"
130 PRINT "BE PROJECTED OUT TO THE END OF A 1-YEAR PERIOD"
140 PRINT "BY TWO DIFFERENT METHODS."
145 PRINT
150 PRINT TAB(12) "(1) START A NEW FILE"
155 PRINT
160 PRINT TAB(12) "(2) ADD TO AN OLD FILE"
165 PRINT
170 PRINT TAB(12) "(3) CHECK YOUR SPENDING RATE"
175 PRINT: PRINT TAB(12) "(4) END"
180 PRINT: INPUT "YOUR CHOICE";CH%
190 IF CH% <1 OR CH% > 4 THEN 180
200 ON CH% GOTO 1000, 2000, 2000, 210
210 END
997 REM
998 REM *** NEW FILE ROUTINE ***
999 REM
1000 PRINT: INPUT "WHAT DO YOU WANT TO CALL THIS FILE"; NMS
1010 PRINT "WHEN DID THE FISCAL YEAR BEGIN ("MM,DD,YY" FORMAT)";
1020 GOSUB 5000: REM COMPUTE JULIAN DATE
1030 INPUT "WHAT IS THIS YEAR'S BUDGET"; BG
1040 OPEN "1."+NMS AS 1
1050 DIM #1, AR(52,1)
1060 AR(0,0)=JD: AR(0,1)=0 : REM START OF THE YEAR
1070 AR(52,0)=JD+365: AR(52,1)=BG: REM END OF THE YEAR
1080 NE%=0: REM COUNTER FOR # OF EXPENDITURE ENTRIES
1085 REM NEXT BLOCK OF CODE SHARED WITH OLD-FILE ROUTINE
1090 NE%=NE%+1
1100 PRINT: PRINT "EXPENDITURE DATE";
1110 GOSUB 5000
1120 INPUT "AMOUNT SPENT THIS PERIOD"; EX
1130 AR(NE%,0)=JD: AR(NE%,1)=EX
1140 INPUT "ANY MORE DATA (Y/N)"; AN$
1150 IF AN$="Y" THEN 1090
1160 IF AN$<>"N" THEN 1140
1170 CLOSE 1
1180 GOTO 145
1997 REM
1998 REM *** OLD-FILE ROUTINE ***
1999 REM
2000 PRINT: INPUT "FILE NAME"; NMS
2010 OPEN "1."+NMS AS 1
2020 DIM #1, AR(52,1)
2030 NE%=1
2040 IF AR(NE%,0)=0 THEN NE%=NE%-1 ELSE 2060
2050 ON CH% GOTO 1000, 1090, 3000, 1000
2060 NE%=NE%+1: GOTO 2040
2994 REM
2995 REM *** EXTRAPOLATION ROUTINE ***
2996 REM
2997 REM ** WEIGHTED-AVERAGE METHOD **
2998 REM
3000 NM=0
3010 FOR C%=1 TO NE%
3020 NM=NM+AR(C%,1)
3030 NEXT C%
3040 DM=AR(NE%,0)-AR(0,0)
3050 SL=NM/DM: REM AVERAGE SPENDING RATE
3060 WA=NM+SL*(AR(52,0)-AR(NE%,0))
3497 REM
3498 REM **"LAST-TWO-POINTS" METHOD **
3499 REM
3500 NN=AR(NE%,1)
3510 DM=AR(NE%,0)-AR(NE%-1,0)
3520 SL=NN/DM: REM MOST RECENT SPENDING RATE
```

Listing continued

Listing continued

```

3530 L2=NM+SL*(AR(52,0)-AR(NE%,0))
3535 BG=AR(52,1)
3540 CLOSE 1
3550 DW=100*(BG-WA)/BG
3560 IF DW>0 THEN A$="BELOW" ELSE A$="ABOVE"
3565 DW=ABS(DW)
3570 D2=100*(BG-L2)/BG
3580 IF D2 > 0 THEN B$="BELOW" ELSE B$="ABOVE"
3585 D2=ABS(D2)
3590 PRINT CHR$(2)
3600 PRINT TAB(19) "*** RESULTS ***":PRINT:PRINT
3610 DIGITS 8,2
3620 PRINT "AVERAGE-SPENDING-RATE METHOD PREDICTS Y
EAR-END"
3630 PRINT "EXPENDITURES OF $";WA
3640 PRINT USING 'OR ##.#',DW;:PRINT"% ";A$;" BUDGE
T."
3650 PRINT
3670 PRINT "YEAR-END EXPENDITURES OF $";L2
3680 PRINT USING 'OR ##.#',D2;:PRINT"% ";B$;" BUDG
ET."
3700 END
4997 REM
4998 REM *** JULIAN DATE CALCULATION ***
4999 REM
5000 INPUT M%, D%, Y%: Y%=Y%+1900
5010 JD=3.67E2*Y%-INT(7*(Y%+INT((M%+9)/12))/4)+INT(
275*M%/9)+D%
5020 RETURN
10000 REM ** YOU SHOULDN'T BE ABLE TO GET HERE ! **

```

END

suffix on N% denotes an integer.

A routine to read our disk file and print out the contents might look like this:

```

100 OPEN "1.FILE-A" AS 1
200 DIM #1, ZZ(9)
300 FOR M%=0 TO 9
400 PRINT ZZ(M%)
500 NEXT M%
600 CLOSE 1

```

Fragments of such code pop up at several points in SEP. The only thing you have to watch is the channel-number syntax: when to include the # sign and when to omit it.

Actually, the simple OPEN statement first tries to find the corresponding file name on disk before opening a new file. There are other commands, OPEN NEW and OPEN OLD, that you can use to tell the computer whether or not the file is already supposed to exist.

Virtual arrays can only have one or two dimensions, and it seems that there are four pieces of data to store for each expenditure report: month, day, and year of the report, and the amount of money spent. No problem. You must convert every date to a single number anyway, so that the program can find the intervals between reports.

The Julian date routine in lines 5000-5020 takes care of this chore, computing a unique value for every date I ever expect to be concerned

with. The 53-by-2-element data arrays wind up with the following form:

AR(0,0)	date of start of year
AR(0,1)	initial expense (=0)
.	.
.	.
AR(n,0)	date of nth expense report
AR(n,1)	corresponding amount spent since last report
.	.
.	.
AR(52,0)	date of end of year
AR(52,1)	budget target figure

The date-computation routine is the one I used in my old Color Key program; so is the whole data storage idea, although I just used a bunch of DATA statements in the earlier version. My subroutine doesn't quite compute the astronomers' Julian date; I've dropped an additive constant, since all I care about is the difference between two dates. The constants would drop out in the subtraction, anyway.

This particular routine has also been known to be off by one for a few specific dates, possibly as the result of being forced through an 8-bit calculation.

One more point about the algorithm: although all the data values are integers, I have forced the date to be computed as a floating-point number by writing the first factor, 367, as 3.67E2. That's all it takes. The reason

for making the switch is that modern-day Julian dates are huge—in excess of 724,000.

TSC Extended Basic can only handle integers up to the familiar 32,767, and while the interpreter automatically converts a large number entered from the keyboard, it generates an error message if one comes about as the result of an integer calculation within a program. Think of line 5010 as a demonstration of the language's maturity; I grew up with a Fortran that had fits if anyone tried to sneak in a mixed-mode expression like that.

Everything else in the SEP code should look familiar to the Color Basic programmer. As I said, TSC Extended Basic is pretty simple to get used to. I didn't go in for elaborate error trapping, but there is a welcome ON ERROR GOTO construct that I might have used. The only things I miss are graphics and a self-contained editor. As things stand, it's necessary to leave TSC Extended Basic, return to Flex, and use ED, TED, or some other editing tool to fix up typos or erroneous code. It's often easier to just retype the offending line.

If you decide to trace through the program, you'll notice that a block of material between lines 1090 and 1180 is used by two routines: the one for opening a new file and the one for adding to an existing file. In the same way, lines 2000-2050 are used when updating an old file and when actually estimating the end-of-year cost figure, minimizing repetitive typing.

This is what I meant by convoluted structure, and of course it's typical of what you can get into with most Basics. Next month, you'll see how the TSC Extended Basic Precompiler encourages a neater, more structured approach.

Absolutely the Last Word About Patching Stylograph

For the past couple of months, I've been boring folks with the gory details of how to patch Stylograph and DynaCalc to take advantage of the 80-column display of PBJ's Word-Pak. I enjoyed these exercises in exploring Flex's file structure, but they may have put some people off. That would be a pity, because the big-screen format is nice to have.

Fear not: now comes news that Great Plains Computer, vendor of Stylograph, is whole-heartedly sup-

The DOSSier

porting Word-Pak. The latest versions of the word processor come with four terminal-driver routines: one each for Hogg Lab and Data-Comp Flex in both the 51-by-24 and 80-by-24 display formats, making patches unnecessary. You'll still need the Word-Pak driver module, and Great Plains can supply that along with the hardware itself.

In fact, you can get the whole package in either Flex or OS-9 formats, which should be welcome news to aspiring OS-9 users with nothing in particular to run. I have had a look at a review copy of OS-9 Stylo; once I got used to a few changes in the control keys, things went quite well.

The current newsletter from Great Plains also informs us that much of their Flex business software can be, and will be, adapted to run on 80-column CoCos. Good news, indeed. Watch this space.

The Inevitable Squawk

Both TSC Extended Basic and Stylograph are blessed with fine manuals: businesslike, clear, and professionally presented. There are a few other winners in the world of Flex/OS-9 documentation: DynaCalc does rather well, and the Computerware business manuals are nice and straightforward. There are some horrendous counterexamples, though, and I simply don't understand why.

At this moment, I possess one high-priced applications disk whose contents seem to be orthogonal to its documentation. I stress the "seem to be" because it's not at all clear just what the program is supposed to do. I also have a major program that does its job, but not in any manner corresponding to the description in the manual.

I'm going to have one more go-round with each vendor before naming names; maybe I just got the wrong stuff. I'm not optimistic, though. An awful lot of the Flex material I see shows its heritage of being installed on Gimix systems by dedicated tinkerers, which is not exactly what one wants for Color Computer software. It's a different game, folks; no one wants to spend much time rooting around in the back of the manual just to get a program running.

But the biggest offender of the moment is Father Tandy. Much of the OS-9 documentation is turgid, some

"I'm not optimistic, though. An awful lot of the Flex material I see shows its heritage of being installed on Gimix systems..."

of it is nearly unfathomable, and a little of it is flat-out wrong—misleading, at the very least. You simply cannot load Basic-09 by following the manual literally, for example.

There is the little matter of changing the execution directory; if you have the OS-9 system disk in drive 0 and Basic-09 in drive 1, you had jolly well better enter CHX /D1 before typing the BASIC-09 command, or you'll never get anywhere. If you're using a single drive, you still need CHX /D0.

It's a little thing, but important to the beginner. Tandy should know better. A shame, too, because Basic-09 is a nice language.

I also have a few horror stories about making allegedly simple modifications to my OS-9 startup file. I'll share them in a later column. Self-esteem demands that I assume that if I'm having trouble, other people are, too. Despite all my fooling around with Word-Pak, I'm not looking for a second career in software installation. ■

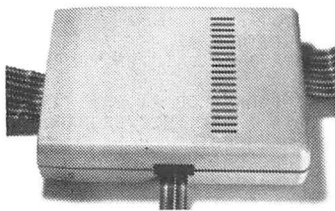
Vendors mentioned in this month's DOSSier:

Technical Systems Consultants Inc.
(Extended Basic, Precompiler)
111 Providence Road
Chapel Hill, NC 27514

Great Plains Computer Co.
(Stylograph, Word-Pak material)
P.O. Box 916
Idaho Falls, ID 83401

PBJ Inc.
(Word-Pak)
P.O. Box 813
North Bergen, NJ 07047

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The Educated Guest



What educator or parent doesn't want to respond to the need of every individual child? Well, the computer can, even where we fail. It can potentially understand, with every keystroke, what a student would like to express. I want to explore methods of accepting and interpreting student responses. This is a thorny problem in producing an educational program.

The first part of the problem is to state the question or task in a way that elicits a reasonable response. At this point, I suggest you either state a question in the same frame of reference as it is given during instructions, or state the problem in terms of what a student might encounter in a real-life situation. You can use the computer to judge whether or not the student has given an appropriate response.

Computer programs commonly give a student multiple answers to choose from. This is a valid approach, but it ignores the fact that recognition of a correct answer is a different skill than the recall of information. In many real-life situations, students will not have a visual choice of their course of action. Since I have previously discussed programs that use the multiple-guess approach, this column deals with methods that require recall of information. That is, the student must type in the correct response.

The most obvious approach (and perhaps the least satisfactory) is to require the student to type in exactly the correct answer. A software author often requires that exact letters, spaces, and correct upper- or lowercase be used before an answer is accepted. On the other hand, for a more flexible approach, you could anticipate every possible correct answer. Program Listing 1 shows a method that checks for multiple correct answers.

The routine uses a single string consisting of possible correct responses separated by a slash. You add a slash before and after the student's response and then use an INSTR function to find the response in the correct response string. Obviously the teacher

ANTICIPATING STUDENTS' RESPONSES

by Charles H. Santee

```
10 "" LISTING #1, ""
A SHORT PROGRAM THAT CHECKS FOR
MULTIPLE CORRECT ANSWERS
20 IF INSTR(A$,SA$)=0 THEN PRINT
"I DON'T HAVE THAT IN MY LIST OF
CORRECT ANSWERS" ELSE PRINT"TH
AT IS CORRECT":PLAY"T8L803CEG"
40 CLS
50 READ QS
55 IF QS="END" THEN CLS 3:PRINT@
330,"THAT IS ALL":PLAY"T4L4CEG
EGCEG":CLS:END
57 READ A$
60 PRINTQS
70 PRINT STRING$(32,"-")
80 INPUT SA$
90 SA$="/"+SA$+"/"
100 IF INSTR(A$,SA$)=0 THEN PRIN
T"I DON'T HAVE THAT IN MY LIST O
F CORRECT ANSWERS" ELSE PRINT"TH
AT IS CORRECT":PLAY"T8L8CEG"
110 PRINT STRING$(32,"-")
120 PRINT"PRESS THE space bar TO
CONTINUE"
130 X$=INKEY$:IF X$<>CHR$(32) T
HEN 130
140 GOTO 40
150 'QUESTION #1
160 DATA "WHO PAINTED THE MONA L
ISA"
170 'ANSWERS FOR #1
180 DATA "/DA VINCI/LEONARDO/LEO
NARDO DA VINCI/"
190 'THE REMAINING QUESTIONS AND
POSSIBLE ANSWERS"
200 DATA "WHAT IS THE CAPITAL O
F NEW YORK"
210 DATA "/ALBANY/albany/"
220 DATA "NAME ONE COLOR IN THE
AMERICAN FLAG"
230 DATA "/RED/WHITE/BLUE/"
240 DATA "NAME A SUMMER MONTH"
250 DATA "/JUNE/JULY/AUGUST/"
260 DATA "NAME A WINTER MONTH"
270 DATA "/DECEMBER/JANUARY/FEBR
UARY/DEC/JAN/FEB/"
280 DATA "END"
```

Program Listing 1

System Requirements

16K RAM
Extended Color Basic

can have problems anticipating which of several responses might be given to correctly answer the question.

A second method is to edit the student's response after he has entered it. Program Listing 2 is a subroutine that converts all letters to uppercase and deletes any blanks or other unusual characters. You can carry this technique too far, however, and end up with an edited response that is quite different from what was sought. Furthermore, this method can't control errors such as common alternatives to the answer, which might be technically correct. Finally, the student does not know exactly what the computer is accepting.

A third method is to edit the response as the student is typing his answer. Program Listing 3 is a routine that accomplishes this goal. It converts lowercase to uppercase as the student is typing. If the student uses an unusual character, the computer informs him that the character is not acceptable, and shows him which characters he can use. The student gets a visual cue as to what the computer is using to check his answer.

A final method is a key, letter, and sequence method. Program Listing 4 shows an application of this method. I first encountered this method in a Presidents game where the student had to type in the name of a president who was pictured on the screen. A code string is used to check the response. If the student's answer contains the same letters in the same relative sequence as the code string, a flag is set to show that the response is correct. The student may have extra letters but must have at least the letters in the coded string. This allows for some creative spelling on the part of the student, especially if he is on to your method of response checking. Teachers who are sticklers for spelling probably won't like this method.

Another response-checking method frequently used in games is to record the time a student takes to complete a task. When applied to multiple choice


```

5 CLS:PRINT"TRY USING BLANKS OR
LOWER CASE":PRINT
10 INPUT"STUDENT ANSWER";SA$
15 SI$=SA$
20 GOSUB 8000
25 PRINT:PRINT"INPUT ANSWER = "
;CHR$(239);SI$;CHR$(239)
30 PRINT:PRINT"EDITED ANSWER = "
;CHR$(239);SA$;CHR$(239)
40 PRINT:PRINT"PRESS space bar T
O CONTINUE"
50 X$=INKEY$:IF X$<>" " THEN 50
ELSE 5
790 'DELETE LINES 5-50 AND YOU C
AN ADD THIS AS A SUBROUTINE TO Y
OUR BASIC PROGRAMS
800 '(3)EDIT RESPONSE "*****"
"*(SA$,C)"*****"
810 IF SA$="" THEN RETURN
820 FOR C = 1 TO LEN(SA$)
830 LT$=MID$(SA$,C,1)
840 IF LT$>"a" AND LT$<="z" THE
N MID$(SA$,C,1)=CHR$(ASC(LT$)-32
):GOTO 860
850 IF LT$<"A" OR LT$>"Z" THEN M
ID$(SA$,C,1)=" "
860 NEXT C
870 C=INSTR(SA$," "):IF C<>0 THE
N SA$=LEFT$(SA$,C-1)+RIGHT$(SA$,
LEN(SA$)-C):GOTO 870
880 RETURN

```

Program Listing 2. EDITR

```

10 CLEAR 10000
20 CLS
30 PLAY"T8L804CG"
35 PRINT @128,STRING$(32,128)::P
RINT"TRY USING CHARACTERS OTHER
THAN LETTERS or LOWER CASE
(SHIFT 0)":PRINTSTRING$(32,
128)
40 PRINT@0,"ENTER A RESPONSE":PR
INT:PRINT
50 GOSUB 7000
60 PRINT@320,"ANSWER ACCEPTED =
";CHR$(223);SA$;CHR$(223)
70 PRINT@480,"PRESS space bar TO
CONTINUE";
80 X$=INKEY$:IF X$<>" " THEN 80
ELSE 20
690 'YOU MAY DELETE LINES 10-80
THEN ADD THIS ROUTINE TO YOUR BAS
IC PROGRAM
700 '(4)EDIT INPUT"*****"
"*(LT$,SA$,C1$,C2$)"*****"
705 SA$=""
710 C1$="ABCDEFGHJKLMNPQRSTUVWXYZ
1234567890!?,."
715 C2$="abcdefghijklmnopqrstuvw
xyz"
720 PRINT@64,SA$;
725 X$=INKEY$:IF X$="" THEN 725
730 IF X$=CHR$(13) THEN RETURN
735 IF X$=CHR$(8) THEN IF LEN(SA
$)>0 THEN PRINT CHR$(8);:SA$=LEF
T$(SA$,LEN(SA$)-1):GOTO 725 ELSE
GOTO 725
740 C=INSTR(C2$,X$):IF C<>0 THEN
X$=CHR$(C+64)
745 IF INSTR(C1$,X$)=0 THEN GOTO
755
750 SA$=SA$+X$:PRINTX$;:GOTO725
755 PRINT@384,"USE ONLY THESE LE
TTERS":PRINTC1$:PLAY"O4T64L64BAG
FEDC":PRINT"PRESS space bar TO C
ONTINUE";
760 X$=INKEY$:IF X$<>" " THEN 76
0 ELSE PRINT@384,STRING$(127,32)
::GOTO 720

```

Program Listing 3. EDITI

```

5 CLEAR 10000
7 CLS
8 PRINT@448,STRING$(32,255)::PRI
NT"TRY TO MISPELL THE ANSWER";
10 PS$="WHAT IS THE CAPITAL OF IL
LINOIS?":H=1:V=1:LB=30:GOSUB 1000
00
20 PRINT:PRINT"INPUT ANSWER";SA
$:CA$="SPFLD":GOSUB 9000
30 IF CF=0 THEN PS$="I THINK YOU
HAVE THE WRONG ANSWER - THE CORR
ECT ANSWER IS SPRINGFIELD":GOTO
50
40 IF SA$="SPRINGFIELD" THEN PLA
Y "T16L16CDEFGAB":PS$="THAT IS VE
RY GOOD":GOTO 50
45 PS$="YOUR ANSWER DOES APPEAR T
O BE CORRECT BUT YOU SHOULD SPEL
L IT THIS WAY 'SPRINGFIELD'"
50 V=V+5:GOSUB 100000
60 PS$="PRESS THE space bar TO C
ONTINUE":V=V+2:GOSUB 100000
70 X$=INKEY$:IF X$<>" " THEN 70
ELSE 7
895 'DELETE LINES 5-70 THEN ADD
THIS TO YOUR BASIC PROGRAM
900 '(2)KEY LETTERS "*****"
"*(C,CA$,SA$,CF,LT$)"*****"
910 CF=1
920 FOR C=1 TO LEN(CA$)
930 LT$=MID$(CA$,C,1)
940 IF CF = 0 THEN 980
950 CF = INSTR(CF,SA$,LT$)
960 IF CF = 0 THEN 980
970 CF = CF + 1
980 NEXT C
990 RETURN
10000 '(1)PRINT ROUTINE"*****"
"*(H,V,LB,PS)"*****"
10010 PS=PS+" "
10020 TB=LB:IF V>15 THEN PRINT:V
=15
10030 IF TB > LEN(PS) THEN PRIN
T@ (H+32*V),PS$:RETURN
10040 IF LEFT$(PS,1)=" " THEN PS
=RIGHT$(PS,LEN(PS)-1):GOTO10020
10050 TS=LEFT$(PS,LB):IF INSTR(T
$, " ")=0 THEN PRINT@ (H+32*V),T$
:PS=RIGHT$(PS,LEN(PS)-TB):V=V+1:
GOTO 10020
10060 IF MID$(PS,TB,1)<>" " THEN
IF TB>1 THEN TB = TB - 1:GOTO 1
0060
10070 PRINT@ (H+32*V),LEFT$(PS,T
B)::PS=RIGHT$(PS,LEN(PS)-TB):V=V
+1:GOTO 10020

```

Program Listing 4. SPELLCHK

or fill-in-the-blank-type questions, this is called measurement of response latency and can provide interesting additional data for comprehensive item analysis.

I am considering a method that uses path analysis. In this method the student uses the arrow keys or a joystick to move to a particular solution. The computer makes a record of the path the student chooses in solving the problem. Though I haven't come up with a good application for this method, look for it in a future column. Perhaps you might suggest some alternatives.

To tie all these methods together, I have included a short Art and Music Quiz for your consideration. It combines several of the methods to edit and check responses. Test this program and see if you can find some areas where the response editing and checking breaks down. If you want to try your own questions, change the DATA statements by using the following rules:

- Each question/answer consists of three parts.
- Separate each part with a comma.
- The first part is the question as it appears on the screen.
- The second part is the correct answer you want to show the student.
- The third part is a code to check the student's response. Use letters in se-

quence that the student must type to give a correct answer.

● To add a tune, make the first part (the question) a string that can be used by a PLAY statement. Use a semicolon to begin the string.

The following item will print the question on the screen:

```
400 DATA "WHAT FAMOUS ARTIST CUT
OFF HIS EAR",VAN GOGH,VNGO
```

To ask the name of a tune:

```
DATA "T4L4GGBDGLIE",ON TOP OF
OLD SMOKY,SMKY
```

Art Quiz contains a long musical introduction. Rather than typing the PLAY statements in by hand, I have a music program (of my own creation) for making Basic PLAY statements. If you want to skip the introduction, delete lines 6-66.

You can add Listings 2, 3, and 4 to your own programs by deleting the

first few lines. The REM statements identify which lines to delete and tell what variables are used in the subroutines.

Improving the Program

This program uses several methods for editing and checking responses, but it does not check for instances where there are two or more logically correct but completely different answers. For example, a question might ask the student to identify the tune commonly referred to as "The Side-walks of New York." The student might have typed "East Side, West Side." Could you make a program that would allow for either answer?

This program asks questions in a serial format. Could you make the selection of questions random? (See my

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Doctor ASCII

by Richard E. Esposito and Ralph E. Ramhoff

Q. Is it possible to make the disk drive controller pack an internal part of the computer?

*Andy Donndelinger
Peterborough, NH*

A. Yes, but you need to know how to solder. You can connect a short cable to the inside, just before the connector that ordinarily goes to ROM packs. This frees up the ROM pack port for an additional peripheral such as a voice synthesizer or an 80-column card as long as it does not cause fan out.

Q. I own a 16K CoCo with an E board. After adding Extended Basic, I have only 8,487 bytes free. Is there a way to restore the missing memory that Extended Basic takes away besides upgrading again to 32 or 64K?

In listings of programs, I keep coming across the "^^" symbol. Is it the printer's version of the up-arrow?

*Jenny Wetz
Morrow, OH*

A. Extended Basic reserves 6K for graphics on power-up, decreasing your free memory by 6,144 bytes. To restore your pre-Extended Basic's 14,631, just type POKE 25,6:NEW.

Your assumption regarding the up-arrow is correct.

Q. I have a program that will not load while my disk drive is connected. Is there a POKE that will fix this?

*James O. Robinson
Clarksville, TN*

A. There is a program called Tapedfix that appeared in "Disk Utilities" (*HOT CoCo*, September 1983, p. 135). The problem lies in the fact that Disk Basic uses the area below \$0E00, but a cassette system has 2K extra bytes available between \$0600 and \$0DFF. The problem stems from the fact that Microsoft chose to use this area of memory and also from the fact that Radio Shack has not responded by distributing all machine-language programs so that they load into the area above \$0E00. The Tapedfix program fixes the program so that it loads high enough, zaps Disk Basic, and then executes at its original address.

Q. I want to use my CoCo with a good letter-quality printer. My problem is that all the good letter-quality printers I've seen are parallel interfaced. I have seen several serial-to-parallel interface devices advertised. Are they any good?

*David J. Forty
Saint Petersburg, FL*

A. The serial-to-parallel converters do work, and unless the printer that you are buying comes with a serial port for less than \$50, you are better off buying the parallel printer version plus the converter. Serial printers usually have the baud-rate selection controlled by tiny inaccessible DIP switches, and some (including the Radio Shack printers) also limit the rates to only 600 or 1,200 baud. On the other hand, many of the converters available have a convenient rotary switch for baud-rate selection throughout the range of 110 to 9,600 baud.

I am familiar with two of these converters. One is made by Botek Instruments (4949 Hampshire, Utica, MI 48087, 313-739-2910) and the other by PBH Computer Products (P.O. Drawer 55868, Houston, TX 77055, 713-956-0207). I would shop for one or the other on the basis of price. The PBH has an extra socket with a three-way switch. This lets you select the printer, your modem, or neither. This switch would be more useful if they added a fourth position that would connect the serial lines to both the printer and the modem so that with the printer set to 110 or 300 baud and with your modem operating at the same rate, you could have hardcopy while on line.

Q. I recently installed the HJL keyboard in my CoCo, and in all the books that I have, I cannot find the ASCII values generated when the four special function keys are pressed. Can you help?

*Claude G. Brown
APO NY, NY*

A. There are two answers to your question.
● When Microsoft wrote Basic for the CoCo, they did not anticipate the addition of these keys, so these are the ASCII codes that resulted by chance:

	Unshifted	Shifted
F1	64	*
F2	61	*
F3	103	52
F4	*	86

Note: * denotes no code generated.

● Possibly a more useful technique is to scan addresses 341 to 344. If F1 is pressed, the value of address 341 is changed from 255 to 191. Likewise, F2 reacts the same way with location 342, F3 with 343, and F4 with 344. If you have the 1.1 version of the Basic ROM (EXEC 41175 to find out), the change is momentary. If you have the newer 1.2 ROM, the change is intact until another key is pressed.

Q. Why are Radio Shack disk drives positioned vertically for disk entry and not horizontally like most disk

drives? For example, Commodore, Atari, and Apple all use horizontal disk drives. Does this make a difference in performance?

*Peter G. Privitera
Chelsea, MA*

A. The CoCo's drives are superior or at least comparable to the ones you mentioned, but not because of the horizontal or vertical placement. Most drives can be mounted either way. The problem with Commodore VIC/64 drives is that they are interfaced via the RS-232 port, which makes them S-L-O-W. Backing up a full disk can take 20 minutes. Atari's drives are single density which means that a disk holds half as much information.

Q. I have a 32/64K CoCo, and I would like to know how I could access the other 32K. I have a friend who has a disk and he does not have any more memory available than I do.

Do I need a cooling fan, and is it a good investment?

*Brad Hansen
Boone, IA*

A. A disk drive in itself will *not* give you access to any more RAM. What you need is software that reprograms the SAM for memory map 1 and gets you there in such a way that the computer does not wind up executing random instructions. It turns out that a lot of the software that uses more than 32K is disk oriented, but it does not have to be that way. If what you want is more memory for Basic programs, Spectrum Projects (P.O. Box 21272, Woodhaven, NY 11421, 212-441-2807) and Double Density Software (920 Baldwin St., Denton, TX 76201, 817-566-2004) market programs that increase the size of the memory available to Basic to 40K with or without disk.

A cooling fan is a mixed bag. Yes, it will make your machine run cooler, but it may cause more problems than it solves due to additional RFI. If you don't have an overheating problem, you don't need it.

Q. I've seen a lot of these new adventure programs with excellent graphics displays, at least six colors in Calixto Island by Mark Data Products. I would like to know how I can get this kind of color display. I'm planning to get either the EDTASM+ or SDS80C assembler. Will this help my problem?

*Dean Johnson
Roslyn, PA*

A. In the October 1983 Doctor ASCII there were two demo programs showing how to get four colors in PMODE 4 from a Basic program. Also, starting in August 1983 *HOT CoCo* there was a three-part series titled "Introduction to Multicolor Graphics," by Ken Anderson. These articles should help you with the hi-res graphics. The editor/assemblers that you asked about will help you improve the response speed of your graphics, but will not help you learn how to get the additional colors.

Q. Is it harmful to the computer to leave it on for extended periods of time? If so, what is the simplest and safest way to wire a power-on indicator light into this machine, since the 115V power supply seems to be on as long as the unit is plugged in?

*Mark and Becky Bakaitis
Washington, PA*

A. When you turn on your machine the power supply produces a power surge. This is normal and occurs in all electronic equipment. This power surge strains the integrated circuits (ICs). Generally speaking, the ICs are most likely to fail when you turn on the machine. On the other hand, the power supply itself is less likely to fail if it is turned off while not in use. We recommend buying a power strip with a power-on lamp and an on/off switch turning off the machine when it's not in use to conserve electricity and avoid unwanted RF interference. This power strip is available from many sources (including Radio Shack) for around \$15. If you prefer to modify your computer by installing an internal power-on light, the May 1983 issue of *Color Computer Magazine* included an article titled "Install a Power-On Light," by Tom Garcia, which explains the procedure.

Q. I am a semi-proud new owner of an MC-10 computer. I discovered that if I POKE a 64 into any location from 36864 to 49152, the text screen becomes black letters on an orange background instead of the usual green background. The default values are also set to orange. Can I do this with other colors? If so, how? I am appalled at Radio Shack's lack of technical support for this little gem. Do you know where I can find things like schematics, a memory map, and information on accessing the RS-232 port? I'm trying to figure out a way to interface a game controller to the computer, and any help you could give me would be greatly appreciated.

*David Ek
Albuquerque, NM*

A. Unfortunately you cannot get any other background colors with text due to the design of the MC6847 character generator. The following articles should help you get some information on the MC-10:

"The Mighty Mite MC-10," by John Cullings, *HOT CoCo*, September 1983, p. 66

"Kid CoCo Is No Lightweight," by Dan Downard, *Rainbow*, August 1983, p. 174

"MC-10 vs. CoCo—A Command Summary," by Frank Smith, *Rainbow*, September 1983, p. 101

"Opening CoCo's Library to the MC-10," by Dan Downard, *Rainbow*, October 1983, p. 196

"TRS-80 Micro Color Computer," by McFadden and Kelley, *The Color Computer Magazine*, August 1983, p. 88

"Custom Color," by Dennis Kitz, *The Color Computer Magazine*, September 1983, p. 78

"My MC-10 Speaks ML!" by McFadden and Kelley, *The Color Computer Magazine*, November 1983, p. 83

There were a number of articles when the MC-10 was first introduced. However, little has been published since.

Q. I read that if you bought a CoCo after May 1983, you had 64K chips in the machine already. Is this true?

Also, could I use my dual Percom TFD 100 disk drives that are connected to a Model I on my CoCo? I also have an IDS-440 Paper Tiger printer, and I would like to use this with my CoCo if possible.

*Leland Day
Onida, SD*

A. It's nice to bring repentant Z-80ers into the CoCo fold. What you read is that 32K CoCos of that vintage really had 64K RAMs in them.

As long as the drives support double-density operation, all you need is a CoCo disk controller that can be purchased from Radio Shack parts (#AX-9060, \$107.77, the populated PC board; and #AZ6839, \$2.43, the case). Your printer can be hooked up using one of the serial-to-parallel converters.

Q. I just bought a 16K CoCo and I can't seem to get the DEF FN feature to work. The example on the 8759244 reference card gives me an error message.

*Bob Crow
Detroit, MI*

A. As far as I can tell, Radio Shack does not employ any proofreaders. This is their umpteenth printing of that reference card and the misprints from three years ago still persist. It should read DEF FNA(X) = X*3.

You can define up to 26 functions: FNA, FNB, FNC, etc. That is not the only misprint. The CSAVEM command uses decimal values or each hex value must be preceded with an &H. The example should read CSAVEM"X", &H4E,&H6F,&H5F. These errors have even overflowed onto their otherwise excellent #26-3194, \$4.95, *Color Quick Reference Guide*.

Q. I would like to find out what kind of keyboard I have. I bought my CoCo in late November 1982.

*Sam Fong
Timmins, Ontario*

A. Radio Shack has used three versions of keyboards in CoCos so far. The original CoCo keyboard had a fiber-board back with the number 879051 and "Made in Japan" in the upper right corner. It had springs under each of the Chiclet-style keys. The second generation CoCo keyboard retained the Chiclet keys but replaced the springs with rubber. It can be identified by its plastic back with the number 8790517 and "Made in Japan" molded in.

The method of attachment to the main PC board was also changed. The original CoCo had a short length of rib-

bon cable with connectors on both ends to connect the keyboard. The newer keyboards use a transparent tape-like cable that fits into a different type of socket. Because of this, without an adapter, keyboards made for the older machines will not fit the new ones and vice-versa.

The current CoCo 2 keyboard is similar to the second generation one with the keys enlarged to fill in the spaces. The new keys are also sculpted to resemble those on an electric typewriter. The new keyboard, although an improvement over the older designs, does not compare with the replacement models offered by HJL, Mark Data, Keytronics, and Micronix.

Q. Is there any way I can add data to the end of a cassette file that was generated with CSAVE "NAMES" without copying the entire file?

*Bob Karsteter
Gettysburg, PA*

A. For all practical purposes, no. While the cassette ROM routines could be patched, the precise positioning of the tape would be difficult and the slightest maladjustment would destroy the file.

Q. Something on the CoCo really bothers me; it only scrolls up! Can you help?

*Dan Jones
Lakeland, FL*

A. Scrolling when in Basic is programmed into the Basic interpreter ROM. You are not stuck with it; you can program something else. One way to program it yourself is to use the PEEK and POKE statements.

The screen memory corresponds to addresses 1024 to 1535 in memory. Addresses 1024 to 1055 correspond to the top line on the screen, addresses 1056 to 1081 to the second line on the screen, and addresses 1504 to 1535 to the last line. The way the computer scrolls is by moving all the information up one line. It takes the contents of address 1056 and copies it into location 1535, then 1057 to 1536, and it continues until all of line 2 becomes line 1. Next, it copies all of line 3 to line 2, and it continues in this fashion until all the lines are moved up one. You can do this yourself in Basic by using PEEK and POKE.

If you want the scroll to go down instead of up, you copy line 15 to line 16, then 14 to 15, etc. Using PEEKs and POKEs, you could also scroll to the left or to the right, and if you wanted to get fancy, you could scroll only a selected part of the screen or even diagonally.

Q. In your answer to Ron Schelle in February 1984, you said "...using a Romfixed copy of the Spectaculator ROM pack..." I moved the Color File, Personal Finance, and Color Scripsit ROM packs to disk, but no matter what I did, I couldn't get Spectaculator transferred

from its ROM pack to disk. How did you do it? I always get an I/O error.

*William R. Orr
APO NY, NY*

A. Thank Bob Rosen of Spectrum Projects for having the foresight to document these patches for the problem ROM packs. For each of the following ROM packs, add the line indicated to the Romfix program (*HOT CoCo*, September 1983, p. 138):

● Spectaculator:

355 POKE&H519F,&H8E: POKE&H51A0,&H9F: POKE&H51A1,&HFE:
POKE&H51A2,&HBF: POKE&H51A3,&H00: POKE&H51A4,&H60:
POKE&H51A5,&H39

● Canyon Climber:

355 POKE&H4424,&H12: POKE&H4425,&H12

● Micro Painter:

355 POKE&H4067,&H3E: POKE&H4068,&H80

● Reactoids:

355 POKE&H4C09,&H39

● Microbes:

355 POKE&H45BB,&H12: POKE&H45BC,&H12

● Megabug:

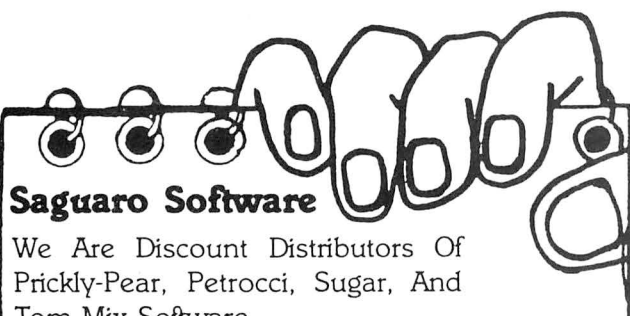
355 POKE&H567D,&H12: POKE&H567E,&H12: POKE&H567F,&H12:
POKE&H5680,&H12

Q. Where can I purchase replacement write-protect tabs for my disks. After a while, they get crimped and stick in the drives, or the glue becomes ineffective due to my removing and replacing them.

*Sandy Hoge
Pocatello, ID*

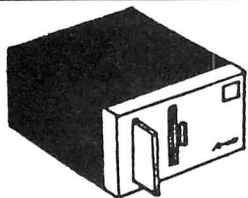
A. I use 1/2-inch masking tape. It works better than the foil tabs in that it never comes loose and gets stuck in my drives. Also, for a dollar or so, you get a five-year supply, and you can write on it.

Got a problem with your Color Computer? Ask Doctor ASCII to solve it. Please include a self-addressed, stamped envelope with your query to Doctor ASCII, c/o HOT CoCo, Pine St., Peterborough, NH 03458.



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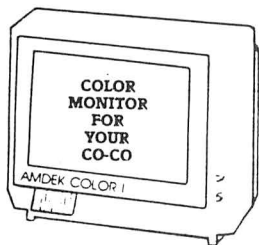
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Reader's Forum

Mystery Functions In the EDIT Command

You have all heard rumors of mysterious commands that lurk deep inside the Color Computers and are not even mentioned in the manuals. Well, some of them are true. While comparing the Extended Color Basic manual with one from a TRS-80 Model III, I stumbled across some undocumented functions in the EDIT command.

Probably the most useful is A. Pressing this key in the edit mode wipes out all your previous changes and allows you to start over with the original line.

The second undocumented command is Q. This key-stroke forgets all your changes like A, but then leaves the edit mode.

The last is E, which simply exits the edit mode. It has the same effect as pressing enter, but it causes an immediate exit without displaying the rest of the edited line.

Remember that these are single-stroke capital letters like the rest of the edit commands.

*Alan A. Farmer
Charlottesville, VA*

INSTR Could Fool You!

The INSTR statement in Extended Color Basic is useful for finding a string within another string. It takes the form of INSTR (position, search string, target string). INSTR searches for the first occurrence of target string within search string, beginning at a certain position. If it finds a match, it returns a value corresponding to the starting location of target string. If it finds no match, it returns a zero.

Load the following program:

```
10 A$="ABCDEFGHIJ"
20 PRINT "INPUT STRING";:INPUT B$
30 A=INSTR(1,A$,B$)
40 IF A=0 THEN PRINT "STRING NOT FOUND":GOTO 20
50 PRINT "STRING ";B$;" IN POSITION";A:GOTO 20
```

Run the program and when the prompt "Input string?" appears, enter any letter, number, or combination thereof. If what you entered exists in A\$, then that string and its position are printed. If the string is not within A\$, variable A is zero and the message "String not found" appears.

If to the prompt "Input string?" you respond with just the enter key, thereby inputting a null string, the CoCo responds with "String in position 1," which is clearly wrong. The letter A occupies position 1.

To remedy this apparent oversight, make sure that your search string begins with a space. Thus line 10 in the above program should be:

```
10 A$=" ABCDEFGHIJ"
```

Now you can use the enter key as a null string indicator and your program will not take erroneous paths when you use it.

*Al Burzynski
San Antonio, TX*

Paper Saver

When you are running a program and want quotation marks, instead of using the apostrophe, use CHR\$(34) before and after the print message.

```
10 PRINT#-2,CHR$(34);"PRINT IN QUOTES";CHR$(34)
```

Another useful trick is to type the above program as follows:

```
5 P=-2
10 PRINT#P,CHR$(34);"PRINT IN QUOTES";CHR$(34)
```

You can then change to P=0 for a dry run on the screen and test your program without wasting paper. This technique is useful for some programs where you want to print selectively:

```
5 P=-2
10 PRINT#P,CHR$(34);"PRINT IN QUOTES";CHR$(34)
20 PRINT "THIS PRINTS ON THE SCREEN ONLY"
30 PRINT#P, "THIS PRINTS ON THE PRINTER"
```

Since most programs start line numbers with 10, you can use line numbers from 1-10 to identify the type and source of program for future reference, and to look up more detailed instructions. (If you have Extended Basic you can use RENUM and ENTER to get the first line to start at 10.) You can go one step further. Before doing an LLIST, print a heading such as: (Don't use program numbers, just type in and hit enter).

```
PRINT#-2,CHR$(31);"PROGRAM FOR PRINTING"
```

```
PRINT#-2,CHR$(34);"PRINT";CHR$(34);CHR$(30)
```

The first line prints the title of the program in enlarged characters; the second line prints the CLOAD file name in quotation marks and returns the printer to smaller type for the listing.

I file copies of listings for all programs that I keep on tape. This system helps me to find a listing more quickly when I need to review, change, or copy parts of a program to be used in a new program. After CSAVEing a program, rewinding the tape recorder, and setting to play position, I type in SKIPF, the file name, and hit enter. This prevents losing a program because of a bad tape.

*Bruce D. Wyman
Winter Park, FL*

REVIEWS

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Adventure in Bipland, Crystal Castles, Middle Kingdom, Androne

edited by Mark E. Reynolds

keys let touch typists find the home-row keys by touch, without taking their eyes from their work.

Key Tronic has obviously intended the KB 500 for the older, silver CoCo, and the light- and darker-grey keycaps are a handsome addition to these machines. Each unit comes with a plug adapter for those machines produced after October 1982 (revisions F and after). The keyboard fits quite nicely in the white-cased computers, too.

The KB 500 also features a programmable function (PF) key. The package doesn't include any software, however, so you'll have to do the programming yourself, according to your own needs. Used wisely, the PF key can be a real convenience. The instructions include a short PF key demonstration program and a table of address (PEEK) locations to get you started.

Remember, however, that the newer machines with the 1.2 ROMs scan the keyboard differently than do the 1.0 and 1.1 versions. Therefore, you'll have to change line 50 in the demo program from `IF PEEK(344) = 191 THEN X = X - 1` to `IF PEEK(344) = 191 THEN POKE344,255:X = X - 1` to get it to work properly on the newer machines. (The trick is to insert a `POKExxx,255` where xxx is any keyboard location between 338 and 345.)

You'll also have to change X 8 in line 70 to X=8. That has nothing to do with the 1.2 ROM, though—it's a typo in the documentation.

The KB 500 is a handsome and convenient addition to the Color Computer. It performs very well, although I did find that the left arrow on my unit often failed to move the cursor for line editing. I had to tap the key approximately 38 times to erase a 32-character line.

At \$90, the KB 500 is the most expensive replacement on the market. Perhaps that should also mean it's the best, but I'd be reluctant to make that claim. However, if you spend much time at the keyboard, and if efficient data entry is important to you, the Key Tronic keyboard will certainly prove a worthwhile investment. ■

	construction	quality	documentation	set up	performance	ease of use
10						
9						
8						
7						
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3						
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1						

Hardware

KB 500 Keyboard
Key Tronic
 Dept. E2
 P.O. Box 14687
 Spokane, WA 99216
 1-800-262-6006
 \$89.95

by **Mark E. Reynolds**
 HOT CoCo staff

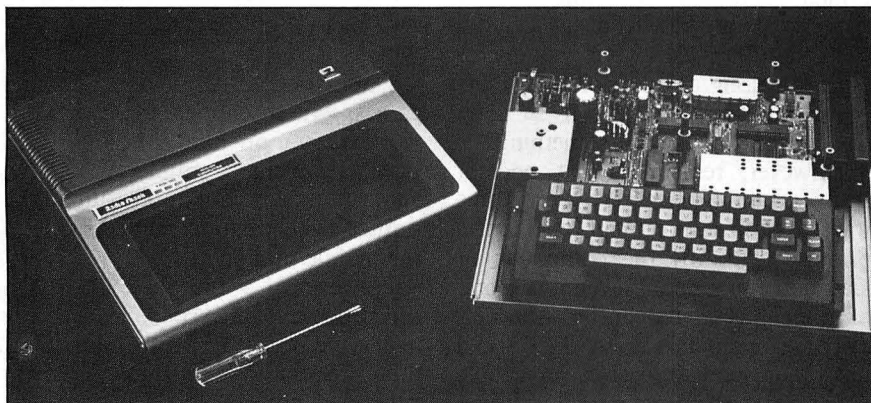
Those of you who use your Color Computer for business and professional applications probably consider a new keyboard to be as important an upgrade as a disk drive, 64K, or Flex or OS-9, even if you have a CoCo 2.

The KB 500 keyboard merits serious consideration from those who haven't yet replaced the stock chiclet keys (no matter what your machine has for keycaps). It offers some handy features and is a definite improvement over the original equipment.

First, you can install the KB 500 faster than you can load most tape

programs. You'll need a #1 Phillips screwdriver to remove the seven screws in the bottom of the computer's case. Then you lift off the top of the case, unplug the old keyboard and lift it out, and plug in the new and set it in. Replace the cover, tighten the screws, and you're all set. The instructions are more than adequate to lead you along.

The KB 500 is sturdily mounted on a metal plate that provides RFI (radio frequency interference) shielding. The clear and break keys have stronger springs under them to add a bit of protection against entry errors. The key height is perhaps a quarter of an inch above the original, making the keys much more comfortable and accessible. Small raised dots on the F and J



The KB 500 Keyboard

	ease of use	documentation	performance	error handling
10				
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1				

Application Software

CSpool

The Micro Works

P.O. Box 1110-A

Del Mar, CA 92014

619-942-2400

\$19.95 16K cassette or disk

(Free with the purchase of a 64K RAM upgrade kit)

by Gary W. Clemens

CSpool is a printer-spooler program that uses part of the computer's memory to store characters to be printed, feeding them to the printer when the computer is not performing other tasks. This can be quite a time saver, since you can continue using the computer to do other things while the printer keeps chugging away.

For example, you can print out items in a database while you continue to add others, LLIST a program while you type in the remaining lines, or print data from one program while running a different one.

The disk version of CSpool contains one unprotected copy of the program. Although it loads as a Basic program, it is 6809 machine code in disguise.

Performance

Once you've installed it, CSpool is easy to use. You won't notice that it's in memory until you use it, and then it works without any fuss. The spooler does have some limitations, however. Since it uses the upper 32K as a buffer, it won't work with other programs that use the upper bank of memory.

Therefore, you can't use it with Telewriter 64, Flex, OS/9, or other programs that modify or shut off the internal interrupts. CSpool uses the interrupts to indicate safe times to send data to the printer, so programs that shut them off or modify them can cause the spooler to do strange things. For this reason, most machine-lan-

guage games are incompatible with CSpool.

Programs that have their own input and output routines also cause problems. Elite-Calc, Scripsit, Personfile, Spectaculator, Omni-Clone, tape Super Color Writer (VIP Writer), and Spell 'n Fix II won't work with CSpool. According to the instructions, most Basic programs that don't do any strange POKEs to memory, and don't use the top 32K should work fine.

I have used the spooler with a Basic database program and found it to be a time saver. Disk and cassette operations and LISTing a program on the screen will temporarily stop CSpool. Printing resumes, though, as soon as those procedures are finished.

Once you have CSpool up and running, you only need to use the LLIST or PRINT commands to use it. Everything from this point on is automatic.

"Each time you direct output to the printer, CSpool intercepts the characters and stores them safely away in the top 32K of RAM..."

CSpool even cleans up after itself, resetting some pointers so that it seems to have disappeared. You can start typing in a Basic program without first typing NEW.

Each time you direct output to the printer, CSpool intercepts the characters and stores them safely away in the top 32K of RAM, sending them to the printer during free CPU time.

It's probably best to install CSpool first and then load your work program. As long as you don't shut off the computer, the spooler is there waiting for you to print something.

However, remember that once it starts printing, there are only three ways to stop it. You can let it finish printing, shut off the computer, or load and run CSpool again. Any one of these flushes the buffer—shutting off the printer doesn't work. CSpool just waits until it receives an enable signal from the printer and resumes sending data.

I also checked print rates with and without CSpool enabled. The documentation explains that CSpool checks 60 times each second to see if the printer is ready to accept a character from the buffer. If so, it sends one.

I timed the same listing, setting the printer at 600 and 1,200 baud with CSpool, and at 1,200 baud without CSpool. The results were surprising. CSpool's print times were two minutes, 52 seconds at 600 baud, and one minute, 55 seconds at 1,200 baud. Without CSpool in operation, the same listing at 1,200 baud took 53 seconds. The results seem to indicate that you shouldn't use CSpool if you are in a hurry.

CSpool doesn't seem to be bug proof. But the break and reset keys don't affect it, you can change the PCLEAR statement at will, and I haven't found any Basic commands that interfere with the spooler's operation.

However, there are a number of problems. Disk and tape I/O are less reliable. Programs that load fine without CSpool installed will sometimes cause load errors on three out of four tries. I didn't notice any distinction between Basic and machine language, either.

It does seem to help to shut off the printer until the loading process is finished. In Basic programs that use the SOUND statement, CSpool keeps printing and the music keeps playing, but with much interference. It sounds like an old radio with a badly tuned car running outside the window. Again, shutting off the printer alleviates the problem.

You probably should forget music written in machine language. I entered such a program from a magazine, but it caused everything to crash. The program doesn't seem to fit into any of the usual problem categories, but it may.

I also tried to run various graphics games, written entirely in Basic. Most worked, but on rare occasions I did have a problem. A couple of times the game hung up, but more often, the printer switched to expanded mode in the middle of a line.

However, I wasn't able to isolate this problem to determine its cause. It may have been from something other than CSpool. Nonetheless, it never happened before I used the spooler. This also hasn't happened when I use

READER SERVICE

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My vote for the best ad in this issue goes to _____ (company)
whose Reader Service number is _____

A. How many articles do you actually read in each issue of HOT CoCo?

1. 1-3
 2. 4-7
 3. 8-11
4. 11-15
 5. Just the ads
 6. Nothing

B. How much do you plan to spend on software during the next 12 months?

- ___ 1. Nothing
___ 2. Less than \$100
___ 3. \$100-\$250
- ___ 4. \$250-\$500
___ 5. \$500-\$1,000
___ 6. Over \$1,000

C. How much do you plan to spend on hardware during the next 12 months?

1. Nothing
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D. Which of the following models do you own? Check all that apply.

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 2. 16K
 3. 32K
 4. 64K
 5. MC-10
6. TDP 100
 7. Dragon 64K
 8. Extended Basic
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 3. Rainbow
 4. Color Computer Magazine
5. Micro
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F. What types of articles in these magazines interest you most? Check 3 only.

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- Check 1 only.
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1. Yes
 2. No

J. On a scale of 1 (no interest) to 5 (great interest) rate your interest in the following HOT CoCo columns:

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___ 2. Elmer's Arcade
___ 3. Digressions
___ 4. Reviews
___ 5. Reader's Forum
- ___ 6. Doctor ASCII
___ 7. Product News
___ 8. Graphically Speaking
___ 9. Re:FLEX
___ 10. The Educated Guest

K. If you are not a subscriber please circle 500.

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1 6 11 16 21	151 156 161 166 171	301 306 311 316 321	451 456 461 466 471
2 7 12 17 22	152 157 162 167 172	302 307 312 317 322	452 457 462 467 472
3 8 13 18 23	153 158 163 168 173	303 308 313 318 323	453 458 463 468 473
4 9 14 19 24	154 159 164 169 174	304 309 314 319 324	454 459 464 469 474
5 10 15 20 25	155 160 165 170 175	305 310 315 320 325	455 460 465 470 475
26 31 36 41 46	176 181 186 191 196	326 331 336 341 346	476 481 486 491 496
27 32 37 42 47	177 182 187 192 197	327 332 337 342 347	477 482 487 492 497
28 33 38 43 48	178 183 188 193 198	328 333 338 343 348	478 483 488 493 498
29 34 39 44 49	179 184 189 194 199	329 334 339 344 349	479 484 489 494 499
30 35 40 45 50	180 185 190 195 200	330 335 340 345 350	480 485 490 495 500
51 56 61 66 71	201 206 211 216 221	351 356 361 366 371	501 506 511 516 521
52 57 62 67 72	202 207 212 217 222	352 357 362 367 372	502 507 512 517 522
53 58 63 68 73	203 208 213 218 223	353 358 363 368 373	503 508 513 518 523
54 59 64 69 74	204 209 214 219 224	354 359 364 369 374	504 509 514 519 524
55 60 65 70 75	205 210 215 220 225	355 360 365 370 375	505 510 515 520 525
76 81 86 91 96	226 231 236 241 246	376 381 386 391 396	526 531 536 541 546
77 82 87 92 97	227 232 237 242 247	377 382 387 392 397	527 532 537 542 547
78 83 88 93 98	228 233 238 243 248	378 383 388 393 398	528 533 538 543 548
79 84 89 94 99	229 234 239 244 249	379 384 389 394 399	529 534 539 544 549
80 85 90 95 100	230 235 240 245 250	380 385 390 395 400	530 535 540 545 550
101 106 111 116 121	251 256 261 266 271	401 406 411 416 421	551 556 561 566 571
102 107 112 117 122	252 257 262 267 272	402 407 412 417 422	552 557 562 567 572
103 108 113 118 123	253 258 263 268 273	403 408 413 418 423	553 558 563 568 573
104 109 114 119 124	254 259 264 269 274	404 409 414 419 424	554 559 564 569 574
105 110 115 120 125	255 260 265 270 275	405 410 415 420 425	555 560 565 570 575
126 131 136 141 146	276 281 286 291 296	426 431 436 441 446	576 581 586 591 596
127 132 137 142 147	277 282 287 292 297	427 432 437 442 447	577 582 587 592 597
128 133 138 143 148	278 283 288 293 298	428 433 438 443 448	578 583 588 593 598
129 134 139 144 149	279 284 289 294 299	429 434 439 444 449	579 584 589 594 599
130 135 140 145 150	280 285 290 295 300	430 435 440 445 450	580 585 590 595 600

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*FLEX is a trademark of Technical Systems Consultants

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F-MATE(RS) FLEX9 Conversion Rout. for the RS Disk Controller when purchased with Special General FLEX9 Sys	\$49.95
when purchased without the General FLEX9 Sys	\$59.95
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2 smaller

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2 sly

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209



REVIEWS

a program that excludes graphics.

The single-page documentation offers enough information to use the program. It includes loading instructions and a brief overview of what the program does and how it works. It also discusses some of the programs that might be incompatible with CSpool. From my own experiences though, this section doesn't cover them all. Micro Works should offer more information about what will and won't work.

Both the instructions and the ad for CSpool seem to be misleading when they state that the spooler "only takes 26 bytes of Color Basic's memory." A PRINT MEM before loading CSpool yields 22823, and a PRINT MEM after running CSpool yields 18702.

In spite of its weak spots, CSpool can be a worthwhile addition to your library. If you need something to handle a lot of printing while you do other chores that use programs written in Basic, CSpool might be just what you need. The instructions say "try it and see." ■

	ease of use		documentation	
	performance	error handling		
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Application Software

Super-Disk Charger

Ozone Engineering

4769 S-200 East

Kokomo, IN 46902

317-453-0989

64K, Radio Shack Disk Controller

Cartridge

\$19 disk

by Terry Kepner

Super-Disk Charger is a set of machine-language disk programs that alter the Color Computer Radio Shack disk operating system (RS DOS) to work with double-sided disk drives and a faster drive-head track-to-track response time.

It gives you access to the improved abilities of better quality disk drives. Although a double-sided drive, for ex-

ample, is more expensive than a single-sided, it gives you twice the data-storage capacity and is therefore more economical than buying two single-sided drives.

Most Radio Shack disk drives require 40 milliseconds to move the drive head from one track to the next. To move from track 0 to track 17 (directory track), as when you ask for the directory of a new disk, takes a little more than half a second at that rate.

Most non-Tandy drives now sold use a track-to-track access time of only 6 or 12 milliseconds, 70 to 85 percent faster than the Radio Shack units. This can mean a significant time saver if you're doing any kind of disk-intensive programming.

Using Super-Disk Charger is easy: Just put the disk in drive 0, type RUN"BOOT/BAS" for the 12-millisecond modification or RUN"BOOT6/BAS for the 6-millisecond operation, and it's ready.

Ease of Use

If your drives are capable of the increased speed, you'll immediately hear the difference as the drive head zips back and forth across the disk in response to the DIR command. If you have double-sided drives and loaded the double-sided modification, you can now format and use the back side of every disk.

Performance

All isn't rosey, however; pressing reset disables the modification, requiring you to reload the Super-Disk Charger program. My TV also showed a slight increase in RFI; apparently the higher clock-speed timing loops penetrate further than the ROM loops that RS DOS uses.

If you have three or four single-sided drives, you can still use the Super-Disk Charger to speed up your access time, without running into difficulties with the double-sided modification.

The Super-Disk Charger won't let you combine single-sided and double-sided drives. The double-sided modification assumes that both drives are double-sided, and mixing the drives will lead to difficulties should you accidentally try to use the back side of a single-sided drive.

This simple and effective software opens up some definite advantages in disk operation. At \$19, it's a good buy. ■

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	thoroughness	readability			
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Books

Computer Art and Animation: A User's Guide to Radio Shack Color Logo

David D. Thornburg

Addison-Wesley Publishing Co.

\$12.95

by Richard Ramella

Here is a fine book for people interested in Color Logo from Radio Shack.

The problem is that it's misnamed. Calling it *Computer Art and Animation* is like labeling a box of Saltine crackers as chocolate chip cookies. To be charitable, I'll simply say that the book's title is wishful thinking. It could be construed as deception. There is nothing in the way of animation here beyond a few simple stick figures. And it ain't no Sistine Chapel of computer graphics, either. It's simple Logo procedures.

While rating it high in other categories, I have rated the work low for thoroughness, simply because it does not carry through the promise of its title. If its subtitle, *A User's Guide to Radio Shack Color Logo*, were the title, I would have happily given it 8 out of 10 for thoroughness.

Mr. Thornburg is a fine writer. He understands simplicity and his heart is happily evident in his work. A determined 10-year-old could read this book and profit from it. In fact, I recommend it for kids who want to play around with Color Logo.

Of course, without a Color Logo disk or cartridge, you can't use the book. If you don't already have the Tandy version of Logo, you probably won't want the book.

The first 125 pages contain step-by-step lessons that gradually introduce more complex Logo procedures. The lessons are geared to the beginner.

I enjoyed Thornburg's style of revealing methods a step at a time and in-

REVIEWS

written by Larry Kheriaty and George Gerhold.

However, I did enjoy Thornburg's style of revealing methods a step at a time and including illustrations that showed the results to be expected if I followed instructions correctly.

The final three chapters of the book are called "Multiple Turtles and Animation," "The Creation of Animated Sequences," and "Artwork Recording Techniques." There are some interesting things here, such as a suggestion for recording images from a computer through a video recorder onto tape. There are also good hints on animation techniques for the beginner.

But face it: A serious computer animator won't be working in Logo, and the author's moving stick figures don't prove he is capable of animation beyond simple theory.

All in all, though, the book will help beginners have fun with Logo and might provide the spark to interest a talented child in developing Logo images. ■

	ease of use	documentation	performance	error handling
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Application Software

Super Bug

Mark Data Products

24001 Alicia Parkway #207

Mission Viejo, CA 92691

714-768-1551

\$29.95 16K cassette

\$32.95 16K disk

by H. Larry Elman

My college course work once forced me to program a short utility in early machine language. As a result, to this day I program in Assembly and other machine-language near cousins only under extreme duress. I can do it, but I would rather have an elegant solution in a higher-order language.

For that reason, I own a disassembler and a few other items that let me perform simple repairs and patches on machine-language programs, but that's about it. Therefore, when I first saw

"Super Bug handles tape input and output very conveniently, is disk compatible, and will operate most printers."

Super Bug, Mark Data's machine-code monitor program, my first thought was that it is unnecessary. However, after using it awhile, I have come to consider it a most valuable utility.

A monitor program lets you examine and change the contents of memory directly. A good monitor program must add such services as format (code) conversion and block move or block compare of memory, and the best will even let you store and retrieve data from other mediums and print out information. Super Bug handles tape input and output very conveniently, is disk compatible, and will operate most printers.

Ease of Use

Super Bug loads very rapidly, even for a machine-language program. It is just under 3,000 bytes long, and load time is, after all, related to program length. It also sets up at once and is as easy to use as Mark Data claims.

Except for addresses, Super Bug uses single- or double-key commands. Even addresses need only a few keystrokes, because the utility appends leading zeros.

The Super Bug commands perform wholesale what PEEKs and POKEs do retail. Since I don't own an assembler, I have at times laboriously used Basic to check a machine-language program for bugs.

Performance

With the exception of a disassembler that is more primitive than the one I got on my January 1984 Instant CoCo (6809 Disassembler from "Journey to the Center of the ROM" by Mark D. Goodwin, *HOT CoCo*, January 1984, p. 114), all the Super Bug routines perform very well.

A monitor program should display the contents of memory in a convenient form. With this utility, you merely type M and the desired start address, and the screen fills with the contents of memory, beginning at your indicated

address. Press A or H and the display immediately becomes an alphanumeric or hexadecimal version of the preceding screen with a full-screen editor.

If you return to a command mode and then enter a number sign (#) and an A again, Super Bug then displays screen-graphics characters as such, while the rest of the screen remains alphanumeric. These display modes make identifying and separating commands, strings, and graphics very easy.

Suppose at this point you need to duplicate some piece of memory to a new location. Hit D, respond to the address prompts, and it is done. Whoops! Forgot that addresses must be in hex, did you? Well, hit C (code conversion), and an auxiliary menu appears to let you convert hex to decimal, decimal to hex, or either one to ASCII code. You can also find the relative addresses of two hex locations. (Relative addressing in *both* directions, no less!)

You can fill memory locations with any specified value by entering the address range and the value, and you can test memory, again over a specific range. Pressing the asterisk converts you to 64K operation if your computer accepts that, automatically copying ROM to RAM. You can also return to Basic and then back to Super Bug at will.

A second menu lets you scroll a memory listing up the screen at either of two different speeds, and perform cassette input/output to obtain a program on which you can operate. While operating on that program, you can display and change the 6809 register set and perform both JUMPs and GOTOs.

You can search memory for a specified string, but you must enter it a byte at a time as hex values. I found the search command particularly useful for finding items I suspected existed but could not locate; it searches ROM as well as RAM.

The equality command compares two pieces of memory and returns all those that don't match. In cases in which it is more convenient to move a piece of machine code to a new location and change it slightly, rather than make it a subroutine, this command could be invaluable.

My Assembly-language book is cross-indexed by the mnemonic name for each command. Therefore, I had problems with Super Bug's quick-disassembly command, because it would

REVIEWS

not give the mnemonic name for each command it disassembled, even though it worked well. However, I keep the Instant CoCo program, 6809 Disassembler, in memory beside Super Bug and easily move from one to the other.

The third menu primarily lets you set baud rate and enable/disable, line-feed/carriage-return combinations to match most printers. It also lets you print out most of the screen combinations that are possible with the other two menus and has a direct-typewriter mode to label your printouts.

Error Handling

Super Bug is usually very error-tolerant, but the instructions warn you to be careful of certain combinations that crash the system. Read and obey! When the system does crash, you must begin again with a power-cycling cold start. Therefore, make back-up copies often when you work on long programs.

Super Bug protects itself from inadvertent changes very well; it will not let you overwrite it. If you think in terms of PEEKs and POKEs, then Super Bug allows almost any possible PEEK, but only safe POKEs.

Documentation

Super Bug's documentation is much clearer than most Assembly-language instructions. Apparently, the project staff took seriously their own claim that the program can help teach newcomers Assembly. Most users with a few hours of serious computing experience should be able to follow Super Bug's documentation without much trouble.

The instructions do say that Super Bug can be relocated faster than it can be offset-loaded, but they don't say how. The answer is simple: load normally, duplicate to the new address, exit to Basic, and execute the new address. (Other approaches do not work, because the utility protects itself.) I don't know that this is any faster than offset loading, but as one who hates doing hex conversions in my head, I am tempted to use this approach as the normal one.

Conclusion

I cannot say that Super Bug is necessary for an Assembly-language programmer who owns a few fancy assemblers, editors, and other devices, but the Basic programmer who occasionally patches or debugs machine

language will find this utility a very wise investment.

I suspect that if I owned a good assembler, I would still load Super Bug over in some corner of memory as an added safety net. It's an excellent program. ■

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Application Software

T.A.G. (The Adventure Generator)
JARB Software/Hardware
1636 D Ave.
Suite C
National City, CA 92050
619-474-8982
32K, Extended Color Basic
\$34.95 cassette
\$39.95 disk

by **Graham L. Heywood**

The Barbarian approaches the door carefully. The hallway is dark. There is a good chance that there are creatures about who wish him harm or who would appreciate a tasty snack. Every muscle in his body is taut; he is poised for action as he kicks down the door.

BAM! The door flies off its hinges and the Barbarian jumps into the room. He looks around, first left, then right, and relaxes a little. Safe at last, he thinks, not noticing the tentacle snaking down from an opening in the ceiling...

How often have you played adventure games and reveled in the intriguing situations or fumed in disenchantment at elusive solutions? And how often have you wished revenge on the world? If only you could write your own scenarios. But the hours of vexatious programming, and the endless typing of codelines is too formidable a task. If only there were another way.

There is—The Adventure Generator (T.A.G.) writes Basic code for adventures. As with all program generating software, you will need to have

a little programming ability and a general knowledge of Basic syntax to supply the logic that you sometimes need to add to the code produced, and to add the final touches that turn your work into a professional-looking piece of software.

T.A.G. is easy to use, but before you write any code, you should map out your plans for the adventure. This can consist of a simple drawing showing the relationship of each room or area to others and a list of objects in each area. Even better would be to compose all descriptions, commands, objects, and conditionals before even thinking about loading the program.

It pays to create detailed descriptions that will add to the game's interest. Simply saying, "You are in the Chamber of the Asp," is not as enticing as depicting a more complete scene, including exits and noteworthy objects in the room.

Documentation

The documentation is concise and more than adequate, consisting of an overview of the software, cassette and disk loading instructions, and a step-by-step walk through the five cycles of the program. These cycles include room designations/directions, verb input, object descriptions, object placement, and conditional input. Study this overview carefully; it will save you time when you actually use the program.

Two appendices complete the documentation: The first gives a verbatim approach to the question-and-answer cycle of writing the mini-adventure that accompanies the main program. A study of this section reveals most of the techniques that you'll need to complete your adventures. The second appendix is a commented listing of the mini-adventure, complete with REM statements explaining exactly what each line of code is doing.

T.A.G.'s real advantage is in the dozens of hours of typing in code that it saves you. You are freer to do the creative thinking necessary to produce an outstanding adventure.

The program will help you produce a fairly substantial adventure, containing up to 100 locations, 60 objects, 30 commands, and nine conditional flags. The conditional flags are useful in setting up action and reaction situations. For example, you get the helm without possessing the spell book and are transported to a random location.

Performance

After working with T.A.G. for an hour or so, I was producing working code. I found no obvious bugs, but T.A.G. does have one weakness common to all generating programs: the software produced is not totally efficient. However, anyone with a dash of elan can add his own enhancements easily enough.

T.A.G. could offer a little more information as to exactly what it is doing, such as saving to tape or disk. It would also be nice if the program on which you're working checked itself more carefully for problems. For example, if the medium you are recording onto is faulty in any way, the generated program is down the drain, and it's back to square one. T.A.G. does, however, offer a printout option that is helpful in checking verb/object relationships. They are not always apparent as you're creating a program.

If you're an avid adventurer who wants to bring some of your own ideas to light, I think you'll find The Adventure Generator an indispensable aid. ■

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Books

Color Computer Applications

by John P. Grillo & J. D. Robertson

Wiley Press

\$10.95

One Wiley Drive

Somerset, NJ 08873

201-469-4400

by Gary Ludwick

Color Computer Applications deals with graphics and how to generate them. As with many books of its type, the authors have supplied numerous programs and examples for you to play with, but they have also gone one step farther: They have designed their programs as modules so you can experiment and include as subroutines in other programs.

Although the programs in the book were written on a 32K, Extended Color Basic machine, all graphics in *Color Computer Applications* are of the low-resolution variety. The authors wisely decided to generate a second book dealing strictly with hi-res graphics, rather than confuse those readers who may not have the extended capabilities.

The book is attractively organized, and does more than just give you page after page of program listings. First, each chapter explores a single premise: i.e., lines or patterns. The authors also discuss their objectives, the techniques used, and what you can expect to learn. Very helpful.

Even better, they also include their "soft code," a program outline that helps you understand program organization and design. Once you know what you want to do and how best to organize the programs, you are ready for the pseudocode.

Pseudocode is another name for program logic or algorithm. The authors list, step by step, each action that must take place in order to meet the program objectives and soft code. For example, "1. Clear screen to black. 2. Set top and bottom endpoint markers L and M to 0. 3. Set top endpoint starting position I to 10."

While all this might sound complicated, it's not, if you really want to learn graphics programming. By the same token, if you only want to type in some interesting graphic programs, you can skip the education and go directly to the heart of the book.

Even here, the book excels. Program listings are clean, easy to read, and therefore easy to type in. The format and the absence of remark statements keep listings neat. With the very extensive background, documentation, and pseudocode preceding the listing, remark statements just aren't necessary.

As for the graphics themselves, they are, in my opinion, almost beside the point. The book's purpose is to teach, not to be a graphics showcase. However, the graphics generated by these programs are excellent examples of what is possible in a low-resolution mode.

Color Computer Applications covers such topics as straight lines, random patterns, bar charts, figure generation, an on-screen sketch pad, point-source graphics, and game graphics.

My only criticism is that the book does not carry any screen illustrations in color. Black and white is OK, but some color would be more attractive, and more representative. Besides that, though, *Color Computer Applications* is an excellent text for those who want to know more about creating Color Computer graphics. ■

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Application Software

Telling Time with Donald

(cat. no. 26-2530)

Mickey's Alpine Adventure

(cat. no. 26-2534)

Space Probe: Math

(cat. no. 26-2537)

Radio Shack

1400 One Tandy Center

Fort Worth, TX 76102

Extended Color Basic

\$34.95 each cassette

by John Steiner

Walt Disney Inc. and Radio Shack have teamed up to create an attractive series of educational software. I looked at three of the packages: Telling Time with Donald for ages 5-8, Mickey's Alpine Adventure for ages 7-10, and Space Probe: Math for ages 7-14.

Each of these machine-language programs work on the same principle. Each cassette contains both computer data and a recorded voice, which narrates the story while the child follows along with the pictures and text on the screen. The cassette and book come in an attractive plastic box similar to those for commercial video cassettes.

Telling Time with Donald

This two-part adventure starts with Mickey Mouse and the people of Mountainview Village. The villagers have no clocks and never get anywhere or do anything on time. Morty and Ferdie travel with a friendly cuckoo



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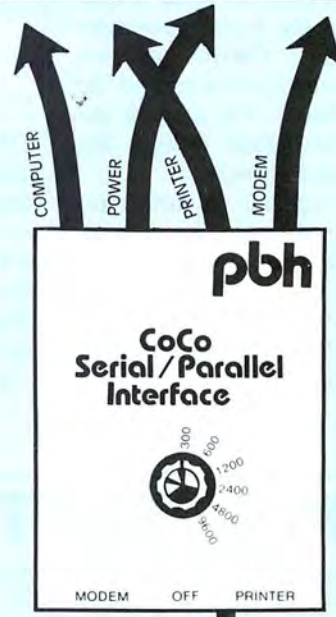
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Mickey's Alpine Adventure

bird to a nearby village where they happen to meet a clockmaker, who helps them learn the importance of clocks and how to use them.

In the second part of the adventure, Donald Duck and his cousin learn to tell time in half-hour intervals. Donald and Gladstone Gander catch a magic lamp while fishing. A genie offers them three wishes that can only be granted on the half hour.

The program asks the child several questions about the lesson's concepts on telling time. Correct answers receive positive reinforcement, and the adventure continues. The score at the end of the adventure reflects the number of correct answers.

A 12-page manual demonstrates how to use the software. Sections titled "To the Parent" provide information and activities that help you teach your child the concepts involved, even without the computer. Some of the ideas are quite good.

Mickey's Alpine Adventure

This two-part program presents short- and long-vowel sounds and reinforces fundamental spelling skills.

"This software is just what you might expect from the folks at Walt Disney."

While on vacation, Mickey and Minnie stop for dinner at a little alpine village. Everywhere they go, the signs are misspelled, and a near accident with the local sign painter prompts Mickey and Minnie into helping the village residents learn spelling concepts.

In part two, Donald Duck and his

nephews are on a ski trip. A snow drift stops them, and they find they don't have enough of the things they need to continue their journey. They walk into town and go from store to store trying to find the necessary supplies.

Again, the program regularly questions the child about the lesson objectives, and the computer keeps tabs on the correct answers.

As in Telling Time with Donald, the 12-page manual contains activities that teach lesson concepts without the aid of a computer.

Space Probe: Math

In this adventure, the space ship Palomino arrives on an Earth-like planet. The crew meets Ishtar, one of the inhabitants, who explains that their village is about to be ravaged by a nearby volcano. The Palomino's crew must use algebraic formulas to calculate how much lava proofing they'll need to save the village from certain destruction.

Part two of the adventure pits the space explorers against a strange disease. By using fundamental math operations, the crew can rescue the remaining unconscious victims. There is no time to waste, however, as the crew begins to notice symptoms of the same disease.

Scoring and progression in the adventure depend upon correct answers to the problems. Again, the manual provides other outside activities that supplement the lesson.

General Assessment

This software is just what you might expect from the folks at Walt Disney. The attractive packaging and programming present sound educational concepts.

When I road tested the lessons on a 5- and an 11-year-old subject, the packaging and Disney characters sparked their interest. However, loading the graphics and text display and running the program takes some time, and both children began to lose interest before they had finished the first lesson. I'm afraid the programs are just too long to hold the attention of younger children.

I hope the people at Walt Disney will develop educational software that is more interactive and faster paced. Their delightful characters could add much positive appeal to good computer-aided instruction. ■

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Gameware

The four games this month are about as different from each other as can be. They'll take you on a quest to find and destroy the evil threatening the lovely Bipland, through the monster-haunted hallways of a magic castle, and down into the guts of your computer, with the usual sidetrips along the way.

The Dataman

Here's a great one for those who are starved for MC-10 software. **Adventure in Bipland** (The Dataman, 420 Ferguson Ave. N., Hamilton, Ontario L8L 4Y9, 416-529-1319, 16K MC-10, \$13.95 cassette) is a graphic-enhanced text adventure, and a real challenge.

The idea is that Bipland is about to be invaded by the subterranean Exjecters, as soon as they perfect their sunshields to protect them from the sunlight. Your task then, should you decide to accept it, is to roam about Bipland, find the necessary tools and information, and kill the Exjecter King before he can finish the sunshields.

The job isn't easy. You're working against the clock, so you must be efficient, especially since a wrong guess usually destroys something you need later, or results in your demise, as adventures are wont to do.

The graphics in this game are simple though effective, but the text supplies most of the necessary information. I found *Adventure in Bipland* frustrating at times, but that's due more to the limitations of the MC-10 than the program. The machine's restricted memory means that you don't have much leeway when you type in commands—the spelling, spacing, and word choice must be exact.

The game is also insulting. As a touch typist on the tiny MC-10 keyboard, I often made typos and then looked and then saw the unkind, "Stupid Bip, that's garble gook" on the screen. Or, if you find the flash light and try to pick up a "flashlight" (one word), you'll be told, "Stupid Bip, there's no flashlight here." I was often called a stupid Bip, and resented it.

All in all, though, *Adventure in Bipland* is a pretty good game. If you're one of the MC-10 owners out



Crystal Castles

there lamenting the dearth of software, I think you'll be delighted with this program.

Thundervision

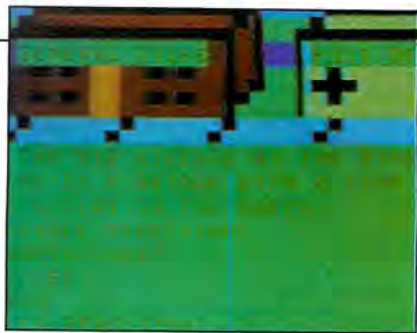
Crystal Castles (ThunderVision Software, P.O. Box 30012, Grand Junction, CO 81503, distributed by Spectral Associates, 3420 S. 90th St., Tacoma, WA 98409, 206-581-6938, 32K, \$24.95 cassette, \$29.95 disk) is one of those unique and absorbing arcade-type games that will tax your planning skills and concentration.

You control Bentley the Bear, who begins at one corner of a 3-D maze (a combination of stairs, walkways, elevators, and platforms), the pathways of which are lined with gemstones. Bentley must run along and pick up as many gems as possible before he is cornered and done in by the Gem Eaters, the Trees, Berthilda the Witch, or the Bees.

A lot can be happening on the screen at one time, and you've got to plot your course to collect as many points as possible while dodging, jumping, and outwitting your adversaries. The joystick control, a necessity for your task, is excellent. You can make quick turns, run, double back, and jump hazards with a precision that can become awesome with a little practice.

The graphics aren't quite as crisp as I would like to see, which makes the task a little more difficult because you sometimes have to look closely at objects to tell exactly what they are. That can waste precious time.

As you successfully complete each screen, you move on to more complex ones. You'll find more stairs, more elevators, and more dead ends to navigate. You're likely to get hooked by the desire to know what the next



Adventure in Bipland

"Here's a great one for those who are starved for MC-10 software. Adventure in Bipland... is a graphic-enhanced text adventure..."

screen is like.

For an unusual twist to great arcade action, check out *Crystal Castles*.

Computerware

Middle Kingdom (Computerware, Box 668, Encinitas, CA 92024, 619-436-3512, 32K, \$24.95 cassette, \$27.95 disk) is a graphic adventure in which you, as warrior, merchant, or wizard, search terror-ridden palace halls to find the three magic rings and return them to the sanctuary to become ruler of the kingdom.

I doubt that this game will be of much interest to seasoned adventurers, but it might be just the thing for younger gamers. The graphics are nice, and portray your character in silhouette, the room he's in, and any objects or monsters there. You use the arrow keys to move him from room to room, and I found the sound of his footsteps trudging along the corridors delightful.

The scenario is a fairly standard adventure-quest, but this version is unusual for the lack of choices it offers. You have basically only two: the direction in which you will go, and the weapon, of those available, you will use when you must fight.

As you walk through the rooms, a lizard-man, dwarf, or other nasty will suddenly appear beside you. You take turns exchanging blows, while the screen displays each character's dwindling strength factor. The first one to reach zero loses. You don't even get an option to fight or retreat.



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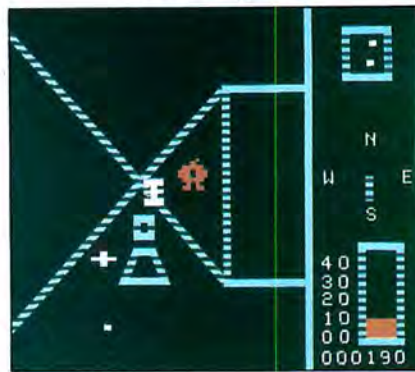
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Middle Kingdom



Androne

Besides the strength factors, the screen displays the attacking monster and numbered pictures of up to seven weapons and magic spells you can be carrying. Each time you strike a blow, you can choose the weapon you want to use by pressing the corresponding number key. The computer does the rest while you sit back to await the outcome.

The documentation says that different weapons and different combinations will be more effective against certain monsters. I haven't found any definite examples of this, except that the wizard is more likely to cast spells effectively, which makes sense.

Middle Kingdom isn't challenging. I found my lack of influence over my character's destiny to be intolerable. But if there's a young person around your house who has the imagination to be captivated by a role-playing situation, but doesn't yet have the logical skills to handle more sophisticated adventures, take a look at this one from Computerware.

Radio Shack

Plug Radio Shack's **Androne** ROM pack (cat. no. 26-3096) into your cartridge port, and your computer is on the fritz. Greedy little data bugs begin gnawing away at your memory banks, and you've got to act fast to save your machine.

"...the number of points you score is not nearly as important as building and maintaining your power supply."

Androne is a remote-controlled robot that enters your CoCo to do battle with the bugs. You send him down the elevator (how else would it get inside your computer?), where he arrives with 15 power points and plenty of ammo.

You might think that your computer is full of printed circuit boards and chips and stuff, but it's actually a maze of long, vacant hallways. The screen gives you a 3-D, Androne-eye view of these passages, a power gauge, and a small screen that shows Androne's location in relation to the available power units. After he's zapped all the power units, the screen shows the whereabouts of the elevator to the next level.

As you move Androne along the hallways, or turn a corner, he might be confronted by one or more data bugs, who will attack. You've got to sight in on them and shoot fast, because the bugs dodge and move quickly to sap your precious energy.

When you find a power unit (an elongated Maltese Cross), shoot it to gain five power points. You also get extra power for taking the elevator.

You get points for killing the bugs, for shooting the power units, and for stepping on pressure-sensitive pads that disappear once you've crossed them. However, the number of points you score is not nearly as important as building and maintaining your power supply. Once it's depleted, the game is over.

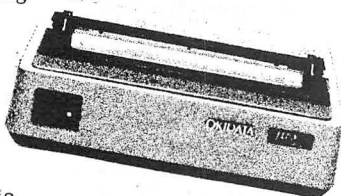
Radio Shack has come up with some pretty interesting game packs lately. However, Androne isn't one of my favorites. The graphics are good and there are times when the action is as fierce as you could ever want. The game is tough. Maybe I'm just disappointed to learn what's really inside my computer—after all this time.—**M.E.R.** ■

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✓ 27

PRODUCT NEWS

edited by Cynthia Smith

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 From Tom Mix Software

Tom Mix has announced these new games for the Color Computer:

● **In Skramble** your mission is to penetrate the enemy scramble system and destroy their headquarters. You start with three space fighters equipped with repeating cannon and twin bomb launcher. Fight your way into the fortress and through the maze to destroy headquarters and win an even more challenging mission. Designed for one or two players, this 16K machine-language game has full color graphics with sound, keyboard, or joystick control, and sells for \$24.95 (tape) and \$27.95 (disk).

● **Crash** is a hi-res, machine-language game consisting of four screens in which you fly an airplane over and through obstacles. Conquer one screen after another, but be careful not to crash. It requires 32K and sells for \$24.95 (tape) and \$27.95 (disk).

● **The Touchstone** lets you become one of the priests of Ra. You have accepted the challenge of the touchstone and work to become a favored high priest. You begin in Ra's temple discovering your powers, then with special orders from Ra himself, you begin your quest. It requires 32K and joysticks for one or two players, and sells for \$27.95 (tape) and \$30.95 (disk).

● **In Cuthbert Goes Walking**, you run your man on the outline of squares. When you complete a square it fills in, and you must complete all squares before the bugs get you in order to win. For one or two players, the game uses joysticks, requires 16K, and sells for \$20.95 (tape) and \$23.95 (disk).

● **King Tut** takes you on a journey through the caverns of Tut's tomb to find hidden treasure. You light your way with a fading candle as you evade snakes and ghosts. Five screens provide a real challenge. It requires 32K, joysticks, and sells

for \$27.95 (tape) and \$30.95 (disk).

● **Elec*Tron** is a game in which you have four men on your team and four subgames to complete including Beam Buggy, Prachnids, Force Field, and Maze. It requires 16K and sells for \$24.95 (tape) and \$27.95 (disk).

● **Worlds of Flight** is a view-oriented flight simulator. The aircraft modeled is an experimental, sport-trainer type, and lacks instruments necessary for instrument capability. It is light-weight, single-place with low wings and a T tail and pusher prop mounted in the rear.

You can do aerobatics including sustained inverted flight, aileron rolls, spins, and stalls. World of Flight uses hi-res line graphics to define landscape features. You can fly into and out of nine different worlds, controlling the weather in each. These worlds are three-dimensional and contain obstacles (trees, mountains, etc.). Your skill as a pilot and observation of the landscape determine your success. The program requires 32K cassette or disk and two joysticks. It sells for \$31.95 (disk) and \$29.95 (tape). Contact Tom Mix Software, 4285 Bradford N.E., Grand Rapids, MI 49506. 616-957-0444 for more information.

Reader Service ✓ 552

Multiform For More

Multiform is a software package that lets the Color Computer equipped with the CoCo Coupler 1 read and write 12 different disk formats in addition to the standard format. Along with this capability the package upgrades your CP/M version 2.2.D2 to 2.2.D3.

It supports the following formats: Wayne Technology standard double-density format, Radio Shack Model I with Omikron adapter, Xerox Model 820-1 and 820-2, Heath H89, Lobo Max 80, Osborne 1, Osborne Executive; Radio Shack Model 4 with CP/M+ and Montezuma Micro CP/M; Kaypro II; Morrow Micro Decision; and Zenith Z100.

Multiform sells for \$39.95 from Wayne Technology, P.O. Box 5196, Anaheim, CA 92804-1196.

Reader Service ✓ 551

Super-Bug

Super-Bug, from Mark Data Products, is a relocatable machine-code monitor for the Color Computer. The program and documentation help beginners understand machine-language programming, while advanced programmers will appreciate Super-Bug's versatility and convenience during programming and debugging.

It offers hex and alphanumeric memory display and modify; character string search; a memory test facility; up to 220 breakpoints; a mini-object-code disassembler; 64K mode setup; decimal, hex, and ASCII code-conversion routines; full printer support with baud rate and line-feed select; extensive documentation; and more.

Available on cassette for \$29.95 and disk for \$32.95, Super-Bug requires a minimum of 16K. Contact your favorite dealer or Mark Data Products, 24001 Alicia Parkway, #207, Mission Viejo, CA 92691. 714-768-1551.

Reader Service ✓ 553

Ulysses in Minutes

Now the CoCo can help you become a speed reader. The Speed Reading program from B&B Software gives you material on the screen at selected speeds. You can vary the speeds and use drills included to improve visual span and perception.

Also available is a three-page printout of program instructions, free if you send a self-addressed, stamped envelope.

Speed Reading requires 16K and sells for \$17.95 (cassette) from B&B Software, P.O. Box 210, Jenkintown, PA 19046.

Reader Service ✓ 554

96K Expanders

These hardware/software cartridges and modules let you use both 32K memory banks in 64K CoCos. There is nothing to load, and software is accessed by EXEC 57701.

Features are as follows: use top unused 8K of memory in the ROM area; allow Basic to be run in either memory bank; compatible with disk drives; do not require Extended Basic; store and recall data in hex, ASCII, or vector formats; display statement numbers and memory and let you change

them one at a time; give the beginning, ending, and execution addresses of machine-language programs; quickly move blocks of data to or from either memory bank or within either bank.

The 96KX is a plug-in cartridge with output connector for disk drives or other accessories. It works on all computers, contains all features mentioned above plus an interrupt switch for running machine-language programs, or for computer reset when the normal reset fails. It sells for \$79.95.

The 96KX-C is like the 96KX, minus the output connector or interrupt switch, for use with cassette systems or Multi-Pak expanders, and sells for \$49.95.

The 96KX-M is a model that mounts inside the computer to become a permanent part of the system. It sells for \$59.95.

Contact Dynamic Electronics Inc., P.O. Box 896, Hartselle, AL 35640. 205-773-2758.

Reader Service ✓ 555

New Editor

Editron is the first full-screen Basic program editor for the Color Computer. The machine-language program uses 3K of RAM and is written in position-independent code.

When you execute Editron, you have 10 available cursor-control functions for free movement within the Basic program text. You also have 10 screen-editing functions including a built-in auto-line numbering utility, auto-repeating keys, optional key tone, prompts, and error messages.

Editron requires 16K Extended Color Basic and comes on disk for \$40 and tape for \$35. Cost includes shipping, 24 pages of documentation, and a quick-reference chart.

Contact Vidtron, 4418 E. Chapman Ave., Suite 284, Orange, CA 92669.

Reader Service ✓ 556

ColorForth Improved

This new version of ColorForth, the Forth language compiler, allows access to all available RAM from 16K through 64K.

ColorForth V2.0 operates under all current ROMs and does not require Extended Basic (except for operation of the disk version). It includes 50 commands in addition

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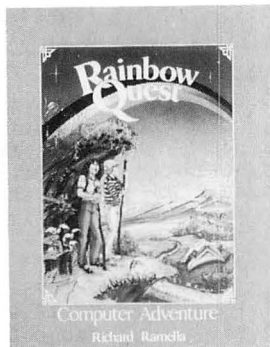
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Wayne Green Inc., Book Sales, Peterborough, NH 03458. Include \$2.00 per package for shipping and handling. Orders payable in U.S. dollars only.

Rainbow Quest by Richard Ramella.
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BK7391 ISBN 0-88006-064-6.

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PRODUCT NEWS

to the standard figForth vocabulary.

With it you will get a faster LIST function and an easy way to save your new Forth words and commands, as well as the ability to create and use vectored words. It reads or writes any sector on the disk and includes a resident figEditor and an 82-page manual.

ColorForth V2.0 consists of both the cassette and Radio Shack DOS versions, and sells for \$49.95 plus \$2.50 shipping from Armadillo International Software, P.O. Box 7661, Austin, TX 78712. 512-835-1088.

Reader Service ✓ 557

Sweet Gaming

Candy Co. is a moving maze game in which you control the hero, Candy Dan, through the maze of Candy Co. conveyor belts. Candy Dan's partner, Q.P. Doll, is controlled by player 2. Their associates, Doc D. Kay and M.C. Squared, can either help or hinder them in collecting jelly beans, bubble gum, candy canes, and lollipops.

The antagonists, Phoodin Drog, Korprut Spy, and Pyro Wurr, steal Greedy Units and Invent Oids and drop off cherry



Bush Industries' Modular Computer Furniture

bombs while attempting to throw you off the conveyor belts.

Candy Co. has over 1,000 frames of increasing difficulty with selectable starting level. You control from either keyboard or joystick. It plays original music during the title screen and the lyrics appear in the documentation. There is also a high-score list with name entry.

Candy Co. is written in machine language and makes use of sprite graphics simulation and continuous sound effects. It requires a

32K CoCo or TDP-100 and is available on cassette and disk for \$34.95. Contact Intracolor Communications, P.O. Box 1035, East Lansing, MI 48823. 517-351-8537.

Reader Service ✓ 558

More Than Furniture

Bush Industries has introduced the new 140 Series of computer furniture. It features acrylic coating and non-glare ebony work surfaces framed by a pecan wood-

grain laminate. A wide variety of accessories and add ons are available.

● The desk (Model CT-140) has a large work surface and full width lower storage shelf with lockable compartment. It costs \$199.95.

● The matching hutch (Model CTA-141) expands equipment and storage space, and it costs \$119.95.

For more information contact Geoffrey McNally, Sharp/McNally Communications, 212-221-6985 or write Bush Industries Inc., 312 Fair Oak St., Little Valley, NY 14755.


Reader Service ✓ 564

HF Antenna Design Program

HF Antenna Design is the latest offering in Cynwyn's software series for amateur radio hobbyists. The program makes the necessary calculations for building three popular types of antennas—dipole, Yagi, and quad—for frequencies of 1.8–30 MHz, and displays them in a tabular format. Dimensions for the Yagi and quad are optimized for maximum gain.

HF Antenna Design requires a TRS-80C Color Computer with 16K RAM and Extended Color

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PRODUCT NEWS

Basic or MC-10 with 4K RAM. The program is available from Cynwyn on cassette for \$10 plus \$2 shipping. Order from Cynwyn, 4791 Broadway, Suite 2F, New York, NY 10035. 212-567-8493.
Reader Service ✓ 567

Composite Video Adapter

The new Composite Video Adapter from Cynwyn enables the Color Computer and Color Computer 2 to be used with a hi-res monitor. The unit comes fully assembled with instructions for installation.

The composite Video Adapter sells for \$15 plus \$2 shipping and is available from Cynwyn, 4791 Broadway, Suite 2F, New York, NY 10034. 212-567-8493.
Reader Service ✓ 563

CoCo Elixir

Ultrabug lets you investigate or modify the inner features and capabilities of your Color Computer. It is more than the usual debugger or monitor. Ultrabug helps you avoid syntax and other errors, is available in source-code format

for customization, and makes many investigative tools available at once.

With Ultrabug you can convert ROM into RAM (64K only) allowing experiments with ROM code. With it you can modify CPU registers or memory locations, do a memory search for character or address, and jump to subroutines in ROM with return to Ultrabug.

The cassette-based program is available for \$49.95 plus \$2 shipping, with manual, from Alpine Systems Inc., P.O. Box 1279, 402 Main, Lyons, CO 80540.

Reader Service ✓ 559

Attention, Shoppers

Organize your shopping time with Kolourdex for Koupons, a file-management system designed to help you effectively use your cash-off coupons. The system stores information such as product name, type, expiration date, and coupon amount for 720 coupons (400 in cassette version), and you can retrieve them by product name, type, date, or any of these categories.

The program is available for the CoCo with 32K Extended Color Basic, from Kensoft, 2102-50th



The Rolltop 100 Executive Disk File

St., Kenosha, WI 53140. 414-654-2722. The disk version (one drive) sells for \$28.95, the cassette version for \$24.95, and an upgrade package (cassette to disk) sells for \$7.50. Add a \$1.50 shipping charge for all items.

Reader Service ✓ 560

Rolltop Order

Here's another way to protect and store your disks. The Rolltop 100 Executive from MicroComputer Accessories Inc. features a silver rolltop enclosure and a textured black high-impact plastic

body. It holds 120 disks and comes with 10 dividers and color-coded labels.

The Rolltop 100 Executive retails for \$39.95, and a lockable model is available for \$49.95. For more information, contact Micro-Computer Accessories Inc., 5712 Buckingham Parkway, Culver City, CA 90230. 213-641-1800.

Reader Service ✓ 550

eForth For Flex

eForth is a programming language that includes simpler, smaller, and more powerful and consistent words; hundreds of definitions provided in the source code; and easy redirection of input and output. It follows the Forth 1983 standard and comes with complete Forth editor source code.

CC-Flex and RS DOS versions are compatible at the disk level and programs and data can be transferred easily between the two operating systems. The package also includes a 200-page manual. It sells for \$79.95 from Frank Hogg Laboratory Inc., Regency Towers, 770 James St., Syracuse, NY 13203. 315-474-7856.

Reader Service ✓ 561

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