THE Color Computer* MAGAZINE

April 1983 $2.95

For TRS-80 ®Color Computer & TDP-100 ™Users

Jake's Memory Map Extraordinaire

The Spelling Teacher

Games:

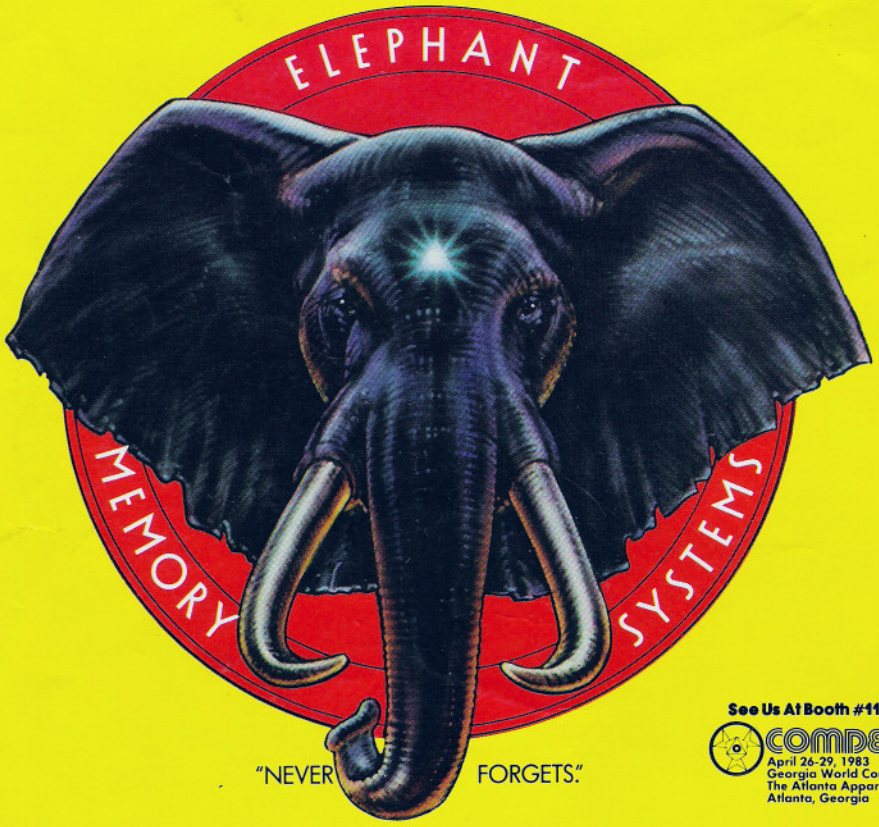
- ☐ The Sorcerer's Puzzles
- ☐ Musical Tales

...and more

0 04
71486 02661

*™Tandy Corporation

REMEMBER:



MORE THAN JUST ANOTHER PRETTY FACE.

Says who? Says ANSI.

Specifically, subcommittee X3B8 of the American National Standards Institute (ANSI) says so. The fact is all Elephant™ floppies meet or exceed the specs required to meet or exceed all their standards.

But just who is "subcommittee X3B8" to issue such pronouncements?

They're a group of people representing a large, well-balanced cross section of disciplines—from academia, government agencies, and the computer industry. People from places like IBM, Hewlett-Packard, 3M, Lawrence Livermore Labs, The U.S. Department of Defense, Honeywell and The Association of Computer Programmers and Analysts. In short, it's a bunch of high-caliber nitpickers whose mission, it seems, in order to make better disks for consumers, is also to make life miserable for everyone in the disk-making business.

How? By gathering together periodically (often, one suspects, under the full moon) to concoct more and more rules to increase the quality of flexible disks. Their most recent rule book runs over 20 single-spaced pages—listing, and insisting upon—hundreds upon hundreds of standards a disk must meet in order to be blessed by ANSI. (And thereby be taken seriously by people who take disks seriously.)

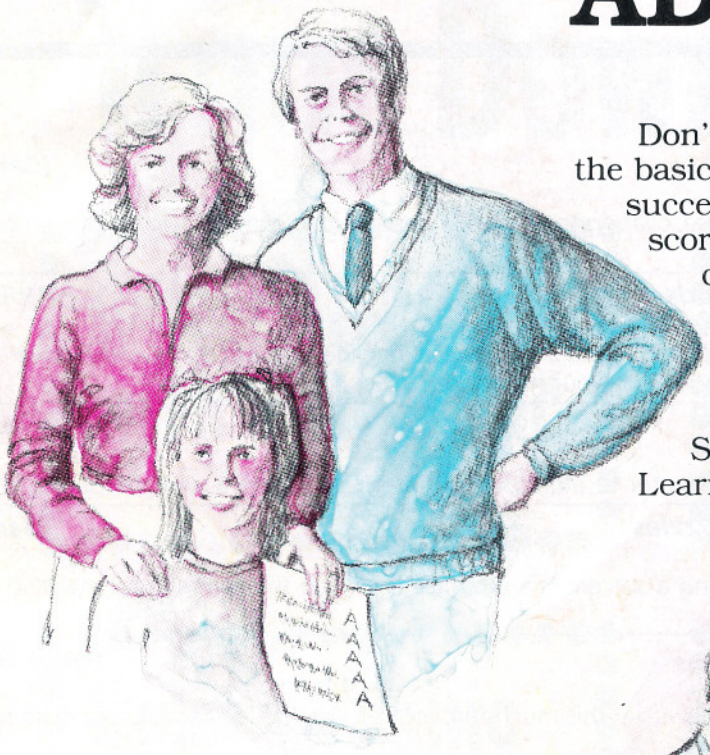
In fact, if you'd like a copy of this formidable document, for free, just let us know and we'll send you one. Because once you know what it takes to make an Elephant for ANSI . . .

We think you'll want us to make some Elephants for you.

ELEPHANT.™ HEAVY DUTY DISKS.

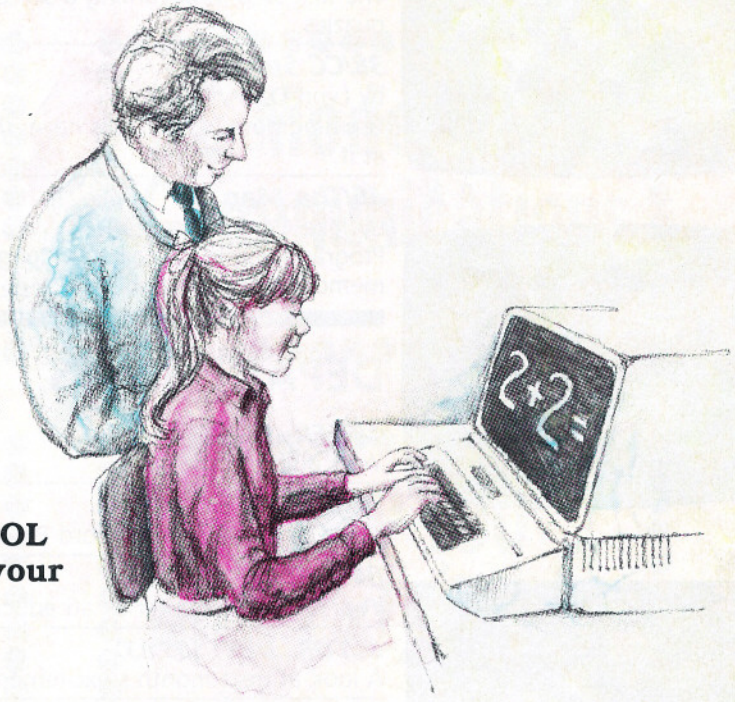
For a free poster-size portrait of our powerful pachyderm, please write us.
Distributed Exclusively by **Leading Edge Products, Inc.**, 225 Turnpike Street, Canton, Massachusetts 02021
Call: toll-free 1-800-343-6833; or in Massachusetts call collect (617) 828-8150. Telex 951-624.

GIVE YOUR CHILD AN UNFAIR ADVANTAGE



Don't just depend on others to provide the basic education your child needs to succeed in tomorrow's world. While test scores of others may go down, your child's scores can improve dramatically when you provide him or her with individualized MICRO SCHOOL PROGRAMS, in Reading, Math, English Usage, Spelling, and Games that Teach. Learning at home can be fun.

He or she can master basic skills, using a MICRO SCHOOL PROGRAM, in just minutes each day if you have an APPLE, ATARI, TRS-80, TRS-80 COLOR or TDP personal computer at home.



ASK FOR MICRO SCHOOL PROGRAMS BY NAME at your local computer store.

BERTAMAX INC.
Max Jerman, Ph.D.,
President

MICRO SCHOOL PROGRAMS™
BERTAMAX INC.

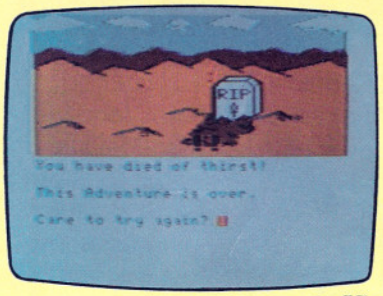
PERSONALIZED INSTRUCTION ON PERSONAL COMPUTERS

THE Color Computer... MAGAZINE

Vol. 1, No. 2
April 1983

p. 46

p. 56



p. 57

p. 62

FEATURES

DEPARTMENTS

Cover
Color Computer Magician Jake Commander by Charles Freiberg.

THE COLOR COMPUTER MAGAZINE is published monthly by New England Publications Inc., Highland Mill, Camden, ME 04843. James S. Povec–President, Michael Perlis–Executive Vice President, H. John Delile–Treasurer

Subscriptions are $24 for twelve issues. User Group subscription rates available. Outside U.S.A. add $10 for extra postage.

POSTMASTER: Please send changes of address to The Color Computer Magazine, P.O. Box 468, Hasbrouck Heights, NJ 07604. Application for mailing at second class rates pending at Camden, Maine, and additional mailing offices.

Peek (04,83)

There will be two reactions to The Map (GOTO 46), our main feature for this month. Reaction number 1: "It's about time someone published this." And reaction number 2: "What in the world is a memory map?"

Those of you who fit reaction number 1, only need be told that this memory map is more complete than any previously published. The rest of you will need a bit more explanation.

Machine-language (also called assembly language or machine code) programs speak directly to your computer's brain, the 6809 CPU. This programming language is more difficult to learn than Basic. It is written in binary numbers using only zeroes and ones to instruct the computer, rather than code words that look almost like English (such as PRINT, LIST, RUN, etc.).

The advantages in programming machine language instead of Basic are many. Because a machine-language program speaks directly to your 6809, the program doesn't first need to be interpreted, or translated, into the computer's language of zeroes and ones. Skipping this interpretation step means the program written in machine language will run faster, because the computer has less work to do. This is why most arcade games, and programs using hi-resolution graphics are written in machine language. The longer a program, the longer it will take to run. If the program is written in Basic it will take even longer to execute because of the interpretation step. If the program is written in machine language it will take that much less time because it doesn't need interpretation.

Color Computerists who aspire to program should set machine-language knowlege as their goal. Great things can be accomplished in Basic, let there be no short-selling of Basic's power. But even greater achievements are possible through machine language.

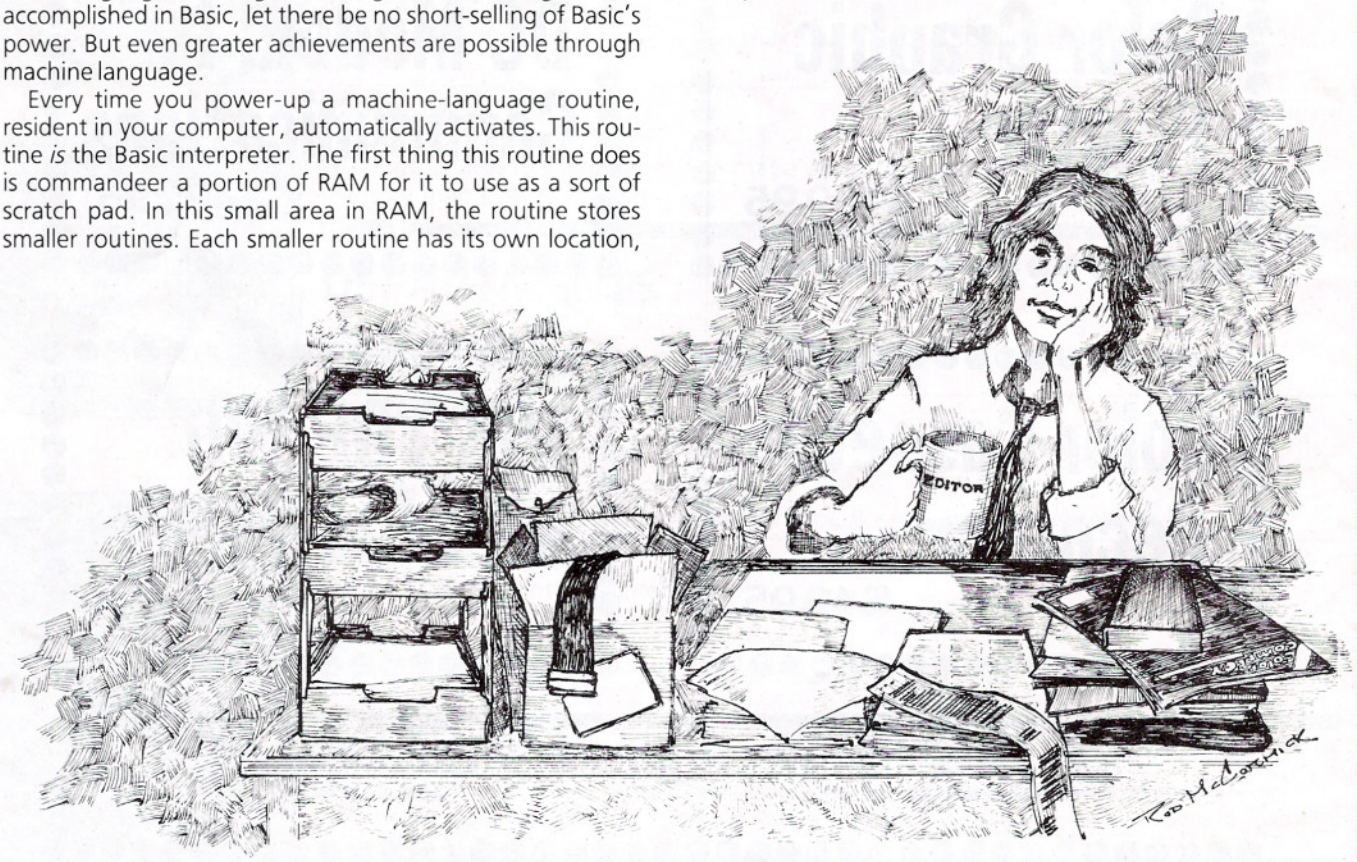
Every time you power-up a machine-language routine, resident in your computer, automatically activates. This routine *is* the Basic interpreter. The first thing this routine does is commandeer a portion of RAM for it to use as a sort of scratch pad. In this small area in RAM, the routine stores smaller routines. Each smaller routine has its own location, or address. If you knew at what address it stored the information to draw a circle you could save yourself the bother of writing coding by calling on the routine already residing in your computer's RAM.

A memory map then, is a chart showing all the execution addresses for your computer's functions. The more detailed the map, the more economical a programmer can be. If you want to learn machine language, or just want to better understand how it controls your computer, Jake's map will make the task easier than it has ever been before.

Technical Consultant Steve Odneal wasn't satisfied with his Color Computer's 32-character screen format — so he changed it. RS Video (GOTO 15) reformats your screen, using a machine-language routine, to a 51 by 24 format. Besides the larger format, Steve's routine also makes true lowercase letters possible on your Color Computer without having to make any modifications to your machine. Be aware that the smaller letters will make more demands on the quality of your TV's resolution. If the letters are unreadable on your screen, try fine tuning your TV to black and white.

Richard Ramella begins an occasional series of puzzles in this issue, GOTO 32 for The Sorcerer's Puzzles. Last month Lynn Davis dazzled you with his Spiral Galaxy, this month he helps you teach your children to spell with CC Speller (GOTO 38). GOTO 28 where Dennis Kitsz presents Part 1 of a method of controlling electrical devices by your Color Computer. Not to be forgotten is a nifty little game by Robert Toscani (GOTO 8) that combines story telling and music.

GOTO 52 for Part II of our Word Processing Guide to open this month's review section. Following the guide are a few other products we checked out for you. Enjoy. — *K.L. Editor*

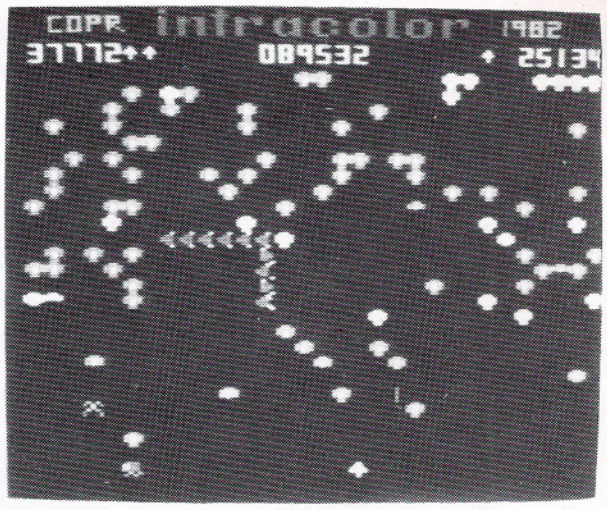


COLORPEDE and ROBOTTACK

COLORPEDE

This truly outstanding engineer designed, 100% machine language game with multi-colored high resolution characters and fast action will challenge the most avid arcade buff. Can be played by 1 or 2 players controlled with joy sticks or key board. Joy stick control is fast, smooth and accurate. As COLORPEDE slithers through the toad stools, you attempt to destroy the COLORPEDE, knock out the menacing Bouncing Bug and eliminate toad stools while accumulating higher and higher scores. Demonstration mode with top 5 scores. Pause feature. For 16K Color Computer and TDP-100.

Cassette - $29.95 Disk - $34.95



Actual Photo

WHAT THEY ARE SAYING ABOUT COLORPEDE

" . . . forefront of the pack . . . " **the Rainbow,** Dec. '82

" . . . the best graphics and playability of any color computer game . . ." McKeesport, PA

"It is great!" Dayton, OH

" . . . an outstanding offering." N. Vernon, IN

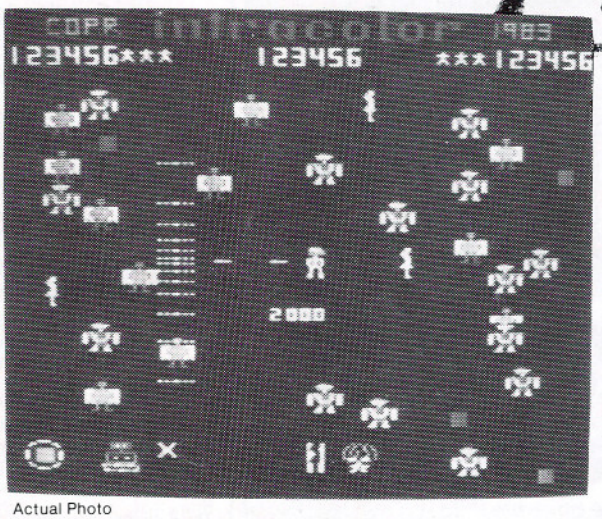
" . . . the best graphics I have seen to date." Erie, PA

intracolor
COMMUNICATIONS

SETTING THE STANDARDS

INTRODUCING

ROBOTTACK



Actual Photo

Ultra fast arcade action with colorful high resolution graphics. You are the super human who must fight off the attacking robots and save the remaining humans from destruction. You have super powers, can shoot in any direction and move anywhere on the screen to accomplish your vital mission.

Engineer designed, 100% machine language. Can be played by 1 or 2 players with joy stick control. Top 5 scores displayed. Pause feature. For 16K Color Computer and TDP-100 with joy sticks.

Cassette - $24.95 Disk - $27.95

TO ORDER: VISA, MASTERCARD, Money Order. Please allow 2 weeks for checks. Add $1.50 for shipping, $3.00 outside U.S. 4% tax in Mich.

DEALER INQUIRIES INVITED.

intracolor
COMMUNICATIONS
P.O. Box 1035, East Lansing, MI 48823
(517) 351-8537

FOR THE COLOR COMPUTER & TDP-100

Circle No. 50 on Reader Service Card

THE Color Computer... MAGAZINE

Editor
Kerry Leichtman

Assistant to the Editor
Caron L. Taylor

Art Director
Illona M. Jennings

Review Editor
Terry Kepner

Contributing Editors
William Barden Jr.
Jake Commander
Dennis Kitsz

Copy Editor
Debra Marshall

Technical Consultants
Paul Detwiler
Steve Odneal

Art Production
J.L. Patterson
Rod McCormick
Karen Searls

Publisher
James S. Povec

Advertising Director
David J. Ezequelle
(207) 236-9621
Highland Mill
Camden, ME 04843

Circulation Director
Lori A. Hellevig

Controller
John Delile
Pam Ward, Assistant

Office Manager
Faith H. Jones

U.S.A. Newsstand distribution by Curtis Circulation Company.

Phototypography by Camden Type 'n Graphics — Camden, Maine; Lithography by Camden Printing — Camden, Maine; Printing by The Lane Press — Burlington, Vermont.

AARDVARK

TRS-80 COLOR COMMODORE 64 VIC-20 SINCLAIR/TIMEX TI99

QUEST – A NEW IDEA IN ADVENTURE GAMES! Different from all the others. Quest is played on a computer generated map of Alesia. Your job is to gather men and supplies by combat, bargaining, exploration of ruins and temples and outright banditry. When your force is strong enough, you attack the Citadel of Moorlock in a life or death battle to the finish. Playable in 2 to 5 hours, this one is different every time. 16k TI99, TRS-80 Color, and Sinclair, 13K VIC-20. $14.95 each.

32K TRS 80 COLOR Version $24.95.

Adds a second level with dungeons and more Questing.

CATERPILLAR

O.K., the Caterpillar does look a lot like a Centipede. We have spiders, falling fleas, monsters traipsing across the screen, poison mushrooms, and a lot of other familiar stuff. COLOR 80 requires 16k and Joysticks. This is Edson's best game to date. $19.95 for TRS 80 COLOR.

ADVENTURES!!!

The Adventures below are written in BASIC, are full featured, fast action, full plotted adventures that take 30-50 hours to play. (Adventures are interactive fantasies. It's like reading a book except that you are the main character as you give the computer, commands like "Look in the Coffin" and "Light the torch.")

Adventuring requires 16k on Sinclair, TRS-80, and TRS-80 Color. They require 8k on OSI and 13k on VIC-20. Sinclair requires extended BASIC. Now available for TI99. Any Commodore 64.

$14.95 Tape – $19.95 Disk.

ESCAPE FROM MARS
(by Rodger Olsen)

This ADVENTURE takes place on the RED PLANET. You'll have to explore a Martian city and deal with possibly hostile aliens to survive this one. A good first adventure.

PYRAMID (by Rodger Olsen)

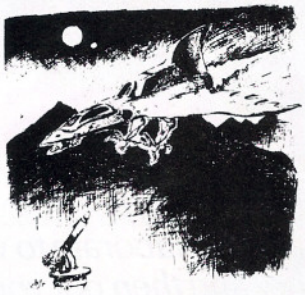
This is our most challenging ADVENTURE. It is a treasure hunt in a pyramid full of problems. Exciting and tough!

DERELICT
(by Rodger Olsen & Bob Anderson)

New winner in the toughest adventure from Aardvark sweepstakes. This one takes place on an alien ship that has been deserted for a thousand years – and is still dangerous!

Dungeons of Death – Just for the 16k TRS-80 COLOR, this is the first D&D type game good enough to qualify at Aardvark. This is serious D&D that allows 1 to 6 players to go on a Dragon Hunting, Monster Killing, Dungeon Exploring Quest. Played on an on-screen map, you get a choice of race and character (Human, Dwarf, Soldier, Wizard, etc.), a chance to grow from game to game, and a 15 page manual. At the normal price for an Adventure ($14.95 tape, $19.95 disk), this is a giveaway.

WIZARDS TOWER – This is very similar to Quest (see above). We added wizards, magic, dragons, and dungeons to come up with a Quest with a D&D flavor. It requires 16k extended color BASIC. $14.95 Tape, $19.95 Disk. VIC 20 Commodore 64.



NEW

PLANET RAIDERS – Not just another defenders copy, this is an original program good in its own right. You pilot a one man ship across a planetary surface dogfighting with alien ships and blasting ground installations while you rescue stranded troopers. Rescue all the troopers and be transported to another harder, faster battle. Joysticks required. ALL MACHINE CODE! EDSONS BEST! 16K Tape TRS80COLOR $19.95 – 32K Disk $21.95.

BASIC THAT ZOOOMMS!!
AT LAST AN AFFORDABLE COMPILER!

The compiler allows you to write your programs in easy BASIC and then automatically generates a machine code equivalent that runs 50 to 150 times faster.

It does have some limitations. It takes at least 8k of RAM to run the compiler and it does only support a subset of BASIC– about 20 commands including FOR, NEXT, END, GOSUB, GOTO, IF, THEN, RETURN, END, PRINT, STOP, USR (X), PEEK, POKE, *, /, +, -, >, <, =, VARIABLE NAMES A-Z, SUBSCRIPTED VARIABLES, and INTEGER NUMBERS FORM 0-64K.

TINY COMPILER is written in BASIC. It generates native, relocatable 6502 or 6809 code. It comes with a 20-page manual and can be modified or augmented by the user. $24.95 on tape or disk for OSI, TRS-80 Color, VIC 20, or Commodore 64.

SEAWOLFE – ALL MACHINE CODE In this high speed arcade game, you lay out patterns of torpedoes ahead of the attacking PT boats. Requires Joysticks, at least 13k RAM, and fast reflexes. Lots of Color and Sound. A fun game. Tape or Disk for Vic20, Commodore 64, and TRS-80 Color.

$14.95 Tape - $19.95 Disk.

Dealers – We have the best deal going for you. Good discounts, exchange programs, and factory support. Send for Dealer Information.

Authors – Aardvark pays the highest commissions in the industry and gives programs the widest possible advertising coverage. Send a Self Addressed Stamped Envelope for our Authors Information Package.

Adventures and Quest now available for TI99

Please specify system on all orders

ALSO FROM AARDVARK – This is only a partial list of what we carry. We have a lot of other games (particularly for the TRS-80 Color and OSI), business programs, blank tapes and disks and hardware. Send $1.00 for our complete catalog.

AARDVARK

2352 S. Commerce, Walled Lake, MI 48088 / (313) 669-3110

Phone Orders Accepted 8:00 a.m. to 4:00 p.m. EST. Mon.-Fri.

$2.00 shipping on each order

Circle No. 62 on Reader Service Card

Musical Tales:

If you and your computer could collaborate to write a story and then put your collective words to music, you would have quite a party game wouldn't you? Well now you do.

by Robert Toscani

16K
Extended Color Basic

illustration by Karen Searls

THIS PROGRAM, Musical Tales, gives you a series of incomplete sentences. After filling in your responses, the program plays back the complete story to musical accompaniment. You can choose from three pre-programmed songs, or you can write your own.

The story questions are general, allowing you to go in any direction; I had planned to make the prompts more specific and adult but decided against it.

The program requires 16K of RAM and Extended Color Basic. Line 10 clears enough memory and line 20 sends the program to the instructions. Lines 50–80 produce a title page and the author's name.

The incomplete sentences, or prompts, start at line 100 and continue to line 490. I did not use the same string label throughout the prompts because the computer confuses some of them, such as B1$ and B10$.

After you input your responses, line 520 lists your musical selections. That list runs down to line 600, which awaits your choice. Line 610 is an error-trapping command and line 620 determines which of the three music data areas you want to go to. Or whether you're going to input your own song. Your programmed choices are western, adventure, and inspirational.

Line 640 prints the completed product. Notice the PLAY command in lines like 670. These commands are interspersed throughout the section so that after reprinting a few lines of your deathless prose, the computer plays a few notes of music. Since the computer prints quickly, there is no noticeable lag in the music.

The tale and the music continue to line 1250, which prints The End. Lines 1290–1340 provide you with the options of playing the same thing again, playing the same story with different music, starting from scratch, or ending. Lines 1350 and 1360 act on your decision.

Line 1380 starts the pre-programmed music and runs down to line 1770. A GOTO command separates each song, so it's not difficult to see where each ends. Lines like 1540 are used because some music repeats itself in spots, but the program has a different label anyway. This saves repetitive typing.

Line 1790 is the routine for your own music; it's a series of input commands that label each section. If you use it, remember to use the L, O, T, and V PLAY commands where needed. The computer won't do it for you.

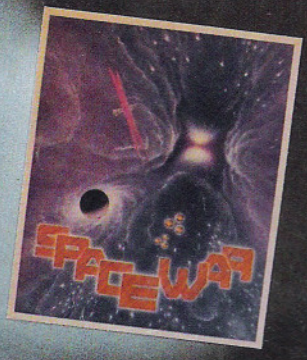
The program is easy to modify to suit you tastes. By making the prompts more suggestive, and programming a song like the stripper, you could have a great adult party game. ■■■

Listing begins page 10

SPECTRAL ASSOCIATES

16K Arcade Quality Games
For TRS-80 Color Computer

Only $21.95



SPECTRAL ASSOCIATES, 141 HARVARD AVE., TACOMA, WA. 98466

BEST SELECTION ANYWHERE

GREAT UTILITIES
FLEX+ DOS
BEST EDITOR/ASSEMBLER
SUPER MACHINE LANGUAGE GAMES
FANTASTIC BASIC GAMES
BOOKS

TOLL FREE FOR ORDERS ONLY: **1-800-426-1830** 8:30-4:30 P.S.T.
Except WA, AK, HI

BUSINESS OFFICE: 206-565-8483

We accept VISA, MASTERCARD, AMERICAN EXPRESS.
Add 3% for shipping. NO C.O.D. All prices U.S. FUNDS.

To find out about our other products, write or call for catalog.

Circle No. 3 on Reader Service Card

Program Listing. Musical Tales

```
10 PCLEAR1
20 GOSUB 1810
30 REM BY ROBERT TOSCANI,4744 WHITAKER AVE,
PHILA, PA. 19120.
40 CLS
50 PRINT@171,"MY STORY"
60 PRINT@206,"BY"
70 INPUT"                                    ";A$
80 FOR A=1 TO 500:NEXT A
90 CLS
100 INPUT"WITH AN ANGRY CLAMOR, THE 1";B1$
110 PRINT"ANSWERING IT, I WAS CONFRONTED"
120 INPUT"BY 2";B2$
130 INPUT"I SAID WHAT ARE 3";B3$
140 INPUT"THE REPLY WAS 4";B4$
150 INPUT"I WAS 5";B5$
160 INPUT"BUT I KEPT 6";B6$
170 INPUT"LEADING THE WAY TO 7";B7$
180 INPUT"I WONDERED WHY 8";B8$
190 INPUT"TO THAT THERE WAS 9";B9$
200 INPUT"IT HAD TO BE 10";B10$
210 INPUT"I TURNED TO 11";Z3$
220 INPUT"AND I SAID 12";Z4$
230 INPUT"THE STUNNING ANSWER WAS 13";Z5$
240 INPUT"THAT 14";Z6$
250 INPUT"AND FORCED ME TO 15";Z7$
260 INPUT"I JUMPED 16";Z9$
270 INPUT"TAKING MY 17";Y1$
280 INPUT"I STARTED 18";Y2$
290 INPUT"I KNEW IF I DIDN'T 19";Y3$
300 INPUT"THAT SETTLED 20";Y5$
310 INPUT"THINGS HAD 21";Y6$
320 INPUT"AND REQUIRED 22";Y7$
330 INPUT "BUT WAS I UP TO 23";Y8$
340 INPUT "I KNEW I HAD TO 24";Y9$
350 INPUT "TAKING 25";XP1$
360 INPUT "I 26";X2$
370 INPUT "THINGS STARTED 27";X3$
380 INPUT"IT WASN'T 28";X4$
390 INPUT"BUT IT HAD 29";X5$
400 INPUT "SURPRISING ME WITH 30";X6$
410 INPUT"I FELT 31";X7$
420 INPUT"THE SITUATION WAS GETTING 32";X8$
430 INPUT"AND ONLY I COULD 33";X9$
440 INPUT"I 34";X10$
450 INPUT"AND IT 35";U1$
460 INPUT" THINGS BEGAN 36";U2$
470 INPUT"AND I WAS ABLE 37";U3$
480 INPUT"I KNEW IT WAS GOING 38";U5$
490 INPUT"AND IT PROVED ONCE AGAIN 39";U6$
500 FOR Z=1 TO 300:NEXT Z
510 CLS
520 PRINT"TO PICK MATCHING MUSIC, YOU"
530 PRINT"HAVE FOUR CHOICES. 1 FOR A"
540 PRINT"WESTERN, 2 FOR SECRET AGENT, 3"
550 PRINT"FOR INSPIRATIONAL AND 4 TO"
560 PRINT"WRITE YOUR OWN. IF YOU PICK 4,"
570 PRINT"YOU WILL GET 18 LINES TO WRITE"
580 PRINT"NOTES ON."
600 INPUT N
610 IFN<1 OR N>4 THEN 600
620 ON N GOTO 1380,1520,1670,1780
630 CLS
640 PRINT@171,"MY STORY"
650 PRINT@206,"BY"
660 PRINT@234,A$
670 PLAY C$
680 CLS
690 PRINT"WITH AN ANGRY CLAMOR THE "B1$"."
700 PRINT "ANSWERING IT, I WAS CONFRONTED"
710 PRINT"BY "B2$"."
720 PLAY D$
730 PRINT "I SAID 'WHAT ARE "B3$"?"
740 PRINT"THE REPLY WAS "B4$"."
750 PLAY E$
760 PRINT"I WAS "B5$","
770 PRINT"BUT I KEPT "B6$"."
780 PLAY F$
790 PRINT"LEADING THE WAY TO "B7$
800 PRINT"I WONDERED WHY "B8$"."
810 PLAY G$
820 PRINT"TO THAT THERE WAS "B9$"!"
830 PRINT"IT HAD TO BE "B10$"."
840 PLAY H$
850 PLAY I$
860 PRINT"I TURNED TO "Z3$
870 PRINT"AND I SAID "Z4$"."
880 PRINT"THE STUNNING ANSWER WAS "Z5$"!"
890 PLAY J$
900 PRINT"THAT "Z6$
910 PRINT"AND FORCED ME TO "Z7$"."
920 PLAYK$
930 PRINT"I JUMPED "Z9$
940 PRINT"TAKING MY "Y1$
950 PRINT"I STARTED "Y2$"."
960 PLAY L$
970 PRINT"I KNEW IF I DIDN'T "Y3$"."
980 PRINT"THAT SETTLED "Y5$"."
990 PLAYM$
1000 PRINT"THINGS HAD "Y6$
1010 PRINT"AND REQUIRED "Y7$
1020 PRINT"BUT WAS I UP TO "Y8$
1030 PLAY N$
1040 PRINT"I KNEW I HAD TO "Y9$"."
1050 PRINT"AND TAKING "XP1$
1060 PRINT"I "X2$"."
1070 PLAY  O$
1080 PRINT"THINGS STARTED "X3$
1090 PRINT "IT WASN'T "X4$
1100 PRINT"BUT IT HAD "X5$"."
1110 PLAY P$
1120 PRINT"SURPRISNG ME WITH "X6$
1130 PRINT"I FELT "X7$"."
1140 PRINT"THE SITUATION WAS GETTING "X8$
1150 PLAY Q$
1160 PRINT"AND ONLY I COULD "X9$"."
1170 PRINT"I "X10$"."
1180 PRINT"AND IT "U1$"!"
1190 PLAY R$
1200 PRINT"THINGS BEGAN "U2$
1210 PRINT"AND I WAS ABLE "U3$"."
1220 PLAY S$
1230 PRINT"I KNEW IT WAS GOING "U5$"."
1240 PRINT"AND IT PROVED ONCE AGAIN "U6$"."
1250 PRINT TAB(12) "THE END"
1260 PLAY T$
1270 FOR Z=1 TO 300:NEXT Z
1280 CLS
1290 PRINT"TO REPEAT THE COMPLETED PIECE,"
1300 PRINT"PRESS 1. TO RUN THE STORY WITH"
1310 PRINT"DIFFERENT MUSIC, PRESS 2. TO"
1320 PRINT"START OVER FROM SCRATCH, PRESS"
1330 PRINT"3. AND TO END IT ALL, PRESS 4."
1340 INPUT WW
1350 IF WW<1 OR WW>4 THEN 1340
1360 ON WW GOTO 630,510,10,1370
1370 END
1380 C$="O3L4T4E-P8L4.GL8GL4FP8L4E-L8E-G"
1390 D$="T3GL4FE-P8L4GL8GL4FP8L8E-E-E-GG"
1400 E$="L4FGL1B-O4L4CO3B-A-O4L1.E-"
1410 F$="O3L4GL1B-O4L4CO3B-A-L1FL4E-FGL2B-"
1420 G$="O4L4CO3B-GL2E-P4O4L4E-E-CO3B-"
1430 H$="O4CO3E-FGL8E-L4E-L8GL4FP8"
1440 I$="L4E-L8E-GGL4FE-P8L4GL8GL4FP8"
1450 J$="L8E-E-E-GGL4F"
1460 K$="XD$;":L$="XE$;":M$="XF$;":N$="XG$;":O$="XH$;":P$="XI$;"
1470 Q$="L4GL1B-O4L4E-L8CO3L4B-A-L1F"
1480 R$="L4.E-L4FGL1B-O4L4CL8O3B-L4GFL1.A-"
1490 S$="L4GL8E-L4E-L8GL4FP8L4E-L8E-GG"
1500 T$="L4FE-P8L4GL8GL4FP8L8E-E-E-GGL4FP8L8E-E-E-GGL4FE-"
1510 GOTO 630
1520 C$="T3O2L2BO3CC#CO2BO3CC#C"
1530 D$="T2O3L8EL16F#F#L8F#L4F#L8EEEEL16GGL8GL4GL8F#F#F#"
1540 E$="XD$;":F$="XD$;"
1550 G$="O4L8D#L2DO3L8BALlB"
1560 H$="O3L8EL4GO4L8D#L4.DL16O3GL8A#L2.B"
1570 I$="L4GL16GL4.FL8O2BO3E-L4C#P8"
1580 J$="XH$;"
1590 K$="L4O3GL16AGL4.F#L8O2BO3D#L4EP16"
1600 L$="L8O3EL4EL8EL8.F#L16EL4F#L8GL4G"
1610 M$="L8GL8.F#L16EL4F#"
1620 N$="XL$;":O$="XM$;"
1630 P$="O3L8BBP5BBP5BBL8.BL8BLl6BL8BBP3"
1640 Q$="XD$;":R$="XD$;":S$="XD$;"
1650 T$="XG$;"
1660 GOTO 630
1670 C$="V15O3L16FFL8.FL16FL8.FL16E-L8.DL16F"
1680 D$="L8.B-L16O4CL8.DL16DL8.DL16CL4O3B-"
1690 E$="L8.B-L16AL8.GL16GL8.GL16A"
1700 F$="L8.B-L16AL8.B-L16GL8.FL16.GL8.FL16DL4F"
1710 G$="XC$;":H$="XD$;"
1720 I$="L4B-O4CCO3B-AL1V22B-"
1730 J$="V20L4.FL8E-L8.DL16FL8.B-L16O4CL2DO3L4B-P4"
1740 K$="L4.GL8AL8.B-L16AL8.B-L16GL2FD"
1750 L$="L4.FL8E-L8.DL16FL8.B-O4L16CL2DO3L4B-B-O4CCO3B-AL2.B-"
1760 M$="XC$;XD$;":N$="XE$;XF$;":O$="XC$;":P$="XD$;":Q$="XI$;":R$
="XJ$;":S$="XK$;":T$="XL$;"
1770 GOTO 630
1780 CLS
1790 INPUT"1";C$:INPUT"2";D$:INPUT"3";E$:INPUT "4";F$:INPUT"5";G$
:INPUT"6";H$:INPUT"7";I$:INPUT"8";J$:INPUT"9";K$:INPUT"10";L$:INP
UT"11";M$:INPUT"12";N$:INPUT"13";O$:INPUT"14";P$:INPUT"15";Q$:INP
UT"16";R$:INPUT"17";S$:INPUT"18-FINAL";T$
1795 FORA=1TO400:NEXTA
1800 GOTO 630
1810 CLS
1820 PRINT@7,"MUSICAL TALES"
1830 PRINT"YOU CAN WRITE YOUR OWN STORY."
1840 PRINT"ALL YOU HAVE TO DO IS FILL IN"
1850 PRINT"NUMBERED BLANKS. THERE ARE 39"
1860 PRINT"SPACES AND YOU CAN PUT WORDS,"
1870 PRINT"PHASES OR WHOLE SENTANCES IN."
1880 PRINT"AFTER DOING THAT, THE COMPUTER"
1890 PRINT"WILL PLAY THE COMPLETE STORY"
1900 PRINT"WITH MUSIC BUT MORE ABOUT THAT"
1910 PRINT"LATER. PRESS ANY KEY TO BEGIN."
1920 MM$=INKEY$:IF MM$="" THEN 1920
1930 RETURN
```

JARB INC SOFTWARE HARDWARE

ADVENTURES

MANSION OF DOOM
by PAL Creations

Rescue the Princess Marlena from the mysterious Count Von Steinoff and reunite her with the townspeople of her village in Transylvania. The Count's mansion has 76 distinct locations for you to explore in your rescue attempt.
32K EXT.....$14.95

S.S. POSEIDON
by Bill & Debbie Cook

You are aboard the S.S. Poseidon when it is capsized by a tidal wave. It is floating bottom-up on the surface and taking on water. Will you survive to tell your tale?
16K EXt $14.95

THE FINAL COUNTDOWN
by Bill & Debbie Cook

You are outside a missile base which has just been evacuated because a beserk General has started the countdown on a nuclear missile – target: MOSCOW. Your mission, if you accept it, is to stop the missile launch and prevent WWIII.
16K EXT.....$14.95

STALAG & ENO
by PAL Creations

1) You are an allied POW in a German prison camp in 1944 and were forgotten in the hot box when the camp was evacuated due to unexpected bombing raids. How will you get out ALIVE?

2) Your eccentric old aunt just died and left you a fortune in cash. To prove you deserve it, you must decipher the clues and find your fortune, which she hid in her living room.
32K EXT.....Both for $14.95

JUNGLE TREK
Lost in a jungle with wild animals lurking; your only survival is to find a safe compound before you are lunch for lions; high resolution; multi-color.
16K EXT.....$14.95

THE WARRIOR & THE WIZARD
by Jimmy Jones

Choose your character, weapons and armor to battle warlords, pygmies and other foes as well as hidden monsters, snakes, booby traps and numerous other dangers in this disk based graphics assisted adventure. Beware of the EVIL WIZARD!
32K EXT.....Plus one disk $19.95

MEMORY UPGRADE KITS

*4K/16K MEMORY CHIP SET
Eight 200 NS 4116 Factory Prime Chips, 16K Ram Button, and Upgrade Instructions. No Soldering.
.....$16.95

*16K/32K MEMORY UPGRADE KIT
Eight 200 NS 4116 Factory Prime Chips with Piggy Backed Sockets, Sam Socket, Bus Wire, and 32K Ram Button. Comprehensive Instructions. Recommended for "D" or earlier, but may be used on "E". Only 9 simple solder connections to kit. None to computer.
.....$25.95

*64K RAM CHIPS
Eight 200 NS Factory Prime 64K RAM Chips. Allows you to upgrade "E" board easily. No soldering needed.
.....$69.95

**Installation of these items will void the Radio Shack warranty. Radio Shack is a trademark of the Tandy Corp.*

WABASH DISKETTES
$25.00 per box of 10

DISK DOUBLER
$12.95

CoCo Chips
Sam, Pia, CPU, Ext. Basic, and 1.1 Standard Available

We carry products from many manufacturers. If you don't see it, ask.

JARB INC SOFTWARE HARDWARE

COMPUTER PRODUCTS
1636 D Avenue, Suite C
National City, CA 92050
(619) 474-6213

Dealer/Author Inquiries Invited

All programs warrantied 60 days from date of purchase to original purchaser. Unless otherwise specified, shipping and handling $2.00 per order. California Residents add 6% sales tax.

COMREX CR-6500
(13" Color Monitor)

High resolution display monitor produces an incredibly sharp image. Includes built-in speaker with audio circuit. Compatible with virtually any microcomputer.
.....$344.95

SHIPPING AND HANDLING: Printers and monitors add 3%. Unless otherwise specified, all other orders $2.00 per order. California Residents add 6% sales tax.

EPSON PRINTERS
MX80FT/Graftrax+ $524.95
MX100FT/Graftrax+ $699.95
Serial Interface w/4K Buffer
Ideal for 80C use $109.95
80CTO Epson Cable $19.95
See shipping Info

NEW PRICES ON DATA CASSETTES

C-05		C-10	
$ .65	QTY	1-10	$ .70
$ .60	QTY	11-20	$ .65

Soft Poly Cases .....Ea. $.20
Hard Shelled Cases .....Ea. $.22
Cassette Labels (12).....Sh. $.36
Cassette Labels Tractor (1000)....$30.00

Call or write for quantity prices on all cassette products. Special lengths available, eg., C-02, etc.

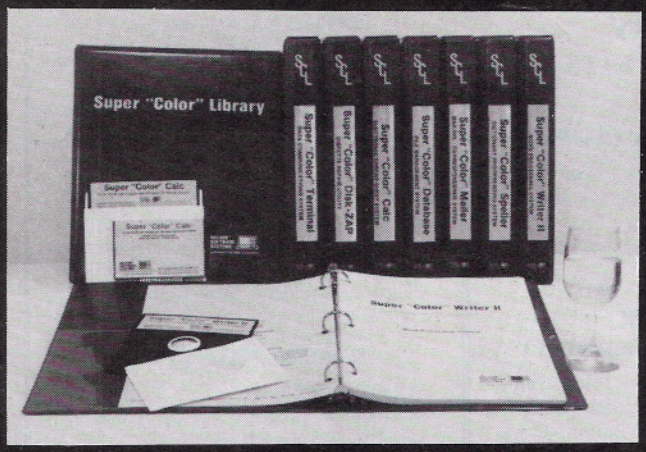
NANOS COLOR BASIC AND EXTENDED SYSTEM REFERENCE CARD
"The New Industry Standard"
$4.95
(We pay postage on this one)
All types of Nanos cards available

SCORE-EZ
From 1 to 6 people can play this excellent adaptation of a popular board game. The computer keeps score for all players, and rolls dice. You can roll again just like the original game. Properly position the results of each turn for maximum score. The only thing you will need besides your computer is players. Color graphics and sound will entertain you for hours, and it's EZ to play.
16K EXT.....$15.95

U.S FUNDS ONLY
C.O.D. ORDERS ACCEPTED
Sorry, no C.O.D. on printers and monitors.
NO CREDIT CARD ORDERS

Super "Color" Library™

For the TRS-80 Color and TDP System 100 Personal Computers



No matter what kind of problem you are trying to solve with the Color Computer, there is a program in the ever-expanding integrated, **Super "Color" Library** that will give you the solution; Faster, Better, Smarter!

Every Library program features **MEMORY-SENSE** to determine your computer's memory, from 16 to 64K, and adjusts automatically to maximize work space. All programs, except the **Super "Color" Speller** and **Super "Color" Disk-ZAP**, feature a true lowercase display with below line descenders. Each program has been written specifically for the Color Computer in fast machine code to be totally compatible for optimum performance — Something a motley assortment of programs from diverse sources or a passel of overpriced, wallet-FLEXing software from a bygone era simply can not achieve.

The **Super "Color" Library** has all the power, speed, dependability and compatibility you will ever need so build your library a volume at a time or put the full power of the complete library of problem solvers to work right away.

— *NEW!* —

64K Compatible

Super "Color" Writer II™

32x16 & 51-64-85x21 WITH REAL LOWERCASE DISPLAY

VERSION 3.0 By Tim Nelson

THE INTELLIGENT WORD PROCESSOR

The **Super "Color" Writer II** is for those who desire the best. It is the most powerful, fastest, most dependable and versatile word processor available for the Color Computer, from 16 to 64K. The **Super "Color" Writer II** has features for the most demanding professional, yet it is easy enough for newcomers to master.

Of course the **Super "Color" Writer II** has all the features you would expect from the highest quality word processor, such as a clear, crisp and readable professional display with your choice of display colors, 4 display formats; standard 32x16 & 51-64-85x21 with real lowercase and descenders: full 4-way cursor control, sophisticated edit commands, the ability to edit any BASIC program or ASCII textfile, seven delete functions, locate and change, wild card locate, a real block move & copy, word wrap-around, programmable tabs, display memory used and left, non-breakable space, multiple headers and footers, dynamic text formatting, comprehensive format parameters, use with ANY printer at any baud rate from 110 to 9600 baud, automatic justification, automatic pagination, automatic centering, automatic flush right, underlining, superscripts, subscripts, pause print, single-sheet pause, optionally print comments, append text files, available in a ROMPAK cartridge for maximum work space, but that's only half of the story. No other program can even begin to compare in features with the **Super "Color" Writer II.**

Check These Exclusive Features

MEMORY-SENSE adjusts to computer's memory (16-64K) for maximum work space; TYPE-AHEAD, TYPAMATIC KEY REPEAT and KEY BEEP for the pros; 3 PROGRAMMABLE FUNCTIONS: AUTO PHRASE INSERT; COLUMN CREATION; TEXT FILE LINKING; HELP MENU; A TRUE EDITING WINDOW IN ALL 4 DISPLAY MODES; TRUE FORMAT WINDOW to display line lengths up to 255 characters, with horizontal and vertical scrolling to replicate the printed page including centered lines, headers, footers, page breaks, page numbers, margins, giving a perfect printed document every time. Also makes hyphenation a snap; **TRUE AUTOMATIC JUSTIFICATION** for neat, even left and right hand margins; Ability to use CHARACTER CODES for printing special characters available with your printer; freedom to embed as many PRINTER CONTROL CODES as desired anywhere in the text, **EVEN WITHIN JUSTIFIED TEXT;** 90-plus page tutorial manual.

ADDITIONAL DISK FEATURES: Read a directory, Display free granules, Save with Automatic Verification, Load and Append ASCII files, and BASIC programs, Kill files, and Link files from disk for continuous printing. 54K bytes of workspace available with a 64 K system. Only the best offers all of these features.

TAPE $69.95 **ROMPAK $89.95** **DISK $99.95**

Tutorial only $15.00 (Refundable with purchase)
Tape & Disk require 32K for lowercase display
Previous **Super "Color" Writer II** owners call for upgrade policy.

Super "Color" Mailer™

By Tim Nelson

The **Super "Color" Mailer** is a powerful multi-purpose mailing list merging and sorting program including lowercase display that uses files created by the **Super "Color" Writer II.** Combine files, sort and print mailing lists, print "Boilerplate" documents, automatically insert text in standardized forms, address envelopes. the list is endless.

TAPE $39.95 **DISK $59.95**
Operators Manual only $10.00 (Refundable with purchase)

NEW

Super "Color" Speller™

By Peter A. Stark

The **Super "Color" Speller** is a fast machine-code proofreading program to correct **Super "Color" Writer** files. Automatically proofreads your documents against a 20,000 word stock dictionary, plus your own customized dictionary and corrects typos or marks them for special attention.

AVAILABLE ON DISK ONLY $69.95
Operators Manual only $10.00 (Refundable with purchase)

NELSON SOFTWARE SYSTEMS **9072 Lyndale Avenue So., Minneapolis, Minnesota 55420** **612/881-2777**

32x16 & 51-64-85x21 Display With Lowercase Descenders And 16 Thru 64K Too!

NEW Super "Color" Calc™

ELECTRONIC SPREADSHEET By Kevin Herrboldt

Now you can answer those "What if?" financial projection, forecasting, budgeting, engineering and calculating questions with precision, speed and power using the **Super "Color" Calc,** truly the finest electronic worksheet and financial modeling program available for the Color Computer, from 16 to 64K. Now every Color Computer owner has access to a calculating and planning tool rivaling VisiCalc™ containing all its features and commands and then some. You need only change one variable and you instantly see how that change affects your assumptions. You can even use VisiCalc templates freely with **Super "Color" Calc!** Combine spread sheet tables with **Super "Color" Writer II** documents to create ledgers, projections, statistical and financial reports and budgets.

Features include: 4 display formats; standard 32x16 & 51-64-85x21 with real lowercase and descenders * MEMORY-SENSE to adjust to computer's memory (16-64K) for maximum work space; Full-size 63x256 worksheet * Easy to use * HELP Menus to make learning faster * Machine code speed and nigh precision * Total flexibility in calculating * Up to FOUR VIDEO DISPLAY WINDOWS to compare and contrast results of changes * Sine and Cosine functions, Averaging, Exponents, Algebraic functions, and base 10 or 16 entry * Multi-layered Column and Row Ascending and Descending sorts * Locate formulas or titles in fields * Easy entry, replication and block moving of frames * Global or Local column width control up to 81 characters each * Create titles of up to 255 characters * Typamatic Key Repeat * Key beep * Type-ahead * Print up to 132 column worksheet * Prints at any baud rate from 110 to 9600 * Print formats savable along with worksheet * Enter control codes for customized printing.

DISK FEATURES: Read a directory; Display free granules; Kill files, Save with Automatic Verification; Load files; Append disk files for complete worksheet printing. 55K bytes of worksheet space available with a 64K system.

Tutorial and sample templates are supplied with the program.

ROMPAK $89.95 **DISK $99.95**

Tutorial only $15.00 (Refundable with purchase)
Tape & Disk require 32K for lowercase display.

Super "Color" Disk-ZAP™

By Tim Nelson

Now the dreamed-of repair of I/0 errors is a reality. The **Super "Color" Disk-ZAP™** is the ultimate repair utility for simple and quick repair of all repairable disk errors. Designed with the non-programmer in mind, the **Super "Color" Disk-ZAP™** will let you retrieve all types of bashed files, including BASIC and Machine Code programs.

This high-speed machine code disk utility has a special dual cursor screen display to show HEXIDECIMAL and ASCII displays simultaneously. You are able to: Verify or modify disk sectors at will * Type right onto the disk to change unwanted program names or prompts * Send sector contents to the printer or any other RS-232 device * Search the entire disk for any grouping of characters * Copy sectors * Backup tracks or entire disks * Repair directory tracks and smashed disks * Full prompting to help you every step of the way * 50-plus page Operators Manual which helps you simply and quickly fix the vast majority of disk errors, and teaches the rudiments of disk structure and repair.

AVAILABLE ON DISK ONLY $49.95

Operators Manual only $10.00 (Refundable with purchase)

Super "Color" Terminal™

THE FINEST TERMINAL PROGRAM ANYWHERE!
Version 3.0 By Dan Nelson

The best has become even better, with many new features including 4 display formats; 32x16 & 51-64-85x21 with real lowercase descenders, plus compatibility with the 64K Color Computer. This user-friendly program makes communicating with ANY computer a breeze even for a newcomer. Communicate using your modem with all the popular information services such as Dow Jones, Compuserve, The Source, and local BBS's, clubs, friends, or the main-frame at work. You can also communicate directly with other microcomputers, such as the TRS-80 I/III, II, other Color Computers, Apples, IBM PCs, etc., via RS-232 without using a modem. Save the information or PRINT IT!

FEATURES: MEMORY-SENSE to adjust to computer's memory (16-64K) for maximum work space; Selectively print data at baud rates from 110 to 9600 * 60K of data storage with 64K disk system. 128 character ASCII keyboard * Automatic graphics mode * Word mode (word wrap) for unbroken words * Send & receive **Super "Color" Writer II, Database & Calc** files, ASCII files, Machine Language & BASIC programs * Set communications baud rate from 110 to 9600, Duplex: Half/Full/Echo, Word length: 5 6 7 or 8, Parity: Odd/Even or None, Stop Bits: 1-9 * Local linefeeds to screen * Save and load ASCII files, Machine Code & BASIC programs * Unique CLONE feature for copying any tape * Lower case masking * 10 Keystroke Multiplier (MACRO) buffers to perform repetitive pre-entry log-on tasks and send short messages * Programmable prompt or delay for send next line * Selectable character trapping * Files compatible with other Library programs,

ADDITIONAL DISK FEATURES: Works with up to four Disk Drives; Call a directory, Print free space, Kill disk files, Save with Automatic Verication and Load textfiles or BASIC programs; Save and Load KSM'S to the disk.

TAPE $49.95 **ROMPAK $59.95** **DISK $69.95**

Operators Manual only $10.00 (Refundable with purcnase)
Previous **Super "Color" Terminal** owners call for upgrade policy.

NEW Super "Color" Database™

By Dan Nelson

This high speed machine language program including true lowercase displays fills all your information management needs, be they for your business or home. Inventory, accounts, mailing, lists, family histories, you name it, the **Super "Color" Database** will keep track of all your data.

The **Super "Color" Database** features MEMORY-SENSE to adjust to computer's memory (16-64K) for maximum work space. It is structured in a simple and easy to understand menu system with full prompting for easy operation. Your data is stored in records of your own design, each divided into as many fields as you need. All files are fully indexed for speed and efficiency. Full sort of records is provided for easy listing of names, figures, addresses, etc., in ascending or descending order. The math package performs arithmetic operations and updates other fields which is especially useful when used as an order entry and invoicing system. You can create reports, or lists for mailings, or whatever. Create files compatible with the **Super "Color" Writer II and Terminal.** Up to five different print formats are available, and control codes may be imbedded for customized printing.

AVAILABLE ON DISK ONLY $79.95

Operators Manual only $10.00 (Refundable with purchase)

For Orders ONLY Call Toll Free

1-800-328-2737

Customer service and product support call (612) 881-2777.

MAIL ORDERS: $3 U.S. Shipping ($4 CANADA, $10 OVERSEAS)
Personal checks allow 3 weeks. **ORDERS SHIPPED SAME DAY!**

Available at Dealers everywhere.
If your Dealer is out of stock ORDER DIRECT!

NELSON™ SOFTWARE SYSTEMS

9072 Lyndale Avenue So. 612/881-2777

A Division of Softlaw Corporation **Minneapolis, Minnesota 55420 U. S. A.**

WE TAKE THE COLOR COMPUTER SERIOUSLY.
AUTHORS' SUBMISSIONS ARE ENCOURAGED.

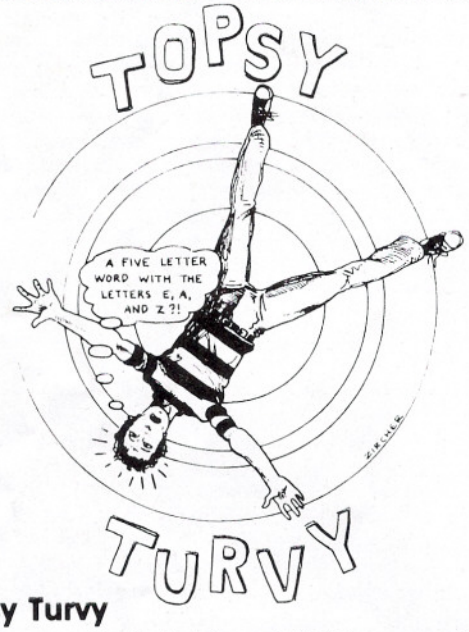
Circle No. 6 on Reader Service Card

PRICKLY-PEAR SOFTWARE

QUALITY PROGRAMS FOR YOUR 80C

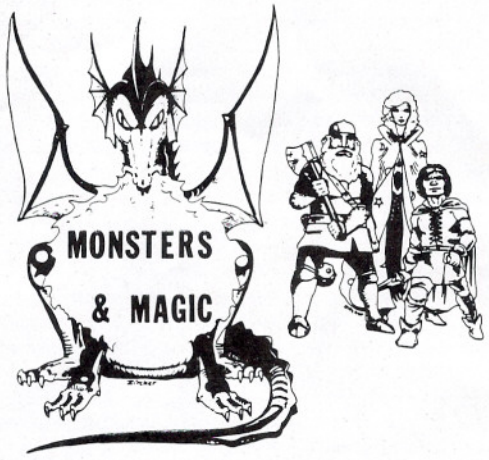
PROGRAMS REQUIRE 16K EXTENDED BASIC FOR TAPE, AND 32K DISK UNLESS OTHERWISE NOTED.

ALL PROGRAMS IN THIS AD ARE NEW THIS MONTH.



Topsy Turvy

Word game enthusiasts take note!! This game pits you against other players and a relentless timer while you try to see how many 3, 4, 5, 6, or more letter words you can make from the 10 letters chosen at random by the computer. The more you get, the more you score, and you get bonuses if you do well. All scoring, timing, and record keeping is done by the computer. Sure the game is educational, but it's so much fun you'll never notice!! **TAPE - $19.95, DISK - $24.95**



Monsters & Magic

The most realistic fantasy role-playing game yet for the Color Computer. You start out by rolling up your character's basic ability scores and buying equipment. When you are ready it's into the dungeon. Your character starts at first level, but can rise in levels by garnering experience in the fray. If you have role-played fantasy games you will be amazed at the realism of the combat system. Armor class, initiative, and damage by weapon type are all included, with over 50 different monsters to fight - each with it's own abilities. As you rise in level you can win treasure and find magic weapons and spells - if you live!! You set the game length by telling how many monsters you want to fight before you reach your final battle to the death against the powerful Dungeon Lord. There are 1000+ place description combinations in this text based game, and real excitement in every one! This is a fantasy simulation, and is truly not like any adventure game you have ever seen. For 1 player; requires 32K extended BASIC. **TAPE - $19.95, DISK - $24.95**

Spanish We know it's been a long wait, but you can finally use your Color Computer to learn a foreign language. This series of programs is very well done and educationally sound. You can use them in either a tutorial or test mode, and in the tutorial mode you can have the word on the screen while you listen to the correct pronunciation from the tape. The tape is controlled by the computer and the sound comes out the TV speaker. The complete Spanish course consists of 6 sets of lessons, with each set composed of 4 lessons. Each set comes with three cassette tapes (or one disk and two tapes in the disk version) and is complete in itself. When you finish the course - at your own pace, in the privacy of your home - you will have a conversational Spanish vocabulary of about 1100 words. Each set builds on the ones preceding, so you can stop at any time and still make full use of what you have learned.

SPANISH LANGUAGE COURSE

Set 1 (ready now) **TAPE - $24.95, DISK - $29.95;** Set 2 (ready now) **TAPE - $24.95, DISK - $29.95**

Sets 3, 4, 5 & 6 will be ready April 1, 1983, and each set will be **$24.95 on Tape** or **$29.95 on Disk.** The full course - all 6 sets - will be **$124.95 on Tape** or **$129.95 on Disk,** and will be ready April 1, 1983. We are already experiencing a heavy demand, so place your orders early. (Purchasers of Set 1 may order the remainder of the course within 30 days and pay the difference.)

COMING SOON — The same course in reverse - English instruction for Spanish-speaking people. Available approximately May 15, 1983.

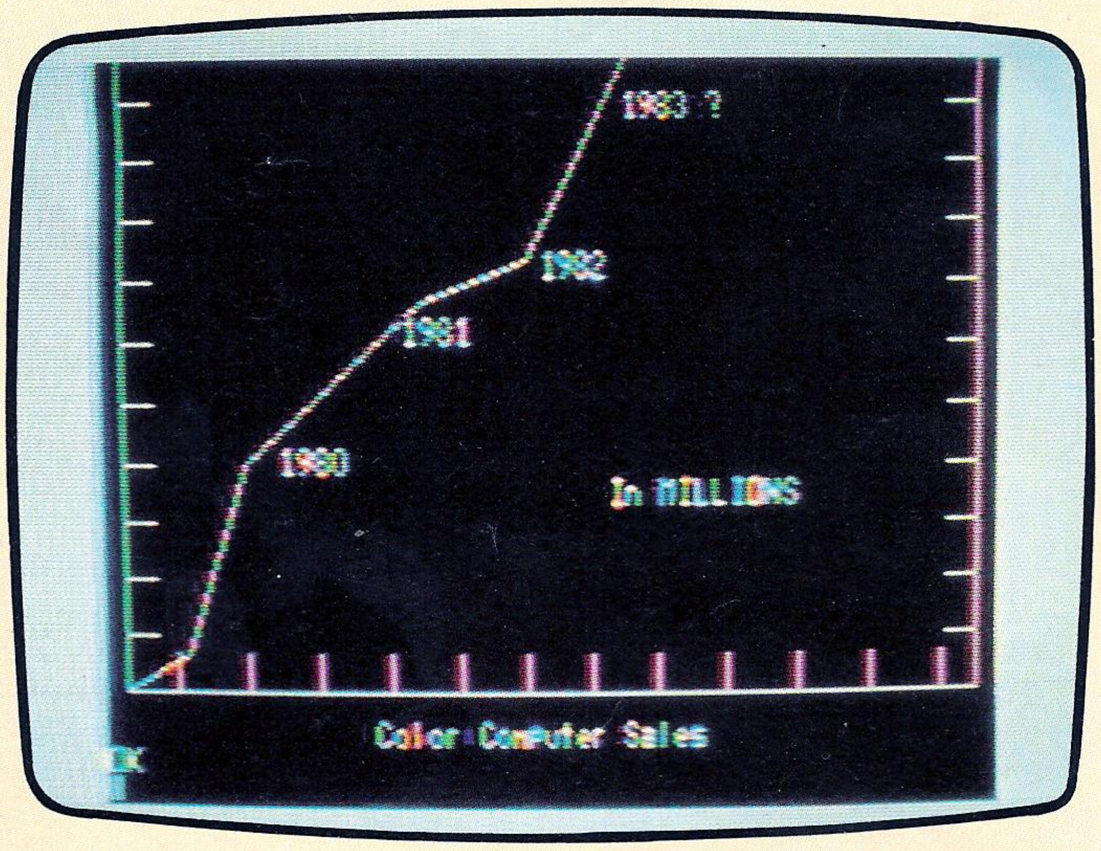
Your Personal check is welcome - no delay. Include $1.50 shipping for each program ordered. (Shipping free on $50.00 or larger orders). Az. residents add 6% sales tax. Orders shipped within two days.

At Your Local Dealer, or

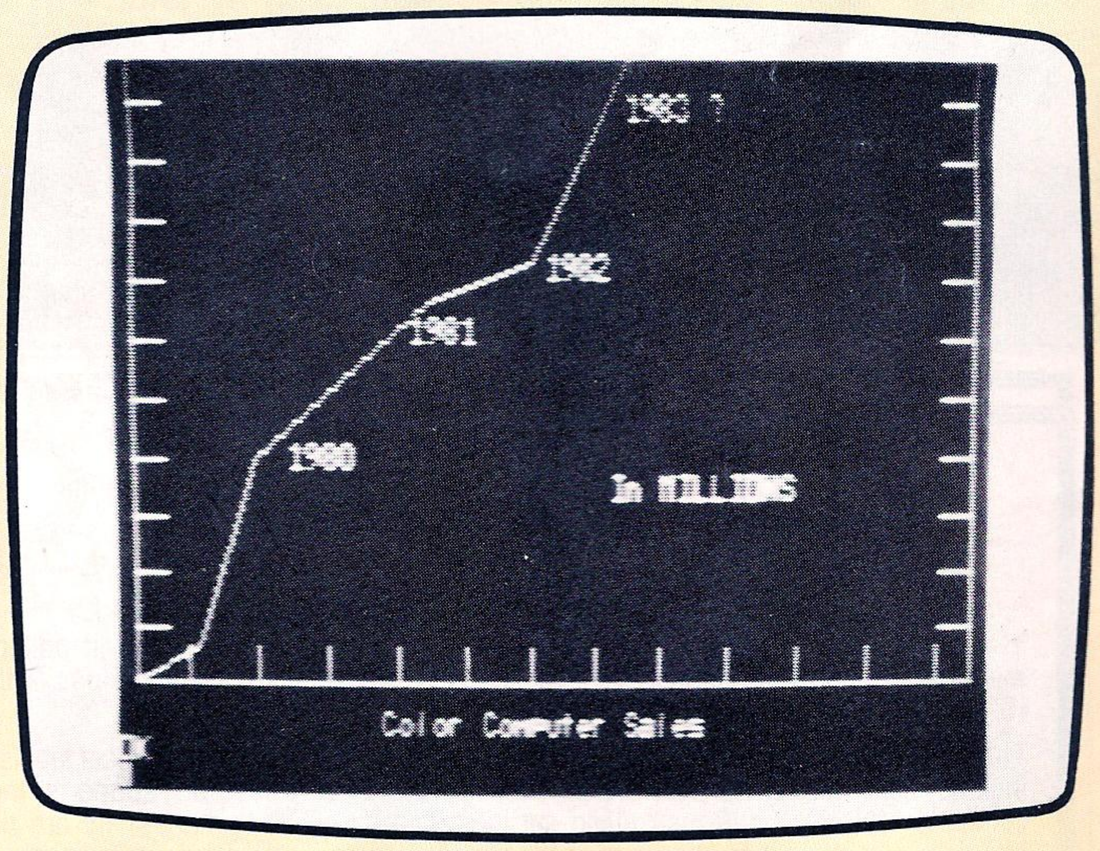
Send Order To: **PRICKLY-PEAR SOFTWARE**
9822 E. Stella Road, Dept. C
Tucson, Arizona 85730
(602) 886-1505

Circle No. 14 on Reader Service Card

Reformat Your Video



by Steve Odneal



Some people find the Color Computer's 32-character screen width to be limiting. Now you can convert your video to 51 characters with true graphic lowercase characters.

PERHAPS THE COLOR Computer's most limiting feature is its 32 by 16 video display. Some of you have probably used Extended Color Basic's DRAW command to add text characters to your graphic displays. This method of creating text characters is slow and consumes a lot of memory.

In this article I will explain how you can display text on your video screen with a 51 by 24 format, combine text and graphics using normal PRINT and DRAW commands and keep the 51 by 24 display active all the time. This will let you LIST your programs with 51 characters across the screen, and 24 lines deep. PRINT commands allow you to show up to 51 characters on a line without wrap-around. In addition, several special control functions are provided to move the cursor to any location on the screen, create reversed video displays of the entire screen or selected text characters, and do some interesting things with the display.

Character resolution on the color screen is barely readable. By fine tuning the video to black and white, the screen is easier to read. The readability of the 51-character screen largely depends on the quality of your television.

Theory

The Color Computer uses several graphics modes. The one we're most interested in is the G6R mode. This gives the highest resolution with an addressable display of 256 *pixels* (picture elements) horizontally, and 192 pixels vertically. This graphics mode is usually entered by the PMODE 4,1 Extended Basic command. Program Listing 1 shows how the screen is addressed while using this mode. You use this to determine how to specify positions for a LINE or CIRCLE command.

DRAW, CIRCLE and other commands cause the Extended Basic interpreter to calculate which pixels are turned on or off to create the required display. The DRAW command of Extended Basic can be used in this highest-resolution mode to create text characters (i.e. A–Z) on the display. However, it is difficult to calculate where to place each character on the

Please turn the page

Continued from page 15

screen. Even if you could perform the necessary screen placement calculations, most of the time it wouldn't be worth the effort. My machine-language program intercepts the PRINT commands, and draws the required characters on the screen in the proper locations.

The characters created are true upper and lowercase, plus the usual ASCII graphic symbols. This conforms to the standard 96 characters as defined for ASCII. Each character is composed of a matrix four pixels wide and seven pixels high. Characters have one blank pixel between each other, horizontally and vertically. This is close to the standard five by seven display used on many mainframe computer terminals, and is quite readable. I experimented with television models likely to be used with Color Computers and found the display readable.

Two values in the assembly-language program let you change the number of characters per line to 32, 42, 51, and even 64 if you want. The 64 by 24 display is difficult to read since each character is so close to the next one. You can redefine the character fonts to produce the 64 by 24 display. Each character is defined in a table at the end of the program. You can change the fonts to create your own character sets for foreign languages, math symbols, and so on. The definition of each character is created by setting bits in an array of seven bytes of data. An example of the letter A is:

```
01100000
01100000
10010000
11110000
10010000
10010000
```

In the 51 by 24 display mode, only the left five bits of each of the seven bytes are used. As the program scans each byte of the font for the required character, the bits tell the program whether to turn on or off a graphics bit on the screen. The last three bits of each byte are not used, and the fifth bit serves as a blank pixel between each character.

Program Descriptions

RSVIDEO/BAS, a short Extended Basic program, sets the Color Computer into the correct PMODE. It then determines the amount of the computer's memory (either 16 or 32K), and loads the position-independent machine-language program into the upper part of memory. The machine then executes RSVIDEO/BIN, and the Basic program draws and labels a Sales Growth chart of Color Computer sales.

The initialization section of the RSVIDEO/BIN modifies some lower-RAM pointers and addresses used by Extended Basic to route all PRINT requests from Basic through the new display routines. In addition, the IRQ interrupt vector changes to produce a blinking cursor. Once the initialization process is complete, control returns to the Basic program.

When the Basic program finishes, the machine-language program controls all text output to the video screen. A LIST command will display the RSVIDEO/BAS program on the screen. However, you'll now have nearly 2-1/2 times the amount of data shown at once on the screen! (Checks are made in the program for disk and tape I/O where necessary.) Commands like DRAW are not affected by the new display routines. The colors used while in the full graphics mode must be taken into consideration. I'll discuss that later.

The remainder of the RSVIDEO/BIN program handles the display of the text characters, controls the position of the characters on the screen, provides a BELL sound through the speaker of the television, and supports the other special functions.

Normal PRINT statements will still display data on the screen much like you did with the old 32 by 16 display. This includes scrolling of the display when printing at the bottom of the screen.

The table below lists the control codes for RSVIDEO/BIN.

01 — Reverse. Causes the screen to reverse from black characters on a light background to light characters on a black background.

06 — EOL. Erases the remainder of the current line.

07 — BELL. Sounds a Bell through the TV speaker.

08 — BSP. Backspace one character.

10 — LF. Perform a linefeed.

11 — XY. Initiate X, Y cursor addressing mode.

12 — Clear. Clears the entire screen without changing the cursor position.

13 — CR. Carriage return.

16 — Home. Position the cursor to the upper-left corner of the screen.

22 — EOS. Erase the remainder of the screen, beginning at the current cursor position.

Each of these control codes is used in a PRINT CHR$(n) statement where n is the decimal value of the code wanted. For example, to home the cursor use a PRINT CHR$ (16) statement.

The Control Codes

REVERSE switches the colors used to display text and graphics. RSVIDEO/BIN initializes to give black characters on a buff background. This gives the best display for normal text characters, you may prefer light characters on a black background. Also, the background color determines which color set must be used with LINE, CIRCLE and other Extended Basic commands. More on this later.

EOL erases the remainder of a line starting at the current cursor position. If you're doing normal PRINT statements, the lines will clear when the screen scrolls. If you're moving the cursor around the screen, or creating custom display maps, EOL erases any old data from a line of the display without scrolling all the old data off the screen.

The BELL code outputs through the speaker of the television. The length of the note, and the duration can be changed by modifying the values in the BEEP routine of RSVIDEO/BIN.

BSP moves the cursor back one position. If the cursor is at the first position on a line, it will move to the end of the previous line. If the cursor is at the upper-left corner of the screen it will not be moved. This is the same as with the 32 by 16 display.

The Clear control code clears the screen without moving the cursor from its current location.

Home moves the cursor to the upper-left corner of the display. The screen does not clear.

EOS clears the screen following the current cursor location. The cursor does not move.

XY is RSVIDEO/BIN's most powerful and complicated control. It interprets the next two control codes as values used to move the cursor on the screen. Program Listing 2 shows the format of the screen in 51 by 24 display mode. Refer to it to understand what values to use to move the cursor to the required locations.

The first value following the XY control code is the horizontal position you want to move the cursor to. This must be a value from zero to 50 to specify one of the 51 horizontal positions on a line. Any value greater than the width of the display line minus one moves the cursor to the far-right position.

The next value determines which line the cursor moves to . This must be a value from zero to 23, to specify one of the 24 lines on the display. Any value greater

Please turn the page

Continued from page 17

than the number of lines on the display minus 1 moves the cursor to the bottom line. So to display the words Color Computer on the next-to-last line of the display, beginning in the 10th column, use the command:

```
PRINT CHR$(11); CHR$(9);
CHR$(22); "Color Computer"
```

If you move the cursor to a specific location on the display and then use the PRINT commands without cursor movement, the text will display with normal scrolling from the location you specified.

The RSVIDEO/BAS program uses some of these control codes to annotate the Color Computer Sales chart (see Photo). As you can see from Program Listing 1, normal LINE commands draw the chart. Then, PRINT commands move the cursor to various locations on the display to add the text characters. This method produces nice graphic pictorials with a minimum of effort and very quickly! The capability to create such a display is not limited to an individual program. This feature is always present providing your program is written to take advantage of it.

One control code I didn't list is the one that lets you display selected text characters in reverse video, much like the 32 by 16 lowercase format. If a text character has 128 added to it, that character displays in reverse video from the rest of the screen color-set. To display the letter A in reverse video, use a command like: PRINT CHR$(ASC("A")+128). Program Listing 3 shows you how to display a string of text characters in reverse video.

Color-Set

In Extended Basic, DRAW, CIRCLE, and other commands need a black background to function normally. Since the RSVIDEO/BIN program begins with a light colored background, you must specify that the color used in the CIRCLE command for example, should be color number two. This draws the circle in black. For the LINE command, use the PRESET option to draw black lines on the light background.

You can use the Reverse control code to change the color-set of the screen and use CIRCLE's own default color. After the graphics display has been drawn, you can again reverse the color-set of the

Text continued on p. 27

Program Listing 1

```
                ************************************************
                * TO CHANGE THE NUMBER OF CHARACTERS DISPLAYED *
                * ON A VIDEO LINE, SIMPLY CHANGE THE 'LENGTH'  *
                * EQUATE ON THE NEXT LINE. I.E. 32,42,51 OR 64 *
                ************************************************
                LENGTH  EQU     51          LENGTH OF A LINE

                ************************************************
                * TO CHANGE THE NUMBER OF LINES DISPLAYED      *
                * ON THE DISPLAY, SIMPLY CHANGE THE 'LINES     *
                * EQUATE ON THE NEXT LINE. I.E. 12,16 OR 20    *
                ************************************************
0018  LINES   EQU     24          NUMBER OF LINES ON SCREEN

0005  WIDTH   EQU     256/LENGTH NUMBER OF BITS FOR EACH CHARACTER

                *********************************
                * VIDEO CONTROL CODES FOLLOW...*
                *********************************

000A  LINFED  EQU     $0A         LINE-FEED
0008  BACKSP  EQU     $08         BACK SPACE CONTROL CHARACTER
000D  CRETURN EQU     $0D         CARRAGE RETURN CONTROL CHARACTER
000B  XYTRIG  EQU     $0B         X-Y MODE TRIGGER CONTROL-CODE
0010  HOME    EQU     $10         HOME THE CURSOR
000C  CLEAR   EQU     $0C         CLEAR SCREEN, NO CURSOR UPDATE
0006  ERASEL  EQU     $06         ERASE TO END-OF-LINE
0016  ERASES  EQU     $16         ERASE TO END-OF-SCREEN
0007  BELL    EQU     $07         'BELL' CONTROL CHARACTER
0001  REVVID  EQU     $01         REVERSE VIDEO CONTROL-CODE
                ******************************************************
                * INITIALIZATION ROUTINE.  THIS SHOULD BE ENTERED *
                * FROM BASIC WITH A 'USR' FUNCTION CALL.          *
                ******************************************************

7800                    ORG     $7800

        7800    INIT    EQU     *
7800 1A   10            SEI             DISABLE INTERRUPTS
7802 34   77            PSHS    A,B,X,Y,U,CC
                * SETUP SCREEN ADDRESSES
7804 9E   BA            LDX     $BA         BASIC START OF GRAPHIC PAGE
7806 AF   8D 00C1       STX     BEGPAG,PCR
780A 30   89 1800       LEAX    6144,X      END OF PAGE
780E AF   8D 00BB       STX     ENDPAG,PCR
7812 30   89 FF00       LEAX    -256,X      SCROLL LINE
7816 AF   8D 00B5       STX     BOTPAG,PCR
781A 8D   4F            BSR     SCNCLR      CLEAR THE SCREEN
                * OUTPUT CHARACTER HOOKS
781C B6   0167          LDA     $167        SAVE OLD JUMP DATA
781F A7   8D 0147       STA     RETZ,PCR
7823 FC   0168          LDD     $168
7826 ED   8D 0141       STD     RETZ+1,PCR
782A 86   7E            LDA     #$7E        JUMP CODE
782C B7   0167          STA     $0167       OUTPUT CHAR HOOK
782F 30   8D 00B6       LEAX    DISPLY,PCR NEW OUTPUT ROUTINE
7833 BF   0168          STX     $0168
                * 'LIST' HOOK
7836 B6   017F          LDA     $017F
7839 A7   8D 024D       STA     CRTRNZ,PCR
783D FC   0180          LDD     $0180
7840 ED   8D 0247       STD     CRTRNZ+1,PCR
7844 86   7E            LDA     #$7E
7846 B7   017F          STA     $017F
7849 30   8D 022F       LEAX    CRTRN2,PCR
784D BF   0180          STX     $0180
                * CURSOR TIMING HOOK
7850 BE   010D          LDX     $10D        IRQ JMP ADDRESS
7853 AF   8D 0346       STX     BLINKZ+1,PCR
7857 31   8D 033F       LEAY    BLINK,PCR CURSOR BLINK ROUTINE
785B 10BF 010D          STY     $10D
785F 8D   2E            BSR     SETPIA      SETUP FOR 'BELL' SOUND
7861 1C   EF            CLI
                * INSURE CANNOT BE INITIALIZED AGAIN
7863 86   39            LDA     #$39        AN RTS
7865 A7   8C 98         STA     INIT,PCR
7868 35   77            PULS    A,B,X,Y,U,CC
786A 39                 RTS

        786B    SCNCLR  EQU     *
786B AE   8D 005C       LDX     BEGPAG,PCR POINT TO BEGINNING OF THE SCREEN
786F CC   FFFF  SCNCL1  LDD     #$FFFF
7872 6D   8D 0071       TST     REVRSE,PCR CHECK REVERSED SCREEN
7876 27   02            BEQ     LOOP1       NO
7878 43                 COMA
7879 53                 COMB
787A ED   81    LOOP1   STD     0,X++
787C AC   8D 004D       CMPX    ENDPAG,PCR
7880 25   F8            BLO     LOOP1
                * RESET CURSOR TO TOP OF SCREEN
7882 EC   8D 0045 HOMECR  LDD     BEGPAG,PCR BEGINNING OF VIDEO PAGE
7886 ED   8D 0047       STD     CURSOR,PCR
788A 6F   8D 0045       CLR     COL,PCR     RESET COLUMN COUNTER
788E 39                 RTS
                * INITIALIZE PIA FOR SINGLE-BIT SOUND OUTPUT
        788F    SETPIA  EQU     *
788F 8E   FF22          LDX     #$FF22      SOUND PIA
7892 A6   01            LDA     1,X         GET THE CONTROL REGISTER
7894 84   FB            ANDA    #$FB        MASK OFF BIT 2
7896 A7   01            STA     1,X         ENABLE DATA DIRECTION REGISTER
7898 E6   84            LDB     0,X         GET DATA DIRECTION STATUS
789A CA   FA            ORB     #$FA        SET BIT 1,3,4,5,6,7 ON
789C E7   84            STB     0,X         BIT 1 IS NOW AN OUTPUT
789E 8A   04            ORA     #4          BIT 2 HIGH
78A0 A7   01            STA     1,X         ENABLE PERIPHERAL REGISTER
78A2 39                 RTS

                * SET G6R MODE
        78A3    SETSAM  EQU     *
78A3 34   16            PSHS    A,B,X
                *-PUT THE VDG INTO G6R MODE
78A5 86   F8            LDA     #$F8
78A7 B7   FF22          STA     $FF22

                *-TELL SAM TOO!
78AA B7   FFC0          STA     $FFC0
78AD B7   FFC3          STA     $FFC3
78B0 B7   FFC5          STA     $FFC5

                *-SET THE SAM FOR GRAPHICS ADDRESS
78B3 DC   BA            LDD     $BA         GRAPHIC PAGE START ADDRESS
78B5 8E   FFC6          LDX     #$FFC6      SAM REGISTERS ADDRESS
78B8 44                 LSRA                GET 512 BYTE FACTOR
78B9 C6   07            LDB     #7          LOOP COUNT
        78BB    SETS01  EQU     *
78BB 44                 LSRA                GET BIT
78BC 24   06            BCC     SETS02
78BE 30   01            LEAX    1,X
78C0 A7   80            STA     0,X+
78C2 20   02            BRA     SETS03
        78C4    SETS02  EQU     *
78C4 A7   81            STA     0,X++
        78C6    SETS03  EQU     *
78C6 5A                 DECB
78C7 26   F2            BNE     SETS01
78C9 35   96            PULS    A,B,X,PC

                * WORK AREAS

78CB 0000       BEGPAG  FDB     0           START OF GRAPHICS PAGES
78CD 0000       ENDPAG  FDB     0           END OF SCREEN
78CF 0000       BOTPAG  FDB     0           LAST LINE FOR SCROLLING
78D1 0000       CURSOR  FDB     0           CURRENT CURSOR ADDRESS
78D3 00         COL     FCB     0           CURRENT COLUMN COUNTER
78D4 00         COLSAV  FCB     0           SAVED X-AXIS
78D5 00         CURSW   FCB     0           CURSOR SWITCH
78D6 00         LOOPCT  FCB     0           DISPLAY LOOP COUNTER
78D7 0000       SAVEX   FDB     0           SAVE AREA FOR X-REGISTER
78D9 00         SAVEA   FCB     0           SAVE AREA FOR A AND B REGISTERS
78DA 00         XYSW    FCB     0           SET WHEN X-Y AXIS MODE
78DB 00         XADDR   FCB     0           X POSITION ON LINE WHEN X-Y MODE
78DC 00         BYTE    FCB     0           BYTE OFFSET FROM BEGINNING OF LINE
78DD 00         BIT     FCB     0           BIT OFFSET INTO A 'BYTE'
78DE            BITA    RMB     1
78DF            BITB    RMB     1
78E0            HOLDA   RMB     1
78E1            HOLDB   RMB     1
78E2 00         INVRSE  FCB     0
78E3            BITCT   RMB     1
78E4            COUNT   RMB     1
78E5 01         CCOUNT  FCB     1

                * THE FOLLOWING VALUES CAN BE CHANGED BY THE
                * USER FOR ALTERNATE DEFAULT PROCESSING BY
                * THIS VIDEO ROUTINE.

78E6 00         DESCUR  FCB     $0          $0=DESTRUCTIVE CURSOR, $'X'=NOT
```

Listing continued on page 20

Telewriter-64™
the Color Computer Word Processor

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

THE ORIGINAL

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

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

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

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

...one of the best programs for the Color Computer I have seen...
— Color Computer News, Jan. 1982

TELEWRITER-64

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

64K COMPATIBLE

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

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, 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 Ave.
Del Mar, CA 92014

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.)

Circle No. 2 on Reader Service Card

Listing continued from page 18

```
78E7 00            REVRSE  FCB     $0          0=NORMAL, 'X'= REVERSED VIDEO
78E8 00            CURTYP  FCB     0           CURSORTYPE, 0=UNDERLINE, 'X'=BLOCK


                   ************************************************
                   *                                              *
                   * ENTRY POINT FOR CHARACTER DISPLAY,           *
                   * AND CONTROL-CODE PROCESSING                  *
                   *    REGISTER 'A' HAS THE VALUE TO DISPLAY,    *
                   *  OR THE CONTROL-CODE TO PROCESS.             *
                   *                                              *
                   ************************************************

          78E9     DISPLY  EQU     *
78E9 0D   6F               TST     $6F         CHECK FOR VIDEO OUTPUT
78EB 26   7D               BNE     RETZ        ..NO
                   * CHECK FOR SPECIAL BASIC FIXES NEEDED
78ED 8C   01DB             CMPX    #$01DB      FOR 'SKIP', ETC
78F0 27   07               BEQ     DISP0       ..YES, DO CARRIAGE-RETURN
78F2 8D   AF               BSR     SETSAM      INSURE SAM IS SET RIGHT
78F4 8C   ABEF             CMPX    #$ABEF      'OK' PROMPT ?
78F7 26   07               BNE     DISP00      ..NO
          78F9     DISP0   EQU     *
78F9 34   02               PSHS    A           SAVE ORIGINAL CHARACTER TO DISPLAY
78FB 17   0178             LBSR    CRTRN1      DO CARRIAGE-RETURN
78FE 35   02               PULS    A           GET ORIGINAL CHARACTER
          7900     DISP00  EQU     *
7900 32   62               LEAS    2,S         REMOVE UNWANTED RTS ADDRESS
7902 1A   10               SEI                 INTERRUPTS (CURSOR) OFF
7904 17   010B             LBSR    CURSR2      INSURE CURSOR IS OFF
7907 34   76               PSHS    A,B,X,Y,U   SAVE EVERYTHING
7909 6D   8C CE            TST     XYSW,PCR    ARE WE IN X-Y MODE ?
790C 1026 00B1             LBNE    XYDECD      ..YES, GO DECODE THEM
7910 1F   89               TFR     A,B         SAVE VALUE
7912 C4   7F               ANDB    #$7F        STRIP SIGN OFF
7914 C1   20               CMPB    #$20        CONTROL CODE ?
7916 25   05               BLO     DISP1       ..YES
7918 17   01BD             LBSR    DISPCH      GO DISPLAY THE CHARACTER
791B 20   38               BRA     RET1
          791D     DISP1   EQU     *
791D C1   0D               CMPB    #CRETURN    CARRAGE RETURN REQUEST?
791F 1027 014D             LBEQ    CRTRN       ..YES, GO TO RESET COLUMN COUNT
7923 C1   0A               CMPB    #LINFED     LINE-FEED ?
7925 1027 00F3             LBEQ    SCROLL      ..YES, SCROLL THE SCREEN
7929 C1   08               CMPB    #BACKSP     BACK SPACE REQUEST?
792B 1027 015E             LBEQ    BACKUP      YES, GO BACKUP ROUTINE
792F C1   0B               CMPB    #XYTRIG     X-Y MODE TRIGGER ?
7931 1027 0086             LBEQ    XYMODE      ..YES
7935 C1   10               CMPB    #HOME       HOME CURSOR ?
7937 27   34               BEQ     HOMEUP      ..YES
7939 C1   06               CMPB    #ERASEL     ERASE TO END-OF-LINE ?
793B 27   35               BEQ     EEOL        ..YES
793D C1   16               CMPB    #ERASES     ERASE TO END-OF-SCREEN ?
793F 27   53               BEQ     EEOS        ..YES
7941 C1   01               CMPB    #REVVID     REVERSE SCREEN ?
7943 1027 00B4             LBEQ    RVRS        ..YES
7947 C1   07               CMPB    #BELL       'BELL' CONTROL CHARACTER ?
7949 1027 02F2             LBEQ    BEEP        ..YES
794D C1   0C               CMPB    #CLEAR      CLEAR SCREEN ?
794F 1027 0160             LBEQ    CLRSCN      ..YES
7953 20   0E               BRA     RET2        ..OTHER CONTROL-CODE, IGNORE IT
          7955     RET1    EQU     *
7955 6C   8D FF7A          INC     COL,PCR     UPDATE THE COLUMN NUMBER
7959 A6   8D FF76          LDA     COL,PCR     GET CURRENT COLUMN
795D 81   33               CMPA    #LENGTH     PAST END OF LINE ?
795F 1027 00B9             LBEQ    SCROLL      ..YES, MUST SCROLL
          7963     RET2    EQU     *
7963 17   0167             LBSR    DESTRY      CHECK/DO DESTRUCTIVE CURSOR
7966 1C   EF               CLI                 INTERRUPTS BACK ON
7968 35   F6               PULS    A,B,X,Y,U,PC
796A 7E   FFFF     RETZ    JMP     $FFFF       CHANGED BY INITIALIZATION
                   *
                   * HOME THE CURSOR, NO SCREEN CLEAR.
                   *
796D 17   FF12     HOMEUP  LBSR    HOMECR      RESET CURSOR ADDRESS
7970 20   F1               BRA     RET2        AND RETURN
                   *
                   * ERASE TO END-OF-LINE.
                   *
7972 8D   02       EEOL    BSR     EEOLO       DO IT
7974 20   ED               BRA     RET2        AND RETURN
          7976     EEOLO   EQU     *
7976 A6   8D FF59          LDA     COL,PCR
797A 34   02               PSHS    A
797C 86   20       EEOL1   LDA     #$20        A SPACE
797E 17   0157             LBSR    DISPCH      SHOW IT
7981 6C   8D FF4E          INC     COL,PCR     UPDATE COLUMN COUNTER
7985 A6   8D FF4A          LDA     COL,PCR
7989 81   33               CMPA    #LENGTH     LOOKING FOR LAST CHAR ON LINE
798B 26   EF               BNE     EEOL1       ..NOT AT END YET
798D 35   02               PULS    A
798F A7   8D FF40          STA     COL,PCR
7993 39                    RTS
                   *
                   * ERASE TO END-OF-SCREEN
                   *
7994 8D   E0       EEOS    BSR     EEOLO       CLEAR THE CURRENT LINE
7996 AE   8D FF37          LDX     CURSOR,PCR  GET CURRENT LOCATION
799A AC   8D FF31          CMPX    BOTPAG,PCR  ON LAST LINE ?
799E 2C   C3               BGE     RET2        ..YES, ALL DONE
79A0 30   89 0100          LEAX    256,X       POINT TO NEXT LINE
79A4 CC   FFFF             LDD     #$FFFF      TO CLEAR THE SCREEN
79A7 6D   8D FF3C          TST     REVRSE,PCR  REVERSED SCREEN ?

79AB 2A   02               BPL     EEOS1       ..NO
79AD 43                    COMA
79AE 53                    COMB
79AF ED   81       EEOS1   STD     0,X++
79B1 ED   81               STD     0,X++
79B3 AC   8D FF16          CMPX    ENDPAG,PCR  DONE ?
79B7 2F   F6               BLE     EEOS1       ..NO
79B9 20   A8               BRA     RET2        DONE
                   *
                   * X-Y CURSOR MOVE MODE
                   *
          79BB     XYMODE  EQU     *
79BB 6C   8D FF1B          INC     XYSW,PCR    SET X-Y MODE OF OPERATION
79BF 20   A2               BRA     RET2        XYSW=1, EXPECTING X-ADDRESS NEXT
          79C1     XYDECD  EQU     *
79C1 8D   4F               BSR     CURSR2      INSURE CURSOR OFF (CSC)
79C3 E6   8D FF13          LDB     XYSW,PCR    WHAT ARE WE LOOKING FOR (X OR Y) ?
79C7 C1   02               CMPB    #2          LOOKING FOR 'X'
79C9 27   10               BEQ     XYYPOS      ..NO, 'Y'
79CB 81   32       XYXPOS  CMPA    #LENGTH-1   VALID X ADDRESS ?
79CD 2F   02               BLE     XYXOK       ..YES
79CF 86   32               LDA     #LENGTH-1   ..NO, DEFALUT
79D1 A7   8D FEFF  XYXOK   STA     COLSAV,PCR  SAVE IT
79D5 6C   8D FF01          INC     XYSW,PCR    NOW LOOKING FOR Y-ADDRESS
79D9 20   88               BRA     RET2        AND RETURN
          7A69     SCL2    EQU     *

7A69 6F   8D FE66          CLR     COL,PCR     RESET COLUMN COUNTER
7A6D 16   FEF3             LBRA    RET2
          7A70     CRTRN   EQU     *
7A70 6F   8D FE5F          CLR     COL,PCR     RESET TO BEGINNING OF LINE
7A74 20   A6               BRA     SCROLL      DO LINE-FEED
          7A76     CRTRN1  EQU     *
7A76 1A   10               SEI
7A78 34   76               PSHS    A,B,X,Y,U
7A7A 20   F4               BRA     CRTRN
          7A7C     CRTRN2  EQU     *
7A7C 0D   6F               TST     $6F         CHECK FOR VIDEO OUTPUT
7A7E 26   0A               BNE     CRTRNZ      ..NO
7A80 6D   8D FE4F          TST     COL,PCR
7A84 27   04               BEQ     CRTRNZ
7A86 8D   8A               BSR     CURSR2      INSURE CURSOR IS OFF
7A88 8D   EC               BSR     CRTRN1      DO CARRIAGE-RETURN
7A8A 7E   FFFF     CRTRNZ  JMP     $FFFF       (CHANGED BY INITIALIZATION)
                   *
                   * BACK SPACE ROUTINE
                   *
          7A8D     BACKUP  EQU     *
7A8D A6   8D FE42          LDA     COL,PCR     GET CURRENT COLUMN NUMBER
7A91 27   03               BEQ     BACKU1      IF AT BEGINNING OF A LINE
                   * ELSE, MUST BACKUP ONE VIDEO BLOCK
7A93 4A                    DECA                BACKUP ONE COLUMN
7A94 20   16               BRA     SCLX
          7A96     BACKU1  EQU     *
                   * BACKUP ONE LINE
7A96 AE   8D FE37          LDX     CURSOR,PCR
7A9A AC   8D FE2D          CMPX    BEGPAG,PCR AT THE TOP OF SCREEN ?
7A9E 1027 FEC1             LBEQ    RET2        ..YES, DO NOTHING !
7AA2 30   89 FF00          LEAX    -256,X      BACKUP TO PREVIOUS LINE
7AA6 AF   8D FE27          STX     CURSOR,PCR
7AAA 86   32               LDA     #LENGTH-1 POINT TO END OF PREVIOUS LINE
          7AAC     SCLX    EQU     *
7AAC A7   8D FE23          STA     COL,PCR     SET CURRENT COLUMN
7AB0 16   FEB0             LBRA    RET2        AND RETURN
                   *
                   * CLEAR THE SCREEN, WITH NO CURSOR CHANGES
                   *
          7AB3     CLRSCN  EQU     *
7AB3 AE   8D FE14          LDX     BEGPAG,PCR TOP OF SCREEN
7AB7 CC   FFFF             LDD     #$FFFF
7ABA 6D   8D FE29          TST     REVRSE,PCR CHECK SCREEN 'SENSE'
7ABE 27   02               BEQ     CLRSC1
7AC0 43                    COMA
7AC1 53                    COMB
          7AC2     CLRSC1  EQU     *
7AC2 ED   81               STD     0,X++
7AC4 AC   8D FE05          CMPX    ENDPAG,PCR AT END YET ?
7AC8 25   F8               BLO     CLRSC1      ..NO
7ACA 16   FE96             LBRA    RET2
                   *
                   * CHECK AND DO DESTRUCTIVE CURSOR, IF REQUIRED
                   *
          7ACD     DESTRY  EQU     *
7ACD 6D   8D FE15          TST     DESCUR,PCR DESTRUCTIVE CURSOR ?
7AD1 26   04               BNE     DESTR1      ..NO
7AD3 86   20               LDA     #$20
7AD5 8D   01               BSR     DISPCH      DESTROY CHAR. UNDER CURSOR
7AD7 39                    RTS
                   *
                   * DISPLAY CHARACTER ROUTINE
                   *
          7AD8     DISPCH  EQU     *
79DB 81   17               CMPA    #LINES-1    VALID Y-ADDRESS
79DD 2F   02               BLE     XYYOK       ..YES
79DF 86   17               LDA     #LINES-1    ..NO, DEFALUT
          79E1     XYYOK   EQU     *
79E1 5F                    CLRB                TIMES 256 EFFECTIVELY
79E2 AE   8D FEE5          LDX     BEGPAG,PCR
79E6 30   8B               LEAX    D,X
79E8 AF   8D FEE5          STX     CURSOR,PCR
79EC A6   8D FEE4          LDA     COLSAV,PCR GET X AXIS VALUE
79F0 A7   8D FEDF          STA     COL,PCR     SET NEW X-AXIS
79F4 6F   8D FEE2          CLR     XYSW,PCR
79F8 16   FF68             LBRA    RET2
                   *
                   * REVERSE THE SCREEN FROM B TO W OR VICE-VERSA
                   *
          79FB     RVRS    EQU     *
79FB 63   8D FEE8          COM     REVRSE,PCR FLIP MODE
79FF AE   8D FEC8          LDX     BEGPAG,PCR TOP OF SCREEN
7A03 EC   84       RVRS1   LDD     0,X         2 VIDEO BYTES
7A05 43                    COMA                FLIP IT
7A06 53                    COMB                FILP IT
7A07 ED   81               STD     0,X++
7A09 AC   8D FEC0          CMPX    ENDPAG,PCR DONE ?
7A0D 2F   F4               BLE     RVRS1       ..NO
7A0F 16   FF51             LBRA    RET2        EXIT
                   *
                   * TURN ANY OLD CURSOR OFF
                   *
          7A12     CURSR2  EQU     *
7A12 6D   8D FEBF          TST     CURSW,PCR NEED TO FLIP TO NORMAL ?
7A16 27   03               BEQ     CURSRX      ..NO
7A18 17   0198             LBSR    CBLNK       ..YES, FLIP TO NORMAL
7A1B 39                    RTS
                   *
                   * LINE-FEED ROUTINE
                   *
          7A1C     SCROLL  EQU     *
7A1C 8D   F4               BSR     CURSR2      INSURE CURSOR IS OFF
7A1E AE   8D FEAF          LDX     CURSOR,PCR GET CURSOR ADDRESS
7A22 AC   8D FEA9          CMPX    BOTPAG,PCR AT THE BOTTOM ?
7A26 2D   39               BLT     SCL1        ..NO
7A28 10AE 8D FE9E          LDY     BEGPAG,PCR POINT TO START OF SCREEN
7A2D 30   A9 0100          LEAX    256,Y       POINT TO NEXT LINE
7A31 EC   81       LOOP5   LDD     0,X++       GET 2 CHARACTERS
7A33 ED   A1               STD     0,Y++       STORE 2 CHARACTERS
7A35 EC   81               LDD     0,X++       GET 2 CHARACTERS
7A37 ED   A1               STD     0,Y++       STORE 2 CHARACTERS
7A39 AC   8D FE90          CMPX    ENDPAG,PCR LAST LINE ?
7A3D 2D   F2               BLT     LOOP5       NO, DO NEXT ONE
7A3F AE   8D FE8C          LDX     BOTPAG,PCR START OF LAST LINE
7A43 AF   8D FE8A          STX     CURSOR,PCR RESET CURSOR ADDRESS
7A47 CC   FFFF             LDD     #$FFFF
7A4A 6D   8D FE99          TST     REVRSE,PCR REVERSED SCREEN ?
7A4E 2A   02               BPL     LOOP6       ..NO
7A50 43                    COMA
7A51 53                    COMB
7A52 ED   81       LOOP6   STD     0,X++       CLEAR LAST LINE
7A54 AC   8D FE75          CMPX    ENDPAG,PCR END OF SCREEN?
7A58 2D   F8               BLT     LOOP6       NO, DO NEXT CHARACTER
7A5A 6F   8D FE75          CLR     COL,PCR     RESET COLUMN COUNTER
7A5E 16   FF02             LBRA    RET2        RETURN
          7A61     SCL1    EQU     *
7A61 30   89 0100          LEAX    256,X
7A65 AF   8D FE6B          STX     CURSOR,PCR UPDATE CURSOR ADDRESS
```

Listing continued on page 22

Listing continued from page 20

```
7AD8 A7   8D FE06          STA    INVRSE,PCR SET VIDEO INVERT ON CHAR.
7ADC 84   7F               ANDA   #$7F       STRIP PARITY BIT
7ADE 80   20               SUBA   #$20       ADJUST VALUE
7AE0 C6   07               LDB    #7         TABLE SIZE
7AE2 3D                    MUL
7AE3 31   8D 0189          LEAY   TABLE,PCR GET ADDRESS OF CHARACTER TABLE
7AE7 31   AB               LEAY   D,Y        INDEX TO CHARACTER FORMAT
7AE9 17   0080             LBSR   CCTOBB     CALCULATE 'BYTE' AND 'BIT'
                  * FIX MASKS
7AEC 30   8D 0170          LEAX   BITTAB,PCR ADDRESS OF BIT-MASK TABLE
7AF0 E6   8D FDE9          LDB    BIT,PCR    GET 'BIT' VALUE
7AF4 A6   85               LDA    B,X        GET BIT MASK 1
7AF6 A7   8D FDE4          STA    BITA,PCR   AND SAVE IT
7AFA 30   08               LEAX   8,X        BUMP TO BIT '2' ENTRY
7AFC A6   85               LDA    B,X        GET BIT MASK 2
7AFE A7   8D FDDD          STA    BITB,PCR   SAVE IT
               * CALCULATE VIDEO LOCATION
7B02 AE   8D FDCB          LDX    CURSOR,PCR CURRENT VIDEO LINE ADDRESS
7B06 E6   8D FDD2          LDB    BYTE,PCR   BYTE OFFSET
7B0A 30   85               LEAX   B,X        CALCULATE ACTUAL VIDEO ADDRESS
               * SHIFT TABLE BYTE
7B0C 86   07               LDA    #7         LOOP COUNT
7B0E A7   8D FDD2          STA    COUNT,PCR
          7B12  DISPC1     EQU    *
7B12 A6   8D FDC7          LDA    BIT,PCR    GET 'BIT' IN 'BYTE' VALUE
7B16 A7   8D FDC9          STA    BITCT,PCR
7B1A A6   A0               LDA    0,Y+       TABLE BYTE
7B1C 6D   8D FDC2          TST    INVRSE,PCR REVERSED CHARACTER ?
7B20 2A   01               BPL    DISP1A     ..NO
7B22 43                    COMA              ..YES, REVERSE IT
          7B23  DISP1A     EQU    *
7B23 5F                    CLRB
7B24 6D   8D FDBB          TST    BITCT,PCR
          7B28  DISPC2     EQU    *
7B28 27   08               BEQ    DISPC3     ..IF DONE SHIFTING
7B2A 44                    LSRA              SHIFT RIGHT, INTO CC
7B2B 56                    RORB              SHIFT CC INTO B-REG
7B2C 6A   8D FDB3          DEC    BITCT,PCR  COUNT BIT SHIFTS
7B30 20   F6               BRA    DISPC2     ..IF NOT DONE
          7B32  DISPC3     EQU    *
7B32 A7   8D FDAA          STA    HOLDA,PCR  SAVE LEFT PORTION
7B36 E7   8D FDA7          STB    HOLDB,PCR  SAVE RIGHT PORTION
               * MERGE VIDEO AND TABLE BYTES
7B3A EC   84               LDD    0,X        GET 2 VIDEO BYTES (INTO A AND B)
7B3C 6D   8D FDA7          TST    REVRSE,PCR REVERSED SCREEN ?
7B40 2B   02               BMI    DISPC4     ..YES
7B42 43                    COMA              ELSE, FLIP TO NORMAL
7B43 53                    COMB              ELSE, FLIP TO NORMAL
          7B44  DISPC4     EQU    *
7B44 A4   8D FD96          ANDA   BITA,PCR   MASK OFF BITS
7B48 AA   8D FD94          ORA    HOLDA,PCR  ADD-IN TABLE BYTE BITS
7B4C E4   8D FD8F          ANDB   BITB,PCR   MASK OFF BITS
7B50 EA   8D FD8D          ORB    HOLDB,PCR  ADD-IN TABLE BYTE BITS
7B54 6D   8D FD8F          TST    REVRSE,PCR REVERSED SCREEN ?
7B58 2B   02               BMI    DISPC5     ..YES
7B5A 43                    COMA              ELSE, FLIP TO NORMAL
7B5B 53                    COMB              ELSE, FLIP TO NORMAL
          7B5C  DISPC5     EQU    *
7B5C ED   84               STD    0,X        PUT VIDEO BYTES BACK ON SCREEN
7B5E 30   88 20            LEAX   32,X       NEXT VIDEO LOCATION
7B61 6A   8D FD7F          DEC    COUNT,PCR  LOOP COUNT
7B65 26   AB               BNE    DISPC1     ..MORE TO DO
7B67 6F   8D FD6A          CLR    CURSW,PCR  RESET CURSOR FLIP SWITCH
7B6B 39                    RTS

                  * THIS ROUTINE CALCULATES WHERE THE NEXT CHARACTER
                  * IS TO BE ON THE VIDEO LINE.
                  *
                  * INPUT IS THE COLUMN NUMBER, OUTPUT IS THE
                  * 'BYTE' ON THE LINE, AND THE STARTING 'BIT' IN THE
                  * BYTE ON THE LINE.

          7B6C  CCTOBB     EQU    *

                  * COL/8
7B6C 34   06               PSHS   A,B
7B6E A6   8D FD61          LDA    COL,PCR    GET COLUMN TO DO
7B72 44                    LSRA              /2
7B73 44                    LSRA              /4
7B74 44                    LSRA              /8
                  * COL/8*WIDTH
7B75 C6   05               LDB    #WIDTH
7B77 3D                    MUL
7B78 34   04               PSHS   B          SAVE THE RESULT
                  *REMAINDER OF (COL/8)*WIDTH
7B7A A6   8D FD55          LDA    COL,PCR
7B7E 84   07               ANDA   #7         /8 REMAINDER
7B80 C6   05               LDB    #WIDTH     * WIDTH
7B82 3D                    MUL
                  * BYTE/8
7B83 1F   98               TFR    B,A
7B85 54                    LSRB              /2
7B86 54                    LSRB              /4
7B87 54                    LSRB              /8
7B88 84   07               ANDA   #7         REMAINDER
7B8A A7   8D FD4F          STA    BIT,PCR    REAL BIT OFFSET
7B8E 35   02               PULS   A
7B90 34   04 ABE0          ABA
7B94 A7   8D FD44          STA    BYTE,PCR   BYTE OFFSET INTO THE LINE
7B98 35   86               PULS   A,B,PC
                  *
                  * CURSOR BLINK ROUTINE
                  *
          7B9A  BLINK      EQU    *
7B9A 8D   03               BSR    CBLINK
          7B9C  BLINKZ     EQU    *
7B9C 7E   FFFF             JMP    $FFFF      (CHANGED BY INITIALIZATION)

          7B9F  CBLINK     EQU    *
7B9F 6A   8D FD42          DEC    CCOUNT,PCR
7BA3 A6   8D FD3E          LDA    CCOUNT,PCR
7BA7 81   00               CMPA   #0
7BA9 1026 0091             LBNE   CBLINX     ..NOT TIME FOR BLINK
7BAD 86   0A               LDA    #$0A       RE-LOAD CURSOR DELAY COUNT
7BAF A7   8D FD32          STA    CCOUNT,PCR
          7BB3  CBLNK      EQU    *
7BB3 34   36               PSHS   A,B,X,Y
7BB5 8D   B5               BSR    CCTOBB     CALCULATE 'BYTE' AND 'BIT'
7BB7 AE   8D FD16          LDX    CURSOR,PCR
7BBB E6   8D FD1D          LDB    BYTE,PCR   OFFSET INTO VIDEO LINE
7BBF 30   85               LEAX   B,X        CALCULATE ACTUAL VIDEO ADDRESS

7BC1 86   07               LDA    #7         LOOP COUNT
7BC3 6D   8D FD21          TST    CURTYP,PCR CHECK CURSOR TYPE
7BC7 27   06               BEQ    CBLINO     ..IF BLOCK CURSOR
7BC9 30   89 00E0          LEAX   7*32,X     POINT TO UNDERLINE
7BCD 86   01               LDA    #1         ONLY ONE LOOP THRU CODE
          7BCF  CBLINO     EQU    *
7BCF A7   8D FD11          STA    COUNT,PCR
```

Listing continued on page 26

COLORSOFT™ BUSINESS SOFTWARE

AT LAST! BUSINESS SOFTWARE **DESIGNED** FOR THE COLOR COMPUTER

★ MAKE YOUR COLOR COMPUTER A WORKING BUSINESS PARTNER ★
★ ALL PROGRAMS ARE MENU DRIVEN AND USER FRIENDLY ★
★ PROFESSIONALLY WRITTEN AND FULLY TESTED ★
★ AFTER-THE-SALE SUPPORT ★

SMALL BUSINESS ACCOUNTING PACKAGE...Ideally suited for any small business with up to $1,000,000 in annual sales and 300 accounts receivable and 300 accounts payable. This package provides detailed record keeping on accounts receivable and payable, sales, purchase orders, and allows input and maintenance of payroll related data. Prepares balance sheet and income statement, aging reports, and displays a check register, a listing of sales by date, and a listing of individual purchase orders. Included are printer output options. The step-by-step user's manual and the user friendly, menu driven format makes this program package fast, efficient, and easy to use.
REQUIRES SINGLE DISK DRIVE (User's manual without program $20).....**$149.95**

DEPRECIATION...Determines depreciation values for assets based upon the new accelerated cost recovery system (ACRS) and the alternate ACRS methods in addition to the conventional methods. Adjusts for placing assets in service during the year. Screen or printer output.....**$22.95**

LOAN ANALYSIS...Evaluate cost of borrowing for capital investments or business expansion. Prints amortization schedules and allows user to determine loan status at any point in the term of a loan. Other options allow user to determine either principle, interest, payment, or term based upon input of any three. An auto loan option includes trade-in allowance and taxes. Screen or printer output.....**$20.95**

ANNUITY...Determine future value of investments, present value of a future amount, compound interest, and amount of an individual retirement account (IRA). Screen or printer output.....**$18.95**

EXPENSE ACCOUNT DIARY...Keeps a record of travel expenses for up to 25 trips per year. Performs file searches based upon cross-referencing of date of trip, city visited, hotel, or purpose of trip. Screen or printer output. An excellent program for the traveling businessman.....**$15.95.**

STOCK ANALYZER...Reviewed in July 1982 RAINBOW. New version provides printer output and is disk compatible. Maintains a stock portfolio data base of multiple stocks. Can be used to track performance of sales personnel or similar applications. Features graphing of data to screen or printer along with analyses that includes projection of data trends .....**$21.95.**

INCLUDE $2.25 HANDLING PER ORDER
ALL PROGRAMS REQUIRE 16K EXT. BASIC
CUSTOM PROGRAMMING SERVICES AVAILABLE
WRITE FOR FREE CATALOG

COLOR SOFTWARE SERVICES

BUSINESS SOFTWARE DIV.
P.O. BOX 1708, DEPT. C
GREENVILLE, TEXAS 75401

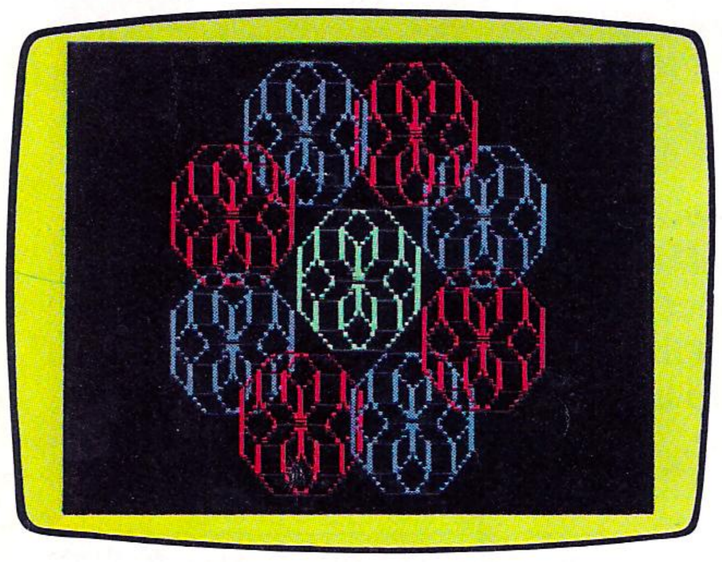
DEALER INQUIRES INVITED

TELEPHONE ORDERS
(214) 454-3674
9-4 Monday-Saturday

VISA/MASTERCARD

Circle No. 10 on Reader Service Card

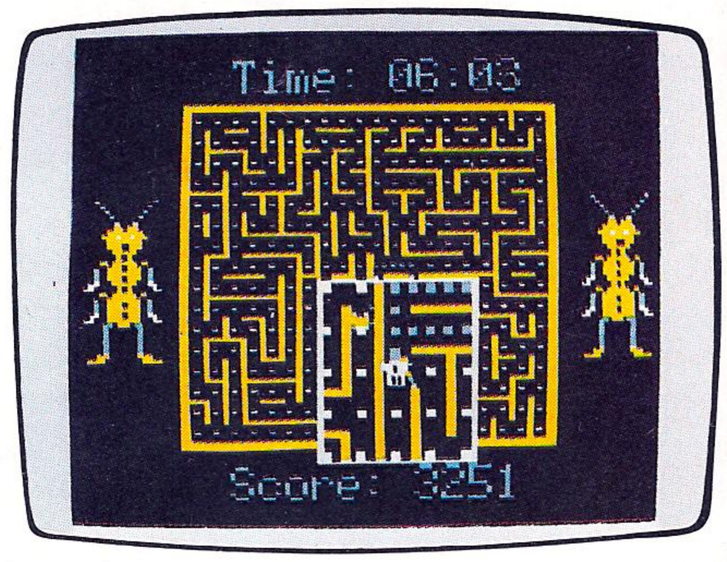
Want More from Your Pop In Another Radio



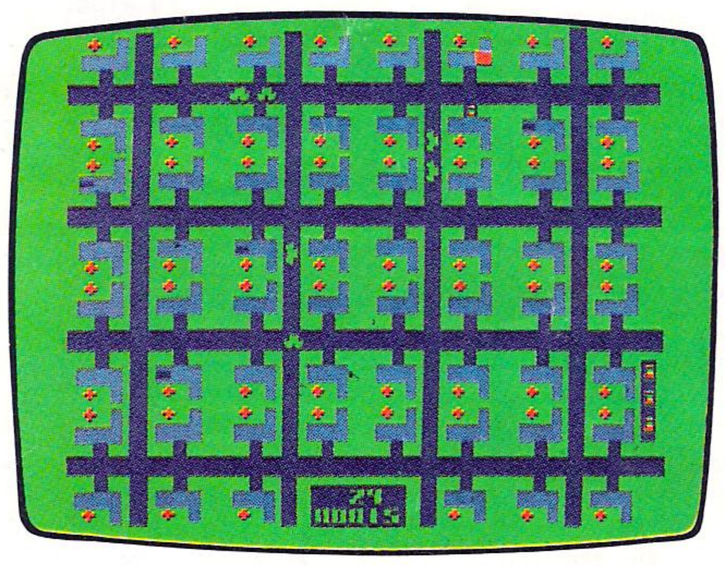
- **A Primer Programming Language for Youngsters and Pre-Schoolers**
- **Helps Children Develop Problem-Solving Skills**

Discover Color LOGO

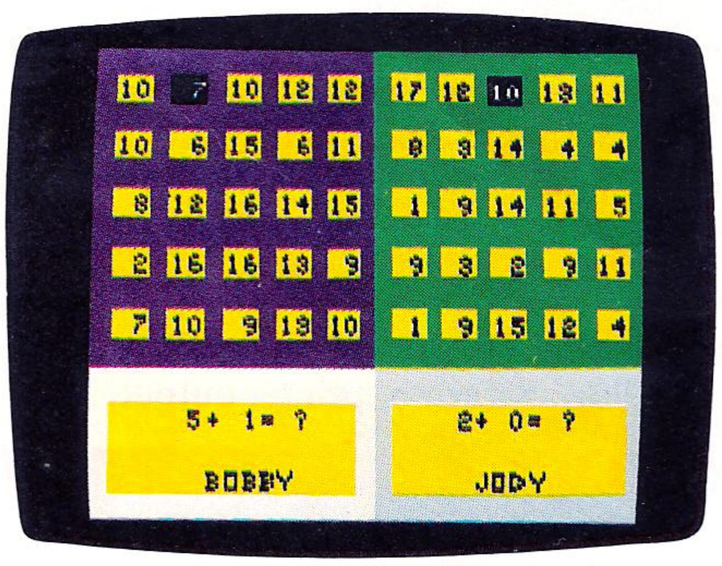
Fun to Learn, Easy to Use. Our Color LOGO programming language is designed to help students grasp fundamental programming concepts. Through manipulation of "turtle" graphics, students learn to write simple programs. The computer becomes a friendly learning tool, and students are prepared for more advanced concepts. Children under reading age can use a "doodle" mode to create graphics. And a "hatch" command creates multiple turtles, capable of running separate programs simultaneously. Cat. No. 26-2722 **49.95**



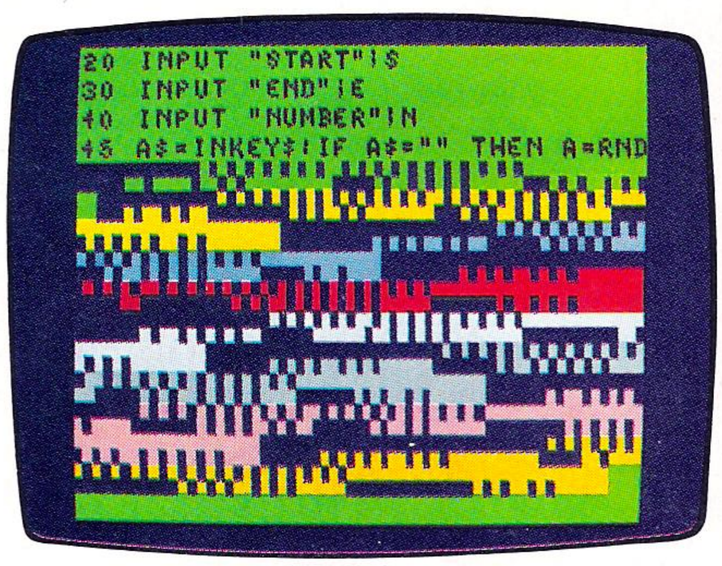
Mega-Bug. It's a maze of fun as you run from the little "buggers" hot on your trail. You eat white dots, leaving a trail of dots behind you. Win by leaving false trails and eating all the dots. 26-3076 **34.95**



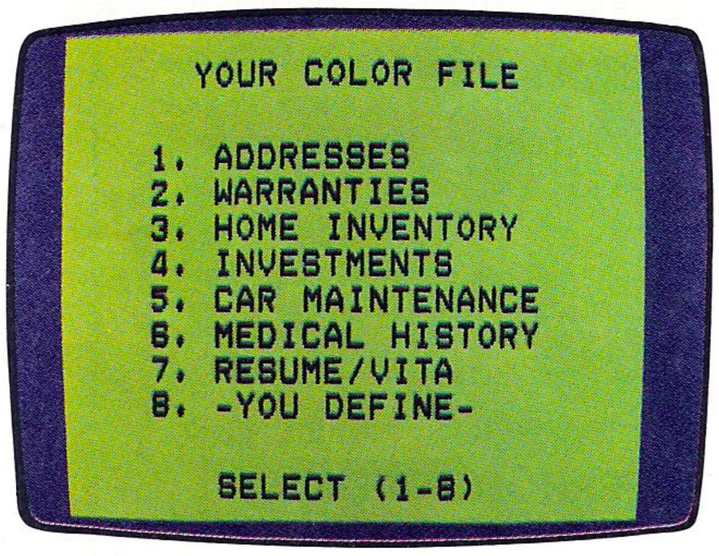
Poltergeist*. Based on Steven Spielberg's hit movie! To have a "ghost" of a chance of saving Carol Anne, you must find the clues, climb the stairs, and destroy the poltergeist. 26-3073 **34.95**



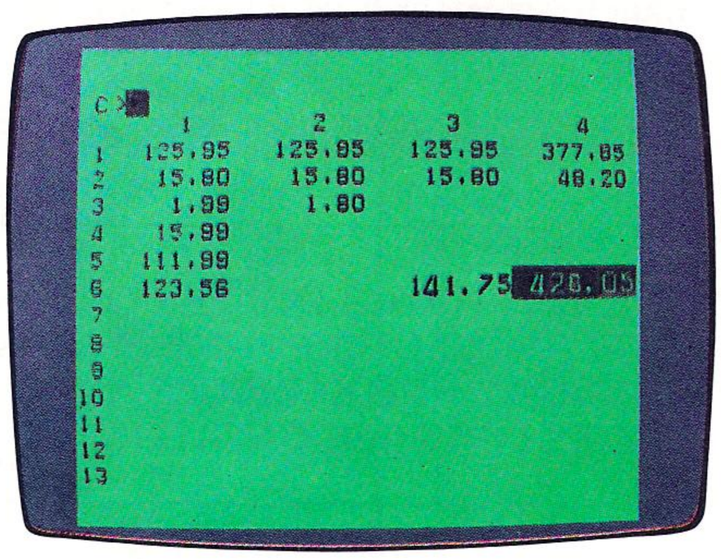
Bingo Math. Kids improve their arithmetic skills while competing against each other or themselves. Solve problems to score a Bingo! Also includes Speed Math and Number Hunt. 26-3150 **29.95**



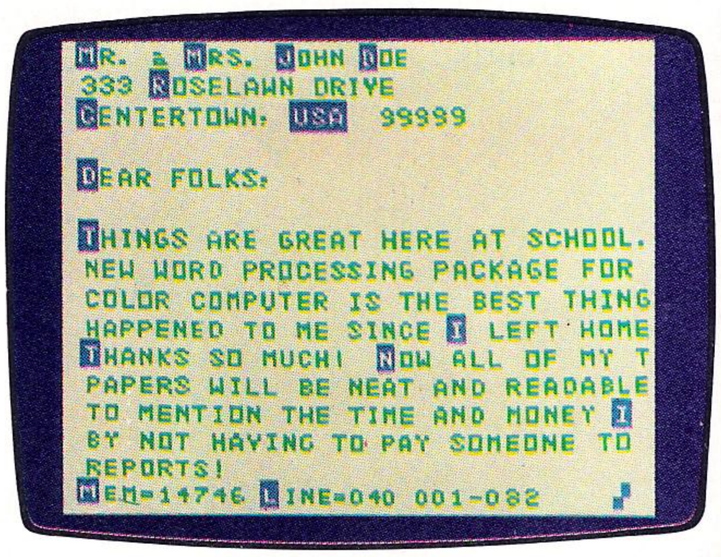
Color Computer Learning Lab. Learn Standard Color BASIC on your computer! This self-teaching course has 22 programs discussed in 30 lessons. Plus manual and eight cassette tapes. 26-3153 **49.95**



Color File. Quickly and easily store and retrieve various types of important data—names, inventories, warranties, etc. Alphabetize, select, examine, print, change and save your information. 26-3103 **29.95**



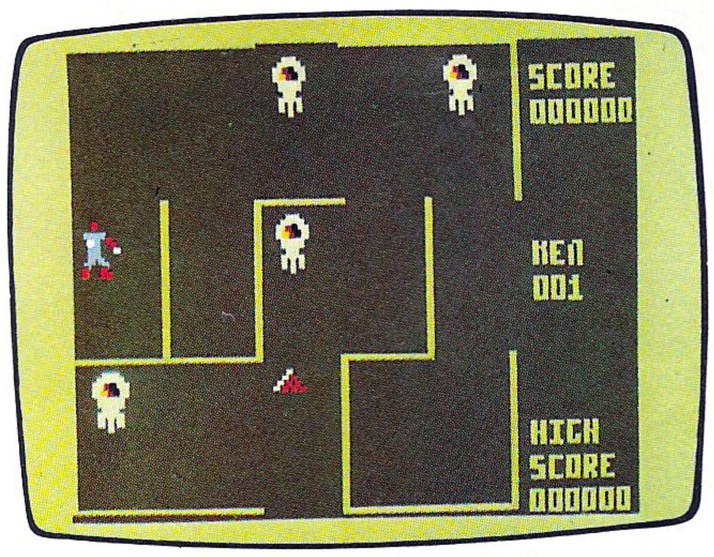
Spectaculator. Do forecasting and problem-solving with this "electronic spreadsheet"! Just enter numbers and formulas, and Spectaculator will calculate and display the results. 26-3104 **39.95**



Color SCRIPSIT™. This low-cost word processing program ends erasing and strikeovers! Type letters and reports on the screen, then print them "correction-free"! 26-3105 **39.95**

Color Computer?

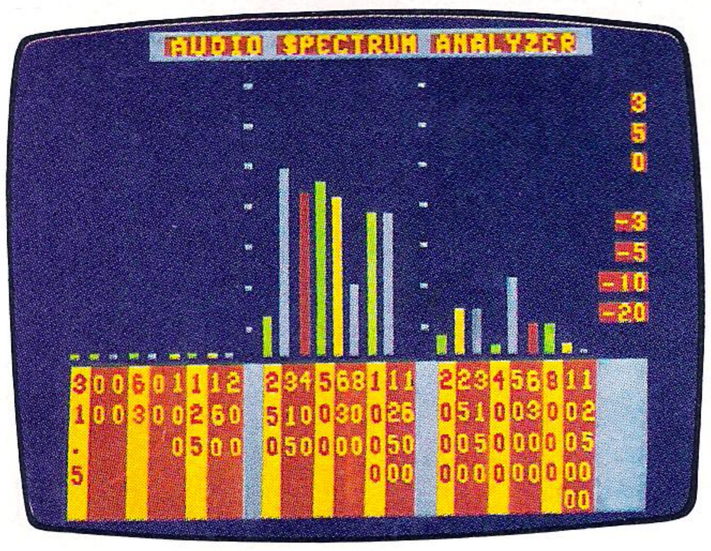
Shack Program Pak™!



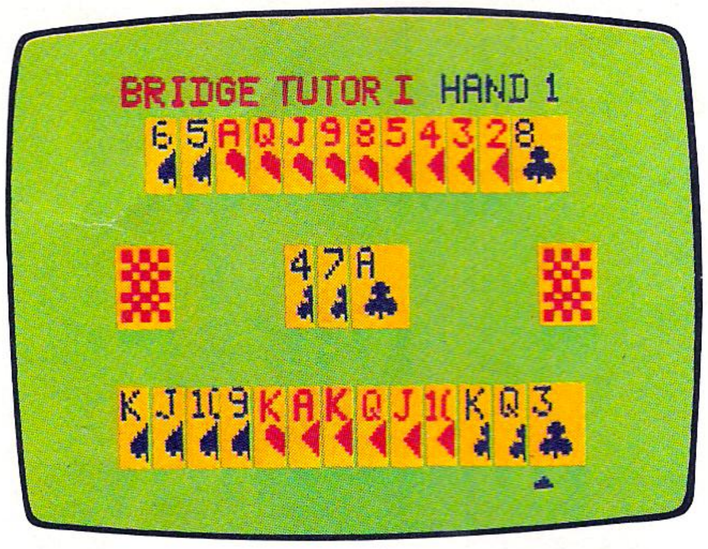
Monster Maze. Thread your way through the evil dungeon in search of gold. Take care—laser-firing monsters could be around! By the way, they can shoot *through* the walls! 26-3081 **29.95**

Clowns & Balloons. Maneuver your firemen's net to bounce a clown in the air. As he pops balloons floating by, you collect points but only if you're fast enough to catch him on the rebound! 26-3087 **29.95**

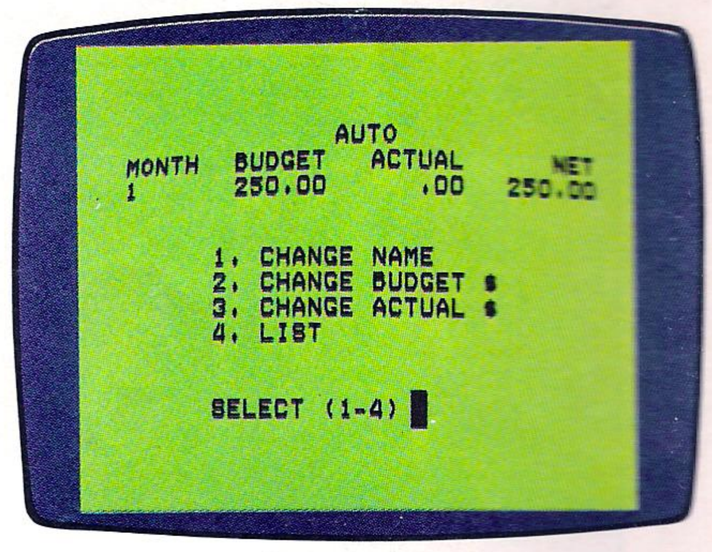
Shooting Gallery. The carnival beckons—lights, music, and the shooting gallery! Hit the moving targets—owls, ducks, faces, . . .and more! There's fewer shots each turn. 26-3088 **29.95**



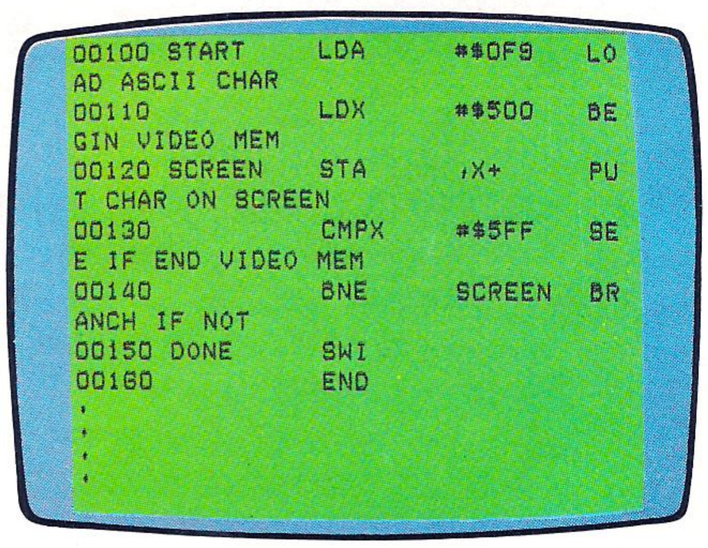
Audio Spectrum Analyzer. Test your stereo equipment for maximum performance! Color bar graphs show the power distribution over nine full octaves in 1/3 octave segments. 26-3156 **14.95**



Bridge Tutor. A grand slam for novice bridge players. One hundred different hands—each analyzed. Play South, East or West. Computer grades bidding and gives advice. 26-3158 **34.95**



Personal Finance. Set up a budget. Features 26 major expense categories: auto, food, clothing, more. Review expenditures on a year-to-date or category basis. Check balancing, too. 26-3101 **39.95**



Editor/Assembler. For the user who wants to gain the speed and efficiency of machine language programming. Develop 6809 programs for storing on audio cassettes. 26-3250 **49.95**

Circle No. 46 on Reader Service Card

Radio Shack®

The biggest name in little computers®

A DIVISION OF TANDY CORPORATION

Send me your free TRS-80 Computer Catalog today!

Radio Shack
Dept. 83-A-650
300 One Tandy Center
Fort Worth, Texas 76102

NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

Listing continued from page 22

```
7BD3 31   8D 0089          LEAY   BITTAB,PCR ADDRESS OF BIT-MASK TABLE
7BD7 E6   8D FD02          LDB    BIT,PCR    'BIT' POSITION
7BDB A6   A5               LDA    B,Y        GET BIT-MASK
7BDD A7   8D FCFD          STA    BITA,PCR
7BE1 31   28               LEAY   8,Y        BUMP TO NEXT BIT-MASK
7BE3 A6   A5               LDA    B,Y        GET BIT MASK
7BE5 A7   8D FCF6          STA    BITB,PCR
             7BE9  CBLIN1  EQU    *
7BE9 A6   84               LDA    0,X        GET VIDEO BYTE
7BEB A4   8D FCEF          ANDA   BITA,PCR   MASK-OFF BITS
7BEF A7   8D FCE6          STA    SAVEA,PCR  SAVE FOR LATER
7BF3 A6   84               LDA    0,X        VIDEO BYTE
7BF5 63   8D FCE5          COM    BITA,PCR
7BF9 A4   8D FCE1          ANDA   BITA,PCR
7BFD 43                    COMA
7BFE A4   8D FCDC          ANDA   BITA,PCR
7C02 AA   8D FCD3          ORA    SAVEA,PCR
7C06 A7   84               STA    0,X        PUT IT BACK WITH FLIPPED CURSOR
7C08 63   8D FCD2          COM    BITA,PCR   BACK TO CORRECT
7C0C A6   01               LDA    1,X        NEXT VIDEO BYTE
7C0E A4   8D FCCD          ANDA   BITB,PCR
7C12 A7   8D FCC3          STA    SAVEA,PCR
7C16 A6   01               LDA    1,X        NEXT VIDEO BYTE AGAIN
7C18 63   8D FCC3          COM    BITB,PCR
7C1C A4   8D FCBF          ANDA   BITB,PCR
7C20 43                    COMA
7C21 A4   8D FCBA          ANDA   BITB,PCR
7C25 AA   8D FCB0          ORA    SAVEA,PCR
7C29 A7   01               STA    1,X        PUT IT BACK FLIPPED
7C2B 63   8D FCB0          COM    BITB,PCR   BACK CORRECT
7C2F 30   88 20            LEAX   32,X       NEXT VIDEO LOCATION
7C32 6A   8D FCAE          DEC    COUNT,PCR  DONE ?
7C36 26   B1               BNE    CBLIN1     ..NO
7C38 63   8D FC99          COM    CURSW,PCR  SHOW CURSOR FLIPPED
7C3C 35   36               PULS   A,B,X,Y
             7C3E  CBLINX  EQU    *
7C3E 39             CBLINZ RTS
                    *
                    * 'BELL' SOUND OUTPUT ROUTINE
                    *
             7C3F  BEEP    EQU    *
7C3F 8E   0200             LDX    #$0200     DURATION OF THE SOUND
             7C42  BEEP1   EQU    *
7C42 1F   10               TFR    X,D        MOVE THE COUNT
7C44 1E   89               EXG    A,B        SWAP
7C46 84   02               ANDA   #2         KEEP ONLY BIT 1
7C48 34   02               PSHS   A          PUT IT ON THE STACK
7C4A B6   FF22             LDA    $FF22      GET PIA1, PORT B
7C4D 84   FD               ANDA   #$FD       MASK OFF OLD SOUND BIT
7C4F AA   E0               ORA    0,S+       INSERT NEW DATA AND FIX STACK
7C51 B7   FF22             STA    $FF22      SET SINGLE-BIT SOUND
7C54 86   40               LDA    #$40       PITCH OF THE SOUND
             7C56  BEEP2   EQU    *
7C56 4A                    DECA              DELAY LOOP TO SET PITCH
7C57 26   FD               BNE    BEEP2      ..IF NOT DELAYED LONG ENOUGH
7C59 30   1F               LEAX   -1,X       CHECK DURATION
7C5B 26   E5               BNE    BEEP1      ..IF MORE SOUND NEEDED
7C5D 16   FD03             LBRA   RET2
                    *
                    * BIT TABLE
                    *
             7C60  BITTAB  EQU    *
7C60 0F 87 C3 E1           FCB    $0F,$87,$C3,$E1,$F0,$F8,$FC,$FE
7C64 F0 F8 FC FE
7C68 FF FF FF FF           FCB    $FF,$FF,$FF,$FF,$FF,$7F,$3F,$1F
7C6C FF 7F 3F 1F
                    ********************************
                    * STORAGE FOR CHARACTER TABLE  *
                    ********************************
             7C70  TABLE   EQU    *
7C70 00 00 00 00           FCB    $00,$00,$00,$00,$00,$00,$00 SPACE
7C74 00 00 00
7C77 40 40 40 40           FCB    $40,$40,$40,$40,$40,$00,$40 !
7C7B 40 00 40
7C7E A0 A0 00 00           FCB    $A0,$A0,$00,$00,$00,$00,$00 "
7C82 00 00 00
7C85 60 60 F0 00           FCB    $60,$60,$F0,$00,$F0,$60,$60 #
7C89 F0 60 60
7C8C 20 70 80 60           FCB    $20,$70,$80,$60,$10,$E0,$20 $
7C90 10 E0 20
7C93 90 90 20 40           FCB    $90,$90,$20,$40,$80,$90,$90 %
7C97 80 90 90
7C9A 40 A0 A0 40           FCB    $40,$A0,$A0,$40,$B0,$90,$60 &
7C9E B0 90 60
7CA1 20 20 00 00           FCB    $20,$20,$00,$00,$00,$00,$00 '
7CA5 00 00 00
7CA8 20 40 80 80           FCB    $20,$40,$80,$80,$80,$40,$20 (
7CAC 80 40 20
7CAF 40 20 10 10           FCB    $40,$20,$10,$10,$10,$20,$40 )
7CB3 10 20 40
7CB6 00 90 60 F0           FCB    $00,$90,$60,$F0,$60,$90,$00 *
7CBA 60 90 00
7CBD 00 40 40 E0           FCB    $00,$40,$40,$E0,$40,$40,$00 +
7CC1 40 40 00
7CC4 00 00 00 60           FCB    $00,$00,$00,$60,$60,$20,$40 ,
7CC8 60 20 40
7CCB 00 00 00 F0           FCB    $00,$00,$00,$F0,$00,$00,$00 -
7CCF 00 00 00
7CD2 00 00 00 00           FCB    $00,$00,$00,$00,$00,$60,$60 .
7CD6 00 60 60
7CD9 00 00 10 20           FCB    $00,$00,$10,$20,$40,$80,$00 /
7CDD 40 80 00
7CE0 60 90 90 90           FCB    $60,$90,$90,$90,$90,$90,$60 0
7CE4 90 90 60
7CE7 20 60 20 20           FCB    $20,$60,$20,$20,$20,$20,$70 1
7CEB 20 20 70
7CEE 60 90 10 20           FCB    $60,$90,$10,$20,$40,$80,$F0 2
7CF2 40 80 F0
7CF5 60 90 10 20           FCB    $60,$90,$10,$20,$10,$90,$60 3
7CF9 10 90 60
7CFC 10 30 50 F0           FCB    $10,$30,$50,$F0,$10,$10,$10 4
7D00 10 10 10
7D03 F0 80 E0 10           FCB    $F0,$80,$E0,$10,$10,$90,$60 5
7D07 10 90 60
7D0A 20 40 80 E0           FCB    $20,$40,$80,$E0,$90,$90,$60 6
7D0E 90 90 60
7D11 70 10 10 20           FCB    $70,$10,$10,$20,$40,$40,$40 7
7D15 40 40 40
7D18 60 90 90 60           FCB    $60,$90,$90,$60,$90,$90,$60 8
7D1C 90 90 60
7D1F 60 90 90 70           FCB    $60,$90,$90,$70,$10,$20,$40 9
7D23 10 20 40
7D26 00 40 40 00           FCB    $00,$40,$40,$00,$40,$40,$00 :
7D2A 40 40 00
7D2D 00 40 40 00           FCB    $00,$40,$40,$00,$40,$40,$80 ;
7D31 40 40 80
7D34 10 20 40 80           FCB    $10,$20,$40,$80,$40,$20,$10 <
7D38 40 20 10
7D3B 00 00 E0 00           FCB    $00,$00,$E0,$00,$E0,$00,$00 =
7D3F E0 00 00
7D42 80 40 20 10           FCB    $80,$40,$20,$10,$20,$40,$80 >
7D46 20 40 80
7D49 60 90 10 20           FCB    $60,$90,$10,$20,$20,$00,$20 ?
7D4D 20 00 20
7D50 60 90 10 70           FCB    $60,$90,$10,$70,$90,$90,$60 @
7D54 90 90 60
7D57 60 60 90 90           FCB    $60,$60,$90,$90,$F0,$90,$90 A
7D5B F0 90 90
7D5E E0 50 50 60           FCB    $E0,$50,$50,$60,$50,$50,$E0 B
7D62 50 50 E0
7D65 60 90 80 80           FCB    $60,$90,$80,$80,$80,$90,$60 C
7D69 80 90 60
7D6C E0 50 50 50           FCB    $E0,$50,$50,$50,$50,$50,$E0 D
7D70 50 50 E0
7D73 F0 80 80 E0           FCB    $F0,$80,$80,$E0,$80,$80,$F0 E
7D77 80 80 F0
7D7A F0 80 80 E0           FCB    $F0,$80,$80,$E0,$80,$80,$80 F
7D7E 80 80 80
7D81 70 80 80 B0           FCB    $70,$80,$80,$B0,$90,$90,$70 G
7D85 90 90 70
7D88 90 90 90 F0           FCB    $90,$90,$90,$F0,$90,$90,$90 H
7D8C 90 90 90
7D8F 70 20 20 20           FCB    $70,$20,$20,$20,$20,$20,$70 I
7D93 20 20 70
7D96 10 10 10 10           FCB    $10,$10,$10,$10,$10,$90,$60 J
7D9A 10 90 60
7D9D 90 A0 C0 C0           FCB    $90,$A0,$C0,$C0,$C0,$A0,$90 K
7DA1 C0 A0 90
7DA4 80 80 80 80           FCB    $80,$80,$80,$80,$80,$80,$F0 L
7DA8 80 80 F0
7DAB 90 F0 90 90           FCB    $90,$F0,$90,$90,$90,$90,$90 M
7DAF 90 90 90
7DB2 90 90 D0 F0           FCB    $90,$90,$D0,$F0,$B0,$90,$90 N
7DB6 B0 90 90
7DB9 F0 90 90 90           FCB    $F0,$90,$90,$90,$90,$90,$F0 O
7DBD 90 90 F0
7DC0 F0 90 90 F0           FCB    $F0,$90,$90,$F0,$80,$80,$80 P
7DC4 80 80 80
7DC7 60 90 90 90           FCB    $60,$90,$90,$90,$90,$60,$10 Q
7DCB 90 60 10
7DCE E0 90 90 E0           FCB    $E0,$90,$90,$E0,$C0,$A0,$90 R
7DD2 C0 A0 90
7DD5 60 90 80 60           FCB    $60,$90,$80,$60,$10,$90,$60 S
7DD9 10 90 60
7DDC F0 20 20 20           FCB    $F0,$20,$20,$20,$20,$20,$20 T
7DE0 20 20 20
7DE3 90 90 90 90           FCB    $90,$90,$90,$90,$90,$90,$60 U
7DE7 90 90 60
7DEA 90 90 90 90           FCB    $90,$90,$90,$90,$90,$60,$60 V
7DEE 90 60 60
7DF1 90 90 90 90           FCB    $90,$90,$90,$90,$90,$F0,$90 W
7DF5 90 F0 90
7DF8 90 90 60 60           FCB    $90,$90,$60,$60,$60,$90,$90 X
7DFC 60 90 90
7DFF 90 90 90 60           FCB    $90,$90,$90,$60,$20,$20,$20 Y
7E03 20 20 20
7E06 F0 10 20 20           FCB    $F0,$10,$20,$20,$40,$80,$F0 Z
7E0A 40 80 F0
7E0D C0 80 80 80           FCB    $C0,$80,$80,$80,$80,$80,$C0 [
7E11 80 80 C0
7E14 00 80 40 20           FCB    $00,$80,$40,$20,$10,$00,$00 \
7E18 10 00 00
7E1B 30 10 10 10           FCB    $30,$10,$10,$10,$10,$10,$30 ]
7E1F 10 10 30
7E22 00 40 E0 40           FCB    $00,$40,$E0,$40,$40,$40,$00 ^
7E26 40 40 00
7E29 00 00 00 00           FCB    $00,$00,$00,$00,$00,$00,$F0 UNDERLINE
7E2D 00 00 F0
7E30 40 40 20 00           FCB    $40,$40,$20,$00,$00,$00,$00 HEX 60
7E34 00 00 00
7E37 00 00 F0 10           FCB    $00,$00,$F0,$10,$F0,$90,$F0 a
7E3B F0 90 F0
7E3E 80 80 F0 90           FCB    $80,$80,$F0,$90,$90,$90,$F0 b
7E42 90 90 F0
7E45 00 00 E0 80           FCB    $00,$00,$E0,$80,$80,$80,$E0 c
7E49 80 80 E0
7E4C 10 10 70 90           FCB    $10,$10,$70,$90,$90,$90,$70 d
7E50 90 90 70
7E53 00 00 60 90           FCB    $00,$00,$60,$90,$F0,$80,$60 e
7E57 F0 80 60
7E5A 60 90 80 E0           FCB    $60,$90,$80,$E0,$80,$80,$80 f
7E5E 80 80 80
7E61 00 00 F0 90           FCB    $00,$00,$F0,$90,$F0,$10,$70 g
7E65 F0 10 70
7E68 80 80 F0 90           FCB    $80,$80,$F0,$90,$90,$90,$90 h
7E6C 90 90 90
7E6F 40 00 40 40           FCB    $40,$00,$40,$40,$40,$40,$40 i
7E73 40 40 40
7E76 20 00 20 20           FCB    $20,$00,$20,$20,$20,$20,$60 j
7E7A 20 20 60
7E7D 00 80 90 A0           FCB    $00,$80,$90,$A0,$C0,$A0,$90 k
7E81 C0 A0 90
7E84 40 40 40 40           FCB    $40,$40,$40,$40,$40,$40,$40 l
7E88 40 40 40
7E8B 00 00 90 F0           FCB    $00,$00,$90,$F0,$90,$90,$90 m
7E8F 90 90 90
7E92 00 00 E0 90           FCB    $00,$00,$E0,$90,$90,$90,$90 n
7E96 90 90 90
7E99 00 00 60 90           FCB    $00,$00,$60,$90,$90,$90,$60 o
7E9D 90 90 60
7EA0 00 00 F0 90           FCB    $00,$00,$F0,$90,$F0,$80,$80 p
7EA4 F0 80 80
7EA7 00 00 70 90           FCB    $00,$00,$70,$90,$50,$10,$10 q
7EAB 50 10 10
7EAE 00 00 E0 80           FCB    $00,$00,$E0,$80,$80,$80,$80 r
7EB2 80 80 80
7EB5 00 00 F0 80           FCB    $00,$00,$F0,$80,$F0,$10,$F0 s
7EB9 F0 10 F0
7EBC 40 40 E0 40           FCB    $40,$40,$E0,$40,$40,$40,$40 t
7EC0 40 40 40
7EC3 00 00 90 90           FCB    $00,$00,$90,$90,$90,$90,$60 u
7EC7 90 90 60
7ECA 00 00 90 90           FCB    $00,$00,$90,$90,$90,$60,$60 v
7ECE 90 60 60
7ED1 00 00 90 90           FCB    $00,$00,$90,$90,$90,$F0,$90 w
7ED5 90 F0 90
7ED8 00 00 90 60           FCB    $00,$00,$90,$60,$20,$60,$90 x
7EDC 20 60 90
7EDF 00 00 90 90           FCB    $00,$00,$90,$90,$60,$20,$60 y
7EE3 60 20 60
7EE6 00 00 F0 10           FCB    $00,$00,$F0,$10,$20,$40,$F0 z
7EEA 20 40 F0
7EED 20 40 40 C0           FCB    $20,$40,$40,$C0,$40,$40,$20 HEX 7B
7EF1 40 40 20
7EF4 40 40 00 00           FCB    $40,$40,$00,$00,$40,$40,$00 HEX 7C
7EF8 40 40 00
7EFB 40 20 20 31           FCB    $40,$20,$20,$31,$20,$20,$40 HEX 7D
7EFF 20 20 40
7F02 00 00 50 A0           FCB    $00,$00,$50,$A0,$00,$00,$00 HEX 7E
7F06 00 00 00
7F09 F0 F0 F0 F0           FCB    $F0,$F0,$F0,$F0,$F0,$F0,$F0 HEX $7F
7F0D F0 F0 F0
                           END
```

26/April 1983

Program Listing 2

```
1000 REM ************************
1100 REM      51 X 24 TEXT +    *
1200 REM    GRAPHICS DISPLAY    *
1300 REM                        *
1400 REM    BY: STEVE ODNEAL    *
1500 REM ************************

1600 PCLEAR5:CLS
1700 REM DETERMINE MEMORY SIZE
1800 SZ=PEEK(&H74)
1900 IF SZ=&H7F THEN 2500
2000 REM MUST BE 16K
2100 CLEAR 200,&H37FF
2200 LOADM "RSVIDEO",&HC000: 'OF
FSET FOR 16K
2300 DEFUSR0=&H3800: 'INITIALIZE
 FOR 16K
2400 GOTO 2800
2500 CLEAR 200,&H77FF
2600 LOADM "RSVIDEO"
2700 DEFUSR0=&H7800: 'INITIALIZE
 FOR 32K
2800 A=USR0(0)
2900 REM CLEAR SCREEN AND REVERS
E
3000 PMODE 4,1:SCREEN 2,1
3100 REM DRAW SALES GROWTH CHART

3200 PRINT CHR$(12):PRINT CHR$(1
)
3300 LINE (5,0)-(5,160),PSET
3400 LINE (250,0)-(250,160),PSET
3500 LINE (5,160)-(250,160),PSET
3600 FOR X=20 TO 255 STEP 20
3700 LINE (X,150)-(X,160),PSET
3800 NEXTX
3900 PRINT CHR$(11);CHR$(15);CHR
$(21);"Color Computer Sales";
4000 FOR Y=160 TO 5 STEP -15
4100 LINE (5,Y)-(14,Y),PSET:LINE
 (241,Y)-(250,Y),PSET
4200 NEXT Y
4300 LINE (5,160)-(23,150),PSET
4400 LINE -(40,100),PSET
4500 LINE -(90,60),PSET
4600 LINE -(120,50),PSET
4700 LINE -(150,0),PSET
4800 REM NOW, ANNOTATE THE GRAPH

4900 PRINT CHR$(11);CHR$(17);CHR
$(8);"1981";
5000 PRINT CHR$(11);CHR$(10);CHR
$(12);"1980";
5100 PRINT CHR$(11);CHR$(25);CHR
$(6);"1982";
5200 PRINT CHR$(11);CHR$(30);CHR
$(1);"'983 ?";
5300 PRINT CHR$(11);CHR$(29);CHR
$(13);"In MILLIONS";
5400 PRINT CHR$(11);CHR$(0);CHR$
(20)
5500 END
```

Continued from page 18

screen to black figures on a buff background.

Options

The RSVIDEO/BIN uses two EQU values to set the number of characters on a line of the display and the number of lines to show. The number of characters on a line can be set to 32, 42, 51, or 64. In the 64 characters-per-line format there's no space between each character. You can change the character fonts to draw each one with only three pixels if you wish.

The number of lines on the display can be set to anything from one to 24, however; each line of the display will be the same height. If a number less than 24 is specified, a margin will appear at the bottom of the display where you can draw the graphics that will remain even if the display is scrolled. The program *must* be reassembled to change these options, since they are used in other instructions in the program.

Three locations in the program can be changed by POKE statements: The DESCUR byte at $78E6 ($38E6 for 16K) is initially set to zero for a destructive cursor. This means that when moving the cursor on the screen, any character that was under the cursor's new location will be erased. If this byte is set to any non-zero value, the cursor will not erase any character under the cursor.

The REVRSE byte at $78E7 ($38E7 for 16K) is initially set to zero to draw black figures on a buff background. By setting this byte to any non-zero value, the figures will appear in a light color on a black background. The color of the screen will not change, only the colors of the characters.

The CURTYP byte at $78E8 ($38E8 for 16K) is initially set to zero to indicate that the cursor is a blinking underline. If this byte is set to any non-zero value, the cursor will become a blinking block.

Funnies

Two Disk Basic commands revert the display back to the old 32 by 16 format while functioning: DSKINI and BACKUP. For some unknown reason, these two commands reset the display mode. Special instructions in RSVIDEO/BIN cause the display to revert back to the 51 by 24 mode following completion of the command. Some garbage will appear on the screen when it returns. This is data from the disk operation loaded into the graphics pages by the Basic commands operation. It will scroll off the screen normally, or you can clear the screen using the Erase control code.

Program Listing 3

```
1000 REM ************************
1100 REM *  DEMONSTRATION OF    *
1200 REM * REVERSE-VIDEO TEXT  *
1300 REM *      DISPLAY         *
1400 REM ************************
1500 A$="HELLO THERE"
1600 GOSUB 2000: 'CONVERT STRING

1700 PRINT A$: 'SHOW ORIGINAL ST
RING
1800 PRINT B$: 'SHOW REVERSED ST
RING
1900 END
2000 REM STRING CONVERSION ROUTI
NE
2100 B$=""
2200 FOR X=1 TO LEN(A$)
2300 B$=B$+CHR$(ASC(MID$(A$,X,1)
)+128)
2400 NEXT
2500 RETURN
```

And Other Strange Things

At one point in the development of this program, extremely large characters appeared on the screen. On a 12-inch television, these characters were about two inches high! I was so surpised by this that I got my camera and took a picture. I then saved all 32K of memory to tape so that later I could figure out how it happened.

As it turns out, changing the PMODE while in the 51 by 24 display makes the SAM and Video Display Chip go out of synchronization. The VDG thinks it's supposed to interpret the bits set in memory one way and the SAM thinks otherwise. I haven't worked this mode further, but it has some interesting applications for creating large block letters for chidren and the visually handicapped. The only help I can give you is to try PMODE 2,1:SCREEN 1,1 and see what happens. You may get various portions of the screen blown-up into a larger display, although the same portion of the screen always seems to appear.

Conclusion

I wrote the RSVIDEO/BIN program to give an enhanced display, and to provide a useful set of control codes. The heart of the display routine is the DISPCH routine that sets the individual pixels on the screen. This routine was rewritten several times to increase its execution speed. While the display of text characters is slower than the 32 by 16 mode, it is still fast enough.

I hope you find this program useful. While the 51 by 24 display mode does not equal the size of some other (higher-priced) computers, it greatly expands the capabilities of the Color Computer and gives you some big computer capabilites I think you'll find useful. ■■■

Custom Color

Part I of a way to control electrical devices using your Color Computer.

by Dennis Kitsz

READERS WHO KNOW me from other magazines (notably *80 Micro*); know that my columns are different from many hardware and software articles in that the material I present is complete and functional, but really only a potential. The "bells and whistles" are left up to you. The project won't stand up and talk unless you make it do so. This is the long way 'round to saying this: don't try anything in "Color Applications" without first reading and *understanding* the material presented! Fair warning? Actually, a pretty fair invitation, I think. Your suggestions, comments and ideas are always welcome; write to me.

The Color Computer is an excellent, solid, well-designed piece of digital hardware, with few glaring faults. It is not oriented toward internal, user-accessible expansion. There is an expansion connector, but no group of expansion slots. Cartridges and the disk pack take over an identical memory area and cannot be used together. If you need other devices or firmware, they must chain to the system via a snaking ribbon cable, causing television interference. And, they look a mess. I like to fix these faults. . .

Why Extra I/O?

I wanted to give the Color Computer additional analog-to-digital conversion — like the joystick inputs, but eight bits (one part in 256 accuracy) instead of six bits (one part in 64 accuracy). For this project I needed a great deal of fast storage, which meant adding a disk system. I wanted to use the Exatron interface — not only because I had one — but also because it uses a cable that plugs into the Color Computer, and its operating system is in RAM instead of a ROMpak. But it had three problems: it was single density (not as much storage space as I needed), it spewed out interference (affecting the extra-sensitive analog converter circuitry), and it drew too much power (often shutting down my system completely). The power problem I could cure with a modification, the interference I could cure with a heavy dose of aluminum foil grounded to the case, but the single density storage couldn't be amended easily.

The Radio Shack disk system was the only answer. It had turned out to be fast, quiet, and remarkably reliable. But the disk controller plug-in pack gobbled up all the remaining memory, leaving no space (physically or in the memory map) for my digital-to-analog converter. Somehow I had to sneak in between the computer and the disk pack to insert my converter.

This month's project, the CoCoPort, is the result. It uses a Motorola MC6821 input/output interface circuit, exactly the same type found inside the Color Computer itself. The design (worked out with the constructive insight of Associate Professor Gregg Shadel of Norwich University) is totally transparent to disk or Rompak operation.

How It Works

The Color Computer memory is arranged this way: locations 0 to 32767 contain RAM; 32768 to 40959 are Extended Basic; 40960 to 49151 hold Color Basic; 49152 to 57343 are used for the ROM or disk pack; 57344 to 65279 are reserved (part are used for Color EDTASM+); the top page (65280 to 65535) contains important power-up, video, port, cassette, disk and other information. Not all of that top page (256-byte block) of memory is used, however. Some of it is marked reserved, and other parts are simply gobbled up by incomplete addressing. That addressing is the key to user expansion.

An exploration of the disk operating software revealed that, although $FF40 (65344) is specified as the disk motor on-off address, something interesting goes on here. The likely candidates for reading the disk, writing to the disk, and track selection are locations $FF41, $FF42, and $FF43 (65345, 65346 and 65347). Certainly these slots work, but Radio Shack's TRSDOS — for whatever reason — doesn't use them. Instead, higher "phantom" addresses are found in the software. Indeed, the whole block $FF40 to $FF5F (65344 to 65375, 32 bytes) is taken up by repeated blocks of a disk system that needs only four bytes! Not only is this a waste of space, but reassignment of these blocks provides plenty of room for some extra port addressing.

Phantom addressing, also known as incomplete decoding, has been mentioned before. I want to take a break in the discussion of the CoCoPort itself to explain what addressing is and how it is accomplished.

Finding Nob Hill

Addressing is an excellent descriptive term for what the central processing unit uses to find its way through the computer's electronic maze. Imagine thousands of city blocks, each with thousands of houses. Finding one house in millions

would be virtually impossible if neither the streets nor the houses were numbered. For example, have you ever tried to find someone in Philadelphia? You would soon discover the frustration of finding a Pine Street among a forest of Vines and Chestnuts and Maples and Walnuts — and wondering on which side of the river to look, how to spell it (Schuylkill?), and how to find a bridge that goes there. By asking directions, it's theoretically possible to find your way through Philadelphia. But an easier method would be to number all the streets in order, and place all the houses in numerical order on those streets. Not as charming, but easier on the harried outsider who is low on gas. Anyway, computers can't ask for directions, even if they could follow them better than I can.

As you probably know, the popular microprocessors (such as the Model I's Z-80 and the Color Computer's 6809E) are described as having an eight-bit data structure and a 16-bit address structure. This means that eight electronic pulses of information — each one turned either on or off — can be sent or received by the processor at one time. If you sit with paper and pencil, you will find you can arrange 256 combinations of ons and offs. Likewise, 16 bits of location information (address) can be arranged 65,536 different ways (no need to try that), making it very easy to locate by number a single place to store or retrieve information, to examine or affect the outside world, to communicate with internal mechanics, or to interact with a human user. As far as the microprocessor knows, these addresses represent access to a generalized world called memory, even though the address might really represent a disk drive motor or part of a video screen or a joystick. It's all memory.

Thus, the overall placement of electronic devices within numbered blocks of memory is known as a memory map. Figure 1a is a general view of how a processor sees its memory — it is a single undifferentiated block. But to make a computer useful, this block must be broken into sections, each with a purpose. A "black box" decoder is hooked up to the processor which reads the address lines; when it finds a match to its own code, it signals that block of the memory map to respond. In Figures 1b and 1c, the memory map is shown broken into two sections, each section hooked into its own

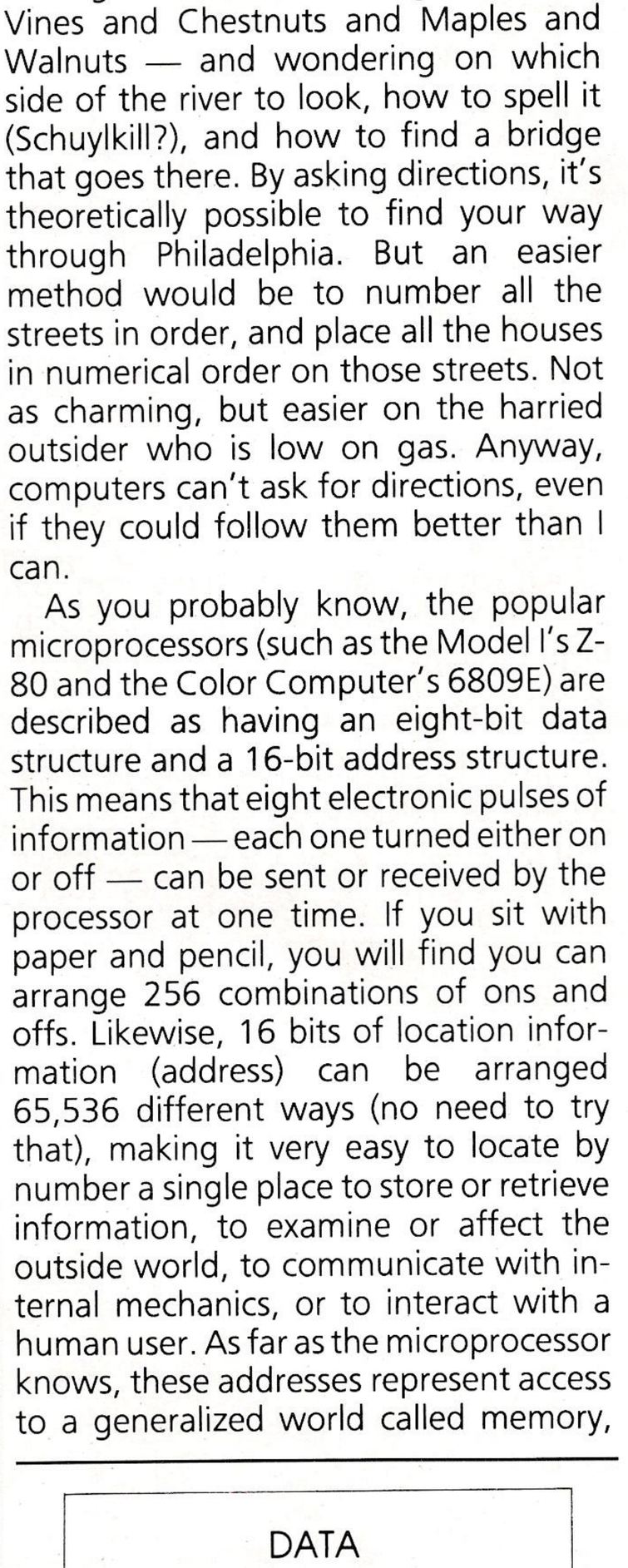


Figure 1a Simple relationship of a Central Processing Unit (CPU) and its memory map.

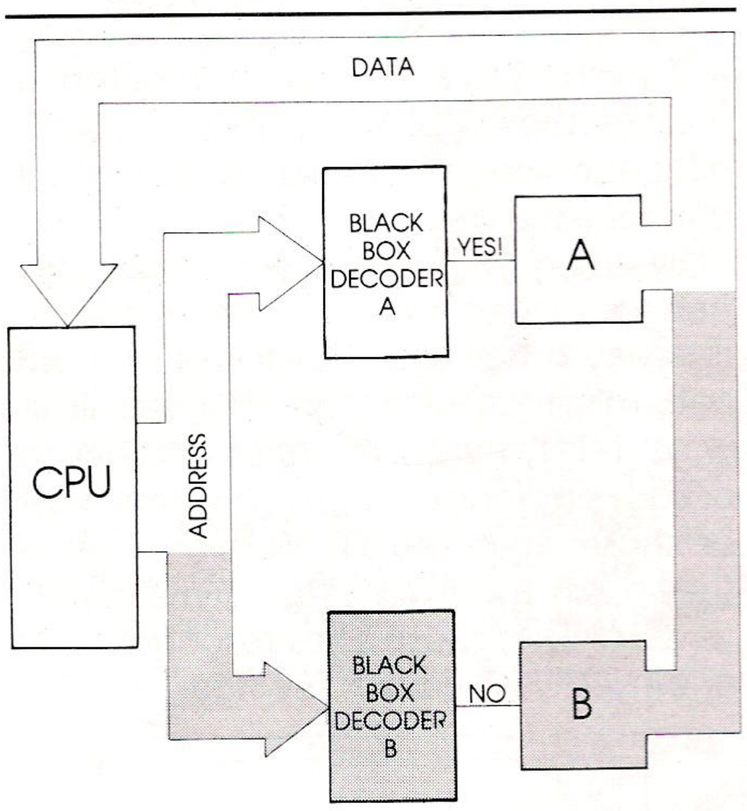
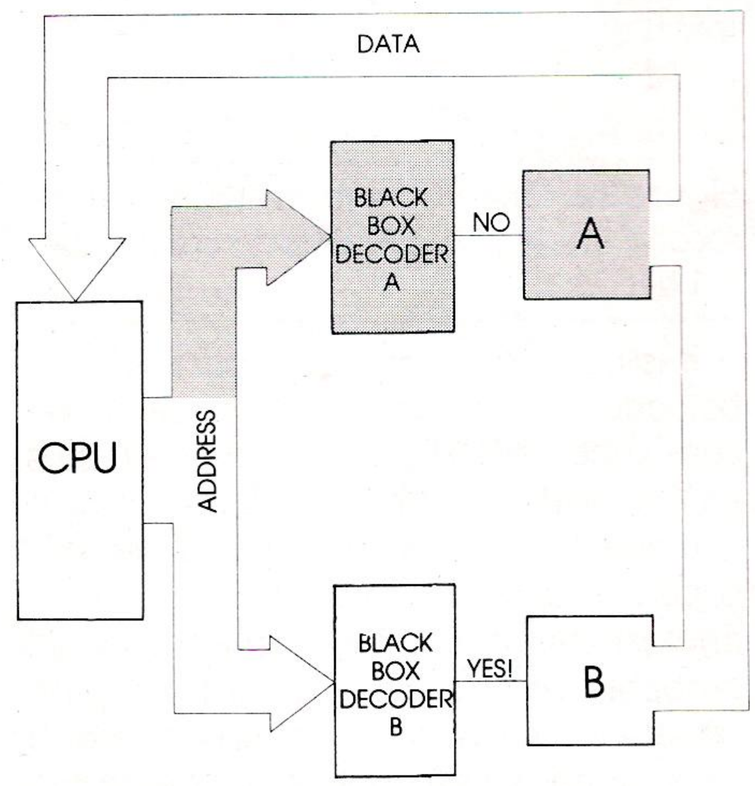


Figure 1b The placement of decoders breaks the memory map into separate units capable of independent response; here, section A responds.



In **Figure 1c**, section B responds.

black box decoder. If black box A sees its code on the lines, it responds; if black box B sees its code, it responds.

Since 65,000 addresses are quite a few to envision comfortably, consider instead a mythical processor which has only a 3-bit address structure. The combinations of addresses would look like the one below.

Electrical Conditions	Numerical Representation	Address Pattern Number
off-off-off	0-0-0	0
off-off-on	0-0-1	1
off-on-off	0-1-0	2
off-on-on	0-1-1	3
on-off-off	1-0-0	4
on-off-on	1-0-1	5
on-on-off	1-1-0	6
on-on-on	1-1-1	7

If I'm the processor, and I want to hear from address 5, I would arrange my three address lines in the pattern on-off-on. Some electronic component — the black box — waves its hand to signal "Here I am," responding to my request in whatever way it has been wired. If I arrange the address lines in the pattern off-on-on, component 3 responds. Figure 2 shows all eight sections of a memory map with their respective black boxes, and how one part of the map would respond to pattern 1-0-1 (black box 5).

What makes one component respond when another doesn't? The answer is the wiring of the black box, which is called a decoder or demultiplexer, and whose purpose is to recognize and respond to specific electronic patterns. A decoder is made up of logical gates, which, in a

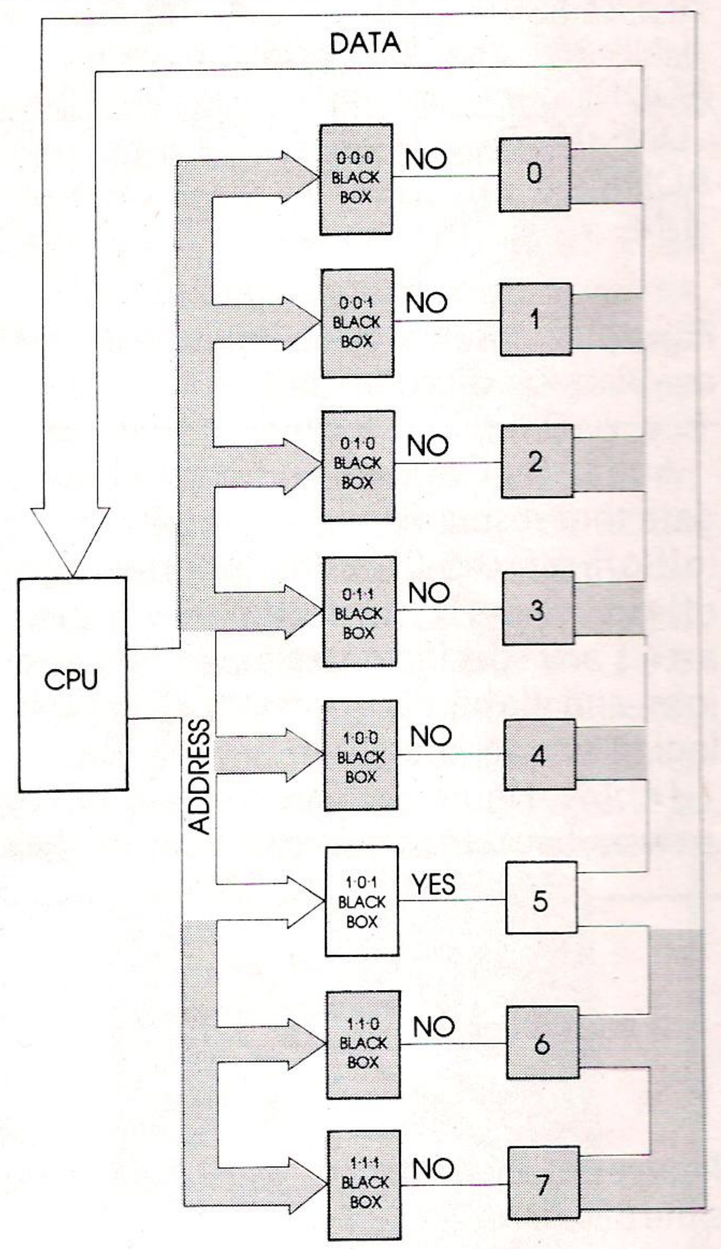


Figure 2 Eight decoders listen to three address lines. When 1-0-1 appears (black box 5), device responds with data.

Please turn the page

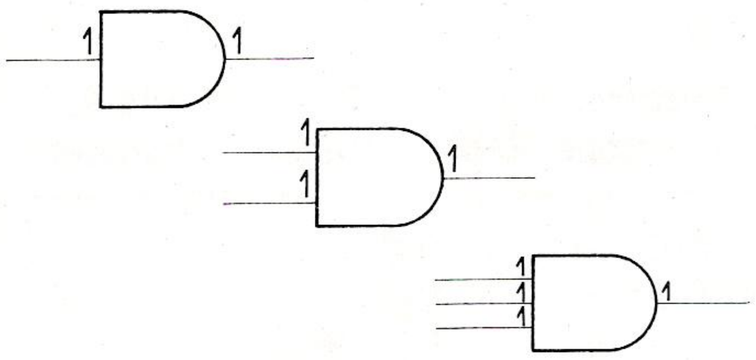


Figure 3a Three AND gates, each responding to on (yes); a one-input AND, two-input AND, and three-input AND.

sense, are decoders as well. Glance at Figure 3a. This is an AND gate; you can think of it as a yes gate. When the input of the first example (the left side in the figure) receives an on (yes) input, the output responds with an on (yes). In the second sample gate there are two inputs, and both must be on for the output to respond yes. In the third sample, all three inputs must be on.

That three-input gate in Figure 3a is very handy. If we hook it up so it can read the three address lines from our mythical processor, the gate will respond yes when all these lines turn on, but at no other time. That is, when the 1-1-1 pattern turns up, the gate's output will signal its device to provide the processor with some information. The hookup is shown in Figure 3b.

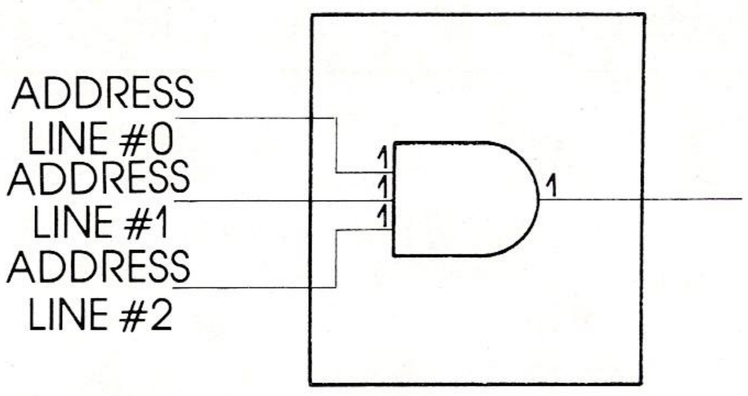


Figure 3b Inside a three-input AND, used as a black-box decoder for 1-1-1.

So far that's good. But how about a gate that responds to, say, the 0 pattern (off-off-off, 0-0-0) or the 5 pattern (on-off-on, 1-0-1)? Unfortunately, there aren't any specific gates made for those jobs, and it's hardly necessary. Computer logic is simpler than that.

Look at Figure 3c. This is a diagram of an inverter, which you can think of as a

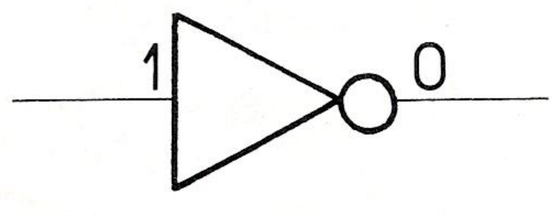


Figure 3c The NOT gate, which inverts the state of its input.

NOT gate. Its job is to invert the input signal this way: if the input is on, the NOT gate's output turns off; if the input is off, the gate's output turns on. To force the AND gate to respond yes to a pattern of 0-0-0, three NOT gates are inserted: a NOT gate is put in-between each line of the 0-0-0 pattern and each AND gate input. See how the 0 pattern (0-0-0) goes into the black box in Figure 3d, and that

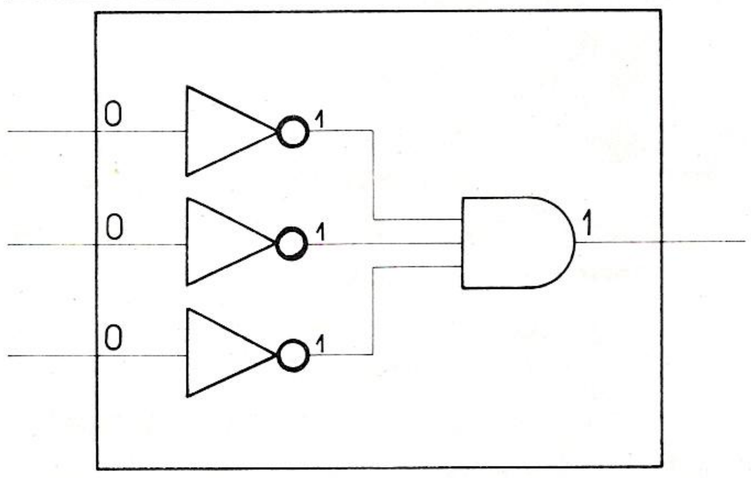


Figure 3d Three NOT gates at the inputs of the AND gate create a 0-0-0 decoder.

it is inverted to a 1-1-1 pattern before it reaches the AND gate. Since the AND gate now sees 1-1-1 instead of 0-0-0, it may respond yes.

By using NOT gates (inverters), any pattern of ons and offs can be turned into any other pattern; since the input pattern that turns on the AND gate is always 1-1-1, here's the rule: in order to decode any input pattern, inverters must be chosen that turn all offs to ons before they reach the AND gate. To make pattern 5 (1-0-1) cause a yes response, only one inverter is needed; see Figure 3e.

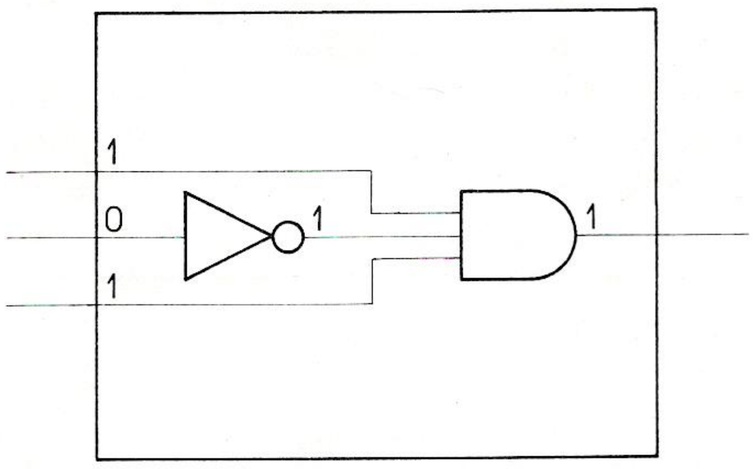


Figure 3e One NOT gate positioned at the second input of the AND gate creates a 1-0-1 decoder.

It is possible to build a separate black box decoder for every pattern, each one consisting of NOT gates as needed, plus an AND gate for the yes (select) signal. If you only had use for one specialized decoder for a single device (to run, say, a printer) this is the method you would probably choose. But if eight separate signals (for pattern 0 through pattern 7) were created, you could consolidate the efforts considerably. In the nice, even organization of a computer's memory map, such selection (demultiplexing) techniques are common.

Look at Figure 4a. Here are all the parts required to create eight select signals: the eight AND gates on the right, plus the original signals (labeled A0, A1 and A2 for Address 0, Address 1 and Address

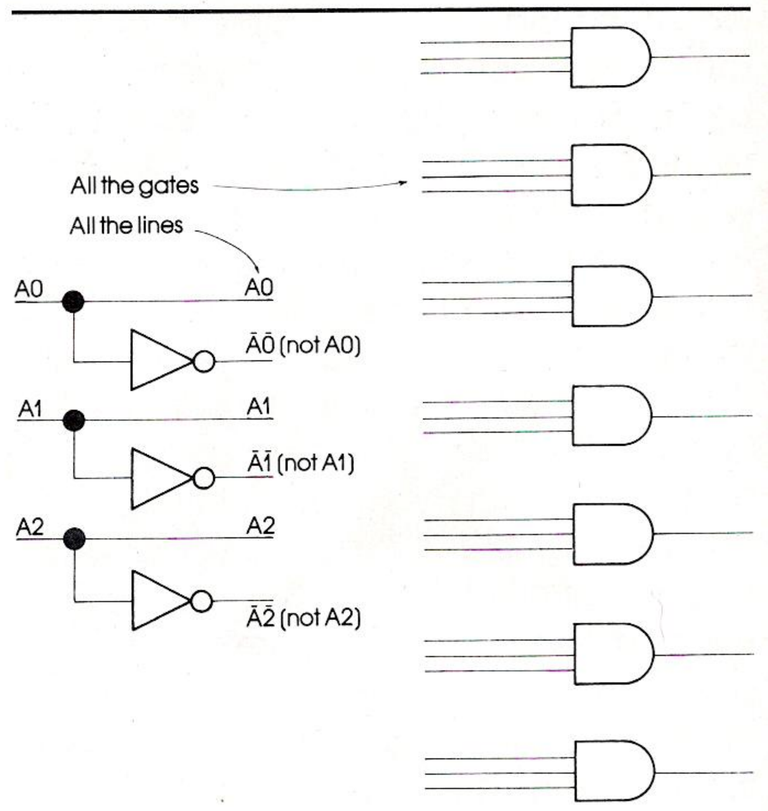


Figure 4a The component parts of a decoding scheme: three unaltered lines, A0 through A2, three lines inverted by passing them through NOT gates, and eight AND gates.

2) and their respective inversions (labeled A0-bar, A1-bar and A2-bar for NOT A0, NOT A1 and NOT A2). It's only necessary to feed the proper lines to the proper gates.

This universal black box process begins in Figure 4b. The original, unchanged

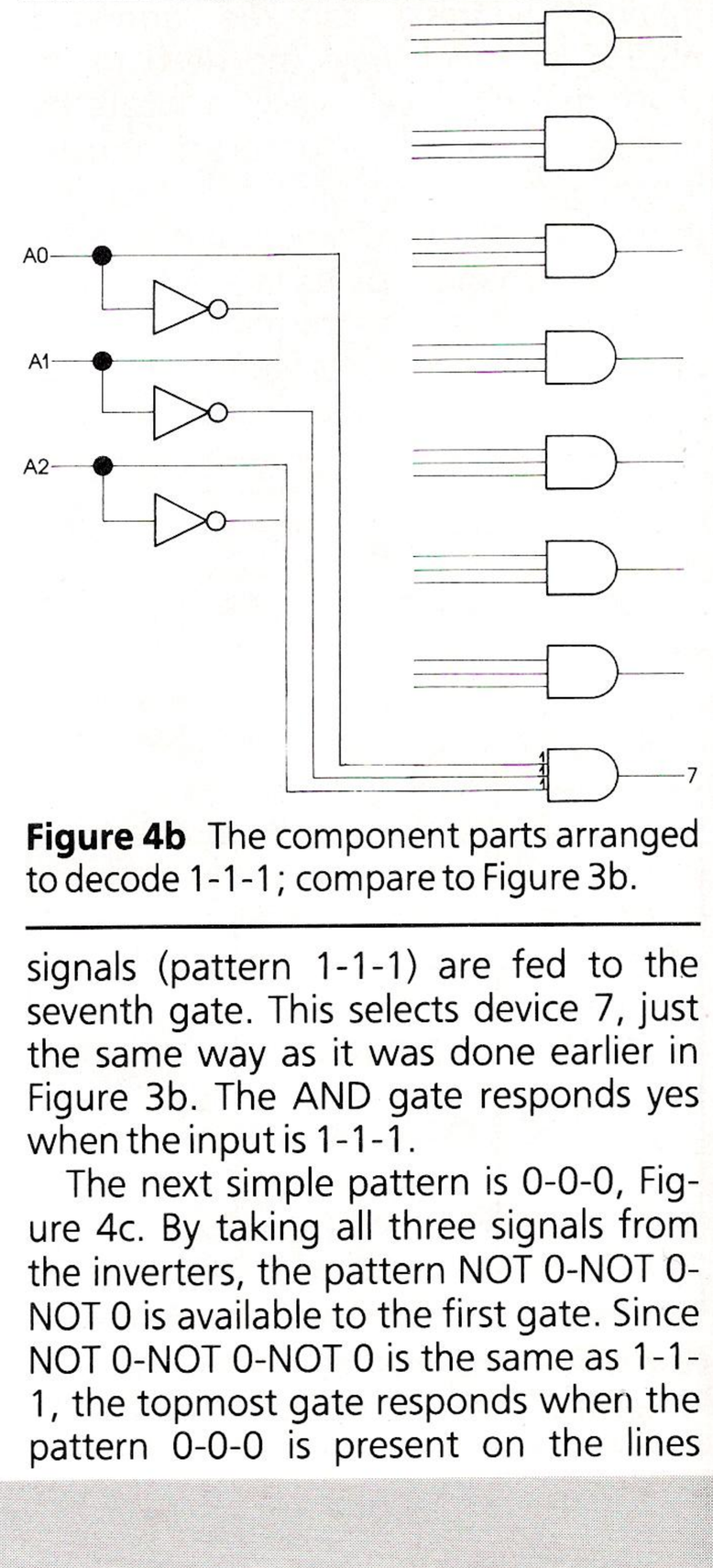


Figure 4b The component parts arranged to decode 1-1-1; compare to Figure 3b.

signals (pattern 1-1-1) are fed to the seventh gate. This selects device 7, just the same way as it was done earlier in Figure 3b. The AND gate responds yes when the input is 1-1-1.

The next simple pattern is 0-0-0, Figure 4c. By taking all three signals from the inverters, the pattern NOT 0-NOT 0-NOT 0 is available to the first gate. Since NOT 0-NOT 0-NOT 0 is the same as 1-1-1, the topmost gate responds when the pattern 0-0-0 is present on the lines

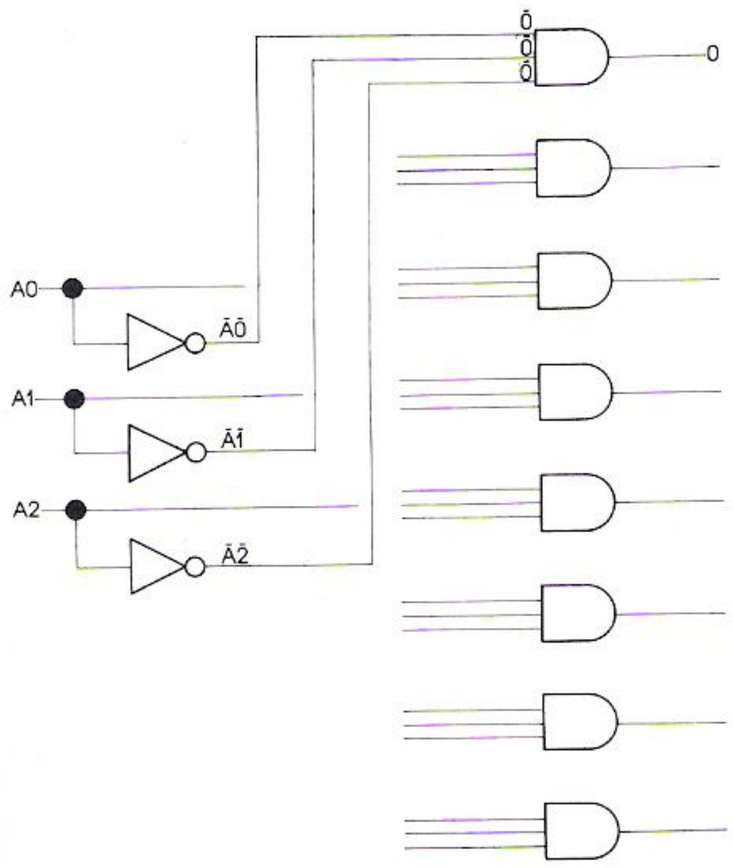


Figure 4c The component parts arranged to decode 0-0-0; compare to Figure 3d.

marked A0, A1 and A2. The AND gate responds yes the same way it did earlier in Figure 3d.

Device 5 was illustrated before, with its pattern 1-0-1. To select device 5, the unchanged A0 is routed through to the gate, but A1 is inverted first. A2 also goes right through. An incoming pattern 1-0-1 is transformed to 1-NOT 0-1 (the same as 1-1-1) before it reaches the gate. Gate 5 responds yes (See Figure 4d).

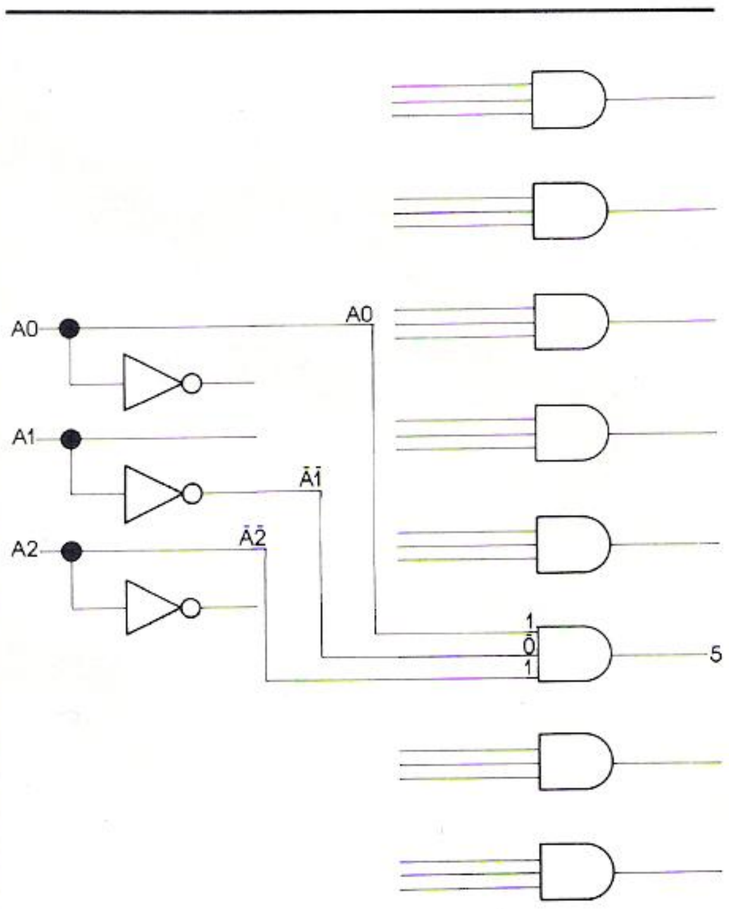


Figure 4d The parts selected to decode 1-0-1, as in Figure 3e.

Three unique patterns have now been created. Electronically, these three patterns may be combined into one larger pattern. Figure 4e shows devices 0, 5 and 7 all hooked up and ready to go, a combination of the patterns created in Figures 4b, 4c and 4d. It begins to look complicated, but if you follow the signal lines from left to right, you will see that it performs precisely the same job as the previous three separate black boxes.

There is only one more step: deriving all eight different patterns of decoding,

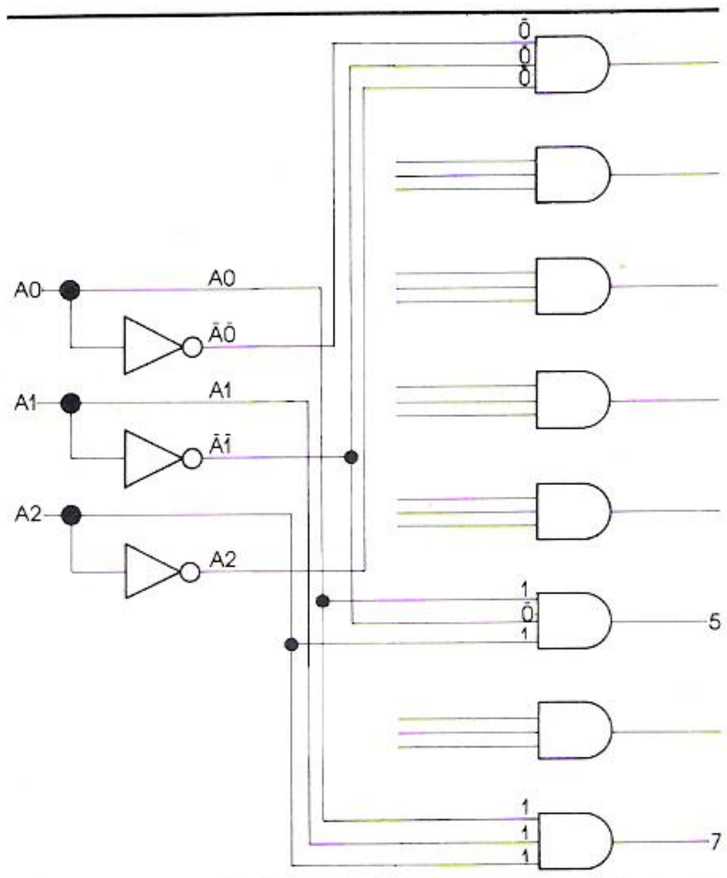


Figure 4e All three of the previous decoders created with one set of parts; one address line can feed more than one gate input, if necessary for complex decoding.

0-0-0 through 1-1-1. Each is unique, and each can be represented by different arrangements of the original signals and their inversions. This is done in Figure 4f,

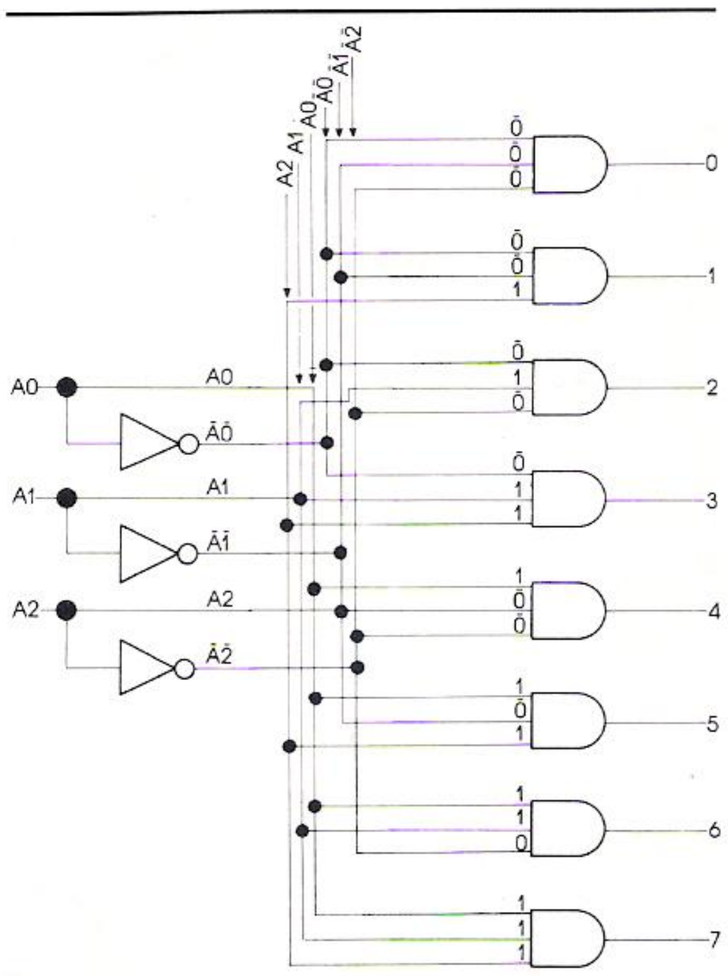


Figure 4f The complete, unique decoding of all patterns from 0-0-0 to 1-1-1.

which represents a complete 3-input, 8-output demultiplexer. In real life, this circuit could be wired with three 7411-type triple 3-input AND gate circuits, and one 7404-type hex inverter circuit.

But that isn't necessary, because demultiplexing black boxes are so important to computers. Look at Figure 5: it is the complete circuit developed to this point, and beyond. You will notice two

TRUTH TABLE

INPUTS				OUTPUTS							
$\bar{E}1$	$\bar{E}2$	E3	A0 A1 A2	$\bar{0}$	$\bar{1}$	$\bar{2}$	$\bar{3}$	$\bar{4}$	$\bar{5}$	$\bar{6}$	$\bar{7}$
H	X	X	X X X	H	H	H	H	H	H	H	H
X	H	X	X X X	H	H	H	H	H	H	H	H
X	X	L	X X X	H	H	H	H	H	H	H	H
L	L	H	L L L	L	H	H	H	H	H	H	H
L	L	H	H L L	H	L	H	H	H	H	H	H
L	L	H	L H L	H	H	L	H	H	H	H	H
L	L	H	H H L	H	H	H	L	H	H	H	H
L	L	H	L L H	H	H	H	H	L	H	H	H
L	L	H	H L H	H	H	H	H	H	L	H	H
L	L	H	L H H	H	H	H	H	H	H	L	H
L	L	H	H H H	H	H	H	H	H	H	H	L

H = HIGH voltage level
L = LOW voltage level
X = Don't care

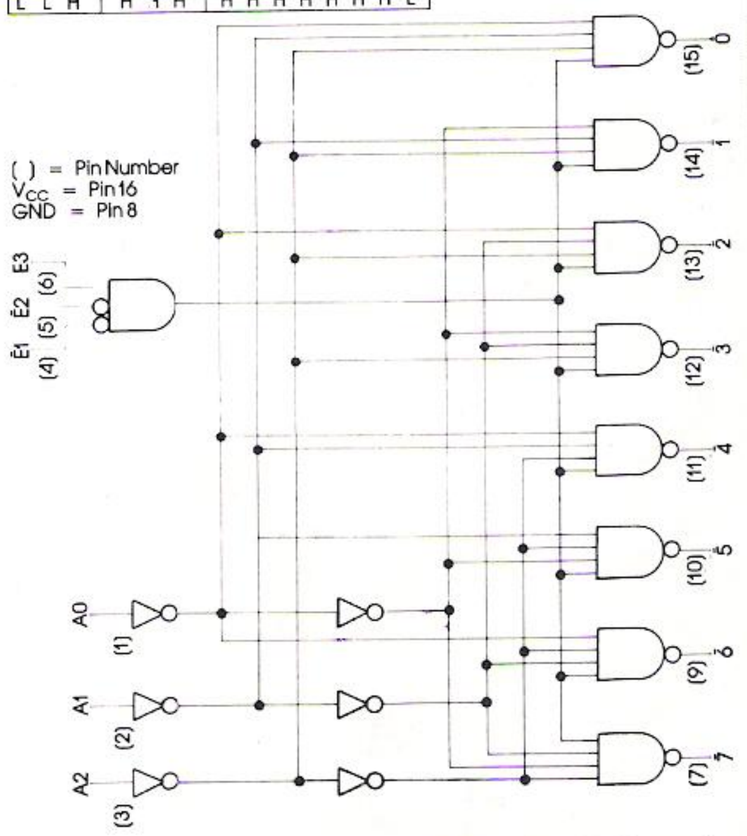


Figure 5 A commercial circuit to decode patterns from 0-0-0 to 1-1-1. Convenience inputs E1, E2 and E3 select the device as a whole, and extra inverters at A0, A1 and A2 make electrical sense (see text). Circuit courtesy of Signetics.

major differences: there are six inverters instead of three (top left), and there is another gate (top right).

Start by looking at the extra gate, and consider this question: What if you want none of the eight devices turned on? Follow the output of that extra gate, and you'll see it feeds a fourth input of *all eight* of the output gates. In other words, if this extra gate responds no, none of the eight outputs can turn on regardless of the input pattern! Good thinking, and important; I'll show you why a little later.

Next month I will present the actual question of phantom addressing, how the disk system can be made less piggish in its memory demands, and the schematics and diagrams for the CoCoPort. But save this month's column! It will help you fathom the phantom! ■■■

Correction: Figure 4 from last month's Custom Color project should be this size, not as previously presented.

— *Eds.*

4K Color Basic

The Sorcerer's Puzzles

Three wizardly puzzles for you to solve, if you can.

by Richard Ramella

AFTER A LONG AND perilous journey across the Darklands the girl named Sunflower and the boy named Poke climbed the mountain and stood at the castle's massive door behind which lived the Sorcerer.

"You knock," said Poke.

"No, you knock," said Sunflower. "I chased the dragons away. That's enough for one day."

Poke shrugged and knocked on the door.

After long minutes the massive door swung slowly open. A man stood before them; a miscreated wreck of a human being—a twisted, hunched creature with an eyepatch, a haystack of hair and a crooked grin.

"What do you want?" The creature asked them.

"We've come to see the Sorcerer," Sunflower said. "We wish to apprentice ourselves to learn his craft."

The creature named Bob sighed. *"Quelle Triste!* Never a day passes without the door being darkened by those who flock here thinking it's so simple to be a Sorcerer. *Mumbo Jumbo! Presto Chango,* eh? Well let me tell you..."

"We'd like to speak to the Sorcerer," Poke interrupted. Then he added, "if you please," and then "sir."

"It's not that simple!" roared Bob. Nothing is simple."

"Tell us what to do," said Sunflower. "And we'll do it."

"Come in so I can shut the door," Bob told them.

"You may not meet the Sorcerer for years. And you certainly won't see him if you don't pass the tests."

"Tests?" said Sunflower.

Bob thrust his head at the tired girl. "You don't know about the tests?"

"No," they said in unison.

"Follow me to the Great Hall," Bob said, curling a crooked finger at them.

On the velvet-covered table in the Great Hall was a row of seven softly glowing stones. The four on the left were orange. The three on the right were blue.

"These are magic color stones. Pass your hand along the table. At a point between any two stones, press the table gently and the two stones to left and right above your hand will exchange colors.

"If a stone is blue, it becomes orange. If it's orange, it becomes blue."

"And the test?" Sunflower asked.

"Make the fewest color-changing moves to order the stones so that no two of the same color are adjacent."

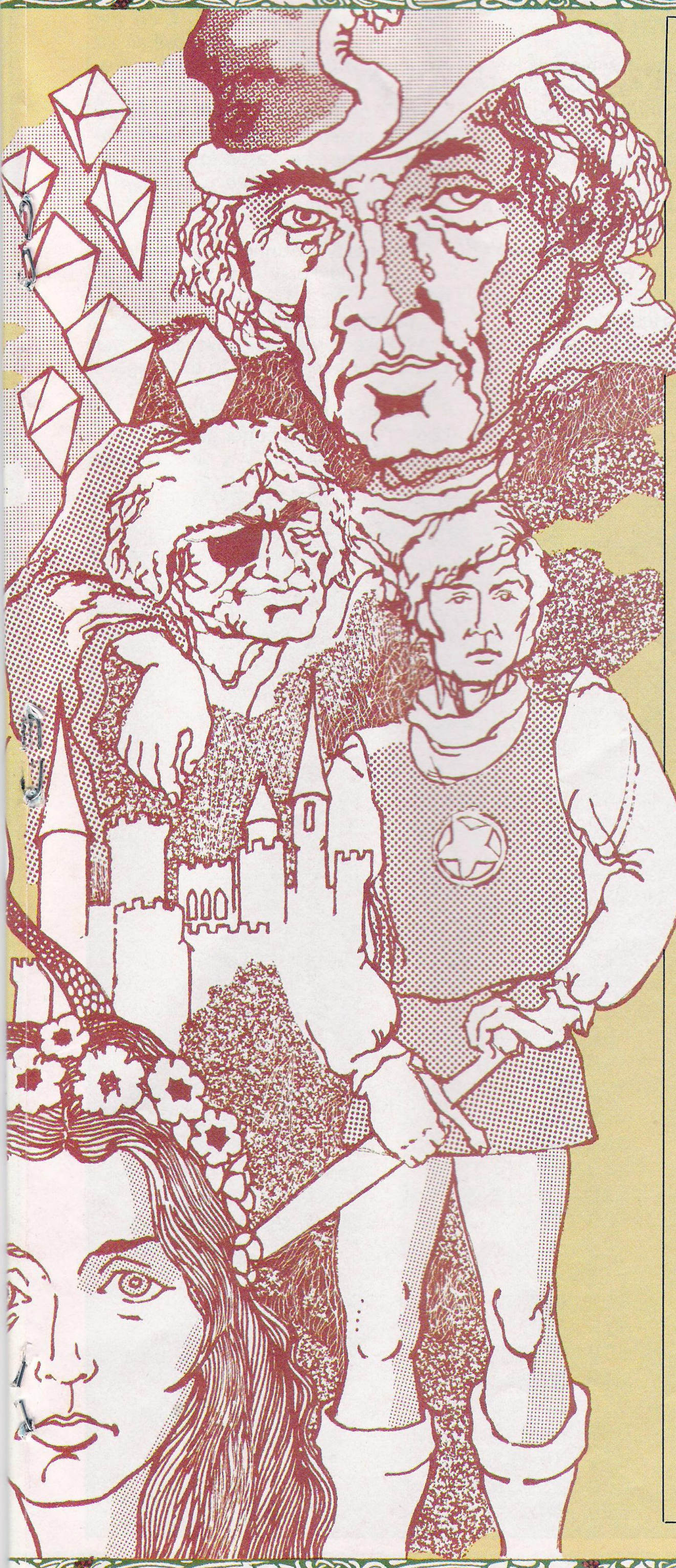
"I think I know what you mean," said Poke. "The ending order must be orange-blue-orange-blue-orange-blue-orange."

Seven stones will be drawn on your computer's screen. The white cursor below the stones represents your hand and can be moved by pressing the left and right arrow keys. When the hand reaches the desired position, press M, and the colors of the two stones to the left and right in the row above will change. The program also generates a display of your moves as a series of numbers. Put the stones in the stipulated order in the fewest possible moves.—Sorcerer's note.

Red Rover

"When, or should I say if, you complete the Color Stones, your next test awaits you in the Yellow Room." Bob pointed one of his crooked fingers toward a door

Please turn the page



Program Listing 1. Color Stones

```
110 REM * BY RICHARD RAMELLA *
120 CLS(0)
130 R$=CHR$(9)
140 L$=CHR$(8)
150 F$=CHR$(128)
160 G$=CHR$(143+64)
170 A$=CHR$(143+112)
180 B$=CHR$(143+32)
190 A$=A$+A$+A$+F$
200 B$=B$+B$+B$+F$
210 FOR A=1 TO 7
220 IF A<5 THEN C$=C$+A$ ELSE C$
=C$+B$
230 NEXT
240 A$=LEFT$(A$,3)
250 B$=LEFT$(B$,3)
260 C$=LEFT$(C$,27)
270 FOR A=1 TO 27
280 D$=D$+F$
290 NEXT
300 MID$(D$,4,1)=G$
310 PRINT @ 0,C$;
320 PRINT @ 32, D$;
330 A=4
340 X$=INKEY$
350 IF X$<>L$ AND X$<>R$ AND X$<
>"M" THEN 340
360 MID$(D$,A,1)=F$
370 IF X$=L$ OR X$=R$ GOSUB 430
380 IF X$="M" GOSUB 460
390 MID$(D$,A,1)=G$
400 PRINT @ 0,C$;
410 PRINT @ 32,D$;
420 GOTO 340
430 IF X$=L$ AND A>4 THEN A=A-4
ELSE IF X$=L$ THEN A=24
440 IF X$=R$ AND A<24 THEN A=A+4
 ELSE IF X$=R$ THEN A=4
450 RETURN
460 Z$=Z$+STR$(A/4)
470 IF LEN(Z$)>41 THEN 520
480 PRINT @ 448,Z$;
490 IF MID$(C$,A-3,3)=A$ THEN MI
D$(C$,A-3,3)=B$ ELSE MID$(C$,A-3
,3)=A$
500 IF MID$(C$,A+1,3)=A$ THEN MI
D$(C$,A+1,3)=B$ ELSE MID$(C$,A+1
,3)=A$
510 RETURN
520 PRINT @ 256,"20 MOVES UP. SO
RRY.":END
```

Please turn the page

Continued from page 33

in the far corner of the room. A yellow glow seemed to ooze through the spaces between the door and its frame.

The program draws 64 points in an eight by eight square. Note that one point is red and is the starting position. To its right is a yellow point, the ending position; the other 62 points are blue. By tapping the four directional arrow keys, you will create a trail of red. You must pass through all blue points and end your journey at the yellow point. The object is to use straight lines, this is acheived by making as few turns as possible.

Red Rover keeps its own score and prohibits illegal moves such as doubling back on or trying to cross the red line. Also, you lose if you don't end your trip on the yellow point—Sorcerer's note.

Firecracker

"Your final test for the night is Firecracker. It is in the Red Room." Bob jerked a calloused thumb behind him. Again a glow, red this time, oozed through cracks and spaces in the walls and door.

"Failing this test might cost you a finger," Bob said smiling. "The Sorcerer doesn't like loud noises, so you won't hear a bang, but I will." Now the crooked man was laughing. "Good night, young fools. I must leave to feed the bats."

The program draws a firecracker containing 20 random numbers ranging from one to nine. There is also an orange cursor that can be moved to positions over any number by tapping the arrow keys. To erase a given number, position the cursor over it and press E on the keyboard. The object is to erase all 20 numbers without exploding the firecracker.

You'll be successful when you figure out the systematic order in which the numbers must be erased to prevent an explosion. It takes patience, but then it wouldn't be much of a puzzle otherwise—Sorcerer's Note.

"You ready?" Sunflower asked Poke.

"No," said Poke. "Let's get out of here."

"You go, I'm staying."

As Poke turned to leave Sunflower called after him, "Say hi to the dragons for me."

Poke stopped and turned around. He said, "I guess we'd better get to work."

And they did. ■■■

Program Listing 2. Red Rover

```
100 REM * RED ROVER
* TRS-80 4K COLOR BASIC
*
110 REM * BY RICHARD RAMELLA *
120 CLS(0)
130 FOR Y=0 TO 14 STEP 2
140 FOR X=0 TO 28 STEP 4
150 IF Y=12 AND X=4 THEN SET(X,Y
,4): GOTO 170
160 IF Y=12 AND X=8 THEN SET(X,Y
,2) ELSE SET(X,Y,3)
170 NEXT X
180 NEXT Y
190 X=4
200 Y=12
210 A$=INKEY$
220 IF W=63 THEN 570
230 PRINT @ 448,"LINES:"V;
240 RESET(X,Y)
250 FOR T=1 TO 40
260 NEXT T
270 SET(X,Y,4)
280 IF A$=CHR$(94) AND Y-2>-1 TH
EN T$="U": GOSUB 330
290 IF A$=CHR$(10) AND Y+2<15 TH
EN T$="D": GOSUB 390
300 IF A$=CHR$(8) AND X-4>-1 THE
N T$="L": GOSUB 450
310 IF A$=CHR$(9) AND X+4<29 THE
N T$="R": GOSUB 510
320 GOTO 210
330 FOR Y=Y TO Y-1 STEP -1
340 IF POINT(X,Y-1)=4 GOTO 570
350 SET(X,Y,4)
360 NEXT Y
370 GOSUB 650
380 RETURN
390 FOR Y=Y TO Y+1
400 IF POINT(X,Y+1)=4 GOTO 570
410 SET(X,Y,4)
420 NEXT Y
430 GOSUB 650
440 RETURN
450 FOR X=X TO X-3 STEP -1
460 IF POINT(X-1,Y)=4 GOTO 570
470 SET(X,Y,4)
480 NEXT X
490 GOSUB 650
500 RETURN
510 FOR X=X TO X+3
520 IF POINT(X+1,Y)=4 GOTO 570
530 SET(X,Y,4)
540 NEXT X
550 GOSUB 650
560 RETURN
570 IF W=63 AND X=8 AND Y=12 THE
N Z$=" WINNER " ELSE Z$="BONER!
GAME OVER "
580 IF T$<>S$ THEN V=V+1
590 PRINT @ 448,"LINES:"V;
600 IF Z$<>" WINNER " AND W=63 T
HEN PRINT @ 497," WRONG ENDING "
;
610 PRINT @ 480,Z$;
620 SOUND 1,1
630 SOUND 200,1
640 GOTO 600
650 IF T$<>S$ THEN V=V+1
660 W=W+1
670 S$=T$
680 RETURN
690 END
```

Program Listing 3. Firecracker

```
100 REM * FIRECRACKER
* TRS-80 4K COLOR BASI
C *
110 REM * BY RICHARD RAMELLA *
120 CLS(0)
140 X$=CHR$(143+112)
150 D$=CHR$(94)
160 U$=CHR$(10)
170 L$=CHR$(8)
180 R$=CHR$(9)
190 PRINT @ 165," F I R E C R A
C K E R ";
200 FOR B=1 TO 5
210 FOR A=1 TO 4
220 C=RND(9)
230 A$(B)=A$(B)+RIGHT$(STR$(C),1)
240 NEXT A
250 NEXT B
260 B=1
270 B=1
280 FOR A=352 TO 480 STEP 32
290 PRINT @ A,A$(B);
300 B=B+1
310 NEXT
320 X=4
330 FOR Y=21 TO 5 STEP -1
340 SET(X,Y,4)
350 NEXT
360 A=352
370 B=1
380 C=1
390 FOR J=1 TO 4
400 Z$=INKEY$
410 IF Z$=D$ AND A>355 THEN A=A-
32: B=B-1
420 IF Z$=U$ AND A<480 THEN A=A+
32: B=B+1
430 IF Z$=L$ AND A/32<>INT(A/32)
THEN A=A-1: C=C-1
440 IF Z$=R$ AND (A-3)/32<>INT((
A-3)/32) THEN A=A+1: C=C+1
450 IF Z$<>"E" THEN 530
460 IF MID$(A$(B),C,1)=" " THEN
530 ELSE S=VAL(MID$(A$(B),C,1)):
 MID$(A$(B),C,1)=" "
470 M=M+1
480 IF M=1 OR M=3 THEN Q=S ELSE
W=S
490 IF M=2 AND W>Q OR M=4 AND W<
Q THEN 670 ELSE H=H+1
500 IF H=20 THEN PRINT @ A, " ";
: GOTO 940
510 IF M=2 OR M=4 THEN W=0: Q=0
520 IF M=4 THEN M=0
530 PRINT @ A,X$;
540 FOR T=1 TO 30
550 NEXT T
560 SET(4,4,4)
570 FOR T=1 TO 20
580 NEXT
590 RESET(4,4)
600 F=1
610 FOR G=352 TO 480 STEP 32
620 PRINT @ G,A$(F);
630 F=F+1
640 NEXT G
650 NEXT J
660 GOTO 390
670 PRINT @ 0,"OH NO...";
680 IF QQ=0 THEN PRINT "NOT AGAI
N ! ";
690 A=100
700 FOR Y=Y TO 21
710 RESET(X,Y)
720 SOUND A,1
730 A=A-5
740 FOR T=1 TO 20
750 NEXT T
760 NEXT Y
770 P=4
780 A=10
790 B=5
800 FOR X=1 TO 20
810 Z=(INT(A)+RND(B))*32+RND(P)-1
820 K=RND(7)*16
830 K$=CHR$(143+K)
840 PRINT @ Z,K$;
850 NEXT
860 A=A-.5
870 B=15-INT(A)
880 P=P+1
890 IF P>31 THEN P=31
900 IF A<0 THEN A=1
910 IF B>14 THEN B=14
920 IF B>9 THEN DEL 130 ELSE IF
QQ=0 AND B>8 THEN DEL 920
930 GOTO 800
940 PRINT @ 332,
"DEFUSED! ";
950 SOUND 176,4
960 SOUND 147,2
970 SOUND 159,3
980 SOUND 133,2
990 GOTO 940
```

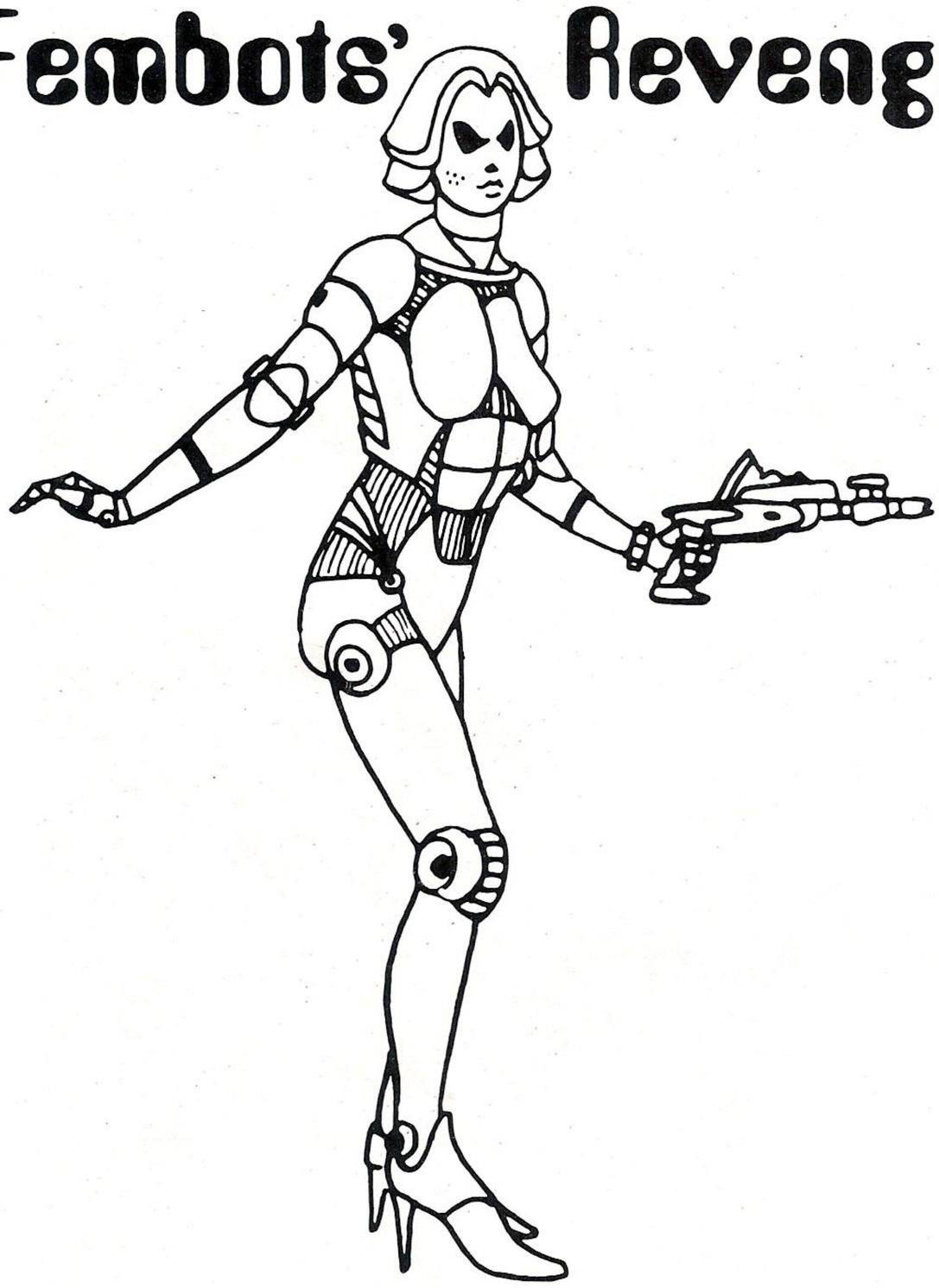
For the answers or strategies for these puzzles, send a 20-cent stamped and self-addressed envelope to Sorcerer's Puzzles, Color Computer Magazine, *Highland Mill, Camden, ME 04843. Canadians please include 40 cents coin, self-addressed envelope. Cheerful, free advice also given on problems you have with these programs.*

ColorQuest™ GAMES

For The TRS-80 Color and TDP System 100

Fast Machine Code • Hi-res Color Graphics • Exciting Arcade Action and Sound

Fembots' Revenge™



3-D GRAPHIC ADVENTURE

Make love not war? Not with these sultry FEMBOTS! What a tale you'll tell IF you live to tell it! Cold steel never felt so HOT! The color and excitement of ARCADE ACTION combined with the sophistication, intellectual challenge and skill of an ADVENTURE GAME doesn't fully describe this cosmic shoot'em up.

16K Tape $29.95 **32K Disk $34.95**

BEYOND THE CIMEEON MOON™

by Kevin Herrboldt & Tim Nelson

3-D GRAPHIC ADVENTURE

A dead star . . . A derlict vessel . . . or is it? Trapped within you must venture the corridors; defend yourself against the merciless gauntlet of agents of the machine mind. A real-time, high-res, 3-D science fiction adventure game of mind-blowing magnitude.

16K Tape $24.95 **32K Disk $29.95**

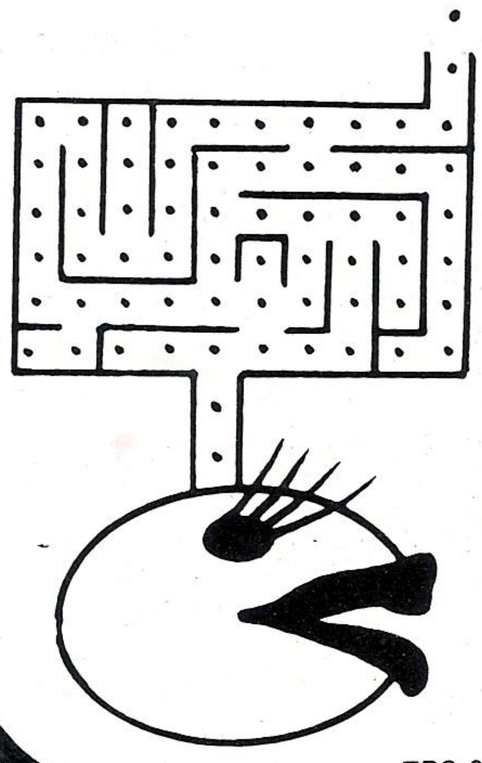
Adventure Trilogy™

by Kevin Herrboldt & Tim Nelson

3-D GRAPHIC ADVENTURE

Clash steel with thy foe in the arena of gore. Proved worthy, go in guest of the elusive Eye of Dazmor. If ye findest the orb, hast ye the might to ward off skem and the fortitude to restore the Eye? The ultimate high-res, 3-D quest for even the most experienced adventurer!

16K Tape $24.95 **32K Disk $29.95**



MS. NIBBLER™

by Tom Czarnecki

The ONLY Ms. game around. A must for your PAC-like game collection.

16K Tape $19.95
16K Disk $24.95

TRS-80 is a trademark of Tandy Corp.

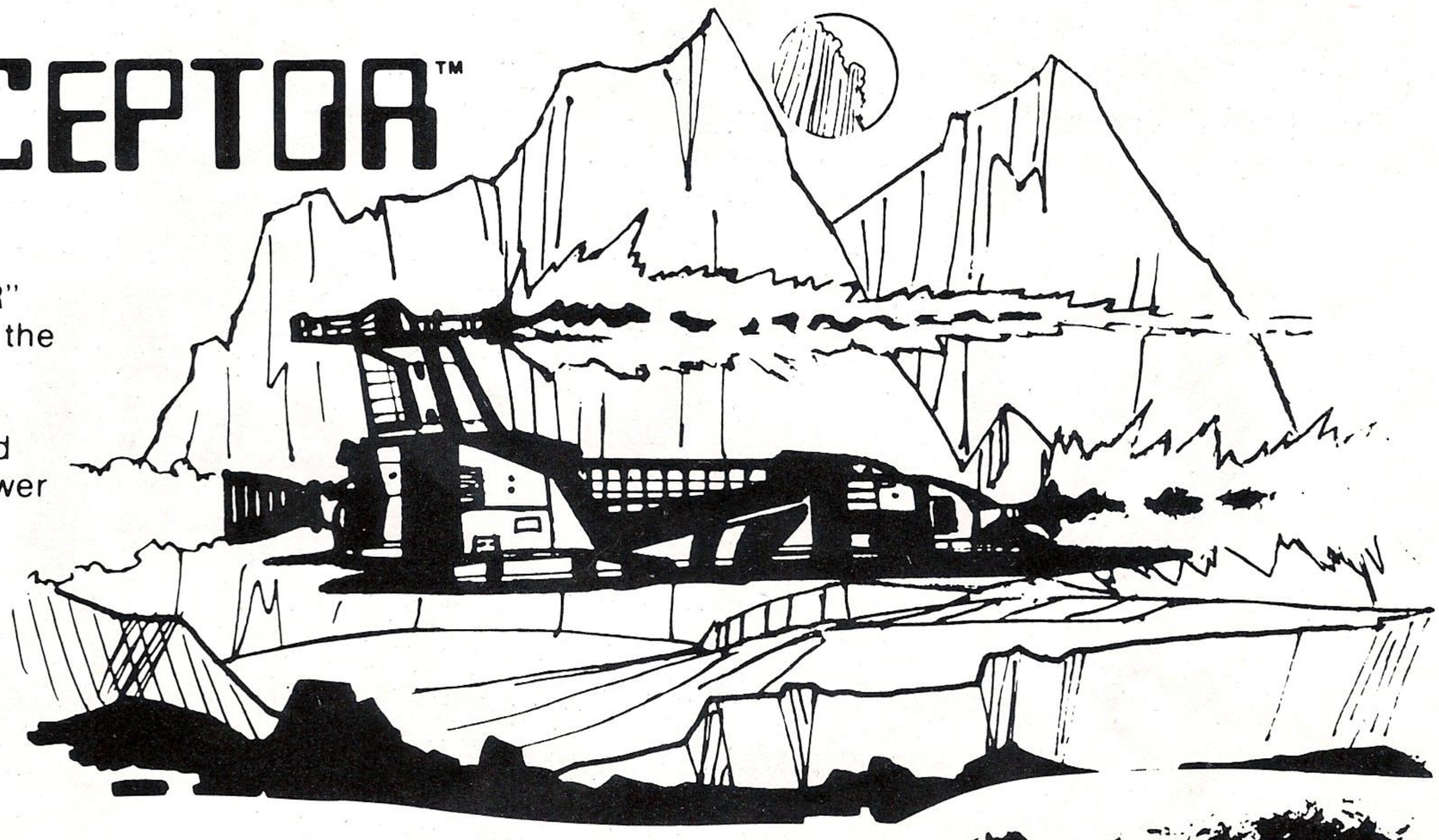
Circle No. 45 on Reader Service Card

For Orders ONLY Call Toll Free

1-800-328-2737

Fast Machine Code • Hi-res Color Graphics • Exciting Arcade Action and Sound

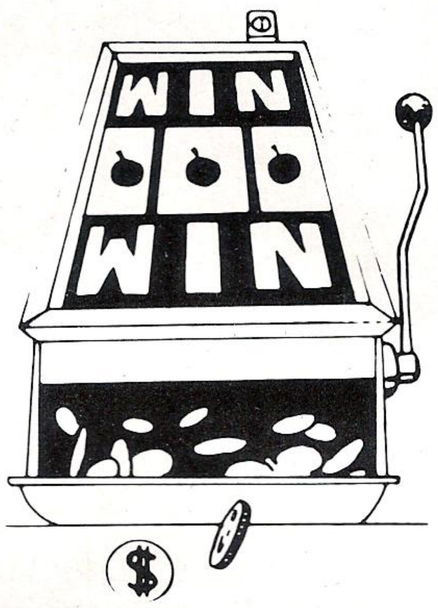
INTERCEPTOR™



by Scott Snyder

Goes beyond "DEFENDER" and "STARGATE" to offer the most realistic ARCADE simulation possible. Warp speed action, multi-colored terrain and long-range viewer make this game tops.

16K Tape $19.95
32K Disk $24.95



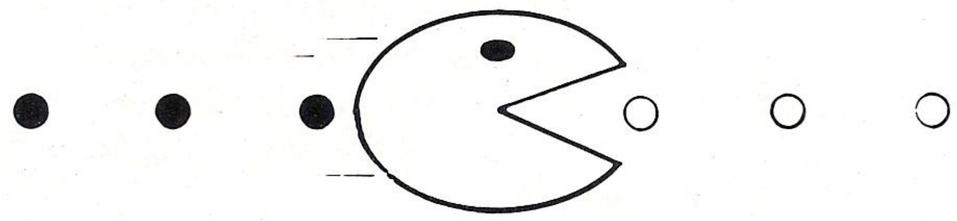
VEGAS GAMEPAK™

by Dan Nelson

Why fly to VEGAS when you can have a casino at home! The VEGAS GAMEPAK is five action packed games with great graphics & sound. SLOT MACHINE - BLACKJACK - UP AND DOWN THE RIVER - CRAPS & KENO.

16K Tape $19.95 16K Disk $24.95

THE NIBBLER™



by Tom Czarnecki

Fast paced maze chase game will entertain the entire family.

16K Tape $19.95
16K Disk $24.95

KOMET-KAZE™

by Tom Czarnecki

Shades of smartbombs and hurtling comets! Defending your planet from invasion was never so challenging. Disruptor fire is your main defense against the fierce alien attacks.

16K Tape $19.95 32K Disk $24.95

ColorQuest™

A Division of Softlaw Corp. 612/881-2777
9072 Lyndale Ave. So., Minneapolis, MN 55420

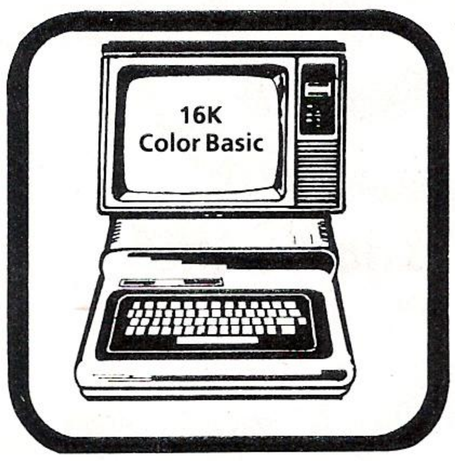
AUTHORS' SUBMISSIONS ARE ENCOURAGED

Available at Dealers everywhere.
If you Dealer is out of stock ORDER DIRECT!

ORDERING

VISA MasterCard

Customer service and product support call (612) 881-2777
Make checks or money orders payable to Nelson Software Systems. Personal checks allow 3 weeks.
MAIL ORDERS: $2.00 U.S. Shipping ($4.00 CANADA $10 OVERSEAS) Add $2.00 for C.O.D.
ORDERS SHIPPED SAME DAY!



CC Speller

Interface your Color Computer with your child's spelling problems and improve grades.

by Lynn Davis

I HATED THE WEEKLY spelling tests in elementary school. I could never figure out how to learn all those words.

I tried writing each one 10 times. When that didn't work I tried writing each word 100 times. All that did was waste 10 times the paper.

Later, much later (too much later), I figured out what I was doing wrong. I wasn't thinking about what I was doing. The boring repetition of copying a word 100 times led to inventing games out of the task: how many words could I fit on a line, or, could I break my all-time speed record of 100 words in three minutes and 32 seconds? Sure I could, but I still got the words wrong on the test.

Out of these memories of learning to spell came the idea for this program. CC Speller presents a structured way to learn to spell. It uses color, movement, and sound to keep student interest high. It keeps a running tally for students to mark their progress. Creating a spelling list is easy. CC Speller can be tailored to any student's needs.

Learning To Spell

This is not a flash card approach to short-term memorization of spelling words. The program is a series of five different activities to help kids (or adults) learn how to spell. It gently forces students to concentrate on the words to learn.

For a student to use this program successfully, he must understand the idea of breaking words into syllables. This skill is taught in the third grade, so this program will benefit anyone eight years old and older.

The Five Activities

In the first activity, the student sees a list of 14 words. The student chooses the five words that are the same. This word will be used in all five activities. After the student completes all five, the program focuses on another word from the original list, and uses it through the five lessons. This continues until all the words on the list have been used.

Activity one is an easy lesson. Most students should quickly succeed and gain confidence to continue. Each time the student chooses an answer, the program reconstructs the screen and indicates whether the responses were right or wrong. This way the student gets a constant update on his progress as well as a reminder of the answers he has already used. This feature is also used in the next activity.

Activity two presents the student with another 14-word list. This time the word from the previous lesson is spelled correctly five times and incorrectly nine times. The student chooses the five correct spellings.

In activity three, the student sounds out the word to determine the number of syllables. Next, he types in the word, using a slash to indicate the syllables in the word. The object is to get the student to break the word into smaller, easier to learn sections.

The last activity asks the student to type in the word, spelling it correctly. The point of the program is to prove to the student that, given a systematic approach, he can learn to spell.

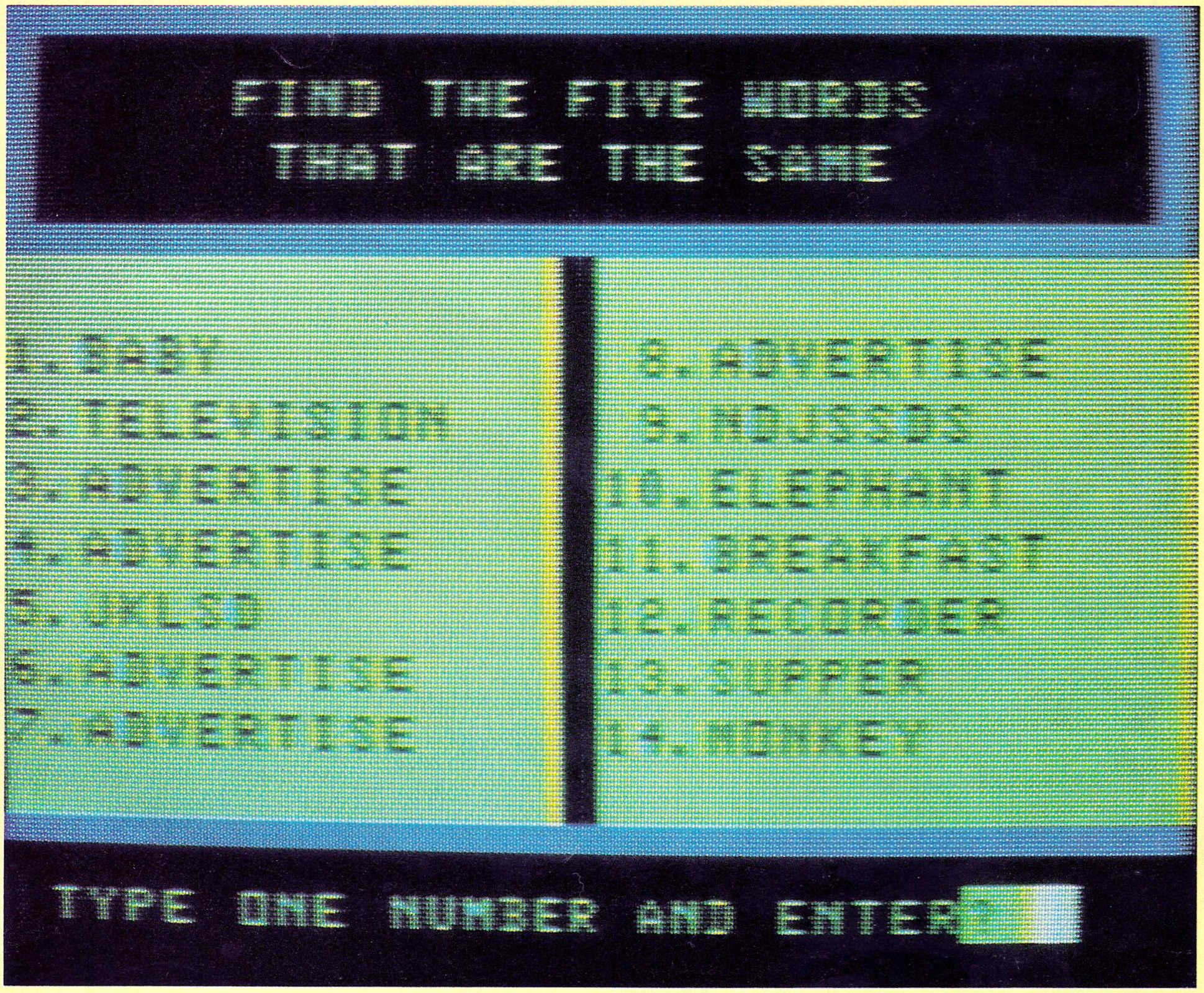
Program Parameters

The file holds a maximum of 20 words, with a minimum of 10 words in the file. Your child does not have to learn all 10 words.

If the child's list is only seven words long, enter three extra words and tell your child to stop working after the seventh word. Or use three additional

Please turn the page

Activity Two.



Program Listing.
CC Speller

```
7 REM
8 REM  TRS-80 COLOR COMPUTER
9 REM  16K COLOR BASIC
11 REM (EXT. BASIC NOT REQUIRED)
12 REM CASSETTE TAPE RECORDER
13 REM
14 REM    DECEMBER 7, 1982
15 REM
16 REM**************************

20 CLEAR 1020
30 DIM W$(21,1):DIM N(21,3):DIM
WL$(14)
40 DIM WA(14):DIM SA(14,1)
50 GOSUB 4680
55 REM INTRODUCTORY SCREEN
60 CLS(0):GOSUB 5020
70 GOSUB 5080
80 PRINT@203,"cc";R3$;"speller";

90 PRINT@265,"by";:POKE1291,58:P
RINT@268,R3$;"lynn";R3$;"davis";

100 FOR J=1 TO 5
110 GOSUB 4780
120 GOSUB 4790
130 NEXT J
140 GOSUB 5020
145 REM MENU I
150 CLS
160 PRINT"initial menu"
170 PRINT:PRINT"WHICH WOULD YOU
PREFER?"
180 PRINT"  1. TYPE IN YOUR OWN
WORDS"
190 PRINT"  2. LOAD WORDS SAVED
ON TAPE"
200 PRINT:PRINT"TYPE IN THE NUMB
ER AND PRESS"
210 INPUT"THE <enter> KEY";D1
220 IF D1<1 OR D1>2 THEN 150
230 ON D1 GOSUB 3770,3410
235 REM MENU II
240 CLS
250 PRINT"organizational menu"
260 PRINT:PRINT"  1. PRINT WORDS
 ON SCREEN"
270 PRINT"  2. ADD OR DELETE WOR
DS FROM"
280 PRINT"     YOUR LIST"
290 PRINT"  3. COMPUTER SELECTED
 RANDOM"
300 PRINT"     ORDER OF WORDS"
310 PRINT"  4. FINISHED WITH THI
S MENU"
320 PRINT:PRINT"TYPE IN THE NUMB
ER OF YOUR "
330 INPUT"CHOICE AND PRESS <ente
r>";D2
340 IF D2<1 OR D2>4 THEN 240
350 IF D2=4 THEN 380
360 ON D2 GOSUB 3570,3770,4270
370 GOTO 240
375 REM MENU III
380 CLS
390 PRINT"tape save menu"
400 PRINT:PRINT"WOULD YOU LIKE T
O SAVE THIS"
410 PRINT"SPELLING LIST ON TAPE?
"
420 PRINT:PRINT"  1. YES"
430 PRINT"  2. NO"
440 PRINT:PRINT"TYPE IN THE NUMB
ER OF YOUR"
450 INPUT"CHOICE AND PRESS <ente
r>";D3
460 IF D3<1 OR D3>2 THEN 380
470 IF D3=1 THEN GOSUB 4490
480 CLS
490 PRINT:PRINT"THE SPELLING LES
SON IS NOW"
500 PRINT"READY FOR STUDENT USE.
"
510 PRINT:INPUT"PRESS <enter> TO
 BEGIN";Z$
515 REM INTRODUCTION TO THE STUD
ENT
520 CLS
530 PRINT:PRINT"HELLO!"
540 PRINT:PRINT"PLEASE TYPE IN Y
OUR NAME AND"
```

Listing continued on page 41

Continued from page 38

words from a previous lesson — a little extra review never hurt anyone.

The maximum word length is 13 letters. When you initially enter the words, use slashes to show the syllable breaks (i.e. ad/ver/tise). The program does the rest. The computer stores what you enter, removes the slashes and stores the word spelled correctly. The program also counts the number of syllables in the word.

After typing the word list (or loading a previously saved file of words), you can do any or all of the following:

- Option 1 prints the words on the screen. This allows you to check for errors and see in what order the words will be presented to your child. The words will be shown in the order you typed them unless you choose option 2 or 3.
- Option 2 lets you add or delete words from your list. If you delete a word, all words following the deleted word will move up one position. If you add a word, it will be added to the bottom of the list.
- Option 3. Computer selected random order of words. If your child will work on these words more than once, use this feature to scramble the order of words.
- Use option 4 when you have all the words ready. You can then save the lesson on tape or begin the lesson.

Teaching Tips

Help your child with the mechanics of the activities the first couple of times to make sure he knows how to enter the responses.

Have the child inform you when he has completed the lesson. Go over the Progress Report together and offer a compliment or a brief discussion of the words that gave him trouble.

Realize that this spelling program is not designed for everyone. There are some children who know how to study spelling words and already do well on the tests. There are other kids who will need more help than this program offers.

If the program doesn't seem to be helping, ask your child's teacher for some suggestions. They will be glad to offer techniques for you to try.

You should realize that your child can outgrow the program. If your child tells you he doesn't need the computer to help him with his spelling, or that he would rather do it himself, that's great. Remember that one of the goals of education is to teach your children how to learn.

Unless your child volunteers for more, I suggest not using this program more than once or twice a week. It shouldn't become a dreaded nightly chore or punishment. It should be a tool for helping the child to become a better speller.

The Computer Program

To run CC Speller on a 16K Color Computer, give the computer the command POKE 25,6:NEW before you type or load the program from tape. This will clear extra RAM.

Because this program uses almost every byte of memory in a 16K computer, don't type in any REMarks. All the REMarks in the listing end with a number other than zero. The REMarks are included for you to see how the program operates and have no other value. Don't enter any of them.

This program operates on Color Basic.

"CC Speller uses sound, color, and movement to keep student interest high."

The Dimensional Arrays

The key to this program's operation is in its use of dimensional arrays. The arrays store the information generated as the program progresses and manipulates that information to make the program function successfully. Table 1 contains a list of the arrays and a brief description of each of them.

Line By Line

Lines 20–50 include the title screen and menus. Use this section of the program to set up the activities for your child.

Activity one starts at line 640. Lines 650–700 check to ensure there are 10 words in the file. Lines 710–760 set the variables used in the program to zero.

Lines 830–990 randomly establish the location of the five correct and nine incorrect responses. Lines 1000–1170 set up the graphics, with the GOSUB 4800 in line 1110 printing the list of words worked on in the activity. Lines 1180–1460 check and store the student's responses, and keep a tally of correct and incorrect responses.

Each time the student chooses an answer, the program reconstructs the screen and indicates whether the responses were right or wrong. This way, the student gets a constant update on his progress, as well as a reminder regarding the answers he has already used. You'll also find this feature used in activity two.

Line 1470 starts activity two. Lines 1630–1760 create the nine misspelled words. These lines take the first two letters of the word being worked on, add to that a random assortment of letters found in the word, and then add the last letter of the word.

Line 1710–1750 make sure the incorrect words are not too long or too short, and that the incorrectly spelled words don't accidentally come out spelled correctly.

The rest of the programming for activity two is similar to activity one.

Activity three starts on line 2170. In this activity, the programming is straightforward. The graphics for each activity are drawn, the computer presents the question, the student gives the answer and the computer checks that answer. The answers for these questions are predetermined in the program, and no special techniques are needed as in the first two activities.

The last three activities let the student make three incorrect responses before the computer gives the correct answer. The child can't get hung-up just because he doesn't know the correct reply.

Lines 3160–3390 contain the progress report the student will see each time he finishes a spelling word. As a teacher, I have found that kids like immediate feedback regarding their perfomance. Although sometimes impossible to do in the classroom, it presents no problem for the computer.

At this point, the child has the option to stop, start again with the first word, or go on to the next word in the list.

GOSUBS

Lines 3410 to the end of the program contains all the subsections for the various GOSUBs.

Lines 3570–3760 let you print the spelling words in the file in the numerical order the student will be working on them. Notice in line 3690 that the word number, F1, converts to a string. The Color Computer, without the Extended Color Basic command of PRINT USING, will not print numbers directly next to strings.

To get a maximum of 20 words (with a maximum length of 13 letters each) to print on one screen, the computer can't leave any spaces. You can avoid this problem by turning the numbers into

strings. Strings can be printed next to each other.

The add or delete spelling words section is in lines 3770–4260. When you add a word, line 4010 takes the word you input (with the slashes) and counts the number of syllables. Line 4020 removes the slashes and lines 4050–4070 reconstructs the word spelled correctly.

Lines 4200—4250 delete the words. Line 4240 rearranges the information stored in two arrays so that all references tot he word are removed. The array manipulation takes all the words stored after the deleted word and moves them down one position on the arrays.

Conclusion

This program not only helps kids learn to spell, it also teaches them a study technique they can use throughout life.

The program demonstrates some of the educational potential the computer has. While most parents and teachers don't have the stamina to produce and correct by hand all the activities in this program, the computer does them in an instant. It takes only a few minutes to input the words and get the activities running, making this program a worthwhile tool for anyone working with children. ■■■

Table 1. Arrays List

W$(X,0) — The word spelled out using slashes to show the syllables.

W$(X,1) — The correctly spelled word.

N(X,0) — The number of syllables in the word.

N(X,1) — The word list order.

N(X,2) — The total number of correct responses for the word as it is worked on.

N(X,3) — The number of incorrect responses for each word.

WL$(14) — Temporarily stores words for activity two (spelled right or wrong).

WA(14) — Temporarily stores the word numbers for words on the screen in activity one.

SA(X,0) — Temporarily stores the answers for activities one and two so the computer can tell if a student uses an answer more than once.

SA(X,1) — Temporarily contains one of three number flags for activities one and two. A zero flag indicates the student hasn't used that particular answer, a one indicates the student chose that answer and it was correct, and a two indicates the student got that answer incorrect.

Listing continued from page 39

```
550 PRINT"PRESS THE ENTER KEY."
560 PRINT:INPUT NA$
570 CLS:PRINT:PRINTNA$","
580 PRINT"PLEASE READ AND FOLLOW
 ALL THE"
590 PRINT"DIRECTIONS."
600 PRINT:PRINT"THE COMPUTER WIL
L BE KEEPING"
610 PRINT"TRACK OF HOW WELL YOU
DO."
620 PRINT:PRINT"GOOD LUCK!"
630 PRINT:INPUT"PRESS ENTER WHEN
 READY";Z$
635 REM ACTIVITY I
640 F=0
650 FOR NU=1 TO 20
660 N(NU,2)=0:N(NU,3)=0
670 IF N(NU,1)=0 THEN 690
680 NEXT NU
690 NU=NU-1
700 IF NU<10 THEN CLS:PRINT"you
do not have ten words!":SOUND 40
,15:PRINT:GOTO 250
710 CLS(0):F=F+1:RC=0:C2=0:C3=0:
C4=0:C5=0:C6=0
720 FOR X=0 TO 1
730 FOR Y=1 TO 14
740 WA(Y)=0
750 SA(Y,X)=0
760 NEXT Y,X
770 FOR WO=1 TO 20
780 IF N(WO,1)=F THEN 800
790 NEXT WO
800 RE=0:RC=RND(7)
810 RE=RC*16
820 R1$=CHR$(143+RE):R2$=CHR$(14
0+RE):R4$=CHR$(131+RE)
825 REM RANDOM SELECTION OF CORR
ECT AND INCORRECT RESPONSES
830 FOR X=1 TO 5
840 RA=RND(14)
850 IF WA(RA)=WO THEN 840
860 WA(RA)=WO
870 RB(X)=RA
880 NEXT X
890 FOR X=1 TO 9
900 RF=RND(NU)
910 IF RF=WO THEN 900
920 FOR Y=1 TO 14
930 IF WA(Y)=WO THEN 950
940 IF WA(Y)=RF THEN 900
950 NEXT Y
960 FOR Z=1 TO 14
970 IF WA(Z)=0 THEN WA(Z)=RF:GOT
O 990
980 NEXT Z
990 NEXT X
1000 CLS(0):PRINT@0,R1$;
1010 FOR X=1 TO 30:PRINT@X,R2$;:
NEXT X
1020 PRINT@31,R1$;:PRINT@32,R1$;
1030 PRINT@63,R1$;:PRINT@64,R1$;
1040 PRINT@95,R1$;:PRINT@96,R1$;
1050 FOR X=97 TO 126:PRINT@X,R4$
;:NEXT X
1060 PRINT@127,R1$;
1070 PRINT@38,"find";R3$;"the";R
3$;"five";R3$;"words";
1080 PRINT@71,"that";R3$;"are";R
3$;"the";R3$;"same";
1090 FOR X=128 TO 415:PRINT@X,CH
R$(143);:NEXT X
1100 CV=0
1110 GOSUB 4800
1120 FOR X=384 TO 415:PRINT@X,CH
R$(143);:NEXT X
```

Listing continued on page 42

Listing continued from page 41

```
1130 FOR X=143 TO 399 STEP 32:PR
INT@X,CHR$(128);:NEXT X
1140 FOR X=416 TO 447:PRINT@X,R2
$;:NEXT X
1150 GOSUB 5030
1160 IF C3=5 THEN 1470
1170 GOSUB 5060
1180 INPUT A1
1185 REM CHECK AND CORRECT STUDE
NT RESPONSES
1190 IF A1<1 OR A1>14 THEN 1200
ELSE 1260
1200 CLS(2)
1210 PRINT@163,NA$;",";
1220 PRINT@227,"YOUR ANSWER MUST
 BE BETWEEN";
1230 PRINT@262,"THE NUMBERS 1 AN
D 14.";
1240 GOSUB 5020
1250 GOTO 1000
1260 FOR X=1 TO 14
1270 IF A1=SA(X,0) THEN 1300
1280 NEXT X
1290 GOTO 1330
1300 CLS(3):PRINT@226,"YOU ALREA
DY USED THAT ANSWER!";
1310 GOSUB 5020
1320 GOTO 1000
1330 C2=C2+1
1340 SA(C2,0)=A1
1350 FOR X=1 TO 5
1360 IF A1=RB(X) THEN 1420
1370 NEXT X
1380 N(WO,3)=N(WO,3)+1
1390 SA(A1,1)=2
1400 GOSUB 4790
1410 GOTO 1000
1420 N(WO,2)=N(WO,2)+1
1430 C3=C3+1
1440 SA(A1,1)=1
1450 GOSUB 4780
1460 GOTO 1000
1465 REM ACTIVITY II
1470 CS=RND(7)+1:CLS(CS)
1480 FOR X=1 TO 14:WL$(X)="":NEX
T X
1490 C2=0:C3=0
1500 FOR X=1 TO 5:RB(X)=0:NEXT X

1510 FOR X=0 TO 1
1520 FOR Y=1 TO 14
1530 SA(Y,X)=0
1540 NEXT Y,X
1545 REM RANDOM PLACEMENT OF COR
RECT AND INCORRECT RESPONSES
1550 FOR X=1 TO 5
1560 RA=RND(14)
1570 FOR Y=1 TO 5
1580 IF RB(Y)=RA THEN 1560
1590 NEXT Y
1600 RB(X)=RA
1610 WL$(RA)=W$(WO,1)
1620 NEXT X
1625 REM CREATION OF NINE INCORR
ECTLY SPELLED WORDS
1630 FOR X=1 TO 14
1640 IF WL$(X)<>"" THEN 1650 ELS
E GOSUB 1670
1650 NEXT X
1660 GOTO 1770
1670 K=LEN(W$(WO,1))
1680 L=RND(K)
1690 M=RND(K)
1700 WL$(X)=LEFT$(W$(WO,1),2)+MI
D$(W$(WO,1),M,L)+MID$(W$(WO,1),L
,M)+RIGHT$(W$(WO,1),1)
1710 IF LEN(W$(WO,1))<4 THEN 174
0
1720 IF LEN(WL$(X))>LEN(W$(WO,1)
)+2 THEN 1680
1730 IF LEN(WL$(X))<LEN(W$(WO,1)
)-1 THEN 1680
1740 IF LEN(WL$(X))>13 THEN 1680
1750 IF WL$(X)=W$(WO,1) THEN 168
0
1760 RETURN
1770 CLS(CS)
1780 PRINT@34,R3$;R3$;"find";R3$
;"the";R3$;"five";R3$;"words";R3
$;"that";R3$;R3$;
1790 PRINT@66,R3$;R3$;R3$;"are";
R3$;"spelled";R3$;"correctly";R3
$;R3$;R3$;R3$;
1800 FOR X=128 TO 415:PRINT@X,CH
R$(143);:NEXT X
1810 CV=1
1820 GOSUB 4800
1830 FOR X=143 TO 399 STEP 32:PR
INT@X,CHR$(143+((CS*16)-16));:NE
XT X
1840 GOSUB 5030
1850 IF C3=5 THEN 2170
1860 GOSUB 5060
1870 INPUT A2
1880 IF A2<1 OR A2>14 THEN 1890
ELSE 1950
1890 CLS(2)
1900 PRINT@163,NA$;",";
1910 PRINT@227,"YOUR ANSWER MUST
 BE BETWEEN";
1920 PRINT@262,"THE NUMBERS 1 AN
D 14.";
1930 GOSUB 5020
1940 GOTO 1770
1950 FOR X=1 TO 14
1960 IF A2=SA(X,0) THEN 1990
1970 NEXT X
1980 GOTO 2030
1990 CLS(3):PRINT@194,NA$;",";
2000 PRINT@226,"YOU ALREADY USED
 THAT ANSWER!";
2010 GOSUB 5020
2020 GOTO 1770
2030 C2=C2+1
2040 SA(C2,0)=A2
2050 FOR X=1 TO 5
2060 IF A2=RB(X) THEN 2120
2070 NEXT X
2080 N(WO,3)=N(WO,3)+1
2090 SA(A2,1)=2
2100 GOSUB 4790
2110 GOTO 1770
2120 N(WO,2)=N(WO,2)+1
2130 C3=C3+1
2140 SA(A2,1)=1
2150 GOSUB 4780
2160 GOTO 1770
2165 REM ACTIVITY III
2170 GOSUB 5080
2180 PRINT@163,NA$;",";
2190 PRINT@195,"  HOW MANY SYLLA
BLES ARE  ";
2200 PRINT@227,"  IN THE WORD TH
AT YOU    ";
2210 FOR X=259 TO 284:PRINT@X,CH
R$(143);:NEXT X
2220 PRINT@259,"  HAVE BEEN WORK
ING ON";
2230 INPUT A3
2240 FOR X=1 TO 3:PRINT@284+X,CH
R$(G2);:NEXT X
2250 IF A3=N(WO,0) THEN 2260 ELS
E 2310
2260 N(WO,2)=N(WO,2)+1
2270 GOSUB 4780
2280 PRINT@324,"GOOD JOB, ";NA$;
"!";
2290 GOSUB 5020
2300 GOTO 2460
2305 REM INCORRECT ANSWER TRAP -
 THREE TRIES THEN ANSWER IS
```

```
 GIVEN
2310 C4=C4+1:N(WO,3)=N(WO,3)+1
2320 GOSUB 4790
2330 IF C4>2 THEN 2380
2340 PRINT@321,"SORRY, ";NA$;".
TRY AGAIN.";
2350 GOSUB 5020
2360 FOR X=321 TO 351:PRINT@X,CH
R$(G2);:NEXT X
2370 GOTO 2190
2380 CLS(4)
2390 PRINT@128,NA$;","
2400 PRINT@160,"THE WORD YOU HAV
E BEEN WORKING"
2410 PRINT@192,"ON IS ";W$(WO,1)
;"."
2420 PRINT@256,"THE WORD HAS";N(
WO,0);"SYLLABLES, AND"
2430 PRINT@288,"IS WRITTEN AS ";
W$(WO,0);"."
2440 PRINT@352,"PRESS ENTER TO C
ONTINUE";
2450 INPUT Z$
2455 REM ACTIVITY IV
2460 CLS(0)
2470 V1=RND(7)+1
2480 V2=RND(7)+1
2490 IF V2=V1 THEN 2480
2500 FOR Y=0 TO 31 STEP 4
2510 FOR X=0 TO 63
2520 SET(X,Y+1,V1)
2530 IF Y+3>31 THEN 2550
2540 SET(X,Y+3,V2)
2550 NEXT X,Y
2560 FOR Y=1 TO 28
2570 FOR X=97 TO 257 STEP 32
2580 PRINT@X+Y,CHR$(143);
2590 NEXT X,Y
2600 FOR X=256 TO 383:PRINT@X,CH
R$(143):NEXT X
2610 PRINT@99,NA$;",";
2620 PRINT@131,"TYPE THE WORD IN
 USING A";
2630 PRINT@163,"'/' TO SHOW WHER
E THE";
2640 PRINT@195,"SYLLABLES ARE FO
UND. PRESS";
2650 PRINT@227,"<ENTER> WHEN YOU
 ARE DONE.";
2660 PRINT@288,;
2670 INPUT A4$
2680 IF A4$=W$(WO,0) THEN 2690 E
LSE 2740
2690 GOSUB 4780
2700 PRINT"VERY GOOD, ";NA$;"."
2710 N(WO,2)=N(WO,2)+1
2720 GOSUB 5020
2730 GOTO 2830
2735 REM WRONG ANSWER TRAPS
2740 GOSUB 4790
2750 C5=C5+1:N(WO,3)=N(WO,3)+1
2760 IF C5=1 THEN PRINT"WRONG, "
;NA$;".";" TRY AGAIN.":GOTO 2670

2770 IF C5=2 THEN PRINT"WRONG AG
AIN. ONE LAST TRY.":FOR X=416 TO
 447:PRINT@X,CHR$(143);:NEXT X:P
RINT@416,;:INPUT A4$:GOTO 2680
2780 IF C5=3 THEN CLS(2)
2790 PRINT@160,"YOU STILL DON'T
HAVE IT CORRECT,";
2800 PRINT NA$". THE WORD SHOULD
"
2810 PRINT"BE TYPED AS "W$(WO,0)
;"."
2820 PRINT:INPUT"PRESS <ENTER> W
HEN READY";Z$
2825 REM ACTIVITY V
2830 CLS
2840 RK=0
2850 R=RND(7)+1
2860 RK=R*16
2870 G3$=CHR$(122+RK)
2880 FOR X=5 TO 26:PRINT@X,G3$:N
EXT X
2890 FOR X=32 TO 99:PRINT@X,G3$:
NEXT X
2900 FOR X=124 TO 131:PRINT@X,G3
$:NEXT X
2910 FOR X=156 TO 159:PRINT@X,G3
$:NEXT X
2920 FOR X=352 TO 355:PRINT@X,G3
$:NEXT X
2930 FOR X=380 TO 387:PRINT@X,G3
$:NEXT X
2940 FOR X=412 TO 479:PRINT@X,G3
$;:NEXT X
2950 FOR X=485 TO 506:PRINT@X,G3
$;:NEXT X
2960 PRINT@101,"TYPE THE WORD, S
PELLED";
2970 PRINT@134,"CORRECTLY, THAT
YOU";
2980 PRINT@165,"HAVE BEEN WORKIN
G ON.";
2990 PRINT@192,;
3000 INPUT A5$
3010 IF A5$=W$(WO,1) THEN 3020 E
LSE 3070
3020 GOSUB 4780
3030 PRINT"THAT'S RIGHT, ";NA$;"
!";
3040 N(WO,2)=N(WO,2)+1
3050 GOSUB 5020
3060 GOTO 3160
3065 REM WRONG ANSWER TRAPS
3070 GOSUB 4790
3080 C6=C6+1:N(WO,3)=N(WO,3)+1
3090 IF C6=1 THEN PRINT"WRONG, "
;NA$;". TRY AGAIN.":GOTO 3000
3100 IF C6=2 THEN PRINT"WRONG AG
AIN. ONE LAST TRY.":GOTO 3000
3110 IF C6=3 THEN CLS(5)
3120 PRINT@160,"YOU STILL DON'T
HAVE IT CORRECT,";
3130 PRINT NA$;".  THE WORD SHOU
LD"
3140 PRINT"BE TYPED AS "W$(WO,1)
;"."
3150 PRINT:INPUT"PRESS <ENTER> W
HEN READY";Z$
3155 REM PROGRESS REPORT
3160 CLS:T1=0:T2=0
3170 PRINT"progress report for:
"NA$
3180 FOR X=1 TO NU
3190 T1=N(X,2)+T1
3200 T2=N(X,3)+T2
3210 NEXT X
3220 T3=T1+T2:T4=INT(((T1/T3)*10
0)+.5)
3230 PRINT" FOR THE"F;:IF F=1 TH
EN PRINT"WORD YOU HAVE BEEN" ELS
E PRINT "WORDS YOU HAVE BEEN"
3240 PRINT"WORKING ON, YOU GOT"T
2"WRONG"
3250 PRINT"AND"T1"RIGHT ANSWERS,
 FOR AN"
3260 PRINT"AVERAGE OF"T4"PERCENT
."
3270 PRINT
3280 IF T4=100 THEN PRINT"you ar
e doing perfect work!"
3290 IF T4>75 AND T4=<99 THEN PR
INT"YOU ARE DOING A GOOD JOB, KE
EP  IT UP!"
3300 IF T4=<75 THEN PRINT"YOU SH
OULD CONSIDER PRACTICING  THESE
WORDS AGAIN."
3310 PRINT:PRINT"number of words
 left ="NU-F
```

Listing continued on page 44

Listing continued from page 43

```
3320 PRINT:PRINT"WHICH WOULD YOU PREFER:"
3330 PRINT"  1. STOP HERE"
3340 PRINT"  2. START OVER"
3350 IF NU-F<>0 THEN PRINT"  3. next word"
3360 INPUT"TYPE AND <ENTER> THE NUMBER";AG
3370 IF NU-F=0 AND AG=3 THEN 3160
3380 IF AG<1 OR AG>3 THEN 3160
3390 ON AG GOTO 3400,640,710
3400 END
3405 REM**TAPE LOADING SECTION**
3410 CLS
3420 PRINT"loading words from tape"
3430 PRINT:PRINT"TYPE IN THE NAME OF THE FILE"
3440 INPUT"AND PRESS <enter>";NF$
3450 PRINT:PRINT"PRESS <enter> WHEN YOU ARE READY";
3460 INPUT"TO LOAD THE FILE";Z$
3470 CLS:PRINT"scanning for ";NF$
3480 OPEN "I",#-1,NF$
3490 CLS:PRINT"loading "NF$
3500 FOR A=1 TO 20
3510 INPUT #-1,W$(A,0),W$(A,1),N(A,0),N(A,1)
3520 NEXT A
3530 CLOSE #-1
3540 CLS:PRINT"file is ready"
3550 GOSUB 5020
3560 RETURN
3565 REM SCREEN PRINT SPELLING  WORDS
3570 CLS
3580 FOR WN=1 TO 20
3590 IF N(WN,1)=0 THEN 3610
3600 NEXT WN
3610 PRINT@43,"word list"
3620 PRINT
3630 Q=63:W=79:F1=0
3640 F1=F1+1
3650 FOR Y=1 TO 20
3660 IF N(Y,1)=F1 THEN 3690
3670 NEXT Y
3680 GOTO 3750
3690 F1$=STR$(F1)
3700 IF F1>10 THEN 3730
3710 Q=Q+32
3720 PRINT@Q,F1$;".";W$(Y,1);:GOTO 3640
3730 W=W+32
3740 PRINT@W,F1$;".";W$(Y,1);:GOTO 3640
3750 PRINT@448,;:INPUT"PRESS <ENTER> FOR MENU";Z$
3760 RETURN
3765 REM ADD OR DELETE WORDS
3770 CLS
3780 PRINT"add or delete spelling words"
3790 FOR WD=1 TO 20
3800 IF W$(WD,0)="" THEN 3820
3810 NEXT WD
3820 PRINT:PRINT"DIRECTIONS:"
3830 PRINT:PRINT"<enter> : A -TO ADD A WORD"
3840 PRINT"          D -TO DELETE A WORD"
3850 PRINT"          F -IF FINISHED"
3860 PRINT:INPUT"<A OR D OR F>";AD$
3870 IF AD$="A" THEN 3910
3880 IF AD$="D" THEN 4110
3890 IF AD$="F" THEN RETURN
3900 GOTO 3770
3910 PRINT:PRINT"adding word:"WD
3920 IF WD>20 THEN PRINT:PRINT"20 word maximum":GOSUB 5020
3930 IF WD>20 THEN GOTO 3770
3940 PRINT:PRINT"TYPE IN THE WORD BY SYLLABLES,"
3950 PRINT"I.E. AD/VER/TISE, AND THEN"
3960 INPUT"PRESS <enter>";W$(WD,0)
3970 N(WD,1)=WD
3980 L=LEN(W$(WD,0))
3990 C=1:J=0
4000 FOR Y=1 TO L
4010 IF MID$(W$(WD,0),Y,1)="/" THEN C=C+1
4020 IF MID$(W$(WD,0),Y,1)<>"/" THEN J=J+1:WL$(J)=MID$(W$(WD,0),Y
,1)
4030 NEXT Y
4040 N(WD,0)=C
4050 FOR Y=1 TO J
4060 W$(WD,1)=W$(WD,1)+WL$(Y)
4070 NEXT Y
4080 L1=LEN(W$(WD,1)):IF L1>13 THEN 4090 ELSE 4100
4090 SOUND 40,8:PRINT"word has more than 13 letters!":FOR X=1 TO
2000:NEXT X:W$(WD,0)="":W$(WD,1)=""
4100 GOTO 3770
4110 PRINT:PRINT"delete a word:"
4120 PRINT:PRINT"TYPE IN THE WORD, WITHOUT"
4130 PRINT"SYLLABLES, YOU WISH TO DELETE."
4140 INPUT DW$
4150 FOR X=1 TO 20
4160 IF W$(X,1)=DW$ THEN 4200
4170 IF X=20 THEN CLS:SOUND 40,8:PRINT:PRINT"THE WORD "DW$
4180 IF X=20 THEN PRINT"IS NOT IN YOUR LIST.":FOR Z=1 TO 2000:NEX
T Z:GOTO 3770
4190 NEXT X
4200 FOR B=1 TO WD-1
4210 IF N(B,1)>N(X,1) THEN N(B,1)=N(B,1)-1
4220 NEXT B
4230 FOR CW=X TO WD-1
4240 W$(CW,0)=W$(CW+1,0):W$(CW,1)=W$(CW+1,1):N(CW,0)=N(CW+1,0):N(
CW,1)=N(CW+1,1)
4250 NEXT CW
4260 GOTO 3770
4265 REM COMPUTER SELECTED RANDOM ORDER
4270 CLS
```

```
4280 FOR WN=1 TO 20
4290 IF W$(WN,0)="" THEN 4310
4300 NEXT WN
4310 WN=WN-1
4320 PRINT"COMPUTER SELECTED RANDOM ORDER"
4330 PRINT@105,WN;"total words"
4340 PRINT@160+WN,CHR$(175);
4350 FOR Z=1 TO WN
4360 N(Z,1)=0
4370 NEXT Z
4380 FOR X=1 TO WN
4390 R=RND(WN)
4400 N(X,1)=R
4410 FOR Y=1 TO X
4420 IF X=Y THEN 4450
4430 IF N(X,1)=N(Y,1) THEN 4390
4440 NEXT Y
4450 PRINT@X+159,CHR$(255);
4460 NEXT X
4470 GOSUB 5020
4480 RETURN
4485 REM TAPE STORAGE SECTION
4490 CLS
4500 PRINT"TAPE STORAGE OF SPELLING LIST"
4510 PRINT:PRINT"TYPE IN THE NAME OF THE FILE"
4520 PRINT"AND PRESS THE <enter> KEY."
4530 PRINT:INPUT"<enter> NAME";NF$
4540 CLS
4550 PRINT:PRINT"PRESS <enter> WHEN YOU ARE READY";
4560 INPUT"TO RECORD THE FILE";Z$
4570 CLS:PRINT"saving information on tape"
4580 OPEN"O",#-1,NF$
4590 FOR A=1 TO 20
4600 PRINT#-1,W$(A,0),W$(A,1),N(A,0),N(A,1)
4610 NEXT A
4620 CLOSE #-1
4630 CLS:PRINT"FILE SAVED UNDER NAME ";NF$
4640 PRINT:PRINT"WOULD YOU LIKE A BACK-UP FILE"
4650 PRINT"TYPE <Y OR N> AND PRESS THE"
4660 INPUT"<enter> KEY";D$
4670 IF D$="Y" THEN 4490 ELSE RETURN
4675 REM STRING GRAPHICS
4680 R5$=CHR$(175)+CHR$(175)+CHR$(175)+CHR$(175)
4690 R3$=CHR$(128)
4700 FOR X=1 TO 5
4710 R6$=CHR$(191)+R6$
4720 R7$=CHR$(175)+R7$
4730 NEXT X
4740 FOR X=1 TO 6
4750 R8$=CHR$(191)+R8$
4760 NEXT X
4770 RETURN
4775 REM SOUNDS FOR CORRECT AND INCORRECT RESPONSES
4780 SOUND150,5:SOUND200,3:RETURN
4790 SOUND100,3:SOUND50,5:RETURN
4795 REM PRINT ROUTINES FOR ACTIVITIES I AND II
4800 PN=127:PP=144
4810 FOR X=1 TO 7
4820 PN=PN+32
4830 X$=STR$(X)
4840 IF SA(X,1)=0 AND CV=0 THEN PRINT@PN,X$;".";W$(WA(X),1);
4850 IF SA(X,1)=0 AND CV=1 THEN PRINT@PN,X$;".";WL$(X);
4860 IF SA(X,1)=1 THEN PRINT@PN+1,R5$;"correct";R5$;
4870 IF SA(X,1)=2 THEN PRINT@PN+1,R6$;"wrong";R6$;
4880 NEXT X
4890 FOR X=8 TO 14
4900 X$=STR$(X)
4910 PP=PP+32
4920 IF SA(X,1)=0 AND X<=9 AND CV=0 THEN PRINT@PP,X$;".";W$(WA(X)
,1);
4930 IF SA(X,1)=0 AND X<=9 AND CV=1 THEN PRINT@PP,X$;".";WL$(X);

4940 IF SA(X,1)=1 AND X<=9 THEN PRINT@PP,R7$;"correct";R5$;

4950 IF SA(X,1)=2 AND X<=9 THEN PRINT@PP,R8$;"wrong";R6$;

4960 IF SA(X,1)=0 AND X>9 AND CV=0 THEN PRINT@PP-1,X$;".";W$(WA(X
),1);
4970 IF SA(X,1)=0 AND X>9 AND CV=1 THEN PRINT@PP-1,X$;".";WL$(X);

4980 IF SA(X,1)=1 AND X>9 THEN PRINT@PP,R7$;"correct";R5$;
4990 IF SA(X,1)=2 AND X>9 THEN PRINT@PP,R8$;"wrong";R6$;
5000 NEXT X
5010 RETURN
5015 REM TIMER
5020 FOR X=1 TO 1800:NEXT X:RETURN
5025 REM REPORT TO STUDENT FOR  ACTIVITIES I AND II
5030 IF C3=5 THEN PRINT@450,NA$;",";
5040 IF C3=5 THEN PRINT@482,"YOU GOT";C3;"RIGHT AND";C2-C3;"WRONG
";:FOR X=1 TO 2000:NEXT X
5050 RETURN
5055 REM DIRECTIONS FOR ACTIVITIES I AND II
5060 PRINT@449,"type";R3$;"one";R3$;"number";R3$;"and";R3$;"enter
";
5070 RETURN
5075 REM INTRODUCTION SCREEN AND ACTIVITY III GRAPHICS
5080 CLS(0)
5090 G2=RND(7)+9:G2=(G2*16)-1
5100 M1=1023:M2=1536
5110 M1=M1+1:M2=M2-1
5120 G1=RND(7)+9
5130 G1=(G1*16)-10
5140 IF M1<1152 THEN POKE M1,G1 ELSE POKE M1,G2
5150 IF M1<1152 THEN POKE M2,G1 ELSE POKE M2,G2
5160 IF M1<1279 THEN 5110
5170 RETURN
```

The Map

A well-defined memory map is programmer's gold. Here then is Color Computer bullion in Fort Knox quantities.

by Jake Commander

THIS COLOR COMPUTER memory map is what every serious programmer needs. The map presented here is a fairly detailed outline of the portion of memory used by ROM in performing its task of interpreting all those Basic programs we type into the computer's RAM. It's much more detailed than the map presented in the *Extended Color Basic* manual — every byte for which I could find a use is documented in this article.

The map can be used in some neat little ways from Basic, but is most useful when using the ROM routines from user-written machine-code subroutines. There are a couple of Basic examples, including a small program, but we'll get to that after the map.

Use this map with care. If you plan on using any of these locations in a program, test your ideas first. Although I really enjoyed unravelling the ROM and finding the undocumented lower RAM locations, it was a difficult task and I may have some of it wrong. I do appreciate the fact that there's an incredibly tiny, infinitessimal possibility with maybe one chance in a googly that I did, in fact, get something wrong.

Second, some parameters may look easy to use, but are maintained in sneaky ways by Basic. Take location 106 for example. Its documented use is "comma column width" and you may logically deduce that by POKEing 106 with a value of 20 that you'd change all column widths to 20 instead of 16. But the Basic interpreter resets the value between every statement or your program; so if you POKE it, it will be promptly unPOKEd again by the time your next program statement has a chance to execute! This is a typical case of a situation where a location can be used from machine code, but not from a Basic program. However, take heart — there are plenty of locations which can be used to good advantage from Basic, but use care! Save all programs before POKEing and expecting weird magic to happen. As likely as not, the only magic you'll see is the irretrievable disappearance of your valuable program!

Some of the locations in the map have so far eluded my analysis, and thus are left blank. I consider this to be more accurate than labeling them "unused," and more professional than labeling them "unknown" (especially as they may indeed be unused). If you find uses for these locations, let me know through *The Color Computer Magazine*, and the information will be passed on to all. This is the way it goes when you're probing the uncharted depths of memory. I don't think you'll find many holes in this though — I have checked all "unknown" locations pretty thoroughly and have found them to remain unused; "unused" in any situation I can throw at the interpreter. To add one final touch of confusion, some locations are used for more than one purpose. This should be clear enough from the description of use in the map.

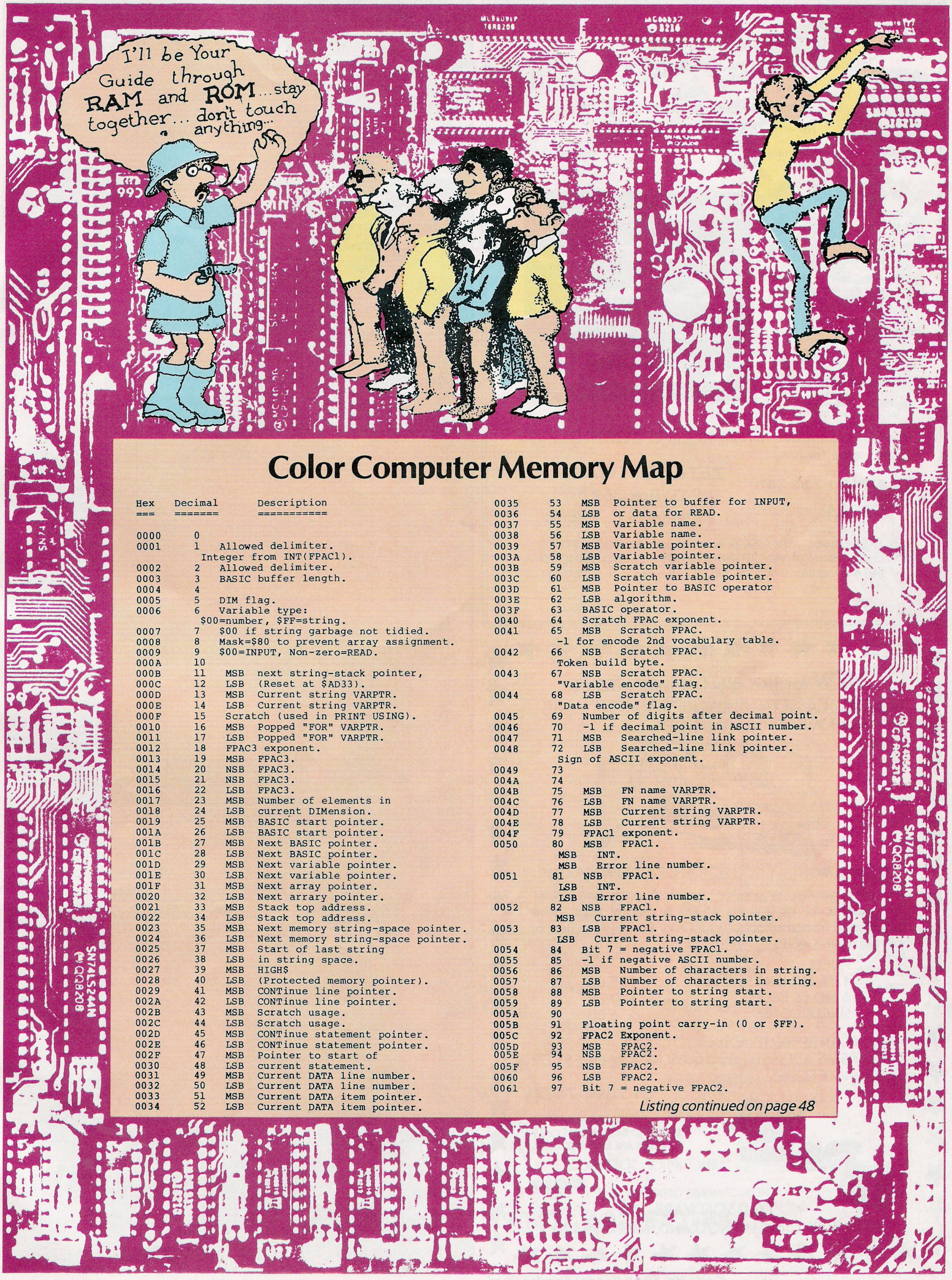
A few notes are in order to help use the memory map. First, there are a few abbreviations here and there. I've tried to keep them to a minimum. The ones most often used are FPAC for Floating Point ACcumulator, MSB for Most Significant Byte, NSB for Next Significant Byte, and LSB for Least Significant Byte. In a couple of places I use i/p and o/p for input and output mainly to help differentiate from Basic's own INPUT command.

For newcomers to hexadecimal, all map addresses are given in decimal as well as hex, but possible address contents are expressed in hex only (these numbers are preceded by $). Wherever Radio Shack has assigned a label to a particular location, it appears in quotes before the description of the location.

Finally, in perusing my efforts, I can see that some descriptions are pretty obscure. The locations in question will make much more sense when used in conjunction with the commented disassembly to be published shortly in this magazine. Experienced machine-code programmers will probably be able to decipher what I had in mind in the more esoteric descriptions. Novices will just have to go the way of all aspiring experts — by crashing the machine unexpectedly and spectacularly at every opportunity. Display a little prudence and, if you find any errors, a little forgiveness.

Here then is the map:

Text continued on p. 51



Color Computer Memory Map

Hex	Decimal		Description
0000	0		
0001	1		Allowed delimiter. Integer from INT(FPAC1).
0002	2		Allowed delimiter.
0003	3		BASIC buffer length.
0004	4		
0005	5		DIM flag.
0006	6		Variable type: $00=number, $FF=string.
0007	7		$00 if string garbage not tidied.
0008	8		Mask=$80 to prevent array assignment.
0009	9		$00=INPUT, Non-zero=READ.
000A	10		
000B	11	MSB	next string-stack pointer,
000C	12	LSB	(Reset at $AD33).
000D	13	MSB	Current string VARPTR.
000E	14	LSB	Current string VARPTR.
000F	15		Scratch (used in PRINT USING).
0010	16	MSB	Popped "FOR" VARPTR.
0011	17	LSB	Popped "FOR" VARPTR.
0012	18		FPAC3 exponent.
0013	19	MSB	FPAC3.
0014	20	NSB	FPAC3.
0015	21	NSB	FPAC3.
0016	22	LSB	FPAC3.
0017	23	MSB	Number of elements in
0018	24	LSB	current DIMension.
0019	25	MSB	BASIC start pointer.
001A	26	LSB	BASIC start pointer.
001B	27	MSB	Next BASIC pointer.
001C	28	LSB	Next BASIC pointer.
001D	29	MSB	Next variable pointer.
001E	30	LSB	Next variable pointer.
001F	31	MSB	Next array pointer.
0020	32	LSB	Next arrary pointer.
0021	33	MSB	Stack top address.
0022	34	LSB	Stack top address.
0023	35	MSB	Next memory string-space pointer.
0024	36	LSB	Next memory string-space pointer.
0025	37	MSB	Start of last string
0026	38	LSB	in string space.
0027	39	MSB	HIGH$
0028	40	LSB	(Protected memory pointer).
0029	41	MSB	CONTinue line pointer.
002A	42	LSB	CONTinue line pointer.
002B	43	MSB	Scratch usage.
002C	44	LSB	Scratch usage.
002D	45	MSB	CONTinue statement pointer.
002E	46	LSB	CONTinue statement pointer.
002F	47	MSB	Pointer to start of
0030	48	LSB	current statement.
0031	49	MSB	Current DATA line number.
0032	50	LSB	Current DATA line number.
0033	51	MSB	Current DATA item pointer.
0034	52	LSB	Current DATA item pointer.
0035	53	MSB	Pointer to buffer for INPUT,
0036	54	LSB	or data for READ.
0037	55	MSB	Variable name.
0038	56	LSB	Variable name.
0039	57	MSB	Variable pointer.
003A	58	LSB	Variable pointer.
003B	59	MSB	Scratch variable pointer.
003C	60	LSB	Scratch variable pointer.
003D	61	MSB	Pointer to BASIC operator
003E	62	LSB	algorithm.
003F	63		BASIC operator.
0040	64		Scratch FPAC exponent.
0041	65	MSB	Scratch FPAC. -1 for encode 2nd vocabulary table.
0042	66	NSB	Scratch FPAC. Token build byte.
0043	67	NSB	Scratch FPAC. "Variable encode" flag.
0044	68	LSB	Scratch FPAC. "Data encode" flag.
0045	69		Number of digits after decimal point.
0046	70		-1 if decimal point in ASCII number.
0047	71	MSB	Searched-line link pointer.
0048	72	LSB	Searched-line link pointer. Sign of ASCII exponent.
0049	73		
004A	74		
004B	75	MSB	FN name VARPTR.
004C	76	LSB	FN name VARPTR.
004D	77	MSB	Current string VARPTR.
004E	78	LSB	Current string VARPTR.
004F	79		FPAC1 exponent.
0050	80	MSB	FPAC1. MSB INT. MSB Error line number.
0051	81	NSB	FPAC1. LSB INT. LSB Error line number.
0052	82	NSB	FPAC1. MSB Current string-stack pointer.
0053	83	LSB	FPAC1. LSB Current string-stack pointer.
0054	84		Bit 7 = negative FPAC1.
0055	85		-1 if negative ASCII number.
0056	86	MSB	Number of characters in string.
0057	87	LSB	Number of characters in string.
0058	88	MSB	Pointer to string start.
0059	89	LSB	Pointer to string start.
005A	90		
005B	91		Floating point carry-in (0 or $FF).
005C	92		FPAC2 Exponent.
005D	93	MSB	FPAC2.
005E	94	NSB	FPAC2.
005F	95	NSB	FPAC2.
0060	96	LSB	FPAC2.
0061	97		Bit 7 = negative FPAC2.

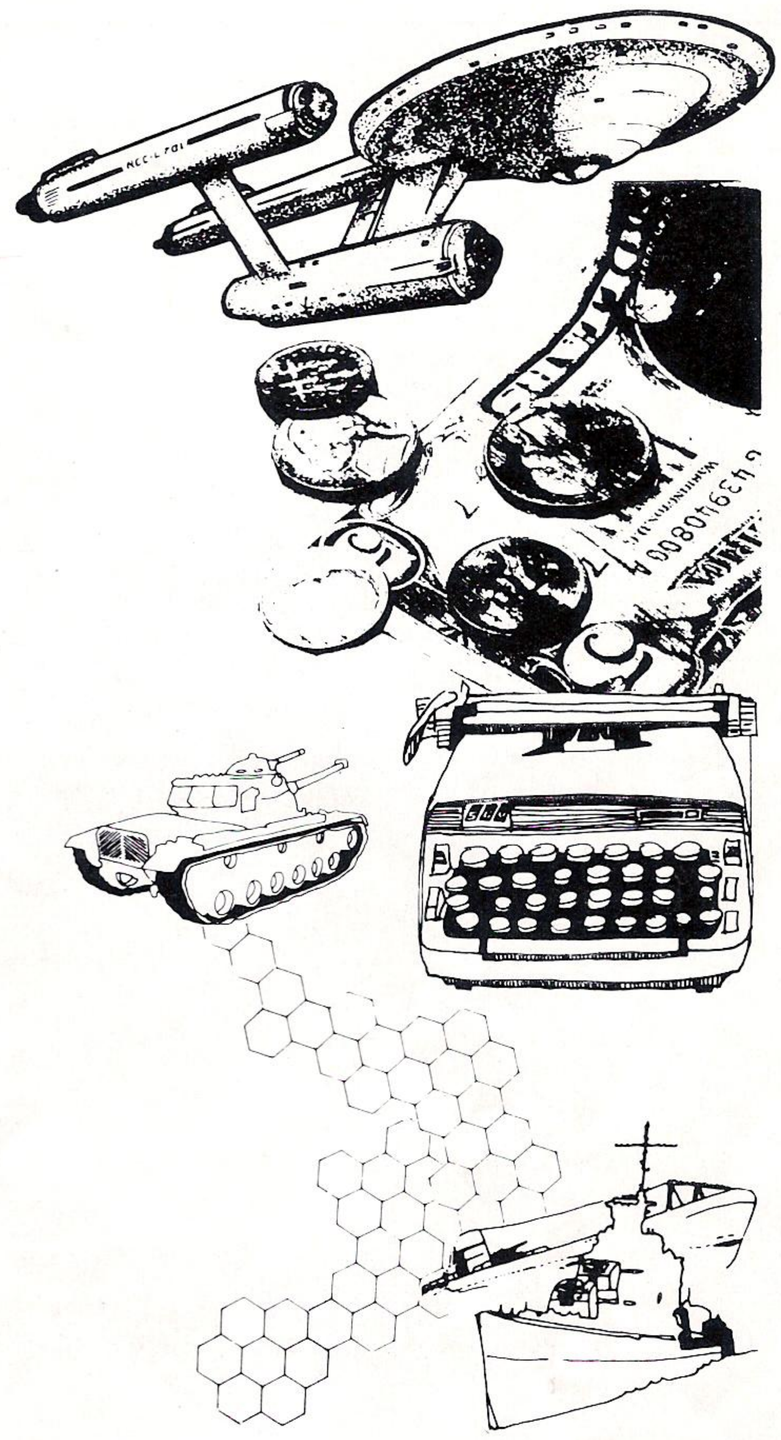
Listing continued on page 48

Listing continued from page 47

```
0062     98   MSB   String start pointer.
          Sign of FPAC1 * FPAC2.
          Scratch usage.
0063     99   LSB   String start pointer.
          Floating point carry-out byte.
0064    100   MSB   String end pointer.
0065    101   LSB   String end pointer.
0066    102   MSB   Current line number.
0067    103   LSB   Current line number.
0068    104   MSB   Current statement pointer.
0069    105   LSB   Current statement pointer.
006A    106   Comma column width.
006B    107   Maximum TAB position.
006C    108   Position in line.
006D    109   Number of characters per output line.
006E    110   PRINT device number.
006F    111   "DEVNUM". 0 = console,
          $FE=printer,
          $FF=cassette.
0070    112   0 = buffer unflushed, $FF = empty.
0071    113   "RSTFLG" $55 = startup done.
0072    114   MSB   "RSTVEC" Reset vector.
0073    115   LSB   (Must point to NOP.)
0074    116   MSB   Maximum memory in system.
0075    117   LSB   Maximum memory in system.
0076    118
0077    119
0078    120   File mode. 0 = closed,
            1 = input.
            2 = output.
0079    121   Working tally of number
          of bytes in buffer.
007A    122   MSB   Working Input/Output
007B    123   LSB   buffer pointer.
007C    124   "BLKTYP" 0 = header,
            1 = data,
            $FF = end of file.
007D    125   "BLKLEN" number of bytes in
          cassette block.
007E   126   MSB   "CBUFAD" cassette load /     007F   127   LSB
keyboard buffer pointer.
0080    128   Cassette checksum.
0081    129   Cassette input status.
1 = checksum error,
            2 = illegal load address.
0082    130   Cassette bit count.
0083    131   Cassette timing count.
0084    132   Cassette input polarity.
0085    133   Cassette last voltage out.
0086    134   Lo-res pixel information.
0087    135   INKEY$ character.
0088    136   MSB   Next cursor pointer.
0089    137   LSB   Next cursor pointer.
008A    138   MSB   Zero constant.
008B    139   LSB   Zero constant.
008C    140   SOUND pitch.
008D    141   SOUND duration.
008E    142   IRQ count.
************************************************************ 008F to
00AA is copied from A10D - A1B9 at startup. ***
008F    143   Wavelength reference.
0090    144   Upper cassette wavelength.
0091    145   Lower cassette wavelength.
0092    146   MSB   Number of bytes
0093    147   LSB   at header (128).
0094    148   Cursor-flash countdown.
0095    149   MSB   "LPTBTD" Baud-rate delay.
0096    150   LSB   Baud-rate delay.
0097    151   MSB   "LPTLND" End-of-line delay.
0098    152   LSB   End-of-line delay.
0099    153   "LPTCFW" Line print column width.
009A    154   "LPTLCF" Maximum tab.
009B    155   "LPTWID" Line print characters per line.
009C    156   "LPTPOS" Line print position.
009D    157   MSB   CLOADM entry-point.
009E    158   LSB   CLOADM entry-point.
***  009F to 00AA is code to fetch each BASIC character ***
009F/A0   159/60 INC <$A7  ;Bump LSB parse pointer.
00A1/A2   161/62 BNE *+2  ;If no carry.
00A3/A4   163/64 INC <$A6  ;Else bump MSB.
00A5    165   LDA    ;Fetch current...
00A6/A7   166/67 address  ;BASIC parse pointer.
00A8-AA   168-70 JMP $AA1A ;Back to ROM.
************************************************************
00AB    171   Scratch usage.
00AC    172   Scratch usage.
00AD    173   Scratch usage.
00AE    174   Scratch usage.
00AF    175   Trace flag.
00B0    176   MSB   DEFUSR table pointer.
00B1    177   LSB   DEFUSR table pointer.
00B2    178   Current foreground color.
00B3    179   Current background color.
00B4    180   Color in use (offset zero).
00B5    181   Color byte for video RAM.
00B6    182   Current PMODE.
00B7    183   MSB   End of current hi-res screen.
00B8    184   LSB   End of current hi-res screen.
00B9    185   Number of bytes per hi-res line.
00BA    186   MSB   Start of current hi-res screen.
00BB    187   LSB   Start of current hi-res screen.
00BC    188   Hi-res base address.
00BD    189   MSB   Start or current X coordinate.
00BE    190   LSB   Start or current X coordinate.
00BF    191   MSB   Start or current Y coordinate.
00C0    192   LSB   Start or current Y coordinate.
00C1    193   Current CSS mask (0 or 8).
00C2    194   PSET = 1, PRESET = 0.
00C3    195   MSB   Line X end coordinate.
00C4    196   LSB   Line X end coordinate.
00C5    197   MSB   Line Y end coordinate.
00C6    198   LSB   Line Y end coordinate.
00C7    199   MSB   Previous X end coordinate.
00C8    200   LSB   Previous X end coordinate.
```

Listing continued on page 50

BANKRUPTCY LIQUIDATION



MOD I & III

This offer may seem strange but it's certainly true. We have been selected to test market this special package in hopes it may bail out a recently bankrupt company. You probably know the company and most likely own some of their software. Who they are is incidental, but the offer is not. You'll never find a better buy. Read the following descriptions and see if you don't agree. As soon as you finish, give us a call or send in your order. We have a limited supply. All disks are guaranteed, as is immediate shipment.

DISK DRIVE OFFER

Can't use these programs because you don't have a disk drive. Fear-not, here's your opportunity to not only take advantage of this offer, but you can upgrade at the same time for a huge savings. We'll sell you a brand spankin new TANDON disk drive for $249.00 (Add $5.00 to each drive for shipping and handling). Disk drive cables ($25.00 ea. If that's not enough how about a 16K upgrade kit for only $29.95. How about 10 100% guaranteed RAMPARTS Disks (Single Sided Double Density—works with both MOD I & MOD III) for only $19.95.

Buy any of the above programs and you are eligible to purchase disk drives, drive cables, upgrade kits, or disks at the prices listed. No excuses now. We've given you every chance. You'll never find another deal like this.

Guarantee: All disk drives warranteed 90 days from date of purchase. All software and disks guaranteed by RAMPARTS. Software and disks will be replaced if found defective. All software sales final. No refunds on any items returned.

COLOR COMPUTER PROGRAMS AVAILABLE ON SELECTED PROGRAMS. PLEASE WRITE FOR MORE INFORMATION.

SIMULATION GAMES

Kriegspiel II	19.95
Warpath	19.95
Pork Barrel	14.95
Taipan	14.95
Up-Periscope	19.95
RETAIL PRICE	89.75
Liquidation Price	**49.95**

HANDLING $2.50
Requires 32K

EDUCATIONAL

Typing Tutor	19.95
9 Games for Preschoolers	14.95
Astronomy Hndbk	14.95
Roots	19.95
Periodical Cross Reference	19.95
RETAIL PRICE	89.75
Liquidation Price	**49.95**

HANDLING $2.50
Requires 32K

BUSINESS

Payrol	39.95
Small Business Bookkeeping	29.95
Inventory "S"	59.95
RETAIL PRICE	129.85
Liquidation Price	**69.95**

HANDLING $2.50
Requires 32K

LANGUAGES

Pascal-80	99.95
APL-80	39.95
RETAIL PRICE	139.90
Liquidation Price	**69.95**

HANDLING $2.50
Requires 48K

UTILITIES

Tiny Comp Floppy disk Diagnostic	24.95
Dynamic Data Base	39.95
File Manager 80	49.95
RETAIL PRICE	139.80
Liquidation Price	**69.95**

HANDLING $2.50
Requires 32K

SPACE GAMES

Star Trek III.5	19.95
X-WING II	14.95
Alien Invaders	14.95
Space Battles	14.95
RETAIL PRICE	64.75
Liquidation Price	**29.95**

HANDLING $2.50
Requires 32K

SPECIAL PACKAGE

Personal Finance Dome Bookkeeping (small business bookkeeping)	29.95
9 Games for Preschoolers	14.95
Tiny Comp	24.95
Inventory "S"	59.95
Pascal-80	99.95
APL-80	39.95
Floppy Disk Diagnostic	24.95
Typing Tutor	19.95
RETAIL PRICE	329.55
Liquidation Price	**129.95**

HANDLING $2.50
Requires 48K

RAMPARTS

Box S-8 Gulf Road, Greenfield, N.H. 03047 603-547-8827
Quick Service Code CC002

VISA
MasterCard

Circle No. 20 on Reader Service Card

Listing continued from page 48

```
00C9    201   MSB   Previous Y end coordinate.
00CA    202   LSB   Previous Y end coordinate.
00CB    203   MSB   Circle X center coordinate.
00CC    204   LSB   Circle X center coordinate.
00CD    205   MSB   Circle Y center coordinate.
00CE    206   LSB   Circle Y center coordinate.
00CF    207   MSB   Circle radius.
          MSB   Array start.
          RENUM increment.
00D0    208   LSB   Circle radius.
          LSB   Array start.
00D1    209   MSB   Circle H/W ratio 256 up.
          MSB   RENUM start line number.
00D2    210   LSB   Circle H/W ratio 256 up.
          LSB   RENUM start line number.
00D3    211   MSB   RENUM link pointer to start line.
          MSB   Machine code offset.
00D4    212   LSB   RENUM link pointer to start line.
          LSB   Machine code offset.
00D5    213   MSB   RENUM new line number.
          MSB   PRINT USING field pointer.
          DRAW no-update flag.
          Note timing decrement.
00D6    214   LSB   RENUM new line number.
          LSB   PRINT USING field pointer.
          DRAW blank flag.
00D7    215   Number of characters in EDIT buffer.
          Current USING delimiter.
          Number of commas required in number.
          PAINT up/down flag.
00D8    216   EDIT list flag.
          GET/PUT flag.
          Number characters after point in USING.
          Border color.
00D9    217   Number characters before decimal point.
          Circle end point.
          MSB   Pixel-to-video jump address.   00DA   218   LSB
Pixel-to-video jump address.
          PRINT USING formatter flag bits.
00DB    219   Pixel-changed flag.
00DC    220
00DD    221
00DE    222   Current octave (offset zero).
00DF    223   Current amplitude.
00E0    224   Current amplitude.
00E1    225   Current note length.
00E2    226   Current tempo.
00E3    227   MSB   Note length.
00E4    228   LSB   Note length.
00E5    229   Number of dots after current note length.
00E6    230   Input baud-rate delay.
00E7    231   RS-232 input timeout counter.
00E8    232   DRAW angle (0 - 3).
00E9    233   DRAW scale number.
00EA/F2   234/42 Used by Disk Basic.
00F3/FF   243/55
************************************************************
***  0100 - 0111 are 6809 interrupt vectors        ***
***  redirected from vectors at FFF2 - FFFD        ***
0100/02   256/58 SWI3 JMP.
0103/05   259/61 SWI2 JMP.
0106/08   262/64 SWI JMP.
0109/0B   265/67 NMI JMP.
010C/0E   268/70 IRQ JMP.
010F/11   271/73 FIRQ JMP.
************************************************************
0112    274   MSB   USR vector Color BASIC.
          MSB   Timer value Extended BASIC.
0113    275   LSB   USR vector Color BASIC.
          LSB   Timer value Extended Basic.
0114    276
0115    277
0116/19   278/81 Random number generator seed.
011A    282   0 = lowercase, $FF = uppercase.
011B    283   MSB   Keyboard debounce delay.
011C    284   LSB   Keyboard debounce delay.
011D/1F   285/87 Exponentiation routine JMP.
0120    288   MSB   Command vocabulary table pointer.
0121    289   LSB   Command vocabulary table pointer.
0122    290
0123    291   MSB   Command jump table pointer.
0124    292   LSB   Command jump table pointer.
0125/29   293/97
012A    298   Number of Extended BASIC table entries.
012B    299   MSB   Extended vocabulary pointer.
012C    300   LSB   Extended vocabulary pointer.
012D    301   MSB   Token > $B4 vector.
012E    302   LSB   Token > $B4 vector.
012F    303   Number of Extended BASIC function
          table entries.
0130    304   MSB   Extended function vocabulary
          pointer.
0131    305   LSB   Extended function vocabulary
          pointer.
0132    306   MSB   Function > $93 vector.
0133    307   LSB   Function > $93 vector.
0134/36   308/10
0137    311   MSB   Token > $CD vector.
0138    312   LSB   Token > $CD vector.
0139/3B   313/15
013C    316   MSB   Function > $A1 vector.
013D    317   LSB   Function > $A1 vector.
013E    318   MSB   DEFUSR0 pointer.
013F    319   LSB   DEFUSR0 pointer.
0140    320   MSB   DEFUSR1 pointer.
0141    321   LSB   DEFUSR1 pointer.
0142    322   MSB   DEFUSR2 pointer.
0143    323   LSB   DEFUSR2 pointer.
0144    324   MSB   DEFUSR3 pointer.
0145    325   LSB   DEFUSR3 pointer.
0146    326   MSB   DEFUSR4 pointer.
0147    327   LSB   DEFUSR4 pointer.
0148    328   MSB   DEFUSR5 pointer.
0149    329   LSB   DEFUSR5 pointer.
014A    330   MSB   DEFUSR6 pointer.
014B    331   LSB   DEFUSR6 pointer.
```

```
014C    332   MSB   DEFUSR7 pointer.
014D    333   LSB   DEFUSR7 pointer.
014E    334   MSB   DEFUSR8 pointer.
014F    335   LSB   DEFUSR8 pointer.
0150    336   MSB   DEFUSR9 pointer.
0151    337   LSB   DEFUSR9 pointer.
0152    338   Keyboard rollover bits @,H,P,X,0,8,enter
0153    339   Keyboard rollover bits A,I,Q,Y,1,9,clear
0154    340   Keyboard rollover bits B,J,R,Z,2,:,break
0155    341   Keyboard rollover bits C,K,S,up,3,;
0156    342   Keyboard rollover bits D,L,T,down,4,comma
0157    343   Keyboard rollover bits E,M,U,left,5,-
0158    344   Keyboard rollover bits F,N,V,right,6,.
0159    345   Keyboard rollover bits G,O,W, ,7,/,shifts
015A    346   "POTVAL" Left joystick vertical.
015B    347   Left joystick horizontal.
015C    348   Right joystick vertical.
015D    349   Right joystick vertical.
*************************************************************
***  015E - 01A8 are JMP links from BASIC          ***
015E/60   350/52 JMP before OPEN.
0161/63   353/55 JMP after got device number.
0164/66   356/58 JMP before o/p parameter initialization.
0167/69   359/61 JMP before PRINT.
016A/6C   362/64 JMP before INPUT.
016D/6F   365/67 JMP before i/p file OPEN check.
0170/72   368/70 JMP before o/p file OPEN check.
0173/75   371/73 JMP before CLOSE all files.
0176/78   374/76 JMP during CLOSE.
0179/7B   377/79 JMP during PRINT.
017C/7E   380/82 JMP at end of INPUT.
017F/81   383/85 JMP before PRINT pause/break check.
0182/84   386/88 JMP before keyboard buffer input.
0185/87   389/91 JMP from A4BF.
0188/8A   392/94 JMP before end of file.
018B/8D   395/97 JMP before BASIC operator check.
018E/90   398/400 JMP before error (1).
0191/93   401/03 JMP before error (2).
0194/96   404/06 JMP before RUN.
0197/99   407/09 JMP during ASCII to floating point.
019A/9C   410/12 JMP between BASIC statements.
019D/9F   413/15 JMP from A8C4.
01A0/A2   416/18 JMP during GET/PUT.
01A3/A5   419/21 JMP before encoding BASIC line.
01A6/A8   422/24
01A9/D0   425/64 String pointer stack.
01D1    465   Number of filename characters.
01D2/D9   466/73 Filename requested.
01DA/E1   474/81 Filename found.
01E2    482   File type. 0 = BASIC,
              1 = data,
              2 = binary.
01E3    483   MSB   Offset.
01E4    484   LSB   Offset.
01E5    485   MSB   Entry point.
01E6    486   LSB   Entry point.
01E7    487   MSB   Start address.
01E8    488   LSB   Start address.
01E9/FF   489/511
```

Continued from page 46

As a simple example of using locations from the map, here is a short program to draw a wheel and roll it across your screen. Locations 196 and 198 are used in line 220 to help draw the spokes of the wheel. By drawing three wheels, all with spokes at slightly differing angles and flashing the images one after the other, the wheel appears to rotate.

If you want to amaze a friend who's come to visit and ogle at your Color Computer's wonderful Basic interpreter, try this one. Load a program (for heaven's sake don't do this with an unsaved version), then POKE 139 with 1. The poor computer now loses its marbles, but in an interesting way. The locations at 138 and 139 are a 16-bit zero constant; the Basic in the Color Computer always takes these bytes as its source of the number zero. Only now it ain't zero anymore — list the program and see what you get. ■■■

Program Listing 2

```
10 PMODE4,1:COLOR0,1
20 X=128:Y=96:R=8:ST=1/5:DIMA1(6,6),A2(6,6),A3(6,6),A4(6,6)
30 HW=1
40 FORWH=0TO1/8STEP1/16:PCLS
50 FORS=WH TO1+WH STEPST
60 E=S+ST':X=X-.125:Y=Y-.05:R=R-.1
70 GOSUB210
80 NEXTS:ONWH*16GOTO100,110
90 GET(109,81)-(143,111),A1,G:GOTO120
100 GET(109,81)-(143,111),A2,G:GOTO120
110 GET(109,81)-(143,111),A3,G
120 NEXTWH
130 PCLS:SCREEN1,1
140 B=81:D=111
150 FORX=20TO240STEP1:A=X-19:C=X+15
160 PUT(A,B)-(C,D),A1,PSET
170 PUT(A,B)-(C,D),A2,PSET
180 PUT(A,B)-(C,D),A3,PSET
190 NEXTX
200 GOTO200
210 CIRCLE(X,Y),R,2,HW,S,E
220 LINE(PEEK(196),PEEK(198))-(X,Y),PSET
230 RETURN
```

REVIEW$

LAST MONTH I DESCRIBED five different Color Computer word processors. This month I'll conclude with three more word processors.

The features of each word processor are summarized in Table 1. For a fair comparison to the programs described last month, I used the same chart. The first line of the table tells you the medium of the program; this month all are disk programs. The next line tells you whether the program is in machine-language or Basic.

One important consideration in choosing and using a word processor is the amount of room left for text after loading the program. The next three lines of Table 1 summarize this information. The display size is the number of characters across the screen by the number of lines.

The manuals are very important for learning and using the programs. I consider one of the most important aspects of a manual to be a summary page, one or two pages that list all the commands and their syntax. I find that I forget what every command does and often need a quick reference card to remind me of what I can do and how to do it. For the most part I found the manuals to be well written. The ratings used for the manuals are relative among the group examined.

The Programs

The word processors are divided into two categories: Basic programs; and machine-language programs. Basic programs offer customization advantages. If you know a little programming you can set them up to operate your printer's special features. While their text editing capabilities are slight, their flexibility and ease of alteration makes up for these deficiencies.

Not all the commands of the processors are reviewed. If you have a specific question, call the producer of the software.

One update from last month: Cercomp has produced an improved version of Textpro *that operates in a 64K RAM computer, leaving you 54K of text room. It retails for $79.95, disk only.*

C.C. Writer

Transformation Technologies
194 Lockwood Lane
Bloomingdale, IL 60108
$32

C.C. WRITER IS AVAILABLE on cassette and disk. The package comes as two programs: a Format program and the word processor itself.

The Format program sets the various printer defaults for your system: form feed (ejecting the rest of a page without printing on it); single sheet page pause; paper eject (the last page of your document automatically form feeds to the bottom of the page for you); justification; single or double space the text, and draft copy. Also, left margin set; line length set; number of spaces used for paragraph indentation; number of lines per page; printer baud rate; and the number of lines skipped at the top of a page are all set up by the Format program. Only the Baud rate doesn't have a default value (the value used if you don't specify one).

A master menu controls C.C. Writer that lets you select whether you want to create text, insert text, edit a line of text, save the file, move text, backup text file to disk, delete text, global edit, load text, print text, change the print format, or quit.

While typing text you also specify the formatting commands, such as skipping to a new paragraph (which always skips a line between the paragraph), skipping lines, and so forth (see Table 1 for a summary of the commands). When entering text, use the backspace key to correct any line errors in a line, until you press Enter. Once pressed, you must use the edit function to correct any mistakes on that line.

C.C. Writer is simple and straightforward to use, as is the documentation, a 22 page 8-½ by 11 inch booklet. The manual includes a short tutorial on how to use C.C. Writer.

COLOR SCRIBE 4.0

Computerware Software Services
Box 668
4403 Manchester Ave.
Suite 102
Encinitas, CA 92024
(714) 436–3512
$49.95

COLOR SCRIBE ISN'T a menu driven program. After loading the program you are in the command mode, and can either input text or load a file. Unlike C.C. Writer, which asks you to terminate each sentence with Enter, Color Scribe lets you type up to 127 characters on a line. If you try to type more than this number, the program beeps, rejects the typed character, and waits for you to press Enter. You don't have to type 127 characters before pressing Enter, that's just the maximum limit.

When you're through typing, press Break to return to command mode. Once you've created a text, or loaded one, your command options increase substantially (see Table 1). A unique command is the margins command, which lets you set left and right margins on the text in memory. You can use these margins to selectively limit text searches, i.e., setting the margins to 10 and 25, respectively, limits any text search to the text between those two margins.

Another interesting feature lets you set the column position of a *bell*. You can use this command to send out a tone when you reach the specified column while typing, much like the moveable right margin bell on a typewriter.

Color Scribe also gives you versatile file manipulation, letting you read and write files to cassette and disk ports, with a special command that writes text files, or parts of files, to cassette or disk instead of paper.

Color Scribe's most powerful feature is its ability to edit files that are larger than available memory by using the More command. This command, when you've finished editing the text in memory, saves the current text buffer and loads the next portion of text into memory. This feature does not save one file, then load another, it saves all the text in memory up to the current line number you're working on, and then loads more text, moving the current line to the beginning of your text buffer. When you're finished with the file, the Save, or Log, command connects all the pieces into one file on disk.

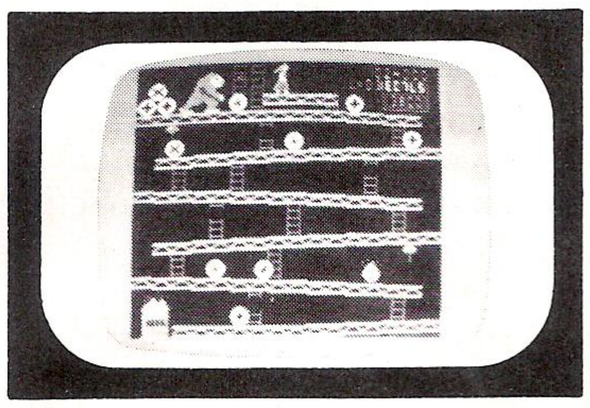
Other commands included in Color Scribe are a macro command, which lets you assign a series of commands to the @ key. Any series of repetitive commands can be condensed and assigned to one key, saving you time and effort. Reverse Video (changing uppercase letters from black-on-green background to green-on-black background, and vice versa for lowercase letters); and one keystroke repeat of the last executed command.

Color Scribe is actually two programs, one for text creation and manipulation and the other for printing files. Most of the format commands are listed in Table 1. One not listed is the tab fill character (usually spaces), which can be defined to

Reviews continued on page 54

TOM MIX SOFTWARE

•FOR THE COLOR COMPUTER & TDP 100 • 3424 College N.E., Grand Rapids, MI 49505 (616) 364-4791•



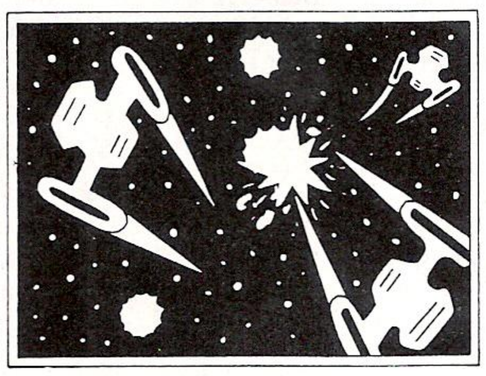
DONKEY KING

1982
32K Machine Language
$26.95 tape
$29.95 disk

NEW

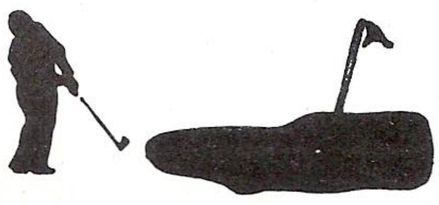
ARCADE ACTION - How high can you climb? Four full graphic screens. Exciting Sound - Realistic graphics. Never before has the color computer seen a game like this. Early reviews say: Just like the arcade - Simply outstanding!

PROTECTORS



Exciting fast paced arcade game that looks and plays like the popular arcade game "DEFENDER",
Wave after wave of enemy fighters drop bombs on your city. Destroy them before they destroy your city. Soon the mother ships appear firing laser blasts at you. Watch for the heat seeking mines.
Your defense includes your laser cannon plus four smart bombs on each of your four ships. A new ship with each 5,000 points.
High resolution graphics with four colors make this new 32K arcade game the one for others to follow.

$24.95 TAPE $27.95 DISK



COLOR GOLF

Now sit at your computer and play nine or eighteen holes. Outstanding graphics in the fairway or on the green. Helps your game.
32K EXTENDED BASIC **$17.95**

BIRD ATTACK-A fast paced machine language arcade game. Shoot the birdmen before they descend upon you. Watch out for their bombs! **16K Machine Language** **$21.95**

MAZE RACE-Maze race is a one or two player game. Play either against the built in timer or against your favorite opponent. **16K Machine Code** **$17.95**

SOLO POOL-Now play pool with your color computer. Two players. Plays like machine language. Super color. High resolution graphics. **16K Ext. Basic** **$17.95**

OTHER GREAT GAMES

ALL PROGRAMS REQUIRE 16K

MOON LANDER•Fantastic Graphics. Land on the Moon if you can. 2 Programs. Ext. Basic **$17.95**

DANCING DEVIL•Watch him dance to music or program him yourself. Machine Language. **$14.95**

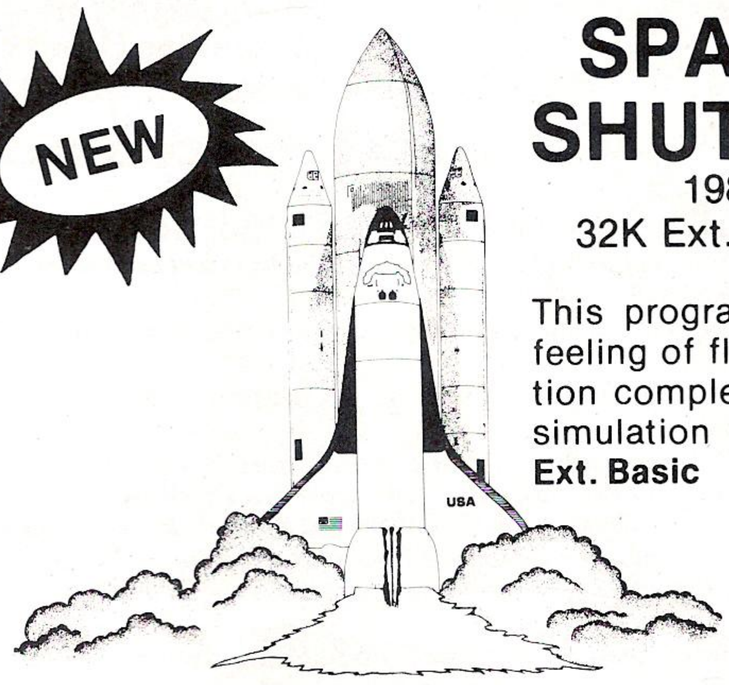
WAR KINGS•Battle to save your castle and king. High resolution graphics with outstanding sound make this one a real winner. 16K Machine Language **$17.95**

ADVENTURES

TREK-16-Travel thru space with Spock and Capt. Kirk. Adventure. Tough! Ext. Basic. **$17.95**

SHIPWRECK-Escape from a desert isle if you can. Great Adventure! Ext. Basic. **$14.95**

ESCAPE FROM SPECTRE (Graphic Adventure)-You are a secret agent for British Intelligence sent on a mission to obtain the secret nerve gas formula being developed by S.P.E.C.T.R.E. to destroy the world. **16K Ext. Basic** **$17.95**



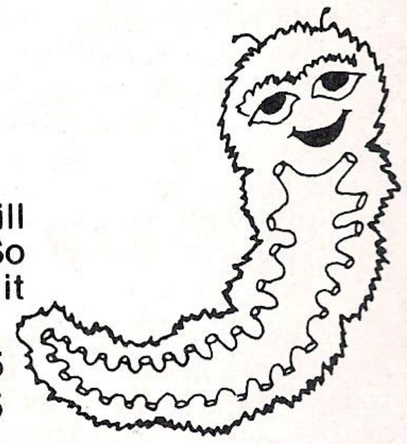
SPACE SHUTTLE

$28.95 TAPE ONLY

1983
32K Ext. Basic

This program gives you the real feeling of flight. Full instrumentation complete to the max. Actual simulation of space flight. **32K Ext. Basic**

KATERPILLAR ATTACK



Outstanding graphics and sound will end all of those trips to the arcade. So much like the arcade you have to see it to believe it. Requires Ext. Basic.

16K MACHINE LANGUAGE **$21.95**
DISK **$24.95**

SEARCH-A-WORD

This Program generates a word search puzzle to your specifications. You specify the size of the puzzle and the number of words that it is to hide within the puzzle. 16K or 32K Ext. Basic.

TAPE **$17.95**
FLEX VERSION **$27.95**

UTILITIES

COLOR MONITOR-Written in position independent code. (May be located in any free memory). Very compact. Only occupies 1174 bytes of memory. Full Featured. Includes Break-Pointing of machine language programs, register display and modify, memory display and modify, and block memory move commands. Displays memory in hex and ascii format on one line 8 bytes long. **MACHINE LANGUAGE $24.95**

ROM-This program is a utility that will move "most" 8K Rom-Packs to disk and allow you to run them from disk. Easy to use. Requires 64K. **$17.95**

SCREEN PRINT ROUTINE-Using your Epson or Microline Printer. Print the screen contents on a full size 8½ x 11 sheet. 16K Ext. Basic **$17.95**

TAPE DUPE—Brand new machine language program that copies any tape effortlessly. Completely automatic. **$16.95**

DISK TO TAPE-Dump the contents of any disk to tape automatically. Machine Language. **$17.95**

TAPE TO DISK-Load the contents of any tape to disk automatically. Machine Language. **$17.95**

MAIL LIST-Maintain a complete mailing list with phone numbers etc. Ext. Basic. **$17.95**

THE FIXER-Having trouble moving those 600 Hex progams to disk? The fixer will help. Completely automatic. **$17.95**

TAPE CAT-All new machine language program lists contents of tapes to printer. Make a catalog of your tapes. **$17.95**

PROGRAM PRINTER UTILITY-This program will list basic programs to your printer in two column format. Saves paper and makes your listing look professional. Disk based. **$17.95**

VISA

ADD $1.00 POSTAGE & HANDLING • TOP ROYALTIES PAID
MICHIGAN RESIDENTS ADD 4% SALES TAX • LOOKING FOR NEW SOFTWARE

MasterCard

Circle No. 16 on Reader Service Card

REVIEW$

Continued from page 52

any character you want. So if you want a series of asterisks up to column 45, you can define the asterisk as the tab character and tab to column 45.

The Color Scribe manual has 41 pages, and includes several appendices summarizing the commands. The manual also gives information about Color Scribe memory locations and their use.

WORD CC7D

DSL Computer Products
P.O. Box 1113
Dearborn, MI 48121
(313) 582–8930
$24.95

WORD CC7D is a simple, menu driven program. From the menu you can input text from the keyboard, tape, or disk, save text on tape or disk, display and correct text in memory, print your text, or quit the program.

WORD CC7D is a line-oriented program that allows you to input 60 characters (on a 32K machine you get 100 characters) on each line, for a maximum of 100 lines (200 lines in a 32K machine). When typing in text, the program beeps when you are within four characters of the maximum line length (56 or 96 characters). Printer control codes are easy to embed in text, as they are in the other word processor programs. After you type the text you can display and edit your text. As with the other line-oriented word processors, you just type in the line number you want to modify.

Printing is as simple as text entry. The computer prompts you for the beginning and ending page numbers, and printing begins. Page numbers are printed in the top right corner of each page.

The manual is nine pages; it has no summary page, but the descriptions of formatting commands only take two pages, and can be used as a fast reference.

Summary

Before you buy a word processor you should determine its purpose: term papers, correspondance or whatever. Make a note of what the word processor has to be able to do and what printer features you want supported. Then compare the features and prices of the word processors available.

If you have any questions, call the company producing the program and ask. A phone call is much cheaper than buying a package that doesn't do what you thought it did. —*T.K. Color Staff.*

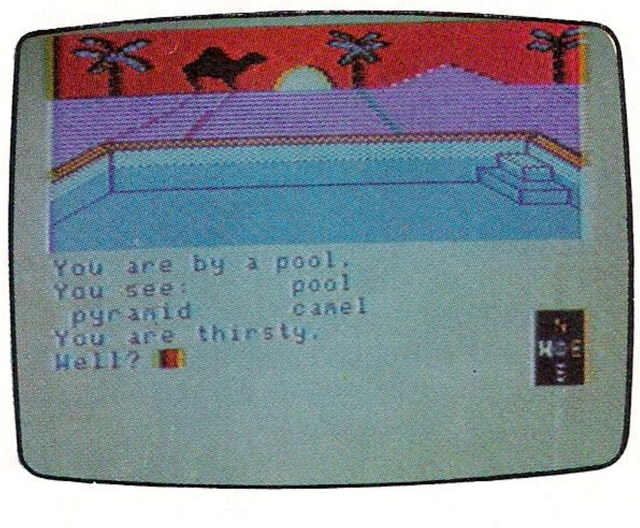
Reviews continued on page 56

Super Color Writer reappears on our chart because of problems with the original chart. See last months issue for accompanying text — Eds

Table 1 — Features

Feature	C.C. WRITER	COLOR SCRIBE 4.0	WORDCC7D	SUPER "COLOR" WRITER II Version 3.0		
Disk/Tape/Cart.	D,T	D	D	T	C	D
Basic/ML	B	ML	B	ML	ML	ML
Available Memory						
(16K)	n.a.	n.a.	6,000	2,000	9,000	1,500
(32K)	15,000	see text	12,000	18,000	25,000	17,500
(64K)				50,000	57,000	49,500
Memory w/o Graphics						
(16K)	n.a.	n.a.	n.a.	8,000	15,000	6,500
(32K)	n.a.	n.a.	n.a.	24,000	31,000	22,500
(64K)	n.a	n.a.	n.a.	56,000	63,000	54,500
Display size	32 x 16	32 x 16	32 x 16	32 x 16	32 x 16	32 x 16
				51 x 21	51 x 21	51 x 21
				64 x 21	64 x 21	64 x 21
				85 x 21	85 x 21	85 x 21
Video Window	N	N	N	Y	Y	Y
Upper/Lowercase	N*	N*	N*	Y	Y	Y
Cursor Control						
(Arrow Keys)	Y	Y	N	Y	Y	Y
On-Screen Tabs	N	Y	N	Y	Y	Y
Line or character oriented	L	L	L	C	C	C
Headers	Y	Y	Y	Y	Y	Y
Footers	N	Y	N	Y	Y	Y
Page Numbering	Y	Y	Y	Y	Y	Y
Block Text Movement						
Move	Y	Y	N	Y	Y	Y
Copy	N	Y	N	Y	Y	Y
Delete	Y	Y	N	Y	Y	Y
String Find	Y	Y	N	Y	Y	Y
String Replace	Y	Y	Y	Y	Y	Y
Hyphenation	N	N	N	N	N	N
ASCII files (can read or write files acceptable to BASIC)	N	Y	N	Y	Y	Y
Typewriter Mode	N	N	N	Y	Y	Y
PRINTING PARAMETERS						
Margin Control	M*	M*	Y	Y	Y	Y
Line width	Y-127	Y-127	Y-100	Y-255	Y-255	Y-255
Lines/page	Y	Y	Y	Y	Y	Y
Page number	N	Y	Y	Y	Y	Y
Line spacing	D*	Y	D*	Y	Y	Y
Baud rate	Y	N	N	Y	Y	Y
All Capitals	N	N	N	N	N	N
Print Flush:						
Left	Y	Y	Y	Y	Y	Y
Right	N	N	N	Y	Y	Y
Centered	Y	Y	Y	Y	Y	Y
Right Justified	Y	Y	Y	Y	Y	Y
Underline	Y	Y	Y	Y	Y	Y
Elongated text	Y	Y	Y	Y	Y	Y
Above two user controlled	Y	Y	Y	Y	Y	Y
Embedded Codes	Y	Y	Y	Y	Y	Y
Change Fonts	Y	Y	Y	Y	Y	Y
Proportional	N	N	N	L*	L*	L*
Spool File	N	N	N	N	N	N
Single Sheet	Y	N	Y	Y	Y	Y
Draft copy	Y	Y	N	Y	Y	Y
Doc. Chaining	Y	See Text	Y	Y	Y	Y
MANUAL						
Table of Contents	N	Y	N	Y	Y	Y
Index	N	N	N	Y	Y	Y
Glossary	N	N	N	Y	Y	Y
Summary Page	Y	Y	Y	Y	Y	Y
Explanations (Excellent/ Good/Fair/Poor)	F	F	F	E	E	E
PRICE	$30	$49.95	$24.95	$69.95	$89.95	$99.95

M* = Limited to left margin and line length only.
N* = Uses reverse video capital letters for lowercase.
D* = Disk version only.
L* = Proportional not directly supported but can be used.



Sands of Egypt

Radio Shack
One Tandy Center
Fort Worth, TX 76102
$29.95

AHH, TO LIVE THE EXPLORER'S life traveling the globe in search of excitement, dining with royalty, collecting trinkets, waking up each morning to new adventures. That's the good side. Then there's the other side: lost in the desert, thirsty, your life endangered by poisonous snakes, thirsty, dangerous cliffs to traverse, sand storms — did I mention thirsty? Sands of Egypt, Radio Shack's newest adventure for the 16K Disk Basic Color Computer has it all, especially the thirst.

Sands of Egypt is more than an adventure, it's an animated adventure. You tell the computer you want to go east and the scene on your screen shifts as you walk east. If you dig and find an object, you see the object. But I'm getting ahead of myself. Let me tell you the setup.

It is 1893; you are the aristocratic British explorer, Sir Percy, searching for the Tomb of Ra in the Sahara Desert. You are hopelessly aristocratic. You have written 19 etiquette books and know Queen Victoria well enough to begin a letter to her with, "Dear Vicky." While this will get you much in London, it won't impress a scorpion very much, nor did it impress the other members of your expedition. After being punished for their refusal to starch their khakis and stop for tea at the proper time, they stole your provisions and left you alone in the middle of the desert. They even stole the tent you were sleeping in! Ungrateful louts.

So here you are alone in the desert. However, prudence did turn you one good turn. You always sleep in your khakis, no matter how hot it might be. And in the pocket of your khakis was your compass. You can't eat or drink a compass, but it does give you a sense of where you are in the desert.

The adventure begins somewhere in the desert. You see orange sand, darker orange sand in the far distance, and clouds moving east (that's right — moving, this is an animated adventure) on a blue sky. A compass at the lower right of your screen lists your movement options. At the beginning screen all your options are available: north, south, east, and west. At other times your options will be fewer. If the compass only shows east and west, you can't go south or north.

All commands, with a few one-word exceptions, use two words: Mount Camel, Use Shovel. Only the first four letters need be typed in, but on directions you can abbreviate and use one letter: N, S, E, W.

As you travel the desert you'll come across objects that, at some point, will become useful to you. The more creatively you think, the longer you'll survive. Speaking of creativity, the program's vocabulary is totally up to your experimentation. There is no VOCAB command, but HELP and INVENTORY are available. The help usually comes in the form of a proverb from Ra. All too often the help request answers that, "Ra helps those who help themselves."

For those of you unfamiliar with adventure games you need to have patience. A good adventure takes a long time to solve, if ever you do solve it. And this is a good adventure. The graphics are well done and fun. My favorite is the camel winking. You'll encounter many different screens as you travel.

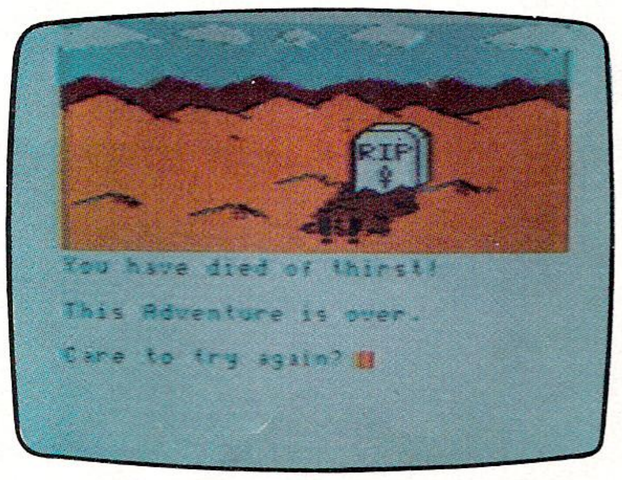
The screen you'll see most often appears in Photo 2. The pool scene in Photo 1 will look like a welcome relief to the aristocratic adventurer dying of thirst. It will quickly become a scene of extreme frustration. Remember, the rest of your expedition party left because of teatime and starched khakis. There you will be dying of thirst, yet unable to drink because you lack a proper drinking accessory.

While your feeling may be, "There's water fool, drink!" The character you are portraying would consider your attitude barbarian. One person I spoke with thought Sir Percy's refusal to drink the pool's water without a bonafide drinking instrument was a flaw in the program. I argued that you can't place your values on Sir Percy. We're both as wrong as we are right. Whether or not Sir Percy's refusal is realistic doesn't matter. When you type RUN"EGYPT" on your computer you place yourself within the realm of that program's world.

The documentation suggests that you make a map as you go. To long-standing adventure fans, this is normal procedure. The map in Sands of Egypt doesn't seem be logical. How to explain that without giving away secrets to the puzzle would be difficult — so I won't. The documentation does say that the desert is a deceptive place, which may be a hint at a seemingly inconsistant map, but I don't think so. If this presented a major problem with the game, I wouldn't have gotten as far as I did. Besides you won't be wandering in the desert long. That's just the beginning of your exploration.

Because of its excellent use of graphic animation, Sands of Egypt represents a new standard for adventure games.

— *K.L.* Color *staff*



The Mean Craps Machine

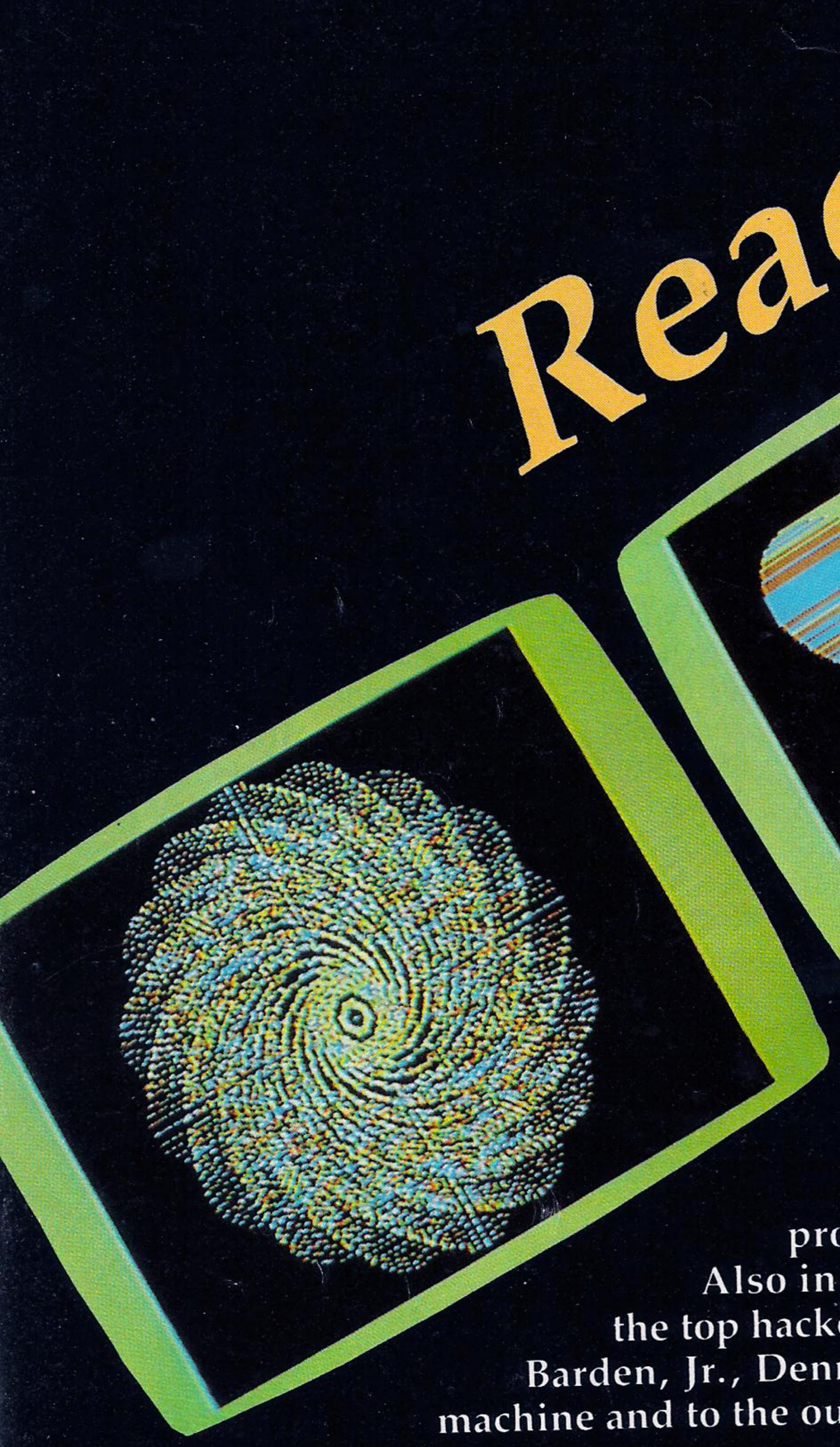
by Lance Micklus
Adventure International
Box 3435
Longwood, FL 32750
(305) 862-6917 **$19.95 Tape**

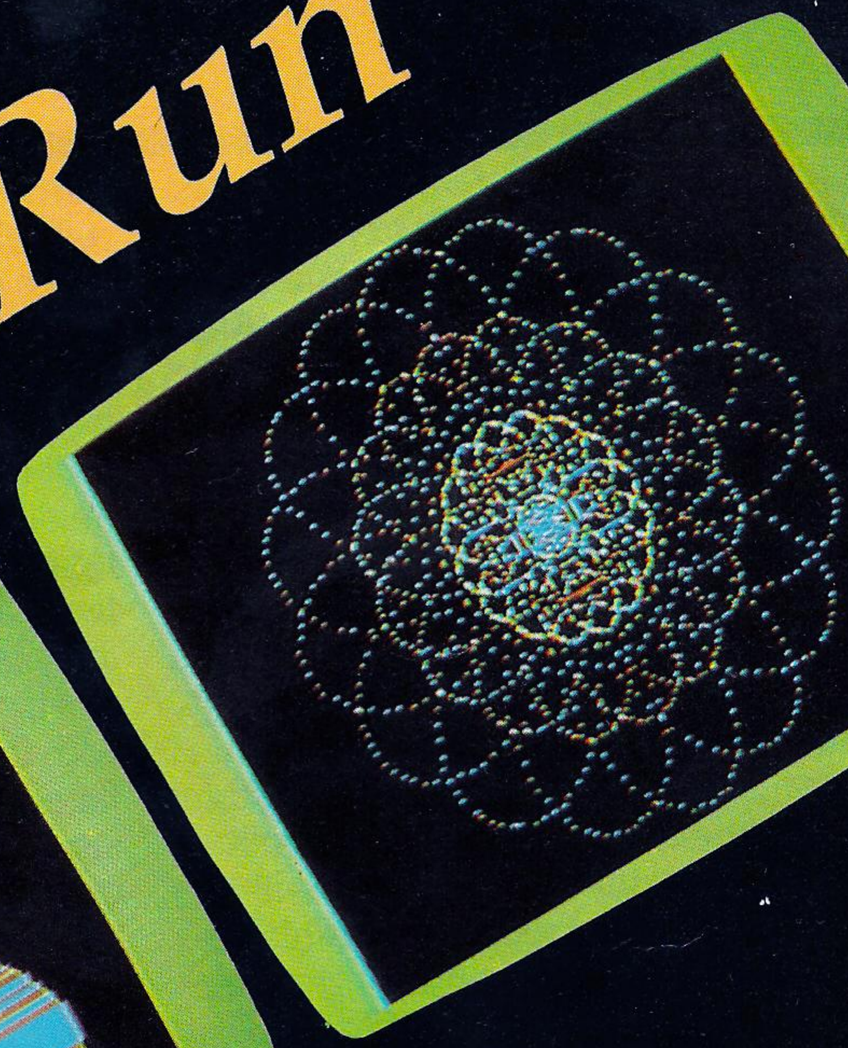
ARE YOU ITCHING TO GIVE Lady Luck a run for her money without risking any of your own? Does the roll of the dice across the green felt stop you in your tracks? Are you looking for a fair game where you don't have to worry about blanket rolls, bounce shots, or capped dice? Then *The Mean Craps Machine* is the game for you. Written by Lance Micklus, published by Adventure International, and available for the TRS-80 Models I, III, and Color Computer; *The Mean Craps Machine* is a 16K Basic Program suitable for the novice and advanced dice-thrower.

The documentation clearly explains the fundamentals of craps, the house rules, and the different bets you can make. If you're used to the casino play, the display of the betting table will be disorienting at first. The computer keeps track of your bets, your current betting

Reviews continued on page 60

Ready to Run





Every issue of THE COLOR COMPUTER MAGAZINE comes packed with a wide range of specially designed programs ready for you to key in and run.

Exciting games for every member of the family, plus education, utility, household and business programs that help you get more out of your Color Computer.

You'd expect to pay anywhere from $25 to $300 for these selected programs, but they're yours FREE with your subscription.

Also in THE COLOR COMPUTER MAGAZINE, you'll rub elbows with the top hackers and beepers in Color Computerdom. Jake Commander, William Barden, Jr., Dennis Kitsz and others will be on hand to take you deep inside your machine and to the outer limits of graphics, animation, music synthesis, bulletin boards and more.

You'll improve your programming skills, learn to upgrade your machine's capabilities, become conversant with all the popular software programs and applications, tap the major data bases, communicate by computer and stay plugged in to the fast-moving world of home computing with hardware and software reviews, buyers guides and more!

DON'T DELAY:

PRINT your name and address on the coupon

ENTER your money saving Charter Subscription now and get ready to

RUN a full year of Color Computer know-how!

Complete and mail to: **THE COLOR COMPUTER MAGAZINE**
P.O. Box 468
Hasbrouck Heights, N.J. 07604

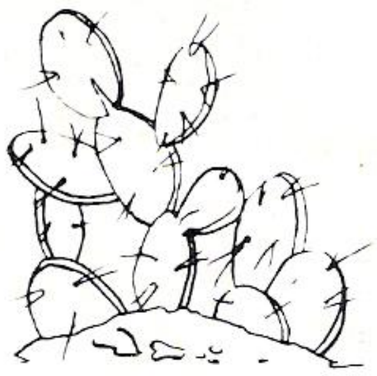
YES! enter my no-risk Charter Subscription to THE COLOR COMPUTER MAGAZINE at the money-saving rate of just $19.97 for 12 monthly issues, a 44% saving off the cover price. If not satisfied, I may cancel at any time and receive a full refund of the unused portion without delay.

☐ Payment enclosed ☐ Please bill me

Print Name _____

Print Address _____

Print City _____ State _____ Zip _____



PRICKLY-PEAR SOFTWARE

QUALITY PROGRAMS FOR YOUR COCO & TDP-100

PROGRAMS REQUIRE 16K EXTENDED BASIC FOR TAPE, AND 32K DISK UNLESS OTHERWISE NOTED.

Flight

If you'd like to fly a plane then this is what you've been waiting for. A really good graphics oriented flight simulator in high resolution. Four difficulty levels let you go from student level to a difficult instrument-only landing. In front of you on the screen are your instruments, and above them are two representations of your plane in relation to the flight path (top and side views). At the higher levels all you have to go by are the instruments. Can you put it down on the runway to hear the synthesized voice from the tower say "perfect landing"? It's tough! You use your joystick just like the control stick on a plane, and the action is realistic indeed. This program was written by a professional flyer — a pilot for a major United States air carrier, and the high standards of professionalism really show. Just CLOADM and take to the skies!! Requires 32K extended. **TAPE** is **$19.95 — DISK** is **$24.95**

Las Vegas Weekend

Two great high-resolution games. You will really feel you've had a vacation. First, play a round of golf. It all happens in high resolution. Choose your club, decide how to swing, and go for it, but watch out for the sand traps and water hazzards! This course would challenge the pros. When you get on the green, the scene zooms in for a closeup view while you putt.

After your shower, go down to the casino and play some poker against the computer. High-resolution graphics plays just like the draw poker machines in Vegas. Win big.. maybe. Both great games are included in the Las Vegas Weekend, on separate tapes or one disk. **$24.95 tape — $29.95 disk**

The Fantasy Master's Secretary

This program will be greatly appreciated by the many people trying to run a fantasy game! It's not easy to keep track of hit points, charges in magic items, monsters, game time, armor values, and a lot more, all while trying to conduct a meelee and listen to 8 people talking at once. If you ever thought you needed a secretary, this is it! It keeps track of all the above and more, and even has a help file in case you forget how to use it. It also figures the experience points of monsters while keeping an electronic eye on value and weight of treasure found. You'll truly wonder how you got along without it!!! If you quit before the campaign is completed, you can save the whole thing to tape (or disk) and take up right where you left off next time you play. At the beginning it will ask you whether or not the players can see the screen, and set its displays up accordingly. Remember, this isn't a game — it's an aid to use with a fantasy game. **$19.95 tape — $24.95 disk.**

Eight-bit Bartender:

This will light up your next party! Over 100 great drink recipes are stored by the bartender and called up at your command. Ask for them by drink name, main liquor used, or class of drink (highball, cocktail, etc.). These were gathered from the favorites and house specialties at famous pubs and taverns across the US. It outputs to the screen, printer, or both! At your next party let the guests browse through the Bartender. Needs 32K. **TAPE $19.95 — DISK $24.95**

Phonics I

This classroom-tested program is the newest in our Phonics series. Written by the same elementary school teacher, it takes up where PREREAD I, II, & III leave off. Actually two programs (on separate tapes), the TUTORIAL teaches all 22 of the consonant blends using on-screen graphics and voice (controlled by the computer and played through the TV speaker). The TEST program asks for the letters in these blends (again using voice throught the speaker), and checks the keyboard input for the correct answer. Again, on screen graphics are used as an aid to learning, and immediate feedback to the learner is given.

Phonics II

Similar to **Phonics I** in concept and execution, but **Phonics II** teaches consonant digraphs. Again there are two programs (on different tapes) for the TUTORIAL and TEST modes.

Both **Phonics I** and **Phonics II** are well documented, and are sold separately on **TAPES** for **$24.95** each. They are also available as a package — only on **DISK** for **$44.95.**

A Partial List of Prickly-Pear Programs

Astrology, Gangbusters, Household Helper, Fantasy Gamer's Package, Viking, Football, Preread I, II & III, Mathpac I, Tarot, I Ching, Numerology, The Great Word Game, The 80C Songbook, Phonics I, Phonics 2, Flight, Las Vegas Weekend, The 8-Bit Bartender, The Fantasy Master's Secretary, Monsters & Magic, Topsy Turvy, Galactic Patrol, Blockade, Sea Wars, Jungle, Spanish . . .

SEND A STAMPED, SELF-ADDRESSED LONG ENVELOPE FOR COMPLETE CATALOG

Your Personal check is welcome - no delay. Include $1.50 shipping for each program ordered. (Shipping free on $50.00 or larger orders). Az. residents add 6% sales tax. Orders shipped within two days.

Stocked by Quality Dealers, or

Send Order To: **PRICKLY-PEAR SOFTWARE**
9822 E. Stella Road, Dept. C
Tucson, Arizona 85730
(602) 886-1505

Circle No. 56 on Reader Service Card

REVIEW$

Continued from page 57

limit, and how much micro-money you have left to gamble away. A separate display lists the betting options and tells you how to access them. Calling this listing and making bets is easy to do. The commands are easy to learn (press F to bet on the field, P for pass bets, and so on), which makes for fast play.

To play, each player places his bet, everyone watches the simulated dice roll, and the computer displays the outcome of each person's bet, singly and as a net result for the roll (since you can have more than one bet active at any given time). The pace of the game is fast, as it should be in craps, provided you don't make the computer one of the participants. The computer takes a long time to place its bets, which makes the human players quickly lose interest.

The simulated roll of the dice is a nice touch, complete with green video-felt and audio. It would help if the computer kept track of the shooter (the current dice-thrower).

Craps is a hands-on game. It doesn't matter that the dice throw requires no skill (all you do is press Enter) and that the outcome is entirely random, it's a central feature of craps that play passes from one player to another. On the first roll, your come out, a seven or 11 automatically wins while a two, three, or a 12 automatically loses. Any other roll is called your point, and the object is to roll your point again before you roll a seven.

The result of the dice roll displays for a few seconds before it vanishes and the betting results appear on the screen. In the casinos, the stickman calls the result of each throw. Because of the short display time it's hard to keep track of whether you're coming out, already in the thick of it, or if it's your turn. You can however, freeze the action by typing Shift @.

The Mean Craps Machine gives a good game. It's ideal entertainment for a party, and a safe way to test your latest ideas on how to break the house. The documentation points out that more ambitious players can reprogram the game to use loaded dice, adding a bit of intrigue to the play. — *C.T. Color Staff.*

Galactic Hangman

Sugar Software
2158 Leah Lane
Reynoldsburg, OH 43068 **$14.95**

YOU EITHER LIKE hangman games or you don't. If you're a hangman fan

Reviews continued on page 62

THE PROGRAM STORE™

Color Computer Collection For Your TRS 80

THE PROGRAM STORE™

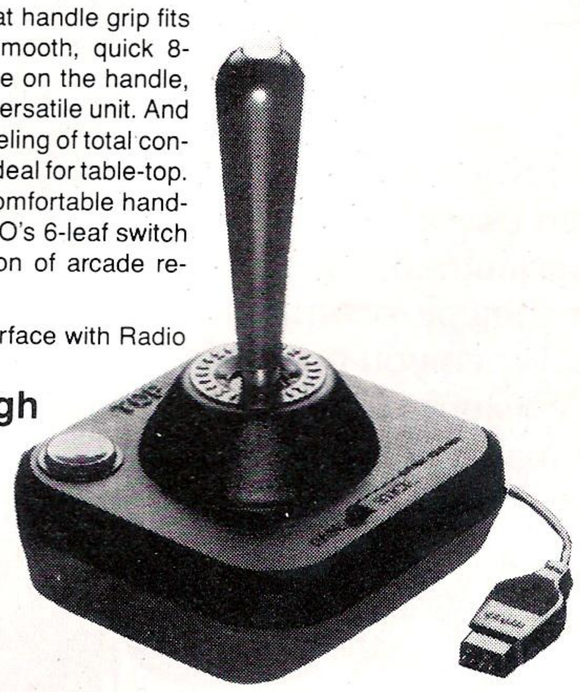
WICO COMMAND CONTROL JOYSTICKS...ALL 10% OFF!

WICO COMMAND CONTROL Joystick

The ultimate in one-hand control. The bat handle grip fits comfortably in your hand and offers smooth, quick 8-position movement. Two fire buttons, one on the handle, the other on the base, make this a most versatile unit. And the rugged, compact base gives you a feeling of total control, while the 4 rubber grip pads make it ideal for table-top. Yet it's lightweight enough for hours of comfortable hand-held action. Most important, there's WICO's 6-leaf switch assembly — the key to a new dimension of arcade response and control.

With appropriate WICO adaptor, will interface with Radio Shack TRS80 Color Computer.

$29.95 (on sale now through April 30 for $26.95)



WICO COMMAND CONTROL ADAPTORS are available for each joystick hook-up to Radio Shack Color Computer.

Radio Shack TRS80 Color Computer Adaptor

$17.95 each (on sale now through April 30 for $16.15)

WICO COMMAND CONTROL JOYSTICK EXTENSION CORDS

For use with all Command Control joysticks and adaptors, allow you to move freely about as you play your favorite games.

Six Foot Length, $4.95 (on sale now through April 30 for $4.45)

Twelve Foot Length, $7.95 (on sale now through April 30 for $7.15)

WICO COMMAND CONTROL *NEW FOR 1983 ANALOG JOYSTICK*

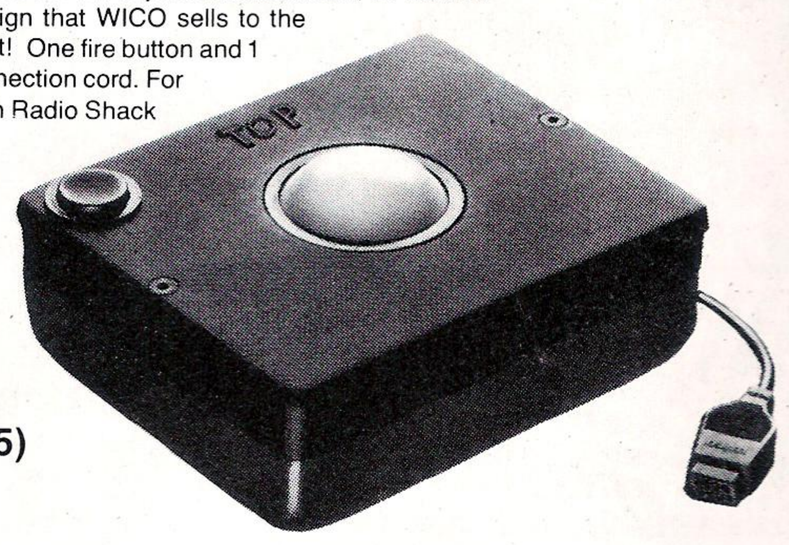
Analog style joystick with two fire buttons now available for direct use with TRS80 Color Computers.

$49.95 (now on sale through April 30 for $44.95)

WICO COMMAND CONTROL TRACKBALL

Increase the response... the challenge... the fun of home video games. A phenolic ball offers the magic of 360 degree movement to an infinite number of positions, and controls the speed of the objects on the screen, as well. It's the same design that WICO sells to the arcade market! One fire button and 1 computer connection cord. For direct use with Radio Shack TRS80 Color Computers.

$69.96 (now on sale through April 30 for $62.95)



Over 1500 Programs for TRS-80, ATARI 400/800, APPLE & IBM.

THE PROGRAM STORE T.M.

For Information Call 202-363-9797

To Order Call Toll-Free 800-424-2738

Visit our other stores:
829 Bethel Rd., Columbus OH
Seven Corners Center, Falls Church, VA
W. Bell Plaza, 6600 Security Blvd., Baltimore, MD
White Flint Mall, Rockville Pike, Rockville, Md.

MAIL ORDERS: Send check or M.O. for total purchase price, plus $2.00 postage & handling. D.C., MD: & VA.: add sales tax. Charge cards: Include all embossed information.

MasterCard VISA

THE PROGRAM STORE • Dept. 30-04-3 • Box 9582 • 4200 Wisconsin Avenue, N.W. • Washington, D.C. 20016

Item Tape/Disk/Book Price

Postage $2.00

Total

☐ CHECK ☐ VISA

☐ MASTERCARD

Computer

Name

Address

City State Zip

Card # Exp

Circle No. 19 on Reader Service Card

REVIEW$

Continued from page 58

you'll love the new twists in this version.

Galactic Hangman is a graphic treat. During the game's load you see a colorful screen display and about 15 seconds worth of Hangman-type music ("Hang Down Your Head John Dooley"). The tape comes with 16K and 32K versions; both are nicely done. The major differences between the two versions is that the 32K version has a built-in vocabulary, while the 16K version requires a separate vocabulary, (a 50-word vocabulary file comes on the tape), and has closing graphics of a spaceship rescuing the little man from the gallows in the case of a win.

With both versions you have the option of letting the computer pick a word from the vocabulary list, or inputting one yourself. The latter option only makes sense if you're not playing solitaire.

The playing screen displays a jailhouse, the gallows, blank lines for each character in the mystery word, your current letter selection, and a letterboard with the letters already guessed outlined in green. The object of the game is to rescue the little man from the gallows by guessing the mystery word letter by letter.

—*K.L. Color Staff.*

Stinger

16K Color Computer
with joysticks
Eigen Systems
P.O. Box 18006
Austin, TX 78766
(512) 837-4665

$34.95 ROMpak
$24.95 (Cassette)
$29.95 (Disk)

A *MAZE OF CONCENTRIC* rings lies ahead of you, filled with honey bees, stinger bees, and deadly killer bees. Your job: enter these rings, capture as many honey bees as possible, and get out—alive! To do this you must elude stinger bees and deadly killer bees.

You slip into the first ring and begin the perilous mission. Ahead lie two honey bees following a stinger bee. You close in on the honey bees, preparing to capture them. Wait! Coming up rapidly behind you is another stinger bee. Quick, jump through the portal into the next ring...

This scenario awaits you in Eigen Systems new game, Stinger. It contains nine levels of play and plenty of action.

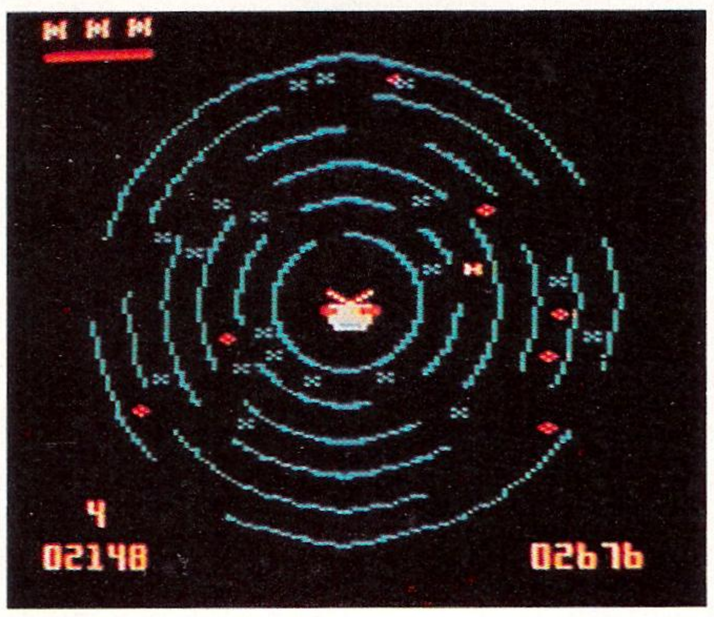
The Game

The objective of Stinger is to capture as many honey bees as possible. You have six bee catchers at your command. They attempt to capture honey bees by over-

taking each one and landing on top of it. The honey bees are protected by stinger bees and the Queen Bee, which emits killer bees if the stinger bees have trouble protecting the honey bees. When a stinger bee or a killer bee catches one of your bee catchers, they kill it. The game is over when you lose all six bee catchers.

The game takes place in a bee hive containing five concentric rings that rotate at different speeds around the center of the hive. A large queen bee inhabits the center circle. At varied points, the rings are connected by open portals. Honey bees occupy the rings of the hive.

The honey bees and the stinger bees move counter-clockwise around the hive, but the stinger bees usually move



faster and overlap the honey bees. The killer bees appear when you reach the third level of play. They rotate clockwise—opposite every thing else.

The stinger bees and the killer bees can move from one ring to another through the walls. The honey bees always remain in their respective rings. Your bee catchers can move between the rings, but only through the open doorways.

Right and left movement of the computer's right joystick controls the bee catcher's movement through the rings. To jump into another ring, move the joystick quickly to the left and back to the center position. To jump to an outer ring, move the joystick quickly to the right and back to the center position. The joystick control is challenging to master. If you leave the joystick in one of the two positions too long, you may move through more rings than you want—maybe right into the path of a stinger or killer bee!

The Play

As the level of play increases, the game becomes mesmerizing. The bees move faster, the stinger bees become smarter and begin searching for you. The queen emits increasing hordes of killer bees and the rings circling the hive become a

battlefield that your bee catcher must thread to catch all the honey bees.

As if the killer bees and stinger bees weren't enough, you have a time limit that governs the amount of points you can accumulate. The longer you take to catch each level's honey bees, the fewer points you gain for that round. Finally, you'll occaisonally run across what appears to be a mutant honey bee—when your bee catcher attempts to catch it, the bee becomes transparent and the bee catcher passes right over it.

Stinger provides a high degree of excitement and a good test of your motor skills. The game is highly addictive and will draw you back time and time again.

— by Darrel Wright

Advertiser's Index

END OF FILE

Education is probably where home computers will shine brightest. CC Speller in this issue, and Tick Talk from last month's issue, are just two examples of how easily and efficiently a microcomputer can serve as an educational tool. The Color Computer's graphic and sound capabilities make it more suitable for children who need to be entertained as well as taught.

Radio Shack is presently compiling the second edition to their *Educational Software Sourcebook*. The purpose behind the book is to help people interested in using the Color Computer as an educational tool find the software they need. This will not only help parents find programs to use at home, but it will serve teachers, and school boards as they try to decide how to allocate monies set aside for computerization.

The sourcebook will contain information in the form of feature publisher profiles, classified listings of instructional software, software user site references, and supplemental use of microcomputers. As was the first edition, this second book will be distributed by Radio Shack and sold in stores and Computer Centers throughout the U.S. and Canada. Listings in this sourcebook are not limited to Tandy products. In fact the real intention of the book is to create a forum for non-Tandy products so that educators will be able to find what they need in one central location.

Application forms for this second edition can be found in the current edition of the *Educational Software Sourcebook*, available at Computer Centers and many Radio Shack stores. The application deadline is March 15th, so you'd better hurry.

We at **The Color Computer Magazine**, fully support Tandy's educational effort. Although much is said and written about grants of support and equipment of Apples, TI's, and PC's in schools, little is said about the Color Computer. Tandy regularly awards equipment for worthy educational endeavors.

Tandy recently granted over $103,000 worth of equipment through their Tandy TRS-80 Educational Grants Program for proposals dealing with the learning of basic skills in elementary education. They will soon make hard and software donations for winning proposals using TRS-80's to help the handicapped and disadvantaged, and for using TRS-80's in unique and innovative ways in the realm of education.

Besides our coverage of the Color Computer's many features, it is our intention to support Tandy's effort of helping people, not just children, use the Color Computer as a learning tool. If you market educational software, list it in the sourcebook. The more quality products listed in the book, the more likely educators will be to make the Color Computer their teaching aid.

— K.L. Editor

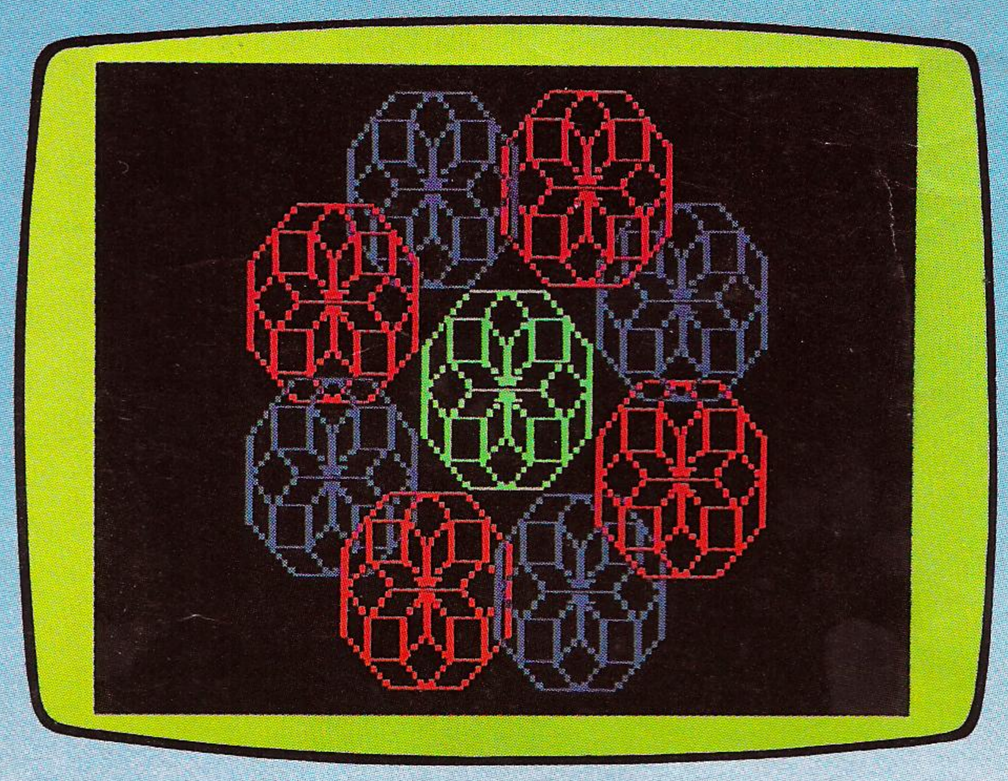
.FOR...NEXT(05,83)

MAY IS THE BEST MONTH of the year. It is the doormat to summer, much like April is the slush puddle residue of winter. To celebrate spring's promise of sunshine and warmth we have many special features planned. Aside from our monstrosity of a smart terminal guide, William Barden begins Part I of a two-part series on Color Animation.

We'll feature a build-it-yourself power-on LED indicator, a utility to condense programs to multi-line statements, a program to help you learn a foreign language, computerized music lessons, Radio Shack's Color Logo reviewed, and much more.

We also have a few surprises in store. One is a game and the other is a contest. If we told you any more about them they wouldn't be surprises.

Look What Radio Shack Has In Store for Your TRS-80® Color Disk System

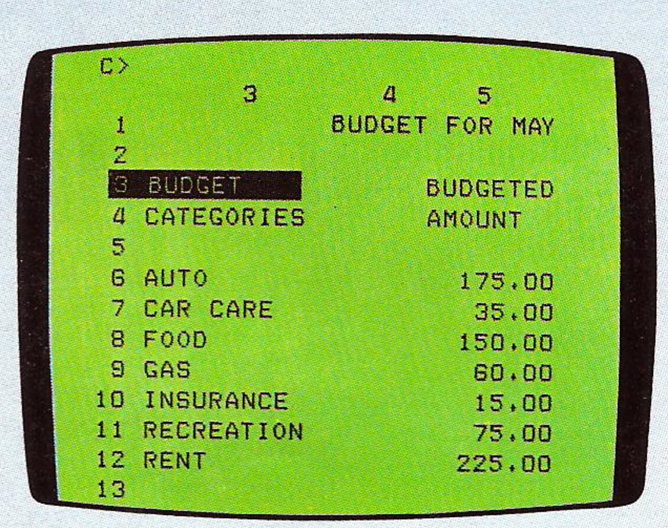


NEW! Color Logo

- **"Turtle" Graphics Allow Children To Learn by Hands-On Experimenting**
- **"Doodle" Mode for Pre-Readers**
- **"Hatch" Command Creates a Second Turtle for Running Several Programs Simultaneously**

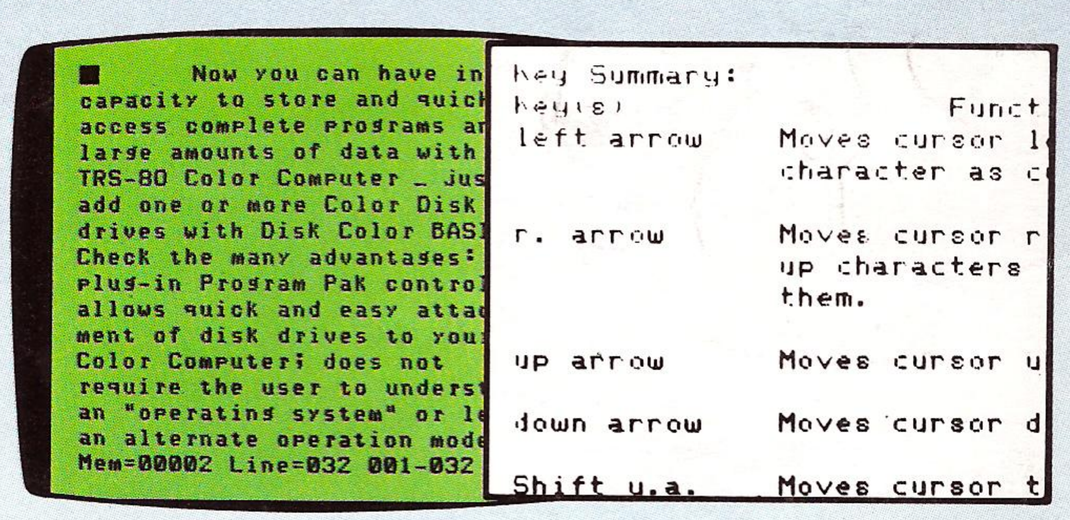
Kids love turtles—especially the kind that draws the designs in our new Color Disk LOGO program. Using our enhanced version of LOGO, children are able to experiment with logical and geometrical relationships at their own pace. They learn by doing, and have fun at the same time. Kids not only learn how to write programs, but they can investigate structured thinking, multi-tasking, inter-process communication, modular programming, parameter passing, local and global variable, and looping and recursion—all from teaching their turtle how to draw designs on the video screen! No wonder LOGO is a favorite with computer scientists and educational theorists as well as kids! (26-2721, $99)

Ask "What If?" With Spectaculator



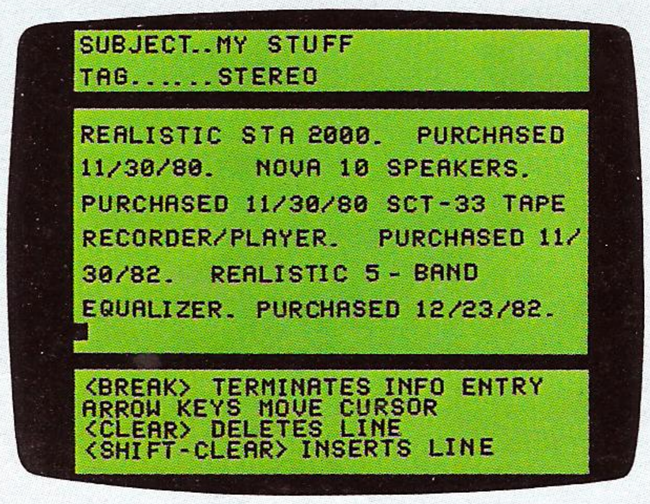
Here's an "electronic spreadsheet" program that's easy to set up and use, yet does the forecasting, planning and problem-solving you need. Just enter the numbers and formulas—Disk Spectaculator will calculate and display the results on command. Enter new figures and it updates every related number. You can run totals of each column and grand total, plus save worksheets to disk for later use. (26-3256, $59.95)

Disk SCRIPSIT™ for Word Processing



Color Disk SCRIPSIT lets you create correction-free letters, themes and reports right on your video screen. It will display upper and lower case letters and even let you print one document while working on another. (26-3255, $59.95)

Personafile Keeps Records Handy



No more frantic searching for the auto insurance, TV warranty, rabies certificate or the recipe for Aunt Tilly's chile. Put your records in Personafile and say goodbye to cluttered drawers stuffed with papers. With Personafile records are easy to find and recall in just seconds. Allows up to 540 records with up to 250 different subjects. (26-3260, $59.95)

Circle No. 11 on Reader Service Card

Now available at . . .

Radio Shack®

The biggest name in little computers®

A DIVISION OF TANDY CORPORATION

Send me your free TRS-80 Computer Catalog today!

Mail To: Radio Shack, Dept. 83-A-649
300 One Tandy Center, Fort Worth, Texas 76102

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

PHONE _____

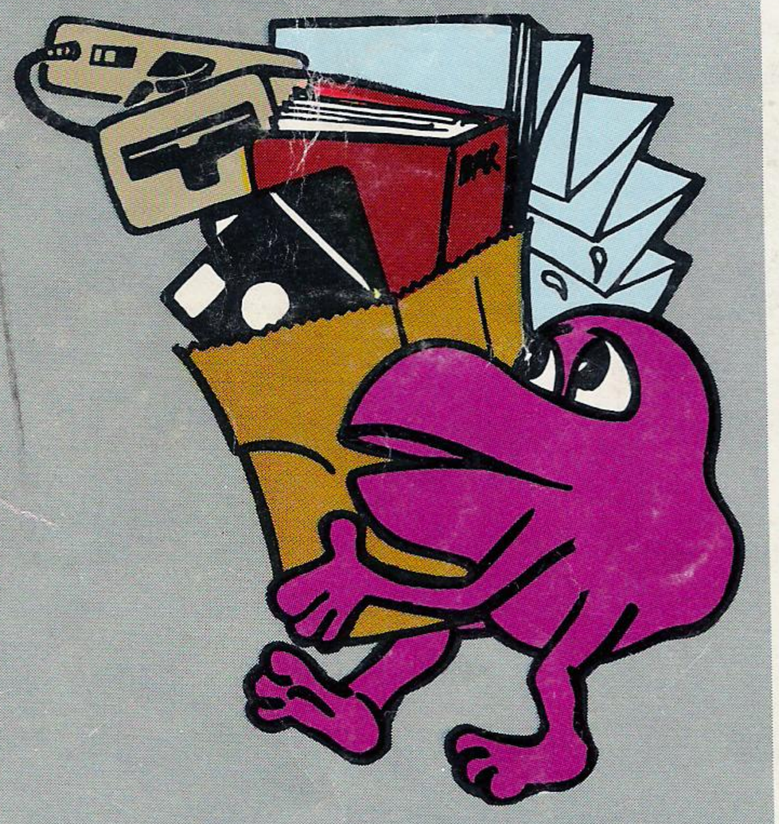
Retail prices may vary at individual stores and dealers.
Special order may be required at some stores.

Meet the Computerware® Clan!

(we're a fun group to know)

Computerware® can offer you:

One-Stop Shopping



In addition to Computerware software, we carry the major manufacturers' products such as printers, modems, memory and software from such companies as Mark Data, Tom Mix, Micro Works, Botek, Frank Hogg Laboratories, TDP, C. Itoh, Aardvark and Dugger Growing Systems.

Software for OS9!

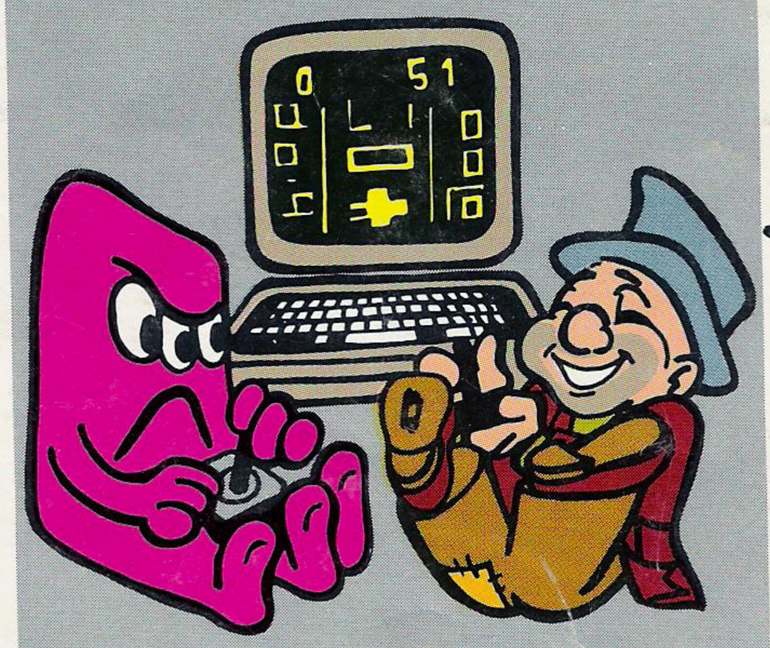
- **OS9** Random BASIC
- **OS9** Macro Assembler
- **OS9** Editor
- **OS9** Text Processor

Also available on FLEX and RS DOS

Circle No. 44 on Reader Service Card

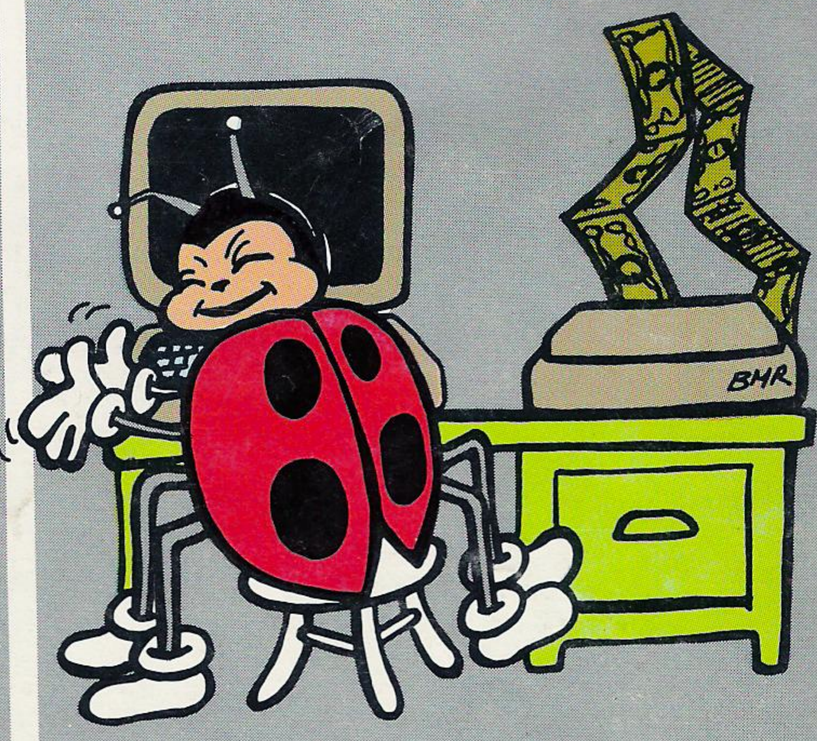
Products for the Color Computer

- from home management software
- to programming tools



- to fun and challenging video games

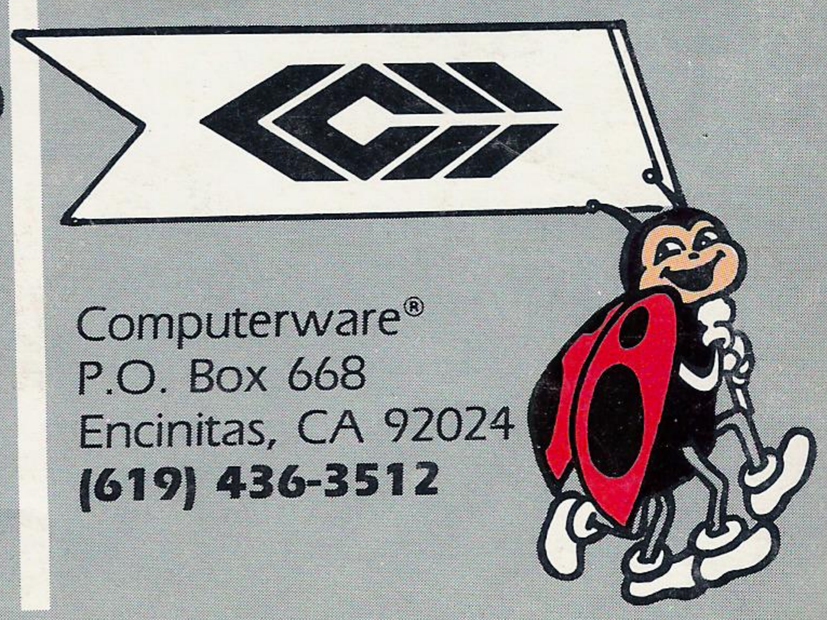
An Attractive Authorship Program



for independent programmers who would like to turn software into cash!

Dealer Inquiries Invited

Call or write to:



Computerware®
P.O. Box 668
Encinitas, CA 92024
(619) 436-3512