

COLOR COMPUTER NEWS

AUGUST 1982
ISSUE #11

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This month's Editorial is written by Frank Hogg because I thought you might be interested in what marketing software is really like. He also touches on a growing problem in the software marketplace today.

THE SOFTWARE GAME

By Frank Hogg

Have you ever thought about selling software? Wouldn't you like to cash in on this growing market? Do you have something that you think would sell? If the answer to any of these questions is yes, then read on.

What I would like to do is give you some idea of what is involved in selling a software product and what you can expect to get from it. We will assume that you have a viable product that many people would want to buy. How do you go about bringing it to market?

EVALUATE YOUR PRODUCT

Is what you have to sell useful to a lot of people? What percentage of users would want your product? Suppose you have a disk based basic program lister. How big is the market for such a program. There are about 100,000 CoCo's out there. But only 25% or so have disks. Assuming that my numbers are right (only God and RS know), that means that only 25,000 are viable customers. Out of that 25,000, only about 1 in 10 would want your program. Now we are down to 2,500. 2,500 is not a bad figure, but we have to par it down, due to software pirates, by another factor of 5 or 10. Most experts agree that there are at least 5 and maybe 10 illegal copies for every legal copy sold. To be safe, we'll figure 10. Now we are down to 250 copies that you might sell.

ADVERTISE

It will do little good to have the slickest basic lister around if nobody buys it, and nobody is going to buy it if they don't know about it. You can't depend on word of mouth to reach 100,000 people. The only way to reach those 250 people is to tell all 100,000 people. The way to do that is to advertise. (Bill Sias loves this part) Unfortunately, even CCN doesn't reach all 100,000 of those people, so you may have to use other magazines to reach your public.

DOCUMENTATION

Did you write a manual for this program? Will your customer be able to run it right out of the box? The documentation is the information your users need to know to make your program run. Do this well and you will save many phone calls from irritated users. Another thing to consider about documentation is that lack of good documentation will make a good program bad and, in some cases, useless. Good clear documentation is necessary to make your program successful. Consider the time it will take you to write this and the cost to produce the manual as part of your cost to produce this program.

COSTS

Here are some guidelines to go by on the costs of producing software based on our experience. Remember, this is just the cost to manufacture the product, not the cost to write it.

It costs about \$10 to produce each product less the manual. That includes the disk itself, labor costs to take the order, write the invoice, make the disk, and get it ready to pack. The manual will cost you about .10 per page if you keep it simple. If you have a 10 page manual, that will bring the cost per program to \$11.00.

Advertising costs will be high at first until people get used to seeing your name and then you should expect advertising to run about 25% of your GROSS income.

SELLING PRICE

Determining the selling price is based on several things, such as your costs as outlined above and your development costs or what you want to receive for your programming effort. This all has to be tempered by what the market will pay for your product based on the selling price of similar products, etc. But let's say you could sell it for \$30.00. After taking the 25% for advertising and the \$11 for production costs, you have \$11.50 as your gross profit. Remember that you only have about 250 customers, so the most you can hope for is a gross profit of \$2,875.00 for all your work. The question you have to ask yourself is whether it is worth it to you to take this upon yourself or whether you would be better off with something else.

DynaStar

WORD PROCESSING SYSTEM FOR OS-9

OS-9 USERS:

If your computer has a SCREEN and you're still struggling with an editor that only knows about LINES, then obviously YOU don't know about

DynaStar

DynaStar is a powerful, menu-driven screen editor equally suited to the tasks of program preparation and document processing. With the addition of the optional DynaForm print formatter, it is the best word-processing package you can buy for your OS-9 system.

DynaStar Version II is now available and features non-nonsense "what you see is what you get" editing for virtually any terminal with or without cursor addressing (it must be at least able to go to "home"). To edit, simply place the cursor where you want it, and type. Any printable character you type is entered directly into your text, and any non-printable control character causes immediate execution of an editing command. Single keystroke commands permit movement of the cursor in any direction, by character, tab, word, line, or screen full, and deletion of characters, words (left or right) or a whole line. Two keystroke commands augment this set by moving the cursor to the left margin, top or bottom of the screen, beginning or end of the edit buffer, or the beginning of the next paragraph. You can search for any string, replace with any other, do it again, mark original blocks of text, copy, move or delete blocks, read or write to side-files, set tabs and margins, or center the current line.

DynaStar features automatic word-wrap, and it can right-justify text as you enter it so you will see exactly how it will look before you print it. If you later make alterations or change the margins, you can reform the text a paragraph at a time with two keystrokes. For programmers, there is a special automatic indent mode to help you write well-structured code. DynaStar includes a Shell command which lets you do almost anything (including edit another file) without even losing your place in your current document, and it permits editing of large disk files in stages without forcing you to break up your files.

If you want to define more powerful commands, DynaStar includes a macro facility which lets you convert any control character to one or a string of characters of your choice. You can use this feature to create global search-and-replace commands, insert "boiler-plate," or simply re-map your keyboard. You can also provide a special "start-up string" which is automatically executed whenever you enter the editor to set up modes such as auto-justify, display a directory, define your favorite macros, or re-map the keyboard.

For complete word-processing, we offer our DynaForm text formatter which provides all the standard features such as pagination, headers and footers with page numbers, single space, double space, multiple space, bold face, double-strike, and underline. DynaForm has its own macro facility with string variables, nested include files, a full merge-print capability for generating form letters and mailing lists, and it can generate an index automatically, sorted alphabetically or by page number. You can call it from DynaStar to proof-print the active edit buffer, or by itself to print a disk file while you edit another.

DynaStar II (for the faithful): \$149.95
DynaForm text formatter: \$149.95
Both purchased together: \$275.00
Note: DynaStar Version I (no macros) will be available at the original price until May 31, and current owners may upgrade to Version II with full credit until June 30.

AVAILABLE SOON FOR FLEX 9

Spelltest

From Dale Puckett
FOR OS-9 AND FLEX

SPELLTEST is the most versatile 68XX spelling checker available. MENU'S MAKE OPERATION EASY. From the menu you may: Print a list of suspect words; Print a list of valid words; Check each suspect word one by one; Read your text, stopping to check suspect words; Use additional dictionaries for more thorough checking or special applications; Build an additional dictionary of newly accepted words; Write correct text file to disk. While checking you may: Accept the suspect word; Accept and save in the dictionary; Replace with correct spelling. Designed to be used by the layman, SPELLTEST is right at home in the office. Ease of use and speed will recover the cost in days. 22,000 word dictionary covers the first 25,000 entries in the American Heritage listing of the most common English words. 500 built in common words (and, or, the, etc.) and 300 specific to your field, filter the text and allows a large file to processed even in small computers.

PRICE \$199.00

A/BASIC

Basic Compiler

For OS-9 and FLEX

If you are still programming in assembler, this is the program for you! This BASIC compiler generates pure, fast efficient 6809 machine code from easy to write BASIC source programs. Uses ultra-fast integer math, extended string functions, boolean operators and run-time operations. Output is ROMable and RUNS WITHOUT ANY RUN-TIME PACKAGE. Supports IF-THEN-ELSE structure, random access, and several improvements over the original 6800 version sold by Microware. Optimized for the 6809, A/BASIC is 8 to 10 times faster than the original 6800 version, and produces code approximately 30% smaller.

SPECIAL

CHES program coded in A/BASIC (originally sold for \$50) is included FREE on the disk in both source and object for your enjoyment. Also some utilities are included for testing and examples, all in source on the disk!

ONLY \$150.00
specify OS-9 or FLEX

PLOT

Now you can have GRAPHICS added to all your programs. Just write the data out to a virtual array and call PLOT. PLOT is written in TSC XBASIC and the source is included on the disk.
INFINITE RESOLUTION GRAPHICS ON YOUR TERMINAL OR PRINTER. HISTOGRAMS, BARGRAPHS, XY PLOTS PLUS OTHERS.
IN TSC XBASIC SOURCE INCLUDED ON DISK. \$44.95

TOOLKIT NO1

The Basic Programmers Toolkit
by Dick Bartholomew

The Basic Programmers Toolkit gives the BASIC programmer the power and flexibility never before achieved under FLEX.

PRICE \$49.95 object only
\$69.95 with source on disk!

TOOLKIT NO2

The Programmers Toolkit
by Dick Bartholomew

The Programmers Toolkit is a package of utilities and programs that extend the capabilities of FLEX to the utmost.

PRICE \$49.95 object only
\$69.95 with source on disk!

Dynasoft PASCAL 1.4 for OS-9

Dynasoft Pascal 1.4 includes all the features of the FLEX version 1.3 with the following enhancements: Chain, Fread, Fwrite, Seek, Open, Create, Close, Delete, Fork, Send, Wait, Sleep, Settime, Time, Getstatus, Setstatus, SetPriority, GetProcID, and JSR. This is an excellent and fast program, small enough to write utilities but powerful enough for things like DynaStar.
Integer Only
Object only \$69.95
Add for run-time source on disk \$30.00
Add for source of Dynasoft Pascal itself \$125.00

CRASMB

MULTI CPU CROSS ASSEMBLER FOR 6809
FLEX
by Frank Hoffman

CRASMB is a conditional macro assembler with the capability to use different CPU overlays in order to cross assemble. These CPU overlays called 'CPU PERSONALITY MODULES' (CPM's) can be called from a source file, thereby making it easy to create object code for a variety of CPU's. It is also possible to create new CPM's yourself for any 8 or 16 bit CPU. The information needed is included in the manual. If you decide to do this, it would be advisable to purchase the source for one of the CPM's and modify it rather than starting from scratch. CPM's are currently available for the following CPU's: 6809, 6800, 6805, 6502, Z80, 8080, 1802, and others coming.

PRICE \$139.95

Includes one 8 bit CPM of your choice (not source)
Additional CPM's
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COLOR COMPUTER USERS

THE POWERFUL FLEX DISK OPERATING SYSTEM WITH HUNDREDS OF SOFTWARE PACKAGES IS NOW AVAILABLE!

Now you can run FLEX, OS-9 and Radio Shack disk software on your Color Computer. If you have a 32K Color Computer with the Radio Shack disk system, all you need to do is make a trivial modification to access the hidden 32K, as described in the Feb. issue of COLOR COMPUTER NEWS and the April Issue of '88' Micro. You can get FLEX from us right now. OS-9 will be ready by summer. Please note that this will only work with the Radio Shack disk system and 32K/64K memory chips that RS calls 32K. Maybe they put 64K's in yours, too. If you don't have a copy of the article, send a legal size SASE (40¢ stamps) and we'll send it to you.

Using this system to run FLEX and OS-9 has many advantages. First, it gives you 48K from zero right up to FLEX. This means that ALL FLEX compatible software will run with NO MODIFICATIONS and NO PATCHES! There are no memory conflicts because we moved the screen up above FLEX which leaves the lower 48K free for user programs.

What you end up with is 48K for user programs, 8K for FLEX and another 8K above FLEX for the screens and stuff. We have a multi screen format so you can page backward to see what scrolled by and a Hi-Res screen that will enable us to have 24 lines by 42 character display in on the way. That's better than an Apple!

We also implemented a full function keyboard, with a control key and escape key. All ASCII codes can now be generated from the Color Computer keyboard!

We also added some bells and whistles to Radio Shack's Disk system when you're running FLEX or OS-9. We are supporting single or double sided, single or double density, 35, 40 and 80 track drives. If you use double sided drives, the maximum is three drives because we use the drive 3 select for side select. When you are running the Radio Shack disk, it will work with the double sided drives but it will only use one side and only 35 tracks. Using 80 track drives is okay, but will not be compatible with standard Radio Shack software. You can also set each drive's stepping rate and drive type. (SS or DS - SD or DD)

In case you don't understand how this works, I'll give you a brief explanation. The Color Computer was designed so that the roms in the system could be turned

off under software control. In a normal Color Computer this would only make it go away. However, if you put a program in memory to do something first (like boot in FLEX or OS-9), when you turn off the roms, you will have a full 64K RAM System with which to run your program. Now, we need the other half of the 64K ram chips to work, and this seems to be the case most of the time, as the article states. Of course, you could also put 64K chips in.

Some neat utilities are included.

MOVROM moves Color Basic from ROM to RAM. Because it's moved to RAM you can not only access it from FLEX, you can run it and even change it!! You can load Color Computer cassette software and save it to FLEX disk. Single Drive Copy, Format and Setup commands plus an online help system are included.

Installing FLEX is simple. Insert the disk and type:

RUN "FLEX"

That's all there is to it! You are now up and running in the most popular disk operating system for the 6809. There are hundreds of software packages now running under the FLEX system. Open your Color Computer to a whole new world of software with FLEX.

FLEX \$99.00

INCLUDES OVER 25 UTILITIES!

Other languages available include; FORTH, Pascal, Fortran77, 'C', A/BASIC compiler, plus more. Application packages include; A/R, G/L, A/P, Inventory, Electronic Spreadsheets, Accounting, Database programs and more. SEND FOR LIST.

TRS-80 COLOR COMPUTER COMPLETE WITH 64K RAM, 24K ROM, SINGLE DISK DRIVE AND FLEX, SET UP AND READY TO RUN FOR ONLY \$1,275. Includes 120 day extended warranty. If you have a Computer, call about RS disk controllers and drives.

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DynaCalc
For Flex
\$200.00

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Requisition Planning	100.00	x
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DYNASOFT Compiler Source		125.00 p
DYNASTAR Screen Editor (OS-9)	149.95	99.00 8 & 9
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STYLOGRAPH Spelling Checker	145.00	9

CODE X = XBASIC, 9 = 6809, 8 = 6800, P = PASCAL

Software by Technical Systems Consultants, Inc.

Flex™ (includes Editor & Assembler)	150.00
UniFlex™ (includes one year maintenance and update)	450.00
Editor	50.00
Assembler	50.00
6800 Cross Assembler on 6809	250.00
Text Processor	75.00
Extended Basic	100.00
Basic Precompiler (specify standard or extended)	50.00
Pascal (Flex™)	200.00
Pascal (UniFlex™) (Add \$75.00 for one year's maintenance and update)	225.00
Soft/Merge Package	75.00
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Debug Package	75.00
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Software by Microware Systems Corp.

OS-9™ Level One	
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Bundle several different software packages to present a coordinated system to the user. AUTOTASK with MENU is compatible with all FLEX compatible software. It uses very little memory and is easy to learn.

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Includes source on disk!

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FORTH FOR THE TRS-80 COLOR COMPUTER DISK SYSTEM

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CC FORTH IS THE ANSWER!!
Includes Editor, 6809 Assembler
String Functions, Disk Data File
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\$99.95

FORTH

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BY Chuck Eaker, Ph.D.
X-FORTH NOTES

Supplied on one 8" disk or 2 5" disks,
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Disk(s) have the source of everything but the core.
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Translator 6502 code to 6809
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Disassembler for 6800/6809 or Z80
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UNIFLEX SIMULATOR
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CONCLUSION

Selling software can be both fun and profitable, but you have to evaluate what you're going to do very carefully before you invest your time and money.

OBSERVATION

Software piracy, and by that I mean any time a program is given away, sold, or shared among friends, reduces the size of the market for any software product. Because of this artificially smaller market, many borderline products have been shelved and will never reach those who could use them. It is unfortunate that piracy is so rampant even in the lower cost programs, but it is a fact of this business. Unfortunately, those who think they benefit from piracy are also being hurt by it. More and more quality programmers are supporting computers that either have a large market or can protect their software. The next time you are exposed to piracy, think about how you would feel if the program in question was yours.

APOLOGY

I told Bill when he asked me to write a editorial about piracy that I didn't think anyone would want to read it. Then I thought that tricking you into reading about what goes into software production from the programmers standpoint would give everyone a look at the other side of the story. There have been many articles about the subject, many of them advocating piracy, and doing the editorial this way would give you insight into the other side of the story. Forget for the moment that it is illegal. Piracy reduces the size of the market and a smaller market means less software at higher prices. It's as simple as that. What may seem like a harmless thing is hurting all of us, producers and users alike. I apologize for tricking you into reading this, but I hope you enjoyed it.

Color Computer News Magna-zine

Finally, your fingers "can do the walking" on something other than your Color Computer keyboard! The Color Computer News Magna-zine subscription service is now available. Each month, CCN Magna-zine subscribers will receive a top quality digital cassette which contains about a half dozen programs from their most informative CC-80 magazine, Color Computer News. Relief for your tired fingers is just a CLOAD away!

Charter subscriptions are available for just \$42.00 (plus postage) for a full 12 issues and your subscription will start with any issue you specify. Single issues are also available for the new low price of just \$6.00 each. First Class postage for the U.S. and Canada is just \$6.00 per year, and Air Mail services to all other countries is \$15.00 per year. Single issue postage is \$1.00 per tape. (Florida residents add \$.30 sales tax per single tape.)

The CCN Magna-zine is now being produced and distributed directly to you by people who are experienced in the field of tape production and duplication. Just clip out (or photo-copy) the coupon and send it directly to the CCN Magna-zine Service, Box 68, Safety Harbor, FL 33572, along with your check or money order. Your subscription will begin with the very next issue of Color Computer News or any specific issue you indicate at the bottom of the coupon.

You already know about the high quality programming articles in CCN, now you can spend your time computing -- not typing!!! So you don't miss a single issue, send in your subscription to the CCN Magna-zine today!

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MAIL CALL

Dear Bill:

I enjoyed my article's appearance in Color Computer News (CCN) this month. I know that other CC owners are reading CCN from the number of phone calls, letters and tapes I have gotten. It has really been enjoyable to talk to some of your other readers about their computers and programs. One reason for the calls and letters is that there were a few errors in the program as it appeared in CCN. Some of the errors were obviously editing or typographical, but two were function errors that I did not catch until just recently. I will list the errors in the article, the debug of my errors, and then some enhancements I have made in the original program.

In line 60 the third from the last number reads 150. It should be 1050. The correct line should be:

```
60 A=ASC(A$)-64: IF A > 0 THEN ON A GOTO 80,
480, 510, 760, 790, 1250, 70, 1370, 1400, 1440,
1560, 1570, 1670, 70, 70, 1730, 70, 1840, 1860, 70,
70, 1050, 70, 2090
```

In line 380 the asterisk before GOTO should be a colon. The correct line should be:

```
380 PRINT @ C, B$: GOTO 140
```

The IT was omitted from the EXIT in line 1380. Line 1380 should read:

```
1380 PRINT "A ADD", "B BLANK", "C COMPILE",
"D DELETE", "E EDIT", "F FORMAT", "H HELP",
"I INSERT", "J JUSTIFY", "K KILL", "L LOAD",
"M MOVE", "P PRINT", "R REPLACE", "S SAVE",
"V VIDEO", "X EXIT"
```

In line 1770 the final number, 170, should be 1790. The correct line should be:

```
1770 IF PN$="Y" THEN B1=63 ELSE B1=66:
PRINT #-2,CHR$(W); CHR$(V); CHR$(T);: IF PN$
<> "Y" OR (P1$="N" AND X=1) THEN 1790
```

The first error I discovered I had overlooked was placement of the line number on the display screen. This involved two errors on line 120. Line 120 should be:

```
120 C=(L-FL+D) * 64: IF C > 447 THEN PRINT:
PRINT: PRINT: C=415
```

The second error was in the Compile algorithm. As it appeared in the article it compiled down correctly when text was added to a line making it longer than the line length. It did not work properly when text was deleted from a line and a compile up was attempted. I had not tested this before I submitted the article. I have completely rewritten the algorithm. To add the new algorithm first delete lines 510 through 750 and add the following new lines:

```
510 INPUT "DO YOU WANT TO COMPILE FROM
THE HIGHEST TO LOWEST NUMBERED
LINE";FLG$
520 INPUT "FIRST LINE TO COMPILE";F: IF F<0
THEN F=0
530 INPUT "LAST LINE TO COMPILE";Z: IF Z>LA
THEN Z=LA
540 IF F>=Z THEN 70 ELSE CLS: PRINT
"COMPILING": IF FLG$="Y" THEN 620
550 FOR L=F TO Z-1: K=L+1
560 X=LEN(A$(L)): IF X<=LL THEN NEXT L:
GOTO 900
570 X$="": FOR I=X TO 1 STEP -1: A$=RIGHT$(
A$(L),1): IF A$=S$ THEN A$(L)=LEFT$(
A$(L),I-1): NEXT I
580 X$=A$+X$: A$(L)=LEFT$(A$(L),I-1):
Y=LEN(A$(L))
590 FOR J=Y TO 1 STEP -1: A$=RIGHT$(A$(L),
1): IF A$<>S$ THEN X$=A$+X$: A$(L)=LEFT$(
A$(L),J-1): NEXT J
600 A$(L)=LEFT$(A$(L),J-1): A=ASC(RIGHT$(
X$,1)): IF A=33 OR A=46 OR A=58 OR A=63 THEN
X$=X$+S$
610 A$(K)=X$+S$+A$(K): GOTO 560
620 FOR L=F TO Z-1: K=L+1
630 X=LEN(A$(L)): IF X>=LL-5 THEN NEXT L:
GOTO 900
640 X$="": Y=LEN(A$(K)): FOR I=Y TO 1 STEP -1:
A$=LEFT$(A$(K),1): IF A$=S$ THEN
A$(K)=RIGHT$(A$(K),I-1): NEXT I
650 X$=X$+A$: A$(K)=RIGHT$(A$(K),I-1):
Y=LEN(A$(K))
660 FOR J=Y TO 1 STEP -1: A$=LEFT$(A$(K),1):
IF A$<>S$ THEN X$=X$+A$: A$(K)=RIGHT$(
A$(K),J-1): NEXT J
670 A2=ASC(RIGHT$(A$(L),1)): IF A2=33 OR
A2=46 OR A2=58 OR A2=63 THEN X$=S$+X$
680 A=LEN(X$): IF X+A<=LL-1 THEN
A$(L)=A$(L)+S$+X$: A$=RIGHT$(X$,1):
A$(K)=RIGHT$(A$(K),J-1): GOTO 630
690 IF A2=33 OR A2=46 OR A2=58 OR A2=63
THEN X$=RIGHT$(X$,A-1)
700 X$=RIGHT$(X$,A-1): A$(K)=X$+S$+A$(K):
NEXT L: GOTO 900
```

There is one problem with this algorithm which I have not been able to overcome. If you compile up and empty a line such as the last short line of a paragraph the algorithm will complete the compilation and then abort giving an FC error in line 680 because it attempts to take a RIGHT\$ of an empty string. Nothing is lost if you enter GOTO 50. If anyone can suggest a fix I would appreciate the ideas.

One of the enhancements I have added to the word processor is the ability to type single

QUALITY SOFTWARE FOR TRS-80 COLOR AND OSI ADVENTURES AND QUEST ALSO FOR SINCLAIR AND VIC-20



ADVENTURES!!!

For TRS-80 COLOR and OSI. These Adventures are written in BASIC, are full featured, fast action, full plotted adventures that take 30-50 hours to play. (Adventures are inter-active 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.")

Adventures require 16k on TRS80, TRS80 color, and Sinclair. They require 8k on OSI and 13k on Vic-20. Derelict takes 12k on OSI. \$14.95 each.

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!

TREK ADVENTURE (by Bob Retelle)

This one takes place aboard a familiar starship. The crew has left for good reasons — but they forgot to take you, and now you are in deep trouble.

HAUNTED HOUSE (by Bob Anderson)

It's a real adventure—with ghosts and ghouls and goblins and treasures and problems — but it is for kids. Designed for the 8 to 12 year old population and those who haven't tried Adventure before and want to start out real easy.

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!



VENTURER!—A fast action all machine code Arcade game that feels like an adventure. Go berserk as you sneak past the DREADED HALL MONSTERS to gather treasure in room after room, killing the NASTIES as you go. Great color, high res graphics, sound and Joystick game for the TRS-80 Color or OSI machines. (black and white and silent on OSI.) Tape only. \$19.95.

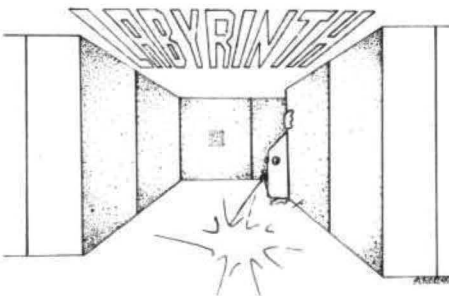
BASIC THAT ZOOMS!!

AT LAST AN AFFORDABLE COMPILER FOR OSI AND TRS-80 COLOR MACHINES!!! 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.

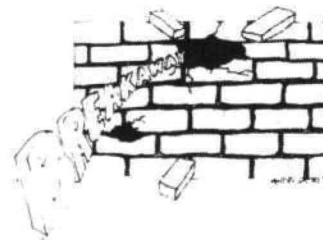
It does have some limitations. It takes at least 8K of RAM to run the compiler and it does only support a subset of BASIC—about 20 commands including FOR, NEXT, END, GOSUB, GOTO, IF, THEN, RETURN, END, PRINT, STOP,USR (X), PEEK, POKE, *, /, +, -, >, <, =, VARIABLE NAMES A-Z, SUBSCRIPTED VARIABLES, and 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 or TRS-80 Color.

LABYRINTH — 16K EXTENDED COLOR BASIC — With amazing 3D graphics, you fight your way through a maze facing real time monsters. The graphics are real enough to cause claustrophobia. The most realistic game that I have ever seen on either system. \$14.95. (8K on OSI)



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 TRS-80, TRS-80 Color, and Sinclair. 13K VIC-20. \$14.95 each.



NEW!!

BREAKAWAY — ALL MACHINE CODE — Every computer has some form of BREAKAWAY available. Ours is fast, smooth, has 15 levels of difficulty — and is a bargain!! 16k TRS-80 Color only \$9.95.

PROGRAMMERS!

SEE YOUR PROGRAM IN THIS SPACE!! Aardvark traditionally pays the highest commissions in the industry and gives programs the widest possible coverage. Quality is the keyword. If your program is good and you want it presented by the best, send it to Aardvark.

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.

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TRS-80 COLOR

SINCLAIR

OSI

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AARDVARK — THE ADVENTURE PLACE

ADVENTURES FOR OSI, TRS-80, TRS-80 COLOR, SINCLAIR, PET, VIC-20

ADVENTURES — Adventures are a unique form of computer game. They let you spend 30 to 70 hours exploring and conquering a world you have never seen before. There is little or no luck in Adventuring. The rewards are for creative thinking, courage, and wise gambling — not fast reflexes.

In Adventuring, the computer speaks and listens to plain English. No prior knowledge of computers, special controls, or games is required so everyone enjoys them—even people who do not like computers.

Except for Quest, itself unique among Adventure games, Adventures are non-graphic. Adventures are more like a novel than a comic book or arcade game. It is like reading a particular exciting book where you are the main character.

All of the Adventures in this ad are in Basic. They are full featured, fully plotted adventures that will take a minimum of thirty hours (in several sittings) to play.

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.

TREK ADVENTURE by Bob Retelle — This one takes place aboard a familiar starship and is a must for trekkies. The problem is a familiar one — The ship is in a "decaying orbit" (the Captain never could learn to park!) and the engines are out (You would think that in all those years, they would have learned to build some that didn't die once a week). Your options are to start the engine, save the ship, get off the ship, or die. Good Luck.

Authors note to players — I wrote this one with a concordance in hand. It is very accurate — and a lot of fun. It was nice to wander around the ship instead of watching it on T.V.

CIRCLE WORLD by Bob Anderson — The Alien culture has built a huge world in the shape of a ring circling their sun. They left behind some strange creatures and a lot of advanced technology. Unfortunately, the world is headed for destruction and it is your job to save it before it plunges into the sun!

Editors note to players — In keeping with the large scale of Circle World, the author wrote a very large adventure. It has a lot of rooms and a lot of objects in them. It is a very convoluted, very complex adventure. One of our largest. Not available on OSI.

HAUNTED HOUSE by Bob Anderson — This one is for the kids. The house has ghosts, goblins, vampires and treasures — and problems designed for the 8 to 13 year old. This is a real adventure and does require some thinking and problem solving — but only for kids.

Authors note to players — This one was fun to write. The vocabulary and characters were designed for younger players and lots of things happen when they give the computer commands. This one teaches logical thought, mapping skills, and creativity while keeping their interest.

DERELICT by Rodger Olsen and Bob Anderson — For Wealth and Glory, you have to ransack a thousand year old space ship. You'll have to learn to speak their language and operate the machinery they left behind. The hardest problem of all is to live through it.

Authors note to players — This adventure is the new winner in the "Toughest Adventure at Aardvark Sweepstakes". Our most difficult problem in writing the adventure was to keep it logical and realistic. There are no irrational traps and sudden senseless deaths in Derelict. This ship was designed to be perfectly safe for its' builders. It just happens to be deadly to alien invaders like you.



NUCLEAR SUB by Bob Retelle — You start at the bottom of the ocean in a wrecked Nuclear Sub. There is literally no way to go but up. Save the ship, raise her, or get out of her before she blows or start WWII.

Editors note to players — This was actually plotted by Rodger Olsen, Bob Retelle, and someone you don't know — Three of the nastiest minds in adventure writing. It is devious, wicked, and kills you often. The TRS-80 Color version has nice sound and special effects.

EARTHQUAKE by Bob Anderson and Rodger Olsen — A second kids adventure. You are trapped in a shopping center during an earthquake. There is a way out, but you need help. To save yourself, you have to be a hero and save others first.

Authors note to players — This one feels good. Not only is it designed for the younger set (see note on Haunted House), but it also plays nicely. Instead of killing, you have to save lives to win this one. The player must help others first if he/she is to survive — I like that.

PYRAMID by Rodger Olsen — This is one of our toughest Adventures. Average time through the Pyramid is 50 to 70 hours. The old boys who built this Pyramid did not mean for it to be ransacked by people like you.

Authors note to players — This is a very entertaining and very tough adventure. I left clues everywhere but came up with some ingenious problems. This one has captivated people so much that I get calls daily from as far away as New Zealand and France from beary eyed people who are stuck in the Pyramid and desperate for more clues.

QUEST by Bob Retelle and Rodger Olsen — THIS IS DIFFERENT FROM ALL THE OTHER GAMES OF ADVENTURE!!!! It is played on a computer generated map of Alesia. You lead a small band of adventurers on a mission to conquer the Citadel of Moorlock. You have to build an army and then arm and feed them by combat, bargaining, exploration of ruins and temples, and outright banditry. The game takes 2 to 5 hours to play and is different each time. The TRS-80 Color version has nice visual effects and sound. Not available on OSI. This is the most popular game we have ever published.

MARS by Rodger Olsen — Your ship crashed on the Red Planet and you have to get home. You will have to explore a Martian city, repair your ship and deal with possibly hostile aliens to get home again.

Authors note to players — This is highly recommended as a first adventure. It is in no way simple—playing time normally runs from 30 to 50 hours — but it is constructed in a more "open" manner to let you try out adventuring and get used to the game before you hit the really tough problems.



ADVENTURE WRITING/DEATHSHIP by Rodger Olsen — This is a data sheet showing how we do it. It is about 14 pages of detailed instructions how to write your own adventures. It contains the entire text of Deathship. Data sheet - \$3.95. NOTE: Owners of OSI, TRS-80, TRS-80 Color, and Vic 20 computers can also get Deathship on tape for an additional \$5.00.

PRICE AND AVAILABILITY:

All adventures are \$14.95 on tape except Earthquake and Haunted House which are \$9.95. Disk versions are available on OSI and TRS-80 Color for \$2.00 additional.

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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.

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TRS-80 COLOR

SINCLAIR

OSI

VIC-20

MAIL CALL

pages so that I can print on bond paper (I added Micro Grip to my MX 80). This can be accomplished by deleting line 1830 and inserting the following lines:

```
1830 IF S THEN S1=B1 - ((S+1)*PL) ELSE S1=B1 - PL
1832 FOR I=1 TO S1: PRINT#-2, CHR$(28): NEXT I: IF P > LA THEN 50 ELSE X=X + 1
1834 IF SP$="Y" THEN INPUT "WAITING FOR NEXT SHEET OF PAPER"; WT$: GOTO 1770
1836 GOTO 1770
```

SP\$ is a flag set in the format algorithm.

Speaking of the Format algorithm, that is the other major enhancement I have made to the processor. As the program appears in CCN each time you want to change one print format statement it is necessary to enter every format parameter. I modified the program to allow changing of only the desired formats. This was accomplished by adding ; RETURN to the end of every line from 1250 through 1360, (eg, 1250 CLS: PRINT "LINE LENGTH ="; LL: INPUT "NEW ="; LL: RETURN) and inserting the following lines:

```
1242 PRINT "THE CURRENT FORMAT IS: "
1244 PRINT "1.LINE LEN"; LL, "2.LINE SPACES"; S, "3.LINE #S"; N$, "4.FIRST LINE", FL, "5.LEFT MAR"; LM, "6.PAGE LEN"; PL, "7.PAGE #S"; PN$, "8.FIRST PAGE"; FP, "9.PAGE 1 #"; P1$, "10.CHAR/INCH"; G, "11.LINES/INCH"; H, "12.SINGLPAG "; SP$, "13 HEADING"; H$
1246 INPUT "WHICH FORMAT DO YOU WANT TO CHANGE (ENTER 1-13)"; A3: ON A3 GOSUB 1250, 1260, 1270, 1280, 1290, 1300, 1310, 1320, 1330, 1340, 1350, 1355, 1360
1248 INPUT "DO YOU WANT TO CHANGE ANOTHER FORMAT(Y/N)"; A3$: IF A3$="Y" THEN 1242 ELSE GOTO 50
1355 PRINT "SINGLE PAGE "; SP$: INPUT "NEW (Y/N)"; SP$: RETURN
```

It is also necessary to change line 60 as follows:
60 A=ASC(A\$)-64: IF A > 0 THEN ON A GOTO 80, 480, 510, 760, 790, 1242, 70, 1370, 1400, 1440, 1560, 1570, 1670, 70, 70, 1730, 70, 1840, 1860, 70, 70, 1050, 70, 2090

These are all the changes of which I am aware which will make the CC WORD PROCESSOR a more functional program. I hope that everyone who attempts to use it is successful. If anyone is reluctant to type the program in because of its length and complexity I will be glad to provide a copy on tape for \$7.50. My address is 1670 Valencia, Las Cruces, NM 88001. Please allow 10 days for personal checks to clear.

Sincerely,
David M. Dacus
Las Cruces, NM

Bill,

I am using the Radio Shack disk system which I think is a pretty good system so far. However there are several points worth noting about the system:

1. My boys use the game cartridges quite a bit. And, as I had expected, I eventually ran into repeated disk I/O errors which were only corrected by cleaning the contacts on the disk plug-in module.

2. The manual says use hexadecimal for SAVEM-don't! Use decimal.

3. The use of the DSKI\$ and DSKO\$ commands which permit the reading or writing of any sector of any track and drive could be extremely useful. For example we have 630 256 byte sectors directly addressable. Since we bypass file operations the access time is very fast. This makes it very appealing for overlay variables and constants as well as complex graphics in string format.

4. The manual, as with other Radio Shack manuals, leaves much to be desired in terms of thoroughness in detailing file operations.

5. As far as I know at this point all DOS commands can be executed directly in the BASIC statements. Thus, by using the disk for temporary storage of variables and constants, segmentation of programs into one or more overlays is possible.

There are a lot of things that I would like to see done which would interest me.

1. An extension board with software control which would permit permanent connection of the disk drive module and still allow changing of ROM cartridges or special function boards.

2. A replacement RAM module for the BASIC ROMS and BASIC on disk to permit use of the address space for whatever (i.e. FORTRAN).

3. Motorola to come out with a 6847 which would accomodate text in high-res graphics, multiple colors in hi-res and an RGB option.

4. A modification to permit the joysticks to return the highest resolution available on the graphics screen (dumb? right).

5. A cessation of the attitude of some of the people at Radio Shack, who seem to think they were the only people who knew anything about computers and that they never make mistakes.

I am enclosing 3 programs which may be useful to your readers.

1. The first is a directory listing program "DIRLIST".

2. The second is a diskdump program "DISKDUMP".

MAIL CALL

3. The third is "GRAFTEXT" a modification of the program by Don Inman in CCN Jan 82. I think that the listing will be self explanatory.

Sincerely,
F. S. Flack
Pasadena, MD

```

5 'PGM NAMES IS DIRLIST/BAS
10 CLEAR 1500
20 INPUT"INPUT DRIVE NO.">;DR
30 INPUT"INPUT DISK NO.">;DN
40 INPUT"INPUT DISK SIDE 1/2">;S
N
50 INPUT"INPUT MO/DA/YR">;DT#
60 INPUT"COMMENTS">;CM#
70 PRINT#-2,"DISK NO.";DN;" SIDE
";SN;" ";DT#;" ";CM#;CHR$(13)
80 PRINT#-2,"NAME"TAB(9)"EXT"TAB
(13)"1"TAB(15)"2"TAB(18)"FGN"TAB
(23)"FTN"TAB(28)"FSN";
90 PRINT#-2,TAB(33)"LGN"TAB(38)"
LTN"TAB(42)"NSLT"TAB(47)"LSN";
100 PRINT#-2,TAB(52)"NBLB"TAB(58
)"NG"TAB(64)"NB"
110 FOR N=1 TO 68:PRINT#-2,"=";;
NEXT N
120 PRINT#-2,""
130 DSKI# DR,17,2,G1#,G2# 'GRAN
TABLES
140 FOR X=3 TO 11
150 DSKI# DR,17,X,A#,B# 'DIRECTO
RIES
160 C#=A#+LEFT$(B#,127)'FIRST B
IN C#
170 FOR N=0 TO 7
180 D#=MID$(C#,N*32+1,32)'32 AT
A TIME
190 IF LEFT$(D#,1)=CHR$(255) GOT
O 300'GOTO END
200 IF LEFT$(D#,1)=CHR$(0) GOTO
280' VACANT NEXT N
210 N#=MID$(D#,1,8);E#=MID$(D#,9
,3)'NAME/EXT
220 PRINT#-2,N#;"/";E#;
230 FOR S=12 TO 16'NEXT 4 ENTRIE
S
240 F#=MID$(D#,S,1)
250 F=ASC(F#)
260 ON S-11 GOSUB 370,380,400,55
0
270 NEXT S
280 NEXT N
290 NEXT X
300 PRINT#-2," "

```

```

310 PRINT#-2,TAB(10)"USED"TAB(17
)"AVAILABLE"TAB(40)"COLUMN HEADE
R CODES"
320 PRINT#-2,USING"%      %###,##
#      ###,###";"GRANS=",GU,GA;
330 PRINT#-2,TAB(29)"1=FILE TYPE
2=ASCII CODE F=FIRST L=LAST"
340 PRINT#-2,USING"%      %###,##
#      ###,###";"BYTES=",BU,BA;
350 PRINT#-2,TAB(29)"G=GRANS T=T
RACK S=SECTOR B=BYTES N=NO."
360 GOTO 360
370 PRINT#-2,F#;RETURN'FILE TYPE

380 IF F=255 THEN R#="A" ELSE R#
="B"
390 PRINT#-2,R#;RETURN
400 FG=F;FT=INT(F/2)'1ST GRN & T
RK
410 IF FT>=17 THEN FT=FT+1'ADJ F
OR DIR
420 A=(F AND 1);IF A =0 THEN FS=
1 ELSE FS=10'1ST SEC
430 TG=1;GA=F'GRN CNTR & GRN ADD

440 GOSUB 530'GET NEXT GRN
450 IF LG>67 THEN GOTO 470'LAST
GRN
460 TG=TG+1;GA=LG;GOTO440'NOT LA
ST GRN
470 LT=INT(GA/2);IF LT>=17 THEN
LT=LT+1'LAST TRK
480 NS=(LG AND 15)'NO SEC LAST G
RAN
490 A=(GA AND 1);IF A=0 THEN LS=
1 ELSE LS=10'LAST SEC STRT
500 LS=LS+NS-1;LG=GA'LAST GRN &
SEC NO.
510 BG=(NS-1)*256'NO. BYTES LAST
SEC-1
520 RETURN
530 N#=MID$(G1#,GA+1,1)
540 LG=ASC(N#);RETURN
550 S=S+1
560 F#=MID$(D#,S,1)'NEED LAST BY
TE(15) ONLY
570 LB=ASC(F#)
580 TB=(TG-1)*2304+BG+LB;DB=DB+T
B;GU=GU+TG;GA=68-GU;BU=BU+TB;BA=
156672-BU
590 PRINT#-2,USING" ### ";FG,FT,
FS,LG,LT,NS,LS,LB,TG;
600 PRINT#-2,USING"###,###";TB
610 RETURN

```

MAIL CALL

```

5 *PGM NAME IS DISKDUMP/BAS
10 CLEAR1000
20 D#="0000"
30 INPUT"INPUT DRIVE NO.">;D
40 INPUT"DISK NO.">;DN
50 INPUT"SIDE NO.">;SN
60 INPUT"INPUT TRACK NO.">;TN
70 INPUT"INPUT SECTOR NO.">;S
80 INPUT"COMMENTS";C#
90 PRINT#-2,"DSK NO.";DN;
100 PRINT#-2,"SIDE NO.";SN;
110 PRINT#-2,"TRK NO.";TN;
120 PRINT#-2,"SEC NO.";S;" *";
130 PRINT#-2,C#;PRINT#-2
140 PRINT#-2,TAB(42)"A B C D
E F"
150 PRINT#-2,TAB(10)" ";
160 FOR N=0 TO 15
170 PRINT#-2,USING"### ";N;;NEXT
N;PRINT#-2," "
180 PRINT#-2,STRING$(58,"=")
190 DSKI# D,TN,S,S1#,S2#
200 FOR N=0 TO 255 STEP 16
210 IF N=128 THEN S1#=S2#
220 PRINT # -2,USING "##### ";N;
230 H#=HEX$(N);L=LEN(H#)
240 PH#=LEFT$(D#,4-L)+H#
250 PRINT#-2,PH#;" ";
260 A#="" ;B#="" ;C#=""
270 S=N+1;IF N>127 THEN S=N-128+
1
280 FOR I=0 TO 15
290 A=ASC(MID$(S1#,S+I,1))
300 UB=(A AND &HF0)/16
310 LB=A AND &HF
320 A#=A#+HEX$(UB)+HEX$(LB)+" "
330 B#=CHR$(A)
340 IF A<32 OR A>126 THEN B#=""
350 C#=C#+B#;NEXT I
360 PRINT#-2,A#;" ";C#
370 PRINT#-2;NEXT N
380 GOTO380

```

```

5 *PROGAM NAME IS GRAFTEXT
10 DIM C$(90)
20 PMODE 4,1
30 PCLS 4
40 SCREEN 1,0
50 GOSUB 140
60 INPUT A#
70 PCLS
80 SCREEN 1,0
90 DRAW "BM2,95"
100 FOR N=1 TO LEN(A#)

```

```

110 C=ASC(MID$(A#,N,1))
120 DRAW "S4"+C$(C);NEXT N
130 GOTO130
140 C$(32)="BR12" SPACE
150 C$(33)="BR0" ? !
160 C$(34)="BR0" ? "
170 C$(35)="BR0" ? #
180 C$(36)="BR0" ? $
190 C$(37)="BR0" ? %
200 C$(38)="BR0" ? &
210 C$(39)="BR0" ? '
220 C$(40)="BR0" ? (
230 C$(41)="BR0" ? )
240 C$(42)="BR0" ? *
250 C$(43)="BR0" ? +
260 C$(44)="BR0" ? ,
270 C$(45)="BR0" ? -
280 C$(46)="R2U2L2D2BR12" ? .
290 C$(47)="BR0" ? /
300 C$(48)="NE8U8R8D8NL8BR4" ? 0
310 C$(49)="BR2R4BL2U8G2E2D8BR4"
? 1
320 C$(50)="NR8U4R8U4NL6BD8BR4"
? 2
330 C$(51)="R8U4NL6U4NL8BD8BR4"
? 3
340 C$(52)="BR6U8G4R8BD4BR4" ? 4
350 C$(53)="R8U4L8U4R6BD8BR6" ? 5
360 C$(54)="U8NR6D4R8D4NL8BR4" ? 6
370 C$(55)="E8NL8BD8BR4" ? 7
380 C$(56)="R8U8L8D4NR8D4BR12" ? 8
390 C$(57)="R8U8L8D4R8D4BR4" ? 9
400 C$(58)="BR0" ? ;
410 C$(59)="BR0" ? ;
420 C$(60)="BR0" ? <
430 C$(61)="BR0" ? =
440 C$(62)="BR0" ? >
450 C$(63)="BR0" ? ?
460 C$(64)="BR0" ? @
470 C$(65)="U8R8D4L8BR8D4BR4" ? A
480 C$(66)="R8U4NL6U4LBR2D8BR10"
? B
490 C$(67)="U8R8BD8L8BR12" ? C
500 C$(68)="R8U8L8R2D8BR12" ? D
510 C$(69)="U8R8BD4L8BD4R8BR4" ? E
520 C$(70)="U8NR8D4NR4D4BR12" ? F
530 C$(71)="U8R8BD4L4BR4D4L8BR12
" ? G
540 C$(72)="U8BR8D8BU4L8BD4BR12"
? H
550 C$(73)="BR4NL2NR2U8NL2NR2BD8
BR6" ? I
560 C$(74)="U4BU4BR8D8L8BR12" ? J

```

MAIL CALL

570 C#(75)="UBBR8G4L4BR4F4BR4"*K
580 C#(76)="UBBD8R8BR4"*L
590 C#(77)="UBF4E4D8BR4"*M
600 C#(78)="UBF8UB8D8BR4"*N
610 C#(79)="UBR8D8L8BR12"*O
620 C#(80)="UBR8D4L8BD4BR12"*P
630 C#(81)="UBR8D8NH2NF2NL8BR4"*
Q
640 C#(82)="UBR8D4L8BR4F4BR4"*R
650 C#(83)="BU4U4R8BD4L8BR8D4L8B
R12"*S
660 C#(84)="BU8R8BL4D8BR8"*T
670 C#(85)="UBR8D8L8BR12"*U
680 C#(86)="BU8D4F4E4U4BD8BR4"*V

690 C#(87)="UBR8D8H4G4BR12"*W
700 C#(88)="E8BL8F8BR4"*X
710 C#(89)="BU8F4E4G4D4BR8"*Y
720 C#(90)="BU8R8G8R8BR4"*Z
730 RETURN

Frank Hogg Labs:

Thanks for delivering us from the TANDY Tyrant. I have wanted a 6809 machine for over a year, but couldn't justify the big initial price tag on the systems available; and I didn't have the smarts to do what you've done with the Color Computer.

When RS lowered their price on the 4K CC to \$300, I couldn't wait any longer. I had already read some of your CCN articles, and I called CCN to get a few of my questions answered. I now own a 4K CC.

There may be more ELF II (Netronics) nuts like me around, so I would like to make a couple of suggestions that might be of benefit to both you and me. Given: the 6809 is a state of the art CPU and the CC is a good package to work with (-two things Netronics ran out of steam on with the RCA 1802 in the ELF II-) so how about an article or two on how someone like me could modify the 4K CC to 32K? You have already told us how to get from 32K to 64K. Then, how about a simple step by step description on how to later add a disk drive and FLEX, OS-9, CC FORTH, etc.? As it is, now, I read a lot of uncoordinated stuff that sounds good; but after reading several articles of half understood (or less) stuff, the main result is at least a slight case of dizziness. I'll bet there is a bunch of us that would appreciate a knowledgeable leader that could start off with a 4K CC baseline and help us to grow into an OS-9. This leads to the second suggestion.

For those of us that are overwhelmed at the thought of having a 35 track single sided disk in the same system as an 80 track, double density, double sided disk and those of us that are mystified with having 64K bytes available, sharing addresses with mapped memory I/O; and all kinds of stuff that I've not even heard of yet - how about a series of coordinated articles that can bring us along at our own pace financially on spare time wise? Maybe include some experiments or demos that would allow us to smell some flowers along the way. We could learn, CCN might build circulation a little faster, and you could build a following that could make better use of more of your software. Maybe the articles could be turned into a "How to" book later on.

At this point my biggest fear is that I will start out fixing up my 4K machine and by following fragmented information come to realize at some point in the future that I made a wrong turn \$400 ago.

Now, to get to my main point. On page 53 of CCN #6 (February 82) you mentioned that you were coming out with "a board --- to allow you to have all of this without opening the CC case". Will this board plug into the anticipated Radio Shack expansion chassis (rumors!), or will it fill the 40 pin slot? Will it include the 4K to 32K (64K?) expansion? I'm just trying to develop a plan that will lead to where I want to get with a minimum of regrets.

Thanks,
Jack Dole
Wichita, KS
cc Color Computer News

Dear CCN,

First, I would like to say that you publish an excellent computer magazine. I always look forward to reading your articles and your software reviews. I have a few questions if you would care to answer them. I think that other readers would benefit from the answers also.

Question #1: How are Auto-Bootup tapes made? I have the Mark-Data products version of BERSERK and it loads a small loader routine starting at \$9F. This in turn loads in an unknown data format tape. Could you include in your Comment-Corner section this part of memory (\$0000-\$0400)?

Question #2: Is there or will there be any products on the market in the near future to expand the parallel bus for additional I/O? I have a 44 pin card rack that I am ready to build

my own motherboard expansion but I won't if it is not compatible with any other products.
Sincerely,
Hubert G. Schneider III
Redland, CA

* Comment Corner has just what you want this month. I recently heard of an expansion connector for the Color Computer, I don't think you'll have any problem if the pin-out of your connector stays the same as the expansion connector (ROMPak port) on the Color Computer.

Dear Bill,

I've been considering buying a used teletypewriter (Model 33 KSR 20 MA current WOP), but have held back because of possible problems with cable connections and or printer-driver problems. I have some information on converting 20MA current loop to RS232, but certain details are sketchy. Do you know where I can find specific information on connecting an 80-C to a Model 33 TTY?

It would be nice if the various printer manufacturers would provide information to concerned magazines on how to interface and what printer driver program to use for each specific computer. To aid in gathering information it would help if hobbyists developing their own interface or driver program would send this information to the printer manufacturer. The manufacturers could also help by offering a small cash prize for the best interface and driver program for each new computer and then providing this information to magazine publishers and purchaser's.

Enclosed is a SASE if you have time to jot down any info or references concerning the Model 33 TTY and the 80-C. Keep up the great work on your really fine computer.

Thanks
Yours Truly,
Timothy McIlwee
Ormond Beach, FL

P.S. Do you have any info on using the 80-C as a terminal for another Microprocessor (I'm putting together an ECK88 Kit, (8088) and need an input-output terminal.)

* Several people are using Model 33s so you shouldn't have much difficulty getting it up and running. The problems you will encounter are that the Model 33 must have a carriage return and a line feed at column 72 or it will continue to type at the same place until it gets them, you also

have to send a line feed with all carriage returns. Your best bets are to see CCN #6 (Interfacing a non standard printer) for adding the line feed and the April 1982 issue of TRS-80 Microcomputing for send a carriage return/line feed at column 72. Using the Color Computer as a terminal should be rather simple by using one of the terminal programs advertised elsewhere in this issue.

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64K KORNER
NCC
By Frank Hogg

First I must apologise for missing last month. I went to both the OS-9 seminar and NCC and just didn't have enough time left to do the Korner.

Last month was supposed to be on the OS-9 disk format etc. I have decided to wait on that so I can talk a little about the NCC.

I flew to Houston on Sunday June 6th, via New York city. That way I could fly on a 747 which I hadn't been on for 10 years. Back then, the 747 was quite a plane, I think the one I left New York on was the same one I flew on 10 years ago, and they haven't kept it up since then. On takeoff, the movie screen opened partially, and the overhead opened and dumped its contents on the passenger across the aisle from me. It was a sign to indicate how Houston was going to be.

The night before, Richard Don of GIMIX called to tell me that Dick Bartholomew, one of my programmers whom I've never met, had a car and would pick me up at the airport. I was glad of this because I had brought a CoCo with a Terminal hooked to it, all in all 9 pieces of baggage.

I arrived in Houston to 90 degree heat and 90% humidity. After some confusion at the airport, Dick, myself, and Lee Barford (another programmer) left for the hotel. None of us knew where the hotel was, although some of us thought they did. Anyway, 1 and 1/2 hours later we finished the 30 minute drive to the hotel.

Richard Don had managed to get me a suite at the hotel rather than the room I originally booked. At the time, I wasn't planning to have any equipment with me. At the last minute I decided to bring the CoCo because we had it running with a TeleVideo terminal running at 19,200 baud hooked to the RS-232 port, and I wanted to show the SS-50 people, who are used to terminals, how well it ran. It is hard to tell the difference between the CoCo and the typical SS-50 machine except that the CoCo is several thousand dollars less money. It was well received and impressed everyone who saw it. So you don't call and ask, we are going to include the software to do this as soon as it's polished up a bit.

Back at the hotel I was shown to our suite and was I surprised. It was the nicest suite in

the hotel, but it was also right next to the GIMIX hospitality suite. Lucky for me I require little sleep. After getting settled, I went to the GIMIX party in the hotel. Our gracious hosts, Mr. and Mrs. Richard Don, did a wonderful job and I thank them for all of us.

The next day I went to the show and I want to tell you if you have never been to the NCC you should try to attend next year in Anaheim, CA. The registration area itself was larger than most shows. We were preregistered, thanks again to Richard Don, and only had to walk around the registration area. That alone took about 15 minutes! In the show itself there was every manufacturer known to man and computer alike. No way could one person see all that show in just four days! You had to have a map (they put different colored carpet in different areas so you could look at your map to find out where you were). One day I left my book with the map in it at the hotel and I got lost for about 1 hour before I got my bearings again.

Enough of this, what about the CoCo at the show? Sorry to say the only people there were RS. They had some new games, but nothing else (see later on about my trip to Fort Worth). I was looking for peripherals that could be added to the CoCo, mainly terminals, printers, and disks. Several companies make terminals that will hook to the CoCo with no problem and they all can be purchased for under \$600.

What we do with the terminal is hook it to the RS-232 port. Now then, where do you hook the printer? We looked at the cassette interface and other options but the best is to use the printer port that is on most of these terminals, anyway. We hook the terminal to the computer and the printer to the terminal. The software has to turn the printer port on the terminal on and off automatically without the user program knowing the difference. We have this all worked out and will be including it, probably by the time you read this with Color FLEX. This is why I was looking at terminals and printers.

The best printer seemed to be the Microline 82A. It has a RS-232 port built in and can be purchased for less than \$500. It also runs at 120 CPS. I've got one now with a TeleVideo 910+ to use for testing. The RS DT-1 also looks like a good choice because it also has a parallel printer

port in addition to the RS-232 port. I will get one for testing and report back.

In disk drives, several companies were showing half height 5 inch drives. Imagine two of those on their side on top of the CoCo. It will be awhile before these are readily available at reasonable cost. The other exciting drives were the small 3 1/2" drives. These will hold the same amount of data as a single sided 40 track 5" drive and as a matter of fact, should plug in to the RS controller and run with no problem. I would like to see it first, though. Two of these in a case are about the same height as the CoCo and about 6 inches square. How about that for taking on a trip. You could fit it in a briefcase. Cost for two was about \$900. Not too bad.

GIMIX was showing their 38M disk system. That's 30 million bytes formatted in two 5" hard disk drives! Talk about fast. Loading a 20K program took about 1 second. Hope someone comes out with a hard disk for the CoCo soon. Of course, I'll need one so we can get FLEX up on it. (my wife Linda proofreads this and I thought I'd get her prepared)

There was nothing else that I saw that would be of special interest to CoCo users, so I'll end the discussion about the show.

Back at the hotel, we had another show going on. We do a lot of business overseas and one of the main reasons I went to NCC was to meet some of our overseas dealers. We had Mr. and Mrs Toshio Shinjo from MicroBoards in Japan, Mr. H. Zacher from Kleincomputer in West Germany, Mr. Peter H. Biermann from PD Computer GMBH in West Germany, Jackie Cockinos with his parents Mr. and Mrs. Paris Cockinos from Paradio in Australia. Jackie is very eager to help any Australian CoCo users and is handling all of our software in Australia. He will give any of you his personal attention and assistance. I apologise for overlooking anyone that was there.

Richard Don was my appointment secretary. He would arrange for me to meet all these people that he knew. I appreciate this very much, Richard is a good friend and I like him very much. However, he was arranging half hour appointments for me every 15 minutes. I've found that I have a multi-user brain in that I can keep 4 conversions going on at the same time. With Richard making my appointments, I needed it.

In the suite, we had a CoCo running FLEX with two Double sided 40 track drives. With the TeleVideo hooked to it, we were able to run FLEX business software (A/R, A/P, and G/L) without any modifications! This impressed all who saw it. I don't think they think it's a toy after that. Much of the business software written for FLEX uses a 24 X 80 screen format. By using a standard terminal like the 910, which has a 24 X 80 screen, we are able to run all this software with no modifications.

Fort Worth

We were invited to Fort Worth for a press party after NCC on Friday the 11th. As usual, we had a little difficulty getting to the airport on time and almost missed the plane. Dale Puckett met us at the airport and we went into Fort Worth to the hotel where RS was supposed to show some new things for the CoCo. The 'New CoCo' turned out to be the same CoCo with the prices changed and there was nothing else there for it. I had previously called RS to make sure that I wouldn't be wasting a trip and they told me they had all this new stuff for the CoCo. Well, calling it like it is, they lied to me. Just goes to prove that you can't believe what Radio Shack says. If you get the idea that I'm still mad after 2 weeks then you got it. I don't like being lied to and I don't mind telling people about it either. There were several things they 'told' me they were going to have for the CoCo but I didn't see anything. I don't want to spread rumors so I won't talk about things I didn't see.

NEW STUFF

A big mistake we have made in the past was to tell people about things we are working on. We are always working on something. After all, we have almost 150 software packages to sell and more are always being developed. However, this has caused a problem for us. You see, we can't tell for sure when a product will be ready until it's almost done. Something always comes up at the last minute to hold it up. Starting after NCC, we decided to stop telling people about things until they were in final test. When we have things in this 'alpha' test we can be fairly sure of shipping dates and will then advertise them. If you call and the people that answer the phone are closemouthed about new products, you will know why.

However, there are some things that are in 'alpha' test or near ready for other reasons and I can give you some info about them.

DBASIC is RS disk basic modified to run under FLEX on the CoCo. It moves ROM to RAM and then modifies it. This release will read and write sequential files plus load and save programs. The price when ordered with CC FLEX is \$30, \$40 separately. With this, you can run RS disk programs under FLEX. Random files are being looked at, but no decision has been made to do that at this time.

EXT and INT are the two commands that switch between the RS keyboard and a terminal hooked to the RS-232 port. This was what we had running at NCC. It will be included with FLEX when it is done, at no additional charge. If you already have CC FLEX, return your disk with enough postage and you will receive them at no charge. As I write this (6/25/82) it is not done, but it should be when you read this.

A/R, A/P, and G/L along with a database program called INFOMAG will all run now if you use an external terminal and the above program. A version of these programs will be available for the smaller display later on. No time set at this point.

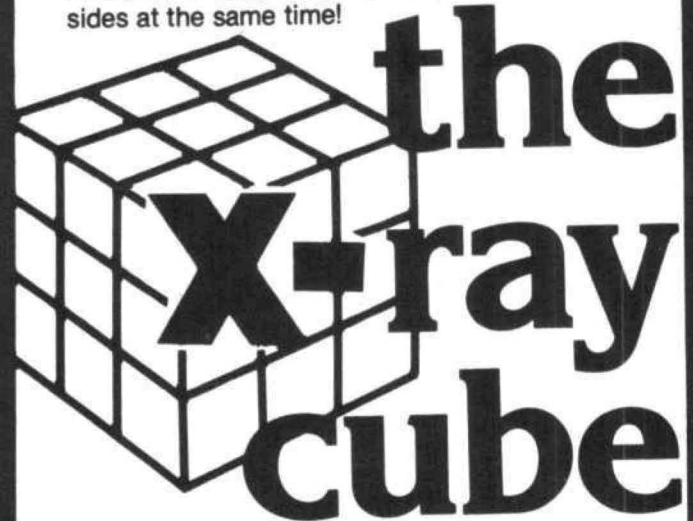
Stylo and DynaStar word processors for the CoCo will be ready probably by the end of summer. Several companion programs like spelling checkers etc. will be out at the same time.

ASM is a 6809 assembler. It has conditionals and macros. It is compatible with TSC ASMB source code. It is, however, more powerful than TSC's and sells for the same \$50. It is being shipped now.

ED is an editor that is also compatible with TSC in that it has all the same features as theirs, plus more. It has macros, where you can define a macro to do a combination of things. It also has a built in math package and with it you can do complex integer math plus decimal to hex to binary conversions. You can create a macro with parameters passed to it to calculate formulas with different variables. It also has screen type editing. You can append two lines together or split one apart. Plus it has a lot more. It is now in alpha test and should be ready by the middle of July. Price is \$50.

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PROGRAM RELOCATION

by Ken Morrow

202 Saxe Road

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In November 1981 Dave Lagerquist, editor of Chromasette, told us about a method of disabling the auto-execute on the Radio Shack cartridges. If you 'POKE 65315,54', the Color Computer will not recognize the ROM pack. To auto-execute it simply 'POKE 65315,55'. Dave went on to say the following cartridges could be moved to RAM and executed: Personal Finance, Color File, Bingo Math, Typing Tutor and Space Assault. I suspect they are written in position independent code and should work as Dave says.

I have tried to relocate the following cartridges; Project Nebula, Football, and Polaris and I can testify that they will not run in RAM. These programs are written in very position dependent code. But all is not lost. For those who wish to relocate a program not written in position independent code this article will detail the procedure I followed to relocate Project Nebula.

You may be thinking this all sounds great but what the heck is position independent code? It is simple code that will work regardless of where it is loaded in memory. Such code can be moved without change to any position in RAM and executed. I encourage all the young budding 6809 programmers to use this coding technique which the 6809 instruction set supports so well.

I picked Project Nebula because I feel it is one of the better Radio Shack ROM packs. Many people will probably want a disk version if they have added a disk to their system. Its structure lends itself well to relocation. Text screens and data areas are clustered at the end of the code.

The first thing you should acquire in order to relocate a program is a disassembly of the code. Hence you need a disassembler. I use a slightly modified version of a program published in the Nov/Dec issue of Color Computer News. The February issue of Chromasette also included a disassembler and there are many other fine products on the market.

Before you do the disassembly you may wish to save a copy of the program on tape. This can be done by using the cartridge disable I mentioned in the beginning of this article. POKE the required value, insert the cartridge and do a 'CSAVEM"PROJNEB", &HC000, &HDFFF, &HC000'. This will save the full 8K of ROM. To load the ROM pack code at HEX (4000) on a 32K system specify an offset of '&HFFFF-&H7FFF'. The Color Computer won't let you load a program with negative offset. However, you can wrap the offset over the top of memory. If you have a

Monitor such as TRSMON from Cer-Comp it is easier to do a block move to Hex(4000) and then do the save. You won't have to do a load with wrap around offset if you move before saving.

It took me about four evenings to determine how to move, save, reload and disassemble the code. When I finished I was looking at approximately fifty pages of code and I was beginning to think relocating this program wasn't so important afterall. I worked the next two nights trying to follow the logic and make the proper changes. I got as far as getting the program title page to display. Assembly language was all new to me and I was learning as I went. I was having a great time but getting nowhere fast. I noticed while manually following the code and playing computer there were only a few instruction types that required changes. However the occurrences were numerous. It was time to figure out a way to let the computer do some of the relocation work.

The operation codes and operands which make up the machine code tell the computer what to do and what to use. The what to use part of the instruction is determined by the address field. The computer uses this part of the instruction to tell where to obtain information or where to store it. This is the heart of the matter because we want the computer to obtain information from RAM rather than ROM. This is especially critical since we pulled the ROM pack out.

To illustrate I will tell you what happened on my first try to run Project Nebula from RAM. I proceeded to disable the auto-start, insert the cartridge and use a monitor to block move the code from HEX(C000) to HEX(4000). I then did a EXEC &H4000 and it worked. I proceeded to free our Galaxy from Zykon colonization. What I hadn't done was remove the cartridge. Very early in the code the program does a jump right back up in the ROM pack area. I concluded the code was position independent, praised the programmer and moved on to my next project. Everything was fine until I loaded the program back into RAM and tried it when the cartridge was not inserted.

Remember our aim is not to recode a program to be position independent, only to relocate and change the necessary code so it will run in RAM. To this end let us look in general at the different addressing modes for the 6809.

Inherent addressing means the operation code alone tells the computer what to do. Instructions like clearing or decrementing a

RELOCATE

register fall into this category. We like these kind of instructions because they involve no changes for relocation.

Next we have instructions that only involve registers. Moving data from one register to another is an example. No challenges with this type of register addressing.

In Immediate addressing the data follows immediately after the operation code. Here we run into some challenges. The immediate data could be a number which is later used as an address for a branch. If this address is in the ROM pack area it is necessary to change it to branch to a relative address in the relocated code.

The same type of problem can occur with Extended Addressing. In this mode, The effective address occupies the two bytes immediately following the operation code.

Indexed addressing uses a base register and an offset. When we correct the instruction that loads the base register we usually solve the relocation problems associated with indexed instructions.

Direct addressing uses a register to specify the most significant byte of the address. Correcting the DP register will most often take care of relocation problems with this type of instruction.

With indirect addressing the effective address is found at the address contained in the instruction. In most cases instructions that use indirect addressing deal with I/O and cause us no problem since these routines are in the Basic ROM area. This is an oversimplification, as much of this discussion on addressing has been, but it holds true for the relocation of Project Nebula.

Last we have Relative addressing. This type of addressing is the primary tool for producing position independent code. Hence, the more of this we see the happier we are. If you want to know more about the addressing modes I will refer you to Vance A. Leventhal's book on 6809 Assembly Language Programming.

The listing which accompanies this article is a program that will make the required changes to run Project Nebula in a relocated position in RAM. I will explain its use with respect to a 32K system and a copy of Project Nebula saved by disabling the auto-start cartridge and entering 'CSAVEM "PROJNEB", &HC000, &HFFFF, &HC000".

The first thing to do is enter 'CLEAR 200, &H3FFF'. This will reserve space for Project Nebula at HEX(4000) and the Basic Relocator in lower RAM. Next load your copy of Project Nebula

with wrap around offset; 'CLOADM "PROJBEM", &HFFFF-&H7FFF'. Now enter the Basic Relocator program and type RUN.

You will be prompted to enter 0 for a screen listing or 2 for hardcopy (for those that have a printer ready). The listing will consist of the address in decimal which requires a change, the operation code and the operand changed. The next prompt is for the starting address of the code. In this case enter 16384, HEX(4000). Now enter 21564 in reply to the end address prompt, even though this isn't the end of the code. The code following address 21564 is text screens and data. We don't want the Relocator going through this area. It could cause all kinds of problems. Actually this is the biggest challenge in relocation; keeping out of the text areas. This is why a disassembly is required. The next prompt is for the decimal value of the first byte of the original starting address. The program was initially in the ROM pack starting at HEX(C000). Hence, we want to enter the decimal equivalent of HEX(C0) or 192. Finally enter 64, the decimal equivalent of HEX(40) for the last prompt. This is the first byte of the address of the relocated code in RAM. Processing will begin and continue for about five minutes. This will be followed by another prompt for the address of the first address constant. Enter 23581. Next reply 23611 to the prompt for the last address constant. The program should complete. Save a copy of the relocated version by entering 'CSAVEM "PROJNEB", &H4000, &H5FFF, &H4000'. To execute the relocated version just type, 'EXEC &H4000'.

Admittedly, the Relocator Program is inefficient. There are much more eloquent ways of doing the job. The program is examining every byte of code and checking for six operation codes.

```
JSR HEX(BD) , 189
JMP HEX(7E) , 126
LDX HEX(8E) , 142
LDU HEX(CE) , 206
LDD HEX(CC) , 204
CMPD HEX(1083) , 131
```

When the program finds one of these op-codes it checks the next byte to determine if the operand is an address in the ROM pack range. If it is, the program simply changes the operand to point to the relative position in the relocated code.

There were still bugs in the code after the final pass with the six op-codes. There is a block of addresses toward the end of the code which a

RELOCATE

friend of mine discovered on examining the disassembly which point to an area in the ROM pack address range. The last two prompts allow you to enter the required information for the program to locate and change these address constants.

If you examine the Relocator program and follow this procedure to successfully relocate Project Nebula you should gain some insight for writing a general program for relocation. The next step would be to include a table of instruction codes and lengths so you wouldn't have to look at every byte. When you step through the code by instruction length you can determine when you run into a bad op-code as the disassemblers do. A bad op-code would imply a text or data area. You could then examine the disassembly at the address of the bad op-code and determine where to begin the relocation process again. You would still have to make another pass to handle the areas of address constants.

Hopefully you have obtained enough information to relocate Project Nebula and the inspiration to tackle some of your own position Dependent code.

```
10 REM RELOCATOR BY KEN MORROW
20 PRINT "ENTER 0 FOR SCREEN LISTING"
30 PRINT "ENTER 2 FOR HARDCOPY"
40 INPUT SW
50 PRINT "DECIMAL VALUE OF"
60 INPUT "START ADDRESS = ";SR
70 PRINT "DECIMAL VALUE OF"
80 INPUT "END ADDRESS = ";EN
90 PRINT "DECIMAL VALUE OF FIRST BYTE OF"
100 INPUT "ORIG START ADDR = ";OG
110 PRINT "DECIMAL VALUE OF FIRST BYTE
OF"
120 INPUT "RELOCATION ADDR = ";RL
130 ST = EN - 1
140 FOR I = SR TO ST
150 L = PEEK(I)
160 Z = I+1
170 M = PEEK(Z)
180 IF L = 126 THEN GOTO 250
190 IF L = 131 THEN GOTO 250
200 IF L = 142 THEN GOTO 250
210 IF L = 189 THEN GOTO 250
220 IF L = 204 THEN GOTO 250
```

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51 x 24 DISPLAY

The Color Computer is an incredibly powerful and versatile computer, but for text editing it has some major drawbacks. The small 32 character by 16 line screen format shows you too little of the text and, combined with its lack of lower case letters, bears little resemblance to the way text really looks on the page. Reverse video in place of lower case just adds confusion.

Telewriter eliminates these shortcomings with **no hardware modifications required**. By using software alone, Telewriter creates a new character set that has **real lower case letters**, and puts 24 lines of 51 characters on the screen. That's more on-screen characters than Apple II, Atari or TRS-80 Model III. That's more than double the Color Computer's standard display.

FULL SCREEN EDITOR

The Telewriter editor is designed for maximum ease of use. The commands are single key (or single key plus control key), fast, and easy to remember. There is no need to switch between insert modes and delete modes and cursor movement modes. You simply type. What you type is inserted into the text at the cursor, on the screen. What you see on the screen is always the current state of your text. You

can move quickly through the text with one key cursor movement in all 4 directions, or press the shift key simultaneously for fast, auto-repeat. You can jump to the top or bottom of the text, the beginning or end of a line, move forward or backward a page at a time, or scroll quickly up or down. When you type past the end of the line, the wordwrap feature moves you cleanly to the next.

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

— Color Computer News, Jan. 1982

You can copy, move or delete any size block of text, search repeatedly for any pattern of characters, then instantly delete it or replace it with another. Telewriter gives you a tab key, tells you how much space you have left in memory, and warns you when the buffer is full.

FORMAT FEATURES

When it comes time to print out the finished manuscript, Telewriter lets you specify: left, right, top, and bottom margins; line spacing and lines per page. These parameters can be set before printing or they can be dynamically modified during printing with simple format codes in the text.

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

— The RAINBOW, Jan. 1982

Telewriter will automatically number pages (if you want) and automatically center lines. It can chain print any number of text files from cassette or disk without user intervention. You can tell it to start a new page anywhere in the text, pause at the bottom of the page, and set the Baud rate to any value (so you can run your printer at top speed).

You can print all or any part of the text buffer, abort the printing at any point, and there is a "Typewriter" feature which allows you to type straight to your printer. Because Telewriter lets you output numeric control codes directly (either from the menu or during printing), it works with **any** printer. There's even a special driver for the Epson MX-80 that lets you simply select any of its 12 fonts and do underlining with a single underline character.

CASSETTE AND DISK I/O

Because Telewriter makes using cassette almost painless, you can still have a powerful word processor without the major additional cost of a disk. The advanced cassette handler will search in the forward direction till it finds the first valid file, so there's no need to keep retyping a load command when you are lost in your tape. The Verify command checks your cassette saves to make sure they're good. You can save all or any part of the text buffer to disk or cassette and you can append pre-existing files from either medium to what you have in the buffer already.

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Telewriter turns your Color Computer into the lowest cost hi-power word processor in the world today. It runs in 16K or 32K (32K recommended) and is so simple you can be writing with it almost immediately. It comes with 63 pages of documentation and is fully supported by Cognitec. Telewriter costs \$49.95 including shipping (California residents add 6% tax). To order, specify disk or cassette and send check or money order to:

Cognitec
704 Nob Ave.
Del Mar, Ca. 92014

Or call (714) 755-1258 weekdays 7 AM-4PM PST. We will gladly answer your questions.

OPTIMIZING HIGH RESOLUTION ANIMATED
GAMES IN EXTENDED BASIC

- PART 2

By: Howard Bassen

3505 Hutch Pl.

N. Chevy Chase, MD 20815

This article is the second of two parts on Extended BASIC high-resolution games. In the first article I discussed the various options for the "optimum" animation speed and smoothness of motion. The sample program I presented gave a high resolution (PMODE 3) program with a flying saucer and a simple scene. Using a special "trick", three colors were obtained against a black background. The right joystick was used to provide smooth "proportional speed control" for vertical motion. Now I will discuss the "optimum" use of SOUNDS, BOMBS, LASER RAYS, and TARGET STRIKES, and then wrap up by applying all of these techniques to produce a complete and "optimized" arcade-style game.

SOUNDS. The color computer can provide a wide variety of sounds through the proper use of the PLAY command. Unfortunately, I have not seen this feature used well in most of the hobbyist's or the commercially available Extended BASIC games. The Color Computer, in my opinion, is equal to or better than any of the other similarly priced personal computers in most respects, except in the generation of sounds. Radio Shack chose to save a little by not including a few \$5 sound synthesis chips, and instead caused the 6809 CPU to be tied up for the entire time that a sound was being generated. Consequently, we must take special care to avoid the crippling of the action in a game. To do this we must use only very short sound bursts during the play of a game (use durations of "L255"). Before and after the high speed action we can use longer sounds to provide a tune, or imitate many different things. The use of very short sounds in a random pattern creates a good approximation of "white noise" (a hissing sound like your TV set makes when you turn off the computer before turning off the TV). The use of longer periods of two or more notes in a repeating pattern creates "dissonance" which is present in many non-musical sounds. In the following demonstration program, you will hear several interesting sounds, ones that I think will surprise and impress you.

```
1 REM LISTING 100
10 DIM K(10)
20 K(1)= 1: K(2)=7:K(3)=2:K(4)=1
0:K(5)=10:K(6)=10:K(7)=10:K(8)=1
0:K(9)=9:K(10)=9
30 CLS
40 PRINT "      SOUND DEMONSTRATI
ON"
50 PRINT "ENTER CHOICE"
```

```
60 PRINT "1= EXPLOSION"
70 PRINT "2= SPACE SOUND #1"
80 PRINT "3= SPACE SOUND #2"
90 PRINT "4= BELL"
100 PRINT "5= DOG"
110 PRINT "6= MOTORCYCLE"
130 INPUT N
140 IF N=1 THEN 240
150 IF N=2 THEN 270
160 IF N=3 THEN 320
170 IF N=4 THEN 370
180 IF N=5 THEN 430
190 IF N=6 THEN 500
210 IF N<1 THEN 130
220 IF N>6 THEN 130
230 REM***** EXPLOSION*****
240 PLAY"L255;V31;01;A;D;C;F;B;A
;G;E;D;V16;A;C;G;A;D;V4;E;A;B;C;
A;E;D;B"
250 GO TO 30
260 REM***** SPACE SOUND #1***
270 FOR M= 1 TO 5 :PLAY"L255;03;
V31;12;11;10;9;8;7;6;5;4;3;2;1"
280 PLAY "L255;02;V31;12;11;10;9
;8;7;6;5;4;3;2;1"
290 NEXT M
300 GO TO 30
310 REM***** SPACE SOUND #2*****
320 FOR K= 1 TO 5: PLAY"L255;V31
;02;1;2;3;4;5;6;7;8;9;10;11;12"
330 PLAY "L255;03;V31;1;2;3;4;5;
6;7;8;9;10;11;12"
340 NEXT K
350 GO TO 30
360 REM***** BELL *****
370 FOR T= 1 TO 3
380 PLAY"03;V31;L10;A;V16;A;V8;A
;V3;A;V1;L20;A"
390 PLAY"P2"
400 NEXT T
410 GO TO 30
420 REM***** DOG*****
430 FOR B= 1 TO 15 : PLAY"L250;
V31;02;1;3;6;05;1;3;01;11;6;11;6
"
440 J=100* RND(3)-90
450 FOR T= 1 TO J
460 NEXT T
470 NEXT B
480 GO TO 30
490 REM***** MOTORCYCLE*****
500 FOR S= 1 TO 4
510 PLAY"L255;V31;02;12;11;10;9;
```

```

7;4;01;1;2;1;2;1;2;1;3;2;1;4;2;1
;3;P3"
520 NEXT S
530 FOR J=1 TO 6
540 FOR B= 1 TO K(J)
550 PLAY"L255;01;V31;12;9;12;9;1
2;9;4;6;4;6;1;3;1;3"
560 NEXT B
570 PLAY"P50"
580 NEXT J
590 GO TO 30
    
```

BOMBS, RAYS, AND TARGET STRIKES.

The use of weapons is almost mandatory in arcade type games. This might be a healthy way to satisfy your destructive fantasies without causing any real harm. In Extended BASIC you must choose the type of weapons fire carefully, or you will tie up the computer and slow down the action. The use of the LINE command to generate an instantaneous ray or laser beam is far superior to the use of bullets or bombs which must be incremented across or down the screen. To generate a ray, simply generate a LINE from the origination source (your ship or flying saucer) to the target. Even in PMODE 4, a white (buff) line will appear against a black background in red or green, if it is in the vertical direction. A line drawn at an angle will have a jagged "stairstep" appearance and will be multicolored. A bomb can be created with the PSET command, and moved incrementally, erasing the old image with the PRESET command. Unless you move in increments of 5 to 15 pixels, you will have a very slow moving bomb. By moving with the larger increments, the bomb's motion will not have a smooth appearance. In the final example program, the "optimum" weapon, a ray, is used for fast action.

To FIRE the weapon, the joystick button is the obvious choice. You can simply look for the closure of this switch (PEEK 65280 = 126 or 254). You can, under certain circumstances, run into problems if the, player presses AND HOLDS the button down. The action may completely stop while the weapon continues to fire again and again. A FLAG can be set once the button is pressed, to lock out a retriggering of the weapon until the button is released. This technique is not needed in the final program, but should be kept in mind.

TARGET STRIKES can be detected quickly and easily with the PPOINT command. Simply look for the PPOINT of a spot directly in front of your weapon beam or bomb to be the color of your target. The use of the PPOINT command does

have problems, however. If you do not look for more than one of several points to be intercepted by the target, your game will be very difficult to score in, since one point out of 192 by 256 (or even 128) pixels in PMODE 3 or 4 requires a very steady control of the joystick or other position or aiming device. Instead of the PPOINT command, you can examine an area to see if the coordinates of the target fall within this zone. This will slow down the action, however. The final program below incorporates all of the "optimized" features of Extended BASIC I have previously mentioned. I would appreciate any feedback, in the form of letters to the editor of Color Computer News, on other techniques you may have developed. Does Extended BASIC produce good animated, high resolution games? It is up to you to use your imagination and skill to create new games that take advantage of the many capabilities of Extended BASIC and the Color Computer, and minimize the speed limitations inherent in this high-level, interpreter-based language. With the recruitment of the many non-machine language programmers who are out there, all of us should benefit from the collection of new software that will be generated.

```

1 CLSO: PRINT @ 128,"          S
AUCER SHOOT"
2 PRINT @ 224,"INSTRUCTIONS: CRO
SS THE SCREEN AND SCORE 1 POINT
. HIT TARGET WITH LASER AND SC
ORE 1 POINT.
3 PRINT @ 320, "YOU WILL HAVE 60
SECONDS.          PRESS ANY KEY
TO CONTINUE."
9 IF INKEY#="" THEN GO TO 9
10 REM LISTING 200 FINAL PROGRAM

20 TIMER=0
30 PMODE 3,1
40 PCLEAR 4
50 PCLS 1
60 REM SET DIMENSION OF IMAGE
ARRAY. NOTE THAT THESE ARE
SINGLE DIMENSION ARRAYS.
70 DIMB(50): DIMBB(50)
80 DIM TG(15) : DIM TR(15)
90 REM BB IS THE ORIGINAL IMAGE
BS IS A BLANK IMAGE
100 DIMBU(50):DIMBD(50)
110 REM BU IS THE IMAGE WITH AN
AREA OF BLANK SPACE BELOW IT,BD
IS THE IMAGE WITH BLANK SPACE
ABOVE IT.
120 SCREEN1,1
    
```


ANIMATED GAMES IN BASIC II

```

130 REM DRAW IMAGE OF AN ELLIPSE
    (FLYING SAUCER) AND PAINT IT
140 CIRCLE (100,100),15,2,.30
150 PAINT (110,100),2,2 : PSET
    (94,100,1) : PSET(100,100,1) :
    PSET(106,100,1)
160 REM DRAW AND PAINT THE
TARGET
170 CIRCLE(150,50),6,2
180 PAINT(150,50),4,2
190 REM GET THE IMAGES OF THE
SAUCER AND THE TARGET
200 GET(142,43)-(158,57),TG,G
210 GET(0,160)-(16,174),TR,G
220 GET(72,92)-(122,108),BB,G
230 GET(0,160)-(50,176),BS,G
240 GET(72,82)-(122,108),BD,G
250 GET(72,92)-(122,118),BU,G
260 REM ERASE THE IMAGES AFTER
THEY ARE STORED AS ARRAYS
270 PUT(85,90)-(135,105),BS,
PSET
280 PUT(142,43)-(192,58),BS,PSET

290 REM SET X AND Y COORDINATES
OF IMAGE
300 REM YK IS THE VERTICAL POS-
ITION YOU WANT TO LOCATE THE
IMAGE AT; UK THE PRESENT VERT-
ICAL POSITION OF THE IMAGE.
310 REM X IS THE HORIZONTAL POS-
ITION YOU WANT TO MOVE THE IMAGE
TO, AND LX IS THE PRESENT POSIT-
ION OF THE IMAGE.
320 REM INITIALIZE THE VALUES-
YK AND X ARE THE SAUCER'S
COORDINATES, YT IS THE TARGET'S
VERTICAL COORDINATE, S1 AND S2
ARE SCORING PARAMETERS, NZ AND
NN ARE VARIABLES FOR THE TARGET
POSITION
330 YK=70: X=0: YT=50: NZ=0:
NN=0
340 S1=0: S2=0
350 REM ADD BACKGROUND FEATURES
AND CHANGE TO THE BLACK, BLUE,
ORANGE, AND BUFF COLOR SET
(PMODE3/4).
360 PMODE 3,1:SCREEN1,1
370 CIRCLE(20,20),9,3
380 PAINT(20,20),3,3
390 LINE(0,192)-(155,165),PSET:
LINE(155,165)-(255,189),PSET
400 PAINT(40,185),4,4
410 PMODE 4,1
420 V=JOYSTK(0)

430 REM DELAY THE MOVEMENT OF
THE TARGET COUNTING NZ= 1 TO 4
440 NZ=NZ+1
450 IF NZ=4 THEN PUT(234,YT)-(25
0,YT+14),TR,PSET
460 IF NZ=4 THEN GOSUB 950
470 UK=YK: LX=X: REM YK IS
THE VERTICAL POSITION YOU WANT
TO LOCATE THE IMAGE AT; UK THE
PRESENT VERTICAL POSITION OF
THE IMAGE. X IS THE HORIZONTAL
POSITION YOU WANT TO MOVE THE
IMAGE TO, AND LX IS THE PRESENT
POSITION OF THE IMAGE.
480 SCREEN1,1
490 REM CHECK ELAPSED TIME AND
IF GREATER THAN (3600/60) SEC
ONDS THEN GO TO SCORE DISPLAY
SUBROUTINE
500 IF TIMER> 3600 THEN 1020
510 REM ADVANCE X
520 IF V>30 THEN X=X+10 :REM
SET HORIZONTAL MOTION CONTROL
AS A "SWITCH" USING THE RIGHT
JOYSTICK'S LEFT-RIGHT POSITION
TO DICTATE "STOP" OR "GO"
530 A=(JOYSTK(1)/10) :
AA=6*INT(A): YK=YK+(AA-18)
540 IF YK<35 THEN YK=35
550 IF YK>140 THEN YK=140
560 REM USE UP-DOWN MOTION OF
RIGHT JOYSTICK TO CONTROL POS-
ITION OF FLYING SAUCER FROM
Y=35 TO Y=140, IN STEPS OF 6
VERTICAL PIXELS.
570 REM VERTICAL POSITION IS
UNDER PROPORTIONAL RATE CONTROL
USING THE RIGHT JOYSTICK.
580 IF YK=UK THEN PUT(X,YK)-
(X+50,YK+16),BB,PSET: REM IF NO
VERTICAL CHANGE IN POSITION IS
CALLED FOR, MOVE THE IMAGE FOR-
WARD WITH A SMALL BLANK "ERASER"
BEHIND IT.
590 IF YK>UK THEN GOSUB 720:
REM MOVE THE IMAGE DOWN (FROM
ONE VERTICAL COORDINATE TO A
LARGER (AND LOWER) ONE USING
THE SUBROUTINE STARTING ON
LINE 720
600 IF UK>YK THEN GOSUB 800 :
REM MOVE THE IMAGE UP WITH SUB-
ROUTINE ON LINE 800
610 IF X>140 THEN GOSUB 650:
REM CHECK FOR POSITION AT RIGHT
EDGE OF SCREEN

```

ANIMATED GAMES IN BASIC II

```

620 REM CHECK FOR STATUS OF JOY
STICK BUTTON, AND IF PRESSED GO
TO SUBROUTINE 880
630 PX=PEEK(65280): IF PX=126
OR PX=254 THEN GOSUB 880
640 GO TO 420
650 PUT(X,YK)-(X+50,YK+16),BS,
PSET
660 REM PLAY NOTES WHEN SAUCER
HAS COMPLETED A TRIP ACROSS THE
SCREEN, AND INCREASE SCORE BY
ONE POINT.
670 PLAY "L10;03;;E;A;P1"
680 S1=S1+1
690 X=0
700 RETURN
710 REM SUBROUTINE TO MOVE THE
IMAGE DOWN.
720 IF YK-UK>16 THEN 760
730 PUT(X,YK-10)-(X+50,YK+16),
BD,PSET: REM FOR A SMALL DOWN
WARD MOVEMENT (LESS THAN THE
IMAGE'S VERTICAL DIMENSION) PUT
AN IMAGE WITH A BLANK AREA ABOVE
IT IN THE NEW POSITION. THIS
INSTANTLY ERASES THE OLD IMAGE.

740 GO TO 780
750 REM FOR A LARGE DOWNWARD
CHANGE IN THE VERTICAL POSITION
PUT A BLANK IMAGE (BS) AT THE
LOCATION OF THE OLD IMAGE (TO
ERASE IT) AND THEN PUT THE
SAUCER IMAGE (BB) AT THE NEW
LOCATION.
760 PUT(LX,UK)-(LX+50,UK+16),BS,
PSET
770 PUT(X,YK)-(X+50,YK+16),BB,
PSET
780 RETURN : REM END OF "DOWN"
SUBROUTINE.
790 REM START THE SUBROUTINE
TO MOVE THE IMAGE UP.
800 IF UK-YK>16 THEN 840
810 PUT(X,YK)-(X+50,YK+26),BU,
PSET : REM FOR A SMALL MOVEMENT
UP, PUT THE IMAGE WITH A BLANK
AREA BELOW IT AT THE NEW LOCA-
TION , TO INSTANTLY ERASE THE
OLD IMAGE.
820 GOTO 860
830 REM FOR A LARGE CHANGE IN
THE VERTICAL POSITION, PUT A
BLANK IMAGE (BS) AT THE LOC
ATION OF THE OLD IMAGE (TO
ERASE IT) AND THEN PUT THE
SAUCER IMAGE (BB) AT THE NEW
LOCATION.
840 PUT(LX,UK)-(LX+50,UK+16),BS,
PSET
850 PUT(X,YK)-(X+50,YK+16),BB,
PSET
860 RETURN : REM END OF "UP"
SUBROUTINE
870 REM LASER RAY FIRING
AND SOUND SUBROUTINE
880 IF X<10 THEN 930 ELSE LINE
(X+50,YK+5)-(240,YK), PSET
890 PLAY"L255;05;3;12;3"
900 REM TARGET HIT DETECTION
910 IF PPOINT(242,YK)=5 THEN
GOSUB 1070
920 LINE(X+50,YK+5)-(240,YK),
PRESET
930 RETURN
940 REM TARGET POSITION SUB
ROUTINE
950 NN=RND(7)
960 YT=(15*NN)+25
970 PUT(234,YT)-(250,YT+14),TG,P
SET
980 REM PUT(234,YT)-(250,YT+14),
TR,PSET
990 NZ=0
1000 RETURN
1010 REM SCORE DISPLAY AT END
OF GAME
1020 CLS 4
1030 SC= INT(S1+S2)
1040 PRINT@ 160, " YOUR S
CORE IS: ";SC
1050 GO TO 1050
1060 REM TARGET EXPLOSION SOUND
AND SCORE INCREASE AFTER HIT
1070 PLAY"L255;V31;01;1;3;2;6;3;
4;1;8;2;9"
1080 REM PUT EXPLODING IMAGE
WHERE HIT OCCURS AND THEN ERASE
AFTER A DELAY
1090 PUT(210,YT)-(250,YT+15),BB,
PSET
1100 PLAY"P20"
1110 PUT(205,YT)-(255,YT+15),BS,
PSET
1120 S2=S2+1
1130 RETURN

```

There is a bug in the floating point routines that can be fixed by moving the ROMs to RAM and typing POKE &HB9D6, &H25. Dr. Chuck Adams

MOTION PICTURE PROGRAMMING AND THE TEACHER

by Lane P. Lester
Liberty Baptist College
Lynchburg, VA 24506

Almost all applications that use microcomputers in education involve the individual student seated at the machine, working through some kind of learning exercise. Still largely unexplored is the use of the computer as an audio-visual aid in the classroom. The bold graphics of the 80C make it an ideal tool for illustrating many kinds of concepts. As a biology professor looking for ways to justify the expense of his new toy, I wrote several graphics programs for illustrating my lectures. These included basic concepts of chemistry, a simulation of muscle contraction viewed through the electron microscope, and chromosome behavior during cell division. My magnum opus was photosynthesis with a shining sun shooting photon torpedoes at chlorophyll molecules which either fluoresced or passed their excited electrons to other molecules.

As satisfying as were these productions, I would never admit to anyone how long it took me to write the programs involved. Calculating all those screen locations became tedious in the extreme. You can well imagine my delight when Arnold Pouch (Superior Graphic Software) developed MPP Programming with its ability to develop graphics free-hand on the screen and then store them for later display. This procedure was described in the March issue of Color Computer News. Although the discovery came too late for this school year, I was asked to speak at the Baltimore Creation Convention on the topic "A Geneticist Looks At Creation", and I took that opportunity to develop a series of 14 different graphics with which to illustrate my lecture. In hopes that others might find the application useful, the following description is provided.

My recent upgrade to 32K and disk drive made it possible to use more elaborate graphics and to load pictures quickly, but the same techniques can be used with 16K and tape, because Pouch describes the differences in his article. Arnold probably wouldn't consider me a true MPPER, because I mixed several different types of graphic generation in the program. Instead of saving the BASIC program and graphics together as one machine language program as Pouch describes, I left each graphic saved separately with the EXEC pointer at 44553. The BASIC program then LOADMed the graphics when they were needed. The "title slide" was done in real time on the text screen by POKEing random graphic characters into the top and bottom two rows and then spelling out

alternately the words "CREATION" and "GENETCS" across the center. A lot of color shifts were done on the display while it was on, and this provided an attention-getter and a tool for me to adjust the video projector.

The right joystick served throughout as a remote control for controlling the animation and for changing from one graphic to the next. The subroutine used most often was as follows (superfluous spaces are not in the actual program, but are included here for clarity):

```
1070 P = PEEK(65280); IF P<>126 AND P<>254  
THEN 1070 ELSE PMODE M,1; SCREEN 1,S; FOR  
I=1 TO 500: NEXT
```

```
1080 P = PEEK(65280); IF P<>126 AND P<>254  
THEN 1080 ELSE PMODE M,5; SCREEN 1,S; FOR  
I=1 TO 500: NEXT
```

```
1090 P = PEEK(65280); IF P<>126 AND P<>254  
THEN 1090 ELSE X = JOYSTK(0); IF  
JOYSTK(1)>10 THEN 1070 ELSE CLS0; SCREEN  
0,1; RETURN
```

Graphics controlled with this subroutine involved two pictures on separate graphic pages 1 and 5. Pressing the fire button shifted from one to the other. When I got ready to move to the next graphic, shifting the joystick lever forward accomplished this on the next button push. This was used to display pairs of graphs generated by my POPGEN routine (CCN March, 1982). The appreciation of these graphs was enhanced by including the real time generation of a graph earlier in the program.

One of the displays most appreciated by the audience was the giraffe (evolutionists and creationists are very interested in how the giraffe got its long neck). Having absolutely no artistic talent, I gave the job of drawing to my student assistant, Martha Lutz. She projected a color slide of a giraffe on the wall and made a clear plastic tracing of the picture. When taped to the TV screen, it made a perfect guide for the graphic. We made one graphic on page 1 with its eyes open and another on page 5 with its eyes shut. The following statements produced a realistic blinking of the eyes. The same could be done with less memory using PUTs and GETs of just the eyes.

```
560 LOADM "GIRAFFE"
```

```
570 P = PEEK(65280); IF P<>126 AND P<>254  
THEN 570
```

```
580 PMODE 3,1; SCREEN 1,0; P = PEEK(65280); IF  
P<>126 AND P<>254 THEN FOR I=1 TO RND(1000)  
+ 2000: NEXT; PMODE 3,5; SCREEN 1,0 FOR I=1  
TO 40: NEXT
```

MPP AND THE TEACHER

```
590 X = JOYSTK(0): IF JOYSTK(0)>10 THEN 580
ELSE CLS0: SCREEN 0,1
```

Of course, no talk on genetics would be complete with a Mendelian cross with its mysterious symbols. Using the drawer program, I produced the basic layout, including a letter "X", and a green and a yellow pea seed. The following allowed a gradual revealing of the different parts of the genetic cross:

```
310 LOADM "MNDLCROS": DIM EX(10),
GREEN(20), YELLOW(20): PAUSE=400
320 PMODE 3,1: SCREEN 1,0: PMODE 3,5:
GET(0,1)-(12,19),EX: GET(28,2)-(52,26),GREEN:
GET(64,2)-(88,26),YELLOW: PMODE 3,1
330 P = PEEK(65280): IF P<>126 AND P<>254
THEN 330 ELSE PUT(92,56)-(116,80),GREEN: FOR
I=1 TO PAUSE: NEXT
340 PUT(144,58)-(156,76),EX: FOR I=1 TO PAUSE:
NEXT: PUT(184,56)-(208,80),GREEN: FOR I=1 TO
500: NEXT
350 P = PEEK(65280): IF P<>126 AND P<>254
THEN 350 ELSE PUT(92,106)-(116,130),GREEN:
FOR I=1 TO PAUSE: NEXT
360 P = PEEK(65280): IF P<>126 AND P<>254
THEN 360 ELSE PUT(144,108)-(156,126),EX: FOR
I=1 TO PAUSE: NEXT
370 PUT(184,106)-(208,130),GREEN: FOR I=1 TO
500: NEXT
380 P = PEEK(65280): IF P<>126 AND P<>254
THEN 380 ELSE PUT(60,156)-(84,180),GREEN:
FOR I=1 TO PAUSE: NEXT
390 PUT(116,156)-(140,180),GREEN: FOR I=1 TO
PAUSE: NEXT: PUT(172,156)-(196,180),GREEN:
FOR I=1 TO PAUSE: NEXT
400 PUT(228,156)-(252,180),YELLOW: FOR I=1 TO
500: NEXT
410 P = PEEK(65280): IF P<>126 AND P<>254
THEN 410 ELSE CLS0: SCREEN 0,1
```

A number of characters were also included in the drawing for the above and other graphics. These were easily inserted by the character generator that I had earlier added to Pouch's version of the drawer program. If you would like to be able to easily insert characters of any size and at any location, the following statements will do the job (statement numbers are for the MPP DRAWER program):

```
13 DIM CHAR(63): FOR I=0 TO 63: READ
CHAR$(I): NEXT 22 ON ASC(A$)-59 GOSUB 50,
26, 280, 26, 26, 300, 100, 100, 66, 68, 76, 118, 218,
180, 72, 116, 26, 70, 26, 26, 118, 26, 150, 96, 158,
26, 26, 140, 26, 26, 310
300 CH$=INKEY$: IF CH$="" THEN 300 ELSE
CH=ASC(CH$): IF CH>63 AND CH<91 THEN
CH=CH-64 ELSE IF CH=12 THEN CH=31 ELSE IF
CH=8 THEN CH=27 ELSE IF CH=9 THEN CH=29
```

```
305 DRAW BM+STR$(X+1)+",""+STR$(Y+1)
+CHAR$(CH): RETURN
```

```
310 K$=INKEY$: IF K$="" THEN 310 ELSE
S=10*VAL(K$): FOR I=1 TO 100: NEXT
```

```
320 K$=INKEY$: IF K$="" THEN 320 ELSE DRAW
"S"+STR$(S+VAL(K)): RETURN
```

330-390 DATA statements containing character specifications

To use the character set, first press "Z" to set the size of the characters. Two digits in the range of 01-62 should be entered. To place a character on the screen, position the cursor at the upper left corner of the desired location, press "A" and the key of the desired character. Statement 300 converts the ASCII code to the array location of the character and will have to be changed to match your particular character set.

```
#####
# NOW USE ANY PRINTER WITH #
# YOUR COLOR COMPUTER USING #
# MODEL CCP-1 SERIAL TO PARALLEL #
# PRINTER INTERFACE #
#
# ** CONNECTS FROM THE COLOR #
# COMPUTER SERIAL I/O PORT TO #
# ANY PRINTER WITH A STANDARD #
# PARALLEL INPUT INCLUDING #
# THESE WELL KNOWN PRINTERS: #
# NEC PC8023 #
# EPSON MX 70/80/100 #
#
# ** COMPLETE--NO ADDITIONAL #
# CABLES NEEDED #
#
# ** JUMPER SELECTABLE BAUD RATES #
#
# ** ONLY $59.00 PLUS $3.00 FOR #
# SHIPPING AND HANDLING. MICH #
# RESIDENTS ADD 4% SALES TAX #
#
# BOTEK INSTRUMENTS #
# 4949 HAMPSHIRE #
# UTICA, MICHIGAN 48087 #
# PHONE 313-739-2695 #
#####
```

COLOR COMPUTER DISK SYSTEM

We offer a complete disk drive interface system for the color computer, featuring the Tall Grass Technologies Double Density, buffered disk controller card. The disk interface board plugs into the color computer expansion socket and provides for doubling the storage capacity of single density type disk drives by using GCR encoding / decoding techniques. Power may be taken internally from the system or from an external power supply (not normally required even with piggyback 4116's installed). This controller will support up to 4 single/double density, single/double sided 5 & 1/4 inch disk drives. These include Shugart 400 series, Siemens 82, TEAC 50 series, Pertec FD200, MPI B51/52/91/92, Tandon and others. The controller uses standard 10 sector diskettes and does not read or write the soft-sectored IBM style formats used by TRS-80 or FLEX systems. Two reasons for not using a soft sectored system are cost and reliability.

The Tallgrass double density format offers more margin for worn diskettes, dirt etc. and less expensive single density disk drives & diskettes. All you need to add to have a complete disk system is a disk drive / cable.

DISK OPERATING SYSTEM (DOS)

The Disk Operating System for the Tallgrass Technologies Disk controller (CCMD+9) is a full featured "BASIC" compatible operating system. It is fully integrated with the ROM basic system already in the color computer and automatically is initialized upon system power on much the same as the R.S. disk system does. But there is a big difference between that disk system and CCMD+9. First of all we support any mix of 35, 40 or 80 track single or double sided disk drives, which allows a minimum of 4 times the storage capacity of the "other" disk system. We also make far better use of the disk storage space by using sector allocation for each file instead of the granular method of 8 sector blocks which can waste anywhere from 1 to 7 sectors for each file on the disk. For example, on their DOS, if 5 files each required only 2 sectors there would be 40 disk sectors allocated, a waste of 30 disk sectors or almost 4 "granuals". This is not the case in our disk system, only the required number of sectors would be used.

Many other disk systems using a sector allocation system have a problem with file fragmentation and excessive seek time after a disk is used over and over adding and deleting files until it becomes so bad that the disk must be re-formatted to correct the problem. With CCMD+9 this is not the case, as files are deleted the disk space is automatically repacked to help keep files from being fragmented and decrease access time.

The DOS is contained in a ROM on the disk controller the same as the R.S. disk system so you don't have to "bootstrap" the DOS off of a disk and it doesn't get clobbered easily by a runaway program as most ram based systems do. The DOS does "NOT" require Extended Basic and will run on a 4, 16 or 32K system without any modifications. CCMD+9 uses approximately 1K of ram for the disk system which is taken from the top of memory, this allows all previously purchased tape software to function with the disk system, this is not so with the R.S. disk system.

CCMD+9 supports both Basic and Machine language programs. It is easily accessible to the beginner or advanced machine language programmer with easy to use and well documented entry points to perform disk as well as screen/printer/keyboard input & output. It includes 10 disk file functions to open, close, read/write random or sequential files, read specific sector of file, flush sector buffer to file, close & rewind file (re-open) and process disk system errors. The screen/printer/keyboard I/O functions include: input character, output character, output text string, output carriage return, output 2/4 hex characters, output space character and read/write single disk sector.

The "BASIC" interface system allows Basic and Basic programs to communicate with the disk system much the same as the R.S. disk system does with a few added features. It includes both Direct and Indirect basic commands, Direct commands can be executed any time and Indirect commands are contained within "Basic" programs. The Direct commands include: LOAD or SAVE (binary/ASCII basic program disk file), CHAIN (load & execute basic program) and CDOS "disk command". The "CDOS command allows you to execute a specific disk command from the free standing disk system, these include: LOAD/SAVE machine language or memory file, REMOVE one or more disk files, CHANGE disk file name, CHECK disk file for errors, ANALYZE disk directory, STRACK set tracks & sides for disk drive, SCMP set compare on/off, RUN load & execute machine language disk program. GOTO execute machine language program at specified address, and NEW initialize disk. If the "CDOS" command is executed without any command following control is passed to CCMD+9 where any of the previously mentioned commands can be executed directly

thus providing total control of the entire system. The command system is easy to learn and remember with a minimum of effort on the users part. The BASIC interface system was designed to be compatible with the existing I/O commands used with tape files for easy conversion and upgrading to disk. When using Basic disk files up to 9 files can be active at once with all disk file memory allocation being done automatically at run time, you don't have to reserve file space as with the R.S. disk system. The indirect basic commands include: Open, Print, Input, Line Input (ext. Basic), EOF, Rewind, Close, Print Using (Ext. Basic), these all function in the same manner as basic tape file I/O.

CCMD+9 has one other unique feature not found in most disk systems. Each disk initialized by the system is assigned a disk label which can be used instead of a disk drive number, the system will automatically locate which drive the diskette is on and use it accordingly. This can be very useful in basic programs which use files on multiple disks, you don't have to worry which disk belongs in which drive.

Part of the power and flexibility of CCMD+9 lies in the Disk Utility System which allows the system commands to be greatly expanded by adding utility or transient disk commands. These commands are automatically handled by the system so as not to overwrite Basic programs in memory and can even be called by a Basic program in some cases. For example you can perform a disk copy or backup while still preserving a basic program currently in memory, no other system that we know of has this ability. We currently have a list of utilities available and will be adding to it constantly to improve the system.

SOFTWARE SUPPORT

This disk system is the most recent one to enter the color computer disk market and is currently the only one with any disk software to support it. There should be no problem in the future with a lack of software for this system because, it is extremely easy to interface software to. We currently have available for the disk system: a Disk Assembler which allows files larger than memory to be assembled, a Disk Text Editor which makes writing Basic and Assembler programs easy and also will edit files larger than memory, a Disk Text Editor/Processor (WORD PROCESSOR) TEXTPRO1 which is easy to learn and extremely powerful for its price range, TEXTPRO II is an advanced version with expanded features: programmable tabs, 3 line processable headers, decimal/center/right justify/ horizontal tabs, keyboard input processing and more. A Disk Disassembler/Source generator, a Disk system monitor which includes all of the "TRSMON" monitor commands & has access to all of CCMD+9 disk commands & automatically locates itself at the top of memory to stay out of the way, and a full compliment of disk utilities. The utility disk includes: full disk backup, build disk text file from keyboard, 24 hour screen clock, single or multiple disk file copy, text file executive processor, ASCII/HEX file dump/list/map utility, ASCII file lister/printer, and a disk relabel utility. All at prices far below what other disk system software sell for.

CG-99 Disk Controller w/CCMD+9 DOS ROM	\$159.95
CCASM9 Disk Assembler	\$ 34.95
CCEDT9 Disk Text Editor	\$ 24.95
CCDISS Disk Disassembler Source Generator	\$ 29.95
CCTPR1 Disk Text Editor/Word Processor TEXTPRO 1	\$ 39.95
CCTPR2 Disk Text Editor/Word Processor TEXTPRO 2	\$ 59.95
CCUTLY Disk Utilities	\$ 19.95
DOSMON Disk system monitor/utility program	\$ 29.95
CGAME1 HI-RES Graphic games Space Invaders, Meteoroids, Space War	\$ 49.95
CGAME2 Mixed games Battle Fleet, Space Traders, Adventure	\$ 39.95

SPECIAL LIMITED OFFER

We have a complete disk system package available that includes: a 40 track single sided disk drive with power supply case, 2 drive cable, TG-99 controller w/CCMD+9 and a disk containing CCUTLY disk utilities and CCEDT9 disk editor all assembled and tested for \$499.00
Additional 40 track drive with power supply & case tested. \$300.00

For double sided drives add \$100.00 per drive. Add \$5.00 per drive for shipping, NO COD's on disk drives or disk system special. Shipping for disk controller add \$2.50. For disk software only add \$1.00. Visa & M/C add 3% (this is what the bank charges us).

Manufactured under license from Tall Grass Technologies.

CO RESIDENT EDITOR/ASSEMBLER

Co-resident Editor/Assembler that will allow the user to create, edit and assemble machine language programs for the color computer. The editor portion of the program is similar to the text editor in TEXTPRO. The assembler will output machine object code to either cassette tape in a "CLOADM" readable format or directly to memory for direct execution. The assembly listing can optionally be output to the printer connected to the RS-232/Printer port on the color computer. All errors are displayed with a full text message (or easy identification). The assembler supports the full compliment of the M6809 instruction set and also will cross assemble 6800 source code to produce M6809 compatible object code.

CO-RES9 \$39.95

SYSTEM MONITOR

TRSMON is a 2K system monitor program that will allow you to explore the workings of the color computer. It features 9 debugging commands, tape load and save compatible with Basic "CLOADM", up/down load via RS232 port, terminal package that allows the color computer to be used as a terminal at baud rates up to 9600 baud and a printer driver to direct display output to the printer for memory dumps, disassemblies etc. The program is position independent so it can be moved anywhere within the system memory. A very powerful tool at a very reasonable price. Commands include:

Memory examine & change, Goto defined address, Load Tape program (w/offset), Load Motorola S1-S9 file (RS232), Save Tape program, Send memory file S1-S9 (RS232), Set and/or display breakpoints, Remove one or all breakpoints, Define printer/terminal baud rate, Set and/or display registers, Dump memory in Hex & Ascii format, Disassemble memory file, Terminal mode & optional buffer, Fill memory, Move block of memory, Find memory byte sequence, Exit monitor to Basic, Exit monitor to Rom Pack (\$C000), Re-initialize monitor, Direct output to printer.

TRSMON ON TAPE \$19.95
TRSMON on 2716 Epram \$34.95

8K COLOR RAM/EPROM CARTRIDGE HOLDS 4-2716 EPROM w/ RAM	\$24.95
2K RAM CHIPS \$19.95	2716 EPROMS \$14.00
5 1/4" DISKETTES, SOFT OR HARD SECTOR, BOX OF 10	\$30.00
MOTOROLA 6809 PROGRAMMERS MANUAL	\$11.95
+ \$2.50 SHIPPING 1ST CLASS	

TEXTPRO TEXT EDITOR/PROCESSOR

TEXTPRO is a complete text editor & text processing program for the Color Computer. The program includes our powerful full function text editor plus the added features of a text processor. The entire program utilizes only 6K of memory space including the tape, screen and keyboard buffers. It is extremely fast in editing and processing text files and is compatible with Basic ASCII formatted tape files.

The Editor itself includes 24 commands including string search & replace; line and automatic line edit modes which allow you to insert, delete, change or add characters. Automatic line editing allows you to skip forward and backward for checking and editing, all screen editing immediately updates the screen so you know exactly what you are doing at all times. The Editor also has commands to move or copy single lines or blocks of text from one place to another. Some of the other commands include Tape load, save and append; Automatic line numbers, delete line, set input line length and printer output.

The Text Processor includes 29 commands for formatting the output, some of them include: page length, left margin, top & bottom margin, line length, justify & fill modes, page heading, center line, double width print, margin control, single, multiple & special indent modes, test lines left on page, display & input from keyboard and even special control codes can be sent to the printer for different print densities etc. It even has a repeat command with a next command to redo all of or a portion of the file as many times as needed. TEXTPRO will turn your color computer into a full fledged text processing machine at a price you won't believe. Available on "CLOADM" compatible cassette.

SPECIAL INTRODUCTORY PRICE \$29.95
RS. DISK VERSION \$49.99

DATAPACK DATA COMMUNICATIONS PACKAGE

DATAPACK is a Terminal package program for the COLOR COMPUTER, allowing you to use the color computer as a buffered computer terminal through a modem to a time sharing network or as a direct connect terminal to another computer system at rates up to 9600 baud. This program is more than a standard "Vidiotext" type program in that it will allow you to save data stored in the buffer either to cassette tape, or output a hard copy to a printer. The data buffer is automatically set to the maximum size of your system memory when entered to allow maximum space for saving data. The program includes features to send control codes and to enable or disable keyboard echo. When the terminal mode is exited the contents of the buffer may be viewed on the screen or saved to tape for later loading. Also the RS-232 port can be used to plug your printer back in for sending the screen buffer to the printer. An additional feature is the ASCII format that is used on tape is compatible with the CER-COMP Text Editor program and BASIC, enabling you to edit or delete unwanted information.

PRICE: \$24.95 ON CASSETTE
RS. DISK VERSION \$49.95

5566 Ricochet Avenue
Las Vegas, Nevada 89110

CER-COMP
(702) 452-0632

All Orders Shipped From Stock
Add \$1.00 Postage - MC/Visa Add 3%

GRAPHICS AND ANIMATION FOR THE COLOR
COMPUTER

(A Four Part Tutorial for the Beginner)

by Steven M. Ostrom
12612 Cedar Lake Road
Minnetonka, MN 55343

III: Low Resolution Graphics - SET/RESET
Commands

Last month we saw how we could use the PRINT @ command to produce colorful, low resolution graphics. Graphics using a similar degree of resolution can be achieved by the SET/RESET commands, also still in the text mode. If you look at the SET/RESET worksheet at the back of either instruction manual, you will notice a 64x32 grid. Each small square on this grid can be controlled independently by turning the square on or off. Any one of the eight colors can be used.

But there is one limitation. In each group of four small squares we are restricted to using the same color for any of the squares which we turn on. A small square not turned on will be black. For example, if we set square (0,0) to blue, then try to set any of the other three small squares in the same group to some other color, say red, then square (0,0) will also change to red.

This limitation does not cause as many problems as it may seem, but it is important to remember that each group of four small squares must be any combination of black and only one of the other colors. The adjoining group of four small squares can use any color and is not dependent upon the color of any other group. A close examination of the SET/RESET grid in the instruction manual will show that every other line is black or gray to help you remember these groups of four small squares.

We set any small square to a color by using the command SET(X,Y,C) where X is any horizontal coordinate from 0 to 63, Y is any vertical coordinate from 0 to 31, and C is any color code from 0 to 8. For example, SET(32,16,4) will put a small red square in the middle of the screen with a black border on two sides.

SET and RESET will allow you to move a dot easily all over the screen. The following short program will show a red ball caroming around the screen.

PROGRAM I

```
10 CLS(0) 'CLEAR SCREEN TO BLACK
20 X=0: Y=0 'DOT STARTING POINT
30 SET(X,Y,4) 'SHOW STARTING DOT
40 A=1: B=1 'DOT INITIAL DIRECTION
50 IF A+X>63 THEN A=-1 'CHANGE DIRECTION
60 IF A+X<0 THEN A=1 'CHANGE DIRECTION
70 IF B+Y>31 THEN B=-1 'CHANGE DIRECTION
80 IF B+Y<0 THEN B=1 'CHANGE DIRECTION
90 RESET (X,Y) 'ERASE PREVIOUS DOT
```

```
100 X=A+X: Y=B+Y 'MOVE DOT
110 SET(X,Y,4) 'COLOR NEW DOT
120 GOTO 50 'REPEAT
```

You can use this technique to make a variety of different games including ping-pong or tennis.

I have included here a simple but very entertaining program called BRICKS. You can choose one of three skill levels, then start the ball moving when you press the fire button on the right joystick. The object of the game is to accumulate points by hitting colored bricks with the ball. The higher the skill level you choose the smaller your paddle becomes and the values of the bricks increase. (As I stated last month, this program along with three others on cassette tape is available for \$10 to cover my costs of the tape and postage.)

Next month we will present the fourth and last in this series of tutorials for the beginning programmer on graphics and animation. We will discuss high resolution graphics using some of the very powerful graphics mode commands.

```
10 'BRICKS
20 '
30 'STEVE OSTROM
40 '12612 CEDAR LAKE ROAD
50 'MINNETONKA, MN 55343
60 '
70 'APRIL 17, 1982
80 '
90 '
100 CLS: E#=CHR$(128)+CHR$(128): Z
    #=CHR$(159)+CHR$(159)
110 T=TIMER
120 IF T>1000 THEN T=T-1000: GOTO
    120
130 FOR R=1 TO T STEP 10
140 S=RND(1): NEXT R
150 PRINT "DIFFICULTY FACTOR: "
160 INPUT "(1=EASY, 3=MEDIUM, 9=HAR
    D)"; Z1
170 IF Z1=9 THEN F1=2.173: GOTO 2
    00
180 IF Z1=3 THEN F1=2.334: E#=E#+
    E#: Z#=Z#+Z#: GOTO 200
190 IF Z1<>1 THEN 150 ELSE F1=2.
    521: E#=E#+E#+E#: Z#=Z#+Z#+Z#
200 P=0
210 M=3
220 CLS(0)
230 Z=464
240 FOR Y=2 TO 3
250 FOR X=0 TO 63
```

GRAPHICS AND ANIMATION II

```

260 SET(X,Y,6)
270 SET(X,Y+6,4)
280 SET(X,Y+8,5)
290 SET(X,Y+10,3)
300 SET(X,Y+28,7)
310 NEXT X
320 NEXT Y
330 FOR X=0 TO 1
340 FOR Y=4 TO 29
350 SET(X,Y,1)
360 SET(X+62,Y,1)
370 NEXT Y:NEXT X
380 PRINT @ Z,Z#;
390 PRINT @ 1,"MEN LEFT";
400 PRINT @ 11,M;
410 PRINT @ 17,"POINTS";
420 PRINT @ 25,P;
430 CT=0
440 Y=14
450 B=1:IF PEEK(65280)=126 OR PEEK(65280)=254 THEN 460 ELSE PRINT @ Z,E#;:Z=INT(JOYSTK(0)/F1)+449:PRINT @Z,Z#;:GOTO450
460 IF RND(2)=1 THEN X=61:A=-1:GOTO480
470 X=2:A=1
480 RESET(X,Y)
490 X=X+A:Y=Y+B
500 SET(X,Y,B)
510 PRINT @ Z,E#;
520 Z=INT(JOYSTK(0)/F1)+449
530 PRINT @ Z,Z#;
540 ON (POINT(X+A,Y+B))+1 GOTO 480,570,580,590,660,650,580,670
550 SOUND 1,1
560 IF POINT(X+A,Y+B)>0 THEN 540 ELSE 480
570 A=-A:GOTO 550
580 FG=1:B=-B:A=(RND(3)-2)*RND(2):GOTO550
590 P=P+Z1:S=50:CH=1
600 PRINT @ 25,P;
610 PRINT @ (INT((X+A)/2)+32*INT((Y+B)/2)),CHR$(128);:SOUND S,1:RESET(X,Y):X=X+A:Y=Y+B:SET(X,Y,B):GOSUB680
620 IF CH=1 THEN IF ABS(B)=2 THEN B=B/2
630 IF CH=2 THEN IF ABS(B)=1 THEN B=B*2
640 CT=CT+1:IF CT<90 THEN 560 ELSE M=M+1:GOTO220
650 P=P+2*Z1:S=100:GOTO600
660 P=P+4*Z1:S=150:CH=2:GOTO600

```

```

670 RESET(X,Y):SOUND 1,25:M=M-1:PRINT @ 11,M;:IF M>0 THEN 440 ELSE FOR J=1 TO 2000:NEXT J:GOTO 200
680 IF FG=1 THEN B=-B
690 FG=0:RETURN

```

IV: High Resolution Animation - Graphics Mode

In the two previous tutorials we discussed low resolution animation using the text mode. We saw how it was possible to move an object, such as a horse, across the screen and to make a ball bounce around the screen. But I'm sure you noticed how the ball was really a small square and the horse needed some bit of imagination.

In the graphics mode we can produce more detail and thus more realistic objects, although we must sacrifice some precious memory and color options to do so. This graphics mode, called PMODE, really has five variations 0, 1, 2, 3 and 4, and is accessible by Extended Color BASIC. All of these variations use the same grid, dividing the screen up into 256 horizontal points by 192 vertical points.

In PMODE 4 we can control each of these tiny points individually. In PMODE 2 and PMODE 3 each set of two adjacent horizontal points are combined into one so that they cannot be controlled individually. In PMODE 0 and PMODE 1 not only are the two adjacent horizontal points combined but the pair below these are combined with them, making all four tiny points act as one unit. But even so, the size of this four point combined unit is still six times smaller than one of the SET/RESET squares, and the small single dot in PMODE 4 is four times smaller yet!

In the previous tutorial we learned how to turn a small square on or off by using the SET/RESET commands. We can do the same here in the graphics mode by using the commands PSET/PRESET, pronounced P-set and P-reset, meaning point set and point reset. For example, PSET(128,96,4) would put a tiny red dot in the center of the screen, since our grid is 256 points across by 192 points up and down. The size of this dot will depend upon which of the five PMODEs we are in.

In order to see anything displayed on the screen in the graphics mode, we must tell the Color Computer to switch to the graphics screen by using the SCREEN command. For the example SCREEN 1,0 the 1 tells the computer we wish to display something on the graphics screen and the 0 chooses one of two sets of available colors. This is where our color limitation comes in which

GRAPHICS AND ANIMATION II

I mentioned earlier was one of the sacrifices we must make to display fine details. To see the size of these small dots, type in this short program. Try changing line 10 to PMODE 2,1 then to PMODE 0,1 and notice how the size of the small point increases with each successive change.

PROGRAM I

```
10 PMODE 4,1 'CHOOSE GRAPHICS MODE
20 PCLS 'CLEAR GRAPHICS SCREEN
30 SCREEN 1,0 'TURN ON GRAPHICS SCREEN
40 PSET(128,96,1) 'GREEN DOT IN CENTER
50 GOTO 50 'HOLD DISPLAY
```

We can create animation with these new graphics commands in a similar way we did last month using SET and RESET. In fact, making a tiny ball bounce around the screen should be no problem for us now. The main program listed at the end of this tutorial is a very entertaining program called PILLBOX using this type of high resolution graphical animation. (As stated in the previous tutorials, this program along with BRICKS, ATACMAN, and HORSES can be obtained from me on one cassette for \$10 to cover my costs.) But now we will progress to something even more exciting.

As space is limited here, please review the Extended Color BASIC manual, including the commands CIRCLE, PAINT, DRAW, LINE, COLOR, and especially GET and PUT. These will become your tools for superb color graphics and you should become very familiar with them.

By typing in the following short program, you can begin to see the fantastic power of these commands, especially GET and PUT.

```
10 PMODE 3,1
20 PCLS
30 DIM A(6), B(6), C(6)
40 DRAW"C3BM31, 14 U1 E1 U2 L2 U1 NL2 U1 R4
ND2 R4 D1 NR3 D1 L1 D2 F1 D1"
50 GET (28,8)-(41,14), A,G
60 PUT (48,8)-(61,14), A,PSET
70 DRAW "C3BM28, 15D4BR12U4"
80 GET (24,8)-(44,19), B,G
90 DRAW "C3BM52, 15D4BR4U4"
100 GET (44,8)-(64,19), C,G
110 PCLS
120 FOR X=4 TO 124 STEP 20
130 PUT (X,8)-(X+20,19), B,PSET
140 NEXT X
150 SCREEN 1,0
160 FOR Y=2 TO 102 STEP 4
170 FOR X=4 TO 124 STEP 20
```

```
180 PUT (X+Y,8)-(X+Y+20,19), C,PSET
190 NEXT X
200 FOR I=1 TO 200: NEXT I
210 FOR X=6 TO 126 STEP 20
220 PUT (X+Y,8)-(X+Y+20,19), B,PSET
230 NEXT X
240 FOR I=1 TO 200: NEXT I
250 NEXT Y
260 GOTO 260
```

Does this look familiar to all you Space Invaders players? Now it's your turn! Invent your own graphics pictures and experiment. Design your own games. The potential uses for these commands are limited only by your imagination. And keep reading Color Computer News. You will find it is one of the very best sources of programs and helpful hints for your Color Computer no matter what your level of expertise may be.

(For those of you who followed me through these tutorials and plan on sending for my cassette tape, I am also including a very complex, high resolution multi-colored program called SLOTS. As you might have guessed from the name, it is an animated slot machine with colorful spinning reels. You will swear it is almost like the real thing.)

```
10 'PILLBOX
20 '
30 'STEVE OSTROM
40 '12612 CEDAR LAKE ROAD
50 'MINNETONKA, MN 55343
60 '
70 'APRIL 17, 1982
80 '
90 '
100 PCLEAR 4
110 PMODE 4,1
120 CLS
130 PRINT" AFTER COMBAT SITU
ATION IS"
140 PRINT"SET UP, PRESS ANY KEY
TO START."
150 PRINT
160 PRINT" THE SPEED AND DIR
ECTION"
170 PRINT"OF THE PLANES FLYING O
VER THE"
180 PRINT"MOUNTAIN INDICATE THE
WIND"
190 PRINT"SPEED AND DIRECTION."
200 PRINT
```


GRAPHICS AND ANIMATION II

```

210 PRINT"      YOU WILL BE ASKED
    TO INPUT VELOCITY AND ANGLE OF
    A SHOT."
220 PRINT
230 PRINT"      YOU MUST CLEAR TH
    E MOUNTAINAND STAY UNDER THE PLA
    NES."
240 PRINT
250 INPUT"HIT <ENTER> TO BEGIN."
    ;A#
260 PCLS
270 T=TIMER
280 IF T>1000 THEN T=T-1000:GOTO
    280
290 FOR R=1 TO T STEP 10
300 S=RND(1):NEXT R
310 GOTO 350
320 SCREEN 0,1
330 CLS
340 GOTO 250
350 SCREEN 1,1
360 PCLS
370 'PICK GUN POS.
380 X=INT((RND(4040)-1)/40)
390 'PICK WIND
400 VW=RND(201)-101
410 IF ABS(VW)<50 THEN 400
420 'SET GUN POS.
430 PSET(X,191):PSET(255-X,191)
440 PSET(X,190):PSET(X+1,190)
450 PSET(255-X,190):PSET(254-X,1
    90)
460 PSET(X,189):PSET(X+1,189)
470 PSET(X+2,189):PSET(255-X,189
    )
480 PSET(254-X,189):PSET(253-X,1
    89)
490 IF X=0 THEN 540
500 PSET(X-1,190):PSET(256-X,190
    )
510 PSET(X-1,189):PSET(256-X,189
    )
520 IF X=1 THEN 540
530 PSET(X-2,189):PSET(257-X,189
    )
540 'PICK MTN., PLANES
550 H=INT((RND(7000)+679)/40)
560 P=H-17
570 'SET MTN.
580 LINE(113,191)-(127,H),PSET
590 LINE(128,H)-(142,191),PSET
600 IF H=0 THEN 620
610 PAINT(127,191),5,5
620 'SET PLANES
630 FOR PP=0 TO 240 STEP 16
640 PSET(PP,P):PSET(PP+1,P)
650 PSET(PP+2,P):PSET(PP+3,P)
660 NEXT PP
670 MA=0
680 IF VW=0 THEN 860
690 IF VW<0 THEN 890
700 MC=VW*.003
710 FOR MP=0 TO 15.9999 STEP MC
720 P#=INKEY#
730 IF P#<>" " THEN 1050
740 IF MA=INT(MP) THEN 820
750 MA=INT(MP)
760 FOR PP=0 TO 240 STEP 16
770 MB=PP+3+MA
780 IF MB<256 THEN 800
790 MB=MB-256
800 PSET(MB,P):PRESET(PP-1+MA,P)
810 NEXT PP
820 NEXT MP
830 FOR PP=15 TO 255 STEP 16
840 PRESET(PP,P):NEXT PP
850 GOTO 630
860 P#=INKEY#
870 IF P#="R" THEN 1050
880 GOTO 860
890 MC=-VW*.003
900 FOR MP=0 TO 15.9999 STEP MC
910 P#=INKEY#
920 IF P#<>" " THEN 1050
930 IF MA=INT(MP) THEN 1010
940 MA=INT(MP)
950 FOR PP=16 TO 256 STEP 16
960 MB=PP-12-MA
970 IF MB>=0 THEN 990
980 MB=MB+256
990 PSET(PP-MA,P):PRESET(MB,P)
1000 NEXT PP
1010 NEXT MP
1020 FOR PP=4 TO 244 STEP 16
1030 PRESET(PP,P):NEXT PP
1040 GOTO 630
1050 CLS
1060 GOTO 1100
1070 'LEFT SHOT ASK
1080 SOUND 10,20
1090 PRESET(L2,M2)
1100 SCREEN 0,1
1110 PRINT"LEFT PLAYER'S TURN"
1120 INPUT"VELOCITY";V1
1130 INPUT"ANGLE";Q1
1140 SCREEN 1,1
1150 'LEFT SHOT
1160 L1=X:M1=188
1170 A1=.0174533*Q1
1180 U1=V1*COS(A1)+VW

```

GRAPHICS AND ANIMATION II

```

1190 U2=V1*SIN(A1)
1200 FOR T=0 TO 100 STEP .5
1210 X1=T*U1
1220 Y1=T*U2-16.087*T*T
1230 D1=INT(X1/40+.5)
1240 G1=188-INT(Y1/40+.5)
1250 IF Y1<-20 THEN G1=191
1260 IF X+D1>255 THEN 1580
1270 IF X+D1<0 THEN 1580
1280 IF G1<=P THEN 1580
1290 IF G1>=191 THEN 1360
1300 IF L1=X+D1 AND M1=G1 THEN N
EXT T
1310 IF PPOINT(X+D1,G1)>0 THEN 1
580
1320 PSET(X+D1,G1)
1330 PRESET(L1,M1)
1340 L1=X+D1:M1=G1
1350 NEXT T
1360 IF X+D1=256-X THEN 1510
1370 IF X+D1=254-X THEN 1510
1380 IF X+D1=255-X THEN 1510
1390 PRESET(L1,M1)
1400 PSET(X+D1,191)
1410 FOR GG=1 TO 100:NEXT GG
1420 PRESET(X+D1,191)
1430 IF D1>1 OR D1<-1 THEN 1580
1440 'DESTROY SELF
1450 FOR C1=1 TO 10
1460 CIRCLE(X,191),C1,5,1
1470 SOUND C1,5
1480 FOR F1=1 TO 50:NEXT F1
1490 NEXT C1
1500 GOTO 320
1510 'LEFT HIT RIGHT
1520 FOR C1=1 TO 10
1530 CIRCLE(X+D1,191),C1,5,1
1540 SOUND C1,5
1550 FOR F1=1 TO 50:NEXT F1
1560 NEXT C1
1570 GOTO 320
1580 'RIGHT SHOT ASK
1590 PRESET(L1,M1)
1600 SOUND 10,20
1610 SCREEN 0,1
1620 PRINT"RIGHT PLAYER'S TURN"
1630 INPUT"VELOCITY";V2
1640 INPUT"ANGLE";Q2
1650 SCREEN 1,1
1660 'RIGHT SHOT
1670 A2=.0174533*Q2
1680 U1=VW-V2*COS(A2)
1690 U2=V2*SIN(A2)
1700 L2=255-X:M2=188
1710 FOR T=0 TO 100 STEP .5

```

```

1720 X2=T*U1
1730 Y2=T*U2-16.087*T*T
1740 D2=INT(X2/40+.5)
1750 G2=188-INT(Y2/40+.5)
1760 IF Y2<-20 THEN G2=191
1770 IF D2>X THEN 1080
1780 IF X>255+D2 THEN 1080
1790 IF G2<=P THEN 1080
1800 IF G2>=191 THEN 1870
1810 IF L2=255-X+D2 AND M2=G2 TH
EN 1860
1820 IF PPOINT(255-X+D2,G2)>0 TH
EN 1080
1830 PSET(255-X+D2,G2)
1840 PRESET(L2,M2)
1850 L2=255-X+D2:M2=G2
1860 NEXT T
1870 IF 254+D2=2*X THEN 2020
1880 IF 256+D2=2*X THEN 2020
1890 IF 255+D2=2*X THEN 2020
1900 PRESET(L2,M2)
1910 PSET(255-X+D2,191)
1920 FOR GG=1 TO 100:NEXT GG
1930 PRESET(255-X+D2,191)
1940 IF D2<-1 OR D2>1 THEN 1080
1950 'DESTROY SELF
1960 FOR C2=1 TO 10
1970 CIRCLE(255-X,191),C2,5,1
1980 SOUND C2,5
1990 FOR F2=1 TO 50:NEXT F2
2000 NEXT C2
2010 GOTO 320
2020 'RIGHT HIT LEFT
2030 FOR C2=1 TO 10
2040 CIRCLE(255-X+D2,191),C2,5,1

2050 SOUND C2,5
2060 FOR F2=1 TO 50:NEXT F2
2070 NEXT C2
2080 GOTO 320

```

W	GOOD THINGS FOR THE (TM) RADIO SHACK COLOR COMPUTER	
	WEST BAY COMPANY	POSTPAID
B	ROUTE 1, BOX 666	\$12⁵⁰
	WHITE STONE, VIRGINIA 22578	SPECIFY MEMORY
<p>"GRAPH ONE" WITHIN SECONDS LETS YOU DRAW 10 DIFFERENT BARGRAPHS. MAKES YOUR BUSINESS OR PERSONAL PLAN COME ALIVE.</p> <p>"QUAD DATABASE" (REV. 1.1) IS SO USEFUL YOU WILL WONDER WHY YOU WAITED SO LONG. 16K</p>		

GRAPHICS AND ANIMATION II

```

10 'ATACMAN
20 '
30 'STEVE OSTROM
40 '12612 CEDAR LAKE ROAD
50 'MINNETONKA, MN 55343
60 '
70 'APRIL 17,1982
80 '
90 '
100 CLEAR 500
110 CLS
120 INPUT"INSTRUCTIONS (Y OR N)"
;A#
130 IF A#="Y" THEN GOSUB 2370
140 DIM E(6),ZZ(5),Z(5),X(5),Y(5)
,A(5),B(5)
150 ML=3
160 SC=0
170 PK=0
180 CT=0
190 E=0
200 CLS 0
210 PRINT @ 0,"MEN LEFT";
220 PRINT @ 9,ML;
230 PRINT @ 14,"POINTS";
240 PRINT @ 21,SC;
250 TM=TIMER
260 IF TM<1001 THEN 290
270 TM=TM-1000
280 GOTO 260
290 FOR QL=1 TO TM
300 QM=RND(6)
310 NEXT QL
320 DATA 2,12,20,30
330 FOR I=64 TO 448 STEP 64
340 FOR J=2 TO 30
350 PRINT @ I+J,CHR$(143+96);
360 NEXT J
370 NEXT I
380 FOR I=1 TO 4
390 READ K
400 FOR J=96 TO 416 STEP 64
410 PRINT @ K+J,CHR$(143+96);
420 NEXT J
430 NEXT I
440 DATA 103,112,121,163,164,170
,171,173,174,178,179,181,182,188
,189,230,232,239,241,248,250,294
,296,303,305,312,314,355,356,362
,363,365,366,370,371,373,374,380
,381,423,432,441
450 FOR I=1 TO 42
460 READ J
470 PRINT @ J,CHR$(143+96);
480 NEXT I
490 DATA 3,11,13,19,21,29
500 FOR I=1 TO 6
510 READ E(I)
520 NEXT I
530 DATA 128,192,320,384
540 FOR J=1 TO 4
550 READ K
560 FOR I=1 TO 6
570 PRINT @ K+E(I),CHR$(128);
580 NEXT I
590 NEXT J
600 PRINT @ 263,CHR$(128);
610 PRINT @ 272,CHR$(128);
620 PRINT @ 281,CHR$(128);
630 DATA 66,94,268,276,450,478
640 FOR I=1 TO 6
650 READ E(I)
660 PRINT @ E(I),CHR$(143+32);
670 NEXT I
680 XP=RND(30)*2
690 YP=RND(14)*2
700 IF POINT(XP,YP)<>7 THEN 680
710 CT=CT+1
720 SC=SC+1
730 PRINT @ 21,SC;
740 PRINT @ 32*INT(YP/2)+INT(XP/
2),"X";
750 FOR I=1 TO 5
760 A(I)=0
770 B(I)=0
780 X(I)=RND(30)*2
790 Y(I)=RND(14)*2
800 IF POINT(X(I),Y(I))<>7 THEN
780
810 PRINT @ 32*INT(Y(I)/2)+INT(X
(I)/2),CHR$(143+48);
820 Z(I)=96
830 NEXT I
840 FOR I=1 TO 1000:NEXT I
850 IF PEEK(65280)=126 OR PEEK(6
5280)=254 THEN 2730
860 LQ=0:FJ=0:FOR I=1 TO 6
870 IF E(I)=0 THEN 890 ELSE PRIN
T @ E(I),CHR$(128);
880 PRINT @ E(I),CHR$(143+32);
890 NEXT I
900 IF E=1 THEN 1510
910 JO=JOYSTK(0):J1=JOYSTK(1):PX
=0:PY=0
920 IF JO>3 THEN 930 ELSE PX=-2:
PY=0:GOTO 960
930 IF JO<60 THEN 940 ELSE PX=2:
PY=0:GOTO 960
940 IF J1>3 THEN 950 ELSE PX=0:P
Y=-2:GOTO 960
950 IF J1<60 THEN 1570 ELSE PX=0
:PY=2

```

SPELL 'N FIX

Finally Available for the Color Computer!

Now produce goof-proof text on your Color Computer by letting SPELL 'N FIX find and correct your spelling and typing mistakes. Used since 1981 on larger 6800 and 6809 systems, SPELL 'N FIX is now available for your Color Computer too.

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- * Even corrects errors in your text. Wrong words can be highlighted or changed to their correct spelling
- * Fast and accurate — reads text faster than you can, spots and corrects errors even experienced proofreaders miss.
- * Dictionary can be expanded and customized — technical and even foreign words are easily added.
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- * Output and list memory contents in various formats.
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- * Single-step through machine language programs.
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GRAPHICS AND ANIMATION II

```

960 IF POINT(XP+PX,YP+PY)=7 THEN
  1430
970 IF POINT(XP+PX,YP+PY)=5 THEN
  1460
980 IF POINT(XP+PX,YP+PY)=0 THEN
  1570
990 IF POINT(XP+PX,YP+PY)=6 THEN
  1570
1000 IF POINT(XP+PX,YP+PY)=3 THEN
  1370
1010 GOTO 1070
1020 PRINT @ 32*INT(Y(I)/2)+INT(X(I)/2),CHR$(143+ZZ(I));
1030 X(I)=X(I)+A(I)
1040 Y(I)=Y(I)+B(I)
1050 FK=1
1060 GOTO 1090
1070 PRINT @ 32*INT(YP/2)+INT(XP/2),CHR$(143+64);
1080 XP=XP+PX;YP=YP+PY
1090 IF E=1 THEN 2130
1100 FK=0
1110 FOR I=1 TO 3
1120 PRINT @ 32*INT(YP/2)+INT(XP/2),"X";
1130 SOUND 1,5
1140 PRINT @ 32*INT(YP/2)+INT(XP/2),CHR$(143+48);
1150 SOUND 1,5
1160 NEXT I
1170 FOR I=1 TO 5
1180 IF XP=X(I) AND YP=Y(I) THEN
  1200
1190 NEXT I
1200 IF Z(I)=96 AND FJ=0 THEN CT=CT+1;SC=SC+1;Z(I)=64
1210 ML=ML-1
1220 PRINT @ 9,ML;
1230 IF ML>0 THEN 1270
1240 PRINT @ 21,SC;
1250 IF INKEY$="" THEN RESTORE;GOTO 150
1260 GOTO 1250
1270 REM
1280 XP=RND(30)*2
1290 YP=RND(14)*2
1300 IF POINT(XP,YP)=5 THEN 1330
1310 IF POINT(XP,YP)<>7 THEN 1280
1320 LQ=1
1330 REM
1340 PRINT @ 32*INT(YP/2)+INT(XP/2),"X";
1350 FOR J=1 TO 500:NEXT J

```

```

1360 IF LQ=0 THEN 850 ELSE 1430
1370 E=1
1380 PE=32*INT((YP+PY)/2)+INT((XP+PX)/2)
1390 FOR I=1 TO 6
1400 IF E(I)=PE THEN E(I)=0 ELSE NEXT I
1410 TIMER=0
1420 PRINT @ 27,INT(30-TIMER/60);
1430 CT=CT+1
1440 SC=SC+1
1450 PRINT @ 21,SC;
1460 IF LQ=1 THEN 850 ELSE PRINT @ 32*INT(YP/2)+INT(XP/2),CHR$(143+64);
1470 XP=XP+PX
1480 YP=YP+PY
1490 PRINT @ 32*INT(YP/2)+INT(XP/2),"X";
1500 IF CT<242 THEN 1570 ELSE ML=ML+1;RESTORE;GOTO 180
1510 IF TIMER>1800 THEN 1520 ELSE SOUND 100,1;PRINT @ 27,INT(30-TIMER/60);GOTO 910
1520 E=0
1530 FOR IT=27 TO 31
1540 PRINT @ IT,CHR$(128);
1550 NEXT IT
1560 GOTO 910
1570 FOR I=1 TO 5
1580 FJ=1
1590 NO=0
1600 C=XP-X(I)
1610 D=YP-Y(I)
1620 IF ABS(C)>ABS(D) THEN 1740
1630 IF NO>1 THEN 1850 ELSE IF D>0 THEN 1690
1640 IF POINT(X(I),Y(I)-2)=0 THEN NO=NO+1;GOTO 1740
1650 IF B(I)=2 THEN NO=NO+1;GOTO 1740
1660 A(I)=0
1670 B(I)=-2
1680 GOTO 1950
1690 IF POINT(X(I),Y(I)+2)=0 THEN NO=NO+1;GOTO 1740
1700 IF B(I)=-2 THEN NO=NO+1;GOTO 1740
1710 A(I)=0
1720 B(I)=2
1730 GOTO 1950
1740 IF NO>1 THEN 1850 ELSE IF C>0 THEN 1800
1750 IF POINT(X(I)-2,Y(I))=0 THEN NO=NO+1;GOTO 1630

```

GRAPHICS AND ANIMATION II

```

1760 IF A(I)=2 THEN NO=NO+1:GOTO
  1630
1770 A(I)=-2
1780 B(I)=0
1790 GOTO 1950
1800 IF POINT(X(I)+2,Y(I))=0 THE
N NO=NO+1:GOTO 1630
1810 IF A(I)=-2 THEN NO=NO+1:GOT
O 1630
1820 A(I)=2
1830 B(I)=0
1840 GOTO 1950
1850 R=RND(4)
1860 ON R GOTO 1870,1890,1910,19
30
1870 IF POINT(X(I),Y(I)-2)=0 THE
N 1890
1880 IF B(I)=2 THEN 1890 ELSE 16
60
1890 IF POINT(X(I),Y(I)+2)=0 THE
N 1910
1900 IF B(I)=-2 THEN 1910 ELSE 1
710
1910 IF POINT(X(I)-2,Y(I))=0 THE
N 1930
1920 IF A(I)=2 THEN 1930 ELSE 17
70
1930 IF POINT(X(I)+2,Y(I))=0 THE
N 1870
1940 IF A(I)=-2 THEN 1870 ELSE 1
820
1950 ZZ(I)=Z(I)
1960 IF POINT(X(I)+A(I),Y(I)+B(I
))<>7 THEN 1970 ELSE Z(I)=96:GOT
O 2000
1970 IF POINT(X(I)+A(I),Y(I)+B(I
))<>5 THEN 1980 ELSE Z(I)=64:GOT
O 2000
1980 IF POINT(X(I)+A(I),Y(I)+B(I
))=-1 THEN 1020
1990 IF POINT(X(I)+A(I),Y(I)+B(I
))=4 THEN GOSUB 2680
2000 PRINT @ 32*INT(Y(I)/2)+INT(
X(I)/2),CHR$(143+ZZ(I));
2010 X(I)=X(I)+A(I):Y(I)=Y(I)+B(
I)
2020 IF XI=0 THEN 2040
2030 X(I)=XI:Y(I)=YI:A(I)=0:B(I)
=0:XI=0
2040 PRINT @ 32*INT(Y(I)/2)+INT(
X(I)/2),CHR$(143+48);
2050 NEXT I
2060 GOTO 850
2070 NO=1
2080 RN=RND(4)
2090 IF RN=1 THEN 1670

```

```

2100 IF RN=2 THEN 1730
2110 IF RN=3 THEN 1810
2120 GOTO 1870
2130 REM
2140 PRINT @ 32*INT(YP/2)+INT(XP
/2),"X";
2150 FOR I=1 TO 3
2160 SOUND 30,1
2170 NEXT I
2180 SC=SC+20
2190 PRINT @ 21,SC;
2200 FOR I=1 TO 5
2210 IF Y(I)=YP AND X(I)=XP THEN
  2230
2220 NEXT I
2230 ZZ(I)=Z(I)
2240 X(I)=RND(30)*2
2250 Y(I)=RND(14)*2
2260 IF POINT(X(I),Y(I))=7 THEN
Z(I)=96:GOTO 2320
2270 IF POINT(X(I),Y(I))=5 THEN
Z(I)=64:GOTO 2320
2280 GOTO 2240
2290 IF ZZ(I)<>96 THEN 850
2300 LQ=1
2310 GOTO 1430
2320 REM
2330 PRINT @ 32*INT(Y(I)/2)+INT(
X(I)/2),CHR$(143+48);
2340 IF FK=0 THEN 2290
2350 FK=0
2360 GOTO 850
2370 CLS
2380 PRINT TAB(12)"ATACMAN":PRIN
T
2390 PRINT:PRINT"  IN THIS GAME
  YOU WILL TRY"
2400 PRINT"TO GATHER AS MANY POI
NTS AS"
2410 PRINT"POSSIBLE BEFORE THE C
OMPUTER'S"
2420 PRINT"MEN CAPTURE YOU."
2430 PRINT"  YOU ARE GIVEN THRE
E CHANCES"
2440 PRINT"OR MEN, ONE AT A TIME
."
2450 PRINT"  YOU EARN AN ADDITI
ONAL MAN"
2460 PRINT"EACH TIME YOU COMPLET
ELY"
2470 PRINT"TRAVERSE ALL OF THE P
ATHS."
2480 PRINT"  EACH POINT ALONG T
HE WAY IS"
2490 PRINT"WORTH ONE POINT FOR S
CORE."

```

```

2500 PRINT:INPUT"HIT <ENTER> TO
CONTINUE..." ;A#
2510 CLS
2520 PRINT"  EACH TIME YOU PASS
OVER A"
2530 PRINT"FLASHING ENERGIZER SP
OT, YOU"
2540 PRINT"CAN CAPTURE THE COMPU
TER'S MEN"
2550 PRINT"AND EARN 20 BONUS POI
NTS."
2560 PRINT"  BUT THIS EXTRA ENE
RGY ONLY"
2570 PRINT"LASTS FOR 30 SECONDS,
AND THAT"
2580 PRINT"ENERGIZER CAN ONLY BE
USED ONCE."
2590 PRINT:PRINT TAB(7)"GOOD LUC
K ! ! !":PRINT
2600 PRINT:INPUT"HIT <ENTER> TO
CONTINUE..." ;A#
2610 CLS
2620 PRINT
2630 PRINT"PLUG IN RIGHT JOYSTIC
K AND HOLD"
2640 PRINT"WITH RED BUTTON AWAY
FROM YOU."
2650 PRINT"  HIT SPACE BAR AT E
ND OF GAME":PRINT"TO REPLAY.":PR
INT
2660 INPUT"HIT <ENTER> TO BEGIN"
;A#
2670 RETURN
2680 XI=RND(30)*2
2690 YI=RND(14)*2
2700 IF POINT(XI,YI)=7 THEN Z(I)
=96:RETURN
2710 IF POINT(XI,YI)=5 THEN Z(I)
=64:RETURN
2720 GOTO 2680
2730 GOTO 860

```

```

1 *SLOTS
2 *
3 *STEVE OSTROM
4 *12612 CEDAR LAKE ROAD
5 *MINNETONKA, MN 55343
6 *
7 *APRIL 17, 1982
8 *
9 *
10 PMODE1,1:PCLEAR2:PCLS:CLEAR70
:DIME(18),F(9),G(9),H(18),I(9),J
(9),K(18),L(9),M(9),N(18),P(9),Q
(9),R(18),S(9),T(9),U(18),V(9),W
(9),A(18),D(9),X(1),B(18),C(18)

```

```

11 GOSUB83:CLS:PRINT"PLEASE WAIT
....":COLOR7,5:LINE(54,14)-(90,3
4),PSET,BF:DRAW"C5BM60,20D8R4U4N
L2U4L2BM70,28U8R4D4NL2D4BM80,28U
8R4D4L2D2F2"
12 CIRCLE(116,24),18,8:PAINT(116
,24),8,8:DRAW"C5BM114,20D8R4U8L2
":CIRCLE(160,24),12,7,1.5:PAINT(
160,24),7,7:DRAW"C5BM158,28U8R4D
4L2"
13 CIRCLE(160,68),18,6,.63:PAINT
(160,68),6,6:DRAW"C5BM158,64D8R4
"
14 DRAW"C6BM98,82R16ND2R2ND4R2ND
2R16U2L36E2R32L4U2L24E2R20U2L20E
2R16U2L16U2R16U2L16E2R12U2L12U2R
12U2L12U2R12H2L8E2R4D14C5L4D8R4U
4NL2U2"
15 DRAW"C6BM98,126U2R2NR2U2R4NR6
U2R8D2R2D2R4U2C8U14L2D12H2U8G2D4
R8U8F2D6R2NU4G2L2D2F2R2U2E2R6D2R
2D8G2U8L2D4L2NU4BD4R2L4H2U4L2D2C
6H2G2C8G2R4F2L8G2R12D2L12D2R12G2
L8F2R4"
16 GET(54,6)-(91,42),E,G:GET(98,
6)-(135,42),H,G:GET(142,6)-(179,
42),K,G:GET(98,50)-(135,86),N,G:
GET(142,50)-(179,86),R,G:GET(98,
106)-(135,142),U,G
17 GET(54,6)-(91,24),F,G:GET(54,
26)-(91,42),G,G:GET(98,6)-(135,2
4),I,G:GET(98,26)-(135,42),J,G:G
ET(142,6)-(179,24),L,G:GET(142,2
6)-(179,42),M,G
18 GET(98,50)-(135,68),P,G:GET(9
8,70)-(135,86),Q,G:GET(142,50)-(
179,68),S,G:GET(142,70)-(179,86)
,T,G:GET(98,106)-(135,124),V,G:G
ET(98,126)-(135,142),W,G
19 PCLS5:DRAW"C6BM30,190U58L24U1
00R14D84R10NR224U64NR224U52BM255
,OD191":LINE(50,6)-(94,46),PSET,
B:LINE(100,6)-(144,46),PSET,B:LI
NE(150,6)-(194,46),PSET,B
20 CIRCLE(224,26),16,6:LINE(190,
136)-(250,186),PSET,B:LINE(80,15
0)-(140,186),PSET,B:DRAW"C7BM84,
154D4R2ND4R2U4BR8L4D8R4U8BR4D8R4
U8"
21 DRAW"C7BM116,154D6ND2R4ND2U6B
R4R2NR2D8NL2R2BR4U8F2D4F2U8":X#="
92":Y#="170":GOSUB86:X#="214":Y
#="20":GOSUB86

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```

22 DRAW"C7BM218,140D4R2ND4R2U4BM
194,148UBR4D4L2BM202,140D8R4BM21
0,148UBR4D4NL2D4BM230,140L4D4NR2
D4R4BM234,148UBR4D4L2D2F2"
23 DRAW"C7BM194,154D8R4U4NL2U4L2
BM202,162UBR4D4NL2D4BM210,154D8R
4BM218,162UBR4D4NL2D4BM226,162UB
F2D4F2UBBM238,154L4D8R4BM246,154
L4D4NR2D4R4"
24 X$="194":Y$="170":GOSUB86:X$="
34":Y$="56":GOSUB97:X$="130":GO
SUB89:X$="150":GOSUB97:X$="246":
GOSUB90:X$="166":GOSUB97
25 X$="34":Y$="72":GOSUB97:X$="9
4":GOSUB99:X$="50":GOSUB97:X$="6
6":GOSUB97:X$="210":GOSUB99:X$="
130":GOSUB92:X$="238":GOSUB88
26 X$="150":GOSUB100:X$="246":GO
SUB87:X$="166":GOSUB100:X$="182"
:GOSUB100:DRAW"C8BM50,64R12BR4R1
2BR16R12BM182,64R12BR16R12"
27 DRAW"C7BM82,64EBBM82,80EBBM82
,96EBBM82,112EBBM198,64EBBM198,8
0EBBM198,96EB":X$="112":Y$="58":
GOSUB98:Y$="74":GOSUB98
28 C=TIMER
29 IFC<100THEN30ELSEC=INT(C/10):
GOTO29
30 FORA=1TOC:B=RND(2):NEXTA
31 Y$="90":GOSUB98:Y$="106":GOSU
B98:X$="210":GOSUB98:X$="228":Y$
="58":GOSUB98:Y$="74":GOSUB98:Y$
="90":GOSUB98:X$="34":Y$="88":GO
SUB101
32 X$="50":GOSUB101:X$="66":GOSU
B101:X$="94":GOSUB99:X$="122":GO
SUB89:X$="130":GOSUB87:X$="150":
GOSUB102:X$="166":GOSUB102
33 X$="182":GOSUB102:X$="210":GO
SUB99:X$="238":GOSUB89:X$="246":
GOSUB92:X$="34":Y$="104":GOSUB10
3:X$="50":GOSUB103
34 X$="66":GOSUB103:X$="94":GOSU
B99:X$="122":GOSUB92:X$="130":GO
SUB87:DRAW"C7BM150,104F4G4BR4H4E
4":X$="160":GOSUB99
35 X$="176":GOSUB99:X$="192":GOS
UB99:X$="220":GOSUB88:X$="228":G
OSUB87:X$="236":GOSUB87:DRAW"C7B
M246,104F4G4BR4H4E4"
36 PAINT(60,140),6,6:PAINT(40,20
),6,6:FORA=1TO18:READA(A),B(A),C
(A):NEXTA:COLOR6,5:H=RND(18):I=R
ND(18):J=RND(18):GOSUB129:GOSUB1
30:GOSUB131

```

```

37 SCREEN1,1:FORP=1TON:IFH=18THE
NH=1ELSEH=H+1
38 IFI=18THENI=1ELSEI=I+1
39 IFJ=18THENJ=1ELSEJ=J+1
40 K=RND(18):L=RND(18):M=RND(18)
:FORA=100TO124STEP8:PUT(A,172)-(
A+6,180),X,PSET:NEXTA
41 FORA=202TO242STEP8:PUT(A,172)
-(A+6,180),X,PSET:NEXTA
42 PUT(242,140)-(248,148),X,PSET
:X$="242":Y$="140":ONP GOSUB88,8
9,90,91,92,93,94,95,96:IFD(P)<1T
HEN80ELSEGOSUB132
43 S$=INKEY$:PUT(222,22)-(228,30
),X,PSET:PUT(230,22)-(236,30),X,
PSET:SOUND55,5:SOUND55,5
44 S$=INKEY$:IFS$=""THEN44ELSEIF
VAL(S$)<0ORVAL(S$)>9THEN44
45 X$="222":Y$="22":ONVAL(S$)+1
GOSUB87,88,89,90,91,92,93,94,95,
96:A=10*VAL(S$)
46 S$=INKEY$:IFS$=""THEN46ELSEIF
VAL(S$)<0ORVAL(S$)>9THEN46
47 X$="230":Y$="22":ONVAL(S$)+1
GOSUB87,88,89,90,91,92,93,94,95,
96:A=A+VAL(S$)
48 IFA<10RA>D(P)THEN43ELSED(P)=D
(P)-A:FORB=32TO114STEP2:LINE(6,B
)-(20,B),PRESET:NEXTB
49 COLOR6,5:FORB=114TO32STEP-2:L
INE(6,B)-(20,B),PSET:NEXTB
50 GOSUB123:GOSUB125:GOSUB127:GO
SUB129:GOSUB130:GOSUB131:IFH=K T
HEN56
51 IFH=18THENH=1ELSEH=H+1
52 IFI=18THENI=1ELSEI=I+1
53 IFJ=18THENJ=1ELSEJ=J+1
54 GOTO50
55 GOSUB125:GOSUB127:GOSUB130:GO
SUB131
56 IFI=L THEN61
57 IFI=18THENI=1ELSEI=I+1
58 IFJ=18THENJ=1ELSEJ=J+1
59 GOTO55
60 GOSUB127:GOSUB131
61 IFJ=M THEN64
62 IFJ=18THENJ=1ELSEJ=J+1
63 GOTO60
64 B=A*100:IFA(H)=6ANDB(I)=6ANDC
(J)=6THEN72
65 B=A*50:IFA(H)=5ANDB(I)=5AND(C
(J)=6ORC(J)=5)THEN72
66 B=A*25:IFA(H)=4ANDB(I)=4AND(C
(J)=6ORC(J)=4)THEN72
67 B=A*20:IFA(H)=3ANDB(I)=3AND(C
(J)=6ORC(J)=3)THEN72

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GRAPHICS AND ANIMATION II

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68 B=A*10: IFA(H)=2ANDB(I)=2AND(C
(J)=6ORC(J)=2) THEN72
69 B=A*5: IFA(H)=1ANDB(I)=1AND(C
(J)=6ORC(J)=1) THEN72
70 B=A*3: IFA(H)=1ANDB(I)=1 THEN72

71 B=A*2: IFA(H)=1 THEN72 ELSE B=0
72 IFB>0 THEN PLAY" T7L402A03DF#L2A
L4F#L2.A"
73 A=INT((B+.1)/1000): C=INT((B-A
*1000+.1)/100): D=INT((B-A*1000-C
*100+.1)/10): Y$="172"
74 E=INT(B-A*1000-C*100-D*10+.1)
: IFA>0 THEN75 ELSE IF C>0 THEN76 ELSE I
FD>0 THEN77 ELSE78
75 X$="100": ONA+1 GOSUB87,88,89,
90,91,92,93,94,95,96
76 X$="108": ONC+1 GOSUB87,88,89,
90,91,92,93,94,95,96
77 X$="116": OND+1 GOSUB87,88,89,
90,91,92,93,94,95,96
78 X$="124": ONE+1 GOSUB87,88,89,
90,91,92,93,94,95,96
79 D(P)=D(P)+B: IFD(P)>999999 THEN
CLS: PRINT"YOU BREAK THE BANK!!!!"
: GOTO82
80 GOSUB132: FORA=1 TO2000: NEXTA: B
=0: FORA=1 TO N: B=D(A)+B: NEXTA: IFB=
0 THEN81 ELSE NEXTP: GOTO37
81 CLS: PRINT"ALL PLAYERS ARE OUT
OF MONEY!!!"
82 INPUT"TRY AGAIN (Y OR N)": S$:
IFS$="N" THEN ENDELSE GOSUB83: GOTO3
7
83 CLS: INPUT"HOW MANY PLAYERS (1
TO 9)": N: IFN<>INT(N) ORN<1 ORN>9 T
HEN83
84 CLS: INPUT"STARTING CASH (10 T
O 1000)": A: IFA<>INT(A) ORA<10 ORA>
1000 THEN84
85 FORB=1 TO N: D(B)=A: NEXTB: RETURN

86 DRAW"C8BM"+X$+", "+Y$+"BR4BD2L
2NU2L2D4R4D4L2ND2L2": RETURN
87 DRAW"C8BM"+X$+", "+Y$+"D8R4U8L
2": RETURN
88 DRAW"C8BM"+X$+", "+Y$+"BR2D2NL
2D6NL2R2": RETURN
89 DRAW"C8BM"+X$+", "+Y$+"R4D4L4D
4R4": RETURN
90 DRAW"C8BM"+X$+", "+Y$+"R4D4NL2
D4L4": RETURN
91 DRAW"C8BM"+X$+", "+Y$+"D4R4NU4
D4": RETURN
92 DRAW"C8BM"+X$+", "+Y$+"NR4D4R4
D4L4": RETURN

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```

93 DRAW"C8BM"+X$+", "+Y$+"NR4D8R4
U4L2": RETURN
94 DRAW"C8BM"+X$+", "+Y$+"R4D8": R
ETURN
95 DRAW"C8BM"+X$+", "+Y$+"D8R4U4N
L2U4L2": RETURN
96 DRAW"C8BM"+X$+", "+Y$+"BD8R4UB
L4D4R2": RETURN
97 DRAW"C8BM"+X$+", "+Y$+"NR4D8R4
BR4U4NU4R4D4": RETURN
98 DRAW"C7BM"+X$+", "+Y$+"R4BD4L4
": RETURN
99 DRAW"C8BM"+X$+", "+Y$+"D8R4U4N
L2U4NL2BF4ND4R4D2": RETURN
100 DRAW"C8BM"+X$+", "+Y$+"D8R4BR
4NR4U6R4D2L2": RETURN
101 DRAW"C8BM"+X$+", "+Y$+"ND8R4D
4NL2BF4U8": RETURN
102 DRAW"C8BM"+X$+", "+Y$+"D8R4UB
L4BF8U4R4D2": RETURN
103 DRAW"C8BM"+X$+", "+Y$+"D8R4U4
NL2U4L4BF8U8": RETURN
104 DATA4,1,1,2,2,2,1,1,3,4,4,4,
3,1,5,5,2,6,2,1,1,4,3,2,1,1,3,3,
5,4,6,1,5,4,2,6,2,1,1,1,6,2,3,1,
3,4,2,4,2,1,5,5,3,6
105 PUT(B,8)-(B+37,26),W,PSET:RE
TURN
106 PUT(B,8)-(B+37,26),T,PSET:RE
TURN
107 PUT(B,8)-(B+37,26),M,PSET:RE
TURN
108 PUT(B,8)-(B+37,26),J,PSET:RE
TURN
109 PUT(B,8)-(B+37,26),Q,PSET:RE
TURN
110 PUT(B,8)-(B+37,26),B,PSET:RE
TURN
111 PUT(B,26)-(B+37,44),V,PSET:R
ETURN
112 PUT(B,26)-(B+37,44),S,PSET:R
ETURN
113 PUT(B,26)-(B+37,44),L,PSET:R
ETURN
114 PUT(B,26)-(B+37,44),I,PSET:R
ETURN
115 PUT(B,26)-(B+37,44),P,PSET:R
ETURN
116 PUT(B,26)-(B+37,44),F,PSET:R
ETURN
117 PUT(B,8)-(B+37,44),U,PSET:RE
TURN
118 PUT(B,8)-(B+37,44),R,PSET:RE
TURN
119 PUT(B,8)-(B+37,44),K,PSET:RE
TURN

```

```

120 PUT (B,B)-(B+37,44),H,PSET:RE
TURN
121 PUT (B,B)-(B+37,44),N,PSET:RE
TURN
122 PUT (B,B)-(B+37,44),E,PSET:RE
TURN
123 B=54:IFH=1THENC=1BELSEC=H-1
124 ONH GOSUB108,106,105,108,107
,109,106,108,105,107,110,108,106
,105,107,108,106,109:ONC GOSUB11
4,112,111,114,113,115,112,114,11
1,113,116,114,112,111,113,114,11
2,115:RETURN
125 B=104:IFI=1THENC=1BELSEC=I-1

```

```

126 ONI GOSUB105,106,105,108,105
,106,105,107,105,109,105,106,105
,110,105,106,105,107:ONC GOSUB11
1,112,111,114,111,112,111,113,11
1,115,111,112,111,116,111,112,11
1,113:RETURN
127 B=154:IFJ=1THENC=1BELSEC=J-1

```

```

128 ONJ GOSUB105,106,107,108,109
,110,105,106,107,108,109,110,105
,106,107,108,109,110:ONC GOSUB11
1,112,113,114,115,116,111,112,11
3,114,115,116,111,112,113,114,11
5,116:RETURN
129 B=54:ONH GOSUB120,118,117,12
0,119,121,118,120,117,119,122,12
0,118,117,119,120,118,121:RETURN

```

```

130 B=104:ONI GOSUB117,118,117,1
20,117,118,117,119,117,121,117,1
18,117,122,117,118,117,119:RETUR
N

```

```

131 B=154:ONJ GOSUB117,118,119,1
20,121,122,117,118,119,120,121,1
22,117,118,119,120,121,122:RETUR
N

```

```

132 A=D(P):B=INT((A+.1)/100000):
C=INT((A-B*100000+.1)/10000):D=I
NT((A-B*100000-C*10000+.1)/1000)

```

```

133 E=INT((A-B*100000-C*10000-D*
1000+.1)/100):F=INT((A-B*100000-
C*10000-D*1000-E*100+.1)/10)

```

```

134 G=INT(A-B*100000-C*10000-D*1
000-E*100-F*10+.1):FORA=202T0242
STEP8:PUT(A,172)-(A+6,180),X,PSE
T:NEXTA:Y#="172"

```

```

135 IFB>0THEN136ELSEIFC>0THEN137
ELSEIFD>0THEN138ELSEIFE>0THEN139
ELSEIFF>0THEN140ELSE141

```

```

136 X#="202":ONB+1 GOSUB87,88,89
,90,91,92,93,94,95,96

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```

137 X#="210":ONC+1 GOSUB87,88,89
,90,91,92,93,94,95,96
138 X#="218":OND+1 GOSUB87,88,89
,90,91,92,93,94,95,96
139 X#="226":ONE+1 GOSUB87,88,89
,90,91,92,93,94,95,96
140 X#="234":ONF+1 GOSUB87,88,89
,90,91,92,93,94,95,96
141 X#="242":ONG+1 GOSUB87,88,89
,90,91,92,93,94,95,96:RETURN

```

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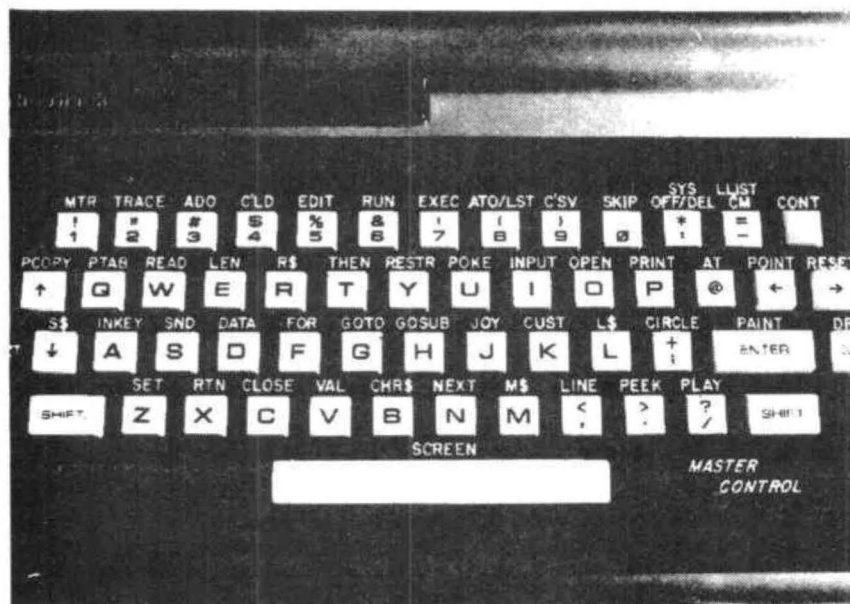
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Bomber	4k	NE
Football	16k	EXT
Kapow	4k	NE
Dodge	4k	NE
Tape 2		
Bounce	16k	EXT
Tank	32k	EXT
One Arm	4k	NE
Chute	16k	EXT
Where is if	16k	EXT
Lunar Lander	16k	EXT
Stock Market	4k	NE
Tape 3		
Multiply	16k	EXT
Divide	16k	EXT
Add Sub	16k	EXT
Simple Simon	4k	NE
Hangman	16k	NE
Beast	16k	NE
Count Down	4k	NE
Acay	16k	NE
Genie	16k	NE
Protect	16k	EXT
Tape 4		
Graphics	16k	EXT
Songs	16k	EXT
Joy	16k	EXT
Mortgage	16k	EXT
Checkbook	16k	EXT
Draw 1	16k	EXT
Moris	16k	EXT
Sound	16k	EXT
Tape 5		
Ram	16k	MA
Trace	16k	MA
MIMaster	16k	MA
Demo	16k	NE
Disassembler	16k	NE
Basbug	16k	NE
OhmLaw	4k	NE
Convert	4k	NE
Drawer 2	32k	EXT
Degrees	4k	NE
Tape 6		
Hurdler	32k	EXT
Entrap	16k	EXT
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This is a very simple game, but, like many simple things, it is a lot of fun. In fact, its simplicity made me somewhat reluctant to submit it at all.

But it is a whole lot more than that. It is a testimony to how easy printing on a graphic screen really is. It was written immediately after reading the excellent article "Draw III", by Don Inman, in the January, 1982 issue of CCN. This program, then, is living proof that the ideas put forward in that article not only work, but work extremely well. It demonstrates that you need not leave the graphic screen when writing or answering prompts. This, of course, allows a very pleasing, smooth running program.

ABOUT THE PROGRAM

On the face of it, it would seem that drawing letters and numbers, using strings from an entrenched alphabet and numerical table, would be extremely wasteful of memory. But it really isn't, especially if there is a lot of writing or scoring to be done. In fact, the larger the program, the more memory is saved.

I have left the whole alphabet intact, although it obviously isn't needed. Please feel free to remove those letters which are not necessary. Also, numbering the dice has no real value to the program, this is just demonstrative. They, too, can be removed.

I included a "PAINT" statement, which can be removed, if you like the colors using "PMODE 4,1" (as I do). If you change "PMODE 4,1" to "PMODE 3,1", however, the dice will be painted.

When re-rolling dice, you must remember the dice values you have "saved". This does not present a problem, however. Besides, if the game were perfect, you couldn't have any fun improving it.

I considered putting an on-screen scoreboard in the program. This would limit the number of players, however, so I left that feature out of the program. You can use, as I do, regular Yahtzee score sheets and allow the whole family, as well as the neighbors, to participate.

The program is well commented with REM statements and should require no further explanation, other than that given below.

THE GAME

Upon typing in the program, type "RUN", followed by "ENTER". The title will be drawn, the 5 required dice drawn and numbered, the randomly generated "dots" will be drawn and prompt "ROLL AGAIN? Y/N" will appear. If you had a good throw and wish to keep it, enter it on your score sheet and press "N". The prompt "NEXT PLAYER? Y/N" will be drawn on the screen and a random melody will sound.

To set the stage for the next player, press "Y". The screen will clear and the dice "thrown" for the next player.

If the answer to the "THROW AGAIN" prompt is "Y", the prompt "HOW MANY?" will be drawn on the screen. DO NOT enter the number above the dice, just the number of dice you wish to roll again. You may roll any number of dice at a time (up to 5), but each player is limited to 3 rolls, as per Yahtzee rules.

If you wish to end the game, enter "N" to the next player's prompt. The screen will clear and the ending message will appear.

Well, there it is, a heck of a fun game, incorporating a heck of a good idea. My thanks to Mr. Don Inman and CCN for making this game, and others, possible.

```
5  'COLOR YAHTZEE BY DON DAWSON
10 CLS
15 PCLS:PMODE4,1:SCREEN1,1
20 CLEAR500
25 DIM L$(32),M$(6),N$(10)
30 GOSUB230:GOSUB400
35 GOSUB90
40 AA=0
45 GOTD120
50 'ROLL AGAIN? Y/N
55 DRAW"C7;S5;BM10,128"+L$(18)+L
$(15)+L$(12)+L$(12)+L$(27)+L$(1)
+L$(7)+L$(1)+L$(9)+L$(14)+L$(28)
+L$(27)+L$(25)+L$(29)+L$(14)
60 A$(1)=INKEY$:IFA$(1)=" "THEN60
ELSEIFA$(1)="Y" THEN70 ELSEIFA$
(1)="N" THEN170 ELSE 60
65 'HOW MANY
70 DRAW"C7;S5;BM10,148"+L$(8)+L$
(15)+L$(23)+L$(27)+L$(13)+L$(1)+
L$(14)+L$(25)+L$(28):FORT=1T0500
:NEXTT
75 PCLS:GOSUB90
```

COLOR YAHTZEE

```

80 A$(2)=INKEY$: IFA$(2)=" " THEN8
0 ELSE IFA$(2)="1" THEN 140 ELSE IFA
A$(2)="2" THEN135 ELSE IFA$(2)="3
" THEN130 ELSE IFA$(2)="4" THEN12
5 ELSE IFA$(2)="5" THEN120 ELSE80

```

```
85 'COLOR YAHTZEE
```

```

90 DRAW"C7;S6;BM10,22"+L$(3)+L$(
15)+L$(12)+L$(15)+L$(18)+L$(27)+
L$(25)+L$(1)+L$(8)+L$(20)+L$(26)
+L$(5)+L$(5)

```

```
95 'DICE SQUARES
```

```

100 DRAW"C7;S5;BM0,60D36R36U36L3
6BR42D36R36U36L36BR42D36R36U36L3
6BR42D36R36U36L36BR42D36R36U36L3
6"

```

```
105 'NUMBER DICE
```

```

110 DRAW"C6;S4;BM19,44"+N$(1):DR
AW"BM+40,+0"+N$(2):DRAW"BM+40,+0
"+N$(3):DRAW"BM+40,+0"+N$(4):DRA
W"BM+40,+0"+N$(5):RETURN

```

```
115 'RANDOM NUMBERS
```

```

120 A=RND(6):DRAW"C7;S5;BM4,64"+
M$(A):SOUNDRND(255),1

```

```

125 B=RND(6):DRAW"C7;S5;BM56,64"
+M$(B):SOUNDRND(255),1

```

```

130 C=RND(6):DRAW"C7;S5;BM108,64
"+M$(C):SOUNDRND(255),1

```

```

135 D=RND(6):DRAW"C7;S5;BM160,64
"+M$(D):SOUNDRND(255),1

```

```

140 E=RND(6):DRAW"C7;S5;BM212,64
"+M$(E):SOUNDRND(255),1

```

```
145 'PAINT DICE
```

```

150 PAINT(10,65),6,3:PAINT(66,65
),2,3:PAINT(118,65),2,3:PAINT(17
0,65),2,3:PAINT(222,65),2,3

```

```
155 AA=AA+1: IFAA=3THEN170ELSE160
```

```
160 GOT055
```

```
165 'NEXT PLAYER? Y/N
```

```

170 DRAW"C7;S5;BM10,168"+L$(14)+
L$(5)+L$(24)+L$(20)+L$(27)+L$(16
)+L$(12)+L$(1)+L$(25)+L$(5)+L$(1
8)+L$(28)+L$(27)+L$(25)+L$(29)+L
$(14)

```

```
175 FORT=1T010
```

```
180 SOUNDRND(255),RND(6):NEXTT
```

```

185 B$=INKEY$: IFB$="" THEN185 EL
SE IFB$="Y" THEN15 ELSE IFB$="N" T
HEN190 ELSE185

```

```
189 'THE END
```

```

190 PCLS: DRAW"C7;S1;BM108,10"+L$(
20)+L$(8)+L$(5)+L$(27)+L$(5)+L$(
14)+L$(4):DRAW"C7;S2;BM99,16"+L
$(20)+L$(8)+L$(5)+L$(27)+L$(5)+L
$(14)+L$(4)

```

```

195 DRAW"C7;S3;BM89,24"+L$(20)+L
$(8)+L$(5)+L$(27)+L$(5)+L$(14)+L
$(4):DRAW"C7;S4;BM79,34"+L$(20)+
L$(8)+L$(5)+L$(27)+L$(5)+L$(14)+
L$(4)

```

```

200 DRAW"C7;S5;BM68,47"+L$(20)+L
$(8)+L$(5)+L$(27)+L$(5)+L$(14)+L
$(4):DRAW"C7;S6;BM59,62"+L$(20)+
L$(8)+L$(5)+L$(27)+L$(5)+L$(14)+
L$(4)

```

```

205 DRAW"C7;S7;BM49,80"+L$(20)+L
$(8)+L$(5)+L$(27)+L$(5)+L$(14)+L
$(4):DRAW"C7;S8;BM39,100"+L$(20)
+L$(8)+L$(5)+L$(27)+L$(5)+L$(14)
+L$(4)

```

```

210 DRAW"C7;S9;BM28,125"+L$(20)+
L$(8)+L$(5)+L$(27)+L$(5)+L$(14)+
L$(4):DRAW"C7;S10;BM18,150"+L$(2
0)+L$(8)+L$(5)+L$(27)+L$(5)+L$(1
4)+L$(4)

```

```

215 DRAW"C7;S11;BM9,175"+L$(20)+
L$(8)+L$(5)+L$(27)+L$(5)+L$(14)+
L$(4)

```

```
220 GOT0220
```

```
225 'ALPHABET
```

```
230 L$(1)="U8R8D4L8BR8D4BR4" 'A
```

```
235 L$(2)="U8R6F2D2L8BR8D2G2L6BR
12" 'B
```

```
240 L$(3)="U8R8BD8L8BR12" 'C
```

```
245 L$(4)="U8R6F2D4G2L6BR12" 'D
```

```
250 L$(5)="U8R8BD4L8BD4R8BR4" 'E
```

```
255 L$(6)="U8R8BD4L8BD4BR12" 'F
```

```
260 L$(7)="U8R8BD4L4BR4D4L8BR12"
'G
```

```
265 L$(8)="U8BR8D8BU4L8BD4BR12" '
H
```

```
270 L$(9)="BU8R8BL4D8BL4R8BR4" 'I
```

```
275 L$(10)="U4BU4BR8D8L8BR12" 'J
```

```
280 L$(11)="U8BR8G4L4BR4F4BR4" 'K
```

```
285 L$(12)="U8BD8R8BR4" 'L
```

```
290 L$(13)="U8F4E4D8BR4" 'M
```

```
295 L$(14)="U8F8U8BD8BR4" 'N
```

```
300 L$(15)="U8R8D8L8BR12" 'O
```

```
305 L$(16)="U8R8D4L8BD4BR12" 'P
```

```
310 L$(17)="U8R8D8H4BG4R8BR4" 'Q
```

```
315 L$(18)="U8R8D4L8BR4F4BR4" 'R
```

```
320 L$(19)="BU4U4R8BD4L8BR8D4L8B
R12" 'S
```

```
325 L$(20)="BU8R8BL4D8BR8" 'T
```

```
330 L$(21)="U8BR8D8L8BR12" 'U
```

```
335 L$(22)="BU8D4F4E4U4BD9BR4" 'V
```

```
340 L$(23)="U8BR8D8H4G4BR12" 'W
```

COLOR YAHTZEE

```

345 L$(24)="EBBL9F8BR4" X
350 L$(25)="BU8F4E4BG4D4BR8" Y
355 L$(26)="BU8R8G8R8BR4" Z
360 L$(27)="BR12" SPACE
365 L$(28)="BR4BU7E2R4F2D2G2L2D4
BR8" ?
370 L$(29)="EBD8BR4" /
390 RETURN
395 DICE SPOTS
400 M$(1)="BD12BR12D4R4U4L4BL12B
U12" 1 SPOT
405 M$(2)="D4R4U4L4BD24BR24D4R4U
4L4BU24BL24" 2 SPOTS
410 M$(3)="D4R4U4L4BD12BR12D4R4U
4L4BD12BR12D4R4U4L4BU24BL24" 3 S
POTS
415 M$(4)="D4R4U4L4BD24D4R4U4L4B
R24D4R4U4L4BU24D4R4U4L4BL24" 4 S
POTS
420 M$(5)="D4R4U4L4BD12BR12D4R4U
4L4BL12BD12D4R4U4L4BR24D4R4U4L4B
U24D4R4U4L4BL24" 5 SPOTS
425 M$(6)="D4R4U4L4BD24D4R4U4L4B
R12D4R4U4L4BR12D4R4U4L4BU24D4R4U
4L4BL12D4R4U4L4BL12" 6 SPOTS
430 NUMBERS
435 N$(1)="BR2R4L2U8G2BD6BR10" 1
440 N$(2)="BR1H1U1E1R5E2U1H2L4G2
BD6BR1R7BR4" 2
445 N$(3)="BR1H1BU6E1R6F1D2G1L4R
4F1D2G1L6BR11" 3
450 N$(4)="BU4U4BR4BD1D3R4L8R4D4
BR8" 4
455 N$(5)="BR1H1BU2U4E1R6F1BD2BL
1L6G1BD4BR1R6E1U3H1BD5BR5" 5
460 RETURN
5 COLOR YAHTZEE BY DON DAWSON
10 CLS
15 PCLS:PMODE4,1:SCREEN1,1
20 CLEAR500
25 DIM L$(32),M$(6),N$(10)
30 GOSUB230:GOSUB400
35 GOSUB90
40 AA=0
45 GOTD120
50 ROLL AGAIN? Y/N
55 DRAW"C7;S5;BM10,128"+L$(18)+L
$(15)+L$(12)+L$(12)+L$(27)+L$(1)
+L$(7)+L$(1)+L$(9)+L$(14)+L$(28)
+L$(27)+L$(25)+L$(29)+L$(14)
60 A$(1)=INKEY$:IFA$(1)=" " THEN60
ELSEIFA$(1)="Y" THEN70 ELSEIFA$
(1)="N" THEN170 ELSE 60
65 HOW MANY

```

```

70 DRAW"C7;S5;BM10,148"+L$(8)+L$
(15)+L$(23)+L$(27)+L$(13)+L$(1)+
L$(14)+L$(25)+L$(28):FORT=1T0500
:NEXTT
75 PCLS:GOSUB90
80 A$(2)=INKEY$:IFA$(2)=" " THEN8
0 ELSEIFA$(2)="1" THEN 140 ELSEIF
A$(2)="2" THEN135 ELSEIFA$(2)="3
" THEN130 ELSEIFA$(2)="4" THEN12
5 ELSEIFA$(2)="5" THEN120 ELSE80
85 COLOR YAHTZEE
90 DRAW"C7;S6;BM10,22"+L$(3)+L$(
15)+L$(12)+L$(15)+L$(18)+L$(27)+
L$(25)+L$(1)+L$(8)+L$(20)+L$(26)
+L$(5)+L$(5)
95 DICE SQUARES
100 DRAW"C7;S5;BM0,60D36R36U36L3
6BR42D36R36U36L36BR42D36R36U36L3
6BR42D36R36U36L36BR42D36R36U36L3
6"
105 NUMBER DICE
110 DRAW"C6;S4;BM19,44"+N$(1):DR
AW"BM+40,+0"+N$(2):DRAW"BM+40,+0
"+N$(3):DRAW"BM+40,+0"+N$(4):DRA
W"BM+40,+0"+N$(5):RETURN
115 RANDOM NUMBERS
120 A=RND(6):DRAW"C7;S5;BM4,64"+
M$(A):SOUNDRND(255),1
125 B=RND(6):DRAW"C7;S5;BM56,64"
+M$(B):SOUNDRND(255),1
130 C=RND(6):DRAW"C7;S5;BM108,64
"+M$(C):SOUNDRND(255),1
135 D=RND(6):DRAW"C7;S5;BM160,64
"+M$(D):SOUNDRND(255),1
140 E=RND(6):DRAW"C7;S5;BM212,64
"+M$(E):SOUNDRND(255),1
145 PAINT DICE
150 PAINT(10,65),6,3:PAINT(66,65
),2,3:PAINT(118,65),2,3:PAINT(17
0,65),2,3:PAINT(222,65),2,3
155 AA=AA+1:IFAA=3THEN170ELSE160
160 GOTD55
165 NEXT PLAYER? Y/N
170 DRAW"C7;S5;BM10,168"+L$(14)+
L$(5)+L$(24)+L$(20)+L$(27)+L$(16
)+L$(12)+L$(1)+L$(25)+L$(5)+L$(1
8)+L$(28)+L$(27)+L$(25)+L$(29)+L
$(14)
175 FORT=1T010
180 SOUNDRND(255),RND(6):NEXTT
185 B$(1)=INKEY$:IFB$(1)=" " THEN185 EL
SEIFB$(1)="Y" THEN15 ELSEIFB$(1)="N" T
HEN190 ELSE185
189 THE END

```

COLOR YAHTZEE

190 PCLS: DRAW"C7; S1; BM108, 10"+L\$ (20)+L\$ (8)+L\$ (5)+L\$ (27)+L\$ (5)+L\$ (14)+L\$ (4); DRAW"C7; S2; BM99, 16"+L\$ (20)+L\$ (8)+L\$ (5)+L\$ (27)+L\$ (5)+L\$ (14)+L\$ (4)
 195 DRAW"C7; S3; BM89, 24"+L\$ (20)+L\$ (8)+L\$ (5)+L\$ (27)+L\$ (5)+L\$ (14)+L\$ (4); DRAW"C7; S4; BM79, 34"+L\$ (20)+L\$ (8)+L\$ (5)+L\$ (27)+L\$ (5)+L\$ (14)+L\$ (4)
 200 DRAW"C7; S5; BM68, 47"+L\$ (20)+L\$ (8)+L\$ (5)+L\$ (27)+L\$ (5)+L\$ (14)+L\$ (4); DRAW"C7; S6; BM59, 62"+L\$ (20)+L\$ (8)+L\$ (5)+L\$ (27)+L\$ (5)+L\$ (14)+L\$ (4)
 205 DRAW"C7; S7; BM49, 80"+L\$ (20)+L\$ (8)+L\$ (5)+L\$ (27)+L\$ (5)+L\$ (14)+L\$ (4); DRAW"C7; S8; BM39, 100"+L\$ (20)+L\$ (8)+L\$ (5)+L\$ (27)+L\$ (5)+L\$ (14)+L\$ (4)
 210 DRAW"C7; S9; BM28, 125"+L\$ (20)+L\$ (8)+L\$ (5)+L\$ (27)+L\$ (5)+L\$ (14)+L\$ (4); DRAW"C7; S10; BM18, 150"+L\$ (20)+L\$ (8)+L\$ (5)+L\$ (27)+L\$ (5)+L\$ (14)+L\$ (4)
 215 DRAW"C7; S11; BM9, 175"+L\$ (20)+L\$ (8)+L\$ (5)+L\$ (27)+L\$ (5)+L\$ (14)+L\$ (4)
 220 GOTD220
 225 ^ ALPHABET
 230 L\$ (1) = "U8R8D4L8BR8D4BR4" ^ A
 235 L\$ (2) = "U8R6F2D2L8BR8D2G2L6BR12" ^ B
 240 L\$ (3) = "U8R8BD8L8BR12" ^ C
 245 L\$ (4) = "U8R6F2D4G2L6BR12" ^ D
 250 L\$ (5) = "U8R8BD4L8BD4R8BR4" ^ E
 255 L\$ (6) = "U8R8BD4L8BD4BR12" ^ F
 260 L\$ (7) = "U8R8BD4L4BR4D4L8BR12" ^ G
 265 L\$ (8) = "U8BR8D8BU4L8BD4BR12" ^ H
 270 L\$ (9) = "BU8R8BL4D3BL4R8BR4" ^ I
 275 L\$ (10) = "U4BU4BR8D8L8BR12" ^ J
 280 L\$ (11) = "U8BR8G4L4BR4F4BR4" ^ K
 285 L\$ (12) = "U8BD8R8BR4" ^ L
 290 L\$ (13) = "U8F4E4D8BR4" ^ M
 295 L\$ (14) = "U8F8U8BD8BR4" ^ N
 300 L\$ (15) = "U8R8D8L8BR12" ^ O
 305 L\$ (16) = "U8R8D4L8BD4BR12" ^ P
 310 L\$ (17) = "U8R8D8H4BG4R8BR4" ^ Q
 315 L\$ (18) = "U8R8D4L8BR4F4BR4" ^ R
 320 L\$ (19) = "BU4U4R8BD4L8BR8D4L8BR12" ^ S

325 L\$ (20) = "BU8R8BL4D8BR8" ^ T
 330 L\$ (21) = "U8BR8D8L8BR12" ^ U
 335 L\$ (22) = "BU8D4F4E4U4BD9BR4" ^ V
 340 L\$ (23) = "U8BR8D8H4G4BR12" ^ W
 345 L\$ (24) = "E8BL8F8BR4" ^ X
 350 L\$ (25) = "BU8F4E4BG4D4BR8" ^ Y
 355 L\$ (26) = "BU8R8G8R8BR4" ^ Z
 360 L\$ (27) = "BR12" ^ SPACE
 365 L\$ (28) = "BR4BU7E2R4F2D2G2L2D4BR8" ^ ?
 370 L\$ (29) = "E8BD8BR4" ^ /
 390 RETURN
 395 ^ DICE SPOTS
 400 M\$ (1) = "BD12BR12D4R4U4L4BL12BU12" ^ 1 SPOT
 405 M\$ (2) = "D4R4U4L4BD24BR24D4R4U4L4BU24BL24" ^ 2 SPOTS
 410 M\$ (3) = "D4R4U4L4BD12BR12D4R4U4L4BD12BR12D4R4U4L4BU24BL24" ^ 3 SPOTS
 415 M\$ (4) = "D4R4U4L4BD24D4R4U4L4BR24D4R4U4L4BU24D4R4U4L4BL24" ^ 4 SPOTS
 420 M\$ (5) = "D4R4U4L4BD12BR12D4R4U4L4BL12BD12D4R4U4L4BR24D4R4U4L4BU24D4R4U4L4BL24" ^ 5 SPOTS
 425 M\$ (6) = "D4R4U4L4BD24D4R4U4L4BR12D4R4U4L4BR12D4R4U4L4BU24D4R4U4L4BL12D4R4U4L4BL12" ^ 6 SPOTS
 430 ^ NUMBERS
 435 N\$ (1) = "BR2R4L2U8G2BD6BR10" ^ 1
 440 N\$ (2) = "BR1H1U1E1R5E2U1H2L4G2BD6BR1R7BR4" ^ 2
 445 N\$ (3) = "BR1H1BU6E1R6F1D2G1L4R4F1D2G1L6BR11" ^ 3
 450 N\$ (4) = "BU4U4BR4BD1D3R4L8R4D4BR8" ^ 4
 455 N\$ (5) = "BR1H1BU2U4E1R6F1BD2BL1L6G1BD4BR1R6E1U3H1BD5BR5" ^ 5
 460 RETURN

TRS-80 COLOR COMPUTER BRICKAWAY!

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COLOR COMPUTER NEW!

MACRO-80C

The Micro Works is pleased to announce the release of its **disk-based editor, macro assembler and monitor**, written for Color Computer by Andy Phelps. **THIS IS IT** — The ultimate programming tool!

The powerful 2-pass macro assembler features conditional assembly, local labels, include files and cross referenced symbol tables. MACRO-80C supports the complete Motorola 6809 instruction set in standard source format. There are no changes, constraints or shortcuts in the source language definition. Incorporating all of the features of our Rompack-based assembler (SDS80C), MACRO-80C contains many more useful instructions and pseudo-ops which aid the programmer and add power and flexibility.

The screen-oriented text editor is designed for efficient and easy editing of assembly language programs. The "Help Key" feature makes it simple and fun to learn to use the editor. As the editor requires no line numbers, you can use the arrow keys to position the cursor anywhere in the file. MACRO-80C allows global changes and moving/copying blocks of text. You can edit lines of assembly source which are longer than 32 characters.

DCBUG is a machine language monitor which allows examining and altering of memory, setting break points, etc.

The editor, assembler and monitor — as well as sample programs — come on one Radio Shack compatible disk. Extensive documentation included. **MACRO-80C Price: \$99.95**

YOU NEED COLOR FORTH!!

Why?

- Forth is faster to program in than Basic
- Forth is easier to learn than Assembly Language
- Forth executes in less time than Basic

Forth is a highly interactive language like Basic, with structure like Pascal and execution speed close to that of Assembly Language. The Micro Works Color Forth is a Rompack containing everything you need to run Forth on your Color Computer.

Color Forth consists of the standard FORTH Interest Group (FIG) implementation of the language plus most of FORTH-79. It has a super screen editor with split screen display. Mass storage is on cassette. Color Forth also contains a decompiler and other aids for learning the inner workings of this fascinating language. It will run on 4K, 16K, and 32K computers. Color Forth contains 10K of ROM, leaving *your* RAM for *your* programs! There are simple words to effectively use the Hi-Res Color Computer graphics, joysticks, and sound. The 112-page manual includes a glossary of the system-specific words, a full standard FIG glossary and complete source listing. **COLOR FORTH ... THE BEST!** From the leader in Forth, Talbot Microsystems. **Price: \$109.95**

SOFTWARE DEVELOPMENT SYSTEM

The Micro Works Software Development System (SDS80C) is a complete 6809 editor, assembler and monitor package contained in one Color Computer program pack! Vastly superior to RAM-based assemblers/editors, the SDS80C is non-volatile, meaning that if your application program bombs, it can't destroy your editor/assembler. Plus it leaves almost all of 16K or 32K RAM free for *your* program. Since all three programs, editor, assembler and monitor are co-resident, we eliminate tedious program loading when going back and forth from editing to assembly and debugging!

The powerful screen-oriented Editor features finds, changes, moves, copies and much more. All keys have convenient auto repeat (typamatic), and since no line numbers are required, the full width of the screen may be used to generate well commented code.

The Assembler features **all** of the following: complete 6809 instruction set; conditional assembly; local labels; assembly to cassette tape or to memory; listing to screen or printer; and mnemonic error codes instead of numbers.

The versatile monitor is tailored for debugging programs generated by the Assembler and Editor. It features examine/change of memory or registers, cassette load and save, breakpoints and more. **SDS80C Price: \$89.95**

MICROTEXT: COMMUNICATIONS VIA YOUR MODEM!

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

PARALLEL PRINTER INTERFACE — Serial to parallel converter allows use of all standard parallel printers. P180C plugs into the serial output port, leaving your Rompack slot free. You supply the printer cable. **P180C Price: \$69.95**

GAMES

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

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

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

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

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

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COMMENT CORNER

by Andrew Phelps
The Micro Works

This month the subject is RAM Hooks. These are places in RAM where the program jumps, and which then jump elsewhere in memory.

For example, whenever a character is printed on the screen, the program in ROM will first do a subroutine call to location \$0167. This may contain a Return instruction (RTS), so that control goes back to the ROM and the character is then printed to the screen (or printer or disk).

So what good did that do? Not much, until you install Extended BASIC. When Extended does its initialization, it replaces that RTS with a Jump to location \$8273. The program in \$8273 does some processing, then returns to the program that displays the character.

If it weren't for these RAM hooks, nothing could ever be modified and no bugs could be patched since the ROM can't be modified. RAM can.

There are several uses for RAM hooks. One is to add the Extended BASIC functions. In the character output example above, the routine at \$8273 resets the screen from graphics to text whenever a character is printed to the screen. Another example is the hook in the "get number" program which allows Extended to look for &H and &O (hex and octal numbers).

Another use for the hooks is to allow Disk BASIC to do its disk I/O, Open, Close, Output Character, etc., all are hooked by Disk.

The most interesting use of the hooks is so that user programs can modify the functions of the ROM programs. The "User Error" hook can be used to trap BASIC errors before they can return control to the idle loop. Output Character can be hooked to modify what is printed (such as sending line feeds after carriage returns to the printer). Execute Line can be hooked to avoid checking the Break key during a BASIC program.

The only problem with the hooks is that they make disassembly difficult. It is hard to follow what a routine is doing when it then jumps into RAM to who knows where. To save some time, then, here is a list of each hook, where it is called from, and where it goes in Extended or Disk systems.

In most cases, a non-Extended system has an RTS in each hook. Some (like GETLINE) may have the RTS replaced by a jump to a RTS. This does the same thing. Some (such as SWI3 below) are never set to anything and would crash the system if used without being set.

0100: SOFTWARE INTERRUPT 3 CALLED BY VECTOR AT FFF2 NEVER SET, NEVER USED

If a SWI3 instruction (113F) is executed, it will stack registers and jump to 0100.

0103: SOFTWARE INTERRUPT 2 CALLED BY VECTOR AT FFF4 NEVER SET, NEVER USED

If a SWI2 instruction (103F) is executed, it will stack registers and jump to 0103.

0106: SOFTWARE INTERRUPT CALLED BY VECTOR AT FFFA NEVER SET, NEVER USED

If a SWI instruction (3F) is executed, it will stack registers and jump to 0106. This is used by CBUG and other monitors.

0109: NON-MASKABLE INTERRUPT CALLED BY VECTOR AT FFFC SET TO D7AE BY DISK

This is used to terminate disk I/O.

010C: INTERRUPT REQUEST CALLED BY VECTOR AT FFF8 SET TO A9B3 SET TO 894C BY EXTENDED SET TO D7BC BY DISK

This is the timer interrupt. It is used to time the SOUND command. It is used by Extended for TIMER. It is used by Disk to turn off the disk motor after several seconds of non-use.

010F: FAST INTERRUPT (FIRQ) CALLED BY VECTOR AT FFF6 SET TO A0F6

This causes a jump to any ROMpack in the expansion interface.

015E: OPEN DEVICE HOOK CALLED AT A5F6 SET TO C426 BY DISK

This allows devices 1-16 to be opened to disk files.

0161: DEVICE NUMBER CHECK CALLED AT A5B9 SET TO C838 BY DISK

This allows device numbers greater than zero for disk.

0164: RETURN DEVICE PARAMETERS CALLED AT A35F SET TO C843 BY DISK

Returns current position in record, tab length, etc., for disk files.

0167: CHARACTER OUTPUT CALLED AT A282 SET TO 8273 BY EXTENDED SET TO CB4A BY DISK

In Extended, changes graphic screen back to text. Also ignores output to device #-3 (used by DLOAD). In Disk, allows output to disk files.

016A: CHARACTER INPUT CALLED AT A176 SET TO BCF1 BY EXTENDED SET TO C58F BY DISK

COMMENT CORNER

In Extended, does input from device #-3 (for DLOAD). In disk, allows input from disk files.

016D: CHECK FILE OPEN FOR INPUT CALLED AT A3ED SET TO C818 BY DISK
Checks to make sure that a device number is open for input.

0173: CLOSE ALL OPEN FILES CALLED A A426 SET TO CA3B BY DISK
All open disk files are closed.

0176: CLOSE ONE FILE CALLED AT A42D SET TO 8286 BY EXTENDED SET TO CA4B BY DISK
The file open to the specified device number is closed.

0179: "PRINT USING" CALLED AT B918 SET TO 8E90 BY EXTENDED
Checks for "USING" and runs the "PRINT USING" statement.

017C: FILE ITEM SCANNER CALLED AT B061 SET TO CC5B BY DISK
For INPUT statements from disk.

017F: BREAK KEY CHECK CALLED AT A549 SET TO C859 BY DISK
Doesn't check Break key during output to disk file.

0182: GET LINE FROM KEYBOARD CALLED AT A390 SET TO JMP RTS BY DISK
Can be hooked by user programs to force input to BASIC.

0185: FINISH LOADING ASCII FILE CALLED AT A4BF SET TO CA36 BY DISK
Cleans up after loading an ASCII program file.

0188: CHECK END OF FILE CALLED AT A5CE SET TO C860 BY DISK
Checks disk file for EOF.

018B: EVALUATE OPERAND CALLED AT B223

SET TO 8846 BY EXTENDED SET CDF6 BY DISK
Checks for extended operands and functions.

018E: USER ERROR CALLED AT AC46 SET TO JMP RTS BY DISK
Allows a user program to trap errors.

0191: ERROR CALLED AT AC49 SET TO 88F0 BY EXTENDED SET TO C24D BY DISK
Prints additional error messages. Allows disk system to close files on error.

0194: RUN CALLED AT AE75 SET TO 829C BY EXTENDED SET TO C990 BY DISK
Initializes graphics parameters in Extended. Allows RUN"filename" for running disk files.

0197: HEX & OCTAL CALLED AT BD22 SET TO 87E5 BY EXTENDED
Allows the "get number" routine to recognize &H and &O.

019A: EXEUCTE LINE CALLED AT AD9E SET TO 82B9 BY EXTENDED
A different version of the interpret loop is run, allowing the trace function.

019D: GRAPHICS ADDRESS CALLED AT A8C4 NOT SET

01A0: CLS, GET, PUT, etc. CALLED AT A910, 975C, 8AFA, 8162 SET TO C29A BY DISK
When this is called from the GET/PUT routine, the hook allows these commands to access disk records. The other miscellaneous functions of this hook are not used.

01A3: TOKENIZE CALLED AT B821 SET TO 8304 BY EXTENDED

This hook is used in a rather confusing manner. If it is called while tokenizing a direct statement, it patches the return address so that after tokenizing the new version of execute will be run.

01A6: UNTOKENIZE CALLED AT B7C2 NOT SET

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REVIEW OF RADIO SHACK'S "SPECTACULATOR"

By: Glenn Leonard
425 Richard Avenue
Lansing, MI 48917

My interest in Radio Shack's electronic spread sheet for the Color Computer, the Spectaculator ROMPAC, resulted from frequent use of Visicalc on a Model III. Having become a true "Visicalc-a-holic" I thought it would be nice to have some type of similar capability with my personal Color Computer. When I found that Mr. Kilgus had written this program it further peaked my curiosity. I am an ardent fan of his Color Scripsit. So, money in hand I headed to my friendly Radio Shack Computer Center. The nice young lady who handed me the program and suggested I try it out on one of their machines commented that she was very impressed with the program and felt it had a lot of features that were even nicer than Visicalc. A salesman nearby mentioned he had spent 15 minutes with the program when it first arrived and was "duly unimpressed" as he put it. A third sales person wandering by said he had only tried it once and had not really figured it out. With this encouragement I started my "do it yourself demo".

Like most people, I hesitate to sit down and start reading all of the directions when just sampling an item like this. Well folks, with this piece of software there isn't much alternative. The first appearance is similar enough to the Visicalc to tempt you to "wing it", but it ends there. So, it was right back to the manual. The manual is well laid out and clearly written, with one glaring exception. The section relating to the "Row Formula" and "Column Formula" entries for establishing relationships is confusing at best. In addition, the command summary listing in the back of the manual is missing the "row formula" command. More on the calculation features later.

When initialized you get a blank spread sheet with rows and columns that are BOTH NUMBERED! That's right folks, both rows and columns are both designated by numbers making for frequent confusion for those of us who are weak of mind. The instructions inform us that we could have a matrix of up to 99 rows by 99 columns if the computer has sufficient memory. In the upper left hand corner of the screen is the Command Mode prompt C>. Before we can do anything with the sheet we must first enter an appropriate command mode. These are logical and straight forward; eg. ET - Enter Text, EN - Enter Numbers, CW - Column Width, ext. The program will remain in the selected command mode until you hit the <BREAK> key when it will return to the C> prompt. Making sure you are in the proper

mode takes a little practice, but within an hour it becomes quite automatic. A really slick feature here is the capability to set individual columns to specific sizes. Usually you need the first column about 12 to 15 characters long for labels and the rest might easily work out at 8. This is accomplished by CW <ENTER> 1,15 <ENTER> <BREAK>, and its all done. Really quite simple. The trade-off here is that the small character width screen comes back to bite you. When the columns exceed 12 characters, the maximum number of columns that will appear on the screen at any one time is 2. When you take into consideration that there is no "window" capability it certainly can make large sheets rather awkward. One very fine feature used in this program is the extensive use of HELP screens. Anytime you enter <?> you will get a HELP screen for the particular command mode you are in. The program is capable of printing sections of the spread sheet or the entire sheet. It also has the capability to send the sheet to the recorder. This capability combined with the feature that allows you to "clean" the sheet of data while retaining all of the mathematical relationships allows quick production of "structurally" similar sheets with different data. Recalculations are not automatic but are performed by entering CA when in the C> command mode. The confusion does not begin until you start to establish mathematical relationships.

Relationships are defined by either "Row Formulas" or "Column Formulas". For example, if you want to add up all of the items in column 1 you enter the "Row Formula" mode. After entering RF to enter the mode you specify the rows you wish to have added up to create the total. This formula will now apply to ALL of the columns. This does allow you to quickly set up very basic spread sheets but prohibits any type of sheet that uses different functions for different columns. The same procedure is used, with similar ambiguous terminology, to create relationships for a given row using a "column formula". This system is probably quite adequate for home budgeting planning, however if you wish to take a specified (by row and column) figure and use it elsewhere on the sheet you are out of luck, it will not support these rather exotic maneuvers. Needless to say, I did not acquire all of this information from a short session at Radio Shack. While at the Computer Center and in a moment of frustration I declared that if anyone of the three

SPECTACULATOR

sales people standing there could make it calculate anything, even if wrong, I would buy it. After 15 of 20 minutes one of them got lucky, (it calculated the wrong direction, but it did calculate) so I bought it. The rest has been learned through about 10 hours of hands on experience.

In summary, the Spectaculator is probably a good buy for the home user interested in setting up basic budgets. If the intent is to use it for any type of business application or analysis of budgets, the prospective buyer should be very wary of its calculation relationship constraints. The user documentation is good for the most part, though the weak area in the explanation of calculation procedures can be very irritating. Using it within its design constraints, the Spectaculator will set up very simple worksheets extremely fast. It's not a Visicalc, but then its less than half the price. When a Visicalc caliber unit becomes available, I'll be in the market, but I will still find a place for the Spectaculator for those "quick and simple" jobs.

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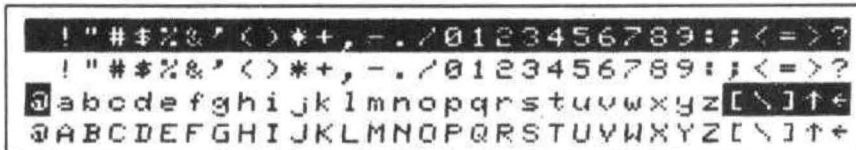
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REVIEW--COMPUVOICE

By: Steven Hoffman
10723 West Road
Harrison, OH 45030

Several weeks ago I was elated to hear that Spectral Associates had released a totally software based speech synthesis system for the Color Computer. This elation quickly turned to disappointment after receiving the program and accompanying documentation.

Compuvoice, by Spectral Associates costs \$44.95 and requires extended color BASIC. The program is memory hungry (it uses 8336 bytes of RAM), but I expected this of such a complex program. The program is in machine language, and with all due respect to the author, took a great deal of work on his part. However I believe it needs a little more.

I received the program on cassette with 5 pages of documentation. The documentation was, to say the least, a little skimpy. I expected the documentation to include some programming examples. It did: one. This was an immediate turn-off. I like to have several examples in front of me when using any program. Sorry, one small program just won't do.

The instruction sheet wastes a lot of time and space describing phoneme speech generation instead of giving examples of how to use the technique. While they could have gone through each phoneme, the documentation simply gives you a table and leaves you to experiment on your own. This, I feel could be improved.

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R. S. COLOR DISK SYSTEM SOFTWARE

DISK EDITOR/ASSEMBLER - This package includes a full featured disk based text editor program and a disk to disk/tape/memory assembler. The text editor is an easy to learn full featured editor which allows files larger than memory to be created and edited with ease. It is compatible with ASCII formatted tape & disk files to allow easy conversion of tape based programs. The assembler supports the full 6809 processor instruction set and will cross assemble 6800 code to 6809 object code. The output object file can be directed to either disk, tape or memory with overwrite protection. The object listing can be output to the screen or printer and versions for printers with or without line feeds are provided. **DISK EDITOR & ASSEMBLER \$79.95**

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TEXTPRO II TEXT EDITOR/WORD PROCESSOR - Includes all the features of TEXTPRO I plus: 10 programmable tab stops, can be used with horizontal tab to next location, center over tab column, decimal alignment on tab column, right justify to tab column, tab to programmed column. Also tab commands can use specific values for tab columns or programmed values. Other additions include: character fill, right justify line, programmable footer can be centered/right justified/double width or almost any processor commands can be used with it. 3 programmable header lines, expanded footnotes and processable keyboard input data during word processing. **DISK TEXTPRO II \$79.95**

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The example program shows how to make the computer speak the numbers 1 through 9. The program was a total 31 lines long. Overall, I would have to give this program poor marks for documentation due to a simple lack of it.

Now, the program itself is probably very complex from what I can see. This is where the package gets it's high marks. The program does exactly what it sets out to do, allow you to easily generate voices in BASIC. There is only one problem: these voices are practically unintelligible. I realize that speech synthesis is a new field with drawbacks, but I did expect a little more quality from the voices. When I tried the demonstration program I had trouble understanding any of the numbers, that is at first. Later, after several tries, I began to understand the voice a little better. Very little.

One reason why you can't understand what it's saying is because it talks too fast. I mean the words just race by. One other reason is that the tones sound so much alike you can't tell some words from others. This I believe, could have been improved.

In conclusion, I would only recommend this program to somebody who is really interested in experimentation in computer generated voice
CONTINUED ON PAGE 79

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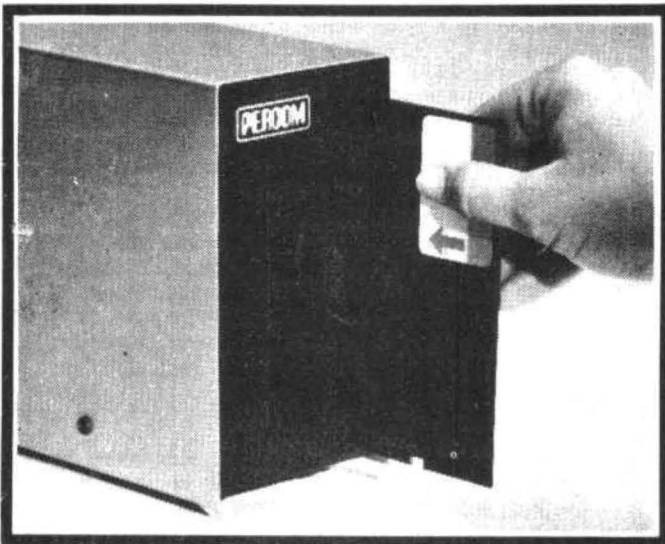
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A REAL KEYBOARD FOR THE CC

by Shawn A McClenahan
11347 Emelita St. #4
N Hollywood, CA 91601

So you've bought a TRS Color Computer. An excellent choice; lots of power. Proud of your investment you invite friends over only to be chided for having purchased a "toy" - an obvious conclusion: just look at the cheap keyboard. Oh, those plastic button blues. Or, if you haven't suffered this crushing blow to your ego, you may have experienced some discomfort in typing. Maybe you've desired a numeric keypad or lusted after the silky smooth feeling of a Model III keyboard. Well, you no longer need to suffer the aspirations of your acquaintances or your own cramped fingers. You can put a Model III keyboard in your Color Computer.

First you phone National Parts (817-870-5662) and order part number AXX0205 for about \$65.00 plus postage and handling. In about 10 days the keyboard arrives and then the fun begins. If you read my article in the March issue of '80 Microcomputing then you know I'm not afraid of cutting traces and soldering in jumpers. Why do I mention this? Because, dear reader, the Model III keyboard doesn't have the same keyboard matrix as the Color Computer ROM expects.

Fortunately the modifications are not very extensive nor difficult to make. Referring to sheet 1 shows all the trace and jumper modifications to be made - and you get to keep the numeric keypad in the bargain. Some metal work is involved in that you must cut 15/16" from the left edge and 2 5/16" from the right edge (oh well, there goes the reset button, but you can't have everything). Be especially careful in making those cuts on the right side as you'll have to cut away part of the printed circuit as well as the metal carrier. Do not cut any traces other than those coming from the reset button.

In attaching the ribbon cable to the keyboard you can either solder the ribbon directly to the pads (pre-tin the wires first so they'll stay put more easily) or you can solder in a double row header and attach a female connector to the keyboard end of the ribbon cable. Don't overheat the pads on the keyboard as they separate rather easily and then break loose (as I found out). The ground wire is particularly useful with the metal carrier of the Mod III keyboard and should keep the FCC happy.

You will have to cut out your Color to accept the larger keyboard area (you now have an additional numeric keypad) and grind down the inside posts. Once this is done you will not be able ever again to return to the "stock" keyboard

- this is a permanent modification. For the best esthetic look you will also have to make a bezel (out of thin plastic - I used clear stock and sprayed the back black for an essentially no mar surface) and this is also given full size on sheet 2 along with the necessary cut outs to be made to your Color Computer.

The keyboard fits inside by an essentially friction fit. DO NOT reinstall the front three screws when you put the case back together as they would splinter your nice \$65 keyboard to junk (talk about getting screwed). Also, don't forget to test out the matrix with an ohmeter to verify that it is behaving properly and that no loose or improperly shorted wires are present. Compare the results from your continuity testing with the matrix found in the Color service manual.

So now you have a vastly better keyboard in your computer but there are two drawbacks. One, you lose the tactile feedback you may have grown accustomed to in the original keyboard, but this is compensated for by the sensitivity and smoothness of the Mod III keys. Two, you won't be able to push all the way down those nice templates Radio Shack is coming out with for the Color's original keyboard, but at least they fit part way down so you can get away with it. Additionally you won't need to purchase the keyboard upgrade Radio Shack will eventually come out with (like TI and PET).

As long as you're making modifications why not get a spst momentary push button switch and mount it up front for your reset button and a 3pdt switch mounted up front for your power switch. The reset switch used should be recessed to avoid accidental hits. Maybe you can even use the old Model III reset switch that was cut off for your new reset switch. Both switches should have inline male/female connectors for easy removal of the top cover. You can also install a LED power on light by using push on jumpers to test point 3, for ground, and test point 9, for +12 volts. Don't forget to use the proper step down resistor in series for 12 volt operation of the LED. In anycase the best arrangement is to keep the power switch over on the left, the reset over on the far right and the light in the middle (is that a political or religious delineation?).

For the real hackers out there, take note that there remains 4 unused spaces in the keyboard matrix and that with the Mod III board access to the matrix is very easy. Four more keys could be added by using line 8 from the Color for

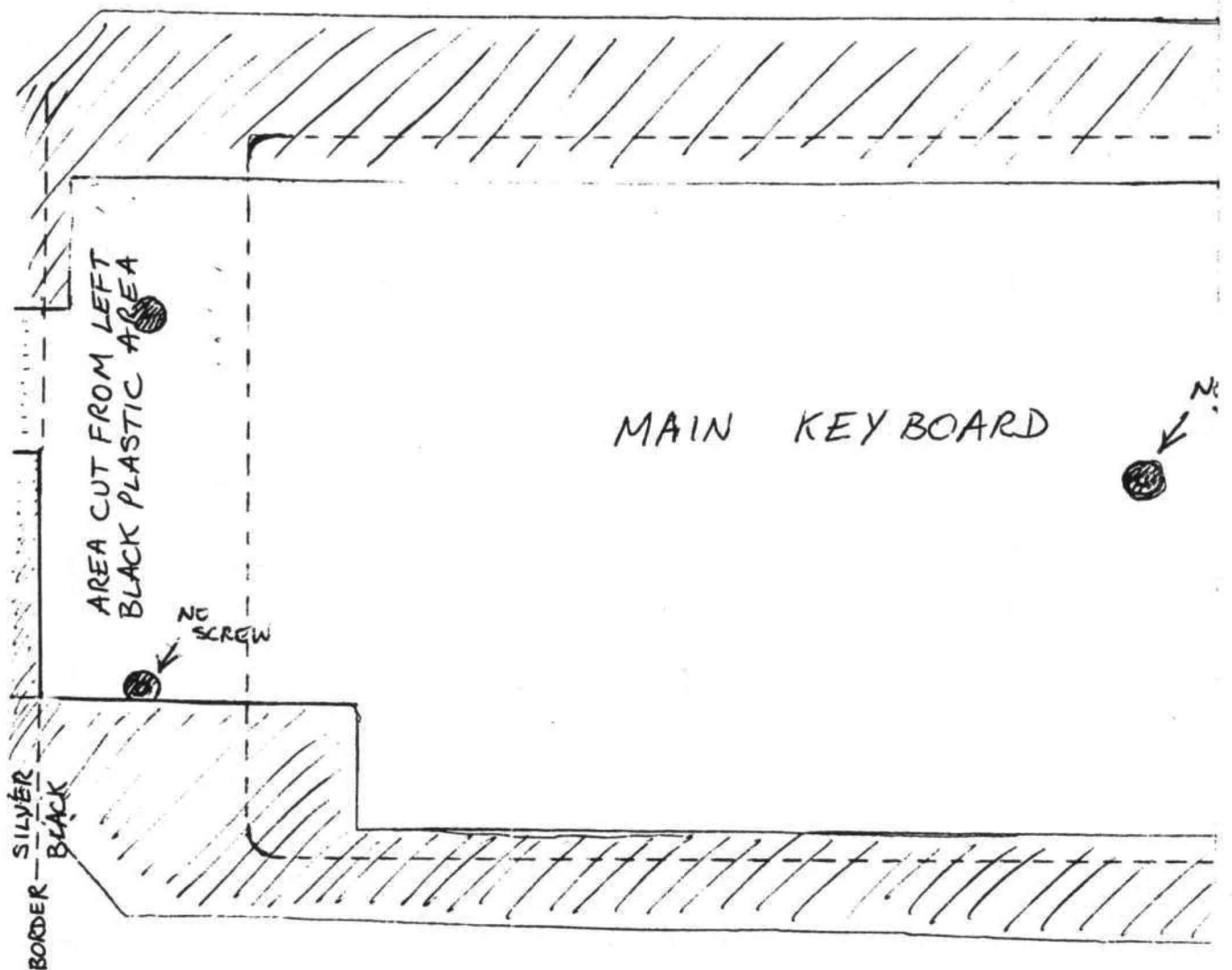
KEYBOARD FOR THE COLOR COMPUTER

a common row selection and then lines 12, 13, 14, and 15 for the individual new keys. The easiest position to place these new keys (without any great conflicts with any traces underneath or any further cutting of the Color's case) appears to be to either the right of the space bar (room for all

4 keys) or to its left (room for 1 extra key). Of course, you'll have to work out the appropriate driver routines if I don't beat you to it first.

Now my Color has 96K memory and a "real" keyboard, you know, 32 X 16 characters on the screen is kind of chintzy. I wonder.....

 PLASTIC SHEET TE



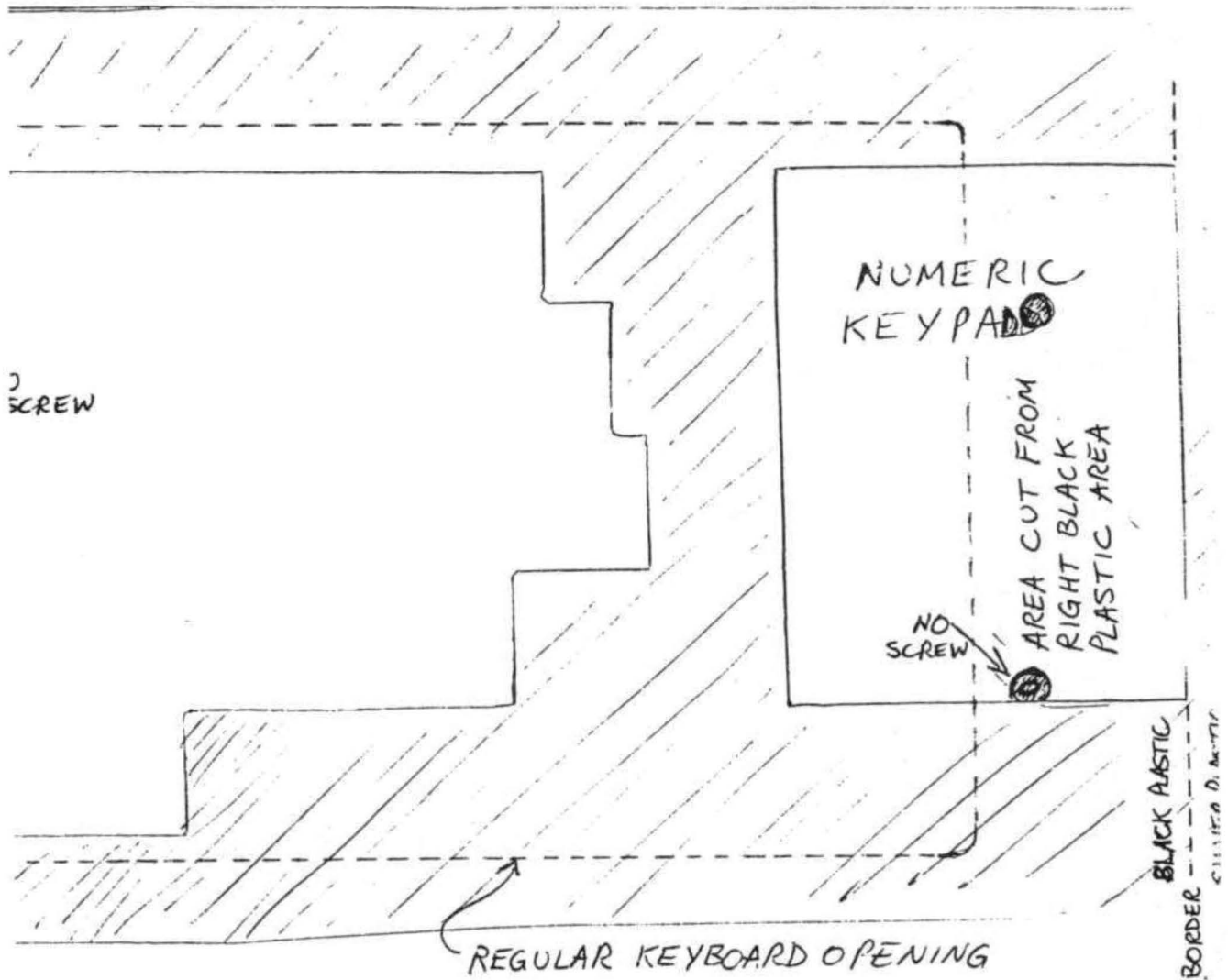
 POSTS - GRIND DOWN TOP COVER THE WAY D → DO NOT PUT THROUGH

 KEYBOARD SLOPE ANGLE

KEYBOARD



MPLATE (OVERLAY) BEZEL



IN SO COMPUTER
WILL ^{JUST} FIT ALL
OWN - KEEP SAME ANGLE (θ)
T SCREWS BACK
THESE POSTS

THE 1248-EP EPROM PROGRAMMER

The 1248-EP EPROM PROGRAMMER is a full function, stand alone unit that is compatible with virtually all popular 1K, 2K, 4K & 8K-by-8, 24 pin, 5 volt EMPROMS (2508's, 2758-0/1's, 2516's, 2716's, 2532's, 68732-0/1's, 68764's, 68766's to mention a few). The programmer is totally MENU DRIVEN by resident, on-board, position independent firmware in EPROM, which makes it suitable for experienced computer operators and novices alike.

In addition to the fact that the 1248-EP is compatible with a large number of devices, it also performs a broad range of user selected functions as well. The 1248-EP verifies EPROM erasure, compares EPROM contents to contents of RAM or ROM, programs blocks or individual bytes of EPROM memory, and copies EPROM contents to user specified location in RAM. At specified times, EPROM's can be inserted or removed from the programmer without having to "power down" the computer.

Hardware features of the 1248-EP programmer are significant. It contains its own on-board programming power supply, plugs into the cartridge slot of the Color Computer, has a quality "zero insertion force" socket and provisions for decoding the firmware driver to any 2K byte boundary within the cartridges memory map for efficient memory map utilization when used with other non-position independent hardware or software that must be executed at \$C000.

The combination of the TRS-80 Color Computer, an editor/assembler/monitor such as the Micro Works SDS80C***, and the 1248-EP EPROM programmer makes a high performance, cost effective software development station for MC-6800/6809 microprocessor based systems. Use the system to write and store your own games or utility programs in EPROM's for execution from the cartridge slot using the CK4 PROM/RAM card described below.

The cost of the unit, including easy to understand instructions is just \$94.95.

THE CK4 PROM/RAM CARD

The CK4 is a cartridge slot compatible circuit board that can be populated with either ROM's, EPROM's or static RAM's as the user so desires. Each of the four on-board sockets can be decoded starting at any 2K block boundary of the memory map from \$C000 through \$F800 of the Color Computer. In addition, each socket can be configured to respond to address blocks from 2K to 8K bytes in length, accommodating therefore, 2K, 4K or 8K-by-8 ROM's, EPROM's or RAM's. One can mix ROM and RAM on the same card in various amounts and sizes. One can also "write protect" RAM's via dip switches on the CK4.

The unit comes complete with instructions for setting up the decoding features as desired. The unit works with 2K, 4K or 8K-by-8 ROM's or EPROM's of the 5 volt only variety in 24 pin packages, or may be used with 4 static RAM's such as 4016's to expand the computers memory work space by 16K.

The CK4 PROM/RAM card is available from stock, with instructions for \$29.95 each.

"COCO" GETS A BREADBOARD

The COCO BREADBOARD is a circuit board that plugs directly into the cartridge slot of the Color Computer and provides the user with 16 square inches of predrilled breadboarding area for circuit development, interfacing experiments, motherboard implementation, or whatever your imagination conjures up. The holes in the breadboarding area of the circuit board are on 0.10 inch centers as found on other popular but more expensive boards. The COCO BREAD BOARD brings all of the data, address and control signals available at the cartridge slot outside of the body of the computer and the signal lines are appropriately labeled to facilitate error free wiring of breadboards. A ground plane is provided on the top side of the board and solder pads are provided on the bottom of the board, thus facilitating circuit grounding and point-to-point wiring. In short, the COCO BREADBOARD was designed with the experimenter in mind.

The COCO BREADBOARD is attractively priced to justify its use for even the lowest budget projects. It is an ideal vehicle for learning interfacing techniques. Buy extras to have on hand for those rainy weekends.

The COCO BREADBOARD costs just \$19.95. Price for two (2) or more is \$16.95 each. Include \$3.00 to cover shipping and handling for quantities through ten (10).

MORSE ENCODER/DECODER KIT

The MEDK80 Morse En/Decoder kit consists of a machine code software driver on tape, a schematic diagram of the interface circuitry, component parts, a printed circuit board (PCB), packaging suggestions and complete instructions for building a Morse code transmission and reception system that is compatible with 4K RAM and up models of the TRS-80 Color Computer.

The transmitter/receiver interface circuitry is totally optically isolated and is, therefore, compatible with all receivers and transmitters. The specific keying method employed in the users transmitter, however, may require minor modification of the interface, e.g., the addition of an external transistor inverter for proper phasing and voltage level matching. Specific examples are given in the instructions to aid in transmitter interfacing. Transmitter and receiver both connect to the interface unit and to the Color Computer via the RS-232 port.

The MEDK80 Morse En/Decoder kit operates at speeds up to 70 words per minute (fastest speed found so far to test receiving capability), and when receiving, automatically adapts to speed variations of the sender.

In the transmit mode, transmission speeds are user selectable from a list of ten (10) speeds that may be user programmed. Words are transmitted only when fully formed and visual management of the 512 character text buffer provides overwrite protection.

Potential purchasers of this product should have previous kit building experience. However, this is not a kit of great complexity, however, and is well within the abilities of those actively involved in amateur radio or electronic hobbyist to construct. To reduce the chance of wiring errors, component placement is indicated on the PCB and detailed assembly instructions are included.

The cost of the MEDK80 software, parts and instructions is \$39.95.

ALIEN ENCOUNTER

This action packed "shoot-em-up" is one of the most challenging games of its kind. These ALIENS are smart, they aim back at you anticipating your every move, and are unrelenting in their attack. Play it at any one of 10 degrees of difficulty, but beware, they become desperate as you approach victory, after all, they are "ALIENS"!!

Program available on tape, is compatible with all machines with more than 16K of RAM and does not need joysticks to play. ALIEN ENCOUNTER costs \$9.95. Add \$1.00 for postage and handling.

CAPTURE

This multiple strategy (10 levels of play) "SURROUND and CAPTURE" game will give hours of thought provoking, stimulating challenge. The computer is your opponent, and you'll be delighted with the level of play that "COCO" has achieved. Chess and Checkers enthusiast will especially enjoy "CAPTURE". Joysticks not required.

"CAPTURE" is supplied on tape for just \$9.95. Add \$1.00 for postage and handling.

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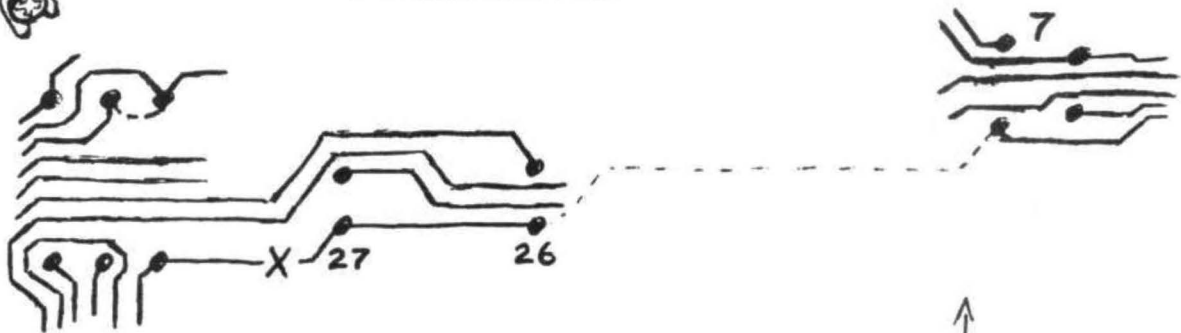
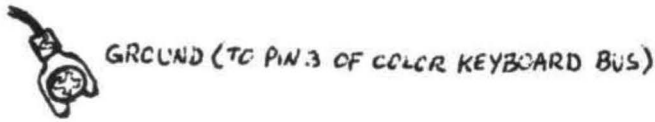
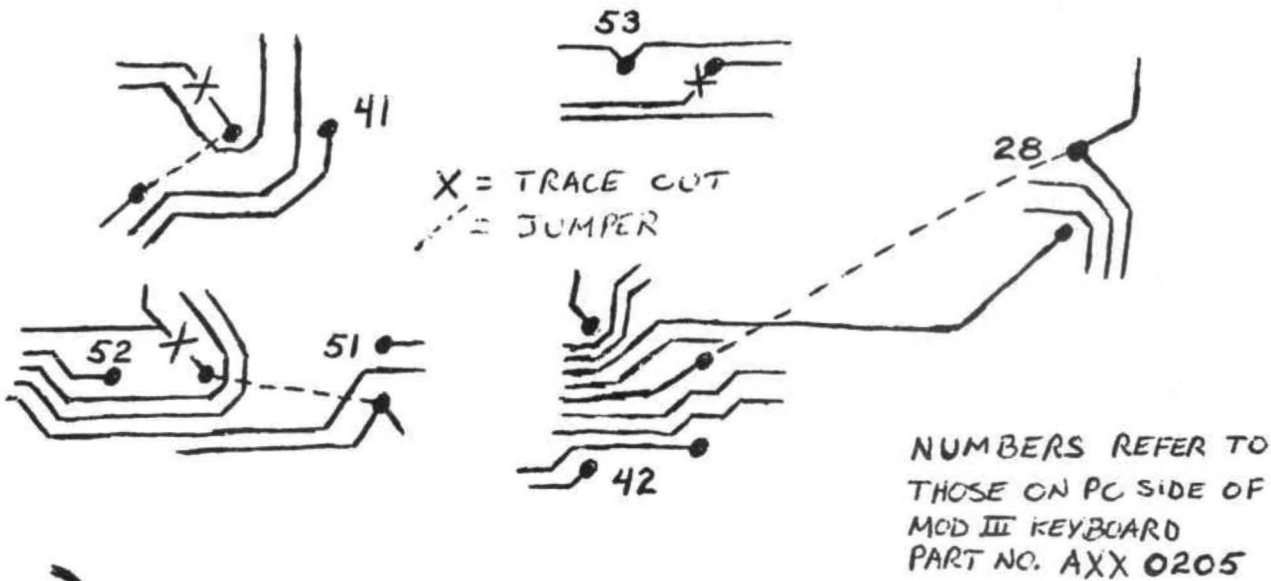
* TRS-80 is a trademark of TANDY CORP.

** SDS80C is a trademark of the MICRO WORKS.

Prices subject to change without notice.

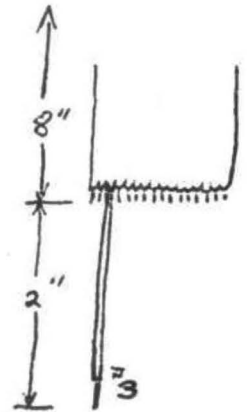
KEYBOARD

CHANGES TO MOD III KEYBOARD MATRIX TO ADAPT TO
 COLOR COMPUTER MATRIX REQUIREMENTS
 4 TRACES CUT AND 5 JUMPERS INSTALLED:

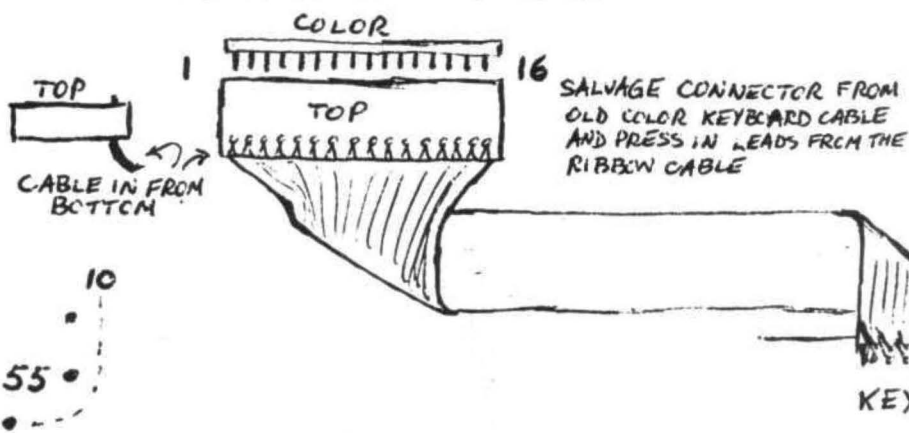


TO COLOR KEYBOARD BUS ↓

										3 GROUND	
	N.C.	N.C.	15	13	11	9	8	6	4	1	KEYBOARD BUS
19	0	0	0	0	0	0	0	0	0	0	BOTTOM/PC SIDE
20	0	0	0	0	0	0	0	0	0	0	
	N.C.	N.C.	16	14	12	10	N.C.	7	5	2	

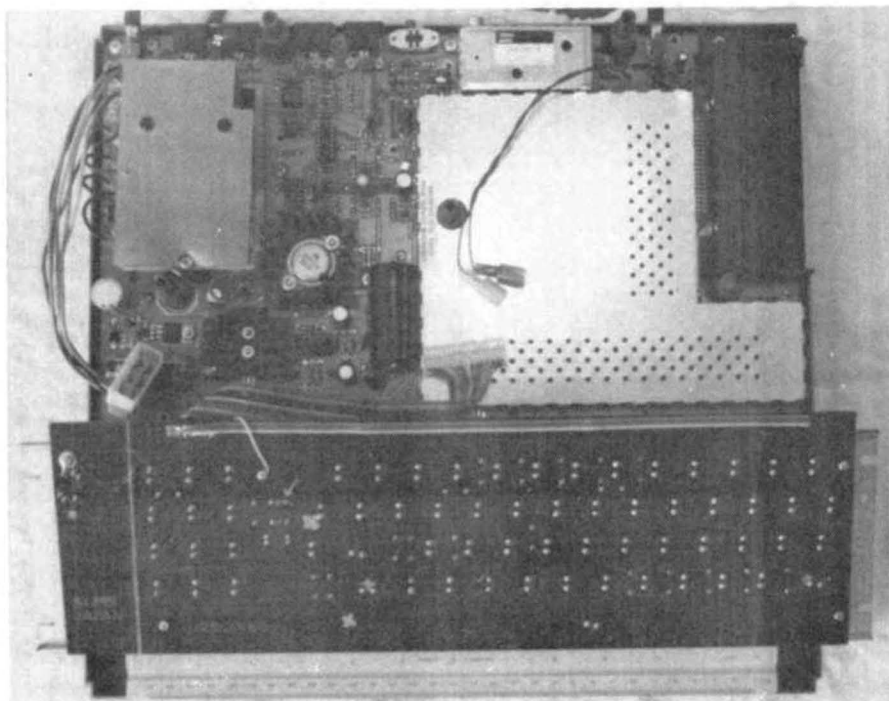


16 CONDUCTOR RIBBON
 CUT W/ #3 LEAD 2"
 LONGER FOR GROUND



10
 55
 THIS PAD MAY BE BROKEN LOOSE BY THE POST IT RESTS ON, SO THIS JUMPER MAY BE NEEDED.

KEYBOARD



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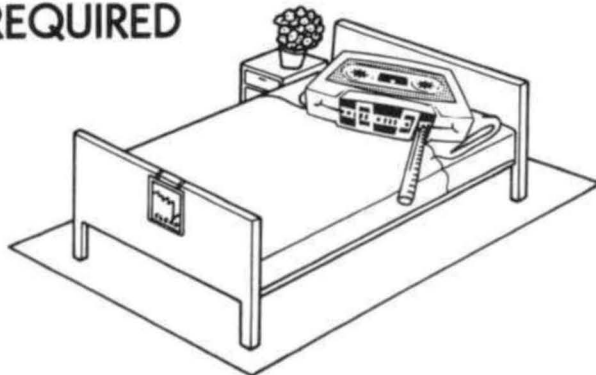
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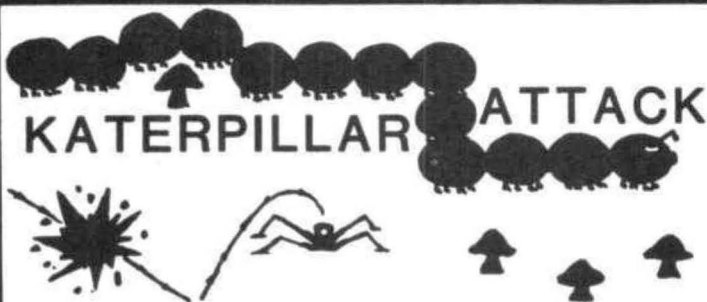
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MICROLINE 82-A PRINTER REVIEW

By: Kermit Wagoner
1100 W. Jeffery #43
Kankakee, IL 60901

This is a brief review of the Microline 82-A printer. First of all, why choose an 82-A over, say, an Epson MX80 or a RS Line Printer VII or VIII? If you want true lower-case descenders you need a 9 wire matrix. This eliminates the Line Printer VII. If you want a printer for around \$500.00 you eliminate the Line Printer VIII. That leaves the MX-80 and the 82-A. Both of these printers are available from discount houses at this price. I bought my 82-A from Omega Sales for \$529.00. With some careful shopping you can buy either of them for less than \$500.00, now.

I have used both the MX-80 and the 82-A. They both have many of the same features. What tipped me in favor of the 82-A is that it comes standard with both serial/parallel interface and pin/friction feed. All you need is a cable and you are in business.

The manual provided with the 82-A is an operators manual. It devotes many pages to inserting paper and changing the ribbon. Oh, speaking of the ribbon, the 82-A uses a ribbon for which you may substitute one made for an Underwood typewriter. This leads me to a digression. In January I saw an ad in The Computer Shopper by Need-To-Know out of San Francisco. They offered a dozen Okidata ribbons for \$24.95. I sent them a check. They called me in February to ask me whether I still wanted my ribbons. I said that I still did. They said that they would ship them that afternoon. I still haven't received my ribbons. I have to give them this, though; they haven't cashed my check. The Okidata sales office wants \$7.95 each. End of digression. Back to the manual.

The 82-A manual has all of the information you will need to make the printer compatible with your computer, but you have to do a lot of page turning to get it all straight. You really have three things to consider: the cable, the Dip switches and the baud rate.

First, the Baud rate. You want your printer to run as fast as possible. After all, you sacrificed letter quality to get speed, right? (You also saved a thousand bucks). The 82-A will run at 120 cps. This means that you can set the Baud rate at 1200 on the printer. The computer initializes to print at 600 baud, so every program you write must tell the computer to print at 1200. To do this, POKE 149,0: POKE 150,41. Your 82-A will run faster than an MX-80 with the optional serial interface at 2400 baud.

About the cable. I kludged up my own, but if I was going to do it again I would but the RS

cable with the DB-25 connector on each end and cut one end off and install the DIN connector. I think it would be cleaner. If you remember that thin blackish book which came with you computer, "TRS-80 COLOR COMPUTER OPERATION MANUAL", you remember that it has the pin out for the DIN connectors. This is how you hook them up:

DB-25	DIN	
Pin 3	Pin 4	Data to printer
Pin 11	Pin 2	Printer Busy
Pin 7	Pin 3	Signal ground
Pin 1	Shield	Protective ground

Pin 6 loops back to Pin 20 on the DB-25 connector. This is the configuration called out in the 82-A manual as diagram (b) on page 47. The signal ground and the protective ground may be tied together. On my installation I used a shielded twisted pair cable and just jumpered pin 6 to 20 on the DB-25.

The last thing to do is set the Dip switch. Remove the cover by lifting off the top cover plate and removing the two phillips head screws of the two front corners. Raise the front of the cover until it is clear of the control panel. Move the cover back about 1/4 inch to clear the holding bars at the rear of the printer and lift the cover completely off. There are no wires connected to the cover.

There is an 8-position Dip switch on the front control panel. Set sw 1, 2, 3, 4 to OFF. Set sw 5, 6, 8 to ON. You can set sw 7 either way depending on what response you wish the printer to make to the DEL command. I have mine off.

The other Dip switch is on the rear PC board in the upper right hand corner (viewed from the rear). It is a 6-position switch. Set sw 1 ON. If you are going to run at 1200 Baud, set sw 2 and 4 ON, and sw 3 OFF. Sw 5 is unused. Set sw 6 to OFF. Replace the cover (watch the wires) and your printer is ready to run.

The control panel has a rotary switch and 4 rocker switches. If you use standard 9 1/2 X 11 fan-fold paper (RS 500 pack is a decent buy) set the rotary switch to position "1". This allows 11 inches from Top Of Form to Top Of Form. The other switches and indicators are pretty much self explanatory.

Although the Microline 82-A is a fine printer is isn't perfect. It does come with both pin-feed and friction feed as standard equipment (while friction feed is an expensive option with Epson). Using it with cut paper can be trying because the paper-out switch cuts off the printer a good distance from the bottom of the page. The

THE FIRST MICROCOMPUTER

by: Stanley E. Schrieffer Jr.
305 S. Hammes Avenue
Joliet, Illinois 60436

1. Who made the first microcomputer?
2. Who designed the first microcomputer chip?
3. What was the purpose of the first microcomputer?
4. What was the date micro chips were created?

When I pose these questions to the hundreds of so-called computer buffs I meet, the answers vary from a shrug of the shoulders to some of the wildest answers imaginable. And in the magazine field not one editor has ever said anything about where it all began or even who started it. Even worse, every computer manual conveniently leaves out microcomputer history and raises their own flag in triumph. TANDY went as far as to publish a comic book which only clouded the issue and did give a one box caption to the designers, while spending the rest of the time patting themselves on the back. So, before the history slides into obscurity, let us take a look as it really was, and to do that we must first begin with the '60s.

Those were the years of increasing prosperity, the fighting of a war in Asia and the race to reach the Moon. In the field of electronics it was the "hay day" of the transistor and the promise of the laser. But it was also the real decade that the theory for the microcomputer was launched. It came near the mid decade in the paper written for the Electronic Journal and followed by three papers, in 1967, on how the technology could be made to function. Together, these papers laid the ground work for our computers today and the bases of our micro technology.

Simply put, the theory operated like a transistor, but with a higher degree of electronic accuracy. The principle was to take three pieces of material, two metal and the third non-conductive. Compress them down minutely. Send two charges of electrical current through them. One current which would not jump the medium and one which would. The one which would jump the medium created an "open" state and the other "closed", all without turning the electricity on or off. It was brilliant!

But what do you do with this brilliant idea. That came in the next series of papers. The key was to make a series of switches cutting down or amplifying current through an overall gated arrangement. From this came OR, XOR, AND, NAND and NOR gated switches and the groundwork for today's computer logic.

But developing this new technology took "BUCKS"! And alot of it...millions! Not to mention that no one spends capital like that without a darn good reason...TANDY included.

By January 1969, the future of the untested gated theory was as bleak as a quick victory in Viet Nam. But by the summer of 1969 the situation reversed. And one company looked into its bag of hopeful alternatives and pulled out the gated switching idea. That company was (be sure to write it down!) the Bell Labs branch of A.T. & T. - the location was Indian Hill, Naperville, Illinois. Much of the coding was done in the New Jersey branch, but Indian Hills would have to be credited with placing the technology into a working application. The date the project was begun to form the chip was in December 1969.

Are you ready for the name? The project was called the 1ESS, #1 Electronic Switching System. And its purpose was to replace the "bar switching" system normally found in the switching offices across the nation. The goal was to cut down on the number of operating parts and to build an ultra-modern system, which could not only provide better service, but be modular in concept and to monitor itself and issue fault instructions.

The project was began on a six month trial, with a chip to be designed, made and placed under strenuous testing. And once the test results were known a decision would be made for the continuation of the project. The life and death decision of micro technology, as I look back on it now, hung on that high corporate decision. And as history shows now...it was a go!

To gain a deeper insight into that history, let's take a look at what actually happened at Bell Labs and look into the real "gut work" of how today's technology came to be.

In the spring of 1969, the laser's capacity to act as an ample switching system to replace the badly depleted bar system was shown to have too many faults to work properly, and silently the hope of the laser was swept beneath the carpet. But not too many people were happy with the failure, and this meant the next project was going to come under a more watchful eye. So, the next project, GATED CHIP circuitry began with one strike against it, followed by a second strike from a skeptical world who knew of it but considered it too small in size to be of any real value, other than for future tinkering by some electrical hobbists.

FIRST MICROCOMPUTER

Into this background came small groups of designers, programmers, language decoders, electrical people, draftsmen and a small group of background draftsmen who would become the frontline shock troops of the attack to turn the idea into a productive and working item. They were the focal point of the entire operation and the group who bore the brunt of the pressure. They were Larry Willis, Dave Reed, Paul Anderson, "Big John", Joe, to name a few and myself. (Paul later saved his sanity and joined the army.)

But I can admit to you now that not one of us ever had the foresight to realize, then, what our results could lead to. And at the start, neither did Pierce or Woods, the two designers I had the most contact with. All any of us knew or cared about for sure was that we were given a new idea and it was our job to make it work, as best as our limited skills would allow.

And limited skills we all had! I was a draftsman who had drawn bulldozers, railroad engines and updated track drawings for the local E.J. & E. Railroad. I knew as much about electrical wiring as a landlover from Kansas knows about ocean sailing. In fact, I barely knew the difference between a resistor and transistor. The others at least knew wiring boards and how to arrange component circuitry. But even that proved to be of little use when a mainframe computer was being used to lay the groundwork.

As for how the project began within the group, it was not like anything imaginable. In fact, there was more secrecy than was within the "Manhattan Project", and it now seems it was due to the "one man now to teach another" philosophy. In theory one learning the job to teach another is nice. In reality it proved only to give one person the edge on his subordinates, resulting in the idea "I know, you'll find out", and a lot of half explanations. (Proving the theory that cold information will freeze up on its downhill run and never reach the bottom. TANDY and its informative flow proves the theory is still alive and well and living in Fort Worth!)

But the first part of the project, for us, was a dull one. We had to insure the internal workings of the gate, itself. And our first introduction into the micro circuit was checking the designer's planned specs against the specs on a computer printout. If there was an error, we recoded a card or two and submitted a card deck to the Computer Center. Big deal!

The second phase of the operation was much more interesting as we played "Connect the

Gates". This began a lot like connect the switches, with a printout and a debugged card deck, but you actually were able to get an X-Y plot drawing of where the runs would go. The first result was something short of the revenge of COLOSSUS, as the drawing looked more like a Washington street map and less like a well organized circuit layout. Dave Reed achieved this level of the project first, out of the group.

By the sixth run, of debugging card decks and achieving a good X-Y plot computer tape and drawing out the results, the planned idea of placing an abstract idea on a two inch piece of ceramic tile did not seem so ridiculous.

Dave Reed also was the first of the group to achieve a good degree of success in getting the computer to do what it was supposed to do, and his tape was taken to make the FIRST CHIP.

The chip was then sent down to testing and checked against the designer's overall and local specs. The question was, would the new technology hold up against power surges and other kinds of abnormalities. No one could be sure, and with millions of more dollars needed the results had to be known.

As it turned out, the chip creation, design and specifications proved a better success than even New Jersey staffers had imagined. It was a 200% success and, in the spring of 1970, received a go. Micro Technology was in to stay, or at least for the 1ESS, and recommendations came down to replace the component boards with the new chip boards.

Now you might imagine that a group of men in their mid 20's might cheer or show some sign of joy over hearing the corporate decree, but not so. Most of us were aware of the pressure the project was under, and when we received the letter congratulating us all on our success most of us sighed with relief. We were going to keep our jobs, and that to most of us was good news. So, we smiled, signed off on the bulletin and passed it along.

Shortly after the go ahead was given, I had found myself with a run problem on one chip and went down to see the designer about it. I ended up walking in on what seemed a great debate by Woods and Pierce. They were debating on when the set memory of the controller circuit should be brought on line. John had an idea it should go into immediate use when turned on, Pierce wanted to wait until all units were on line, checked and ready to function, then the controller would begin operational checks. They agreed the checks were needed first and before the

FIRST MICROCOMPUTER

operation instructions were set into memory. Then they agreed to write up their findings and let the supervisor select the right procedure. (Those who know the controller chip of the home computer are aware of the outcome. Pierce obviously won.)

By the summer of 1970, making a chip from scratch was "old hat" and as fast as we turned out the chips they were placed onto pads by Angie and her partner and mounted onto boards.

The boards then were taken downstairs, tested and placed into a test mockup. The size of the mockup had been planned at 10 x 12 feet, but the advent of converting component boards to chip boards reduced the size to 8 x 10. This allowed later for more features to be added and more boards. But the nicest feature of the test system was that you could redirect your phone calls to another phone. If you were expecting an important call from the language people you could take it in testing.

When the luxury wore off, the fun started. Since there was no check on which phone was being transferred to, a number could be transferred about the entire block long building. People in the chip mounting section were getting calls for people in programming, and anyone in the section who seemed out of sorts was made secretary for the group, receiving all the calls. But a few words from the supervisor quickly ended the prankstering and settled the group back to normal.

In the year that I worked for the Labs, I saw a change take place within the group. The biggest was in "Big John". He was the intellectual of the group, well mannered and considerate of others, even a little jovial. By the time I decided to return to college, John's work had gotten the best of him. He no longer was jovial, nor able to hold a long conversation. In fact, he began to wear poncho like clothes and declared constantly that the computer was against him, and that we would all be replaced by the number cruncher.

Dave and Larry, the two leadmen, I think went to work for TANDY's computer Information Center. (Just kidding, TANDY!) Joe, I think went back to used cars. And a fellow by the name of Jim, is probably running his car through robot toll booths on Chicago's I-294. And, I was the wargamer of the group going on to found the small steady company of Computer Simulations and designing games on the TRS-80.

As for the 1ESS, it was finally completed nearly five years behind schedule and tested in OSWEGO, Illinois. Today, it is the mainstay of

the entire Bell System, swithing your calls about locally and across the country.

And A.T. & T. has been rumored to have bought out ATARI. And if this is so, the staffing of ATARI by A.T. & T. Lab's designers could mean a whole new innovation in computing. It may even mean a better looking computer. And, as for rumors, it is said that Bell now has a talk system second to none. So stand back HAL 3000 - ATARI may be barreling through! (You better not rest on your lorals, TANDY - ATARI may be saying a lot more to its people than just with words!)

As for how the technology left the Labs and moved into the market place is simple. Throughout 1970, the backlog of chips to be mounted was growing. Someone outside of the company was needed to produce chips at a faster rate. This called for the Labs to share the technology in exchange for help.

Frank Smith, the chief supervisor, called up 5 companies and promised them complete technical exchange for their support. He was offering them the keys to the new technology. Out of the five, 3 flatly refused to handle it, one said maybe and one said an affirmative yes. (That one I believe he called INTEL.)

Most of the story on home computing we can now figure out. But the 8080 Bugbook's "Preface" picks up the story quite amply, stating that in 1971 INTEL released the first microcomputer chip and paved the way for computer hobbieists and companies to follow. First with a 4004 four bit microprocessor and then with the now famous 8008 and 8080, fore runners of today's Z80.

And so, everytime you use the phone, or transfer a program by modem, the first microcomputer is working for you, doing its best to support the age it began. So take a moment out before a call, say a soft, "Hi there, ESS". And you'll be talking to the father of your home computer.

And if your teacher asks you when the first microcomputer came to be, you can say, "At the Bell Laboratory Research and Development Center, in Naperville, Illinois. Started in December 1969 and named the 1ESS Project, used today to switch phone calls locally and across the nation. And whose knowledge paved the way for the home computer".

A very special THANK YOU, BELL LABS

THE ULTIMATE IN COLOR COMPUTING

WORD PROCESSING

THE SUPER "COLOR" WRITER II

The Word Processor that re-wrote the book on Word Processing

The Super "Color" Writer is a FAST, machine code, full featured, character (screen) oriented word processing system for the TRS-80(TM) Color Computer and ANY printer. The video display is styled after a professional phosphor (green characters on black background) display for hours of use without eye fatigue (optional orange on black). The unique print WINDOW frees you from 32, 51 or 64 character lines FOREVER! This window can be moved anywhere in the text file, up, down, left or right to display the text as it will be printed without wasting paper. You can create or edit Super "Color" Terminal files, ASCII files, BASIC programs or Editor/Assembler source listings. It's simple enough for beginners with 4K and for the professional writer with a 32K disk system and a lot to say, there's plenty of room to say it!

COMPARISON CHART	SUPER COLOR WRITER		THE COMPETITION			
System Size	4K	16K	32K	4K	16K	32K
TAPE Text space	N/A	8K	24K	N/A	2K	18K
ROMPAK Text space	2.5K	15K	31K	N/A	N/A	N/A
DISK Text space	N/A	6.5K	22.5K	N/A	0.5K	16.5K
Right Justify		YES			NO	
Video Window		YES			NO	
Edit any ASCII File		YES			NO	

The figures speak for themselves and with professional features like PROGRAMMABLE function string commands to perform up to 28 commands automatically, PROGRAMMABLE text file chaining, PROGRAMMABLE column insert & delete, and right hand JUSTIFICATION with punctuation precedence, the choice is clear but there's still more!

The Super "Color" Writer takes full advantage of the new breed of "smart printers" with Control codes 1-31, 20 Programmable control codes 0-255 for special needs and built in Epson MX-80, Centronics 737, 739 and R.S. Line Printer IV, VII, VIII drivers.

CHECK THESE FEATURES!!

HIGH SPEED & normal operations • 32K Compatible • Window • Key beep • HELP table • 128 character ASCII & graphics • Memory left • Lower case • Full cursor control • Quick paging • Scrolling • Word wrap around • Tabs • Repeat all functions • Repeat last command • Insert character & line • Delete character delete to end of line, line to cursor, line & block • Block move, copy & delete • Global Search, Exchange & Delete • Merge or Append files • Imbed Control Codes in text • Underline • Superscripts • Subscripts • Headers, Footers & 2 Auxiliary footnotes on odd, even or all pages definable position • Flush right • Non-breakable space • 4 centering modes: 5, 8, 3, 10 & 16.7 (CPI) • Full page & print formatting in text • Single sheet pause • Set Page length • Line length, Line spacing, Margins, page numbers • Title pages • Printer baud: 110, 300, 600, 1200, 2400 • Linefeeds after CR • Soft & hard formfeed • Works with 8 bit printer fix • and more!

SUPER "COLOR" WRITER DISK

The Disk version of the Super "Color" Writer works with the TRS-80C Disk System and has all the features listed above plus many more! Use with up to four Disk Drives. Includes an extended HELP table you can access at any time. Call a directory, print FREE space, Kill disk files and SAVE and LOAD text files you've created all from the Super "Color" Writer. Print, merge or append any Super "Color" Terminal file, ASCII file, BASIC program or Editor, Assembler source listing stored on the Disk or tape. The Super "Color" Writer Disk version has additional formatting and print features for more control over your printer and PROGRAMMABLE chaining of disk files for "hands off" operation. Print an entire BOOK without ever touching a thing!

Includes comprehensive operators manual.

TAPE \$49.95 ROM PAK \$74.95 DISK \$99.95

Manual only, \$7.00 Refundable with purchase.

Allow 2 extra weeks for personal checks. C.O.D. orders add \$2.00. When ordering specify computer type and add \$2.00 for S/H. Minn. residents add 5% sales tax. VISA/Master Chg.

DEALER INQUIRES ARE INVITED.

TRS-80 is a registered trademark of the Tandy Corp.

COMMUNICATIONS

THE SUPER "COLOR" TERMINAL

Time Share, Smart Terminal, High-speed Data X'fer & Videotex

The Super "Color" Terminal turns the Color Computer into a Super-smart terminal with all the features of VIDEOTEX(TM) plus much more. COMMUNICATE with Dow Jones & Compuserve and with computers like the TRS-80(TM) MODEL I, II, III, APPLE etc., via modem or RS-232 direct! Save the data to tape or print it! Reduces ON-LINE cost to a minimum!

FEATURES

10 buffer size settings from 2-30K • Buffer full indicator • Lprints buffer contents • Full 128 ASCII keyboard • Compatible with Super "Color" Writer files • UPLOAD & DOWNLOAD ASCII files, Machine Language & Basic programs • Set RS-232 parameters • Duplex: Half/Full • Baud Rate: 110, 300, 600, 1200, 2400, 4800 • Word Lengths: 5, 6, 7 or 8 • Parity: Odd, Even or None • Stop Bits: 1-9 • Local linefeeds to screen • Tape save & load for ASCII files, Machine code & Basic programs • Unique clone feature for copying any tape.

Super "Color" Terminal Disk

The Disk version offers all the features listed above plus Host ability in full duplex • Lower case masking • 10 Keystroke Multiplier (MACRO) buffers on disk to perform repetitive log-on tasks and send short messages (up to 255 bytes) • Programmable prompts for send next line • Selectable character trapping • Set printer line length • Pagination • Linefeed with CR option • Printer Baud: 110, 300, 600, 1200 & 2400 • Documentation.

ROM PAK \$49.95

DISK \$69.95

Documentation only, \$4.00 Refundable with purchase.

COLOR GAMES!!

FEATURING GREAT GRAPHICS & SOUND!

ADVENTURE 3-PAK Requires 16K Extended Basic **TAPE \$24.95**

This TRILOGY OF 3-D FANTASY GAMES takes you to the **WORLD UNDER THE CIMEON MOON**. Engage in ritual combat with Tooamoath Narthokc Monsters and skilled warriors. Advance in rank with play experience. Then adventure through **DAZMAR'S UNDERWORLD OF DOOM** to the forbidden ruins of Castle Argaan. Search for the Eye of Dazmar while avoiding the sorcerer's intricate traps. Survivors must then negotiate the perilous peaks of the Ugrek Mountains to the **FORSAKEN GULCH** where the wicked idol awaits restoration.

VEGAS 5-PAK Requires 16K Extended Basic **TAPE \$19.95**

The THRILLS OF A VEGAS CASINO at home. Five action packed Vegas games for up to four players: **CASINO CRAPS** • **21** • **ONE ARMED BANDIT** • **UP & DOWN THE RIVER** • **KENO**. Bank tracks players' winnings from game to game • realistic cards • regulation tables • boards • authentic sounds • lively graphics • official rules in each game.

COMBAT 3-PAK Requires 16K Extended Basic **TAPE \$24.95**

Three action packed two player games featuring lifelike graphics and sound of **LASER FIRE**, **CANNONS** and **PHOTON TORPEDOES**.

2-1-0 TANK COMBAT five terrains • the experienced arcade player can design combat scenario. **STELLAR BATTLE** pilot a Flex-Wing Fighter at incredible speeds in enemy space taking out Dorian Tye Fighters defending the Imperial Star Fortress. **GALACTIC BLOCKADE** maneuver your craft in a course that boxes your opponent but avoid cosmic debris and hostile space probes!



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ELECTRO-SKETCH
 By: E. C. Field
 1052 N.E. Glass Dr.
 Jensen Bch. FL 33457

Electro-Sketch is a graphics program to allow one to draw simple schematics on the screen and save them to tape or print them. The applications I would see are for electronics courses where the instructor would create tests using the blank schematics. The test question could be, "Will this circuit work? If not, correct it and input proper values, otherwise just show values needed for operation." The program could also generate schematics for projects. The instructor could have a tape file of favorite projects for the students to choose from.

The program is in Extended BASIC and is remarked to allow easy editing. I've tried to make it self-prompting. It allows one to double size some or all of the components by pressing "2". Pressing "1" returns to normal size.

Changing the character strings would enable the same program to function as a small-scale sketch pad for house plans (symbols could be replaced with doors, windows, bathtubs, etc.) or boat/motorhome layout. The concept may prove useful in other applications as well.

Considering one of your previous articles, I would suggest combining Motion Picture Programming and Electro-Sketch.

The MPP hi-res graphics screens could even make mechanical drawings that move! One could have a working drawing of the internal combustion engine for classroom demonstration and modify the engine parts during the demo. Different carbs, egnition etc. would change performance.

I've also enclosed a scripsit file after this that shows the keyboard memory locations to be used for single-key data entry. "Peeking" a location is much faster than inkey\$ and will allow one to hold down the key for multiples. It's a convenient way to error-trap a menu or graphics input.

```

5 '-----
10 '      Lectro-Sketch
11 ' BY; E.C. FIELD APRIL, 1982
12 '-----
14 '
20 PCLEAR4:PMODE4,1
25 CLS:PRINT@68,"MAKE SURE YOU'VE
   LOADED THE SCREEN-PRINT PROG
   RAM IF THIS COMPUTER HAS THE 1
   .0 BASIC.":PRINT:PRINT"      PRESS
   ENTER TO CONTINUE";
30 INPUTA$
32 PRINT:PRINT"      INSTRUCTIO
NS Y/N?"
  
```

```

34 IFPEEK(339)=247THEN2000ELSEIF
PEEK(344)=253THEN50
36 GOTO34
50 '      MENU
52 CLS:PRINT@106,"- MENU -"
54 PRINT@167,"D)RAW","C)LEAR"
56 PRINT@231,"L)OAD","S)AVE"
58 PRINT@299,"P)RINT"
62 ' IFA$="D"GOTO110ELSEIFA$="C"GO
   TOTO100ELSEIFA$="L"GOTO900ELSEIFA
   $="S"GOTO950ELSEIFA$="P"GOTO1000
64 IFPEEK(342)=254THEN110ELSEIFP
EEK(341)=254THEN100ELSEIFPEEK(34
2)=253THEN900ELSEIFPEEK(341)=251
THEN950ELSEIFPEEK(338)=251THEN10
00
66 GOTO64
70 GOTO50
100 '      CLS
101 CLS:PRINT@200,"ERASE Y/N?"
102 IFPEEK(344)=253THEN110ELSEIF
PEEK(339)=247THEN104
103 GOTO102
104 SCREEN1,0:PCLS
106 DRAW"BM+0,+OC5BNU1"
109 '
110 '      DRAW
111 '
112 SCREEN1,0
114 DRAW"BM+0,+OC4NL1"
116 IFPEEK(340)=239THENDRAW"S8BM
+0,+OBNU1"
118 IFPEEK(339)=239THENDRAW"S4BM
+0,+OBNU1"
120 IFPEEK(341)=247GOSUB150
122 IFPEEK(342)=247GOSUB152
124 IFPEEK(343)=247GOSUB154
126 IFPEEK(344)=247GOSUB156
128 IFPEEK(339)=251GOSUB158
130 IFPEEK(339)=254GOSUB160
132 IFPEEK(338)=191GOSUB162
134 IFPEEK(339)=191GOSUB164
136 IFPEEK(343)=253GOTO50
138 IFPEEK(341)=254GOSUB200
140 IFPEEK(344)=223GOSUB166
149 DRAW"BM+0,+OC5NL1":GOTO110
150 DRAW"BM+0,+OC5U1":RETURN
152 DRAW"BM+0,+OC5D1":RETURN
154 DRAW"BM+0,+OC5L1":RETURN
156 DRAW"BM+1,+ONC5L2":RETURN
158 DRAW"BM+0,+OC4U1":RETURN
160 DRAW"BM+0,+1C4NU1":RETURN
  
```

ELECTRO-SKETCH

```

162 DRAW"BM+0,+0C4L1":RETURN
164 DRAW"BM+0,+0C4R1":RETURN
166 DRAW"BM+0,+2C5L1H1U2E1R2F1D2
G1L1U2":FORT=1T0300:NEXTT:RETURN

199 *
200 *      COMPONENT MENU
201 *
210 CLS:PRINT@66,"PRESS COMPONEN
T DIRECTION"
212 IFPEEK(341)=247THENA=2:GOTO2
30
214 IFPEEK(342)=247THENA=0:GOTO2
30
216 IFPEEK(343)=247THENA=1:GOTO2
30
218 IFPEEK(344)=247THENA=3:GOTO2
30
220 GOTO210
230 CLS:PRINT:PRINT"  GR)UND,
ME)TER, SP)EAKER"
232 PRINT" MI)CROPHONE, CO)IL, C
R)YSTAL"
234 PRINT"  RE)SISTOR, PO)TENTI
OMETER"
236 PRINT"  CA)PACITOR, CV= VARI
ABLE CAP"
238 PRINT"  DI)ODE, LD=LED, SO)L
AR CELL"
240 PRINT" PH)OTORESISTOR, LA)MP
, AR)ROWS"
242 PRINT"PN)P TRANSISTOR, NP)N
TRANSISTOR";
246 PRINT"  PB=NORMALLY OPEN PUS
HBUTTON"
248 PRINT"  PC=NORMALLY CLOSED PU
SBUTTON"
249 PRINT"          BA)TTERY"
250 PRINT:INPUT"  ENTER COMPONEN
T LETTERS ";C#
252 PRINT:PRINT"          D)RAW OR
E)RASE?"
256 IFPEEK(342)=254GOTO308
258 IFPEEK(343)=254GOTO300
260 GOTO256
290 PRINT
299 *
300 *      COMPONENTS
301 *
302 DRAW"BM+0,+0C4NBU1":GOTO310
308 DRAW"BM+0,+0C5NBU1"
310 IFA=0THENDRAW"A0;BM+0,+0NBU1
"
312 IFA=1THENDRAW"A1;BM+0,+0NBU1
"
314 IFA=2THENDRAW"A2;BM+0,+0NBU1
"
316 IFA=3THENDRAW"A3;BM+0,+0NBU1
"
350 IFC#="GR"THENDRAW"BM+0,+0D3N
L5NR5BD3NL3NR3BD3NL1NR1BD4":DRAW
"A0;BM+0,+0BNU1":RETURN
352 IFC#="RE"THENDRAW"BM+0,+0D3G
2F4G4F4G4F2D3":DRAW"A0;BM+0,+0BN
U1":RETURN
354 IFC#="CR"THENDRAW"BM+0,+0D3L
5R10BD3D3L10U3R10D3BD3L10R5D3":D
RAW"A0;BM+0,+0BNU1":RETURN
356 IFC#="NP"THENDRAW"BM+0,+0D3G
6U3D9U3F5NU3NL3F1D3":DRAW"A0;BM+
0,+0BNU1":RETURN
358 IFC#="PN"THENDRAW"BM+0,+0D3G
5NU3NR3G1U3D9U3F6D3":DRAW"A0;BM+
0,+0BNU1":RETURN
360 IFC#="CO"THENDRAW"BM+0,+0D3F
3D4G5H5E5F5D5G5H5E5F5D5G5H5E5F5D
5G4D3":DRAW"A0;BM+0,+0BNU1":RETU
RN
362 IFC#="DI"THENDRAW"BM+0,+0D3N
L4R4G4NH4D1NL4NR4D3":DRAW"A0;BM+
0,+0BNU1":RETURN
364 IFC#="LD"THENDRAW"BM+0,+0D3N
L4R4G4NH4D1NL4NR4D5ND2BRBR3NU3H5
BU5F5NU3NL3BR2BD7BL13":DRAW"A0;B
M+0,+0BNU1":RETURN
366 IFC#="CA"THENDRAW"BM+0,+0BR3
R4L2NU2ND2BL5D4NL5NR5BD2L3NG2R6N
F2L3D6":DRAW"A0;BM+0,+0BNU1":RET
URN
368 IFC#="CV"THENDRAW"BM+0,+0D4N
L5R2E6NL3ND3G6R3L5BD2L3NG2R6NF2L
3D1NG4D6":DRAW"A0;BM+0,+0BNU1":R
ETURN
370 IFC#="PO"THENDRAW"BM+0,+0D3F
2G4F4NE3NR7NF3G4F4G2D3":DRAW"A0;
BM+0,+0BNU1":RETURN
372 IFC#="SP"THENDRAW"BM+0,+0D3R
2D4F3L18E3U4R2NR11U3":DRAW"A0;BM
+0,+0BNU1":RETURN
374 IFC#="MI"THENDRAW"BM+0,+0D3R
3F3D4G3L5U10R3BD10D3":DRAW"A0;BM
+0,+0BNU1":RETURN
376 IFC#="PB"THENDRAW"BM+0,+0D3G
2F2E2NH2BR3NU2D3NR3D3ND2BL3NG2H2
G2F2D3":DRAW"A0;BM+0,+0BNU1":RET
URN
380 IFC#="PC"THENDRAW"BM+0,+0D3N
F2G2F2E2BR3NU2D3NL3D3ND2BL3NG2H2
G2F2D3":DRAW"A0;BM+0,+0BNU1":RET
URN
382 IFC#="ME"THENDRAW"BM+0,+0R3U
3E4R8F4D3NR3D4G4NU4L8H4NU4F4U4R4
NH5R4BRBBU4":DRAW"A0;BM+0,+0BNU1
":RETURN

```

ELECTRO-SKETCH

```

384 IFC#="LA"THENDRAW"BM+0,+OD3L
2G4D4F4R4E4U4H4L4D6F3E3H3G3D6R2D
3":DRAW"A0;BM+0,+OBNU1":RETURN
386 IFC#="AR"THENDRAW"BM+0,+OD8N
H2NE2BR7NH2NE2U8BU2":DRAW"A0;BM+
0,+OBNU1":RETURN
388 IFC#="SO"THENDRAW"BM+0,+OD3R
4F4D8G4L8H4U8E4R4D5BR2R2NU2NR2ND
2BL4D5NR4NL4BD2NR3NL3DB":DRAW"A0
;BM+0,+OBNU1":RETURN
390 IFC#="BA"THENDRAW"BM+0,+OD3N
L4NR4BD2NR2NL2BD2NR4NL4BD2NR2NL2
D3":DRAW"A0;BM+0,+OBNU1":RETURN
690 RETURN
899 '
900 '          LOAD FROM TAPE
901 '
902 MOTOR ON
903 INPUT"ENTER TITLE";TI#
905 SCREEN1,0:PCLS
910 OPEN"I",-1,TI#
912 FORM=1536T07679
914 INPUT#-1,GR
915 IFEOF(-1)THEN920
916 POKEM,GR
918 NEXTM
920 CLOSE-1
925 MOTOR OFF
930 GOT050
949 '
950 '          SAVE TO TAPE
951 '
952 INPUT"ENTER TITLE";TI#;CLS:P
RINT"SET CASSETTE TO RECORD MODE
AND PRESS ENTER":FORT=1T0300:NE
XTT
954 IFPEEK(338)=191THEN955ELSEG0
T0954
955 CLS:PRINT@200,"PATIENCE PLEA
SE":PRINT@261,"SAVEING IMAGE TO
TAPE"
957 MOTOR ON
960 OPEN"O",-1,"DATA"
970 FORM=1536T07679
980 GR=PEEK(M)
985 PRINT#-1,GR
987 NEXTM
989 CLOSE-1
990 MOTOR OFF:GOT050
999 '
1000 '          PRINTER
1001 '
1100 CLS:PRINT"PRINTER ROUTINE"
1110 PRINT@130,"NEGATIVE IMAGE Y
/N"
1115 CLS:PRINT@200,"PRINTING IMA
GE"

```

```

1120 IFPEEK(344)=253THEN1130ELSE
IFPEEK(339)=247THEN1140
1125 GOT01120
1130 POKE 16303,0:GOT01150
1140 POKE16303,255
1150 DEFUSR0=15785:Y=USR(0)
1160 GOT050
1999 '
2000 '          DIRECTIONS
2001 '
2100 CLS:PRINT"          WHEN YOU RE
ACH THE 'MENU' ENTER C)LEAR. PR
ESSING 'Y' WILL THEN PRESENT YOU
WITH A CLEAR SCREEN WITH A SM
ALL WINKING DOT IN THE CENTER."
2110 PRINT"THE FOUR ARROWS WILL
DRAW A LINE IN THEIR RESPECTIVE
DIRECTIONS. THE 'Q' AND 'A' WILL
ERASE UP AND DOWN.";
2120 PRINT" THE 'ENTER' AND
'CLEAR' KEYS ERASE TO THE LEFT
AND RIGHT."
2140 PRINT"PRESS 'C' FOR A COMPO
NENT AND 'M' TO RETURN TO THE
MENU."
2142 PRINT@420,"PRESS 'ENTER' TO
CONTINUE":IFPEEK(338)=191THEN21
44ELSE2142
2144 CLS:PRINT:PRINT"PRESSING A
PERIOD WILL CREATE A DOT (INTE
RSECTION)"
2146 PRINT"          PRESSING '2' GIVE
S DOUBLE SIZE GRAPHICS AND
'1' RETURNS TO NORMAL."
2150 FORT=1T0300:NEXTT:PRINT@420
,"PRESS 'ENTER' TO CONTINUE":IFP
EEK(338)=191THEN50ELSE2150

```

```

*****
value returned #
338 339 340 341 342 343 344 345
@ a b c d e f g 254
h i j k l m n o 253
p q r s t u v w 251
x y z ua da la ra sp 247
0 1 2 3 4 5 6 7 239
8 9 ; ; , - . / 223
ent clr 191

```

This is a keyboard map showing the memory locations that can be used for data entry without the "enter" key.

UA, DA, LA, and RA stand for up arrow, down arrow, left arrow and right arrow respectively.

The "break" key and "shift @" cannot be accessed from a PEEK routine because of the Color Computer structure.

Have fun!

80-U.S.

THE TRS-80 USERS JOURNAL

80-U.S. Journal is a monthly publication for the TRS-80 computer owner. The Journal covers Business, Scientific, Educational, and Recreational areas.

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Name _____

Address _____

City _____ State _____ Zip _____

I prefer to enclose payment now.

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EDUCATING YOUR PRESCHOOLER WITH THE
COLOR COMPUTER

by Paul Lee
136 Olive Ct
Hercules, CA 94547

Now that my 2 1/2 year old daughter is bored with the Alphabet, I have moved her into the world of numbers. This time, I have designed my program to display all of the numbers from 1 to 99. As in the Alphabet program (CCN March 82), the numbers flash onto the screen one at a time increasing in size each time it is flashed.

This time, I designed the number 1 to 9 so that they all ended at the same place on the number, namely the lower right hand corner of the number. This was done so that when I combined two numbers together, I would only need to move over a certain amount of space each time. This technique is shown in the introduction of the program where "B\$" is the variable I used to move each letter over a set spacing.

Lines 200 to 270 draw the single numbers from 1 to 9. Lines 300 to 380 then draw two numbers together to make the number from 10 to 99. I did not include the feature of recording the names of the numbers on this program because I did not think that it was necessary. Besides, I was also feeling too lazy to record 99 numbers.

If you wish to incorporate the recording of the names of the numbers into the program, you can add the following lines:

```
265 GOSUB 500
375 GOSUB 500
410 END
500 AUDIOON; MOTORON
510 FOR T=1 TO 1500:NEXT T
520 AUDIOOFF; MOTOROFF
530 RETURN
```

I hope that your preschooler enjoys this program as much as mine does. She can recognize the numbers up to 11, but I'm sure that she will continue to learn more of the numbers as she watches the program.

```
10 'COUNTING PROGRAM TO 100 BY PAUL LEE
   OLIVE CT HERCULES, CA 94547
20 CLS: DIMA$(10): CLEAR500
30 PRINT@ 102, "COUNTING PROGRAM"
40 PRINT@ 135, "FROM 1 TO 99"
50 PRINT@ 204, "BY"
60 PRINT@ 234, "PAUL LEE"
70 FOR K=1 TO 2000: NEXT K
80 PMODE 3,1: PCLS: SCREEN 1,1
90 FOR X=1 TO 10
100 READ A$(X)
110 NEXT X
```

```
120 B$="BR6BU7"
130 DRAW "BM10,20;S20;" +A$(2) +B$ +A$(3) +B$
+A$(4) +B$ +A$(5) +B$ +A$(6)
140 PLAY "03; L10; T50; A; B; C; D; E; F; G"
150 B$="BR4BU7"
160 DRAW "BM1,120;S20;" +A$(7) +B$ +A$(8) +B$
+A$(9) +B$ +A$(10) +B$ +A$(1)
170 PLAY "03; L10; T50; A; B; C; D; E; F; G"
180 FOR K=1 TO 800: NEXT K
200 FOR X=2 TO 10
210 FOR S=5 TO 50 STEP 5
220 PCLS
230 DRAW "BM90,50;S" +STR$(S)+ ";" +A$(X)
240 PLAY "03; L10; T50; A; B; C; D; E; F; G"
250 NEXT S
260 FOR K=1 TO 200: NEXT K
270 NEXT X
300 FOR Y=2 TO 10
310 FOR X=1 TO 10
320 FOR S=5 TO 50 STEP 5
330 PCLS
340 DRAW "BM90,50,S "+STR$(S)+"; BL2 "+A$(
(Y)+"BR3BU7" +A$(X)
350 PLAY "03; L10; T50; A; B; C; D; E; F; G"
360 NEXT S
370 FOR K=1 TO 200: NEXT K
380 NEXT X: NEXT Y
390 DATA BD1 E1R 3F1 D5G 1L3 H1U5, GD 7NL
1R1, BD2 U1E 1R2 F1D 1G4 D1R4, BD1 E1R 3F1
D1G 1NL 3F1 D2G 1L3 H1B D1B R5, BR4 G5R 5N
U5N R1D2
400 DATA NR5 3E 1R3 F1D 3G1 L3H 1BD 1BR5,
BR5 NF1 L3G 1D5 F1R 3E1 U2H 1L3 G1B D3B R5,
R7G 7BR7, BD2 U1E 1R3 F1D 1G1 L3N H1G 1D2
F1R 3E1 U2H 1BR 1BD4, BD3 U2E 1R3 F1D 2G1
L3N H1B G1B D1F 1R3 E1U 3BD4
```

MICROLINE CONTINUED FROM PAGE 62

Bottom-load feature is nice, except on mine, the Paper-out signal stays on and the printer doesn't run. I think that it is probably a defect in the unit I have and not a problem with all 82-A units. Also, it can be aggravating to press the SElect switch off to jog the paper up a couple of lines and then miss the SElect switch and press the TOF SET switch by mistake. They really shouldn't be adjacent.

It is my opinion that the Microline 82-A gives you a lot of printer for your dollar.

CRYPTOGRAM
by Arnold Weiss
1901 J F Kennedy Blvd
Philadelphia, PA 19103

A BIT OF BACKGROUND

Before I purchased my computer, October 1981, I had had no experience with computer. I was interested in them for three main reasons; Word Processing - I'm a terrible typist and word processing seemed to be the ideal solution; Inventorying a stamp collection - I've had to put this off until I get a disc and learn more about file management; and lastly the mental challenge that programing presented.

Shortly after I got the computer I bought "Basic Computer Games" and "More Basic Computer Games", and set about "translating" them for the Color Computer. At that time I wasn't "thinking Basic" and had a difficult time. I have since revised these programs to be more efficient. One of the programs I've used the most is the "Word Search Puzzle". I correspond with a number of friends and relatives both here and in England who like word puzzles. I use the "Word Search Puzzle" program to make personalized puzzles for them.

I just subscribed to "Color Computer News", and after I got all the back issues I read them eagerly. On pages 15 & 16 of the Nov/Dec 1981 issue is Mr. David Bodnar's column "Making Education More Colorful" in which he listed a program to produce a cryptogram. See Listing A. In the column Mr. Bodnar writes "This program is by no means complete..." It has lots of possibilities...let me know what you do with it." The following is what I did with it.

PROCESS LEADING TO LISTING #2

As I stated earlier I used word puzzles to send personalized greetings to various people. The programs produces a "cryptogram" on the TV screen which then can be solved. I wanted printed copies of the cryptogram to send to friends, and I quickly wrote Listing #1. This presented program had many faults. I had to pre-type the original phrase, so I could be sure that words would not bread at the end of a line. See example #1. It used only upper case letters, and it had no "editing" capabilities. Hint #1 - Before starting to write a program, carefully define the problem(s) you want to solve.

Before I purchased a word processing program I modified and used the "Word Processing Challenge" on pages 284 and 285 of "Getting Started With Color Basic". Combining this with Listing #1 I produced the final program Listing #2.

EXPLANATION OF LISTING #2

Line 1 and lines 640 to 700 these initialize the program. Hint #2 - if you want to "PCLEAR0", thus gaining 1 1/2K more free memory delete "PCLEAR1" from line 650. Before, I repeat before, loading the program enter "POKE25,6;NEW". This will destroy anything in memory, so it must be done before loading anything. This Poke has appeared in many sources, so I've given no reference.

Lines 20 to 50 Instructions - GOSUB630" in line 50 Hint #3 - If you are using the same command in a number of lines in the program it is much more efficient to set the command up as a "GOSUB". To see excellent use of this technique read the "CLOAD "CHECKBOOK"" article by Mr. Richard White on pages 25 to 30 incl. of the Nov/Dec 1981 issue of "Color Computer News". Studying this program was a real learning experience for me. It took me quite a few hours of going from one "GOSUB" to another, but once I understood it I found that this is a very useful technique.

Line 60 Sets up Arrays - "C" for code, "F1" use to make certain that no code is duplicated, "A" coded sentences, and "B" original sentences.

Line 70 The Color Computer's "Random Number Generator" is not very random. Try the following: 10 for X=1 to 10: A=RND(10): PRINTX;; NEXT X. Run this program - write down the sequence - turn off the computer-re-enter the program and run it again. Surprise -that same sequence of number is repeated. It is necessary to "reseed" the random number generator. "A=RND(TIMER)" accomplishes this and gives 65536 starting sequences. See "Basic Speaking" column on page 37 of the Feb. 1982 issue of "TRS-80 Microcomputer News".

Line 80 This "POKE" will set the clock to a higher speed, thus increasing the "number crunching" speed of the computer. This "POKE" cannot be used during "INPUT" or "OUTPUT". Enter "POKE 65494,0" before an "INPUT" or "OUTPUT". See page 15 of the July/Aug issue of "Color Computer News".

Line 90 Sets up "For next loop" to get code.

Line 100 Sets code "IF F1(C(X))=1 OR C(X)=X" prevents duplication of code. "C(X)=RND(26)" takes each "C" from Array "C" and makes it equal to RND(26). "IF F1(C(X))=1" F1(C(3))=1 sends program back to get random "C" - "IF C(X)=X" C(3)=3 sends the program back to get random "C" - "ELSE F1(C(X))=1" F1(C(3))=1 prevents the number from being duplicated.

CRYPTOGRAM

Line 110 Continues loop.
Line 120 Ends "High speed POKE".
Lines 130 to 150 Gives instructions for typing paragraph.
Line 160 "P=1" sets the sentence counter - "Q=5" initially sets the character counter to five.
Line 170 Clears the screen - makes the top line blank - Prints the first character of the paragraph in the fifth position, thus indenting the start of the paragraph.
Line 180 "INKEY\$" makes program wait until you type something.
Line 190 Prints "INKEY\$" - adds one to the character counter - "IF Q>64 THEN IF Z#=CHR\$(32) THEN Z#=CHR\$(13)" this simulates the "EXTENDED BASIC POS(x)" command if the character counter is greater than 64 then if the character typed is the space bar it changes the command to a line feed. The TV screen is 32 characters wide and my printer is 80 column wide, so I can't tell when a word is being broken at the end of a line. This prevents words from being broken. - "Q=0" resets the character counter to 0.
Line 200 "IF INKEY\$=CHR\$(95)" UP ARROW SHIFTED ends the paragraph. I choose "UP ARROW SHIFTED" as it is a character I rarely use in writing.
Line 210 Adds "INKEY\$" to sentence.
Line 220 Ends sentence.
Line 230 "IF INKEY\$=CHR\$(93)" RIGHT ARROW SHIFTED goes to the "edit" mode. This deletes this sentence from the printed copy. See lines 710 to 760.
Line 240 Goes back to "INKEY\$" for next character.
Line 250 Clears the screen and asks for the number of copies to be printed.
Line 260 High speed Poke.
Line 270 Sets up a loop to go through the paragraph one sentence at a time.
Line 280 Clears the screen and finds the length of the sentence being examined.
Line 290 Creates a line to be coded as long as the sentence being examined.
Line 300 Sets up loop to examine the sentence one character at a time.
Line 310 Finds the numeric value of each character (one character at a time) and subtracts 64 from this value.
Line 320 If value from 310 is less than 1 or greater than 27 A to Z are 65 to 90, so the values minus 64 are 1 to 26.
Line 330 Changes the space being examined into the code. Example 23+64 would be upper case "W".
Line 340 If value is greater than 32 and less than 59 changes character into code. 33+64 = lower

case "a" 58+64 = 122 lower case "z". Else passes the program onto line 370.
Line 350 Subtracts 32 from AS.
Line 360 Changes the value being examined into code, thus providing lower case letters, then onto line 380.
Line 370 Takes all the non-alphabetic characters (numbers, symbols, punctuation marks, and space) and leaves them unchanged.
Line 380 Continues loop to examine the next character in the sentence.
Line 390 Continues loop to examine next sentence in paragraph.
Line 400 Ends high speed Poke.
Line 410 Sets loop to print out copies.
Line 420 Sets paragraph to print at fifth position.
Line 430 Sets loop to print out uncoded paragraph one sentence at a time.
Line 440 Prints original sentence.
Line 450 Sends loop back to print next sentence.
Line 460 3 Line Feed Characters - spaces paper up three lines.
Line 470 Same as Line 420.
Line 480 Same as Line 430.
Line 490 Prints coded sentence.
Line 500 Same as Line 450.
Line 510 Same as Line 460.
Line 520 Sends loop back to print next copy.
Lines 530 to 570 Asks if you want another paragraph. If YES goes SUB 710 to no ENDS.

LISTING A

```
100 CLEAR 1000: DIM C(26), F1(26),  
FL(26)  
200 CLS: PRINT "TYPE A PHRASE": LI  
NE INPUT B$: CLS: L=LEN(B$)  
300 A$=STRING$(L, "")  
400 FOR X=1 TO 26: PRINT @32*6+3,  
"GETTING RANDOM LETTERS": PRINT @  
32*7+10, USING "##/26": X  
500 C(X)=RND(26): IF F1(C(X))=1 O  
R C(X)=X THEN 500: ELSE F1(C(X))=1  
600 NEXT X: CLS  
700 FOR X=1 TO L  
800 AS=ASC(MID$(B$, X, 1))-64  
900 IF AS<1 OR AS>26 THEN MID$(A  
$, X, 1)=MID$(B$, X, 1): GOTO 1100  
1000 MID$(A$, X, 1)=CHR$(C(AS)+64)  
  
1100 NEXT X  
1250 C$=A$  
1300 CLS: PRINT @32*2, A$: FOR X=1  
TO 6: FL(X)=0: NEXT X
```

CRYPTOGRAM

```

1400 PRINT @32*13,"CHANGE FROM";
:INPUT F$:IF F$="XX" THEN A#=C#:
GOTO 1250 ELSE:INPUT "TO":T4:IF
T$=F$ THEN 1400
1500 FOR X=1 TO 26:IF FL(X)=1 AN
D ASC(F$)-64=X THEN SOUND 150,10
:GOTO 1400 ELSE NEXT X
1600 FL(ASC(F$)-64)=1
1700 FOR X=1 TO LEN(A$)
1800 IF MID$(A$,X,1)=F$ THEN MID
$(A$,X,1)=CHR$(ASC(T$)+32)
1900 NEXT X
2000 PRINT @32*8,A$:SOUND 100,1:
GOTO 1400

```

LISTING #1

```

10 TW=RND(TIMER)
100 CLEAR 1000:DIM C(26),F1(26),
FL(26)
110 INPUT "HOW MANY COPIES DO YO
U WANT":NB
200 CLS:PRINT "TYPE A PHRASE":LI
NE INPUT B$:CLS:L=LEN(B$)
210 FOR DF=1 TO NB
220 PRINT #,-2,B$:CHR$(13);CHR$(1
3);CHR$(13);CHR$(13);CHR$(13)
230 NEXT DF
300 A$=STRING$(L," ")
400 FOR X=1 TO 26:PRINT @32*6+3,
"GETTING RANDOM LETTERS":PRINT @
32*7+10,USING "##/26":X
500 C(X)=RND(26):IF F1(C(X))=1 O
R C(X)=X THEN 500:ELSE F1(C(X))=
1
600 NEXT X:CLS
700 FOR X=1 TO L
800 AS=ASC(MID$(B$,X,1))-64
900 IF AS<1 OR AS>26 THEN MID$(A
$,X,1)=MID$(B$,X,1):GOTO 1100
1000 MID$(A$,X,1)=CHR$(C(AS)+64)
1100 NEXT X
1105 FOR FB=1 TO NB
1250 C$=A$
1260 PRINT#,-2,C$:CHR$(13);CHR$(1
3);CHR$(13);CHR$(13);CHR$(13)
1265 NEXT FB

```

LISTING #2

```

10 GOTO 640
20 CLS:PRINT:PRINT"          CR
YPTOGRAM"
30 PRINT:PRINT" THIS PROGRAM WI
LL TAKE A PARA- GRAPH & THEN EN
CODE IT IN A SIMPLE CODE. A

```

SIMPLE CODE IS ONE IN WHICH EACH LETTER OF THE ALPHABET IS REPRESENTED BY ANOTHER LETTER (E X: A=Q,B=Z,C=D,ETC.).":GOSUB 620

40 CLS:PRINT:PRINT:PRINT"AFTER EACH PARAGRAPH IS FINISHED THE ORIGINAL & CODED PARAGRAPHS WILL BE PRINTED. YOU MAY SELECT THE NUMBER OF COPIES TO BE PRINTED.":

50 PRINT"AFTER EACH PARAGRAPH IS PRINTED YOU MAY START A NEW PARAGRAPH WITH THE SAME CODE. IF YOU WANT A NEW CODE RERUN THE PROGRAM.":GOSUB620

60 DIM C(26),F1(26),A\$(50),B\$(50)

70 A=RND(TIMER)

80 POKE 65495,0

90 FOR X=1 TO 26

100 C(X)=RND(26):IF F1(C(X))=1 OR C(X)=X THEN 100:ELSE F1(C(X))=1

110 NEXT X

120 POKE 65494,0

130 CLS:PRINT:PRINT" TYPE A PARAGRAPH":PRINT:PRINT" CHECK THE SENTENCE FOR MISTAKES BEFORE ENTERING A PERIOD, QUESTION MARK, OR EXCLAMATION POINT. IF YOU HAVE MADE AN ERROR PRESS THE RIGHT ARROW SHIFTED. THIS WILL DELETE THE SENTENCE FROM":

140 PRINT" THE PRINTED,BUT NOT FROM THE SCREEN,COPY. PRESS THE UP ARROW SHIFTED WHEN FINISHED.":GOSUB620

150 CLS:PRINT:PRINT:PRINT" PUT THE COMPUTER IN THE 'LOWER CASE' MODE & TURN ON THE PRINTER":GOSUB620

160 P=1:Q=5

170 CLS:PRINT:PRINT" ":

180 GOSUB630

190 PRINTZ\$:Q=Q+1:IF Q>64 THEN IF Z\$=CHR\$(32) THEN Z\$=CHR\$(13):Q=0

200 IF Z\$=CHR\$(95) THEN 250

210 B\$(P)=B\$(P)+Z\$

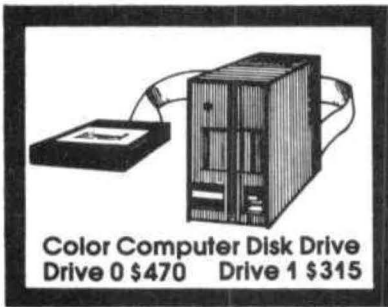
220 IF Z\$="." OR Z\$="?" OR Z\$="!" THEN P=P+1

230 IF Z\$=CHR\$(93) THEN GOSUB590

240 GOTO 180

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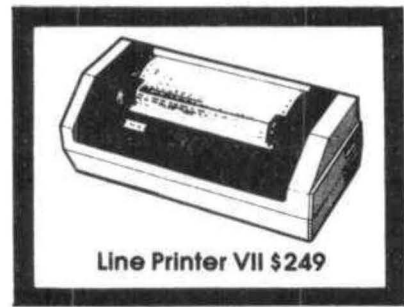
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CRYPTOGRAM

```

250 CLS:PRINT:PRINT:INPUT"NUMBER
  OF COPIES TO BE PRINTED";LL
260 POKE 65495,0
270 FOR R=1 TO P-1
280 CLS:L=LEN(B$(R))
290 A$(R)=STRING$(L," ")
300 FOR X=1 TO L
310 AS=ASC(MID$(B$(R),X,1))-64
320 IF AS>0 AND AS<27 THEN MID$(
A$(R),X,1)=MID$(B$(R),X,1) ELSE
340
330 MID$(A$(R),X,1)=CHR$(C(AS)+6
4):GOTO 380
340 IF AS>32 AND AS<59 THEN MID$(
(A$(R),X,1)=MID$(B$(R),X,1) ELSE
370
350 AS=AS-32
360 MID$(A$(R),X,1)=CHR$(C(AS)+9
6):GOTO 380
370 MID$(A$(R),X,1)=CHR$(AS+64)
380 NEXT X
390 NEXT R
400 POKE 65494,0
410 FOR X=1 TO LL
420 PRINT#-2," ";
430 FOR Y=1 TO P-1
440 PRINT#-2,B$(Y);
450 NEXT Y
460 PRINT#-2,CHR$(13);CHR$(13);C
HR$(13)
470 PRINT#-2," ";
480 FOR Y=1 TO P-1
490 PRINT#-2,A$(Y);
500 NEXT Y
510 PRINT#-2,CHR$(13);CHR$(13);C
HR$(13)
520 NEXT X
530 CLS
540 PRINT:INPUT " DO YOU WANT A
NOTHER PARAGRAPH (Y OR N)";Z#
550 IF Z#="N" OR Z#="n" THEN 580

560 IF Z#="Y" OR Z#="y" THEN 710

570 PRINT" INVALID ENTRY";
GOTO 540
580 END
590 W=LEN(B$(P)):Q=Q-W
600 B$(P)=" "
610 RETURN
620 PRINT:PRINT" PRESS ANY KE
Y TO CONTINUE"
630 Z#=INKEY$:IF Z#="" THEN 630
ELSE RETURN
640 PCLEAR1:CLEAR(4000)
650 ^CRYPTOGRAM

```

```

660 ^A.ARNOLD WEISS
670 ^APT 1626 KENNEDY HOUSE
680 ^1901 J. F. KENNEDY BLVD.
690 ^PHILA., PA. 19103
700 GOTO 20
710 FOR X=1 TO P
720 A$(X)=" "
730 B$(X)=" "
740 NEXT X
750 P=0
760 GOTO 150

```

EXAMPLE #1

FORTY-FOUR FAT FUNKY FLAT FOOTED
 FLOOZIES FROM FLORIDA FLAMOBAN
 TLY FLIRTED WITH FIFTY-FIVE FATI
 DIOUSLY FESTOONED FRENCHMEN FOUN
 D FISHING FOR FLOUNDER WITH THE
 FIRST FRIGATE FLOTILLA OFF THE F
 IRTH OF FOURTH.

HNASG-HNBA HIS HBEZG HYIS HNNSOL
 HYNNWPOK HANQ HYNAPLI HYI@NDGIE
 SYG HYPASOL MPSV HPHSG-HPJO HISP
 LPNBKYG HOKSNNEOL HAOERVQOE HNBE
 L HPKVPEC HNA HYNBELOA MPSV SVO
 HPAKS HAPCISO HYNSPYYI NHH SVO H
 PASV NH HNBASV.

EXAMPLE #2

THIS IS JUST A TEST TO SEE IF TH
 E PROGRAM IS WORKING PROPERLY. S
 O FAR SO GOOD. I WANT SIX SENTEN
 CES IN THE FIRST PARAGRAPH, AND
 FOUR IN THE SECOND. I WANT TO DO
 THIS TO CHECK AND SEE IF THE PR
 OGRAM CORRECTLY CLEARS THE MEMOR
 Y. IT HAS WORKED BEFORE,

KINT NT CSTK P KMTK KZ TMM NE KI
 M GLZRLPX NT YZLWNR GLZGMLUJ. T
 Z EPL TZ RZZV. N YPDK TNQ TMDKMD
 AMT ND KIM ENLTK GPLPRLPGI, PDV
 EZSL ND KIM TMAZDV. N YPDK KZ VZ
 KINT KZ AIMAW PDV TMM NE KIM GL
 ZRLPX AZLLMAKUJ AUMPLT KIM XMXZL
 J. NK IPT YZLWMV HMEZLM,

ABCDEFGHIJKLMNOPQRSTUVWXYZ!"#\$%&
 ?()*+<?><abcdefghijklmnopqrstu
 vwx yz1234567890:;/,.

MRONHAJKQVIWBPDESCZXLYGFTU!"#\$%&
 ?()*+<?><abcdefghijklmnopqrstu
 vwx yz1234567890:;/,.

WORD PROCESSOR

by: Jeff Harper
430 Swing Avenue
Findlay, OH 45840

After loading and running, you will be instructed on the use of 4 keys: tab, centering, error correction, and COMMAND mode.

Following this, the computer requests a tab value (default is 0), and after entering a value, a blue screen is displayed. Text entry may now begin. I eliminated a visual work-wrap to save memory, but it is used internally. The only times you MUST press ENTER are (1) following text that is to be centered, (2) following an insertion in the EDIT mode, and (3) to begin a new paragraph. Pressing ENTER can also be used to add blank lines (displayed as "@@@" in the EDIT mode) into the text.

Following text entry, it is useful (though not required) to go to the EDIT mode. When entering the EDIT mode, the computer will display the editing features the program supports. <D>elete, <I>nsert, <X>tend, and <H>ack all work upon the portion of text being edited, the same as they do in regular operation of Extended BASIC. <S>earch and <K>ill only search or kill to the NEXT occurrence of the specified character, but may be used several times in the same pass. Numeric entries before <S> or <K> are not permitted. Typing <LEFT ARROW> "correction" in the insert phase, will cancel any insertions.

The <UP ARROW> will scroll text from the beginning toward the end, while the <DOWN ARROW> will scroll in the opposite direction. The <LEFT ARROW> moves the current position one space to the left for correction purposes, and <SPACE BAR> advances the position one space to the right.

When editing, the portion of text being edited will be displayed completely, at the top of the screen, while the current state of the text (as it's being worked on) will be displayed in the middle of the screen.

In the COMMAND mode, <R>esume will let you resume text entry exactly where you left off. <N>ew will cancel ALL previous text and begin new text entry. <J>ustify will begin setting right margin justification parameters. The computer will ask for line length (default is 60, max. is 80, min. is 32) and then, if the length is less than 80, it will request a left margin value (default is 10, max. is 80-length). This allows text to be formatted and printed anywhere on the paper. All text MUST be justified before it can be printed. As justification is taking place, the computer will display the text. Following justification, the computer returns to the COMMAND mode. Typing

<P>rint will send justified text to a printer following entry of line spacing choice. Text may be rejustified, reedited, and reprinted without having to reenter text.

Additional Notes

The <UP ARROW> key is not available for use as a text character. Line 53 sets printer page parameters, and may not be correct for all printers. Speed POKES in lines 9, 40, and 47 may have to be eliminated on CC's with Disc Drives.

Persons with more than 16K will want to change the DIMs in line 9 to obtain more space for text storage. Minor program modification would allow the storage and retrieval of text from disc or tape.

SHIFT & <UP ARROW> return you from the text entry mode, to the COMMAND mode manually. The computer will automatically return you to the COMMAND mode from the TEXT entry mode, if you use up the dimensioned memory. If this occurs, you can justify and print the text, then press <N>ew and continue with new text. Using this method allows 16K users to type larger texts, but copies can not be made. With 16K, the program will allow approximately 3 pages of double-spaced text.

```
0 * WORD PROCESSOR FOR THE
1 * 16K OR 32K EXTENDED TRS-80
2 * COLOR COMPUTER
3 *
4 * BY
5 *
6 * JEFF HARPER
7 *
8 *
9 CLEAR8500:POKE65495,0:DIMP$(11
2),J$(65):K=1:Q=0:GOTO61
10 IFLEN(J$(K))=0THENRETURNELSEP
RINTK$;:K$=LEFT$(J$(K),LEN(J$(K)
)-1):J$(K)=K$:RETURN
11 CLSO:Q=0:FORI=1TOK
12 IFJ$(I)=""THEN23ELSEIFJ$(I)="
@@@"THENQ=Q+1:P$(Q)="@@@":GOTO23
13 IFLEFT$(J$(I),1)<>"^"THEN15
14 Q=Q+1:P$(Q)=STRING$(INT(L/2-LE
N(J$(I))/2),CHR$(32))+RIGHT$(J$
(I),LEN(J$(I))-1):GOTO23
15 FORH=1TOLEN(J$(I))
16 K$=MID$(J$(I),H,1):W$=W$+K$
17 PRINTK$;
```

WORD PROCESSOR

```

18 IFLEN(W$)=L+2THEN26
19 IFI=KANDH=LEN(J$(I))THENIFLEN
(W$)>L THEN26
20 NEXTH
21 IFJ$(I+1)="@@@"ANDLEN(W$)<=L
THENQ=Q+1:P$(Q)=W$:W$="":GOTO23
22 IFJ$(I+1)="@@@"THEN26
23 NEXT
24 Q=Q+1:P$(Q)=W$
25 GOTO40
26 K$=MID$(W$,L,1):IFK$="."OR"K$="
"!":OR"K$="?"OR"K$=":"THENQ=Q+1:P$(
Q)=LEFT$(W$,L):W$="":GOTO20
27 IFK$=","OR"K$=";"THENQ=Q+1:P$(
Q)=LEFT$(W$,L):W$=RIGHT$(W$,1):G
OTO20
28 K$=MID$(W$,L-1,1):IFK$="."OR"K$="
"!":OR"K$="?"OR"K$=":"THENK$=LEFT
$(W$,L-1):W$=RIGHT$(W$,1):GOTO36
29 IFK$=","OR"K$=";"THENK$=LEFT$(
W$,L-1):W$=RIGHT$(W$,2):GOTO36
30 K$=MID$(W$,L+1,1):IFK$="."THE
NQ=Q+1:P$(Q)=LEFT$(W$,L):W$=RIGH
T$(W$,1):GOTO20
31 IFRIGHT$(W$,2)=" "THENW$=LEF
T$(W$,LEN(W$)-2)
32 FORP=L TO2STEP-1
33 IFMID$(W$,P,1)=" "ANDMID$(W$,
P-1,1)=" "THENK$=LEFT$(W$,P-2):W
$=RIGHT$(W$,LEN(W$)-P):GOTO36
34 IFMID$(W$,P,1)=" "THENK$=LEFT
$(W$,P-1):W$=RIGHT$(W$,LEN(W$)-P
):GOTO36
35 NEXT
36 FORX=INT(L/5)TOL-INT(L/5):IFM
ID$(K$,X,1)<>" "THENNEXT:GOTO39
37 K$=LEFT$(K$,X-1)+" "+RIGHT$(
K$,LEN(K$)-X):IFLEN(K$)=L THENQ=
Q+1:P$(Q)=K$:GOTO20
38 X=X+2:NEXT
39 IFLEN(K$)<L THEN36ELSE20
40 CLS4:POKE65495,0:PRINT@105,"<
N>EW TEXT":PRINT@169,"<E>DI
T TEXT":PRINT@233,"<P>RINT
TEXT":PRINT@297,"<R>ESUME TEX
T":PRINT@361,"<J>USTIFY TEXT":
41 K$=INKEY$
42 IFK$="E"OR"K$="e"THEN84
43 IFK$="J"OR"K$="j"THENCLS3:FORI
=1TOQ:P$(I)="":NEXT:W$="":K$(1)=
"":K$(2)="":K$="":GOTO66
44 IFK$="N"OR"K$="n"THEN9
45 IFK$="R"OR"K$="r"THENCLS3:X=0:
GOTO76
46 IFK$<>"P"ANDK$<>"p"THEN41
47 GOSUB73:POKE65494,0:FORI=1TOQ
:IFQ=0THEN40
48 CLS0:PRINT@224,P$(I):
49 IFP$(I)="@@@"ANDP$(I+1)="@@@"
THEN52ELSEIFP$(I)="@@@"THEN53
50 PRINT#-2,CHR$(16);CHR$(M(1));
CHR$(M(2));P$(I)
51 IFS<2THEN53
52 PRINT#-2
53 IFI*S/61=INT(I*S/61)THENFORH=
1TO10:PRINT#-2:NEXT
54 NEXT:GOTO40
55 J$(K)="^"
56 K$=INKEY$:IFK$=""THEN56
57 IFK$=CHR$(13)THENPRINTK$;K=K
+1:GOTO76
58 IFK$=CHR$(95)THENJ$(K)="":GOT
O40
59 IFK$=CHR$(8)THENGOSUB10:GOTO5
6
60 PRINTK$;J$(K)=J$(K)+K$:GOTO5
6
61 CLS3:PRINT@67,"<RIGHT ARROW>-
-----TAB";
62 PRINT@131,"<^>-----C
ENTERING";
63 PRINT@195,"<_>-----CO
RRECTION";
64 PRINT@259,"<SHIFT & ^>---COMM
AND MODE";
65 PRINT@388,"TYPE ANY KEY TO CO
NTINUE";K$=INKEY$:IFK$=""THEN65
ELSE72
66 CLS3:PRINT@195,"LINE LENGTH (
32-80)":INPUTL:IFL=80THEN11ELSE
IFL<32ORL>80THENL=60
67 CLS3:PRINT@195,"ENTER LEFT MA
RGIN":INPUTK$:IFK$=""THENK$="10
":GOTO70
68 M=VAL(K$):IF80-M<L THEN67
69 IFLEN(K$)<2THENK$(1)="0":K$(2
)=K$:GOTO71
70 K$(1)=LEFT$(K$,1):K$(2)=RIGHT
$(K$,1)
71 M(1)=ASC(K$(1)):M(2)=ASC(K$(2
)):GOTO11
72 CLS3:PRINT@202,"ENTER TAB":I
NPUTT:IFT>70THENT=70ELSEIFT<OTHE
NT=0ELSET=INT(T):CLS3:GOTO76
73 CLS3:PRINT@105,"LINE SPACING"
:PRINT@167,"<1> SINGLE SPACE":
PRINT@199,"<2> DOUBLE SPACE":PR
INT@298,"SELECTION";
74 K$=INKEY$:IFK$=""ORVAL(K$)<10
RVAL(K$)>2THEN74ELSES=VAL(K$):CL
S3:RETURN

```

WORD PROCESSOR

```

75 PRINTK#;
76 K#=INKEY#; IFK#="" THEN76
77 IFK#=CHR$(8) THENGOSUB10;GOTO7
6
78 IFK#=CHR$(95) THEN40
79 IFK#="^" THEN55
80 IFK#=CHR$(13) THENIFJ$(K)="" TH
ENJ$(K)="@@";K=K+1;GOTO75ELSEK=
K+1;J$(K)="@@";K=K+1;GOTO75
81 IFK#=CHR$(9) THENK#=STRING$(T,
CHR$(32))
82 J$(K)=J$(K)+K#; IFLEN(J$(K))=2
00 THENK=K+1
83 IFK>61 THEN40ELSE75
84 CLS3; I=1; PRINT@33, "(D) ELETE";
:PRINT@65, "(I) NSERT"; :PRINT@97, "
(H) ACK "; :PRINT@129, "(X) TEND ";
:PRINT@161, "(S) EARCH"; :PRINT@193
, "(K) ILL "; :PRINT@225, "(E) ND
";
85 PRINT@45, "(^) FORWARD SCROLL"
; :PRINT@77, "(_) BACKSPACE ";
:PRINT@109, "(SB) FORWARD SPACE";
:PRINT@141, "(DOWN ARROW) ";
:PRINT@173, " REVERSE SCROLL";

86 PRINT@391, "<CLEAR> TO CONTINU
E"; :PRINT@451, "<SHIFT & ^> TO CO
MMAND MODE";
87 K#=INKEY#; IFK#="" THEN87
88 IFK#=CHR$(95) THEN40
89 IFK#<>CHR$(12) THEN87
90 I=1
91 IFK#="E" ORK#="e" THEN84
92 X=0; CLS0; PRINT@0, J$(I); :PRINT
@224, "";
93 IFPEEK(341)<>247 THEN97
94 I=I+1; IFI>K THENI=K
95 IFJ$(I)="" THEN93
96 GOTO91
97 IFPEEK(342)<>247 THEN101
98 I=I-1; IFI<1 THENI=1
99 IFJ$(I)="" THEN97
100 GOTO91
101 K#=INKEY#; IFK#="S" ORK#="s" TH
EN102ELSEIFK#=CHR$(13) THEN91ELSE
IFK#<>CHR$(32) THEN111ELSE109
102 K#=INKEY#; IFK#="" THEN102
103 IFK#=CHR$(95) THEN111
104 IFX=0 THENX=2; GOTO106
105 X=X+2
106 FORH=X TOLEN(J$(I))
107 IFMID$(J$(I), H, 1)=K# THENX=LE
N(LEFT$(J$(I), H-1)); PRINT@224, LE
FT$(J$(I), H-1); :H=255; NEXT; GOTO1
01
108 NEXTH; GOTO91

```

```

109 X=X+1; IFX=>LEN(J$(I))+1 THENX
=0; GOTO91
110 PRINTMID$(J$(I), X, 1); :GOTO93
111 IFK#<>CHR$(8) THEN114
112 PRINTK#; :X=X-1; IFX<0 THENX=0;
GOTO91
113 POKE343, 255; GOTO93
114 IFK#<>"I" ANDK#<>"i" THEN120
115 K$(1)=LEFT$(J$(I), X); K$(2)=R
IGHT$(J$(I), LEN(J$(I))-X)
116 K#=INKEY#; IFK#="" THEN116
117 IFK#=CHR$(8) THENW#="" ; X=0; K$
(1)="" ; K$(2)="" ; GOTO91
118 PRINTK#; : IFK#=CHR$(13) ORK#=C
HR$(10) THENJ$(I)=K$(1)+W#+K$(2);
PRINT@256, J$(I); :X=0; W#="" ; K$(1)
="" ; K$(2)="" ; GOTO91
119 W#=W#+K#; X=LEN(J$(I)); GOTO11
6
120 IFK#<>"D" ANDK#<>"d" THEN123
121 IFX=LEN(J$(I)) THEN91
122 J$(I)=LEFT$(J$(I), X)+RIGHT$(
J$(I), LEN(J$(I))-(X+1)); X=0; PRIN
T@256, J$(I); :GOTO91
123 IFK#<>"H" ANDK#<>"h" THEN125
124 J$(I)=LEFT$(J$(I), X); GOTO91
125 IFK#<>"X" ANDK#<>"x" THEN131
126 PRINT@224, J$(I);
127 K#=INKEY#; IFK#="" THEN127
128 IFK#=CHR$(95) ORK#=CHR$(13) TH
EN91
129 IFK#=CHR$(8) THENGOSUB10; GOTO
126
130 J$(I)=J$(I)+K#; PRINTK#; :GOTO
127
131 IFK#<>"K" ANDK#<>"k" THEN139
132 K#=INKEY#; IFK#="" THEN132
133 IFK#=CHR$(95) THEN111
134 IFX=0 THENX=2
135 K$(1)=LEFT$(J$(I), X)
136 FORH=X+2 TOLEN(J$(I))
137 IF MID$(J$(I), H, 1)=K# THENJ$(
I)=K$(1)+RIGHT$(J$(I), LEN(J$(I))
-H+1); PRINT@224, J$(I); :H=255; NEX
T; GOTO91
138 NEXT; GOTO91
139 IFK#="E" ORK#="e" THEN84ELSE93

```

COMPUVOICE CONTINUED FROM PAGE 54

synthesis. I believe that the documentation leaves much to be desired, and that the voices generated by the program are hard to understand. I also believe that in it's present state, the program is overpriced at \$44.95. Therefore in my book, Compuvoice, which could have been an excellent program, gets low marks.



TRS-80[®] BASIC

LEVEL II SYSTEM REFERENCE CARD
MODEL I



TRS-80[®] BASIC AND ASSEMBLER

LEVEL II SYSTEM REFERENCE CARD
MODEL I

LEVEL II MEMORY MAP

DECIMAL	HEX	DESCRIPTION
0	0000	BASIC ROM
1288	5000h	RESERVED
1430	5700h	COMMUNICATION STATUS ADDRESS
1430	5700h	COMMUNICATION DATA ADDRESS
1430	5700h	INTERRUPT LATCH ADDRESS
1430	5700h	DISK DRIVE SELECT LATCH ADDRESS
1430	5700h	CASSETTE SELECT LATCH ADDRESS
1432	5700h	LINE PRINTER ADDRESS
1434	5700h	FLOPPY DISK CONTROLLER ADDRESS
1438	5800h	KEYBOARD MEMORY
1580	5C00h	CRT VIDEO MEMORY
1580	5C00h	INTERRUPT ADDRESSES (FOR RESTART)
1600	6000h	KEYBOARD DCB
1610	6010h	VIDEO DCB
1620	6020h	PRINTER DCB
1620	6020h	RESERVED
1640	6050h	FDI INTERRUPT VECTOR
1640	6050h	COMMUNICATIONS INTERRUPT VECTOR
1648	605Ah	RESERVED
1650	6060h	25 KSEC HEARTBEAT INTERRUPT
1652	6060h	BASIC RAM
1670	6100h	IO BUFFER
1728	6200h	ALWAYS ZERO
1728	6200h	USER PROGRAM MEMORY
2047	80FFh	END OF 4K SYSTEMS
32767	FFFFh	END OF 32K SYSTEMS
65535	FFFFh	END OF 48K SYSTEMS

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NEW! QUICK REFERENCE



TRS-80[®] BASIC AND ASSEMBLER

MODEL II SYSTEM REFERENCE CARD
TRSDOS VERSION 3.0

TRSDOS MODEL II MEMORY MAP

ADDRESS	DEC	HEX	DESCRIPTION
0	0000h	0000	TRSDOS High-level commands area
1000	3000h	3000	User program area
TOP	7000h	7000	Established by TRSDOS
32767	FFFFh	FFFF	End of 32K systems
65535	FFFFh	FFFF	End of 48K systems

SCREEN LAYOUT

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MODEL III



TRS-80[®] BASIC AND ASSEMBLER

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MODEL III

SPECIAL CHARACTERS

000	001	002	003	004	005	006	007	008	009
010	011	012	013	014	015	016	017	018	019
020	021	022	023	024	025	026	027	028	029
030	031	032	033	034	035	036	037	038	039
040	041	042	043	044	045	046	047	048	049
050	051	052	053	054	055	056	057	058	059
060	061	062	063	064	065	066	067	068	069
070	071	072	073	074	075	076	077	078	079
080	081	082	083	084	085	086	087	088	089
090	091	092	093	094	095	096	097	098	099

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MONITOR
By Robert D. Foster
Merriam KS

Would you like a simple monitor to see what your computer is doing? Do you want to learn more about machine language programs by entering a short program? Do you want to observe how the graphics are stored in memory?

This program is because I did.

If you are a beginner, enter the program and learn more about your computer. If you are advanced you can use this as a basis for adding more features.

You do not need to type the lines that are REM. No other lines refer to them. After you enter the program and RUN then you will see "<;><-><G><M>". These are the commands available.

The <G> stands for "Go". Press the G key and you will see "GO TO ?". Enter the location you want using hex. If you just press ENTER you will go to 0000.

Use the ";" key to go higher in memory. Use the "-" key to go lower.

The <M> stands for "Modify". Press the M key and you will see "START CHANGE ?". Type a hex address (0 to FFFF) and press the ENTER key. Now you see the three locations before and the three locations after the location to be modified. If you want to modify the location then enter a hex number (0 to FF). If you just press the ENTER key, then you do not modify the location but move to the next location. Type X and press ENTER to exit. Type the minus key ("-") and you will back up one.

OUTLINE

120 Set up
***** Subroutines *****
150 Inkey\$ Input
180 Display Memory
180 Check for exceeding limits
200 Seven lines in the display
220 Address of first location in the line
240 Hex value of seven locations
270 Chr\$() value of the same seven locations
300 Change Memory
310 Three before and three after the location
330 Print Chr\$()
***** Main Routine *****
360 User Input
380 Commands
400 If ";" go higher in memory
410 If "-" go lower in memory
420 If "G" then input go to location
430 Set location equal to ST
440 If not "M" input again. Input start of change location

450 Set flag (F2) for change mode
If ENTER ("") go to to previous change location.
480 Input value of change in hex If "-" then back up one
490 If "X" then reset change flag and return to display mode else if ENTER ("") then keep same value at location.
500 Trap values above FF and poke new value
510 Go to next memory location, check that it is not at the end of memory, and get next change
520 Display memory and present commands.

VARIABLES

C Column in display of hex and Chr\$()
CG\$ Command, (- ; G M)
CH Location for change
F2 Flag, -1=Change mode 0=display memory mode
HE\$ Convert decimal to hex
I\$ Inkey\$
J Lines in display change mode
PK In display mode, location of first column in each row. In modify mode, location displayed.
R Row in display
ST Start location to display
V/V\$ Input and value of input in modify mode
X\$ Chr\$() for right side of video display

```
100 REM ***** MONITOR *****
110 REM ***** ROBERT FOSTER
120 CLEAR 1000
130 ST = 0: F2 = -1
140 GOTO 370
150 I$ = INKEY$
160 I$ = INKEY$: IF I$ = "" THEN 160 ELSE
RETURN
170 REM **** DISPLAY MEMORY ****
180 IF ST>&HFFB3 THEN ST = &HFFB3 ELSE IF
ST<0 THEN ST = 0
190 CLS
200 FOR R = 0 TO 10
210 PK = ST+( R*7 )
220 PRINT HEX$( PK );
230 REM ** HEX **
240 FOR C = 0 TO 6: PRINT " "RIGHT$(
"0"+HEX$( PEEK( C+PK ) ),2 );
250 NEXT C
260 REM *** CHR$( HEX ) ***
270 FOR C = 0 TO 6: X$ = CHR$( PEEK( C+PK ) ):
IF X$<" " THEN PRINT ", "; ELSE PRINT X$;
280 NEXT C: IF PK<( &H1000 ) THEN PRINT
290 NEXT R: RETURN
300 REM ***** CHANGE MEMORY *****
310 CLS: FOR J = -3 TO 3: PK = CH+J
```

```

320 IF PK>= 0 AND PK<= &HFFFF THEN PRINT
HEX$(PK) "HEX$(PEEK(PK)); ELSE 340
330 IF PEEK(PK) > 32 THEN PRINT TAB(9
)CHR$(PEEK(PK));
340 PRINT: NEXT
350 RETURN
360 REM ***** USER INPUT *****
370 CLS
380 IF F2 THEN PRINT @384,"<><-><G><M> ";
390 GOSUB 150: CG$ = I$
400 IF CG$ = ";" THEN ST = ST+&H46: GOTO 520
410 IF CG$ = "-" THEN ST = ST-&H46: GOTO 520
420 IF CG$<>"G" THEN 440 ELSE INPUT"GOTO
";CG$
430 ST = VAL("&H"+CG$): GOTO 520
440 IF CG$<>"M" THEN 380 ELSE PRINT @416,;;
INPUT"START CHANGE";CG$
450 F2 = 0: IF CG$<>" " THEN CH = VAL(
"&H"+CG$) ELSE CH = ST
460 ST = CH
470 GOSUB 310: PRINT @108,"<== CHANGE TO";
480 INPUTV$: IF V$ = "-" AND CH>0 THEN CH =
CH-2: GOTO 510
490 IF V$ = "X" THEN F2 = -1: GOTO 520 ELSE IF
V$<>" " THEN V = VAL("&H"+V$) ELSE V =
PEEK(CH)
500 IF V>255 THEN 480 ELSE POKE CH,V
510 CH = CH+1: IF CH<= &HFFFF THEN F2 = -1:
GOTO 470
520 GOSUB 180: GOTO 380

```

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Are you tired of searching the latest magazine for articles about your new Color Computer? When was the last time you saw a great sounding program listing only to discover that it's for the Model I and it's too complex to translate? Do you feel that you are all alone in a sea of Z-80's? On finding an ad for a Color

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EXTRA TRICKS WITH COLOR SCRIPSIT

by: Ralph Tenny
PO Box 545
Richardson TX 75080

A couple of reviewers have had some good things to say about Color Scripsit, but one of the major lacks of this very nice text processor is that your Epson MX-80 is essentially no better than a Line printer VII. This is because you cannot use any of the fancy printing modes the printer knows. However, all is not as black as it seems at first glance!

Color Scripsit's intractability is due to the fact that the cartridge "auto-boots" (starts up automatically); not even a RESET will give you control of the computer if the cartridge is plugged in. If you are tempted to power up the computer, set the printer, and then plug in Scripsit--don't! There is a good chance that you will damage the computer, the cartridge, or both. Of course, you can power down after setting the printer mode, but the method described here is also very usable.

The CC cartridges auto-boot by means of a connection between pins 7 and 8 of the connector. This connection can be broken permanently with an etch cut, or temporarily isolated by placing tape over one of these pins. You must open the cartridge to see the connector; a single screw under the label has to be removed before the case will snap open. Once this connection is broken, Scripsit must be started with "EXEC49152" in BASIC, or the appropriate command from a monitor.

So what have we gained? Well, if you want to run Scripsit from an assembly language monitor based in ROM (as I do), you can save an edit session on tape, go do something else, and re-enter Scripsit with J COOO (or GO COOO from another monitor). The same thing applies with BASIC--there is no hassle with powering down the computer.

All the above leads up to the listing shown below. Enter this program into memory before executing Scripsit, or enter it after saving an edit session on tape. A simple two-key sequence is used to enter each printer code, then the printer will be set up for some of the fancy printing modes. For example, any of the following modes can be set (these will be used for all printing done once you have re-entered Scripsit):

1. Special line spacing,
2. Italics,
3. Special page length (requires caution),
4. Emphasized print mode,
5. Compressed print mode,
6. Expanded print mode.

Use the program in Listing 1 this way: load the program and RUN it. The prompt will be a set of instructions. Let's assume that you want the emphasize print mode. The Epson requires the following key sequence: ESCAPE, E, ENTER. When the program executes down to line 50, BASIC prompts with "?". The following keystrokes will follow: / (to signify that ESCAPE (CHR\$(27) is to be sent); ENTER (to get BASIC to read the input); E (the actual printer code); ENTER (read the line); BREAK. To enter two ESCAPE code sequences, RUN the program once for each sequence.

Some EPSON code sequences require parameters following the code. For example, to set line spacings different from the three standard ones provided by GRAPHTRAX. A typical sequence is ESCAPE, 3, n. In this case, n is a decimal number, which is somewhat tricky to enter. For that reason, we'll deal with it later.

Once these keystrokes have been entered, EXEC49152, re-load the tape, and print it out in enhanced mode. If you play with the program a bit, it quickly becomes much simpler than it sounds here! What I have outlined is really just the tip of the iceberg; I expect that some of you will quickly refine this idea to something much more useful. One suggestion: if you want to print different sections of a paper with different print parameters (Scripsit won't even allow different line spacing in different parts of the same document), break the document into separate records and print them separately. It is possible to print under manual control, so the printhead can be set manually on the desired line, then each section printed under manual control. The manual control procedure is described on page 33 of the Scripsit manual.

LISTING AND DEMONSTRATION PRINT-OUTS

Figure 1 is a short LLIST of the main program listing, printed with the Epson's default line spacing of six lines per inch. Figure 2 shows the results of LLISTing the same material after this command sequence: /, ENTER, 3, ENTER, I, BREAK; the line spacing is 3 lines per inch. To compute the spacing, refer to page 280 of the Color Computer BASIC manual, and to page 11 of the Epson GRAPHTRAX manual. From the BASIC manual, note that "I" has a decimal code value of 72. From the Epson manual, we note that the command "ESC 3 n" produces a line spacing of $216/n$ lines per inch. So, "ESC 3 *" would produce $216/42$ or just over 5 lines per inch. Obviously,

TRICKS WITH COLOR SCRIPTSIT

substituting other keystrokes with decimal values between these numbers will give a very subtle variation in line spacing for special effects.

```
5 CLS
10 PRINT@33,"ENTER PRINTER CODES"
15 PRINT@97,"IF CODE NEEDS AN ESCAPE"
20 PRINT@129,"CODE PREFIX, THEN ENTER"
25 PRINT@161,"SLASH (/), FOLLOWED BY"
30 PRINT@193,"THE CHARACTER OR
CHARACTERS"
35 PRINT@225,"OTHERWISE ENTER THE"
40 PRINT@257,"CHARACTERS DIRECTLY."
45 PRINT@289,"TERMIATE ENTRY WITH
BREAK."
50 INPUT A$
55 IF A$="/" THEN80 ELSE70
60 INPUT A$
70 PRINT#-2,A$;
75 GOTO60
80 A$=CHR$(27)
90 GOTO70
100 END
```

LISTING 1 - "EPSON"

```
5 CLS
10 PRINT@33,"ENTER PRINTER CODES"
15 PRINT@97,"IF CODE NEEDS AN ESCAPE"
20 PRINT@129,"CODE PREFIX, THEN ENTER"
```

Figure 1. A partial LLIST of "EPSON", showing the MX-80 default spacing of six lines per inch.

```
5 CLS
10 PRINT@33,"ENTER PRINTER CODES"
15 PRINT@97,"IF CODE NEEDS AN ESCAPE"
20 PRINT@129,"CODE PREFIX, THEN ENTER"
```

Figure 2. A repeat of Figure 1, after the command string: ESC, 3, I.

```
10 PRINT@33,"ENTER PRINTER CODES"
15 PRINT@97,"IF CODE NEEDS AN ESCAPE"
20 PRINT@129,"CODE PREFIX, THEN ENTER"
```

™ TRS80 color

From the January 1981 issue of the CSRA Computer Club newsletter:

There was some amusement at the November meeting when the Radio Shack representatives stated that the software in the ROM cartridges could not be copied. This month's 68 Micro Journal reported they had disassembled the programs on ROM by covering some of the connector pins with tape. They promise details next month. Never tell a hobbyist something can't be done! This magazine seems to be the only source so far of technical informations on the TRS-80 color computer[™]. Devoted to SS-50 6800 and 6809 machines up to now, 68 Micro Journal plans to include the TRS-80 6809 unit in future issues.

NOTE: This and other interesting and needed articles for the Radio Shack TRS-80 color computer[™] are being included monthly in 68 Micro Journal—The Largest specialty computer magazine in the world!

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Currently, and even before the Color Computer[™] hit the stores, 68 Micro Journal[™] was devoting more space to the TRS-80C Color Computer[™] and information concerning the Motorola 6809 (which is the CPU in the Color Computer[™]) than ANY OTHER Computer Magazine. Examples include:

REVIEWS of the three major Disk Control Systems for the Color Computer[™], most of the Monitors, Assemblers, and Disassemblers, Word Processors and Editors, "Terminal" Programs (for use with Modems, Communications with other Computers, etc.), and of course, Games.

HINTS for Expanding Memory, Power Supply Cooling, repairing sticky keyboards, disabling the ROM PAK "Take Over", hooking up to Printers, etc.

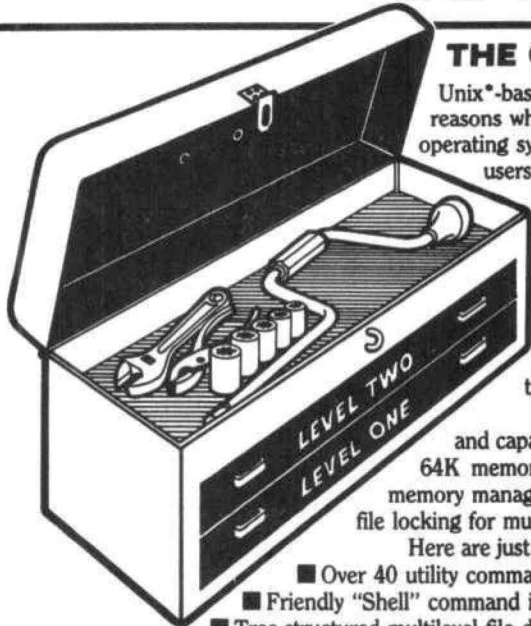
DISCUSSIONS of the 6883 Synchronous Address Multiplexer, using the Color Computer[™] with 64K and 96K memory (which it is ALREADY capable of handling), thoughts on Programming, etc.

I suggest that you subscribe to 68 Micro Journal[™], SOON, as many back issues are sold-out.

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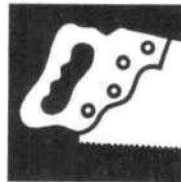
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Contest Final!

The results are now completely in and the winner of the Magic Square contest is F. C. Aldrich of Lansing Michigan with a timed run of 8 minutes 12 seconds. The next best was over 20 minutes. I remember well getting his first entry when he explained that he had over 50 hours of work into the program and then a few weeks later getting another one from him with an explanation that he now had over 100 hours into the project. Well F. C. the hard work paid off. Frank Hannum, the judge of the Magic Square contest, sends his complements for a job well done.

Final prizes, in addition to those presented last issue are:

Chromasette: A three month introductory subscription to each winner.

Nanos Systems Corp: A copy of their CC quick reference card to each winner.

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Computerware: a 10% discount on any hardware or software product for the Color Computer to each winner.

10 * MAGIC SQUARE
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LANSING, MI 48910

```
20 TIMER=0:POKE65495,0:POKE248,&
H32:POKE249,&H62:POKE250,&H1C:PO
KE251,&HAF:POKE252,&H7E:POKE253,
&HAD:POKE254,&HA5:POKE410,&H7E:P
OKE411,0:POKE412,&HFB
30 K4=0:J1=0:J4=0:K1=0:I2=0:J3=0
:K2=0:JJ=0:J2=0:MX=0:L2=0:IL=0:L
3=0:MN=0:TL=0:K3=0:I3=0:II=0:L1=
0:L4=0:N=0:LI=0:I1=0:I4=0:DIMC(1
6):DEFFNOD(N)=N-INT(N/2)*2
40 FORI1=1TO7:C(I1)=1:FORI4=I1+1
+FNOD(I1)TO16-I1:C(I4)=1:II=I1+I
4:L2=18-II:L3=L2+15-II:IFL2<I4+1
THENL2=I4+1
50 IFL3>16THENL3=16
60 IFFNOD(II)=0ANDFNOD(I1+L2)=0T
HENL2=L2+1
70 FORL1=L2 TOL3 STEP2-FNOD(II):
C(L1)=1:TL=I4+L1:L4=34-I1-TL:IFC
(L4)THEN490
80 C(L4)=1:IL=I1+L1:LI=L1-I1:L2=
TL-16:IFL2<1THENL2=1
90 IFL2<LI-7THENL2=LI-7
100 IFFNOD(II)ORIL=17THEN130
110 IFFNOD(I1+L2)=0THENL2=L2+1
```

```
120 FORJ2=L2 TOINT((TL-1)/2)STEP
2:IFC(J2)THEN480ELSE140
130 FORJ2=L2 TOINT((TL-1)/2):IFC
(J2)THEN480
140 C(J2)=1:K3=TL-J2:IFC(K3)THEN
470
150 C(K3)=1:L2=18-TL:IFL2<1THENL
3=L2+15:L2=1ELSEL3=16
160 IFTL=17THENL2=J2+1
170 IFFNOD(II+J2+L2)THENL2=L2+1
180 FORJ3=L2 TOL3 STEP2:IFC(J3)T
HEN460
190 C(J3)=1:K2=34-J3-TL:IFC(K2)T
HEN450
200 C(K2)=1:JJ=J2+J3:J1=35-JJ-IL
:J4=18-JJ:K4=18-IL:K1=J1:IFJ4>K1
THENK1=J4
210 IFK4>K1 THENK1=K4
220 IFJ4<K4 THENK4=J4
230 IFJ1<K4 THENK4=J1:K1=1
240 K4=K4+15:IFK4>16THENK4=16
250 IFK1>K4 THEN440
260 MN=1+LI-J2+J3:I2=18-II:MX=33
-J2-K2:IFI2>MN THENMN=I2:GOTO280

270 IFI2<MX-15THENMX=I2+15
280 IFMX>16THENMX=16
290 IFMN>MX THEN440
300 FORJ1=K1 TOK4:IFC(J1)THEN430

310 C(J1)=1:K4=34-J1:J4=K4-JJ:IF
C(J4)THEN420
320 C(J4)=1:K1=K4-IL:IFC(K1)THEN
410
330 C(K1)=1:K4=34-K3-K2-K1:IFC(K
4)THEN400
340 C(K4)=1:FORI2=MN TOMX:IFC(I2
)THEN390
350 C(I2)=1:L3=34-I2:I3=L3-II:IF
C(I3)THEN380
360 C(I3)=1:L2=L3-J2-K2:IFC(L2)=
0THENGOSUB500:IFTL<>17THEN470ELS
EC(J2)=0:C(L4)=0:GOTO490
370 C(I3)=0
380 C(I2)=0
390 NEXTI2:C(K4)=0
400 C(K1)=0
410 C(J4)=0
420 C(J1)=0
430 NEXTJ1
440 C(K2)=0
450 C(J3)=0
460 NEXTJ3:C(K3)=0
470 C(J2)=0
480 NEXTJ2:C(L4)=0
```

CONTEST FINAL

```

490 C(L1)=0:NEXTL1:C(I4)=0:NEXTI
4:C(I1)=0:NEXTI1:N=TIMER:POKE654
94,0:PRINT:PRINT"RUNNING TIME":I
NT(N/3600):"MIN":INT(N/6-INT(N/3
600)*600+.5)/10:"SEC":END
500 L3=34-L1-L2-L4:CLS:N=N+2:PRI
NTN-1,N,I1,I2,I3,I4,I1,I3,I2,I4,
J1,J2,J3,J4,K1,K3,K2,K4,K1,K2,K3
,K4,J1,J3,J2,J4,L1,L2,L3,L4,L1,L
3,L2,L4
510 IFIL<>17THEN530
520 N=N+2:PRINTN-1,N,I1,I2,I3,I4
,I1,I3,I2,I4,J4,J2,J3,J1,K4,K3,K
2,K1,K4,K2,K3,K1,J4,J3,J2,J1,L1;
L2;L3;L4,L1;L3;L2;L4
530 IFTL<>17THEN550
540 N=N+2:PRINTN-1,N,I1,I3,I2,I4
,I1,I2,I3,I4,J1,J3,J2,J4,K1,K2;K
3,K4,K1;K3;K2;K4,J1,J2;J3;J4,L1;
L3;L2;L4,L1;L2;L3;L4
550 IFJJ<>17THEN570
560 N=N+2:PRINTN-1,N,I1,I2,I3,I4
,I1,I3,I2,I4,K1;J2;J3;K4,J1;K3;K
2;J4,J1;K2;K3;J4,K1;J3;J2;K4,L1;
L2;L3;L4,L1;L3;L2;L4
    
```



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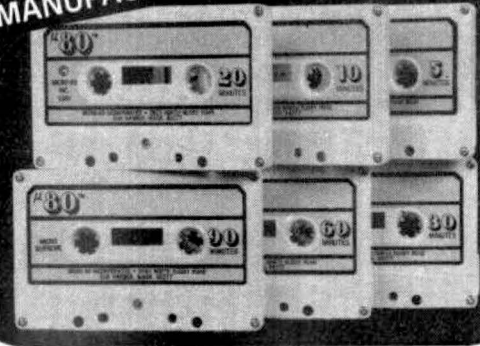
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CONTEST FINAL

```

570 IFJ2+K2<>17THEN610
580 N=N+2:PRINTN-1,N,I1,I2,I3,I4
,I1,I3,I2,I4,K1,K3,K2,K4,J1,J2,J
3,J4,J1,J3,J2,J4,K1,K2,K3,K4,L1;
L2;L3;L4,L1;L3;L2;L4
590 IFIL<>17THEN610
600 N=N+2:PRINTN-1,N,I1,I2,I3,I4
,I1,I3,I2,I4,K4,K3,K2,K1,J4,J2,J
3,J1,J4,J3,J2,J1,K4,K2,K3,K1,L1;
L2;L3;L4,L1;L3;L2;L4
610 IFII<>JJ ORJ3+L1<>17THEN630
620 N=N+2:PRINTN-1,N,I1,J1,J4,I4
,I1,J4,J1,I4,I2,J2,J3,I3,L2,K3,K
2;L3,L2,K2,K3;L3,I2,J3,J2,I3,L1;
K1,K4;L4,L1,K4;K1;L4
630 C(I3)=0:C(I2)=0:C(K4)=0:C(K1
)=0:C(J4)=0:C(J1)=0:C(K2)=0:C(J3
)=0:C(K3)=0:RETURN
    
```

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Color Computer

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- 55 Color Computer Programs for Home, School & Office**, practical ready-to-run software with colorful graphics for TRS-80 Color Computer, 128 pages. **\$9.95**
- 55 MORE Color Computer Programs for Home, School & Office**, sourcebook of useful type-in-and-run software with exciting graphics, for TRS-80 Color Computer, 112 pages. **\$9.95**
- The Color Computer Songbook**, 40 favorite pop, classical, folk & seasonal songs arranged for TRS-80 Color Computer; ready-to-run music programs, 96 pages. **\$7.95**
- Color Computer Graphics**, complete guidebook loaded with tips, tricks, hints, secrets for making the most of TRS-80 Color Computer video graphics. Learn-by-doing instructions plus complete programs, 128 pages **\$9.95**
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- Color Computer Coding Form**, handy preprinted programming worksheets make writing software easy, fun, 40-sheet pad **\$2.95**

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- Pocket Computer Programming Made Easy**, new fast 'n easy way to learn BASIC, make your computer work for you, for TRS-80, Sharp, Casio pocket computers, 128 pages. **\$8.95**
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Color computer owners, 32K PLUS DISKS* \$298.00

Yes, that's right - for as little as \$298.00 you can add 32K of dynamic RAM, and a disk interface, to your TRS-80 Color Computer! If you just want the extra memory it's only \$199.00, and you can add the disk interface later for \$99.00.

Just plug the *Color Computer Interface (CCI)*, from Exatron, into your expansion socket and "Hey Presto!" - an extra 32K of memory. No modifications are needed to your computer, so you don't void your Radio Shack warranty, and Exatron give both a 30 day money-back guarantee and full 1 year repair warranty on their interface.

The *CCI* also contains a 2K machine-language monitor, with which you can examine (and change) memory, set break-points, set memory to a constant and block-move memory.

So what about the *CCI Disk Card*? Well as we said it's only an extra \$99.00, but you'll probably want Exatron's *CCDOS* which is only \$29.95 - unless you want to write your own operating system. The *CCI Disk*

Card uses normal TRS-80 Model I type disk drives, and *CCDOS* will even load Model I TRSDOS disks into your color computer - so you can adapt existing TRS-80 BASIC programs.

As a further plus, with the optional *ROM Backup* adaptor, you can dump game cartridges to cassette or disk. Once the ROM cartridge is on cassette, or disk, you can reload, examine and modify the software. The *ROM Backup* adaptor is only \$19.95.

For more information, or to place an order, phone Exatron on their Hot Line 800-538 8559 (inside California 408-737 7111), or clip the coupon.



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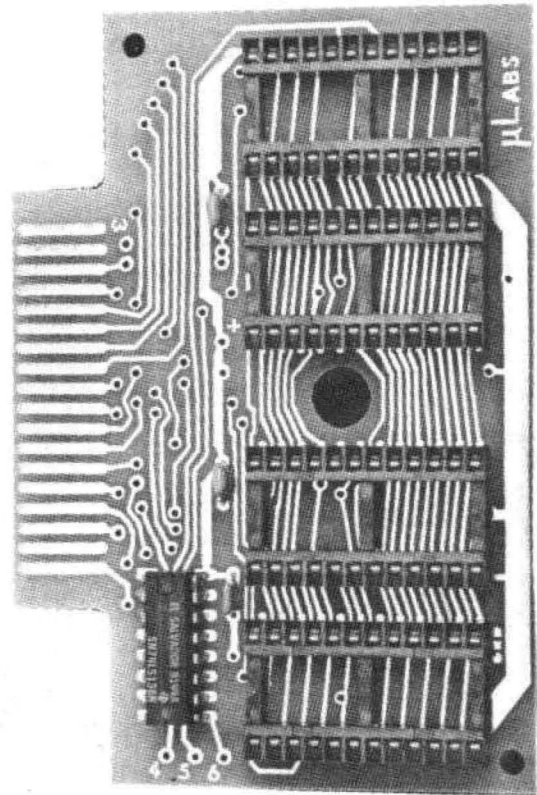
Signature

COLOR COMPUTER EPROM CARTRIDGE

The CMEMORY-16 is a plug in cartridge for the TRS-80 Computer which allows the user to add up to 16K of continuous read only memory. From one to four 2732 EPROMs can be plugged into the available sockets enabling the user to save his favorite utilities or games in easy to use cartridges. For example, one might put a communications package, editor/assembler, disassembler, and monitor all in one cartridge. For dedicated applications such as a banking terminal, a permanent, fool-proof program in EPROM is the only viable solution.

The CMEMORY-16 occupies the unused address space \$C000 to \$FEFF normally reserved for plug in game cartridges. By adding a jumper, the Color Computer can be set to automatically execute a program in EPROM whenever reset is pressed or the computer is turned on. The cartridge plugs into the Program Pak expansion slot on the right side of the Color Computer.

Neatly packaged in a custom made black plastic case, the CMEMORY-16 cartridge without any memory sells for \$34.95. Although you can use your own memory parts, 4K 2732 EPROMs are available for \$24. An 8K version of the board which uses 2K RAMs or 2716 EPROMs is available for \$24.95. EPROM programming services and quantity pricing may be obtained on request. All items are shipped from stock and may be ordered COD or prepaid from Micro-Labs, Inc., 902 Pinecrest Drive, Richardson, TX 75080, (214)-235-0915.



NEW AUDIO SPECTRUM ANALYZER PROGRAM
FROM RADIO SHACK
TURNS TRS-80 COLOR COMPUTER INTO
GRAPHIC TESTING TOOL FOR AUDIO BUFFS

Radio Shack, a division of TANDY Corporation, is now providing audiophiles and high fidelity enthusiasts with a new way to use the TRS-80 Color Computer as a test instrument or as a colorful adjunctive aid to their audio systems. Audio Spectrum Analyzer (26-3156), available for \$19.95 at Radio Shack stores, Computer Centers and participating dealers, provides a colorful and graphic display (of the power-frequency distribution) of energy in sound presented to the computer's cassette port input.

With Audio Spectrum Analyzer and a TRS-80 Color Computer, an audio enthusiast can "watch the music"; color bargraphs show the relative power distribution over a nine-octave audio range (see Technical Notes). A built-in "audio kaleidoscope" mode presents random changing visual images, keyed to the tonal distribution and intensity ("color", in musical terms) of the input signal.

Both fast-response (peak measurement) and slow-response (RMS measurement) modes are available. A Peak Hold option automatically locks each 1/3-octave display on the highest intensity presented. A Detail option switches from a 9-bar



NEW PRODUCTS

full-octave display to a 27-bar 1/3-octave display. A Freeze option instantly locks the display into a "snapshot" of the signal levels present.

Audio Spectrum Analyzer includes both the Program Pak and an easy-to-read instruction manual. The manual includes information on how to use the program with an electronic chain (a stereo receiver, tape player or electronic musical instrument, for example), or with a complete audio chain (including a speaker). When used with an electronic chain, audio can be passed through the system and heard through the TV speaker.

TECHNICAL NOTES

Vertical color bars represent twenty-seven 1/3-octave segments from 31.5 Hz to 12.5 kHz. The bars are calibrated in dB, a relative measurement. Since audio program material can vary greatly in average level, the program is designed to automatically "lock onto" the loudest 1/3-octave present, and to scale its measurements from that reference; this insures that the largest relative deviation will always be displayed. The measurement range extends from -20 dB to +5 dB, which means it can display a maximum level that is 256 times louder than the softest measured (1/3-octave segment) sound.

Audio signals should be from a low level source, such as a headphone jack, cassette jack of low-power amplifier (e.g., the Radio Shack 277-1008A Miniamp, not included). A low-powered amplifier may be driven by a microphone (e.g., the Realistic 33-1058 Tie Clip Mike, not included) for measurements of room acoustics or complete audio chains. A cable is required (e.g., Radio Shack 26-1207, not included) for connection of the audio source to the TRS-80 Color Computer cassette input port.

THE COLORCOM/E

Smart terminal program for the Color Computer-The Colorcom/E is a smart terminal program for the Color Computer. It comes in a ROM cartridge ready to plug in and run. Colorcom/E's features and capabilities include: online and offline scrolling; offline printing of data; receiving and sending cassette files; support of any serial printer; full and half duplex; and an optional word mode to eliminate word wrap. Data can be easily edited before printing or writing to cassette.

Priced at \$49.95, this program is available from Spectrum Projects, 93-1586 Drive, Woodhaven, New York 11421, (212) 441-2807.

CCP-1 SERIAL TP PARALLEL INTERFACE

Botek Instruments introduces the CCP-1 SERIAL TO PARALLEL INTERFACE for the Color Computer. This interface allows the use of almost any printer with the Color Computer, including: Epson Mx 70/80/100, NEC PC8023,....any printer with a standard parallel input.

The CCP-1 consists of a cable that connects between the Color Computer Serial I/O connector and a printer input receptacle. A small plastic enclosure, built into the center of the cable, houses the electronics section that converts the serial information from the Color Computer into parallel information for the printer. Baud rate is jumper selectable from 300-19200. Retuning is not necessary when changing baud rates.

CCP-1 is COMPLETE--no need to buy additional cables or connectors.

CCP-1 is now available for only \$59.00 plus \$3.00 for shipping and handling. Michigan residents add 4% sales tax.

BOTEK INSTRUMENTS

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Five new cables are available from Spectrum Projects. A disk Interface/ROMpack Extender which is a 40 pin ribbon cable that plugs into the ROMpack port and terminates 3 feet later with a 40 pin female connector to connect disk interfaces and ROMpacks. This makes it more convenient to place your disk drive and ROMpacks. Next is a joystick extension cable that gives you an additional 10 foot length to place your joysticks. Also a printer/modem extension cable. (10 feet) To eliminate I/O errors, from having your tape recorder too close to the computer is a 10-foot cassette recorder cable extension. The last cable is a joystick "Y" adapter cable. Lets you hook up inline a joystick and our newest product - The Light Pen. Now you can enter the world of A/D circuitry, with our low cost Light Pen.

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COCO DRAWER

COCO DRAWER is a joystick driven graphics editor for quick and easy drawing of color pictures on the Color Computer from Radio Shack.

The joystick selects and controls over 40 commands on two menus to draw lines, rectangles, circles, dots, and paint with Extended BASICs resolutions and colors. Other commands are merge, change colors, copy, store, restore, and many more. Its fun and easy with a graphics cursor controlled by a joystick.

COCO DRAWER comes with two complete character sets for typing messages on pictures. Also included are outlines of Texas and Australia digitized with this program.

COCO DRAWER is available for \$19.95 from Greathouse and Company, P.O. Box 27051, Rancho Bernardo, CA 92127. Extended BASIC and 32K are required.

RADIO SHACK ADDS NUMBER PATTERNS BOOK TO EDUCATIONAL RESOURCE SERIES

Radio Shack, a division of TANDY Corporation, now offers educators a booklet that not only acquaints students with the basics of number pattern theory, but also reinforces computer skills using the TRS-80 microcomputer. Number Patterns (26-2752) by Bob Albrecht and George Firedrake is available for \$2.50 at Radio Shack stores, Computer Centers and participating dealers.

Number Patterns presents a series of programming exercises using simple BASIC statements and functions, including numeric and string variables and plus and minus arithmetic operations. These exercises are grouped into functional, self-explanatory sections and help students recognize and create a variety of number patterns and sequences.

RADIO SHACK INTRODUCES NEW VOCABULARY TUTOR COURSEWARE FOR TRS-80 COLOR COMPUTER

Radio Shack, a division of TANDY Corporation, now helps students build vocabulary skills with a new TRS-80 Color Computer courseware offering that uses the graphics and sound capabilities of the Talk/Tutor development system. Vocabulary Tutor I (26-2568) is available for \$8.95 at Radio Shack stores, Computer Centers and participating dealers.

Vocabulary Tutor I provides drill sessions and practice lessons in reading vocabulary and

comprehension at the grade 4-6 level. Picture and graphics, text and audio are combined to provide fun while learning.

Vocabulary Tutor I requires a 4K TRS-80 Color Computer and cassette tape player.

NEW-MY TRS-80 LIKES ME BOOKLET FROM RADIO SHACK INTRODUCES STUDENTS TO SIMPLE ELEMENTS OF BASIC

Radio Shack, a division of TANDY Corporation, introduces a new booklet in its popular Educational Resource Series that offers educators suggestions to help acquaint students with elementary principles of BASIC using the TRS-80 microcomputer. My TRS-80 Likes Me (26-2751) by Bob Albrecht and George Firedrake is available for \$2.50 at Radio Shack stores, Computer Centers and participating dealers.

My TRS-80 Likes Me is a series of programming exercises introducing students to BASIC statements and commands. The exercises begin with a simple print statement and logically progress to more advanced concepts including INKEY\$ and subroutines which are demonstrated through game programs.

RADIO SHACK INTRODUCES CHEMISTRY SIMULATIONS COURSEWARE

Radio Shack, a division of TANDY Corporation, now offers TRS-80 microcomputer courseware that simulates actual chemistry laboratory experiments. Chemistry Simulations (26-2609) for the TRS-80 Model I or Model III microcomputers and Color Chemistry Simulations (26-2626) for the TRS-80 Color Computer are available for \$199.00 each at Radio Shack stores, Computer Centers and participating dealers.

Chemistry Simulations uses imaginative graphics and a series of mathematical equations to simulate chemical reactions that occur under actual laboratory conditions for six basic chemistry experiments - kinetic theory, Charles' Law, Boyle's Law, solubility, titration and conductivity. Students can witness experimental results, plus collect, graphs and analyze experimental data with the aid of the computer.

Chemistry Simulations includes software, an instructor's manual and twenty-five student manuals. The instructor's manual offers suggested areas for emphasis and methods of presentation. Student manuals present topical background material on each experiment, step-by-step instructions, quizzes and worksheets.

NEW PRODUCTS

Chemistry Simulations requires a TRS-80 Model I or Model III disk system with a minimum of 32K memory. Color Chemistry Simulations requires a 16K TRS-80 Color Computer with Extended BASIC and CTR-80A cassette recorder.

RADIO SHACK ANNOUNCES COLOR LOGO FOR THE TRS-80 COLOR COMPUTER.

Radio Shack, a division of TANDY Corporation, is offering an enhanced version of LOGO, the popular "turtle graphics" programming language, for TRS-80 Color Computer. Disk Color LOGO (26-2721) will be available 3rd quarter 1982 for \$99.00 at Radio Shack stores, Computer Centers and participating dealers.

Color LOGO extends the turtle graphics commands of standard LOGO with several additions, including a "doodle" mode and a "Hatch" command. In the doodle mode, while the user draws a picture, he or she simultaneously creates a program that can draw that picture again later. The Hatch command causes any one turtle to create another turtle, which then runs its own program; this allows simultaneous execution of a large number of multiple turtle graphics programs on the same screen, and helps the user investigate principles of structured thinking, multitasking, inter-process communications, modular programming, parameter passing, local and global variables, looping and recursion - even to create simple arcade-style video games.

Color LOGO includes a manual with a beginner's level tutorial, plus both simple and advanced sample programs. A 32K TRS-80 Color Computer disk system is required. A Program Pak version of Color LOGO (26-2722) will be available in early 1983.

NEW COLOR PILOT AUTHORIZING LANGUAGE FROM RADIO SHACK OFFERS PROGRAMMING VERSATILITY.

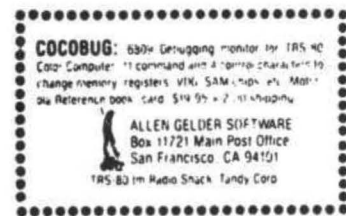
Radio Shack, a division of TANDY Corporation, now offers educators a powerful authoring language for preparing graphic and textual/dialogue programs using the TRS-80 Color Computer. Color PILOT is available in both a 16K tape version (26-2709) for \$59.95 and a 32K disk version (26-2710) for \$79.95 at Radio Shack stores, Computer Centers and participating dealers.

Color PILOT provides the capability of mixing text and graphics in each display, and features built-in text and program line editors.

In addition to standard PILOT commands, Color PILOT features convenient one-letter commands for match, key execute, indirect, automatic escape and record keeping functions.

Color PILOT comes with a complete self-study course for individuals interested in writing their own instructional programs. The Color PILOT manual offers a step-by-step, "hands-on" approach, and features demonstrations and examples of instructional applications. The manual incorporates a programming style and aids section to assist in writing clear and effective programs efficiently.

Color PILOT requires a 16K TRS-80 Color Computer, CTR-80A cassette recorder and a standard color TV receiver.



Color Computer SMALL C Compiler

- Generates assembly language source output
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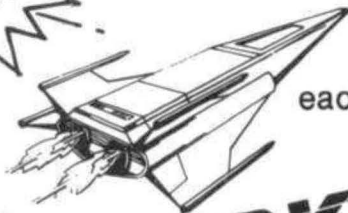
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- ★ 1 MB 5 1/4" Floppy Disk Drive
- ★ DMA Double Density Floppy Disk Controller

SOFTWARE FEATURES:

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- ★ OS-9 Text Editor
- ★ OS-9 Debugger
- ★ OS-9 Assembler

128KB MULTI-USER SYSTEM \$6997.39

HARDWARE FEATURES:

- ★ 2MHz 6809 CPU
- ★ DMA Double Density Floppy Disk Controller
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- ★ 2 RS232C Serial Ports
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- ★ 2 RS232C Serial Ports
- ★ DMA Double Density Floppy Disk Controller
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- ★ GMXBUG monitor — FLEX Disk Operating System
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WINCHESTER SUBSYSTEMS

Winchester packages are available for upgrading current GIMIX 6809 systems equipped with DMA controllers, at least one floppy disk drive, and running FLEX, OS-9 LEVEL ONE or OS-9 LEVEL TWO. The packages include one or two 19MB (unformatted) Winchester drives, DMA Hard Disk Interface, and the appropriate software drivers. The Interface can handle two 5 1/4" Winchester Drives, providing Automatic Data Error Detection and Correction: up to 22 bit burst error detection and 11 bit burst error correction.

Dual drives can be used together to provide over 30 MBytes of on line storage -- or use one for back-up of the other. (More convenient and reliable than tape backup systems.)

- #90 includes one 19MB Drive, Interface, and Software \$4288.90
- #91 includes two 19MB Drives, Interface, and Software \$6688.91

Contact GIMIX for systems customized to your needs or for more information.

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