# COLOR COMPUTER NEWS

July 1982 Issue #10

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In case there is any confusion about last issue, everyone has had their subscriptions extended by one issue because of combining the two issues together.

Murphy was rampant again, I told you last issue that our new address was to be 2380 Henry St. and not only was that the wrong address, but we didn't even move into that building! The correct address is now 1781 Fifth St. with all other information remaining the same. The new phone number is (616) 728-9100. The reason for the last minute change is that it became obvious that by moving to a slightly larger place we were only helping the situation temporarily. The new office is HUGE, I think we can stay here for an extremely long time. In case you are interested we now have over 4000 square feet of space, a real loading dock, and offices that don't double as other things. We've come a long way folks, from part-time on the kitchen table to several offices, and five employees.

Orders for the book of all 1981 issues are going well and by the time you read this we should have started shipping. For you newcomers, we are binding all of the 1981 issues together into a single volume because we have had great difficulty in keeping back issues in stock, especially issues 1 & 2. The books are being printed on a reservation basis only and since we have a minimum press run delivery we have to receive enough reservations to go to the printer.

It has been my opinion from the beginning that everyone, from newest subscriber to oldest advertiser, has the right to be aware of everything going on with CCN and all future plans. So with that in mind I'd like to share some of the Goals, Plans, and Policies that I have developed for REMarkable Software and Color Computer News. The last time I did this was in issue #1 so I quess we're overdue.

Our goals are, basically, to provide a forum for all Color Computer Users, to present new ideas and options, to provide a place for the uncensored expression of opinion (provided the expression is unoffensive and not malicious), to provide a marketplace where products related to the Color Computer may be viewed and reviewed.

Our plans come under two headings; immediate and long range. Immediate plans are to continue expansion of the magazine as evidenced by this issue, our plans require that we do not allow more than 40% advertising in more than one successive issue and since we can not expand by less than 32 pages our next expansion will be 128 pages. Future plans include the publishing of Books. We are now seeking manuscripts to be published in 1983 on the following subjects; machine language tutorial for beginners, language instruction using the languages available for the Color Computer (BASIC, Forth, Pascal and C), and collections of programs (home use, games and business).

Our policies are quite simple, First, all submitted articles will be edited as little as possible so that the authors original idea is not influenced in any way by personal bias' of the Editors. Second, neither I or my staff will write reviews of any products unless that review clearly states that the review is a staff review (it would be easy for an "inhouse" reviewer to be influenced by either advertiser pressure or the desire to increase advertising through "good reviews" in addition our opinions are no better than any other CC owner's). However, I received a telephone call today from Stan Shoemake in Mississippi who complained that because of this policy it is impossible to get reviews of new products together as quickly as he would like. Therefore, he suggested that we establish a CCN board of review. He proposed that this board would examine all software received by CCN and rate it on the following criteria: 1. Does the product perform as advertised?, 2. Do the instructions and/or manuals explain operation of the product completely?, 3. If a game, is it fun, if a utility or application program is it useful?, 4. Each member of the board will write a single paragraph with his personal comments about the product and the entire board will write another paragraph describing the product briefly. The board will then throw out all but the highest and lowest scores and the corresponding paragraphs. The average of all scores will be published also as the "Official" score. A letter "C" with the official score inside will be used as a logo for any advertiser that cared to use it. I agreed with Stan and so we are going for it. The most practical way will perhaps be to use computer clubs as the raters and so clubs send in your request, along with a letter stating that you will not copy or otherwise pirate the software we send to you and your club can become an official CCN board of review.

Third, advertisers will not be disallowed unless sufficient reader complaints are received to cause me to feel that the advertiser is not dealing in "good faith" with his customers (this has happened only once to date).

I recently received a letter from a fellow that wrote an article for CCN that stated that I

#### **OS-9 USERS:**

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

#### **DynaStar**

DynaStar is a powerful, menu-driven screed 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 Dackage you can buy for your CS-9 system. DynaStar Version II is now available and features no-nonsense "what you see is what you get" editing for vir-tually 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 print-able character you type is entered directly into your text, and any non-printable control character causes im-mediate execution of an editing command. Single key-stroke 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.

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 pro-grammers, 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 (in-cluding 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.

Cluding 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, Dyna-Star 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 'boller-plate,' or simply re-map your keyboard. You can also provide a special "startup 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 Dyna-Form 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 <u>underline</u>. 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 to proof-print its available today. If you're still not convinced that it would be the best thing that ever hap-pened to your video terminal, you can order our 'Doubt-ing Thomas'' test pak consisting of complete documen-tation and a special version of DynaStar that lets you edit to your hear's content, but won't update your files. Later when your doubts meit away, you can obtain credit. bought the whole thing in the first place.

"Doubting Thomas" test pak: DynaStar II (for the faithful): DynaForm text formatter: \$ 49.95 \$149.95 \$149.95 \$275.00 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 is the most versatile 68XX spelling checker available

MENU'S MAKE OPERATION EASY. From the menu you 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 ap-plications; Build an additional dictionary of newly ac-cepted words; Write correct text file to disk. While checking you may: Accept the suspect word; Ac-cept 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.

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 runtime operations. Output is ROMable and RUNS WITH-OUT ANY RUN-TIME PACKAGE. Supports IF-THEM-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 duces code approximately 30% smaller.

#### SPECIAL

CHESS program coded in A/BASIC (originally sold for \$50) is included FREE on the disk in both source and ob-ject 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 pro-Now you can have GRAPHICS added to all your pro-grams. 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 TER-MINAL OR PRINTER. HISTOGRAMS, BARGRAPHS, XY PLOTS PLUS OTHERS. IN TSC XBASIC SOURCE INCLUDED ON DISK. \$44.95

## TOOLKITNOL

The Basic Programmers Toolkit by Dick Bartholomew

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

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



The Programmers Toolkit by Dick Bartholomew The Programmers Toolkit is a package of utilities and programs that extend the capabilities of FLEX to the ut-most.

> 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 ex-Sersiaus, Serricity, Gerrociu, and JSR. This is an ex-cellent and fast program, small enough to write utilities but powerful enough for things like DynaStar. Object only \$69.95 Add for run-time source on disk \$30.00 Add for source of Dynasoft Pascal itself \$125.00



#### **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 PERSONAL'. TY MODULES' (CPW 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 and currently available to the following CPU's: 6809, 6800, 6805, 6502, 280/8080, 1802, and others coming. ing.

#### PRICE \$139.95

includes one 8 bit CPM of your choice (not source) Additional CPM's

8 Bit \$25.00 Source \$25.00 extra.

#### THE BILL PAYER SYSTEM<sup>™</sup>

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Explore Package now included at the same price. THE PURCHASE ORDER system adds purchase orders to the BILL PAYER. This package of programs adds another level of control to your expenditures. Prints out purchase orders and keeps track of pur-chases. Requires the Bill Payer to work.

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#### COMPUT USE

#### 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 Now you can run FLEX, OS-9 and Radio Shack disk software on your Color Computer. If you have a 32K Col-or 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 '68' 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 ad variages. 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 is 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 be density, 35, 40 and 80 track drives. If you use double sided drives, the maximum is three drives because we use the drive 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) DS · SD or DD)

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

AUTOTASK WITH MENU AUTOTASK with MENU is a revolutionary new con-

AUTOTASK with MENU is a revolutionary new con-cept designed to overcome the problems and frustra-tions which confront the non-technical when using a computer. Users are greeted with a series of self-prompting interactive menus linking directly to the ap-plication. Several example menus are provided. You can create your own menus from simple text files. AUTOTASK with MENU gives you unlimited software flexibility by providing a system to coordinate multiple-application programs. Bundle several different software packages to pre-sent 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.

**PRICE \$129.95** Includes source on disk!

Manual \$10.00

off under software control. In a normal Color Computer

bit 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 ran 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. chips in.

Some neat utilities are included.

MOVEROM moves Color Basic from ROM to RAM. Be-cause 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, For-tran77, 'C,' A/BASIC compiler, plus more. Application packages include; A/R, G/L, A/P, Inventory, Electronic Spreadsheets, Accounting, Database pro-grams 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 60 day extended warranty. If you have a Computer, call about RS disk controllers and drives.



#### FORTH FOR THE TRS-80 COLOR COMPUTER DISK SYSTEM

FORTH FOR THE TRS-80 COLOR COMPUTER DISK SYSTEM Trying to get control of your Color Computer?? Tired of translating HEX to decimal?? Tired of remembering where the VDG and SAM are and how to program them?? Want to write machine language code with assembly language mnemonics instead of POKES?? Want to write programs in half the time?? Want to write lots of small pieces of code that you can put together in seconds to do BIG JOBS??? Want a language that is at least 5 to 10 times faster than BASIC??? Want to learn everything there is to know about FORTH, with the best manual on the market, including lots of examples of FORTH applications, and detailed explanations of how everything works? everything works??



\$**99**<sup>95</sup>



INVENTORY with MATERIAL **REQUISITION PLANNING** \$100.00

SUPER SLEUTH Disassembler for 6800/6809 or Z80 \$99.00

> **TABULA RASA Electronic Spreadsheet** \$100.00



BY Chuck Eaker, Ph.D. X-FORTH NOTES Supplied on one 8" disk or 2 5" disks. with a 400 + page manual. Disk(s) have the source of everything but the core. PRICE only \$149.95 plus \$2.50 S&H Manual available separately for \$49.95 plus \$2.50 S&H

#### SOFTWARE CATALOG

PROGRAM	OBJECT/ ONLY/SC	WITH	code
BILLPAYER		169.95	х
PLOT		44.95	x
TABULA RASA		100.00	×
Mailing List		99.95	х
Forms Display		49.95	х
Inventory with Material		400.00	
Requisition Planning	-	100.00	X
ELEX For Color Computer	99 00	69.90	â
X-EORTH (ELEX)	140.05		820
CC-EORTH (TRS-80 Color)	99.95		q
TOOLKIT #1 (BASIC)	49.95/	69.95	9
TOOLKIT #2	49.95/	69.95	9
AUTOTASK		129.95	9
A/BASIC Compiler	150.00		9
Extended Utilities	49.95/	69.95	9
Password Protection	69.95/	89.95	9
CRASMB (X Assembler)	139.95	50.00	a
Personality Modules (1 INC)	25.00	50.00	9 ea
0002, 0000, 0000, 0009, 200, DEADTARE	0000, 1002	64.05	0
	100 00/	200.00	9
READTEST	54.95/	74 95	820
ESTHER	39.95/	59.95	8 8 9
HELP	29.95/	49.95	8 & 9
Job Control Program	49.95/	89.95	889
DYNASOFT PAŠCAL (FLEX)	59.95/	89.95	9
DYNASFT PASCAL (OS-0)	69.95/	99.95	9
DYNASOFT Compiler Source		125.00	P
DYNASTAR Screen Editor (OS-	9) 149.95		9
SUPER SLEUTH (6800/6809)		99.00	989
SUPER SLEUTH (280)	TOC ACMO	99.00	0 6 9
6900/1 6905 6502 700 900	130 ASMB	40.05	ooob
0000/1, 0003, 0302, 200, 000	3 FOR	00.05	each
6502 Translator	01011	75.00	9
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STYLOGRAPH 2.0	295.00	. 5100	9
STYLOGRAPH MAIL MERGE	125.00		9
STYLOGRAPH Spelling Check	er 145.00		9

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

Software by Technical Systems Consultants, Inc.			
FlexTM (includes Editor & Assembler)	150.00		
UniFLEXTM (includes one year			
maintenance and update)	450.00		
Editor	50.00		
Assembler	50.00		
68000 Cross Assembler on 6809	250.00		
Text Processor	75.00		
Extended Basic	100.00		
Basic Precompiler (specify standard			
or extended)	50.00		
Pascal (FlexTM)	200.00		
Pascal (UniFLEXTM) (Add \$75.00 for			
one year's maintenance and update)	225.00		
Soft/Merge Package	75.00		
6809 Flex M Utilities	75.00		
Debug Package	75.00		
Diagnostic Package	75.00		
Software by Microware Systems Corp.			
OS-9 IM Level One			
Operating System	200.00		
US-91W Level Two	500.00		
Operating System	500.00		
OC OTM Magaza Taul Editor	105.00		
OS OTM Interestive Assembles	125.00		
OS OTM Interactive Assembler	125.00		
(Disk vargion)	50.00		
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a acai comprisi	400.00		

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ZS

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vi	920/C	758.00	779.00
vi	925	759.00	780.00
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OROC	IQ135	765.00	785.00
ŌRŌĊ	IQ135G	831.00	853.00
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Printer		Cash	Card
IDS	445	632.50	650.00
IDS	460G	852.50	876.00
IDS	560G	1094.50	1124.50
Centronics	739	519.00	533.50
Centronics	739-3	641.50	658.79
TI	820	1738.00	1785.50

All printers and terminals are shipped freight collect and there are no COD's



should publish the amount I pay for articles, he was quite surprised by the amount he received for his. I've been quite hesitant to print the amount because I really don't want articles from people that are only interested in the money. So lets leave it at this; of the six magazines that would tell me their payment rate we ranked number 2. We do need more articles, with the new expanded size we are using up the backlog rather quickly. To stay at 96 pages we need to accept 15 pages of articles per day and to have at least the equivilent of 3 issues in the file cabinet. I frequently get asked about what I'm looking for in the way of subjects, that's probably the most difficult question to answer of all. I would like cames, utility programs, financial software, tutorials and lots of reviews. I'd also like to see some languages, it should be fairly simple to write a language like Pilot for the Color Computer, how about libraries of machine language subroutines (sorts, searches, etc.). Since Forth, Pascal and C are now available for the CC how about some programs using these languages. We even have alternative BASICs now, so let's see some programs written in BASIC09 or TSC BASIC. Conversions of Flex or OS9 programs so they work well on the Color Computer's smaller screen.

I've frequently been asked how you can tell if a Flex program will run on the Color Computer. The answer is both simple and complex, any program that is "Flex Compatable" will run under Color Computer Flex. The trick is the definition of Flex compatable. There are several proorams available for the Flex operating system that are not "Flex Compatable". As I understand it Flex compatable means that the program does all of it's I/O through Flex, several programs will directly read the ACIA on the SS-50 buss, these programs are NOT Flex compatable. You add further difficulty when you add the fact that many programs assume a video display that is either 64x16 or 80x24, programs that make these assumptions will run on the Color Computer but will look terrible and/or be difficult to run because of lines scrolling off the screen. The best solution is to tell the software house when you order that you have a Color Computer and that the screen size is 32x16. I'm sure that you could use a graphics screen to simulate the larger display but that's a "make work" solution at best.

Warren Napier, the author of the 1981 Tax program, has sent in the following enhancements to his program.

6285 PRINT: INPUT"OTHER PAYMENTS";GP 6290 IF GM+GP=GL THEN CLS: PRINT234,"NO REFUND BUT": PRINT262,"NOTHING OWED EITHER!" 66660 PRINT230, "BALANCE OWED: \$"GL-(GM+GP);

Delete lines 6520, 6530, 6540, 6550, 6560, 6570, 6340, 6345

Add:

6470 FOR X=1 TO 100; NEXT X

6480 PRINT232,"REFUND= \$"GM+GP-GL;

6490 FOR X=1 TO 250; NEXT X: NEXT Y

6500 PRINT456,"HOW ABOUT THAT!";

6510 FOR X=1 TO 1500: NEXT X

6520 RETURN

I'd like to see this program updated for next years taxes also.

The transition to the Gimix is going quite well. So far I've written a Subscription List system that has reduced our time for handling the subscription list from 6 hours per day to about two and a half hours per day. When you unpack a Gimix the first surprise is the amount of documentation, included are two notebooks containing all of the schematics for every option you ordered, complete circuit descriptions, and data sheets I haven't verified but there seems to be a data sheet for every chip in the thing. You also receive a bound version of all Motorola's computer related data sheets, a 6809 programming guide and the manuals for two disk operating systems. As I've told you before it has two Disk Operating Systems which are Flex and OS9. The Gimix has the unique ability to switch between the two Disk Operating Sytems with the press of a key. The hardware is excellent, all connectors are gold plated to stop intermittent problems. After moving, the Gimix and the Color Computers were the only computers to run on the first try. The power supply in the Gimix is what I would call overkill, it can handle anything I can ever imagine stuffing into the box and accounts for at least 90% of the weight of the cabinet. At the old office we had problems with the old computers suffering silent death from power line drops with the Gimix we could hear the fan slow down and the terminal would go narrow for a second or so, but the computer never even noticed. I'm truly impressed with the Disk Controller board, the old computer was extremely fussy about media, therefore I have several boxes of disks that I couldn't format single sided, single density 35 tracks on the old system that we're now using double sided, double density 80 tracks without a single glitch. When operating under Flex you can software select CPU clock speeds of either 1, 1.5, or 2 MHz, change the disk drive head stepping speed or set a drive to single or double step (40 or 80 tracks on an 80 track drive). When your using OS9 all of this is taken care of for you, the first sector on the disk has information about the disk and the software

reacts accordingly. I think, but I'm not sure, that the CPU runs at 2 MHz all the time under OS9. The only problems I've had so far have been with terminals, I bought one Hazeltine Esprit that one day started having display troubles, it acted like a thermal problem in a memory chip, after removing the cover to check it out it stopped malfunctioning and has flown right ever since, I also bought a Heathkit H19A. After assembling it everything checked out but the keyboard was dead, I called Heath and they decided that it must be either the Z80 or the keyboard encoder. Since Heath is only about 70 miles away I drove down to get it fixed, after all the terminal board is the part that comes pre-assembled, they didn't want to fix it on the spot so I was forced to leave it there since they promised I'd have it back in two or three days at the worst. It's now been 3 weeks and I still haven't seen it or heard from them. I've learned my lesson, never send things back to the factory when your on a deadline.

Next month I'll show you Flex and OS9 as they appear on the Gimix and if space permits print a couple of programs I've written to show you BASIC09, the Pascal that thinks its a BASIC.

Last minute items. As most of you are aware, I've made a commitment to not compete with my advertisers. Essentially this means that I have decided to not sell hardware or software for the Color Computer. Many of you have asked me to make the programs that appear in CCN available on tape which is definately a "oray" area with regards to competition. Since it does seem like a worthy thing to do yet not wanting to breach my own ethics I've licenced a company in Florida to produce and distribute cassettes that contain most of the programs that appear in each issue. The programs that will not appear are the ones that the author has specifically requested otherwise. All authors whose works are on the cassette will be splitting a 10% royalty. For more information see the ad that appears elsewhere in this issue.

I recently returned from a speaking engagement at the Cincinnati TRS-80 Users group and was really impressed with the direction they are moving in. They have a main meeting once each month with all members and later each month special interest groups meet. I spoke to the total users group and discussed publishing, how to get an article accepted and spent about a hour and a half answering questions about Rumors (or is that Rumors, Rumors). I thought you'd like to see a few pictures from the meeting so they are enclosed here.



Gary and Susan Davis showed off their new program, Auto Run.



We quickly solved all the problems with the micro industry.



Almost everyone managed to stay awake.

#### 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.

\* Checks your text against a 20,000 word dictionary and finds your spelling and typing errors.

\* Displays all questionable words, or prints them on your printer for later action.

\* Even corrects errors in your text. Wrong words can be highlighted or changed to their correct spelling.

 $\star$  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.
- \* Available for the Radio Shack disc, cassette, or Flex disk operating system.
- \* Compatible with all Color Computer Text Processors, including TeleWriter!

SPELL 'N FIX is available off-the-shelf right NOW, and costs \$69.29 in the Radio Shack disk or cassette versions (32K RAM required!); \$89.29 in the Flex version. (Other versions, including Percom DOS, SSB DOS, and OS-9 versions also available — contact us.)

#### HUMBUG

#### Now in a Color Computer Version

HUMBUG is the famous SUPER MONITOR for 6800 and 6809 systems — you can now use it on your Color Computer too.

HUMBUG is a complete machine language monitor and debugging system which allows access to the full power of the 6809E processor in the computer. HUMBUG lets you

- \* Input programs and data into memory.
- \* Output and list memory contents in various formats.
- \* Insert multiple breakpoints into programs.
- \* Single-step through machine language programs.
- \* Test, checksum, and compare memory contents.
- \* Find data in memory.

- \* Start and stop programs.
- \* Upload and download from bigger systems, save to tape.
- \* Connect the Color Computer to a terminal, printer, or remote computer.

\* Learn how the Color Computer works by studying the listing of HUMBUG in the complete manual.

HUMBUG is available right NOW on disk or cassette for \$39.95 for 16K or 32K Color Computers. Special version for 64K systems costs \$59.29 and is compatible with software for large 6809 systems.

#### **Other Color Computer Software**

CHECK 'N TAX — Basic programs for checkbook maintenance and income tax reports, for either RS Disk or Flex, \$50.

REMOTERM — allows full operation of the Color Computer from an external terminal. \$19.95.

LFPRINT — permits the Color Computer to be used with non-standard serial printers which do not support handshaking or automatic line feeds. \$19.95.

NEWTALK — a memory examine utility for machine language programmers which reads out memory contents through the TV set speaker. \$20.

SHRINK — our version of Eliza, in machine language and extremely fast. \$15.

OXXO — our version of Othello, also machine language and very fast. \$15.

We accept cash, check, COD, Visa, or Master Card. NY State residents please add appropriate sales tax. **Star Kits** 

P.O. Box 209—N Mt. Kisco, N.Y. 10549 (914) 241-0287  Dear Bill:

First, let me thank you for CCN. I know that you're in business to make money and I certainly hope you do. While you're doing so, we the users of the CC, can enjoy the close association and education that CCN brings.

A word about Wayne Green, He's commanded a lot of attention lately as a result of his February editorial in 80 Microcomputing, As a ham (WA6IVN) of 23 years, I've never much cared for Wayne Green, He's the Ralph Nader of amateur radio and perhaps computing as well. As much as I dislike him. I think that he does serve a purpose. Case in point: His controversial editorial in his February issue. I got stomping mad when I read it. Two of my friends that were going to purchase a CC changed their minds and went other ways. After all, who wants to buy a white elephant? After I got my dander down, I asked myself why he would do such a thing? I was pretty confident that Radio Shack wasn't dropping the CC as that was not their style. They certainly had the big bucks to promote it in whatever way they thought best. Then why?

I think that Wayne went fishing. I don't think he had a thing to go on. He probably was tired of all the secrecy and decided to force the hand of the illustrious computer giant and get a peak at their cards. And this he did! Radio Shack has since devoted many editorials to the defense of the CC in their newsletter. Curiously, Wayne jammed his rag in the March issue with more CC articles/programs than ever before. On top of all this, I think he generated a lot more advertisement in his magazine by that controversial editorial. Either way, good or bad, the final outcome was that people certainly started paying more attention to the CC and the powerful machine that it is. Food for good thought.

Finally, a word about Clay's CW/RTTY program. It's everything that everybody says and perhaps even more. This is especially true if you're a CW buff like me. Certainly it's a bargain at his low, low price. I use the MFJ 1200 interface. Everything works as expected. As a bonus, I even copy RTTY (usually solid) without any type of RTTY interface.

I do have one point of criticism concerning Clay's program, however. There appears to be some kind of timing function associated with the keyboard. If you type to fast, you will make errors. I can type straight text on the CC at over 100 WPM with few errors (if any). Yet with Clay's program I cannot do the same at 35 WPM. I'll be getting together with Clay via 2 meters soon. I'll see if I can pick his brain on this defect and report back to your readers.

Again, I thank CCN for all the help. Believe me, I needed it! Sincerely, Steve Eichman Manteca, CA

\* I've also read Wayne's magazines for a number of years and he has always played the devil's advocate. I agree, he did accomplish exactly what he wanted, the thing that surprised me was that I knew about the Color Computer issue for months before his editorial appeared, I'm certain he did too.

Dear Bill:

We are starting a Color Computer Club in Columbus, Ohio. So far, we have about 20 people who are interested in our Club. Surely there must be more people in the central Ohio area who have or are interested in purchasing a Color Computer. Anyone who is interested in finding out more about our group, please call Susan Davis at (614) 861-0565.

Thank you for passing along this information, Sincerely, Susan P. Davis

Reynaldsburg, OH 43068

\* Thanks for letting me share it Susan. As you know, we used to send names of folks to people starting clubs but the problems of sorting out the people that didn't want their names included on such lists got to be excessive. As a possible solution I'll be running new club notices as they are received. It was good meeting you and Gary at the Cincinnati TUG.

#### Dear Bill:

I first would like to congratulate the entire staff as well as the subscribers to your fine publication. You have indeed made an enormous contribution to those of us who as novice users of the Color Computer feel abandoned by the very company that sold us our machine. Truly it is inconceivable that Radio Shack support following this major purchase of equipment can remain virtually non-existant. I would like to see a consumer group rise and speak out against this most outrageous practice. Surely our government would never permit such a practice in the automobile industry. Perhaps this expression of dissatisfaction should have been addressed to the "Sleeping Giant in Fort Worth", but I believe that my feeling will receive greater attention of all of us involved with the Color Computer. Radio Shack should indeed recognize and support your continuing efforts. Again, I wish to congratulate all involved.

As a self taught programmer in Color BASIC, there are many, many questions and problems that arise and are labored over by me. I hope that some assistance to a specific problem (or two) may be forthcoming.

1. I would like to be able to access the high speed mode, (POKE 65495,0) but have not been able to do so. I have replaced the PIA chips, 6821's with 68A21's, but still have not been successful. I have been told to cut C73 and C75 to effect the change to high speed. I have sufficient electronic experience to do so, but first would like to know that this is the correct procedure.

2. Also, I wonder whether anyone would know how to insert additional LINE FEEDS into a Radio Shack ROM PAC. Using the Sigmon Monitor, I am able to transfer the contents of the ROM PAC to RAM memory so that I'm sure that the modification can be accomplished. But how? Very Sincerely,

Robert Popper New York, NY 10011

\* Thank you for making the congratulations to both the staff and subscribers. I like to think of CCN as a group project with both REMarkable Software employees and the thousands of folks that support the project with articles, letters and of course the folks that just subscribe. It's good to know that subscribers feel the same way. I've heard many people complain about the lack of support from Radio Shack but I feel somewhat differently. Back when the Color Computer was first introduced Bill Gates, President of Microsoft, stated in an interview with 80 US Journal that they would be publishing information about their Color BASIC, i.e. comments to the ROMs, I've never seen it, Radio Shack has introduced the techinal reference manual which, although it could be improved upon greatly, is step in the right direction. Radio Shack Hotline also catches a lot of flack but at least it's an attempt at support, let's face it, they really can't afford to pay gualified people to sit at a free phone. Most of all, if their support was everything it could be I'd still be writing Business Software, I hope it never gets any

better. The next letter answers your question number 1, I've never tried it so check it out carefully before attempting it. Your question number 2 would be the basis of a number of good articles, on first glance I think it would be easier to simply disassemble it to either disk or tape, modify the newly created source code and reassemble it, patching in more code is a difficult task.

#### Dear Bill:

I think that CCN is the best source of CC information around. Two letters in the April issue caught my eye, and I would like to comment on them. First, the letter from John Boals whose system locks up when he tries to use "Vitamin E" on it. You were correct in saying that it wasn't the chips, but there is a simple way to make any vintage CC handle the address-dependent rate.

Do not attempt the following modifications if you a) are still under warranty, b) can't solder, or c) are all thumbs. I also recommend having a copy of the Color Computer Technical Reference Manual on hand to help locate things. If you don't have a disk system, all you need are a pair of small wire clippers; if you do, you may also need a low-wattage soldering iron. Unplug the computer, open the case and remove the RFI shield. All components are labeled; locate C73 and C75. These are beige disk shaped capacitors. Carefully clip them off the circuit board, or desolder them if you have the patience. Save them in case problems arise. Unless you have a disk system, you should now have no trouble with a POKE 65495.0. These capacitors sit on the clock lines to the 6809E and degrade the clock signals, but not enough to cause problems until you try something like 1.8 MHz.

Many of you with disk systems have by now found that even if your CC went fast before the disk cartridge was inserted, trying it afterwards resulted in a total lock-up. Here's how to cure that problem. As per the above instructions, also remove C85. Then check R73, R74 and R80. If they are grey-black in color, leave them alone. However, if they look like normal resistors (beige cylinders with colored stripes), bypass them by carefully soldering a wire across their leads. Now you should have trouble-free fast operation with the disk system installed. However, actual disk I/O is not totally reliable at high speed, so you should reset or POKE 65494,0 before reading or writing a disk. The other letter was from Ken Knecht who has a balky disk system. I have experienced all of those problems too, but when I brought mine in for repair, the first estimate was \$100, just to replace a stepper motor! Luckily, I knew a Service Technician, and he got it down to \$50; but when I finally got it back, all they had done was clean it, align it and charge me \$25. Also like Mr. Knecht, I am not satisfied; it may be cleaner, but the first thing it did when I got it back was destroy the directories on 3 disks. Since then, it has been working better, but it is not reliable for the heavy use FLEX will give it.

I think there are 2 problems with the system. First, the controller card edge must be kept clean (like on Model 1's), and is easy to bump out of contact since it sticks out so far. Second, besides the file handling bugs in the disk BASIC, the disk controller is reliable. The real problem is the drives. They are not the same brand that Radio Shack uses for the Model I and the Model III, but a cheap copy made by a company that had never made drives before. I quess Radio Shack assumed that since anyone who buys a Color Computer is not seriously into computing, they didn't have to make serious disk drives. Unfortunately, though I've heard of many and tried several fixes for the disk drive, none of them helped.

I've got a couple of questions about Frank Hogg's FLEX. First off, FLEX was designed for a multi-drive environment. Even with special utilities, it's a bear with only one drive. You need at least 2. Also, the ads and the April article (which reads like another ad) stress over and over that Frank Hogg's FLEX will run any FLEX compatible program. I don't think so. Some of those programs, such as extended BASIC's, will surely have problems with the interrupt vectors that are there from Radio Shack BASIC. Additionally, any DOS like FLEX or OS-9 will be expecting too much from Radio Shack's color disk drives. Anyone who plans to use such a system will have to get real disk drives.

Alexander Benenson

New York, NY 10024

P.S. If you have 64K with BASIC in RAM, try POKE 65495,0. Its not any faster, and just look at that display!

\* Thanks for sharing the modification, as with all mods please proceed cautiously, neither the contributor or CCN can be responsible for any mods. I've been running Flex for about a month now with no problems. I had questions about the interrupt vectors also until I tried the software, I'm not sure what they've done but the vectors aren't a problem. My Color Computer at home only has one disk drive and it really isn't a problem, although it is much more convenient to use at work where I have two.

#### Dear Editor:

In January I bought my first Radio Shack Color Computer Disk Drive, In March it stopped working. It wrote on top of the directory of several disks, and finally just stopped. I mean not a sound!

I took it to my neighborhood dealer since the warranty was still in place. A good guy, he traded me a demo on the spot. I took this drive home and started it up. It would do nothing but I/O error, not even DSKINIO! I went back to the store and we began trying two other demo drives. Not one drive in the store would work. So, I had to send my drive into the shop. Three weeks later I received my repaired drive. I tried it right on the spot in the store, and it would not work. Two more drives (demos) that the store sent in for repairs were tested. None worked at all. The store manager gave me a brand new (in box, not demo) drive. It worked fine for one month.

It wrote one last record last week. Further attempts to read this record result in I/O errors. (And, it seems like even a working drive will occasionally write on top of the DIR.)

I know someone else who has two disk drives. As of this writing, both of these drives are in the shop.

Somebody tell me, and tell me true: Are the Color Disk Drives lemons, or do I just have bad luck? Thanks.

Britt Monk

Elyria, OH 44036

\* Truthfully I think your lemons are causing you bad luck.

#### Hello Bill:

Bill what is the best RAM and disk set up for the Color Computer. I now have TRS-80 Model I 48K, with 3 drives. Is there any way to down load to the Model I so I can use my Centronics 101A Line Printer for print out? Is there a disk system compatible?

I think Radio Shack has a very good thing with CC. I don't think they are very serious about it though. I would like to see more practical applications developed for it. Good luck with the news letter. Thank you for your time. Sincerely, Bill Ricky KoKomo, IN 46902

\* I'm not sure I can recommend a "best" RAM and Disk Controller. It really depends on what you want to do with the computer, in my case I like OS9 as an operating system so the 64K mod and Radio Shacks controller make sense, if you only play pames or aren't interested in alternate operating systems then straight Radio Shack sounds good, Exatron or Tallgrass seems right for hardware oriented folks. The Exatron disk controller can load ASCII text files (including BASIC programs) from a Model I and to some people that may be a consideration. It's all in what you need. Any of the terminal programs available can be used to communicate with a Model 1. You can use REMOTERM from Star-Kits to operate your Color Computer from a terminal which I assume could be your Model I running a terminal program.

#### Dear Sirs:

I have a few remarks which may be of interest to other readers of your very informative magazine:

1. For those who have early model computers and disks, when I connected up my drive I got not only the screen interference about which Radio Shack warns, but also a number of disk I/O errors about which Radio Shack does not warn you. When I brought the computer in for the grounding (which RS will do for free) I not only got away from the interference, but the I/O errors were cured too.

2. A further note on TELEWRITER; yes, it's as good as the reviews say. I've been using it for several months now and have had only two minor problems. Once the print-out put out garbage from somewhere instead of a line feed. although this corrected itself the second time I printed it. The second problem is that I have never been able to get the embedded font change to work -- that's the command in the text which allows the use of different fonts without messing with the printer. I don't use this feature a great deal -- but I might if it worked -- so it isn't a big problem. The big problem, though, is that I wrote to Cognitec about these problems twice, one month ago and two months ago, and haven't gotten a reply to either letter. I recall the reviews I read saying how helpful the people at

Cognitec were, and I just hope that they don't reserve their helpfulness for magazine reviewers. If you plan to use the embedded font commands, or if you don't like the feeling that once you've bought it you're on your own, you might keep this in mind, although I don't know of another editor with all these features.

Now, is anyone else having their disk drives write over parts of their saved programs? Sincerely.

**Duff Kennedy** 

Santa Barbara, CA 93105

Dear Bill:

I just finished keying in and debugging the CC Word Processor from the February CCN (by David Dacus) besides finding my typing errors (at least a half dozen of those). I found 3 other bugs (or at least I found 3 things I had to change to get the program to run). First, line 60, the "ON A GOTO" statement. The third to the last address is "150", I think it should be "1950". Line 380 has an asterisk before "GOTO", I believe it should be a colon. And. line 690 starts out with "Y = Y -1:", I think it should be "Y = Y - I:", I really don't feel comfortable criticiziino someone else's work, especially with the obvious amount of time and effort being put into an extremely useful program. (It has features in it that I haven't been able to find in any other word processor less than \$50.)

The errors look like "keying in" errors. (The asterisk is an upper case colon. The 1 and I are an easy to make "keying" mistake. I made two of those when I keyed the program in. The 9 was probably just dropped. I am less sure of the 9 than I am the other two errors, but sticking it in does make it work.)

My thanks and compliments to Mr. Dacus for an extremely useful program. Rich Petty

\* Up until this issue we always tested the programs and then dumped them into our word processor. Now we're listing them directly from the Color Computer. We have always used the copy provided by the author. Some problems used to develop when we added spaces to the programs, using the word processor, but we'll not be doing that anymore. Please authors; programs without spaces are sloppy and the readers can take them out as they type. It's easier than reading the thing without them.



CONTEST

Here they are, most of the things you've been waiting for. The judging is finished (almost) and the decisions have been made. The Magic Square winner is uncertain for now since there were more entries than we had anticapated. The unconfirmed best time is just under nine minutes. I'll have the final results on that one for you in next issue.

The winner of the best graphic portrait is J. Ventling of Xenia, OH. The portrait was of George C. Scott and is truly REMarkable.

The winner of the best rendition of the William Tell Overture is Garry Howard of Kennesaw, GA, Garry's submission is amazing, it was fun running his program when people stopped by and watching them glance at the radio and then the tape recorder and then discover that it was the computer and not an organ. It is without a doubt the best example of computer music that I've ever heard. Its only draw back is the fact that its extremely large, in fact he had to break the Source code files into seven parts so that they could be loaded into 16K. The program itself is small but the data is quite large, we are presenting his program in a rather unusual manner, the program, organ sound waveform table, and note table are presented in assembled source form and the data for the music is presented as a hex dump. Since the hex dump is several pages long and would be extremely hard to debug Garry has offered to produce tapes of the complete object code to anyone that doesn't wish to type it in for only \$3.95. His address is Garry Howard, 690 Teague Dr, Kennesaw, GA 30144.

The best program that assists with another hobby was extremely difficult to judge because all of the entries were very good and ranged from map drawing to pistol shooting. The winner however was Regena with her cookie file program. The thing that put her over the top was a neat little trick where you input the ingredients that you have available and it then tells you what cookies you can bake.

The winners of the Life Subscriptions to CCN are: Donald Johnson of Pittstown NJ, Richard Rogers of Fenton MI, Robert Foiles of Lancaster PA, Bob Schneider of Redlands CA, and Spencer Trimble of Tallahassee FL.

Since the winners haven't had a chance to select their prizes yet we just present the list of prizes here and show you the split after they have been selected. Cognitec: has given a copy of Telewriter to each of the winners.

Computer Plus: The winner of one of the contests will receive a 10% discount on any Color Computer related order. This can be any number of items but only one of any single item.

Tom Mix Software: has given the following software that the winners can chose between: 2 copies War Kings, 2 Moon Landers, 2 Tape Dupes, 2 Katerpillar Attacks, 2 Dancing Devils, 2 Trek 16s, 1 Ship Wreck and 1 Educational package.

Mark Data Products: The winner of the Magic Square contest will receive any 3 programs of his choice, the William Tell winner will get 2 programs of his choice, the winner of the best graphics portrait can pick any 2 programs and the hobby related winner can pick any single program.

Frank Hogg Labs: will be giving one winner a copy of Flex and another will receive OS9 when it becomes available.

80 US Journal: Each winner will receive a one year subscription.

Micro Technical Products: Has given each winner a \$25.00 discount for an LCA-47.

REMarkable Software: has given each winner a Life subscription.

The Micro Works: has given the winner of the Magic Square contest a copy of Macro 80C.

Strawberry Software: donated a copy of Tanjali (Genius) to the winner of the Hobbies contest.

Armadillo International Software: has given a copy of Armadillo bug to the William Tell contest and a copy of their Biorhythm program to the winner of the graphics contest.

This is only a partial listing since we were unable to verify all prizes by press time. The rest of the list will appear next issue.

#### GEORGE C. SCOTT PORTRAIT by J. Ventling 2400 Cornwall Xenia, OH 45385

10 CLS: PRINT@172, "PORTRAIT": PRIN T0201. "GEORGE C. SCOTT": PRINT026 5, "BY J. VENTLING": PRINT2487. "ON E MOMENT PLEASE": 20 G\$="U3H2L7G2D11F2R7E2U4L3DR2D 3LDL7ULU11RUR7DRD3" 30 E\$="L11D15R11UL10U6R6UL6U6R10 U" 40 T#="D3R6D20R3U20R6U3L15" 50 PMODE4, 1: PCLS: DRAW"C1" 60 DRAW"BM143.53"+G\$ 70 DRAW"BM159.48"+E\$ 80 DRAW"BM166,48;G2D11F2R7E2U11H 2L7D2LD11RDR7URU11LUL7" 90 DRAW"BM181,56:D7LU15R9F2D4G2L BURBURU4LUL8D6NF8RNF8RF8" 100 DRAW"BM207, 53"+6\$ 110 DRAW"BM223,48"+E\$ 120 DRAW"BM247, 53; U3H2L7G2D11F2R 7E2U3LD3LDL7ULU11RUR7DRD3" 130 DRAW"BM251, 63; ULDR" 140 DRAW"BM151,77:U2H3L9G3D6F3R4 DR2F4G4L3H3L3D2F3R9E3U6H3L4UL2H4 E4R3F3R3":PAINT(144,73),5,5:PAIN T(144,94),5,5 150 DRAW"BM175, 79; U3H4L7G4D15F4R 7E4U3L3G4LH4U9E4RF4R3"; PAINT (168 ,73),5,5 160 DRAW"BM188, 72; G4D15F4R7E4U15 H4L7BM191,75;G4D9F4RE4U9H4L":PAI NT(191,73),5,5 170 DRAW"BM204.72"+T\$: PAINT (208. 73).5.5 180 DRAW"BM223,72"+T#:PAINT(224, 73),5,5 200 DRAW"BM32, ODRD3M26, 7R4ERFD2G 2L2FR3D3F2R10D2L4GL6D2F2RF3R8DG2 L7GD2FERER2D2FND2R2ERF2DR4D2L4GD 4L5HLDF3DFRFR3FR14FR2FR5FRF2D3G2 D2R2DF3DGFD4F2DF3D4FDFD4F2DFDFD3 GDG2F3DFDF4D2FDFDF2RFDRF2D5FRE2U EUEU5HU2M87,57U5E4UHU2EUM97,34U2 EU2EU7HUHUH2U3HUH3EU2M90.0" 210 DRAW"BM34, 6R5ER2FG2LGL5U3"; DRAW"BM44.5R4D2L4U2":DRAW"BM51.6 4L4GLGDFRE4" 220 DRAW"BM69,83GD3FD4R2FR2U2HU2 HUH3": DRAW"BM85, 116DF3DF2REU2H4L 3" 230 DRAW"BM91,139D4GD2G2LGL2G3DG D3GDFRER2ER4F2RERUE3UM92,139";DR AW"BM59.157G2L2DRUR5HL" 240 DRAW"BM68, 191M87, 181U2L3DL3D L2UL5UL3UL2R4DR4DR3UE2HLHL2HLHER ER5E2UEUE2R3FGDGD3F2DGDG2D5FD3FM 90,191"

250 DRAW"BM42, 191M45, 168E2U3EU3E U3EU2H2LUEUH2U4EUM42, 132HLHUHUHU 2H2GU2HUH4LHL2U2HLH4L2U2HUHLHLH2 URE2UFR3F3RFRFRF3RFREUF2R9ER3ERE RE6HGLGL4DLUR2U3HE2HL2DLEUR2DR2E RE2UEH"

260 DRAW"L3G3L2UL5DL4H3U2R4DR5U2 H2U3E2U3NLD2R2D4RD2R2FEREU2RFEU4 NLDRD2F2RD2RDLD5FD5G3DFD6FD4FRED 5F2DGD2GD2GFRG3DG2DFG2D6F6RDLG2D 2G2L4DL3G3DG2D2LD6LD6FDF2RFDG2D6 M52,191"

270 PAINT (60,0),5,5; PAINT (46,66) ,5,5; PAINT (71,88),5,5; PAINT (89,1 19),5,5; PAINT (92,152),5,5; PAINT ( 84,173),5,5; PAINT (84,191),5,5; PA INT (47,82),5,5; PAINT (48,108),5,5 ; PAINT (43,191),5,5 300 SCREEN1,1; GOTO300



#### WILLIAM TELL OVERTURE by Garry Howard 690 Terrace Drive Kennesaw, GA 30144

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0012 004C	VOICE4	RNB 3
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	1 MMAC	runn indle fun undan duunu
0018 1000 0D0E0F1112	WFT	FCB \$00, \$0E, \$0F, \$11, \$12
0019 1005 141514		FCB \$14.\$15.\$16
0020 1000 1010101010		FCR 418, 419, 618, 617, 618
0020 1000 1017101010		ECD 415 420 422
		FUD 415; 424; 422 400 404
VV22 IVIV 23282/2728		F68 \$23, \$20, \$27, \$27, \$28
0023 1015 28202E		FUB \$28, \$29, \$20, \$2E
Q024 1018 3031323435		FCB \$30, \$31, \$32, \$34, \$35
0025 101D 373838		FCB \$37, \$38, \$38
0026 1020 393B3B3C3C		FCB \$39, \$38, \$38, \$3C, \$3C
0027 1025 3E3E3E		FCB \$3E, \$3E, \$3E
0028 1028 3F3F3F3F3F3F		FCB \$3F,\$3F,\$3F,\$3F,\$3F
0029 102D 3F3F3E		FCB \$3F, \$3F, \$3E
0030 1030 3E3E3C3C3B		FCB \$3E, \$3E, \$3C, \$3C, \$3B
0031 1035 383938		FCB \$38,\$39,\$38
0032 1038 3737353432		FCB \$37, \$37, \$35, \$34, \$32
0033 1030 31302F		FCR \$31.\$30.\$2E
ANTA (AAA 757878787878		500 475 478 478 474 479
		FLD 422; 429; 420; 420; 420; 427
0035 1045 272624		FUB \$27, \$20, \$29
0036 1048 2322201F1F		FCB \$23,\$22,\$20,\$1F,\$1F
0037 104D 1D1C1B		FCB \$1D, \$1C, \$1B
0038 1050 1B19191818		FCB \$18,\$19,\$19,\$18,\$18
0039 1055 161615		FCB \$16,\$16,\$15
-0040 1058 1515151515		FCB \$15, \$15, \$15, \$15, \$15
0041 105D 151515		FCB \$15,\$15,\$15
0042 1060 1515151516		FCR \$15,\$15,\$15,\$15,\$16
0043 1045 141418		FCR \$14.514.518
AAAA 1AAQ 1010101010		FCR 418, 418, 419, 419, 418
AAR IALS IBICIC		CCD 41D 41C 41C
ANAL LATA LAISIDICE		FUD TIDETIVETIV
		TUB VILITINITINITITITIT
VQ47 1075 1F2020		rus vir, v20, v20
0048 1078 2222222222		FCB \$22, \$22, \$22, \$22, \$22, \$22
0049 107D 232323		FCB \$23, \$23, \$23
0050 1080 23232323232		FCB \$23, \$23, \$23, \$23, \$23, \$22
0051 1085 222222		FC8 \$22,\$22,\$22
0052 1068 2020201F1F		FCB \$20, \$20, \$20, \$1F, \$1F
0053 108D 1D1D1C		FCB \$10, \$10. \$1C
0054 1090 1018191918		FCB \$1C, \$18. \$19. \$19. \$18

144	
0055 1095 161515	FCB \$16, \$15, \$15
0056 1098 141212110F	FCB \$14, \$12, \$12, \$11, \$0F
0057 109D 0E0E0D	FCB \$0E, \$0E, \$0D
0058 1040 0808040808	FCB \$08, \$08, \$0A, \$08, \$08
0059 10A5 070706	FCB \$07,\$07,\$06
0060 10AB 0604040303	FCB \$06, \$04, \$04, \$03, \$03
0061 10AD 030101	FCB \$03,\$01.\$01
0062 1080 0101010100	FCB \$01,\$01,\$01,\$01,\$01
0063 1085 000000	FCB \$00,\$00,\$00
0064 10BB 0001010101	FCB 400, 401, 401, 401, 401
0065 10BD 010101	FCB \$01,\$01,\$01
0066 1000 030303030303	FCB \$03, \$03, \$03, \$03, \$03
0067 1005 040404	FCB \$04, \$04, \$04
0068 1068 0404060606	FCB \$04, \$04, \$06, \$06, \$06
0069 10CD 060606	FCB \$06, \$06, \$06
0070 1000 0606070707	FCB \$06, \$06, \$07, \$07, \$07
0071 10D5 070707	FCB \$07,\$07,\$07
0072 1008 0706060606	FCB \$07, \$06, \$06, \$06, \$06
0073 10DD 060606	FCB \$06, \$06, \$06
0074 10E0 0606040404	FCB \$06, \$06, \$04, \$04, \$04
0075 1065 040404	FCB \$04, \$04, \$04
0076 10E8 0404040403	FCB \$04,\$04,\$04,\$04,\$04,\$03
0077 10ED 030304	FCB \$03,\$03,\$04
0078 10F0 0404040404	FCB \$04, \$04, \$04, \$04, \$04, \$04
0079 10F5 060606	FCB \$06,\$06,\$06
0080 10FB 070707080A	FCB \$07, \$07, \$07, \$08, \$0A
COBI 10FD CAOBOD	FCB \$0A, \$0B, \$0D
	1
	* NOTE TABLE
	<b># A ABOVE NIDDLE C (440 HERTZ)</b>
	# IS AT LOCATION #1144
0082 1100 0000026F02	TABL FCB \$00, \$00, \$02, \$67, \$02
0083 1103 7402EB	FLB \$74, \$V2, \$EB
0084 1108 VZE4V31VU3	FUB \$V2; \$E4; \$V3; \$10; \$03
VV83 11V8 3FV3/1	FGB 43F, 4V3, 471 FDD 447 446 447 400 446
	rus +us, +H3, +Us, +Ut, +U4
008/ 1113 1/0438	CCO ELT ENE ELL
AAGO 1115 A455A455A5	FCB \$17,504,556
0088 1118 049804DD05	FCB \$17, \$04, \$56 FCB \$04, \$98, \$04, \$30, \$05
0088 1118 049804DD05 0089 111D 280576	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$DD,\$05 FCB \$28,\$05,\$76 FCB \$28,\$05,\$76
0088 1119 049804DD05 0089 1119 280576 0090 1120 0509062106	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$50,\$05 FCB \$28,\$05,\$76 FCB \$05,\$07,\$06,\$21,\$06
0088 1118 049804DD05 0089 1118 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074007898	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$DD,\$05 FCB \$28,\$05,\$76 FCB \$05,\$C9,\$06,\$21,\$06 FCB \$7F,\$06,\$E2 FCB \$7F,\$06,\$E2
0088 1118 049804DD05 0089 111B 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074A078908	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$00,\$05 FCB \$28,\$05,\$76 FCB \$05,\$C9,\$06,\$21,\$06 FCB \$7F,\$06,\$E2 FCB \$07,\$4A,\$07,\$89,\$08 FCB \$07,\$4A,\$07,\$89,\$08
0088 1119 049804DD05 0089 1110 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074A07B908 0093 1120 2F08AC	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$DD,\$05 FCB \$28,\$05,\$76 FCB \$05,\$C9,\$06,\$21,\$06 FCB \$7F,\$06,\$E2 FCB \$07,\$4A,\$07,\$B9,\$08 FCB \$2F,\$08,\$AC
0088 1118 049804DD05 0089 111D 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074A07B908 0093 112D 2F08AC 0094 1130 093009BB0A	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$DD,\$05 FCB \$28,\$05,\$76 FCB \$05,\$C9,\$06,\$21,\$06 FCB \$7F,\$06,\$E2 FCB \$07,\$4A,\$07,\$B9,\$08 FCB \$2F,\$08,\$AC FCB \$09,\$30,\$09,\$BB,\$0A
0088 1118 049804DD05 0089 111D 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074A078908 0093 112D 2F08AC 0094 1130 0930098B0A 0095 1135 500AED	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$50,\$05 FCB \$28,\$05,\$76 FCB \$05,\$C9,\$06,\$21,\$06 FCB \$7F,\$06,\$E2 FCB \$07,\$4A,\$07,\$89,\$08 FCB \$2F,\$08,\$AC FCB \$09,\$30,\$09,\$BB,\$0A FCB \$50,\$0A,\$ED
0088 1118 049804DD05 0089 111B 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074A07B908 0093 112D 2F08AC 0094 1130 093009BB0A 0095 1135 500AED 0096 1138 0B930C430C	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$50,\$05 FCB \$28,\$05,\$76 FCB \$05,\$C9,\$06,\$21,\$06 FCB \$7F,\$06,\$E2 FCB \$07,\$44,\$07,\$B9,\$08 FCB \$2F,\$08,\$4C FCB \$09,\$30,\$09,\$BB,\$04 FCB \$50,\$04,\$ED FCB \$08,\$93,\$0C,\$43,\$0C
0088 1118 049804DD05 0089 111B 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074A07B908 0093 112B 2F08AC 0094 1130 093009BB0A 0095 1135 300AED 0096 1138 0B930C430C 0097 113D FE0DC4	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$DD,\$05 FCB \$28,\$05,\$76 FCB \$05,\$C9,\$06,\$21,\$06 FCB \$7F,\$06,\$E2 FCB \$07,\$4A,\$07,\$B9,\$08 FCB \$2F,\$08,\$AC FCB \$09,\$30,\$09,\$BB,\$0A FCB \$50,\$0A,\$ED FCB \$50,\$0A,\$ED FCB \$50,\$0A,\$ED FCB \$0B,\$93,\$0C,\$43,\$0C FCB \$FE,\$0D,\$C4
0088 1118 049804DD05 0089 111D 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074A07B908 0093 112D 2F08AC 0094 1130 093009BB0A 0095 1135 500AED 0096 1138 0B930C430C 0097 113D FE0DC4 0098 1140 0E950F7310 0099 1145 E511E2	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$DD,\$05 FCB \$28,\$05,\$76 FCB \$05,\$C9,\$06,\$21,\$06 FCB \$7F,\$06,\$E2 FCB \$07,\$4A,\$07,\$B9,\$08 FCB \$2F,\$08,\$AC FCB \$09,\$30,\$09,\$BB,\$0A FCB \$50,\$0A,\$ED FCB \$08,\$93,\$0C,\$43,\$0C FCB \$FE,\$0D,\$C4 FCB \$0E,\$95,\$0F,\$73,\$10 FCB \$0E,\$95,\$0F,\$73,\$10
0088 1118 049804DD05 0089 111D 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074A07B908 0093 112D 2F08AC 0094 1130 073009BB0A 0095 1135 300AED 0096 1138 0B930C430C 0097 113D FE0DC4 0098 1140 0E930F7310 0099 1145 3F1158	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$00,\$05 FCB \$28,\$05,\$76 FCB \$05,\$C9,\$06,\$21,\$06 FCB \$7F,\$06,\$E2 FCB \$07,\$4A,\$07,\$89,\$08 FCB \$2F,\$08,\$AC FCB \$09,\$30,\$09,\$88,\$0A FCB \$50,\$0A,\$ED FCB \$08,\$93,\$0C,\$43,\$0C FCB \$FE,\$00,\$C4 FCB \$0F,\$11,\$58 FCB \$17,\$10,\$17,\$10 FCB \$5F,\$11,\$58 FCB \$17,\$40,\$11,\$17,\$11
0088 1118 049804DD05 0089 1119 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074A078908 0093 1129 2F08AC 0094 1130 0730098B0A 0095 1135 500AED 0096 1138 08930C430C 0097 1139 FE0DC4 0098 1140 0E930F7310 0099 1145 5F1158 0100 1148 1260137714	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$50 FCB \$28,\$05,\$76 FCB \$05,\$C9,\$06,\$21,\$06 FCB \$7F,\$06,\$E2 FCB \$07,\$4A,\$07,\$89,\$08 FCB \$2F,\$08,\$AC FCB \$09,\$30,\$09,\$88,\$0A FCB \$50,\$0A,\$ED FCB \$08,\$93,\$0C,\$43,\$0C FCB \$08,\$93,\$0C,\$43,\$0C FCB \$FE,\$0D,\$C4 FCB \$0E,\$95,\$0F,\$73,\$10 FCB \$5F,\$11,\$58 FCB \$12,\$60,\$13,\$77,\$14 FCB \$06,\$15,\$77,\$14
0088 1118 049804DD05 0089 111D 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074A07B908 0093 112D 2F08AC 0094 1130 073009BB0A 0095 1135 500AED 0096 1138 0B930C430C 0097 113D FE0DC4 0098 1140 0E950F7310 0099 1145 3F1158 0100 1148 1260137714 0101 114D A015DA	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$50,\$05 FCB \$28,\$05,\$76 FCB \$05,\$07,\$06,\$21,\$06 FCB \$7F,\$06,\$E2 FCB \$07,\$4A,\$07,\$89,\$08 FCB \$2F,\$08,\$AC FCB \$09,\$30,\$07,\$88,\$0A FCB \$50,\$0A,\$ED FCB \$08,\$93,\$0C,\$43,\$0C FCB \$08,\$93,\$0C,\$43,\$0C FCB \$FE,\$0D,\$C4 FCB \$0E,\$75,\$0F,\$73,\$10 FCB \$0F,\$11,\$58 FCB \$12,\$60,\$13,\$77,\$14 FCB \$A0,\$15,\$DA FCB \$A0,\$15,\$DA
0088 1118 049804DD05 0089 111B 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074A07B908 0093 112D 2F08AC 0094 1130 073009BB0A 0095 1135 300AED 0096 1138 0B930C430C 0097 113D FE0DC4 0098 1140 0E930F7310 0099 1145 3F1158 0100 1148 1260137714 0101 114D A013DA 0102 1150 1726188719 0103 1155 FC1BB9	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$50,\$05 FCB \$28,\$05,\$76 FCB \$05,\$C9,\$06,\$21,\$06 FCB \$07,\$40,\$07,\$89,\$08 FCB \$07,\$40,\$07,\$89,\$08 FCB \$2F,\$08,\$4C FCB \$09,\$30,\$09,\$88,\$00 FCB \$08,\$93,\$00,\$43,\$00 FCB \$50,\$00,\$ED FCB \$08,\$93,\$00,\$43,\$00 FCB \$FE,\$00,\$C4 FCB \$0E,\$95,\$0F,\$73,\$10 FCB \$0F,\$11,\$58 FCB \$12,\$60,\$13,\$77,\$14 FCB \$00,\$15,\$DA FCB \$17,\$26,\$18,\$87,\$19 FCB \$17,\$26,\$18,\$87,\$19
0088 1118 049804DD05 0089 111B 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074A07B908 0093 112D 2F08AC 0094 1130 0930098B0A 0095 1135 500AED 0096 1138 0B930C430C 0097 113D FE0DC4 0098 1140 0E930F7310 0099 1145 5F1158 0100 1148 1260137714 0101 114D A015DA 0102 1150 1726188719 0103 1155 FC1B88 0104 1158 1D28155720	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$50,\$05 FCB \$28,\$05,\$76 FCB \$05,\$C9,\$06,\$21,\$06 FCB \$7F,\$06,\$E2 FCB \$07,\$4A,\$07,\$B9,\$08 FCB \$2F,\$08,\$AC FCB \$09,\$30,\$09,\$BB,\$0A FCB \$09,\$30,\$09,\$BB,\$0A FCB \$05,\$0A,\$ED FCB \$08,\$93,\$0C,\$43,\$0C FCB \$12,\$40,\$15,\$77,\$10 FCB \$12,\$60,\$13,\$77,\$14 FCB \$A0,\$15,\$DA FCB \$17,\$26,\$18,\$87,\$19 FCB \$FC,\$18,\$68 FCB \$12,\$26,\$15,\$65,\$73,\$10
0068 1118 049804DD05 0089 111B 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074A07B908 0093 112B 2F08AC 0094 1130 093009BB0A 0095 1135 300AED 0096 1138 0B930C430C 0097 113D FE0DC4 0098 1140 0E930F7310 0099 1145 3F1158 0100 1148 1260137714 0101 114D A015DA 0102 1150 1726188719 0103 1155 FC1B88 0104 1158 1D2B1EE720 0105 1150 PE32B0	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$50,\$05 FCB \$28,\$05,\$76 FCB \$03,\$C9,\$06,\$21,\$06 FCB \$7F,\$06,\$E2 FCB \$07,\$4A,\$07,\$B9,\$08 FCB \$2F,\$08,\$AC FCB \$09,\$30,\$09,\$B9,\$0A FCB \$09,\$30,\$09,\$B9,\$0A FCB \$50,\$0A,\$ED FCB \$08,\$93,\$0C,\$43,\$0C FCB \$FE,\$0D,\$C4 FCB \$0E,\$95,\$0F,\$73,\$10 FCB \$5F,\$11,\$58 FCB \$12,\$60,\$13,\$77,\$14 FCB \$A0,\$15,\$DA FCB \$17,\$26,\$18,\$87,\$19 FCB \$17,\$26,\$18,\$87,\$19 FCB \$10,\$28,\$15,\$E7,\$20 FCB \$10,\$28,\$15,\$E7,\$20
0068 1118 049804DD05 0089 111B 280576 0090 1120 05C9062106 0091 1125 7F06E2 0092 1128 074A07B908 0093 112B 2F08AC 0094 1130 093009BB0A 0095 1135 300AED 0096 1138 0B930C430C 0097 113D FE0DC4 0098 1140 0E930F7310 0099 1145 3F1158 0100 1148 1260137714 0101 114D A015DA 0102 1150 1726188719 0103 1155 FC1B88 0104 1158 1D2B1EE720 0105 115D BE22B0	FCB \$17,\$04,\$56 FCB \$04,\$98,\$04,\$00,\$05 FCB \$28,\$05,\$76 FCB \$05,\$07,\$06,\$21,\$06 FCB \$7F,\$06,\$E2 FCB \$07,\$4A,\$07,\$89,\$08 FCB \$2F,\$08,\$AC FCB \$07,\$30,\$07,\$88,\$0A FCB \$07,\$30,\$07,\$88,\$0A FCB \$05,\$0A,\$ED FCB \$08,\$93,\$0C,\$43,\$0C FCB \$FE,\$00,\$C4 FCB \$0E,\$75,\$0F,\$73,\$10 FCB \$5F,\$11,\$58 FCB \$12,\$60,\$13,\$77,\$14 FCB \$A0,\$15,\$DA FCB \$12,\$60,\$13,\$77,\$14 FCB \$A0,\$15,\$DA FCB \$17,\$26,\$18,\$87,\$19 FCB \$17,\$26,\$18,\$87,\$19 FCB \$10,\$28,\$16,\$57,\$20 FCB \$86,\$22,\$80 FCB \$24,\$00,\$24,\$55,\$27

0107 1165 402BB4	FCB \$40,\$2B,\$	B4	0150 11D7 A99F004C	ADCA [VOICE4]	
0108 1168 2E4D310E33	FCB \$2E, \$4D, \$	31, \$0E, \$33	0151 11DB B7FF20	STA PORT	TO D/A CONVERTER
0109 1160 F93710	FCB \$F9, \$37, \$	10	0152 11DE DC44	I DB VOICEI+1	
0110 1170 3A573DCF41	FCB \$34, \$57, \$	3D, \$CF, \$41	A157 1156 BTAE	ADDD INCI	THEOREWIC TO
0111 1175 704560	FCB \$7C. \$45. \$	60	VIGG ISEV DOTE AIRA LIEG BRAA	ADDD INGI ATR NATACIAL	INVALIENTO IV
0112 1178 4981400F52	FCR \$49, \$81, \$	40. 40F. 452	VIJ9 1162 DU99	BIN ANTCELAT	FULRIERS FUR
0113 1178 815749	FCR 481.457.4	40	0133 11E4 DC4/	LDD VUICE2+1	THE 4 VUICES
A114 1100 50004010		41D	0156 1166 0351	ADDD INC2	
ALLE LIDA LLAADA	FUD FUL; F7D; F1	DA TO WATH DOD	0157 11E8 DD47	STD VOICE2+1	
A113 1104 100004	SINKI LEKN MUSIC	ON IN UNTH LKD	0158 11EA DC4A	LDD VOICE3+1	
v 20 <sup>3</sup> 340	-		0159 11EC D353	ADDD INC3	
÷ K	V INITIALIZATION PRO	CEDURE	0160 11EE DD4A	STD VOICE3+1	
The second s	1		0161 11F0 DC4D	LDD VOICE4+1	
0116 1187 1A10	INIT ORCC 4\$10		0162 11F2 D355	ADDD INC4	
0117 1189 863F	LDA 443F	TURN ON AUDIO	0163 11F4 DD4D	STD VOICE4+1	
0118 1188 B7FF23	STA SWITCH		0164 11F6 31A2	LEAYY	DEC & CHEK TENPO
0119 118E 308DFE6E	LEAX WFT, PCR	INITIALIZE	0145 1158 2404	RME TINHAR	RRA IF NOT OUT
0120 1192 9F43	STX VOICE1	WAVEFORM	0144 11EA 0442	DEC NID	DEC & CHEV MIDATH
0121 1194 9F46	STX VOICE2	POINTERS	A147 1150 2700	DEG ENDNAT	INDIE NOTE ENA
0122 1196 9F49	STX VOICES		V10/ 11F5 2/V5	DEN ENUNUI	VITT AVIE CAV
0123 1198 9FAC	STY VOICEA		VIOD IIFE 2067	DRM FLMT	
0124 1194 TAPROATA	LEAY NOTOT DO	HIGTOTAST	VIG7 12VV H004	IIMHS LUA IY	PAUVIAN IN MAKE
A128 1108 0540	ETT MIMORY	1 119920911111	01/0 1202 2000	SKA WASIEI	LUUPS THE SAME
0120 1176 7TTV	DTO	END THIT	0171 1204 2000	WASTEL BRA WASTEZ	
VILO 11MV 07			0172 1206 2000	WASTEZ BRA WASTEJ	
		JEM	0173 1208 2001	WASTES BRA PLAYI	CONTINUE PLAYIN
	A PRULEBURE IU READ I		0174 120A 39	ENDNOT RTS	END PLAY
	t Dukailun			1	
	3			<b>I NAIN PROBRAM STARTS</b>	HERE
0127 11A1 9E40	READ LOX NUNORK			1	
0128 11A3 A680	LDA , X+	BET NEW DURATION	0175 120B 17FF79	MUSIC LBSR INIT	INITIALIZE
0129 1165 9742	STA DUR	STORE IT	0176 120E 8D91	LOOP BSR READ	BET DURATION
0130 11A7 39	RTS	END READ	0177 1210 8100	CNPA #0	
	<b>I</b>		0178 1212 2601	RNF OVER	
,	I PROCEDURE TO GET TI	IE NEXT	A179 1214 39	RTR	
	<b>I NOTES FOR THE FOUR</b>	VOICES	AIGA 1218 DRG1	AUCD BOD NATE	OFT NOTED
	1		VIOV 1215 5071	DOD DIAV	DEL MUTED
0131 11A8 3180FF54	NOTE LEAY TABL. PCR	NOTE TABLE	VIDI 1217 DUNE 0102 1210 2057	DDA LAND	CONTINUE LOODING
0132 1140 4480	IDA .Y+	RET NOTE VOICE 1	VIOL 1217 2VFJ A107 1910 100000000	STALLUNT COD OF A A A A	CONTINUE LOUFING
AITT HIAF FEAL	I DH A.V	RET INCREMENT	VIDJ 1218 10000000M	MOINT FUB 24, V, V, V, I	
ATTA 1100 BEAE	QTIL INCS	CTODE IT		UA V6 UV UV UV UB UB 1	
VIJ7 110V 9F4F	IRA VA	OFT NOTE UNICE 2	1228 00 0A 06	00 00 00 10 06 00 00 0	0 18
VIJJ IIDZ MOOV	LUN JAT	DET INFDEMENT	1234 06 00 00	00 22 06 00 00 00 28 0	6 00
VIJO IIDT EENO	LUU NJI	DEI INUNENENI DIODE IT	1240 00 00 30	06 00 00 00 3A OC 40 0	0 00
A121 1188 N.21	310 1962	DIVKE II	1240 00 09 00	00 00 00 03 40 00 00 0	0 30
0138 1188 A680	LDA JX+	REI MUIE ANICE 2	1258 48 00 00	00 18 48 3A 28 22 18 4	8 38
0139 11BA EEA6	LDU A, Y	GET INCREMENT	1264 2C 26 18	48 3A 28 22 12 48 40 3	8 18
0140 11BC DF53	STU INC3	STORE IT	1270 04 48 3E	38 18 01 00 00 00 00 0	C 48
0141 11BE A680	LDA ,X+	BET NOTE VOICE 4	127C 3E 38 18	OC 48 00 00 00 12 44 0	00 00
0142 11C0 EEA6	LDU A, Y	<b>BET INCREMENT</b>	1288 00 04 48	00 00 00 01 00 00 00 0	0 24
0143 11C2 DF55	STU INC4	STORE IT	1294 48 00 00	00 24 00 00 00 00 18 0	DE 00
0144 11C4 9F40	STX NUNORK	SAVE POINTER	1240 00 00 06	OC 00 00 00 06 0E 00 0	0 00
0145 1166 39	RTS	END NOTE	1200 06 14 00	00 00 06 18 00 00 00 0	06 20
	1		1288 00 00 00	04 24 00 00 00 04 30 0	0 00
* * *	I PROCEDURE TO PLAY	THE NUSIC	1200 VV VV VV VV	AA AA AA AF TE AA AA	00.09
	:		1267 VV VB 38	00 00 00 00 00 00 00 00 00 00 00 00 00	
0146 1107 10850048	PLAY LOY STENPO			AD 75 70 00 40 40 74 1	TA 30
	PLAYI INA FUNICEIT	ADD 4 VOICE		TO JE JV 26 10 70 JA	A 10
ALLE LICE ADDEAALL	ADDA LUNICESI	SANPI FR	12E8 18 48 JE	JU ZU 1Z 46 44 JU ZZ 6	17 70 80 70
A140 1107 1007000	ANCA FUNTPERT	WITTIT SALA W	12F4 40 30 22	VI UU UU UU UU UU UU UC 48	VC VC
VITT 1100 8775VV97	NUUN LIVIGEJJ		1300 22 OC 48	00 00 00 12 4A 00 00 0	JV V4

#### 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 enasure, 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 boundry 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 \$COOO.

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 boundry of the memory map from \$COOD 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 hobbiest 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.

#### Ordering Information COMPUTER ACCESSORIES OF ARIZONA 5801 E. VOLTAIRE DRIVE SCOTTSDALE, ARIZONA 85254 (602) 996-7569

Make checks payable to: COMPUTER ACCESSORIES OF ARIZONA Arizona residents add 5% sales tax. \* TRS-80 is a trademark of TANDY CORP. \*\* SDS80C is a trademark of the MICRO WORKS. Prices subject to change without notice.

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## -----

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	!"#\$%&/<>*+,/01234567 !"#\$%&/<>*+,/01234567 ⑤abcdefghijklmnopqrstuvu ⑥ABCDEFGHIJKLMNOPQRSTUVU	89:;<=>? 89:;<=>? xyz[\]t+ xyz[\]t+	
Compatibility:	Custom character sets are available as an option, call for a The LCA-47 is fully compatible with all TRS-80C software that we know on any semi-graphics or full-graphics modes. Also works great with Mi VDG chip! The LCA-47 will not fit under the RF shield if Computerwar	<sup>quote.</sup> w of, including Color Scripsit. It has no effect cro-Chroma-68 Kits and others using the 6847 are's "16-plus" memory board is installed.	
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#### COOKIE FILE by Regena 120 South 350 East North Salt Lake, UT 84054

"Cookie File" is a program written for the TRS 80 Color Computer, 16K, Extended BASIC. This program uses an array and a data structure to keep a file of cookie recipes. The user may select a cookie recipe from the menu screen, then that recipe will be printed on the screen. If the user then chooses to convert the recipe (double, triple, or halve, for example), a multiplication factor is entered and the converted recipe is printed. Another option of this program is that the user indicates on an inventory list which ingredients are available, then a list of which cookies can be made from those ingredients is printed.

Cookie Monster appears on the title screen with the music from Dr. Seuss's "Super Supper March" (Hungry, Hungry...).

The data statement for each cookie is entered in the following order: name of cookie, oraphics code, cups shortening, cups sugar, cups brown sugar, cups powdered sugar, tablespoons honey, eggs, teaspoons vanilla, cups flour, teaspoons baking powder, teaspoons baking soda, teaspoons salt, teaspoons cinnamon, tablespoons cocoa, teaspoons almond extract, cups milk, cups patmeal, ounces of chocolate chips, number of dozen almonds, teaspoons cake decors, and cups cinnamon and sugar, then baking temperature, An example is 1150 DATA ALMOND COOKIES, 2, 2, 2, ,,, 2, ,4, 2, ,,,,2, ,,,4, ,,375 which indicates almond cookies uses graphics color 2, and the recipe is 2 cups shortening, 2 cups sugar, 2 eggs, 4 cups flour, 2 tsp. baking powder, 2 tsp. almond extract, and 4 dozen almonds, then bake at 375,

#### VERSATILITY AND OTHER APPLICATIONS

Of course you can put your own recipes in this program by changing the data statements. I just chose some of my favorite cookie recipes. Other ingredients may be added or deleted by adjusting the first data statements which read the ingredient and measurement lists and the DIMension statement which uses the number of ingredients as a parameter in the array. You will also need to change the titles on the menu screen and the parameters of the FOR-NEXT loops.

The basic data structure idea for this program does not need to be limited to cookies. Any kind of recipe (casseroles, meats, or even craft or sewing instructions) may be used. Other applications could be food storage, home inventory, store inventory, attendance records, record keeping, or even letter composition from standard sentences or paragraphs. Only the data statements and titles need to be changed; the basic logic is the same (adapted slightly for the situation you want).

For example, a home inventory could use its data statement in this order: room number, item name, purchase price, depreciation, replacement value, year. Then items may be sorted alphabetically, by purchase price, by room, etc. A letter writer program could use in the data statement flags for which sentence to print and which to skip for each individualized letter.

Hard copy printing can be obtained by inserting the appropriate PRINT statements for your printer configuration.

#### BACK TO COOKIES

I did not always include mixing directions in the program because with cookies you usually know the procedure and just need the proportions of ingredients. You could add mixing instructions by adding some codes in the data statements to correspond to certain print statements. An example in this program is the graphics code 6 which also includes the "mixing" instruction, "Roll in powdered sugar."

In case you wish to try some of these recipes, you just mix the ingredients in order then bake. Some of the specifics are:

Almond cookies-roll into balls, flatten slightly, place blanched almond on top; brush with egg if desired. Ball cookies-drop cookies onto sheet then flatten with ice cube or moist rag; sprinkle "ball" colored cake decors on top; bake just until golden brown around the edges.

Brownies-melt the cocoa with the shortening first; bake in square pan. Butterscotch bars-melt shortening (or butter) with brown sugar; cool; then add other ingredients; bake in rectangular glass baking dish. Chocolate chip bars-bake in 9 x 13 pan. Chocolate chip cookies-drop cookies. Chocolate drop cookies-drop cookies. These are good with chocolate frosting.

Honey balls-roll into balls; bake about 25 minutes; roll in powdered sugar while still warm then again when cool. Honey spice cookies-drop cookies. Mexican wedding cookies-like honey balls. Oatmeal chocolate chips-drop cookies. Oatmeal crisps-refrigerator cookie; form into long roll; slice then bake. Snickerdoodles-roll dough into balls then roll in cinnamon and sugar mixture before baking. Toffee bars-press into 9 x 13 pan or on cookie sheet (about 1/2 inch thick).

#### EXPLANATION OF THE PROGRAM

Line Numbers Dimensions arrays for number of recipes. 60 number of ingredients. 70 Reads measurement and inpredient list. 80-110 Reads data for cookie recipe. 120-180 Subroutine to draw colored border around SCTOOD. 190 Specifies graphics screen for title screen. Draws letters of title. 200-270 280-320 Draws cookie monster. Plays "Super Supper March" theme. 330 Prints first menu screen. 350-400 Waits for user's input and branches 410-430 appropriately. 440-460 Prints instructions for first option, ingredient list. Prints each ingredient and waits for user 470-550 to press Y or N for inventory. 560-650 Checks cookie ingredients against ingredient inventory. Prints appropriate messages at end of 660-680 cookie list. 690-870 Prints lists of cookies and receives user's choice. 880-950 Prints recipe. 960-990 Asks if user wishes to convert recipe; branches appropriately. 1000-1010 Waits for user to press any key to continue. 1020-1030 Receives user's input of conversion factor. Prints converted recipe. 1040-1090 Asks if user wishes to convert again: 1100 branches. Data for measurements and ingredients. 1110-1140 Data for cookie recipes. 1150-1290 Clears screen and ends. 1300 Cookie data, where I indicates which C\$(I.J)

- cookie is chosen and J indicates data for that cookie. C\$(I,J) = name; C\$(I,2) = color code; C\$(I,23) = baking temperature; other parameters are ingredients used. I\$(I,J) Ingredients. I\$(I,1) = measurement used; I\$(I,J) = name of incondignt; I\$(I,2) = Y
- I\$(I,2) = name of ingredient; I\$(I,3) = Y
  or N for inventory.
  I.J Loop counters
- C Color code for graphics
- A\$ Key pressed by user; A\$=INKEY\$.
- YS Number of Yes answers in inventory.
- K Number of cookies possible with given inventory.

Number of cookie chosen. A F Conversion factor: must be greater than zero. 10 REM COOKIE FILE 20 REM BY REGENA 30 REM 120 SOUTH 350 EAST 40 REM NORTH SALT LAKE, UT 84054 50 GOTO 190 60 DIM C\$(15,23), I\$(20,3) 70 FOR I=1 TO 20:READ I\$(I,1),I\$ (1,2):NEXT I 80 FOR I=1 TO 15:FOR J=1 TO 23 90 READ C\$(I.J) 100 NEXT J.I 110 GOTO 350 120 REM SUB FOR BORDER 130 FOR I=0 TO 63 140 SET(I.O.C);SET(I.1.C);SET(I. 30.C):SET(I,31,C) 150 NEXT I 160 FOR I=2 TO 29 170 SET(0, I, C): SET(1, I, C): SET(62 , I, C):SET(63, I, C) 180 NEXT I:RETURN 190 PMODE 3,1; SCREEN 1,0; PCLS:CO LOR 4 200 DRAW "BM38, 15; H4L1264D20F4R1 2E4" 210 DRAW "BM70, 15; H4L12G4D20F4R1 2E4U20": DRAW "BM102, 15; H4L12G4D2 OF4R12E4U20" 220 LINE(116,11)-(116,39), PBET:L INE(130,11)-(116,22), PSET:LINE(1 16,22)-(130,39),PSET 230 LINE(144,11)-(144,39), PSET 240 DRAW "BM172.11:L16D12R10L10D 15R16" 250 DRAW "BM158, 60; L16D12R10L10D 15": DRAW "BM168, 60: D28": DRAW "BM 182.60:D27R16" 260 DRAW "BM228, 60; L16D12R10L10D 15R16" 270 DRAW "BM96, 60; L86F16G16D64F8 R72E8U64H16E16":PAINT(60,161).4. 280 COLOR 3: CIRCLE (166, 130), 8: CI RCLE(178,130),8:CIRCLE(166,134), 4:CIRCLE(178,134),4 290 DRAW "BM166, 136; L8H2L4G4D6F4 D2F4G8D4G4D4G2D4G12":DRAW "BM166 ,136; R20F6D6G2D2G4D2G4F12D12F4D1 2" 300 DRAW "BM180,142; D4G4L2G2L8H2 L1H3U4R22" 310 DRAW "BM172, 128; U4E2U4E4R2E4 R8E2R12F4D4F2D4F2D8G3L4H2L6G8"

350 SCREEN 0,0:CLS 360 PRINT 069, "CHOOSE:" 370 PRINT @133, "1 NEED TO KNOW W HAT": PRINT @167. "CAN BE MADE" 380 PRINT 0228, "2 WANT TO SEE A" PRINT 0263, "CERTAIN RECIPE" 390 PRINT 0325, "3 END PROGRAM" 400 C=4: GOSUB 130 410 AS=INKEYSIF AS="" THEN 410 420 IF ASC(A\$)<49 OR ASC(A\$)>51 **THEN 410** 430 ON ASC(A\$)-48 GOTO 440,690,1 300 440 CLS:PRINT "IN THE FOLLOWING LIST," 450 PRINT "PRESS 'Y' IF YOU HAVE ":PRINT "THE INGREDIENT.":PRINT "PRESS 'N' IF YOU DO NOT." 460 PRINT: PRINT "PRESS 'S' TO ST ART OVER." 470 SOUND 193,6:YS=0 480 FOR I=1 TO 20 490 PRINT I\$(I,2);" -"; 500 A#=INKEY#: IF A#="" THEN 500 510 IF A#="S" THEN 440 520 IF A\$<>"Y" AND A\$<>"N" THEN 500 530 I\$(I,3)=A\$;PRINT A\$ 540 IF As="Y" THEN YS=YS+1 550 NEXT I 560 K=0: PRINT: PRINT "YOU CAN MAK E: ": PRINT 570 IF I\$(1,3)="N" OR I\$(8,3)="N " THEN 680 580 IF YS<=4 THEN 680 590 FOR I=1 TO 15 600 FOR J=1 TO 20 610 IF C#(I,J+2)="" THEN 630 620 IF I\$(J,3)="N" THEN 650 630 NEXT J 640 SOUND 200,10:PRINT C\$(I,1):K #K+1 650 NEXT I 660 IF K=0 THEN 680 670 PRINT: PRINT "GO AHEAD AND BA KE!":GOTO 1000 680 PRINT "NOTHING TODAY.":PRINT "YOU NEED MORE SUPPLIES.": GOTO 1000

 

 320 PAINT(166,140),3,3;PAINT(166
 690 CLS:PRINT 066,"CHOOSE:":PRINT

 ,128),2,3:PAINT(178,128),2,3
 T 0130,"1 ALMOND COOKIES":PRINT

 330 PLAY "T3;L4;03D02B03C02ABGAD
 0162,"2 BALL COOKIES"

 GBA03C02BGL2A;L403D02B03C02ABGED
 700 PRINT 0194,"3 BROWNIES":PRINT

 3L3CL402DGL8AG#A03C02L4BAL4G"
 T 0226,"4 BUTTERSCOTCH BARS":PRINT

 340 G0T060
 NT 0258,"5 CHOCOLATE CHIP BARS"

 710 PRINT 0290, "6 CHOCOLATE CHIP COOKIES": PRINT 0322, "7 CHOCOLAT E DROP COOKIES" 720 PRINT 0354, "8 HONEY BALLS":P RINT 0386, "9 HONEY SPICE COOKIES ":PRINT 0418, "0 GO TO NEXT SCREE N<sup>11</sup> 730 C=3:GOSUB 130 740 A\$=INKEY\$:IF A\$="" THEN 740 750 IF ASC(A\$)<48 DR ASC(A\$)>67 THEN 740 760 IF A\$="0" THEN 780 760 A=101 (A\$) (A\$) 770 A=VAL (A\$): GOTO 880 780 CLS:PRINT 066, "CHODSE: ":PRIN T 0130, "1 MEXICAN WEDDING COOKIE S"" 790 PRINT @162,"2 DATMEAL CHOCOL ATE CHIPS":PRINT @194,"3 DATMEAL CRISPS" 800 PRINT 0226, "4 SNICKERDOODLES ":PRINT 0258, "5 SUGAR COOKIES":P RINT 0290, "6 TOFFEE BARS" 810 PRINT 0354, "B BACK TO FIRST SCREEN": PRINT 0386, "E END PROGRA M'' 820 C=4:GOSUB 130 830 A\$=INKEY\$:IF A\$="" THEN 830 840 IF A\$="E" THEN 1300 850 IF A\$="B" THEN 690 860 IF A8C(A\$)<49 DR A8C(A\$)>54 THEN 830 870 A=VAL(A\$)+9 880 CLS:PRINT:PRINT " ";C\$(A,1 ):PRINT 890 FOR I=3 TO 22 900 IF C\$(A,I)="" THEN 920
910 PRINT " ";C\$(A,I);I\$(I-2,1
);I\$(I-2,2)
920 NEXT I 930 PRINT:PRINT " BAKE AT ";C\$ (A,23);" DEGREES." 940 IF C\$ (A, 2) ="6" THEN PRINT " ROLL IN POWDERED SUGAR." ROLL IN POWDERED SUGAR." 950 C=VAL(C\$(A,2)):GOSUB 130 960 PRINT: PRINT "WANT TO CONVERT RECIPE (Y/N)?"; 970 A#=INKEY#: IF A#="" THEN 970 980 IF A#="Y" THEN 1020 990 IF A\$<>"N" THEN 970

1000 PRINT: PRINT "PRESS ANY KEY TO CONTINUE.": 1010 A\$=INKEY\$: IF A\$="" THEN 101 0 ELSE 350 1020 PRINT: PRINT "MULTIPLY BY WH AT NUMBER": PRINT "OR DECIMAL FRA CTION?" 1030 INPUT F; IF F<=0 THEN PRINT SORRY, F>0": GOTO 1020 11 1040 PRINT: PRINT F: "TIMES ORIGIN AL RECIPE": PRINT: PRINT C\$ (A, 1):P RINT 1050 FOR I=3 TO 22 1060 IF C\$ (A, I) ="" THEN 1080 1070 PRINT F\*VAL(C\$(A,I)); I\$(I-2 ,1);I\$(I-2,2) 1080 NEXT I BAKE AT ";C\$ (A, 23 1090 PRINT " 1100 PRINT: PRINT "CONVERT AGAIN? (Y/N) "::GOTO 970 1110 DATA " C. ", SHORTENING, " C. ", SUGAR, " C. ", BROWN SUGAR, " C. , POWDERED SUGAR, " TB8P. ", HONE Y, " ", "EGGS" 1120 DATA " TSP. ", VANILLA, " C. ", FLOUR, " TSP. ", BAKING POWDER, " TSP. ", BAKING SODA, " TSP. ", SAL T 1130 DATA " TSP. ", CINNAMON, " TB SP. ", COCOA, " TSP. ", ALMOND EXTR ACT." C. ".MILK," C. ", DATMEAL 1140 DATA " DZ. ", CHOCOLATE CHIP S, " DOZ. ", ALMONDS, " TSP. ", CAKE DECORS, " C. ", "CINNAMON & SUGAR 11 1150 DATA ALMOND COOKIES, 2, 2, 2, ,,2,,4,2,,,,2,,,,4,,,375 1160 DATA BALL COOKIES, 3, .5, .33, 1170 DATA BROWNIES, 4, .5, 1, , , , 2, 1 ..75,.5,.5,.6,.,,,,350 1180 DATA BUTTERSCOTCH BARS,2,.5 ,,2,,,2,1,1.75,2,,.25,,,,,,,,3 75 1190 DATA CHOCOLATE CHIP BARS.3. .5,,1,,,1,1,1.75,,.5,.5,..5,..5,.1 2,,,,350 1200 DATA CHOCOLATE CHIP COOKIES ,4,.5,.25,.5,,,1,.5,1,,.5,.5,,,, ,,6,,,,375 1210 DATA CHOCOLATE DROP COOKIES ,3,.5,,1,,,1,1,1.67,,.5,.5,,6,,. 5,,,,,350 1220 DATA HONEY BALLS, 6, . 5, . . . 2, ,1,1,,,.25,,,,,,,,,,,300

1230 DATA HONEY SPICE COOKIES, 3. 75 1240 DATA MEXICAN WEDDING COOKIE 8, 6, . 75, , , . 67, , , 1, 1. 5, , , . 25, 1, , , ,.75,,,,,325 1250 DATA DATMEAL CHOCOLATE CHIP 8, 2, 1, 1, .5, ,, 2, 1, 2, , 1, 1, ,, ,, 2, 6, 1260 DATA OATMEAL CRISPS, 3, 1, 1, 1 ,,,2,1,1.5,,1,1,,,,,3,,,,,350 1270 DATA SNICKERDOODLES, 4, 1, 1.5 ,,,,2,,2.75,3,,.5,,,,,,,,,,5,400 1280 DATA SUGAR COOKIES, 2, . 67, . 7 5,,,,1,.5,2,1.5,,.25,,,,.25,,,,, ,375 1290 DATA TOFFEE BARS, 3, 1, , 1, ... 1,2,,,,,,,,,6,,,,350 1300 CLS: END

## Color Computer SMALL C Compiler

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- Generates position independent code

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## For Your Color Computer

## MASTER CONTROL

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#### MAKING EDUCATION MORE COLORFUL by David Bodnar

This month I would like to complete several things that I started in last month's column. First I will bring you up to date on how my school district is using the Color Computer. I will also review an interesting utility program that was used to create some of the features that made SILLY SYNTAX, the program that I reviewed last month, so good.

Last time I described how my school district began using computers to teach programming and problem solving to elementary students. I would like to complete that discussion by giving a detailed description of how the program was implemented.

After all 5th and 6th grade students were introduced to the computers our task of teaching programming and "computer literacy" began. We began our instructional program with about one third of the students that had already been introduced to the computers, those who had demonstrated the greatest competency with basic mathematical skills. One hour of their weekly mathematics instruction was replaced with one hour of computer instruction. Since our main interest was in using the computer as a vehicle to teach problem solving strategies we felt that this was a tradeoff of instructional time.

In addition to the one hour of class instruction per week the students chose partners and each pair of students was assigned about 45 minutes of computer time per week.

The class lessons were taken from the book PROBLEM SOLVING WITH COMPUTERS. As the title implies it does not look upon basic programming as an end in itself but as a tool that can be used to solve problems in many areas of study. The first chapter looks at what a computer is, where they are used, and the 5 parts of every computer: INPUT, OUTPUT, MEMORY, ARITHMETIC and CONTROL.

Chapter 2 explains how to log onto a timesharing system with a terminal (which we briefly discussed just as a point of interest) and how to set up a microcomputer and load programs from tape. The microcomputer that they use as an example seems to be a MODEL I so its instructions transfer with minimal changes to the COLOR COMPUTER.

Chapter 3 introduces the BASIC language and one of the most valuable tools that any serious problem solver can have, flowcharting. This chapter is also the first to have activities that reinforce and extend the concepts developed in the chapter. The 8 activities include practice in flowcharting, simulating a BASIC run and "DEBUGGING" programs. Chapter 4's topics are INPUT statements, order of operations and scientific notation. Chapter 5 gets into decision steps (IF/THEN) and how they are flowcharted and used to solve problems.

The last chapter, chapter 6, challenges the students to use what they have learned to solve several fairly involved problems by following a systematic strategy that includes converting the problem into very specific English statements, then into a flowchart and finally into a BASIC program. It also explains the process of documenting a program and why this is so important.

In addition to the activities for chapters 3-6 there are also tests and retests for each chapter. The retests are to be given to those who demonstrated an area of weakness that had to be retaught.

PROBLEM SOLVING WITH COMPUTERS gave our students a good introduction to what might be called a "generic" computer. To give them specific instruction in the use of the COLOR COMPUTER we chose to use GETTING STARTED WITH COLOR BASIC. As it is. GSWCB is a good test, but it lacks two components that are needed for use in a school setting; activities and tests, We prepared worksheets for the first 7 chapters of the book. Each has room to answer the questions that are posed in the text and for the Do-It-Yourself activities. At the end of each worksheet are several extension activities that allow the students to apply what he/she has learned by solving a problem or writing a program. We also wrote retests for those who needed additional instruction in one or more areas.

The PSWC and GSWCB programs were run concurrently. The weekly one hour class was used to work through PSWC and to introduce and go over specific problem areas in GSWCB. It was also used to give and go over tests for both programs.

We found that this dual program method was particularly effective because the students were given two doses of instruction in most areas. If one book didn't present the material in a way that a student could understand then the other book presented it to them in a different context. During the first semester of this school year we covered all of PSWC and the first 7 chapters of GSWCB. This gave the students enough of a base of knowledge to start on independent projects. These projects were designed to challenge the students to apply their skills and to encourage them to continue with

#### GSWCB and GOING AHEAD WITH EXTENDED COLOR BASIC. For example, the first independent project was the following:

Write and save on tape a program that will:

1. Ask your name.

2. Greet you by name.

3. Ask you to choose a number between 1 and 100.

4. Have the computer choose a random number between 1 and 100.

5. Tell you if your number choice is the same as the computer's.

6. Tell you if your number choice is less than the computer's.

7. Tell you if your number choice is greater than the computer's.

8. Keep track of the number of guesses that you use to correctly guess the computer's number.

#### TO MAKE YOUR PROGRAM REALLY SUPER!!

Modify your program so that it will also: 9. Let you choose the largest number that the computer can pick.

10. Catch any ERRORS that the player makes. For example if you select 200 as the largest number that the computer can pick the computer should not allow a guess of 323.

11. Do something FANCY when you win. (sounds, pictures...use your imagination!!!)

12. Add something that no one would expect that makes you program really special.

The first 8 items were required from everyone and they could be accomplished using only the commands and concepts presented in the first 7 chapter of GSWCB. Items 9-11, however, require additional information on PLAY, a command that could truly make their programs special. They also found that chapters 9 and 15 in GSWCB explained how to use low-res graphics. Since they had a "NEED TO KNOW" about these things the learning went more quickly and it was more fun. To give a specific example, one student wanted to do a routine that could only be done efficiently with arrays. Since he needed to know about arrays and understood the job that the array was to do it was fairly easy for him to grasp this particularly difficult concept.

To show how far one pair of students could go with the above assignment I have included the listing for a program that was turned in by one group of boys. I think that you will be as pleasantly surprised as I was with what kids can do after a fairly short introduction to the COLOR COMPUTER. All in all we have been very pleased with the success that the students have experienced and the attitude of the children, their parents and the administration. We have started to teach programming to another third of the 5th and 6th grade students and find their interest to be as great as that of the first group.

#### AUTO RUN

For those of you that have been impressed with programs like SILLY SYNTAX that display a low-res graphics screen while the program loads and then self-execute..read on. AUTO RUN can make your programs do all of this and more. It contains a superb screen editor that will allow you to create a customized title screen for your programs in a very short time. It also modifies your BASIC or machine language program so that it will self-execute.

When AUTO RUN is loaded, as you might expect, it displays a graphics title screen. But then there is a little surprise for those of you who have your TV's volume control turned up. The sound of an automobile skidding and crashing comes from your speaker. You see, the program also allows you to add a section of audio (music, voice, sound effects or whatever) to your program tape.

Upon self-execution a menu appears asking if you want Title screen utilities, to Create program tape or to Return to BASIC. The Title screen utility allows you to start from tape and edit it or to save a screen to tape. When you begin a new screen you are asked for background and border colors, then you are asked to choose a border design. You may select a checkerboard or a variety of solid borders. When creating the title screen you may move a flashing cursor around the screen with the arrow keys and use them to draw large words or designs. Keying <X> allows you to enter text onto the screen. Other commands allow you to draw lines, shift the entire screen or a section of it left, right, up or down.

When you are ready to create a program tape you must first define parameters. These include opting to include a title screen and, if your program is in BASIC, selecting where it is to load. This allows you to load a very long BASIC program directly into the 1st or 2nd graphics page thus avoiding the executing of a PCLEAR0 or PCLEAR1 before loading.

If you choose to include sound effects you are given an opportunity to choose the length of the selection and there is a test mode that allows

you to make a dry run to see if the time you have selected is sufficient.

Once this is done it is a simple matter to place the AUTO RUN loader on tape. Your program is then saved directly after it and you are done. For those of you who are interested in marketing the loader produced by AUTO RUN in your program without paying royalties.

The program is very well documented and includes a complete, commented source listing of the assembly language routines that are used in the program. Those of you who are learning assembly language may learn enough from this listing alone to justify the \$14.95 price.

#### AUTO RUN SUGAR SOFTWARE 2153 Leah Lane Reynoldsburg, OH 43068

10 REM STEVE M & STEVE K 20 GOTO 1240 30 \* \* \* \* GUESS NUMBER \* \* \* 40 ' BY S&S PRODUCTIONS 60 ' WASHINGTON SCHOOL 70 ' 735 WASHINGTON ROAD 80 ' PITTSBURGH, PA MT. LEBANON 100 PMODE 1, 1: PCLS: COLOR8, 8: SCRE EN 1,0:PAINT (0,0),5,8 110 LINE (0,0) - (255, 191), PSET, B 120 DRAW"BM75, 20; U5; H10; L15; G7; D 15; F5; R20; F7; D15; G6; L20; H7" 130 DRAW"BM145,55; H40; E10; R17; F5 ; G35; D5; F8; R15; E15; U5" 140 DRAW"BM210, 20; U5; H10; L15; G7; D15: F5: R20: F7: D15: G6: L20: H7" 150 DRAW"BM85, 110; U30; BU5; U5" 160 DRAW"BM100.110:U30:BD9:E9:R1 21F91D22" 170 DRAW"BM165, 105; G5; L15; H5; U20 ; E5; R15; F5"; DRAW"BM175, 110; U5; R5 1D5:L5" 180 DRAW"BM16, 170; U40; R20; D20; L2 0":DRAW"BM40,170;U40;R20;D20;L20 ; F20": DRAW"BM65, 170; R20; BL20; U20 :R20:BL20:U20:R20" 190 DRAW"BM115,140;U5;H5;L15;G5; D9; F5; R14; F5; D12G5; L15; H5"; DRAW" BM125, 170; R20; BL20; U20; R20; BL20; U20; R20": DRAW"BM150, 170; U40; F15; D10F15U40"

200 DRAW"BM200, 170; U40; L15; BR15; R15": DRAW"BM245, 140; U5; H5; L15; G5 1 D9; F5; R14; F5; D12; G5; L15; H5"; DRA W"BM248,150;R7" 210 FOR Y=1 TO 15; SCREEN 1, 0; SOU ND 100,2:SCREEN 1,1:SOUND 200,2: NEXT 220 DUMMY=RND(-TIMER) 230 CLS 240 CH#=CHR#(134+32) 250 A=481 260 D=160+17 270 FOR X=1 TO 30 280 PRINT@X, CHR#(134+32); : PRINT@ A.CHR\$(134+32); 290 A=A+1 300 NEXT 310 FOR X=0 TO 448 STEP 32 320 PRINTQX, CHR\$(134+32); : PRINTQ X+31, CHR\$(134+32); **330 NEXT** 340 PRINT@0, CHR# (&H20); : PRINT@31 .CHR\$(&H20): 350 PRINT@96+10, "quess number": 360 PRINT@160+8, "A GAME OF SKILL + <sup>11</sup> # 370 PRINT0385+6, "PRODUCED BY S&S INC.": 380 FOR T=1 TO 4 390 SCREEN 0,1:SOUND 100,3 400 FOR X=1 TO 460:NEXT 410 SCREEN 0,0:SOUND 200,3 420 FOR X=1 TO 460:NEXT 430 NEXT 440 TIMER=0 450 IF TIMER<110 THEN 450 460 GOSUB 710 470 PRINT064+3, "ENTER YOUR NAME" j:INPUT NA\$:PRINT@64+31,CHR\$(134 +32) # 480 IF VAL (NA\$) <> OOR NA\$="" THEN PRINT064+3, STRING\$ (28, &H20) :: GOT 0 470 490 PRINT@96+3, "THANK YOU, ": NA\$: IFOR X=1 TO 4601NEXT 500 PRINT@128+32+3, "ENTER HIGHES T NUMBER COMP. "; PRINT@192+3, "CA N PICK"; : INPUT NU: PRINT@192+31.C HR\$(134+32); 510 IF NU<2 THEN PRINT0320+3, "BE REASONABLE !! :: FOR X=1 TO 460\*2 :NEXT:PRINT0320+3,STRING\$ (16,&H2 0)::GOTO 500 520 CO=RND(NU) 530 CO=INT(CO);NU=INT(NU)
540 GOSUB 1150 550 GOSUB 710 560 PRINT@64+3, "PICK A NUMBER":: PRINT@96+6, "BETWEEN 1 AND"NU; 570 GU#="" 580 C1=128+5 590 PRINT@128+3, "?";:A#=INKEY#:I F AS="" THEN 590 ELSEIF AS=CHRS( 8) THEN GOTO1140ELSEIF As=CHR\$(0) 3) THEN 590ELSE IF AS=CHR\$(13) T HEN 600 ELSE GUS=GUS+AS:PRINTO C1.A\$::C1=C1+1:Z3=Z3+1:GOTO 590 600 GU=VAL (GU\$) 610 IF VAL (GU\$)=0 THENPRINT@128+ 3,STRING\$(28,&H20):: GOTO 570 620 Z3=0 630 IF GU>NU THEN PRINT@32+2, "ON LY BETWEEN 1 AND"NU: NA\$: FOR X=1 TO 460\*2:NEXT:PRINT032+2,STRING \$(28, " ");:PRINT@128+2.STRING\$(2 8," ")::GOTO 560 640 IF GU>CO THEN C=1:PRINT@160. CH\$:" TOO LARGE";:EW=EW+1; C DE TERMINES TOO LARGE OR TOO LOW WH EN MAKING RECORD ON SIDE 650 IF GU<CO THEN C=2:PRINT0160, CH\$:" TOO SMALL"::EW=EW+1 660 IF GU=CO THENEW=EW+1: PRINT03 2+25, "G="; EW;; GOTO 810 670 PRINT032+25, "G="; EW; 680 GOSUB1150 690 GOSUB 750 700 GOTO 560 710 FOR X=33 TO 449 STEP 32 720 PRINTQX,STRING\$(30, " "); **730 NEXT** 740 RETURN 750 IF C=2 THEN PRINT@D-1,GU; "TO O SMALL"; 760 IF C=1 THEN PRINT@D-1, GU; "TO O LARGE": 770 TIMER=0 780 IF TIMER<110 THEN 780 ELSEPR INT0128+3,STRING\$(28," ");;D=D+3 2: IF D>448+17 THEN D=160+17: GOSU B 710 790 PRINT@160+2,STRING\$(10," "); 800 RETURN 810 PLAY"V2002; T2; L16; C; E; G; L9; D 3;C;P100;L16;02;G;L4;03;C;P10" 820 FOR X=1 TO 255 STEP 30; SCREE N 0, SC: SOUND X, 2: SCREEN 0, 1: SOUN D X+1.2:NEXT 830 CLSO; PRINT0226, ""; : NW\$=" YOU GOT IT ON THE BUTTON! "

840 FOR X=1 TO LEN(NW\$): PLAY"T25 L110A; B": PRINTMID\$ (NW\$, X, 1): NEX T 850 FOR X=1 TO 460:NEXT 860 IF RND(2)=2 THEN 970 870 PMODE 3.1: PCLS: COLOR 3.5: SCR EEN 1.1 880 A=127; B=97; C=129: D=95 890 FOR X=1 TO 32 900 LINE (A, B)-(C, D), PSET, B 910 A=A-4:B=B-3:C=C+4:D=D+3 920 SOUNDRND (255),1 930 NEXT 940 PAINT (0,0),8,7 950 FOR X=5 TO 253STEP 2: PAINT (X ,96),CX,7:CX=CX+1:IF CX>8 THEN C X=1 960 NEXT: GOTO 1000 970 PMODE 4,1:PCLS:SCREEN 1,1:FO R X=10 TO 170 STEP 2 980 CIRCLE(128,96),X,7 990 NEXT 1000 FOR X=1 TO 100:NEXT 1010 CLS 1020 NA#=NA#+"." 1030 CX=1 1040 NWS="CONGRATULAT IONS 11 1050 FOR X=1 TO LEN(NW\$):PRINTMI D\$(NW\$,X,1);:SOUND 225,2:NEXT 1060 FOR X=1 TO LEN(NA\$); PRINTMI D\$ (NA\$, X, 1); :SOUND 240, 2:NEXT 1070 PRINT@230, "YOU GOT IT IN"EW "ATTEMPT"::IF EW>1 THEN PRINT"S" 1080 IF V>5 THEN V=0 1090 NA(V)=NA=EW(V)=EWNU(V)=N U 1100 PRINT: PRINT: PRINT" (C) -CONTI NUE, (E) END, ": PRINT" (R) -SEE RES ULTS SO FAR": INPUT"PICK ONE"; AN\$ 1110 IF LEFT\$ (AN\$, 1) = "C" THEN V= V+1:CX=0:EW=0:GOTO 30 1120 IF LEFT\$ (AN\$, 1) = "R" THEN 11 70 1130 IF LEFT\$ (AN\$, 1) ="E" THEN CL S:END ELSE 1100 1140 IF C1<134 THEN GOTO 590 ELS EIF GU\$="" THEN 590 ELSEMID\$ (GU\$ , Z3, 1) =" ": PRINT@C1-1," ";:C1=C1 -1:A\$=INKEY\$:Z3=Z3-1:GOTO 590 1150 PLAY"02T5L16C; D; E; F; G; 03C; D 1E:F:G:04C" 1160 RETURN

## MAKING EDUCATION MORE COLORFUL

## 1170 CLS:PRINTTAB(13)"RESULTS":P RINTSTRING\$(32,&H83); 1180 PRINTTAB(2)"NAME:"TAB(10)"G UESSES:"TAB(20)"HIGHEST#:":PRINT

1190 FOR X=0 TO 5 1200 IF NA\$(X)="" THEN 1210 ELSE PRINTTAB(0)X+1TAB(3)NA\$(X); 1210 PRINTTAB(10)EW(X);TAB(20)NU (X) 1220 NEXT 1230 GOTO 1100 1240 PCLEAR4:GOTO 30 30000 CSAVE"# GUESS",A

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## OPTIMIZING HIGH RESOLUTION ANIMATED GAMES IN EXTENDED BASIC By: Howard Bassen 3505 Hutch Pl. N. Chevy Chase, MD 20815

You might not develop the fastest arcade type games with Extended BASIC, but the high resolution graphics (available in PMODE 3 or PMODE 4), the varied sound effects, and ease of programming available to the Intermediate-Level BASIC Programmer, make the Color Computer a step ahead of all other personal computers in its price range. By using a variety of special techniques, many not mentioned in the Radio Shack manuals, you can create complex and colorful images for your own high resolution animated games, and generate sounds that are wild and varied. I have found many techniques and tricks through trial and error, by reading various articles, letters, etc. in Color Computer News, TRS-80 Microcomputer News, Rainbow, Chromasette, and other magazines, and by speaking with the TRS staff via the toll-free Hot Line. I will present these techniques in this article and indicate the "optimum" choice (as best I could determine) in terms of game performance (maximum speed, smoothest motion, minimum memory requirements, etc.), To aid understanding I will present examples which separately demonstrate each of the various methods and programming tricks.

ANIMATION, To create animation we can use either the GET-PUT feature of Extended BASIC, or the DRAW command, Let's start with GET-PUT. The Radio Shack Manual states that you can not generate an image which is much larger than about 35 by 35 (length times width) in a 16K machine. Since 5 bytes of memory are used for each element, and the number of elements you must declare in a 2 DIMension array is equal to the product of length times the width, this implies that you use about 7000 bytes for a single image. This, together with 4 pages of graphic screen memory (about 6000 bytes) leaves little room for your program. Several articles in CCN and in TRS-80 Microcomputer News showed that instead of using a two-dimension array of say (50 X 25) for an image contained in this size of screen space, all you need do is use a SINGLE dimension array, DIM(50) for the above example. Unfortunately, using images which are much bigger than 50 X 25 in size will start to significantly slow down the speed of motion of an image when it is PUT in different places on the screen for animated effects. Still, with all of this "extra" memory made available by using a single dimension array for image storage, you can afford to have many images stored, including several partially or completely "blank" images containing

areas with only the background color. You can PUT these special images in any location to selectively "erase" another image. You can store an image of a puff of smoke and PUT it where a hit has occurred during the action in a game. Another trick I have used is to put some "destruction" in a game by PUTting a stored image in one spot, but using the wrong size area. A scrambled image will appear. For example, if you get an image which is at location (0,0)-(50,25) and later PUT it in location (0,0)-(60,25) a rectangle containing a scrambled image appears.

Moving an image around on the screen by using the PUT statement requires some special care, or a flickering effect will occur. A good method for providing short moves with smooth animation is to include an extra bit of blank background at the margin of the stored image, when using the GET command. If you only plan to move the object from left to right in increments of 5 picture elements, for example, then leave 5 extra blank pixels on the left side of the stored image. However, if you surround all sides of your image with a wide, blank border to allow movement in any direction, you will probably erase some of the graphics on the screen when you move your image. You could use two stored screens and form an image on one while displaying the other, but, in the high resolution PMODEs (3 or 4) this would cost you about six thousand memory locations. I have developed an "optimum" strategy which uses virtually no memory, yet allows smooth motion anywhere on the screen. To move in any direction, use several stored images, each containing the same object, but each having a different side containing a blank background area. For example, when moving UP in a given increment, PUT a stored image containing a blank area BELOW the object, in the new location. If you want to PUT the image in a random location at any particular instant (large moves), use a totally blank image to erase the presently displayed image. For example, if the image is in location (100,100)-(120,120), PUT a totally blank image there. Then, immediately PUT the desired image in its new spot, say location (150,100)-(170,120). First, you must save the X and Y coordinates of the old image before youchange these X,Y values. Caution is required for these long moves, since you can create flicker in part of the new image if you PUT part of the blank image in an area where you next put the new image. The above methods are demonstrated in the following example.

1 REM LISTING 1 SAMPLE PROGRAM USING GET-PUT. 5 PMODE 3,1: COLOR 1,3 :REM SET BACKGROUND COLOR TO BLUE 10 PCLEAR 4 20 PCLS 30 REM SET DIMENSION OF IMAGE AR RAY. NOTE THAT THESE ARE SINGLE DIMENSION ARRAYS 40 DIMBS(50): DIMBB(50) 45 REM BB IS THE ORIGINAL IMAGE BS IS A BLANK IMAGE 50 DIMBU(50):DIMBD(50) 60 REM BU IS THE IMAGE WITH AN AREA OF BLANK SPACE BELOW IT, BD IS THE IMAGE WITH BLANK SPACE ABOVE IT. 70 CIRCLE (100,100),15,2,.30 75 REM DRAW IMAGE OF AN ELLIPSE (FLYING SAUCER) BO PAINT (110,100),2,2 : PSET(94,100,4): PSET(100,100,4): PSET(106,100,4) 85 REM PAINT SAUCER YELLOW. THEN GET THE IMAGES WITH THE FOLLOW-ING STATEMENTS: 90 GET (72,92)-(122,108), BB,G 100 GET (0,160)-(50,176),85,6 110 GET(72,82)-(122,108), BD, G 120 GET(72,92)-(122,118),BU,G 130 PUT (85,90)-(135,105),88, PSET 140 REM SET X AND Y COORDINATES OF IMAGE 150 REM YK IS THE VERTICAL POS-ITION YOU WANT TO LOCATE THE IMAGE AT; UK THE PRESENT VERT-ICAL POSITION OF THE IMAGE. 160 REM X IS THE HORIZONTAL POS-ITION YOU WANT TO MOVE THE IMAGE TO, AND LX IS THE PRESENT POSITION OF THE IMAGE. 170 YK=70: X=0 180 REM FOR DEMONSTRATION PUR-POSES SET BACKGROUND COLOR TO YELLOW. CHANGE THIS AND LINE 330 TO "PCLS 3" LATER FOR BLUE BACK-GROUND. 190 PCLS 2 200 V=JOYSTK(0) 210 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. 220 SCREEN1,0 230 REM ADVANCE X 240 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" 250 A=INT(JOYSTK(1)/3); YK=INT((6.5\*A))+30 260 REM USE UP-DOWN MOTION OF RIGHT JOYSTICK TOCONTROL POS-ITION OF FLYING SAUCER FROM Y=30 TO Y=160, IN STEPS OF VERTICAL PIXELS. 270 REM VERTICAL POSITION CAN BE CHANGED TO ANY LOCATION ON SCREEN IN ONE MOVE. 280 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. 290 IF YK>UK THEN GOSUB 360: REM MOVE THE IMAGE DOWN (FROM ONE VERTICAL COORDINATE TO A LARGER (AND LOWER) ONE USING THE SUBROUTINE STARTING ON LINE 360 300 IF UK>YK THEN GOBUB 420 : REM MOVE THE IMAGE UP WITH SUB-ROUTINE ON LINE 420. 310 IF X>190 THEN GOSUB 330: REM CHECK FOR POSITION AT RIGHT EDGE OF SCREEN 320 GD TD 200 330 PCLS 2 : REM IF AT RIGHT EDGE OF SCREEN THEN CLEAR SCREEN. RESET HORIZONTAL POS-ITION TO X=0 IN LINE 340 340 X=0 350 RETURN 355 REM LINE 360 IS THE START OF THE SUBROUTINE TO MOVE THE IMAGE DOWN. 360 IF YK-UK>16 THEN 390 D, PSET: REM FOR A SMALL DOWN-WARD MOVEMENT (LESS THAN THE IMAGE'S VERTICAL DIMENSION 370 PUT(X, YK-10)-(X+50, YK+16), B PUT AN IMAGE WITH A BLANK AREA ABOVE IT IN THE NEW POSITION. THIS INSTANTLY ERASES THE OLD IMAGE.

380 GD TO 410 385 REM FOR A LARGE DOWNWARD CHANGE IN THE VERTICAL POSITION LINES 390 AND 400 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. 390 PUT(LX,UK)-(LX+50,UK+16),BS, PSET 400 PUT (X, YK) - (X+50, YK+16), BB, PS ET 410 RETURN : REM END OF "DOWN" SUBROUTINE. 415 REM LINE 420 STARTS THE SUR-ROUTINE TO MOVE THE IMAGE UP. 420 IF UK-YK>16 THEN 450 -430 -PUT (X, YK) - (X+50, YK+26), BU, PBET : 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. 440 GOTO 470 445 REM FOR A LARGE CHANGE IN THE VERTICAL POSITION, LINES 450 AND 460 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. 450 PUT(LX,UK)-(LX+50,UK+16),BS, PSET 460 PUT(X, YK)-(X+50, YK+16), BB, PS ET 470 RETURN : REM END OF "UP" SUBROUTINE

The DRAW command can be used for animation too. As long as the image size is not too large, and you don't PAINT your image, the DRAW command is fast, and has the advantage of being able to create different size "scaled" images. This gives you a method for creating a three-dimensional motion effect so an image can be made to appear as if it is moving from a far-away location to a closer position. Changing from a smaller to a larger image makes the object appear as if it is coming closer to the viewer. You erase the old image by simply DRAWing the image at the same location, but use the background color to DRAW over the first image. The following example produces the near-far effect with the scale size controlled by the right joystick - JOYSTK(1).

```
5 REM LISTING 2. DEMO OF DRAW
WITH JOYSTICK CONTROL OF SCALE.
10 PCLEAR4
20 PMODE 4.1
30 PCLS
40 SCREEN1,1
50 K#="1" : ZZ=1
60 CIRCLE(20,170),10: CIRCLE (45
,180),5: CIRCLE(190,25),12
70 KB#=K# : ZB=ZZ : J=JOYSTK(0)
:GX=JOYSTK(1)
BO Z = 1 + (GX/6)
90 K=20
          +1.7* (GX)
100 K=INT (K)
110 K$=STR$(K)
120 ZZ = INT(Z)
130 SCALE=(ZZ )
140 S#="S"+STR# (SCALE) +";"
150 B$="S"+STR$ (ZB) +";"
160 DRAW "CO"+B$+"BM"+KB$+","+"5
0;H10;R15;F10;R20;F10;G10;L20;G1
0; L15; E10; U20; D4; NL8; D4; NL12; D4;
NL16; D4; NL12; D4; NL8"
170 DRAW "C5"+S$+"BM"+K$+", "+"50
;H10;R15;F10;R20;F10;G10;L20;B10
;L15;E10;U20;D4;NL8;D4;NL12;D4;N
L16: D4: NL12: D4: NL8"
180 GOTO 70
```

MOTION can be controlled by the joysticks, are arrow keys, or by a pre-defined set of program instructions. The joysticks can be used in an "analog" fashion by directly locating the X and Y coordinates of the object to be moved at the value of the joysticks J(0) and J(1), or some multiple of each. In the first example (Listing 1) this technique was used to control the vertical motion (Y axis) of the flying saucer. This analog technique results in a rather "choppy" and hard to control type of motion or positioning. For smoother control of motion, the joysticks can be used as "switching" devices to send a "forward", "reverse", "up" or "down" command that is identical to the use of the arrow keys, Finally, the joysticks can be used for "proportional speed control" to give the "optimum" in smooth control of both speed and position. The following sets of BASIC statements illustrate the use of the joysticks for motion and position control.

1 REM LISTING 3 JOYSTICK DEMO 10 CLS: PRINT"FOR JOYSTICK DEMOS ,ENTER THE FOLLOWING: ANALOG MODE\*RUN 15\*, SWITCHING MODE \*RU N 100\*, PROPORTIONAL MODE \*RUN 200\*" 12 END

```
15 CL8: PRINT"ANALOG MODE DEMO-
 MOVE RT. JOYSTK UP/DOWN": REM ANA
LOG MODE, DEMO PROGRAM PRINTSOUT
 THE VALUE OF Y
                  WHILE YOU
                              MOV
E RIGHT JOYSTICK UP AND DOWN.
20 P=JOYSTK(0): REM YOU MUST
ALWAYS CALL JYSTK(0) FIRST.
BEFORE CALLING OTHERS.
25 N=3: K=20
30 Y=N*JOYSTK(1)+K
35 IF Y>180 THEN Y=180: REM
N= A CONSTANT (NUMBER)
40 REM K= A CONSTANT (NUMBER)
45 PRINT Y:" ":
50 PLAY"A"
55 GO TO 20
100 REM SWITCHING MODE OF JOY-
STICK CONTROL.
105 CLS: PRINT "SWITCHING MODE
DEMO. MOVE RT JOYSTK UP/DOWN":J=
JOYSTK(0)
110 V=JOYSTK(1)
115 IF V>45 THEN GOSUB 140
120 IF V< 15 THEN GOSUB 155
125 PRINT Y;"
               - <sup>10</sup> H
130 PLAY"A"
135 GO TO 105
140 Y=Y+10
145 IF Y>180 THEN Y=180
150 RETURN
155 Y=Y-10
160 IF Y<20 THEN Y=20
165 RETURN
200 REM PROPORTINAL CONTROL MODE
205 CLS: PRINT"PROPORTIONAL MODE
 DEMO. MOVE RT.JOYSTK UP/DOWN FO
R DIFFERENT
              RATES OF CHANGE";
Y=100
210 J=JOYSTK(0)
215 A=JOYSTK(1)/3
220 Y=INT(Y+A-10)
225 IF Y>180 THEN Y=180
230 IF Y<20 THEN Y=20
235 PRINT Y:" ":
240 PLAY"A"
245 GO TO 210
```

The "DISPLAY" of an animated game involves the proper use of color sets, PMODES, the SCREEN command and other miscellaneous features. Most of these are covered adequately in the Radio Shack Extended BASIC manual. Some things are not mentioned or clearly explained. These include the 2 color PMODE 4 (the highest resolution mode) in a special way that enables you to get 4 colors. In addition to black and buff in PMODE 4 (color set 1) you can set small points or lines in red and green, and still retain the highest level of resolution (256 by 192 pixels). Red and green appear against a black background when a single line width is used to draw a line of point in PMODE 4 using color #5 (buff). This is especially good for space games. You can get other colors to appear against a black background in a lower resolution mode by drawing a scene in PMODE 3, and then switching to PMODE 4. Orange and blue can be obtained in addition to buff and black using color set 1. The following changes can be made to LISTING 1 to get the special colors of PMODES 3/4.

1 REM LISTING 4 SAMPLE PROGRAM USING GET-PUT AND USING 4 COLORS WITH BLACK BACKGROUND. 5 PMODE 3,1 70 CIRCLE (100,100),15,2,.30 75 REM DRAW IMAGE OF AN ELLIPSE (FLYING SAUCER) 80 PAINT (110,100),2,2 : PSET (94,100,1): PSET(100,100,1): PSET (106, 100, 1) 85 REM PAINT SAUCER BLUE AND PUT THREE WINDOWS ON IT. THEN GET THE IMAGES WITH THE FOLLOWING STATEMENTS: 190 REM LINES 191-197 ADD BACK GROUND FEATURES AND CHANGE TO THE BLACK, BLUE, ORANGE, AND BUFF COLOR SET (PMODE3/4). 191 PMODE 3,1:SCREEN1,1 192 CIRCLE(20,20),9,3 193 PAINT (20, 20), 3, 3 194 LINE(0,192)-(155,165),PSET; LINE(155,165)-(255,189), PBET 195 PAINT (40,185),4,4 197 PMODE 4.1 220 SCREEN1,1 250 A=(J0YSTK(1)/10) ; AA=6\*INT(A): YK=YK+(AA-18) 255 IF YK<35 THEN YK=35 257 IF YK>140 THEN YK=140 270 REM VERTICAL POSITION IS UNDER PROPORTIONAL RATE CONTROL USING THE RIGHT JOYSTICK. 330 PUT(X, YK)-(X+50, YK+16), B8, PSET

Uses of the SCREEN and PMODE commands that are not clearly defined in the Extended BASIC manual are: until the SCREEN command is called, you remain in the text mode. This allows you to DRAW an image and PAINT in **Optimizing High Resolution Animated Games** 

various features (a slow process) without showing the drawing process going on, For example, call PMODE 3,1. Then draw and paint a picture, and then call SCREEN 1,1. Then call PMODE 3,5 and draw and paint another image. Doing this, you can show a completed picture which is located on pages 1 through 4, then draw a second picture starting on page 5 (by calling PMODE 3,5). Finally, display the second image by using the SCREEN 1,1 command. This uses lots of memory, however, and is only practical for 32K systems if many other BASIC program statements are used in a high resolution program. This concludes the first of two parts of my article on Extended BASIC high resolution games. In a future article I will discuss the "optimum" use of SOUNDS, and the use of BOMBS, LASER RAYS, etc., and then apply them to our sample game (Listing 1 + Listing 4's modifications) to produce a complete arcade type game in BASIC.



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WAR-KINGS from TOM MIX SOFTWARE \*=\*=\*= MACHINE LANGUAGE =\*=\*=\* 16K Ext.Basic - Cassette 19,95 reviewed by Ron Beatty 1045 Pine N.W. Grand Rapids, MI 49504

One of my favorite eras is the Middle Ages, the Age of Chivalry, when King Arthur, Sir Lancelot, Merlin, the Knights of the Round Table and Mystical Dragons wandered the earth. Although there are no Merlins or dragons (or Guenevere) in WAR-KINGS, there are two kings and two armies af knights.

WAR-KINGS is an arcade game that is a cross between Breakaway and War Lords and a good one it is!! It is written in MACHINE LANGUAGE for fast action and lots of fun. It is for two players and requires both joysticks. If you don't have a partner find one. If you can't, find a stop watch and take control of both joysticks and see how long you can last.

I have learned a new term while playing this one. The term is "BLOOD OUT". I'll get to it's source and meaning later.

After loading and executing the program, you are asked the skill level you desire. There are three, EASY, MEDIUM and HARD. The next display is the battle field. This consists of two castles, one at the top left of the screen and the other at the bottom right. Each castle has a WAR-KING residing within. Outside of the castle walls, each King has a shield, let us call them an army of knights. Each army has the task of 1.) stopping an approaching cannonball, (a boulder flung from a catapult), from destroying your castle and 2.) flinging the cannonball back at the opponent.

Each time the cannonball strikes a castle wall, a piece of the wall crumbles away. The castle walls are three layers of stone thick. Therefore, it takes more than one hit in the same area of a wall in order to break completely through it. After the cannonball hits a wall or the edge of the battle field, it returns across the battle field in a new direction. Finally, if you last long enough, your walls are in a shambles leaving you, (the WAR-KING) open for a direct hit. Of course, it only takes one hole in a wall to allow the cannonball to enter the castle. If this happens you could be in trouble. You are carrying your own shield of armor and although it does offer you some protection, it does not move.

After you select the skill level, both joystick "fire" buttons must be pressed simultaneously to begin play. Each player's army of knights is controlled by a joystick. Their movement can be confusing at first. Your army will move from side to side. For newcomers, if you are not familiar with this type of game, the idea is to move your army in a direction that will meet the oncoming connonball. If you succeed, the cannonball will be deflected away from your castle and will head back toward your opponent.

By the way, don't let the cannonball get caught between YOUR army and YOUR castle walls, it could be disasterous!!!

The EASY skill level provides a good training ground for future combat. The cannonball moves at a slow speed and gives you plenty of time to react. The MEDIUM level, as expected, is a bit faster. The HARD level is definitely a challenge. It's fast and for my son and myself, it's a time when we add more sound effects to a game that already has good sound effects.

Speaking of my son, he is the source of the term "BLOOD OUT". This "BLOOD OUT" occurs when the cannonball slips through a hole in one of the castle walls and hits a WAR-KING. You'll see what I mean when you play it.

I mentioned earlier that the sound is good. Actually I think it's better than good, especially because it occurs each time the cannonball hits anything and does not interfere with the action.

A feature that I think would have been nice to have that is not in WAR-KINGS is some type of scoring. Scoring always gives you that extra target to shoot at other than your opponent. There are two other points I will mention here. 1.) It appears that you cannot put any english on the cannonball. This feature always adds more challenge to this type of game. Of course it's a bit difficult to put english on a cannonball. 2.) The cannonball will go through the movable armies. The latter is rare and during play in the HARD level, I believe both points will not make any difference. The action is fast enough that there is scarcely time to notice.

An important feature that all good arcade games should have is durability or staying power. WAR-KINGS looks good. I have only had this game about a month, but I think that with the right mix of other games, you will return to this one time and time again. Tom Mix has added a fine product to his catalog. This month we have a discussion of the string pool and its garbage collect routine.

So what is string pool garbage collection anyway? It doesn't sound like something useful like keyboard input or line drawing routines. It is, however, fundamental to the operation of the Color Computer and is worth some study so that you can fully understand how it operates.

Whenever you do an INPUT A\$, or run a line such as X\$=Y\$+Z\$, you are creating a new string. Whenever there is a string, the computer has to store it somewhere. Even if you just type CLOAD"NERF" then the string "NERF" must be put somewhere. These strings are stored in the string pool.

The string pool is a block of memory at the end of RAM. Its size can be set with the CLEAR statement, and is initially set to 200 bytes. Whenever a string is to be stored, it is copied into the string pool at the highest available addresses. The string variable then just keeps a pointer into the string pool, along with the length of the string.

When any variable is set to a new value, the old value is lost. So it is with string variables, too. As string variables change values, all the old strings are left in the string pool taking up space which we may eventually need. We could keep compacting as we go, but this would be slow, since some data might have to be moved many times as various strings are deleted.

So now, as strings come and go, we work our way through the string pool leaving unused strings behind us. When we finally run out of room, we have to go back and figure out which strings we can throw away. This is called garbage collection, and is done by the garbage collect routine which starts at address \$B591 in Rom.

The garbage collection algorithm is this: We go through everything which might point at a valid string, find the string with the highest starting address, move that string up against the end of the string pool, and repeat until done.

Valid string pointers can be found in three places: variables, dimensioned variables, and temporary string pointers in the string formula area. The string formula area contains room for eight temporary string pointers and keeps a record of all strings until they are assigned to a specific variable (or printed or otherwise used). By the way, an overflow of those eight pointers is what causes that error message "String Formula Too Complicated".

It should be noted that attempts to measure the speed of various Basic routines may be confounded by the arbitrary nature of the garbage collection, which will take up a substantial amount of time at an unpredictable moment.

If your program has the line A="HELLO" then the word HELLO is not put into the string pool. It doesn't need to be. The pointer in A\$ can simply point at the word right in the program itself. That is why you can use a lot of strings in a program which would appear to overflow the string pool. Even if you READ strings from a DATA statement they don't go into the pool. If you INPUT them, then they do. Also, if you say A\$="HELLO" + "" the resulting string will be in the pool.

Here are the comments to a disassembly listing. If you haven't gotten a disassembler yet, all I can say is, "Haven't you been listening all these months?"

The routine at \$B56D is called with a length in the B register, and it allocates that many bytes in the string pool. It returns with X pointing at the area allocated. It calls the garbage collect at \$B591 if necessary, and jumps to the error routine at \$AC46 if there is still not enough room.

Variables, areas, and routines -

Addr	Comments
coune ecces secto quante	since online water device device acres labors allow
0007	FLAG IF GARBAGE COLLECTED
001B	START OF VARIABLES
001D	START OF ARRAYS
001F	END OF ARRAYS
0021	START OF STRING POOL
0023	START OF USED AREA OF
	STRING POOL
0025	POINTER TO STRING
0027	END OF STRING POOL
0041	TEMPORARY POINTER
0047	HIGHEST STRING FOUND
004B	ADDRESS OF DESCRIPTOR OF
	HIGHEST STRING FOUND
PARAME	TERS TO BLOCK MOVE.
0041	HIGHEST ADDRESS TO MOUE TO
W. W	HIGHEST HODRESS TO HOVE TO
0043	HIGHEST ADDRESS TO MOVE
0045	LOWEST ADDRESS MOVED TO
0047	LOWEST ADDRESS TO MOVE
B56D	ALLOCATE STRING ROUTINE
B591	GARBAGE COLLECT
B5D8	PROCESS ONE DESCRIPTOR
BSEF	COMPACT ONE STRING

Line-by-line comments -Addr Comments 856D CLEAR GARB. COLL. FLAG **B56F** MAKE LENGTH 16 BITS 8570 PUSH STRING LENGTH B572 LOWEST USED LOCATION B574 NEW LOWER LIMIT (& POP O) 8576 WILL IT FIT? B579 IF LOWER, MUST GARB. COLL. **B57B** NEW LOWER ADDRESS 857D PUT IT IN X 857F BUMP BY ONE B581 PUT INTO STRING POINTER 8583 RESTORE B & RETURN B585 GET ERROR CODE (IN CASE) B587 HAVE WE COLLECTED YET? YEST IT REALLY WON'T FIT 8589 8588 GO GARBAGE COLLECT 858D RESTORE LENGTH TO B 858F GO TRY AGAIN B591 GET END OF POOL 8593 MARK IT EMPTY 8595 CLEAR TO ZERO ... TO FLAG NONE YET B596 ... OF VALID STRING PTRS B597 LOWEST ADDRESS IN POOL **B599** AS HIGHEST STRING YET **B59B** 859D STRING FORMULA AREA B5A0 BEYOND LAST VALID ONE? B5A2 IF SO. EXIT LOOP GO DO ONE DESCRIPTOR B5A4 85A6 LOOP POINT TO FIRST VARIABLE **B5A8** END OF VARIABLES? B5AA IF SO, EXIT LOOP **B**5AC **B5AE** GO DO ONE VARIABLE B5BO LOOP **B5B2** POINTER NOW IN TEMP **B5B4** GET THE TEMP POINTER **B5B6** END OF ARRAYS? **B5B8** IF SO, EXIT LOOP B5BA GET LENGTH OF ARRAY ADD ONTO TEMP B5BC NOW POINTS TO NEXT ARRAY B5BE B5CO GET SECOND LETTER IN NAME IF PLUS, NOT STRING ARRAY **B5C2** GET NUMBER OF DIMENSIONS B5C4 TIMES 2 BYTES PER DIMENSN **B5C6** B5C7 PLUS 5 BYTES OVERHEAD B5C9 POINT X AT 1ST DESCRIPTOR END OF THIS ARRAY? B5CA IF SO, ON TO NEXT ARRAY B5CC

DO ONE DESCRIPTOR BSCE LOOP FOR NEXT ELEMENT B5D0 GET 2ND LETTER OF NAME B5D2 **B5D4** POINT X AT DESCRIPTOR **B5D6** IF 2ND LTTR MINUS, STRING B5D8 GET STRING LENGTH **B5DA** IF ZERO, FORGET IT **B5DC** GET STRING ADDRESS BSDE IN AREA ALREADY COMPACTED? BSE1 IF SO. FORGET IT B5E3 HIGHEST ONE WITHIN POOL? BSE6 IF NOT, FORGET IT BSE8 SAVE DESCRIPTOR ADDRESS **B**5EA SAVE STRING ADDRESS BUMP X TO NEXT DESCRIPTOR B5EC BSEE RETURN BSEF GET HIGHEST DESCRIPTOR **B5F1** IF WEREN'T ANY MORE, DONE **B5F3** CLEAR MSB OF LENGTH **B5F4** GET LSB OF LENGTH -1 TO POINT AT LAST BYTE B5F6 **B5F7** FORM ADDRESS OF LAST BYTE 85F9 SET TOP MOVE ADDRESS B5FB TOP OF FREE AREA SET TOP OF MOVE TO ADDRESS B5FD CALL MOVE BLOCK ROUTINE BSFF GET DESCRIPTOR ADDRESS B602 B604 GET NEW ADDRESS PUT IT INTO THE DESCRIPTOR B606 B608 STRING ADDRESS AGAIN B60A BACK TO LAST FREE BYTE LOOP FOR NEXT COMPACTION B60C



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## 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!

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MasterCharge/Visa Accepted California residents add 6% tax. 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

Part I: Introduction to Graphics and Animation

So, you broke down and bought a personal computer! You have now joined millions of other people in this country and abroad who have done the same thing. You will never regret it.

Your reasons for buying a microcomputer could be many and varied. For some people the computer was purchased as a record keeper. It will keep track of their budget, Christmas card list, favorite recipes, household valuables and may even double as a small business computer to handle payroll, inventories and accounts receivable.

Other people bought their personal computer to learn computer programming. This allows the user to develop an expertise at that user's own pace. Since computers are the future, developing a working knowledge of computers and the basics of programming will prepare the user for the coming age.

Some people, and here I include myself, bought a microcomputer for the sheer joy and challenge of programming. These are the programming fanatics. Quite a few of these people are independent software developers. Many or most of the business and arcade-type game programs are written by these independent programmers. A few are directly associated with certain software companies.

In the fourth category I put people who bought their first computer for fun. They purchase many game programs, some of which utilize dazzling displays of graphics and animation. It is not the intent of this tutorial to instantly change the beginner into a seasoned professional at producing these colorful graphics. That can only be accomplished by much practice and trial-and error.

These quick lessons are meant to give the beginning programmer some experience in producing colorful displays and a firm base from which to advance and produce more complex animation as experience is gained.

Part II of this tutorial will be presented next month. We will be looking at some simple low resolution, text mode graphic representations and programming ideas using the command PRINT Q. Included will be a complete program, utilizing low resolution graphics to display a horserace. This will be a fun game to play at parties, and you will find that youngsters will want to play it over and over. In Part III we will examine another method of producing low resolution graphics in the text mode. The commands SET and RESET will allow us to produce some types of graphics much more easily than the PRINT @ command, although the resolution will be basically the same.

In Part IV we will look at some high resolution graphics. Our discussion will deal with BASIC only, and not involve assembly language programming since the programmer who is at this level of expertise will not need much prompting, and will probably already have a firm grasp of graphics and animation.

I have used the word "resolution" quite a few times now in this introduction. It should be explained before we proceed much further. The degree of resolution means the degree of detail in your graphics. The higher the resolution, the finer lines look and the rounder circles are. Low resolution graphics would be similar to drawing a picture with a broad-tipped marking pen; while high resolution graphics would be similar to using a fine point pen.

You may very well ask why anyone would want to use low resolution graphics if high resolution makes better looking pictures. The main reasons are available memory and color selection. In general, the higher the resolution the more memory is needed and the fewer colors are available for use. So, even though a low resolution graphics picture may look "blocky", it can be very colorful. Like most of life, there always seems to be a trade-off.

Even the very beginning programmer will be able to do nice animation after reading these tutorials. Animation is not difficult to learn at all, and you will be very surprised to see how soon you will be producing game programs that are colorful and fun to play. Graphics and animation can make the difference between a good program and a great one.

Your Radio Shack Color Computer is a very powerful personal computer. Its many capabilities are at your command. Happy Programming!

Part II: Low Resolution Graphics - PRINT @ Command

Low resoluton graphics can be examined at two different levers, both in the text mode. The first level uses the PRINT @ command and is explained here. The second uses the SET/RESET commands which will be examined next month. The text mode is the normal mode for your Color Computer. Any PRINT statement will automatically put you in the text mode. Take a look at the text mode, or PRINT @ mode, worksheet in the back of the instruction manual. This is the grid we will be using for this tutorial. You will notice that in this grid the squares are numbered from 0 to 511.

The PRINT @ command works as follows. The command PRINT @ 224,"X" will print the letter X in square number 224. You can substitute any letter, number, expression or graphics character in place of the X inside the quotes. Any expression, or series of characters, will be printed starting at the location you command. For example, PRINT @ 224,"ABCD" will print A in location 224, B in location 225, C in location 226 and D in location 227.

Since animation is just a moving picture, if we move an item from square to square, animation is born. To demonstrate this, type in this short program and RUN it.

## PROGRAM I

10 CLS 'CLEAR THE SCREEN 20 FOR A=224 TO 225 'PICK START AND STOP POINTS 30 PRINT @ A,"X" 'PRINT OBJECT 40 FOR B=1 TO 10:NEXT B 'TIME DELAY 50 PRINT @ A-1," " 'ERASE PREVIOUS OBJECT 60 FOR B=1 TO 10:NEXT B 'TIME DELAY 70 NEXT A 'MOVE OBJECT 80 GOTO 80 'HOLD PICTURE AT END

As you can see, we make the object move by printing a new picture of it, then erasing the old picture. To your eye it appears as if the object slides from one position to the next. It sometimes produces smoother motion when you erase the old object, then print the new one instead of printing the new one before erasing the old one. This is something you will have to experiment with. There are no hard and fast rules.

Your Color Computer has the ability to display a rainbow of colors. So where are the colorful graphics I promised? On page 276 of GETTING STARTED WITH COLOR BASIC you will find a set of graphics characters. We can use this set of characters to build objects in color.

Let's build a horse, a blue horse in fact. First we'll draw the horse on the PRINT @ worksheet. (See Figure I.) This horse is formed in four parts. Location 224 uses CHR\$(131), location 225 uses CHR\$(142) and CHR\$(136) is used in both locations 256 and 257. To make the horse blue, we simply add 32 to the numbers inside the brackets. To form the complete horse, we put

X\$=CHR\$ (131+32) + CHR\$ (142+32) and

Y\$=CHR\$ (136+32) + CHR\$ (136+32),

where X\$ represents the top of the horse and Y\$ represents the horse's legs.

As you can see by my example, we can add these CHR\$ expressions as long as they are adjacent to each other on the same line. This means we can describe any section of the horse by a simple variable instead of a cumbersome expression.

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In program II, we can now make the blue horse run across the screen instead of the X in program I.

## PROGRAM II

10 CLS(0) 'CLEARS SCREEN TO BLACK

20 X\$=CHR\$(131+32) + CHR\$(142+32) 'TOP HALF OF HORSE

30 Y\$=CHR\$(136+32) + CHR\$(136+32) 'LEGS OF HORSE

40 FOR A=224 TO 254 'PICK START AND STOP POINTS

50 PRINT@ A-1, CHR\$(128); 'ERASE TOP OF HORSE

60 PRINT@ A+31, CHR\$(128); 'ERASE LEGS OF HORSE

70 PRINT@ A, X\$; 'PRINT TOP OF HORSE 80 PRINT@ A+32, Y\$; 'PRINT LEGS OF HORSE 90 FOR B=1 TO 40: NEXT B 'TIME DELAY 100 NEXT A 'MOVE HORSE 110 GOTO 110 'HOLD PICTURE AT END

TO GOTO TTO HOLD FICTORE AT END

You can now create your own shapes and colors. You are not limited to motion in only one direction. Let your imagination go and be creative.

You can type in the following colorful horserace program to see this type of low resolution graphics in action. (Or you can send me \$10 to cover my costs and I will send you this game called HORSES on cassette tape, postage paid, along with an arcade-style game called ATACMAN, using this same graphics mode, a game called BRICKS, and a game called PILLBOX, all using animated graphics. Both BRICKS and PILLBOX will be listed out in upcoming tutorials. I'm sure you will be delighted with this entire selection of animated games.

Next month we will examine the use of the SET and RESET commands.

## GRAPHICS AND ANIMATION

## FIGURE I

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270 READ 0(A) 280 NEXT A 290 CLS 300 INPUT "HOW MANY PLAYERS (<6)" INP 310 IF NP<1 THEN 300 320 IF NP>5 THEN 300 330 IF NP<>INT(NP) THEN 300 340 FOR A=1 TO NP 350 T(A)=100 360 NEXT A 370 INPUT"PRESS (ENTER) TO SEE P AYOUTS. ":A 380 CLS 390 PRINT"HORSE # PAYS OFF ( PER \$1)" 400 PRINT 410 PRINT" WIN PLAC E SHOW" 420 PRINT 430 PRINT" 1 3.33 1.82 1.33" 440 PRINT 450 PRINT" 2 4.00 2.11 1.48" 460 PRINT 470 PRINT" 3 5,00 2.50 1.67" 480 PRINT 490 PRINT" 4 6.67 3.08 1 . 90" 500 PRINT 510 PRINT" 5 10.00 4.00 2.22" 520 PRINT 530 PRINT 540 ZX=0 550 INPUT"PRESS (ENTER) TO PLACE BETS. "A 560 CLS 570 FOR A=1 TO NP 580 PRINT"FOR PLAYER NUMBER ";A; 98 g 88 590 IF T(A)=0 THEN 720 600 INPUT" BET \$";BT 610 IF BT<0 THEN 600 620 IF BT<>INT(BT) THEN 600 630 B(A)=BT 640 IF B(A) >T (A) THEN 600 650 T(A)=T(A)-B(A) 660 INPUT" HORSE NO. " HN 670 H(A) = INT (HN) 680 IF H(A)<1 OR H(A)>5 THEN 660 690 INPUT" WIN, PLACE OR SHOW ( 1,2,3)";P(A)

700 IF P(A) <>1 AND P(A) <>2 AND P (A) <>3 THEN 690 710 GOTO 740 720 PRINT"OUT OF MONEY. TOO BAD 1110 730 B(A)=0 740 PRINT 750 NEXT A 760 INPUT"PRESS <ENTER> TO BEGIN RACE!": A7 770 FOR A=1 TO 5 780 X\$(A)=CHR\$(131+16\*A)+CHR\$(14 2+16\*A) 790 Y\$ (A) = CHR\$ (136+16\*A) + CHR\$ (13 6+16\*A) 800 D(A)=0 810 NEXT A 820 GOTO 920 830 R=RND(4729) 840 IF R<=961 THEN D(1)=D(1)+1:N B=1:RETURN 850 IF R<=1916 THEN D(2)=D(2)+1: NB=2: RETURN 860 IF R<=2864 THEN D(3)=D(3)+1: NB=3:RETURN 870 IF R<=3803 THEN D(4)=D(4)+1: NB=4: RETURN 880 D(5)=D(5)+1:NB=5:RETURN 890 DATA .3,.25,.2,.15,.1 900 DATA .55, .475, .4, .325, .25 910 DATA .75,.675,.6,.525,.45 920 PLAY"T5: L4: 01: A: 02: D: F#: A: L8 ;A;A;L4;A;F#;L8;F#;F#;L4;F#;D;F# 1D1L31011A" 930 PLAY"T5;L4;01;A;02;D;F#;A;L8 ; A; A; L4; A; F#; L8; F#; F#; L4; F#; 01: A AAAL1:02:D" 940 CL8(0) 950 JJ=0 960 FOR GL=0 TO 480 STEP 32 970 PRINT @ GL+2, CHR\$(138); 980 PRINT @ GL+31, CHR\$(138); 990 NEXT GL 1000 FOR AA=1 TO 5 1010 A=96\*(AA-1)+32 1020 PRINT @ A, X\$ (AA); 1030 PRINT @ A+32, Y\$ (AA) ; 1040 NEXT AA 1050 FOR AA=1 TO 500:NEXT AA 1060 SOUND 1,3 1070 GOSUB 830 1080 IF D(NB)>30 THEN 1070 1090 A=96\*(NB-1)+32+D(NB) 1100 PRINT @ A-1, CHR\$(128); 1110 PRINT @ A+31, CHR\$(128); 1120 PRINT @ A, X\$ (NB);

-7

1130 PRINT @ A+32, Y\$ (NB); 1140 IF D(NB)<30 THEN 1070 1150 JJ=JJ+1:C(JJ)=NB 1160 FOR KK=1 TO JJ 1170 SOUND JJ\*10.3 1180 NEXT KK 1190 IF JJ=5 THEN 1210 1200 GOTO 1070 1210 CLS 1220 FOR A=1 TO NP 1230 ON P(A) BOSUB 1300, 1340, 138 Ō 1240 PRINT"AND HAS \$" | T (A) ; " REM AINING." 1250 ZX=ZX+T(A) 1260 PRINT 1270 NEXT A 1280 IF ZX=0 THEN 1450 1290 GOTO 370 1300 IF H(A)<>C(1) THEN 1430 1310 W(A) = INT(B(A)/O(H(A)) + 5)1320 T(A) = T(A) + W(A)1330 GOTO 1410 1340 IF H(A)<>C(1) AND H(A)<>C(2 ) THEN 1430 1350 W(A)=INT(B(A)/D(H(A)+5)+.5) 1360 T(A)=T(A)+W(A) 1370 GOTO 1410 1380 IF H(A)<>C(1) AND H(A)<>C(2 ) AND H(A)<>C(3) THEN 1430 1390 W(A)=INT(B(A)/0(H(A)+10)+.5 1 1400 T(A) = T(A) + W(A)1410 PRINT"PLAYER NO. ":A:" WINS \$"=W(A) 1420 RETURN 1430 PRINT"PLAYER NO. ";A;" LOSE 8 \$":B(A) 1440 RETURN 1450 FOR A=1 TO 5000:NEXT A 1460 CLS 1470 PRINT"EVERYBODY LOST THEIR SHIRTS!!!" 1480 PRINT **1490 PRINT** 1500 PRINT"WANT TO START AGAIN?" 1510 PRINT 1520 INPUT"TYPE 1 IF YES": ZX 1530 IF ZX=1 THEN 290 1540 CL8 1550 END

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Everything you need to know to get started programming your own computer. These handy books of programs, each jam-packed with easy-tounderstand info for beginners, are crammed with hundreds of tips, tricks, secrets, hints, shortcuts, techniques, plus hundreds of tested ready-to-run programs. For the TRS-80 Color Computer. For the TRS-80 Pocket Computer and Sharp PC-1211, PC-1500, Casio FX-702P pocket computers, as well as for Apple and IBM.

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This is the first of a series of articles about OS9. Since OS9 will soon be available for the Color Computer I felt that now would be a good time to start giving you information about it so that you can make a more informed decision about its value to you.

I'm still looking for someone to take over this column. To qualify for this department you must have experience with OS9; this can be either on the Color Computer or any other computer and you must own a Color Computer with OS9 on it. In addition you must pass our other requirements for a column author.

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I'm going to spend most of this article talking about unusual features of OS9, or at least the things that struck me as out of the ordinary or impressed me very much. OS9 has several unusual features for a micro-computer, the most obvious of which is the fact that the operator can create directories. For example, on a single disk you can have a main or root directory and within that directory you can find references to other directories such as a letters directory or an assembler directory. On our system we have, as an example, a Basic Source Files directory, an Assembler Files directory, a Form Letters and several others but I think you get the idea. This leads very naturally to another unusual feature in OS9, the names of files can be up to 29 characters in length. If you write as much as I do this alone can relieve a lot of problems by being able to use file names that tell specifically what the file is. My\_Editorial\_For\_July\_Issue10 is a valid file name, stretching the point perhaps but a valid file name just the same. You have perhaps noticed the underlines, a file name in OS9 can consist of letters, numbers and either underlines or periods it cannot contain spaces, an extremely minor inconvenience.

Another unusual aspect of OS9 are the pathlists. In OS9 all devices are handled much the same. That is, the operating system can send output to the printer as easily as it can a disk, therefore all I/O can be misdirected (redirected?) to any valid I/O port as long as the new port is compatable (you can't send output to an input only device). I use this to redirect all I/O by having my programs ask which port to send output to or to accept input from. If I need a report now I can have it, if its necessary to print the report but I don't necessarily need it now, I can send it to a disk file.

Its really difficult for me to talk about OS9 without referencing BASIC09, since I've spent most of my time to date writing software to allow us to start using OS9 full time. BASIC09 has several types of variables including Integers, Reals, Strings, Booleen and Byte. If you are familiar with Pascal you should start to see some similarities. All variables should be declared at the beginning of each procedure (we'll pretend that a procedure and a program are the same thing for a while) using the DIM statement. DIM is different from DIM in most BASICs in that a DIM statement is used for all variables not just arrays. Integer are numbers without decimal points of the range -32768 to 32767, Reals are numbers with decimal points and Byte variables are simply one byte variables from 0 to 255. Booleen variable are flags or test variables and return either TRUE or FALSE. Strings in BASIC09 are real memory savers as compared with other BASICs because the DIM statement also allows you to specify the length of the string. Unlike Color BASIC you are not limited to 256 bytes,a string here can be practically any length. I guess the most unusual feature about BASIC09 is the number of loop or control structures. These include FOR / NEXT which is of the garden variety FOR / NEXT family, WHILE / DO loops have become my favorite for test loops. A WHILE / DO loop has its test at the beginning of the loop and therefore allows you to test at the beginning and if necessary never execute the loop, A REPEAT / UNTIL loop has its test at the bottom of the loop and will always be executed at least once, IF / THEN loops are greatly improved over the usual IF/THEN statement because it uses an ENDIF statement. all lines between the IF THEN and the ENDIF are executed if the test at the top are true. LOOP/ENDLOOP is used with the EXITIF statement to put the control test anywhere in the loop, extremely handy if you need part of the loop executed whether or not the test is true on the first pass through the loop.

Another unusual feature about BASIC09 is the fact that line numbers are optional, in fact Microware recommends that line numbers not be used at all. One of the real advantages of BASIC09 is the fact that you can write a program as a series of modules called procedures (and I told you to pretend that procedures were programs). You can have either all of the procedures that constitute a program in memory at once if speed is a requirement or run them as overlays (only one in memory at time) if memory is the major problem.

If you haven't guessed by now I really like OS9 and BASIC09. BASIC09 is the first interactive compiler I've ever worked with and I must say that its really a pleasure to be able to write structured programs, test them as though they were interpreted and then run them later at almost the speed of machine language. I strongly suggest that you locate a book about Pascal and read up on that before you invest in BASICO9, since it and Pascal are extremely similar. I like to think of BASICO9 as Pascal with the inherent bugs fixed.

There is another quite unusual part to Microware's software, they hold a seminar for their users. I attended this year and in addition to having a good time meeting several people that I've only talked to on the phone before, I even learned a lot. The seminar began on Friday at noon with registation and manufacturers displays. Hardware displays included Gimix, Smoke Signal Broadcasting, Positron and Helix. Gimix was running OS9 Level 2 with six users, a rather impressive diplay and Positron was displaying their new 6809 computer. Positron is an English company and their unit includes 256K of RAM, 128K of ROM and color graphics. There was also an Apple there with a 6809 board, ouite a step up for an Apple. On saturday the classes began. I attended the class on OS9s unified I/O structure and all of the programming language classes including BASIC09, Pascal, C and Cobol and still haven't gotten all the way through my notes yet. I've included some pictures off some of the people that attended and of the Microware folks.

Next issue, if I haven't found someone to take this column over, we'll look at some programs I've written in BASIC09 and most about the seminar.



Frank Hogg discussing software with another seminar attendee.



Ken Kaplan, president of Microware, discussing Microware software.



Terry Ritter, the designer of the 6809 also attended the seminar.

How to read the new mailing labels.

You can now tell which computer you are on by examining your mailing label. If the top line of your label contains a string of alphanumerics you are on the Gimix. The first number on the top of the label is your expiration date (YMM), the next string of characters are your code and the last number is your key position in the main file.





The people of Microware, starting in the back row left to right is Cindy Phelps, Bill Phelps, Bob Doggett, Larry Crane and Grace Ambrose. Front row left to right is Andy Ball, Ken Kaplan and Jeanne Tunis.



Here I am discussing the future of the Color Computer as a "valid" 6809 machine with Frank Hogg and some other attendees.



That famous cube...on a computer at last. Move any side any direction. The program stores your moves so you can quickly retrace your steps and analyze new strategies.

And best of all, you can see all six sides at the same time!



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Requires 16K. Does not need Ext. Basic.

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Sold on cassette. Shipped first class mail.

## TTYPELOG by Jesse W. Jackson 2522 Maytime Drive Gambrills, MD 21054

Load this program, which patches to TAPETYPE, put that unlabelled C-120 in your recorder, turn your printer on, EXECute, and let your system document the tape for you.

TTYPELOG appends to TAPETYPE by THE MICROWORKS (Nov-Dec 81 CCN) and logs tape information from TAPETYPE's display to your printer. Additionally, you have the option to log all files, or any file, on command, after TAPETYPE reads the end-of-file. If you do not choose to log all files, you have the option to continue in TAPETYPE, or exit to basic. If you do not exit to basic, then TAPETYPE, will read another tape, and at the end you will again have the options to print and/or exit to basic again.

TTYPELOG is written in PIC (Position Independent Code), as is TAPETYPE so that you may use the offset option with CLOADM to run in high memory.

1 CO-RES9 FORMAT 10 NAM TTYPELOG 20 \* 6 APRIL 82 30 \* 40 \* JESSE W. JACKSON 50 \* 2522 MAYTIME DR 60 \* GAMBRILLS , MD 21054 70 # 80 \* THIS PROGRAM PATCHES TO 90 \* THE MICRO-WORKS 100 \* "TAPETYPE" 110 \* 120 # GIVES HARD COPY LOG OF: 130 \* FILE NAME 140 \* FILE TYPE 150 \* LOAD ADDRESS 160 \* END ADDRESS 170 \* START (EXEC) ADDRESS 180 \* FILE LENGTH 190 \* 200 \* INCREASES TAPETYPE'S 210 \* STACK BY CHANGING .... 220 \* \$0600 327A LEAS -VLEN.S 230 \* TO 240 \* \$0600 3279 LEAS -\$07,5 250 \* 260 \* SELECT PRINTER MODE 270 \* BY CHANGING ..... 280 \* \$0607 CC0000 LDD #0 290 \* TO 300 \* \$0607 1702D6 LBBR TAPLOG 310 \* 320 \* CHANGE TAPETYPE'S 330 \* EDFILE ROUTINE 340 \* TO BRANCH HERE .....

350 \* \$0779 16FE96 LBRA RECORD 360 \* TO 370 \* \$0779 16019A LBRA PRTSEL 380 \* 390 \* ABSOLUTE ADDRESSES 400 LPTBD EQU \$0095 410 SCREEN EQU \$0400 420 TAPTYP EQU \$0600 EQU TAPTYP+\$02E0 430 TAPLOG 440 RECORD EQU TAPTYP+\$12 450 POLKEY EQU \$A1C1 460 RESET EQU \$4027 470 PRTOUT EQU \$A2BF 480 PCRA EQU #FF21 490 \* 500 \* CONSTANTS 510 RATE EQU \$57 \$600 BAUD 520 SFLAG EQU \$02 530 FN EQU \$6C 540 FNWID EQU \$0A 550 FT EQU \$8C 560 FTWID EQU SOF 570 LA EQU \$CF 580 EA EQU \$DC 590 SA EQU \$B3 600 FL EQU \$EE 610 \* LOOP FLAG FOR TAPLOG 620 LFLAG EQU \$06 630 \* INCREASE TAPTYP'S STACK 640 \* FOR LFLAG 650 VLEN EQU \$07 660 \* 670 \* ORG TAPTYP 680 \* LEAS -VLEN.S 690 \* 700 \* ORG TAPTYP+\$07 710 \* LBSR TAPLOG 720 \* 730 \* ORG TAPTYP+\$0179 740 \* LBRA PRTSEL 750 \* 760 ORG TAPLOG 770 \* 780 TAPLOG LEAX SETUP, PCR 790 LBSR PUTMBG 800 BEQ PRTON 810 LDAA ##FF 820 BRA RTAPE 825 \* 830 PRTON LDX #RATE 840 STX >LPTBD 850 LEAX HDR, PCR 860 LBSR PRTHDR 870 LBSR PRTLF

880 PRMODE LDY #SCREEN+\$180 890 LEAX MODE, PCR 900 LBSR PUTCHR 910 BEQ PRTALL 920 LDAA ##7F 930 BRA RTAPE 940 PRTALL LDAA #\$00 950 RTAPE STAA LFLAG, U 960 LDD #\$00 970 RTS 980 \* PRINTER SELECT 990 PRTSEL LBSR MOTOFF 1000 LDAA LFLAG, U 1010 BMI BYE 1020 BEQ LOGIT 1030 LEAX PRTREQ, PCR 1040 LBSR PUTMSG 1050 LBNE BYE 1060 \* 1070 LOGIT LBSR MOTOFF 1080 \* PRINT FILE NAME 1090 LDX #SCREEN+FN 1100 LDB #FNWID 1110 BSR PRTIT 1120 \* PRINT FILE TYPE 1130 LDX #SCREEN+FT 1140 LDB #FTWID 1150 BBR PRTIT 1160 # PRINT LOAD ADDRESS 1170 LDX #SCREEN+LA 1180 BSR PRTADD 1190 \* PRINT END ADDRESS 1200 LDX #SCREEN+EA 1210 BSR PRTADD 1220 \* PRINT START ADDRESS 1230 LDX #SCREEN+SA 1240 BSR PRTADD 1250 \* PRINT FILE LENGTH 1260 LDX #SCREEN+FL 1270 BSR PRTADD 1280 BSR PRTLF 1281 LDAA LFLAG,U 1282 BEQ CASON 1290 \* EXIT TO BASIC PRINT 1300 BYE LEAX EXIT, PCR 1305 LDY #8CREEN+\$180 1310 BSR PUTCHR 1320 BEQ JBASIC 1330 CASON BSR MOTON 1340 LBRA RECORD 1350 \* 1360 JBASIC JMP >RESET 1370 \* 1380 PRTIT LDAA 0, X+ 1390 CMPA ##5F 1400 BLE P1

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1410 ANDA #\$3F 1420 \* 1430 P1 JSR PRTOUT 1440 DECB 1450 BNE PRTIT 1460 RTS 1470 \* 1480 PRTADD LDA #'\$ 1490 JSR PRTOUT 1500 LDB ##04 1510 P2 LDA O, X+ 1520 CMPA ##5F 1530 BLE P3 1540 ANDA ##3F 1550 P3 JSR PRTOUT 1560 DECB 1570 BNE P2 1580 LDB ##05 1590 LDA #\$20 1600 PRTSPA JSR PRTOUT 1610 DECB 1620 BNE PRTSPA 1630 RTS 1640 \* 1650 PRTLF LDA ##0D 1660 JSR PRTOUT 1670 RTS 1680 \* 1690 MOTOFF LDA >PCRA 1700 ANDA #\$F7 1710 STAA >PCRA 1720 RTS 1730 \* 1740 MOTON LDA >PCRA 1750 DRAA #\$08 1760 STAA >PCRA 1770 RTS 1780 \* 1790 PRTHDR LDAA 0, X+ 1800 BEQ EOHDR 1810 JSR PRTOUT 1820 BRA PRTHDR 1830 EOHDR RTS 1840 \* 1840 \* 1850 PUTMSG LDY #SCREEN+\$140 1860 PUTCHR LDAA 0,X+ 1870 BEQ GETKEY 1880 DRAA #\$40 1890 STAA 0.Y+ 1900 BRA PUTCHR 1910 GETKEY LDB #\$8F 1920 BLINK STB 0,Y 1930 JBR POLKEY 1940 BNE GOTIT 1941 LDA ##FF 1942 CURDLY DECA

## TTYPELOG

1943 BNE CURDLY 1950 ADDB #\$01 1960 ORB ##8F 1970 BRA BLINK 1980 GOTIT STAA O.Y 1990 CMPA #"Y 2000 BEQ GIVIT 2010 CMPA #'N 2020 BNE GETKEY 2030 TSTA 2040 GIVIT RTS FCC/FILENAME 2050 HDR 2060 FCC/FILE TYPE 2070 FCC/FROM 1 2080 FCC/THRU 1 2090 FCC/EXEC 2100 FCC/LENGTH 2110 FCB \$0D 2120 FCB \$00 2130 EXIT FCC/EXIT TO BASIC/ 2140 FCC/ <Y> OR <N> PRINT/ 2150 FCB 00 2160 PRTREQ FCC/ TO PRINTER PRIN T/ 2170 FCC/ <Y> OR <N> 2180 FCB 00 2190 SETUP FCC/ LOG TO / 2200 FCC/PRINTER PRINT / 2210 FCC/ <Y> OR <N> / 2220 FCB 00 2230 MODE FCC/ LOG ALL / 2240 FCC/FILES PRINT / 2250 FCC/<Y> OR <N> / 2260 FCB 00 2270 END Qugar -Software introduces... Auto Run Auto Run is a utility program for the TRS-80% Extended Basic Color Computer. It is used to add convenience and professionalism to your software. Auto Run will create a tape which will consist of a machine language loader followed by your basic or machine language program. With this tape, a simple CLOADM command will load and start the loader which will then load and start your program. You may design a title screen with the graphics editor which will display as your program loads. Also, you may record a vocal or musical introduction preceding your program. The Auto Run loader will control the audio on/off. Basic programs can be set to load anywhere in memory above 5600 (the PCLEAR 0 page). Software authors: The Auto Run prefix may be appended to your software products. Auto Run is \$14.95 and includes complete documentation and an asseebly source listing. Obloans add 5.52 sales tax. Ohioans add 5.5% sales tax. Add \$1.00 per tape for postage and handling. C.D.D. orders are welcome. Dealer inquiries invited. Sugar Software 2153 Leah Lane Reynoldsburg, Dh 43068 (614) 861-0565 #TRS-80 is a trademark of Tandy Corp.



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## MORTGAGE A "WHAT IF" FROGRAM By: Alan Rouse 631 Seneca Fl Charlotte, NC 28210

MORTGAGE is a very useful tool for studying the effects of various factors involved in a standard mortgage loan. The program permits you to enter any three of the pertinent factors (loan amount, number of payments, amount of payments, and interest rate) in order to compute the unknown amount.

This program is also a good example of formatting a screen for ease of data entry and correction. These same routines can be used for entry of any type of data for a myriad of programming applications. (For example, I have adapted them to a database program I have written. I will send you a tape copy for \$7.95 if you are interested.)

Upon typing "RUN", the program will present a formatted input screen, prompting you to enter the interest rate, mortgage amount, monthly payments, and number of payments for the life of the loan. You should simply enter any three of these parameters, in order to compute the fourth. Once computed, the value will be displayed on the formatted screen along with the values you entered. Now, you can blank out any value and make any changes to the remaining values in order to calculate a revised set of numbers, CAUTION - only one value can be left blank or you will bomb out. (For the purist--can you figure out what lines could be added to alleviate this situation?) Also, if you try to calculate when all the values are given, you will get an obnoxious tone and be returned to the input screen. The following keys are helpful in making entries:

DOWN ARROW - tab to next field CLEAR - erase from cursor to end of field LEFT ARROW - backspace RIGHT ARROW - forward space ENTER - skip to end of screen

For the mathematically inclined, there is an interesting application of Newton's method employed in the section which calculates the interest rates. As you may remember from an advanced algebra class, Newton's method is an iteractive method for finding zeros of an equation. The program makes a first guess of the monthly interest rate at .01. The formulas used are derived from the formula below:

 $Y = (1 - (1+I) \pmod{p} / I - MO/MP)$ where I is the annual percentage rate divided by 12, MP is the monthly payment, and MO is the mortgage amount. If you were to plot this function, it would cross the I axis at some value I. This value is the desired interest rate. In order to arrive at the next approximation of I, the program projects down the tangent to the curve at the present guess, and picks the interest rate where the tangent crosses the I axis. See if you can derive the formulas used in lines 350 through 390. (Hint: the tangent takes the form  $Y=M*I+B_*$ )

10 CLS 20 CLEAR200 30 Z\$="" 34 \* 35 ' DEFINE SCREEN POSITIONS AND DESCRIPTIONS 36 \* 40 F\$(1)="INTEREST (APR):":L(1)= 10 50 F\$(2)="MORTGAGE AMT:":L(2)=10 60 F = "MONTHLY PAYMENT; ": L(3)**=**8 70 F\$(4)="# OF PAYMENTS:":L(4)=4 80 FIELDS = 490 K=0:L=0:FOR C=1 TO FIELDS:KK( C) = K + LEN(E + (C)) = K = K + 32100 LL=LL+L(C):NEXT:I=0 110 ? 111 ' DATA ENTRY AND CORRECTION 112 \* 120 GOSUB 510:GOTO 190 160 PRINT@416, "PRESS DOWN ARROW TO CHANGE OR UP ARROW TO CALCU LATE": 170 Z\$=INKEY\$;Z\$="" 180 Z\$=INKEY\$: IF Z\$=CHR\$(10) THE N PRINT@416;PRINT@448;GOTO 190 F LSE IF Z\$=CHR\$(94) THEN CLS:GOTO 250 ELSE 180 190 SOUND 125,1:FOR C=1 TO FIELD S: GOSUB590 200 IF A\$<>"" THEN C\$(C)=A\$ 210 IF I\$=CHR\$(13) THEN CLS:C=FI ELDS 220 PRINT@KK(C), C\$(C);:A\$="" 230 NEXTC: CLS: GOSUB510: GOT0160 240 \* 250 'READ DATA 260 I=VAL(C\$(1))/12 270 MO=VAL(C\$(2)) 280 MP=VAL (C\$(3)) 290 N=VAL (C\$(4))

300 IF I=0 THEN GOSUB 330 ELSE I F MO=0 THEN GOSUB 400 ELSE IF MP =0 THEN GOSUB 430 ELSE IF N=0 TH EN GOSUB460 ELSE SOUND 50.5 310 GOSUB 510 320 GOTO 160 329 ? 330 'CALCULATE INTEREST RATE I 331 2 340 I=.01 350 M=N\*((1+I)^(-N-1))/I-(1-(1+I  $)^{(-N)} / (I^{2})$  $360 \ Y = (1 - (1 + I)^{(-N)}) / I - MO / MP$ 370 IF Y<.000001 AND Y>-.000001 THEN I=I\*12: I=.00001\*INT(I\*10000 0+.5):C\$(1)=LEFT\$(STR\$(I),L(1)): RETURN 380 B=Y-I\*M 390 I=-B/M:GOTO 350 399 ' 400 'CALCULATE MORTGAGE AMOUNT M 0 401 ? 410 MO=(MP\*(1-(1+I)^(-N)))/I 420 MO=INT(MO+.5):C\$(2)=STR\$(MO) : RETURN 429 \* 430 'CALCULATE MP 431 7 440 MP=(I\*MO)/(1-(1+I)^(-N)) 450 C\$(3)=STR\$(INT((100\*MP)+.5)/ 100) : RETURN 459 ' 460 'CALCULATE N 461 \* 470 M=(MP-I\*MO)/MP:Y=1+I 480 N=-LOG(M)/LOG(Y) 490 C\$(4)=STR\$(INT(N+.5)):RETURN 500 ' 510 'DISPLAY FORMAT 520 ° 530 FOR C=1 TO FIELDS 540 PRINT@KK(C)-LEN(F\$(C)),F\$(C) :PRINT@KK(C)+L(C),":" 550 PRINT@KK(C), C\$(C); 560 NEXT: RETURN 580 \* 590 'INPUT ONE FIELD OF DATA 600 ° 601 ' 602 'C\$(C) IS THE ORIGINAL VALUE OF THE CURRENT FIELD. 603 "A\$ IS THE LEFT-HAND PORT ION OF THE REVISED CURRENT FIELD

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604 °L(C) IS THE MAXIMUM LENGTH OF THE CURRENT FIELD. 605 'KK(C) IS THE "PRINT O" POSI TION OF THE CURRENT FIELD. 606 °Y\$ IS THE CURSOR 607 'Y IS THE ASCII VALUE OF THE CURSOR. 608 ' 609 \* 610 A\$="" 617 \* 618 'REVERSE VIDEO CURSOR 619 ' 620 Y=PEEK(KK(C)+1024+LEN(A\$)):I F Y>63 AND Y<96 THEN Y=CHR\$(Y+3 2) ELSE IF Y>96 AND Y<128 THEN Y \$=CHR\$(Y-64) ELSE Y\$=CHR\$(128) 627 ' 628 'AUTO TAB AT END OF FIELD 629 ' 630 IF LEN(A\$)=L(C) THEN740 ELSE PRINTOKK(C),A\$+Y\$; 637 \* 638 'REVERSE VIDEO CURSOR 639 ' 640 IF Y>96 AND Y<128 THEN POKE KK(C)+1024+LEN(A\$),Y-64 647 ' 648 'GET NEXT CHARACTER 649 ' 650 I\$=INKEY\$:IF I\$=""THEN650 660 IF ASC(I\$)>13 THEN720 667 ' 668 'RIGHT ARROW 669 ' 670 IF I\$=CHR\$(9) THEN A\$=A\$+MID \$(C\$(C),LEN(A\$)+1,1):GOTO 620 677 ? 678 'LEFT ARROW-FOR CHANGING EXI STING DATA (NON-DESTRUCTIVE) 679 \* 680 IF I\$=CHR\$(8) AND LEN(A\$)>0 AND LEN(C\$(C))=L(C) THEN C\$(C)=A \$+RIGHT\$(C\$(C),LEN(C\$(C))-LEN(A\$ )):A\$=LEFT\$(A\$,LEN(A\$)-1):PRINT@ KK(C), C\$(C); : GOTO 620 687 \* 688 'LEFT ARROW-FOR INITIAL ENTR Y (DESTRUCTIVE) 689 \* 690 IF I\$=CHR\$(8) AND LEN(A\$)>0 THEN A==LEFT=(A=,LEN(A=)-1):PRIN Takk(C), A\$+Y\$+" ":: GOTO 650 ELSE IF I\$=CHR\$(8) THEN 650 697 °

## Mortgage

698 'CLEAR KEY-DELETES RIGHT-HAN Mow! AN AFFORDABLE LIGHT PEN D PORTION OF FIELD AND TABS DOWN FOR YOUR TRS-80 COLOR COMPUTER. 699 " 700 IF I\$=CHR\$(12) THEN GOTO 750 Only \$3995 each 710 IF I\$=CHR\$(13) OR I\$=CHR\$(10 ) THEN 740 Programs for home, school, office include: 716 \* 717 ' ADD CHARACTER TO A\$ Shuttle Bible Quiz 718 720 IF ASC(I\$)<91 THEN A\$=A\$+I\$ Hangman 730 IF LEN(A\$) < L(C) THEN 620 Meteor Shower (Joysticks required) Chex (balance your bank account) 737 738 'ADD UNCHANGED RIGHT-HAND PO Tic Tac Toe Moon Lander (from inside the LEM) RTION TO A\$ Photon (Artificial Intelligence) 739 1 Night Flight 740 IF LEN(C\$(C))>LEN(A\$)THEN A\$ =A\$+RIGHT\$(C\$(C),LEN(C\$(C))-LEN( Many morel From Kindergarten through graduate A\$)) courses. All cassettes \$499 each. Write for free list. 746 7 747 'FILL OUT FIELD WITH BLANKS MOSES ENGINEERING COMPANY 748 " 750 IF LEN(A\$)<L(C) THEN FOR J=L Route 7, Regent Drive EN(A\$)+1 TO L(C):A\$=A\$+" ":NEXT Greenville, S.C. 29609 (803) 834-7974 Continued on page 67

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System Requirements: Radio Shack 16K Extended Basic Color Computer and Color Disk #0 Kit. Optional cable required for third and fourth drives. PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE. \* trademark of Tandy Radio Shack Corporation



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 Richardson, Texas 75080
 214/340-5366

## SHOPLIST An Inventory/File Program by: Steve Eichman P.O. Box 752 Stockton, CA 95201

Being new at computing, I was searching for some practical uses for my beloved toy (and so was my wife who duly noted the substantial dent in our bank account).

Having nothing else available at the time, I naturally went to the back of "Getting Started With Color BASIC", searching for a program that would convince me that I was actually going to use this computer for something other than household entertainment.

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Alas! Shoplist. Radio Shack's starter program showed real promise. So I very carefully (and laborously) typed out the whole thing. After using it for several months to keep track of all kinds of lists of things, I decided that it fell short in many ways. For example, there was no provision to list to printer; no way of alphabetizing these seemingly endless lists of whatnots; no way to abort when I accidently pressed "Save to Tape" or "Load from Tape"; and above all I just plain got tired of "paging" through all the groups of 15 items just to return to the menu.

I've rewritten that original program and cured all of these ills and a number of others that I won't belabor here. I have also used the POKE 65495,0 to speed things up a bit here and there.

I use this program principally to keep track of things that I need to take on various outdoor excursions. I've got one for our sailboat, backpacking trips, etc. What I do is establish a master list for each of these catagories. Then I copy this and make a "working copy". It is this working copy that I use until all items are loaded. As the family members load the various items, they delete them from the list. Sometimes we each take a block of 15 and list them to the printer and head for the garage with our own list. Then we come back later and make the necessary deletions to the working copy. If we don't get everything the first night then I save it to tape and reload the next night using the same method.

My wife uses this program for a grocery list. She has a shelf and isle location coded along with each and every item. She loads the master list and deletes anything that she feels she won't be needing this shopping trip. Finally, she lists to the printer and gets an alphabetical shopping .st. Actually she places her code ahead of the item so it is alphanumerical according to the floor/aisle plan of the store.

After you learn how to use the program (If I can learn, believe me anyone can!) you can delete lines 640-750 which do nothing more than tell you (or your not so in tune family members) how to bypass the rest of the list and return to the menu when they access #5 (print).

One last comment. My method of alphabetizing is somewhat slow even with the high speed POKE. I tend to alphabetize as I go along in groups of say, 30 or so. If you attempt to alphabetize 100 or more, be patient as it will take a while. Just wait for it to finish. Don't make any attempt to interfere as you will dump your program. I have included a series of modulated tones in the program to alert you when the alphabetizing routine is complete. This way you can go pour yourself a brew while your handy CC does it's work. Good luck!

10 CLS 20 SOUND 150,2 30 PRINT @ 139. "SHOPLIST" 40 PRINT @ 238. "AN" 50 PRINTO 326. "INVENTORY/FILE P GM "BY" 60 PRINT @ 462. 70 PRINT @ 483, "STEVE EICHMAN, MANTECA. CA" 80 FOR U = 1 TO 999: NEXT U 90 CLS 100 CLEAR 3000: DIM S\$(200), E\$( 200) 110 REM INVENTORY/ SHOPPING LIST 120 CL8 130 SOUND 150,2 140 PRINT @ 39, "DO YOU WANT TO--150 PRINT @ 100,"(1) INPUT ITEMS ... 160 PRINT @ 132,"(2) REPLACE ITE M8" 170 PRINT @ 164,"(3) ADD TO THE LIST" 180 PRINT @ 196, "(4) DELETE ITE MS" 190 PRINT @ 228, "(5) PRINT ALL ITEMS" 200 PRINT @ 260, "(6) SAVE ITEMS ON TAPE" 210 PRINT @ 292, "(7) LOAD ITEMS FROM TAPE" 220 PRINT @ 324, "(8) ALPHABETIZ E ITEMS" 230 PRINT @ 356, "(9) LIST ITEMS TO PRINTER

TEMS"RN YOU TO THE MENU"330 PRINT @ 34, "PRESS <ENTER> W720 PRINT @ 416, STRING\$(32,46)330 PRINT @ 34, "PRESS <ENTER> W730 PRINT @ 483, "PRESS <ENTER>HEN FINISHED730 PRINT @ 483, "PRESS <ENTER>340 PRINT: PRINT"ITEM" Y;740 U\$ = INKEY\$350 INPUT S\$(Y)750 IF U\$ = "" THEN 740360 IF S\$(Y) = "" THEN RETURN760 FORX=1TO Y-1 STEP 15370 Y = Y+1770 FORZ=X TO X + 14380 GOTO 340780 PRINT Z; S\$(Z)390 REM790 NEXTZ 390 REM790 NEXTZ400 REMREPLACE ITEMS800 INPUT "PRESS <ENTER> TO CONT410 N = 0INUE"; C\$420 CLS: PRINT @ 9, "REPLACE ITEM810 IF C\$ = "XX" THEN POKE 65494 S" 430 PRINT @ 34, "PRESS <ENTER> W 820 NEXT X HEN FINISHED" 440 PRINT: INPUT "ITEM NUMBER TO REPLACE": N 450 IF N=0 THEN RETURN 460 INPUT "REPLACEMENT ITEM"; S\$ 870 CLS: PRINT @ 71, "SAVE ITEM (N) (N)470 GOTO 400 480 REM 490 REM DELETE ITEMS 500 N = 0510 CLS:PRINT @ 9, "DELETE ITEMS 900 PRINT @ 357, "PRESS <ENTER> 

 520 PRINT @ 34, "PRESS <ENTER> W

 HEN FINISHED"

 530 PRINT: INPUT "ITEM TO DELETE

 "; N

 540 IF N> Y=1 THEN 530

 550 IF N = 0 THEN RETURN

 560 FOR X = N TO Y-2

 570 S\$(X)=S\$(X)=S\$(X+1)

 580 NEXTX

 580 NEXTX

 11 590 S\$(X) = "" 600 Y=Y-1 610 REM 620 REM PRINT ITEMS 640 PRINT @ 66, "THE PRINT OPTIO N LISTS YOUR" 650 PRINT @ 78, "ITEMS IN GROUPS OF 15 CALLED"

240 PRINT @ 425, "(1-7) <ENTER> "
250 INPUT M
250 IF M <0 DR M>7 THEN 110
270 DN M GOSUB 300, 400, 320,470
, 620, 860, 1000, 1160, 1340
280 GOTO 110
270 REM
300 REM INPUT/ADD ITEMS
310 Y=1
320 CLS: PRINT @ 8, "INPUT/ADD I
TEMS"
260 PRINT @ 416, STRING\$ (32,46) , O: RETURN 830 POKE 65494,0 840 RETURN 850 REM 860 REM SAVE ITEMS ON TAPE S ON TAPE" 880 PRINT @ 170, "POSITION TAPE" 890 PRINT @ 262, "PRESS PLAY AND RECORD" WHEN READY" 980 CLOSE #-1: RETURN 990 REM 1000 REM LOAD ITEMS FROM TAP E 1010 CLS: PRINT @ 69, "LOAD ITE

## SHOPLIST

1050 PRINTO 450. "\*\*\*\*\*ABORT? ( Y OR N) ?\*\*\*\*\*\* 1060 INPUT R\$ 1070 IF R\$ = "Y" THEN RETURN 1080 OPEN "I", #-1, "LIST" 1090 Y = 11100 IF EOF(-1) THEN 1150 1110 INPUT #-1.S#(Y) 1120 PRINT 5\$(Y) 1130 Y = Y + 11140 GOTO 1100 1150 CLOSE #-1: RETURN 1160 CLS: POKE 65495.0 1170 PRINT @ 233, "ALPHABETIZING 11 1180 FOR V = 1 TO 1000: NEXT V 1190 CLS 1200 T = 01210 FOR L = 1 TO Y - 21220 IF S\$(L) <=S\$(L+1) THEN 124 Ô 1230 E#=S#(L):S#(L) = S#(L+1):S# (L+1) = E\*: T = 11240 NEXT L 1250 IF T = 1 THEN 1200 1260 FOR L = 1 TO Y-21270 IF S\$(L) <>"" THEN 1290 1280 NEXT L 1290 FOR B = 1 TO 61300 SOUND 175,1 1310 SOUND 200,2 1320 NEXT B 1330 GOTO 620 1340 REM SEND ITEMS TO PRINTER 1350 CLS: POKE 65494.0 1360 PRINT @ 235, "PRINTING" 1370 FOR X = 1 TO Y-11380 PRINT #-2, S#(X) 1390 NEXT X 1400 RETURN

## THE BASICS

## <u>Concepts for Kids</u>

JESSE'S BUSY BUGS (6 mo. - 2 yrs) Graphics & sound fun ..... 9.95 For the very young. SO BIG, SO SMALL (2 - 6 yrs.) Shape & size recognition. . . 12.95 For reading readiness. RAINBOW FOREST (3 - 7 yrs) Eye-hand coordination. . . . 14.95 A creative game. COUNTERS (4 - 7 yrs.) Basic math concepts. . . . . . 19.95 A prize-winning program. TANJALI (8 yrs to Adult) Memory & perception game ... 19,95 A real challenge for any age. TRS-80C, 16K, Extended Basic Add \$1.50/order for shipping (VISA / MC welcome)

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## Mortgage Continued from page 64

760 C\$(C)=A\$ 770 PRINT@KK(C),A\$;:SOUND 125,1: RETURN 1000 X\$=INKEY\$:IF X\$="" THEN 100 0 ELSE PRINT ASC(X\$):GOTO 1000

## COLORTERM (c)

• any data format (commercial)

memory buffer for incoming

data-save buffer-scroll

through bufferpreserve a "window" of

systems, TSO, bulletins etc.)

any size; new material scrolls

through remainder of screen.

The 16K Color Computer× as an intelligent terminal with \$1 or 64 columns by 21 lines and lower case!

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Cassette and Manual \$34.95 (U.S.) \$40.95 (Canadian)

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### **COLOR COMPUTER DISK SYSTEM**

We offer a complete disk drive interface system for the color computer, leaturing 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 sivile formats used by TRS-80 or FLEX systems. Two reasons for not using a soft sectored system are cost and reliability.

The Tailgrass double density format offers more margin for worn diskettes, dirt etc. and less expensi 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 Taligrass 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 granual 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 ould 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 cessive 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, 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 1/0 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 with "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 cute a specific disk command from the free standing disk system, these include: LOAD/SAVE m achine 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 tood & 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

#### **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 con-nected to the RS-232/Printer port on the color computer. All errors are displayed with a full text message for 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-RESS

\$39.95

\$24.96

\$30.00

\$11.95

2716 EPROMS \$14.00

#### SYSTEM MONITOR

TRSMON is a 2K system monitor program that will allow you to explore the workings of the color computer. It atures 9 debuging 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. n is position independent so it can be moved anywhere within the system memory. A very The pro 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 & Ascil format, Diseasemble memory file, Terminal mode & optional buffer, Fill memory, Move block of the table table table table table table table table table tables to be table. memory, Find memory byte sequence, Exit monitor to Basic, Exit monitor to Rom Pack (\$C000), Re-initialize monitor, Direct output to printer.

TREMON ON TAPE	\$19.9
TREMON on 2716 Eprem	\$34.9

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thus providing total control of the entire system. The command system is easy to learn and remember with a imum 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 en, Print, Input, Line Input (ext. Basic), EOF, Rewind, Close, Print Using (Ext. Basic), these all include: Of function in the same manner as basic tape file I/O. CCMD+9 has one other unique feature not found in most disk systems. Eash disk initialized by the

system is assigned a disk label which can be used instead of a disk drive number, the syste automatically locate which drive the diskette is on and use it accordingly. This can be very usefull 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 each interface interface of the unit of the disk was 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 sable 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 sells for.

TE-99 Disk Controller w/CCMD + 9 DDS ROM		\$	159.95	
CCASM9 Disk Assembler		5	34.95	
CCEDT9 Disk Text Editor		Ś	24.95	
CCDISS Disk Disessembler Source Generator		ŝ	29.95	
CCTPR1 Disk Text Editor/Word Processor TEXTPRO 1			39.95	
CCTPR2 Disk Text Editor/Word Processor TEXTPR0 2		Ś	59.95	
CCUTLY Disk Utilities		5	19.95	
DOSMON Disk system monitor/utility program			29.95	
CGAME1 HI-RES Graphic games Space Invaders, Meteriolds, Space War			49.95	
CGAME2 Mixed games Battle Floet, 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.

#### 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 formating the output, some of them include: page length.

In the track to be bottom margin, line length, justify & till 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 is a repeat comm nand with a next command to redo all of or a portion of the file as many times as need 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 modern 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 "Videotext" 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 it 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

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## BASIC PROGRAM LINE MOVER FOR A COLOR COMPUTER WITH EXTENDED BASIC, 16K OR 32K MEMORY by: Jack L. Aker 6944 Burnside Drive San Jose, CA 95120

Here is another one of those functions which could have been included in the EXTENDED BASIC rom, if 8290 byte mask roms were available. This program copies BASIC program lines from one place to another in your program. Maybe the program should be called LINEMOVE, but since the original line is not deleted by the program, linecopy is the better descriptor. The "line mover" moves a copy of a specified line to a specified new location. The source line must exist in your BASIC program, and the destination line can be an existing line, which is then replaced, or a new line number.

The program is short enough to be entered directly into memory, with monitors like CBUG or SIGMON. The machine code is relocatable. This allows the program to be located above the stack on 16K or 32K machines, without modification. Before loading the code into memory, either from tape or using a monitor, first do a CLEAR 200,&H3F9D. Use CLEAR 200,&H7F9D for 32K. This will move the stack 200 bytes below the starting location of the program &H3F9E, (&H7F9E for 32K). If using a monitor, set the memory load address to hex 3F9E or 7F9E for 32K and start entering the hex bytes at the START label in the listing. If you have an assembler, so much the better, you can enter the source statements and do an assembly. The program is short enough, however that you could probably get the job done quicker by entering the hex bytes directly into memory. I wrote this program before I had an assembler, and assembled it by hand.

To invoke the line mover, do an EXEC &H3F9E, and answer the prompts for the FROM line and the TO line. You will then be put into the familiar line edit mode with the data from the source line with the line number shown for the TO line. Perform any editing you wish, and then <ENTER> to complete the editing. If you wish to delete the FROM line, do it before you forget. Move another line by simply typing EXEC and (ENTER), since you set up the EXEC address the first time. After you are convinced the program is working properly, save it to tape, or disk with the CSAVEM or SAVEM command, using &H3F9E, &H3FFF, &H3F9E as the parameters, You know what the addresses are by now if you have a 32K machine.

HAPPY LINE MOVING.

0001 0600	NAN LINECOPY			# DISPLAY PRONPT N	ESSAGE
AAA1 AAAA	1/5) 1001 3.1. AKER. 5	AN JORF CA	0020 JFBC BDA282	P1 JSR CHROUT	
	AIDI TIMI AIDI MIDNI -		0021 3FBF 4680	SETIN LDA .X+	
	+ M EAD 300 LUTERD /4	75081	0022 3FC1 26F9	BRE PI	
		/			
	I CLUADA "LINECOPT"			+ OFT THE I THE MOD	
	I EXEC		0077 TEPT BRATON	+ UE; INE LINE NON 100 OFTI 14	
			9923 JFLJ BUMJ70		
	\$ ORB \$7F9E 32K		0024 JFC6 8E0209	LUX VIRDAK	
0002 0600	GRB \$3F9E	16K	0025 JFC9 6FE2	CLR ,-S	ENAKI MAKY
0003 0200	INBFR EQU \$2DD	BASIC LINE BFR	0026 3FCB 6FEZ	CLR ,-S	, AREA
0004 4282	CHROUT EQU \$A282	CHAR OUTPUT	0027 3FCD A680	AGN LDA , X+	
0005 4390	BETLIN EQU \$A390	LINE INPUT	0028 3FCF 2602	BNE CNVRT	ASCII TO BIN
	ORIARE FOIL CAROL	GET ABS ADDR	0029 3FD1 3586	PULS A, B, PC	
4440 MUVS	COENT EDI 40343	ENTRY TO EDIT			
000/ 6342	QUENTI ELU VONIO	PULLI IN PACT		t CONVERT ABCII TO	BINARY
		CDAN NOG AND	0030 3FD3 8030	CHURT SURA \$'0	
0008 3F7E 308D0054	SIAKI LEAL PRITUR	Frun nog fur	0071 TEBS 3402	PRNR A	
0009 3FA2 8D18		PK LINE V	AATO TERT BLAA	188 810	BIGIT MIB TIDI
0010 JFA4 DD2B	STD <\$2B	STO LINE HUK	ANTE TERR ELLO		STATI UNFILL
Q011 JFA6 BDAD01	JSR GBLADR	ABS ADR	0033 3PD7 2002		
0012 3FA9 3410	PSHS X		0034 3FBB 3D	MUL.	
0013 3FAB 30800040	LEAX TO, PCR	TO NSB ADR	0035 3FDC 3402	PSHS A	
OOIA JEAF BOOE	BSR GETIN	TO LINE #	0036 3FDE E763	STB 3,8	
0015 3581 802R	STD (\$2B		0037 3FE0 860A	LDA #10	DIGIT MULTIPL
A11 TERT 751A	PIR S I		0038 3FE2 E662	LDB 2,8	
ANT TERE 0401	IDA AL	NBR OF LINES	0039 3FE4 3D	MAAL	
AALA TERT ATRA	QTA (4DA		0040 JFE5 EBEO	ADDB ,S+	
VVIG JEB/ 7/90	IND GACATT	FTT BARIC ED	0041 3FE7 E761	STB 1.8	
AN14 2684 (58242	ALL ARCALL		0042 JFE9 A662	LDA 2,8	

#### LINE MOVER

0043 3	FEB AB	EO		ADD	A .8+		
0044 3F	ED 24	02		BHS	NOINC		
0045 3	FEF 6C	E4		INC	0,8		
0046 3F	F1 A7	61	NOT	IC STA	1.8		
0047 3	F3 20	DB		BRA	AGN		
0048 3F	F5 39			RTS			
			2 P	ROMPT H	ESSAGE	8	
0049 3	F6 46	524F4D38	FR	FCC	"FRON	?"	
0050 3	FFB 00			FCB	0		
0051 3	FC 54	4F3F	TO	FCC	"T0?"		
0052 3	FFF 00			FCB	0		
0053 40	000			END	START		
AGN	3FCD	CHROUT	A282	CNVRT	3FD3	FR	
GBLADR	ADOI	BETIN	3FBF	BETL IN	A390	BOEDIT	
INBER	0200	NOTINC	3FF1	P1	3FBC	START	
TO	<b>3FFC</b>						

#### R.S. COLOR DISK SYSTEM

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 many 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 6809 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

feeds are provided. DISK TERNINAL PACKAGE - A disk based Terminal program for your color computer features full text buffering, baud rates from 300 to 9600 baud, programable word length, parity bits odd/even/none, stop bits. The buffer size is automatically set to the maximum size of your memory. Full control codes can be sent, display word wrap is automatic. The text buffer can be saved or loaded from/to tape or disk. The contents of the buffer can be sent as a file with automatic re-entry to terminal mode, also a file can be sent directly from disk to another user. The contents of the buffer can be displayed on the screen or optionally be output to a printer plugged into the RS 232 port. All file formats are directly compatible with our text editor and word processor programs. DISK TERMINAL PACKAGE .... \$49.95

DISK TERMINAL PACKAGE .... \$49.95 TEXTPRO I DISK TEXT EDITOR/HORD PROCESSOR - is a complete word processing system designed for easy learning and use. It features a disk based text editor for editing files larger than memory and direct processing of text files from disk or memory. Bome of the editor commands include: copy, move, search, replace, delste, line & automatic, adit modes allow easy logical commands to add, change, insert, delete, skip up/down line, ignore changes made on last line, skip to begin/end of line all with easy single keystroke commands using arrow keys. The editor can also load, save and append tape or disk files for easy conversion of existing ABCII text files. The Word Processor includes over 29 commands for formatting the output, some of them include: page length, page mode on/off, page numbers on/off, left margin, top/bottom margin, line length, center, double width print, single, multiple & special indent, test lines left on page, skip to top of page, bend control codes & accid data for special printer control, justify on/off, page heading, multiple footnotes per page, mord on/off, seam domessage to screen, display & input from keyboard and more. This is an excellent word processor with many dvanced features and one of the easiest to learn and use in just minutes. All commands are logically oriented in easy to remember and associate 2 character commands. DISK TEXTPRO

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

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# 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 <sup>™</sup>. 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 12 are being included monthly in 68 Micro Journal-The Largest specialty computer magazine in the world!

**68 MICRO JOURNAL** 

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WE DO Y YOUGHE



68 Micro Journal" was established with one objective in mind; to provide a Magazine FOR 68xx Users BY 68xx Users. Because of a strict advertiser policy, 68 Micro Journal" has gained a strong following WORLDWIDE because the reader KNOWS what he is getting when purchasing from a 68 Micro Journal" Advertiser. It has gained a strong User following because most of the material published is contributed BY USERS, and, therefore, is relevant to the Users needs therefore, is relevant to the Users needs.

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.

course, Games. HINTS for Expanding Memory, Power Supply Cooling, re-pairing 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 Procemanian etc. thoughts on Programming, etc.

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

We still, and will continue to, lead in the type information you need to FULLY UTILIZE the POWER of the 6809 in the Radio Shack TRS-80 Color Computer".

Bob Nay C

Color Computer Editor

## TRACETXT LISTING PRODUCED BY PRINTXT CTRACE: A COARSE TRACE UTILITY by: Georges A. Becus ML#70, U. of Cincinnati, Cincinnati, OH 45221

So you want to use some of those wonderful machine language routines in the ROM of your Color Computer. You have already located the dispatch tables, so you grab your favorite disassembler and start disassembly at one of these addresses. Three branches and seven jumps (one unconditional and six to subroutines) later you are totally lost in the middle of the ROM hardly remembering where you started and totally unable to decide whether the carry is set or not and thus unable to decide where to go next. If only you had a way to trace a program or statement or routine through ROM as it is executed!

One way to do that would involve some hardware modification perhaps along the lines of Cahill's trace facility for 6800-based systems (Microprocessors and Microsystems, vol 3, pp 400-403, 1979) or those of Gaskell's abort switch for 6809 (68 Micro Journal, vol 3, p 35, 1981). The idea in these hardware modifications is to generate an interrupt either as each instruction is fetched as in Cahill's trace or at will as in the abort switch.

In fact, you don't really need to trace each instruction as long as you can have a general idea of the flow of the program or routine you want to follow through memory. So you only need an interrupt every once in a while: often enough so that you won't miss a whole block of code, but not to often so that it won't take forever to follow one routine through execution. Many many thanks to the folks at Radio Shack who in their great wisdom (?) have provided the Color Computer with just what we need: the fast colcr interrupt on PIAO tied to the horizontal sync signal of the VDG and thus generating an interrupt every 63.5 microseconds.

CTRACE uses this fast clock interrupt to stop execution of a program, dump all the registers and disassemble the instruction which is going to be executed upon return from interrupt. The commented source listing provided below is self explanatory. Let me just explain further a few points. First the program is written in position independent code and as such can be relocated anywhere in RAM from \$600 up. If you have 32K and use the version of the listing, do not forget to CLEAR nnnn,&H77AF before loading the program. Next the program is compatible with all versions of BASIC (Color, Extended, and Disk) and restores the appropriate IRQ vector upon exit. The program uses DISAS9 Ver 1.1 by J. Dubner as published in the February 1982 issue

of BYTE Magazine to disassemble the next instruction to be executed upon return from interrupt. If you do not want to disassemble the next instruction or do not want to enter the almost 2000 bytes of code for DISAS9 by hand, you can replace the instruction at \$78EE by two NOP's (\$1212). This will still allow you to follow the flow of a program by watching the Program Counter. Control of the trace is via the keyboard. The Q key when pressed will allow you to exit from the trace. The spacebar has been reconfigured as an autorepeat key which allows continuous tracing. Any other key when pressed will allow to resume execution of the traced program until the next interrupt occurs. Unfortunately the wisdom of the good folks at Radio Shack has limits (as we all have guessed by now). PIAO is used mainly for the keyboard so that reading the keyboard will reset the interrupt flag and allow interrupts to be recognized and remembered by the PIAO. This is the reason for which sometimes the trace will appear to be "stuck" on an instruction for 2 or 3 interrupts. But eventually the trace will proceed. In this respect the instruction at \$7939 is probably unnecessary since the interrupt flag has already been reset by reading the keyboard. Very often a routine in ROM will be sent to a delay subroutine located at \$A7D3-\$A7D7. Whenever this occurs. CTRACE modifies the value of the delay counter (X) down to one so that a minimum of time is spent in that delay routine.

To use CTRACE: (i) CLOADM "CTRACE" after having cleared the adequate amount of memory if necessary. Type in EXEC: (statement). Here <statement> is the statement (or routine or program) you want interrupted. For example EXEC:PRINT "A" will allow you to trace execution of the BASIC print to screen routine first through the interpreter and then finally as it is executed. EXEC:EXEC &HA30A will allow you to follow the same routine without going through the interpreter. Finally you could trace the execution of an entire basic program residing in memory by entering EXEC:RUN. The advantage of going through the interpreter is that it will provide you with some information about where in low memory the various parameters and pointers for a particular routine are stored. (iii) Enter. (iv) CTRACE will prompt you for the device (screen or printer) to which you want to send the output. (v) After having made your choice by typing a P or S, CTRACE will start its job usually interrupting the RTS instruction at \$7898 concluding the main program.

One final word of caution about the use of CTRACE. Since it uses some of the ROM routines (especially POLCAT and the print to screen or the printer routines) and since these are not garanteed to be reentrant, CTRACE may errorwhenever it interrupts one of these routines. The solution of course would be to write special routines for CTRACE to read the keyboard and output a character to screen or the printer but I'll leave that task to you.

I hope you find as much use for CTRACE as I have found myself. Please let me know at the above address of any problem you encounter with it as well as any enhancement you may supply.

NAM CTRACE

\* VERBION 2.0, MAY 10, 1982
\* VERBION 2.0, MAY 10, 1982
\* (C) 1982 BY GEORGES A. BECUS
\* A CDARSE TRACE UTILITY FOR THE COLOR CONPUTER
\* USES THE FAST CLOCK (SYNC) INTERRUPT TO STOP
\* EXECUTION OF A PROGRAM. PRESSING THE Q KEY
\* WILL EXIT THE TRACE, KEEPING THE SPACEBAR
\* PRESSED PROVIDES CONTINUOUS TRACING, PRESSING
\* ANY OTHER KEY TRACES THROUGH THE PROGRAM ONE

\* INTERRUPT AT A TIME. TO USE CTRACE: CLOADN
\* CTRACE THEN TYPE "EXEC: [XXXX]", ENTER WHERE [XXXX]
\* IS THE STATEMENT OR PROBRAM OR ROUTINE YOU WISH TO
\* INTERRUPT.

\$ THIS PROGRAM MAY BE COPIED BY ANYBODY FOR THEIR OWN \$ USE AS LONG AS THE HEADER IS KEPT IN THE PROGRAM. \$

### **‡ EQUATES**

FCC

FCC

/ CC=/

/ A=/

t CHROUT EQU \$A30A Screen output routine CLS EQU \$A928 Clear screen DELAY EQU \$A7D3 Delay loop IRDSRV EQU \$010D Address of IRQ vector KBDBUF EQU \$0152 Start keyboard memory buffer PIAOCA EQU \$FF01 PIAO Control register A PIAODA EQU SFF00 PIAO Data register A POLCAT EQU \$AICI Read keyboard PRINIT EQU 1A2BF Printer routine 1 ORE \$77AF Can be changed (PIC) **#** THIS TABLE CONTAINS REGISTER NAMES **\$** A ZERO INDICATES A 16 BIT REGISTER Ż REGNAN FCR \$00 Start on a new line FCC /8=/ FCB \$00

	FCC	/ B=/	
	FCC	/ DP=/	
	FCB	\$0D	Skip to next line
	FCC	/X=/	
	FCB	\$00	
	FCC	/ Y=/	· · · · · · · · · · · · · · · · · · ·
	FCB	\$00	а 12- ж ж
•	FCC	/ U=/	
	FCB	\$00	
	FCC	/ PC=/	
	FCB	\$00	the second second
OUTPUT	RNB	2	Dutput routine address
STACK	RNB	2	Return stack pointer
REPEAT	RMB	1	Auto repeat flag
1		1	
<b>\$ SUBRO</b>	UTINE	TO DISPLAY HEAD	ER
I USES	IN LI	NE PARAMETERS	
t .		1	· · · · ·
MSBOUT	PULS	X	Bet start of header
ABAIN	LDA	, X+	Get character
	BEQ	RETURN	Finished if zero
	JSR	CHROUT	60 display
	BRA	ABAIN	Do it again
RETURN	JNP	,X .	Back to calling program
1			
\$ NAIN	PROGR	M	
1.	:		
START	JSR	CLS	Clear screen
	BSR	MSBOUT	Display header
HEADER	FCB	\$0D	Start on 2nd line
	FCC	/CTRACE: /	
	FCC	/A COARSE/	
	FCC	/ TRACE /	
	FCC	/UTILITY/	4
	FCB	SOD	Next line
	FCC	/FOR THE/	
	FCC	/ COLOR /	
	FCC	/COMPUTER/	
	FCB	\$0D	Next line
	FCC	/GEORGES /	
	FCC	/A. BECUS/	
	FCC	/ (1982)/	
	FDB	SODOD	Skip one line
	FCC	/OUTPUT TO/	
	FCC	/ P(RINTER)/	
	FCC	/ OR /	
	FCC	/S(CREEN)/	
•	FCB	SOD	Next line
	FCC	/ENTER /	
	FCC	/CHOICE /	
	FCB	\$00	End of header
1	1.1		
# BACK	TO NAI	in program	
CHKKEY	189	POI CAT	Ro read bauboard
ma saargen 1	****	a managera	WY I THY RETUUNIU

CHPA #\*P

Output to printer?
# TELEWRITER the Color Computer Word Processor the only one with all these features for your TRS-80 Color: 51 column x 24 line screen display

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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.

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... 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.

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- 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.

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	BNE	CHKS	No. 80 check for screen		BNE	RGNANE	6o dump next register
	LDX	<b>#</b> PRINIT			LDA	#\$0D	Next line
	BRA	SHONST			JSR	ųΥ .	
CHKS	CNPA	4'S	Butput to screen?		PULS	U	Restore stack pointer
	BNE	CHKKEY	No. Try again		LDX	\$A, S	Set next instruction address
	LDX	ACHROUT			BSR	DISAS9	and go disassemble
SHONST	JSR	CHROUT	Display choice		LDX	\$A, S	<del>Bet address</del> again
	STX	OUTPUT, PCR	and store		CMPX	<b>#DELAY</b>	If in DELAY
	LEAX	INTSRV, PCR	Bet address of interrupt		BCS	TSTRPT	make sure we exit
	STX	IROSRV	routine and store		CNPX	#DELAY+2	fast by reducing
	LEAX	, 9	Bet value of stack pointer		BHI	TSTRPT	the value of the
	STX	STACK, PCR	and save to use when quitting		LDX	#1	delay counter (X)
	CLR	REPEAT, PCR	Clear auto repeat flag		STX	4,8	to one
	LDA	4710110101	Enable fast clock interrupt	TSTRPT	TST	REPEAT, PCR	Check autorepeat flag
	STA	PIAOCA	in PIAO		BEQ	KEYBRD	
	ANDCC	#211101111	and in processor		LDX	<b>#KBDBUF</b>	If set, fool POLCAT into
	RTS				LDD	##FF08	thinking no key is pressed
±				LOOP	STA	,X+	by storing FF's in
<b>#</b> RETUR	N TO T	HIS ROUTINE IF Q	KEY IS PRESSED		DECB		keyboard memory buffer
1					BNE	LOOP	
QUIT	LEAS	ESTACK, PCRJ	Restore stack pointer		LDX	##FFFF	So wait a while
	LDA	#710110100	Disable fast clock interrupt		JSR	DELAY	
	STA	PIAOCA	in PIAO		DEC	REPEAT, PCR	Clear autorepeat flag
	LDX	#\$A983	Color Basic IR9 routine	KEYBRD	JSR	POLCAT	Bo read keyboard
	LDD	♦'EX	Extended Basic?		BEQ	KEYBRD	until a key is pressed
	CMPD	\$8000			CNPA	\$*Q	Is it the Q key?
	BNE	DSKBAS	No, go check for Disk Basic		BNE	RPTKEY	No, go check for spacebar
	LDX	##8940	Extended Basic IRQ routine		LEAX	QUIT.PCR	Yes, change return address
	BRA	RSTORE	80 restore		STX	\$A.S	to routine QUIT
DSKBAS	LDD	#"DK	Disk Basic?		LDA	.s	and make sure interrupt
	CMPD	\$C000			ORA	#200010000	is disabled upon
	BNE	RSTORE		?!	STA	.5	return
	LDX	#\$D7BC	Disk Basic IRQ routine	RPTKEY	CMPA	#\$20	Spacebar pressed?
RSTORE	STX	IRQSRV	Store appropriate IRQ routine		BNE	INTRET	No, co return from interrupt
	RTS		And return		INC	REPEAT. PCR	Yes, set autorepeat flao
1				INTRET	LDA	PIAODA	Clear PIAO interrupt flag
INTE	REUPT S	ERVICE ROUTINE			RTI		
t DUNP		THE REGISTERS AN	PRAVIDES A	1			
1 DISA	SENRI V	OF THE INSTRUCT	TION TO BE	# ROUTI	NE TO	CONVERT ONE BY	TE IN A
A EXEC	UTED U	PON RETURN		I TO H	EX NUM	BER AND OUTPUT	RESULT
1				1			
INTSRV	ORCC	#201010000	Don't want interruption	ASCII	PSHS	A	Save byte temporarily on stack
	LEAY	COUTPUT. PCR1	Y contains Output routine		LSRA		Strin off LS nibble
	LEAU	\$C.S	Save stack pointer on the		LSRA		
	PSHS	i Ul II II II II II I	stack		LSRA		
TFR	5.0	Use I	l as stack pointer		LSRA		
	LDB	<b>#14</b>	14 bytes on the stack		BSR	CONVRT	Convert and output MS nibble
	LEAX	REGNAN, PCR	X points to register table		PULS	A	Retrieve byte
RENAME	LDA	.X+	Bet character in table		ANDA	#200001111	Strip off MS nibble
	BEQ	DUNP	If zero go dump another byte	CONVRT	ADDA	#\$30	Convert one nibble to ASCII
	JSR	•Y	Output character		CNPA	#\$39	Breater than nine?
	CNPA	_ <u>∔</u> ?≖	If equal sign go dump		BLS	DISPL	
	BNE	RGNAME	if not get another character		ADDA	<b>#</b> 7	Change to hex
DUMP	LDA	,U+	Set a byte from the stack	DISPL	JSR	<b>,</b> Υ	Output ASCII character
	BSR	ASCII	Go display in ASCII form		RTS		
	DECB		Decrement byte counter	+			

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\* DISAS9 VER 1.1 BY J. DUBNER \* (see BYTE, Feb 82, pp 340-364) \* DISASSEMBLES ONE INSTRUCTION WITH \* STARTING ADDRESS IN X AND OUTPUTS \* DISASSEMBLY THROUGH ROUTINE POINTED TO BY Y \* DISAS9 PSHS U,Y,B,A Start of DISAS9 \* INSERT REST OF DISAS9 HERE \* FCC /STX / End of DISAS9 END START

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#### A FULL ON YOUR "ART" STRINGS A SIMPLE STRING ART PROGRAM FOR THE TRS-80 COLOR COMPUTER by Richard Petty

Here is a simple string art program that beautifully demonstrates the graphics capability of the TRS-80 Color Computer with Extended Color Basic. The heart of the program is the "line" statement 320 LINE (X0,Y0)-(X1,Y1), PSET. The variables defining the end points of the line (X0,X1,Y0,Y1) are randomly determined in program lines 120 through 150. Because of this random selection, the graphics will be different every time the program is run. (The odds are almost 100 million to one against the same starting points being selected twice in a row). The end point variables are then incremented with each pass through the program by variables (S,U,R,T) in program lines 260 and 270. The values of the incrementors were also randomly selected in program line 80.

Lines 170 through 240 set up "edges" while a "bounce off of the wall effect" is obtained by reversing the sign of the incrementors in line 370 through 460. Notice that the edges are 5 places closer to the center than needs be to make just one line. This fact plus the initial values of the end point variables being restricted to a value no closer than 5 spaces from each edge prevents the incrementors from driving the end point variables negative when the incrementors are negative, or out of range on the positive side.

This program writes 150 lines, pauses for a couple of seconds and then starts over. (Program lines 480 and 490).

It can be stopped at any time to enjoy the current "creation" by SHIFT Q. (Hit any key to continue). The program is an endless loop, so interruption can be made with the "BREAK" key.

Caution: Many people find this program addictive and hard to shut off!!

10 ' \*\*MOVING STRING ART\*\* 20 CLS 30 PMODE 3,1 40 SCREEN 1,1 50 PCLS 60 Z=1 70 ' SET UP LINE INCREMENTORS 80 R=RND(4): T=RND(4): S=RND(4): U=RND(4) 90 ' SELECTS LINE COLOR 100 C=RND(3)+5 110 ' SELECTS RANDOM START POINTS 120 X0=RND(245)+5

130 X1=RND(245)+5 140 Y0=RND(181)+5 150 Y1=RND(181)+5 160 ' TESTS FOR BOUNDERIES 170 IF X0 > 250 THEN GOSUB 370 **180 IF X0 < =5 THEN GOSUB 370** 190 IF X1 > 250 THEN GOSUB 410 200 IF X1 < =5 THEN GOSUB 410 210 IF Y0 > 186 THEN GOSUB 430 220 IF Y0 < =5 THEN GOSUB 430 230 IF Y1 > 186 THEN GOSUB 450 240 IF Y1 < =5 THEN GOSUB 450 **250 ' LINE INCREMENTORS** 260 X1=X1+S: X0=X0+R 270 Y1=Y1+U: Y0=Y0+T **280 ' GRAPHICS PARAMETERS** 290 PMODE 3.1 **300 COLOR C.5** 310 SCREEN 1.1 320 LINE (X0,Y0)-(X1,Y1), PSET 330 ' ENDING ROUTINE 340 Z=Z+1: IF Z=150 THEN 480 350 GOTO 170 **360 ' DIRECTION REVERSAL ROUTINES** 370 R=-R 380 ' COLOR CHANGER 390 C=RND(3)+5 **400 RETURN** 410 S=-S **420 RETURN** 430 T=-T 440 RETURN 450 U=-U **460 RETURN 470 ' ENDING PAUSE AND RESTART** 480 FOR M=1 TO 1000: NEXT M 490 GOTO 30 SOFTWARE FOR TRS-80 COLOR 1. File Systems



#### GOLD MINE by: Mark Barnes 805 S. Dwyer Apt.E Arlington Heights, IL 60005

If your tired of shooting up aliens from outer space, here is a game that brings you down to earth...as a matter of fact, it takes you below the surface of the earth. Gold mine is a game which employs a random maze, created by the computer, which only has one path between any two points within the maze. This maze is hidden from the player during the game, but is used by the computer to tell where a player can move. The logic behind this maze can be found in the December 1981 issue of Byte magazine page 190, how to build a maze, by David Matuszek. If you wish to actually see the maze being built, add SCREEN 1.0 to the end of line 150 in the program (this should not be added when you're actually going to play the game).

The strange sound effects heard in the game are created by using the "PLAY" command with the tempo increased to 200 or greater. This increase causes normal sounding notes to change into very interesting sounds (try it yourself using different patterns of notes at high speeds). Since the instructions are simple, and generally only read once, I did not waste memory space by putting them within the program. I hope you have as much fun playing it as I did creating it.

#### INSTRUCTIONS

The object of this game is to gather as much gold from the mine and get out before the dynamite blows up. The mine is actually a simple maze with only one way out. The hard part is the fact that the mine is dark, this means that you can't see the walls of the maze. Use the four arrow keys to stumble through the mine and get as much gold as possible. If you need help, you have two matches that you can light by pressing the <space bar>. When lit, these matches will show the entire maze for about 2 seconds each (use these matches wisely, you only have two of them). Also beware of the spots marked with an X. When these spots are landed on, they will blow up, causing you to land somewhere else in the mine. Many times you will have to cross them to get out, but once they've blown up they're no longer a hazzard. Lastly, you will get bonus money for the amount of fuse left on the dynamite when you emerge from the mine. --GOOD LUCK--

--GOOD LUCK-

- 1 'MARK BARNES
- 2 '805 DWYER APT. E
- 3 'ARLINGTON HEIGHTS, IL 60005

10 PMODE1, 1: PCLS: SCREEN1, 1 20 FOR S=4 TO 9:S\$="S"+STR\$(S):S OUND S\*10,1:PCLS 30 DRAW S\$+"BM0,10;C8;R20D5L15D2 OR10U5L5U5R10D15L20U30BR30R20D30 L20U30BF5R10D20L10U20BU5BR25R5D2 5R15D5L20U30BR30R15F5D20G5L15U30 BF5R8D20L8U20" 40 DRAW S\$+"BMO, 180; U30R5F5E5R5D 30L5U25G5H5D25L5BR31U5R7U20L7U5R 19D5L7D20R7D5L19BR29U30R5D5F10U1 5R5D30L5U5H10D15L5BR30U30R20D5L1 5D7R7D6L7D7R15D5L20" 50 NEXT 55 DRAW"S4" 60 A=1:B=0:FOR TM=1 TO 10 70 C=A:A=B:B=C BO SCREEN1, A: PLAY "T150; ABCDEFGAB CDEFG" 90 NEXT 100 PAINT(0.0).8.7 110 CLS8: PRINT@96, "THE GOLD MINE IS BEING CREATED ONE MIN UTE PLEASE": SCREENO, 1 130 R=RND(-TIMER) 135 'CREATING THE MAZE 140 DIM S(10,9),H(50),V(50) 150 PMODE1, 1: PCLS: J=1 160 FOR X=0 TO 200 STEP 20 170 LINE(X,0)-(X,180), PSET **180 NEXT** 190 FOR Y=0 TO 180 STEP 20 200 LINE(0,Y)-(200,Y), PSET 210 NEXT 220 LINE(0,0)-(200,180), PSET, B 230 X=RND(9):Y=RND(8) 240 S(X,Y)=2250 IF X+1>9 THEN 260 ELSE IF S( X+1, Y = 0 THEN S(X+1, Y) = 1 + (J) = X+1 : V(J) = Y : J = J + 1260 IF X-1<0 THEN 270 ELSE IF S( X-1, Y = 0 THEN S(X-1, Y) = 1: H(J) = X- $1: \vee (J) = \forall : J = J+1$ 270 IF Y+1>8 THEN 280 ELSE IF S(  $X_{s}Y+1 = 0$  THEN  $S(X_{s}Y+1)=1:H(J)=X_{s}$ V(J) = Y + 1 : J = J + 1280 IF Y-1<0 THEN 290 ELSE IF S(  $X_{*}Y-1 = 0$  THEN  $S(X_{*}Y-1) = 1:H(J) = X:$ V(J) = Y - 1 = J = J + 1290 R=RND(J-1):S(H(R),V(R))=2:A= H(R) #20: D=V(R) #20 300 K=RND(4) 310 IF V(R)<>0 THEN IF K=1 AND S (H(R),V(R)-1)=2 THEN LINE(A,D)-(A+20, D), PRESET: Q=1

#### THE ULTIMATE IN COLORCOMPUTING WORD PROCESSING COMMUNICATIONS

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TAPE Text space	N/A	8K	24K	N/A	2K	18K
ROMPAK Text space	2.5K	15K	31K	N/A	N/A	NA
DISK Text space	N.A	6.5K	22 5K	N/A	0.5K	16.5K
Right Justity		YES			NO	
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320 IF H(R)<>9 THEN IF K=2 AND S (H(R)+1,V(R))=2 THEN LINE(A+20,D)+1)-(A+20, D+19), PRESET:Q=1 330 IF V(R) <> B THEN IF K=3 AND S (H(R), V(R)+1)=2 THEN LINE(A, D+20))-(A+20,D+20),PRESET:Q=1 340 IF H(R)<>0 THEN IF K=4 AND S (H(R)-1,V(R))=2 THEN LINE(A,D+1)-(A, D+19), PRESET: Q=1 350 IF Q=0 THEN 300 ELSE Q=0 360 X=H(R):Y=V(R) 370 IF R=J-1 THEN 410 380 FOR L=R TO J 390 H(L)=H(L+1):V(L)=V(L+1) 400 NEXT 410 J=J-1 420 IF J<>1 THEN 250 430 R2=RND(8):Y2=R2\*20+1 440 LINE (200, Y2) - (200, Y2+19), PRE SET 445 'SCREEN SET-UP 450 PMODE1, 3: PCL8 460 LINE(0,0)-(200,180), PSET, B 470 CIRCLE (222, 150), 10, 3, .75: DRA W"BM233,150;C3;D40;L20;U40;C4" 480 PAINT (220, 150), 2, 3: PAINT (222 ,180),3,3 490 LINE (222,0) - (222,150), PSET 500 LINE (200, Y2) - (200, Y2+19), PRE SET 510 CLEAR: GOSUB970: SCREEN1, 0: FOR Y=10 TO 170 STEP40 520 FDR X=30 TO 190 STEP 40 530 CIRCLE(X,Y), 3, 2: PAINT(X,Y), 2 ,2 540 NEXT X,Y 550 FOR Y=30 TO 170 STEP 40 560 FOR X=10 TO 170 STEP 40 570 CIRCLE(X,Y),3,2:PAINT(X,Y),2 ,2 580 NEXT X,Y 590 GOSUB 890 600 PLAY"T4:03:L4:CEG:04:L2:C:03 :L4:G:O4:L2:C:O3":X=5:Y=5:TIMER= Ô. 610 LINE(X,Y)-(X+10,Y+10), PBET, B 620 H##INKEY# 625 IF H==" AND Q=0 THEN 620 628 Q=1 630 GOSUB 1310 640 PMODE1, 3: SCREEN1, 0 650 IF M>1 THEN 670 660 IF H#=CHR#(32) THEN PMODE1,1 SCREEN1, OFFOR J=1 TO 500:NEXTIM =M+1:GOT0620

670 IF H#=CHR#(9) THEN 720 680 IF H#=CHR#(8) THEN 740 690 IF H#=CHR#(10) THEN 760 700 IF H#=CHR#(94) THEN 780 710 GOT0610 720 PMODE1, 1: IF PPOINT (X+15, Y+5) <>4 THEN PMODE1.3:LINE(X,Y)-(X+1 O, Y+10), PRESET, BF: X=X+20: GOSUB 8 00: IF X>200 THEN 1500 ELSE GOTO6 10 730 PMODE1, 3: GOTO610 740 PMODE1,1:IF PPOINT(X-5,Y+5)< >4 THEN PMODE1, 3:LINE(X, Y) - (X+10) ,Y+10), PRESET, BF: X=X-20: GOSUBBOO :GOT0610 750 PMODE1, 3: GOTO610 760 PMODE1, 1, IF PPOINT (X+5, Y+15) <>4 THEN PMODE1, 3:LINE(X, Y)-(X+1 0, Y+10), PRESET, BF: Y=Y+20: GOSUB80 0:G0T0610 770 PMODE1, 3: GOTO 610 780 PMODE1,1:IF PPOINT(X+5,Y-5)< >4 THEN PMODE1, 3:LINE(X,Y)-(X+10 , Y+10), PRESET, BF: Y=Y-20: GOSUB 80 0:GOT0610 790 PMODE1, 3: GOTO610 800 IF PPDINT(X+5,Y+5)=2 THEN SC =SC+20: PLAY"T250; ABCDEFGABCDEFGA BCDEFG" : GOSUB1140: RETURN (70 6107 810 IF PPOINT (X+5, Y+5)=3 THEN 83 Ö 820 RETURN 830 FOR J=1 TO 10 840 LINE(X,Y)-(X+10,Y+10), PSET, B F 850 LINE(X,Y)-(X+10,Y+10), PRESET , BF: PLAY "T250; ECECECECEC" 860 NEXT 870 X=(RND(10)-1)\*20+5:Y=RND(8)\* 20+5880 RETURN 890 FOR J=1 TO 5 900 X=RND(9)\*20+10:Y=(RND(9)-1)\* 20+10910 IF PPDINT(X,Y)=2 THEN X=X-20920 IF PPDINT(X,Y)=3 THEN 900 925 IF X<20 AND Y<20 THEN 900 930 J#="BM"+STR#(X)+","+STR#(Y) 940 DRAW"XJ\$1C31N1E41N1F41N1G41N :H4:C4" 950 NEXT 960 RETURN 965 'SCORE DRAWING ROUTINE

970 DIM NO(1), N1(1), N2(1), N3(1), N4(1),N5(1),N6(1),N7(1),N8(1),N9  $(1)_{FL}(1)$ 980 LINE(17,10)-(17,20), PSET: GET (10,10)-(20,20),N1,G 990 LINE(12,10)-(17,10), PSET: GET (10, 10) - (20, 20), N7, G1000 LINE(12,14)-(17,14), PSET:LI NE(12,20)-(17,20), PSET: GET(10,10) )-(20,20),N3,G 1010 LINE(12,10)-(12,14), PSET:GE T(10, 10) - (20, 20), N9, G1020 LINE (12, 14) - (12, 20), PSET: GE T(10,10)-(20,20),NB,G 1030 LINE(17,11)-(17,13), PRESET: LINE(12,10)-(17,10), PSET: GET(10, 10) - (20, 20), N6, G1040 LINE(12,13)-(12,19), PRESET: LINE(12,10)-(12,14), PSET: GET(10, 10) - (20, 20), N5, G1050 LINE(10,10)-(20,20), PRESET, BF:LINE(12,10)-(17,20), PSET, B:GE T(10,10)-(20,20),NO,G 1060 LINE(12,14)-(17,14), PSET:LI NE(12,11)-(12,13), PRESET:LINE(12) ,10)-(17,10),PSET 1070 LINE(17,15)-(17,19), PRESET: GET(10,10)-(20,20),N2,G 1080 LINE(10,10)-(20,20), PRESET, BF:LINE(12,14)-(17,14), PSET 1090 LINE(12,10)-(12,14), PSET:LI NE(17,10)-(17,20), PSET 1100 GET(10,10)-(20,20),N4,G:LIN E(10,10)-(20,20), PRESET, BF 1110 CIRCLE(15,18),4,2,1.3:PAINT (15,18),2,2 1120 GET(10,10)-(20,20),FL,G 1130 DRAW"C4":LINE(5,5)-(50,50); PRESET, BF 1135 'SCORE KEEPING ROUTINE 1140 SC\$=STR\$(SC):LINE(243,0)-(2 55,191), PRESET, BF 1150 FOR L=1 TO LEN(SC\$) 1160 J==MID=(SC=,L,1):IF J==" " **THEN 1190** 1170 D=VAL(J\$) 1180 J1=L\*14:J2=J1+10:ON D+1 GOS UB 1210,1220,1230,1240,1250,1260 ,1270,1280,1290,1300 1190 NEXT 1200 RETURN 1210 PUT(244, J1) - (254, J2), NO, PSE T: RETURN 1220 PUT(244, J1) - (254, J2), N1, PSE **TIRETURN** 

1230 PUT(244, J1) - (254, J2), N2, PSE **T** RETURN 1240 PUT(244, J1)-(254, J2), N3, PSE T: RETURN 1250 PUT(244, J1) - (254, J2), N4, PSE T:RETURN 1260 PUT(244, J1)-(254, J2), N5, PSE T:RETURN 1270 PUT(244, J1)-(254, J2), N6, PSE **T** RETURN 1280 PUT(244, J1)-(254, J2), N7, PSE T : RETURN 1290 PUT(244, J1)-(254, J2), NB, PSE T:RETURN 1300 PUT(244, J1) - (254, J2), N9, PSE T:RETURN 1310 IF TIMER>30 THEN T=T+1:TIME R=0:G0T01330 1320 RETURN 1330 PUT(218,T)-(228,T+10),FL,PS ET 1340 IF T>=140 THEN 1360 1350 RETURN 1360 A=0; B=1; FOR J=1 TO 10 1370 C=A:A=B:B=C 1380 PLAY"01; T250; ECECECECECEC" 1390 SCREEN1, A 1400 NEXT 1410 PLAY"03; T5; L2; C; L2; C; L8; C; L 2;C;L2;E;L8;D;L4;D;L4;C;L4;C;02; B:03:L2:C" 1420 CLS: PRINT@64, "YOU GATHERED \$"SC" WORTH":PRINT"OF GOLD....BU T GOLD IS WORTH- LESS TO A DEA D MAN!":PRINT:PRINT" Y O U \_\_\_\_\_ 0 S E ! ! !" 1430 GOT01600 1500 SC=SC+(140-T):GOSUB1140 1510 PLAY"T25:L4:03:CDEFGABAGFED C; T20; P1; 05; D; 03" 1515 FOR TM=1 TO 500:NEXT 1520 PRINT064, "YOU GATHERED \$"SC " WORTH": PRINT" OF GOLD & GOT OUT OF THE MINE ALIVE. ": PRINT: PRI NT" CONGRADULATION 8" 1530 GOT01600 1600 PRINT0418, "ANOTHER GAME? (Y/ N) " 1610 H#=INKEY#: IF H#="" THEN 161 Ö 1620 IF H#="N" THEN END ELSE RUN 110



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#### CONVERT THAT FILE by Darrel Wright 2017 NE Hillaire Drive Hillsboro, OR 97123

For those of you with a Color Computer and Cognitec's Telewriter, you're probably aware of the power that word processing gives you - the ability to create, move, edit, delete, or virtually any word manipulation you desire. Maybe you've even thought of using Telewriter to develop and edit your Basic programs! Telewriter can perform all of these things, except that other programs cannot read its text files - until now.

The program described in this article converts a Telewriter text file to a standard ASCII data file, or a standard ASCII data file back to a Telewriter text file. You can develop Basic programs with the word processor, convert them to standard ASCII data files, then load the programs with the CLOAD command and execute them. Going the other way, you can write a program with Color Computer's Basic, convert it to a Telewriter text file, and include the program in a word processing document. The program described later was developed with Extended Basic, converted to a Telewriter text file, and then included as part of this article.

Telewriter creates, edits, and saves text files that consist of modified ASCII codes. All standard alphanumeric characters are formed by subtracting 32 from the desired character's ASCII code (A = 65 - 32 = 33). Telewriter assigns the following control characters unique values: a carriage return is given the value 94, the direct command character is given the value 107, and the end-of-file mark is given the value 92. The end-of-file mark terminates the file when it is stored on cassette.

The program CONVERT, shown in listing 1, accepts either a Telewriter text file or a standard ASCII file and produces the appropriate conversion file. The program requires either a 16K or 32K Color Computer, depending on the length of the file to be convert, and a cassette recorder. If you're converting a Basic program, the program must have been CSAVE'd with the "A" option.

The program queries you for a new name for the converted file. It's best to assign a unique name to each version of a file; otherwise it's easy to confuse them. As an example, I specify the last three letters of a converted word processing file name as ASC and the last letter of a CSAVE'd Basic file as A. By using this procedure, I always know the type of file I'm working with.

The operation of the program is fairly straightforward. Table 1 lists the variables used in the program, while the following paragraphs 83

contain a section-by-section description of the program.

Lines 12 through 31 convert the Telewriter file to a standard ASCII file and store it on cassette. The routine loads the word processor file into memory beginning at address 14146 (the beginning of Telewriter's text buffer. If you have version 1.1 Basic ROM's, this address is 14186) with the CLOADM command, converts the codes to standard ASCII values, then transfers the converted file to tape. This section also translates the carriage return code (94), the direct command code (107), and the end-of-file mark code (92). Since I transfer files to several different places, I've chosen to convert the direct command code to a space (32). If you want to use a different character, change program line 16 so it inserts your desired value.

Lines 35 through 59 convert a standard ASCII file to a Telewriter text file and store it on cassette. The routine reads the ASCII file in from tape one line at a time, converts the codes to modified ASCII values, and stores them in memory beginning at address 14146 (14186 if you have version 1.1 Basic ROM's). The carriage return is converted to the value 94, and the end-of-file mark (92) is inserted at the end of the file. I haven't incorporated it, but you could easily add a line that recognizes your version of the direct command and replaces it with the value 107. When the entire file is converted, the routine writes it to cassette with the CSAVEM command.

#### FINAL NOTES

CONVERT provides the missing link to effectively use Telewriter for many applications, although it has one drawback - speed. If you're converting a long file (4 to 9 pages), the program takes several minutes to perform the conversion.

With CONVERT, Telewriter can now be used for numerous applications besides just word processing. It can be used for developing Basic programs, writing text for transmission to other computers via a modem, or practically anything requiring text manipulation.

#### Table 1. Program Variables

- Z\$ awaits user input signifying ready
- A\$ file name to load
- B\$ new file name to store by
- C\$ holds line of converted characters
- D\$ character picked off of C\$
- A character to operate on from non-ASCII file
- B converted character to be stored

#### **CONVERT THAT FILE**

C - stripped code TB - address of Telewriter's text buffer NOTE: If you have version 1.1 Basic Rom's, change variable TB, in line 6, to address 14186. 5 CLEAR 1000: CLS 6 TB=14146 7 PRINT"DO YOU WANT TO CONVERT A": PRINT"TELEWRITER FILE TO ASCII OR": PRINT"ASCII TO TELEWRITER FILE?": INPUT"ENTER (AT OR A)":Z\$ 8 IF Z\$="A" THEN 33 **9 PRINT: INPUT"TELEWRITER FILE NAME":A\$** PRINT"SEARCH AND LOAD" 11 CLOADM AS 12 PRINT"LOAD COMPLETE - BEGIN CONVERT" **13 PRINT: PRNT"ONE DOT PRINTED FOR EACH":** PRINT"CONVERTED LINE OF TEXT." 14 I=0 15 A=PEEK(TB+I) 16 IF A=107 THEN POKE TB+1.32; GOTO 20 17 IF A=94 THEN POKE TB+I,&HOD: PRINT".";; GOTO 20 18 IF A=92 THEN I=I-1: GOTO 22 19 POKE TB+I.A+32 20 I=I+1: GOTO 15 22 PRINT: PRINT"CONVERSION COMPLETE.": PRINT: PRINT"CHANGE TAPE -": INPUT"READY TO RECORD":Z\$: INPUT"NEW FILE NAME":B\$ 23 OPEN"02,-1,B\$ 24 FOR K=TB TO TB+I 25 B=PEEK(K)26 IF B=&HOD THEN GOTO 28 27 S\$=S\$+CHR\$(B): GOTO29 28 PRINT#-1.5\$:5\$="": PRINT".": 29 NEXTK 30 CLOSE -1 **31 PRINT: PRINT"CONVERTED PROGRAM** STORED.": PRINT"STOP RECORD" 32 GOTO 61 33 FRINT: INPUT"ASCII FILE NAME";A\$ 34 PRINT"SEARCHING .... " 35 K=O 36 OPEN"I",-1,A\$ 37 IF EOF(-1) THEN GOTO52 38 INPUT#-1,C\$ 39 IF C\$="" THEN 51 40 IF C\$=""THEN POKE TB+K,ASC(C\$)-32; GOTO 50 41 FOR J=1 TO LEN(C\$)+1 42 D\$=MID\$(C\$,J,1) 43 IF D\$="" THEN 47 ELSE C=ASC(D\$) 44 PRINT CHR\$(C);

45 C=C-32: POKE TB+K.C 46 K=K+1 47 NEXT J **48 POKE TB+K.94 49 PRINT** 51 GOTO 37 52 POKE TB+K.92 53 CLOSE -1 54 PRINT 55 PRINT"CONVERTED - CHANGE TAPE.": INPUT"READY TO RECORD":ZZ\$ 56 PRINT: INPUT"NEW FILE NAME";B\$ 57 PRINT"RECORDING...." 58 S=TB: T=TB+K 59 CSAVEM B\$,S,T,T 60 PRINT"DONE - STOP RECORD"





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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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Exatron, 181 Commercial Street, Sunnyvale, CA 94086



- Please send a 32K Color Computer Interface for \$199.00
- □ Please send a CCI Disk Card for \$99.00
- Please include CCDOS and manual for \$29.95
- Also include a ROM Backup adaptor for \$19.95

Please add \$5.00 for shipping to all orders, and 6 percent sales tax in California.

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Signature .....

232K RAM plus Disk Interface

**TRS-80** is a trademark of Tandy

#### REVIEW: EXATRON "THING" Price as reviewed - \$298.00 by Phillip Beistel

I have been a user of the "EXATRON" disk system since late last year, when after a very long wait, it arrived. The instruction manual was not complete but it did get me going, (by the way the temporary manual has never been replaced by the so called perminent manual as stated in the temporary manual). The first thing that I noticed after connecting the "THING" into the ROMPAK port of my Color Computer was that on powerup I now had a lot more memory (no internal modification necessary). The temporary manual explained how to connect up my disk drive (an old Model II type) and instructed me to insert the diskette (CCDOS). I then applied power to the drive and turned on the computer. What happened next was that the computer sat there and after a couple seconds started up the disk drive reading the "DOS". When it finished I received the now familiar "EXATRON READY" prompt instead of the standard power-up message. I immediately performed a "BACKUPO" as called out in the "temporary manual" to make a copy of the "DOS". I was now ready to begin the task of learning about my new operating system.

Next, I played with the Save and Load commands. I have always been impressed with the speed that program Save/Load as opposed to cassette. Another nice feature of a "DOS" is the capability to "BACKUP" a disk or "COPY" a file. These are very handy when writing programs (I tend to Save/Backup much more often). Another very good feature is the "MERGE" function. It allows you to merge two files together giving a merged file as a result. A very handy thing if you have subroutines that you want to use in different programs.

Not being a Model I owner I never had a use for the "LOADT" command which allows the loading of Model I programs (ASCII format) into the Color Computer, but I understand that it works just fine.

One thing that I forgot to mention is the ROM MONITOR located in the "THING". It is a good machine language debugging tool. It is used to 'BOOT' in the DOS and can be accessed by EXEC &HC01B. With the monitor you can display memory (ASCII or HEX), set breakpoints, load DOS, move memory contents, perform a memory test, modify memory and jump to a machine language program or return to basic.

Some problems that I have encountered:

1. The single density disk system is totally non-compatible with the "standard" R/S system ("EXATRON" says that they will be bringing out a double density "Compatible DOS" soon). 2. The DOS entry points have never been documented by "EXATRON" for use with maching language programs (They also say that this will be taken care of in the new DOS).

3. The "EXATRON" thing gets all of it's power directly from the CC. I have not noted any problem with this but I understand that others have.

4. The "tokenization" of DOS instructions is non-compatible with the "SHACK" system so any program written now on "EXATRON" CCDOS using "DOS" commands is at present not even usable by dumping to cassette and loading in on a "SHACK" system.

In summation, I have enjoyed the "EXATRON" thing and am looking forward to much more use of it in the future. I feel that when/if "EXATRON" ever gets the double density compatible DOS available it could be superior to the "ROM" offering from the "SHACK". It might be worth noting here that I am at present waiting for my R/S disk controller to arrive.



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EXPLORING GRAPHICS MODES With The SDS80C Editor Assembler by Russell M. Peterson, II Rte. 66 Box 3A , Ghent, WV 25843

If you've never tried assembly language programming before, all you need is a 16K Color Computer, a 6809 assembly language programming manual, a Micro Works SDS80C editor assembler rompak, and some good programming examples to get you started. When I set out to learn assembly language my biggest problem was finding out how to set up the various graphics modes available to the Color Computer. I hope to overcome that problem for some of you with this program.

First of all, get out your Color Basic manual, and turn to page 263. Check out columns 2 and 3 in Table 2. This is the data you'll be using to modify my program to get different graphics modes. Now look at Table 1 on page 262. It shows the resolution and the number of memory bytes for one screen page of graphics in each mode. I found out early that in order to set up moving graphics that don't flash you need 2 pages of graphics, so I've incorporated that feature in this program.

I'm using 12288 bytes of screen memory so that you can use all of the modes without having to set up different sized pages for each mode. When you write your own programs you'll want to adjust the size of the pages to fit the graphics mode you are using. An explanation of how to figure page offset can be found on page 259 of your Color Basic Manual. Don't use the last 512 byte page for graphics as it will interfere with the operation of the SDS80C stack. After you determine the 7-bit binary offsets, simply enter each bit as data in PAG1DT and PAG2DT. Also change the data in PG1BGD and PG2BGD to correspond with the beginning and end of the pages you've chosen.

If your ready go ahead and type in the program. Anyone not familiar with assembly language program listings: Only type in columns 4 and 5 of the program listing, don't type in the first three columns containing numbers of the remarks which are inside single quotes. Also be sure to include the blank lines wherever they appear in the listing.

5

Once you get the program to run successfully it's time to start experimenting with different graphics modes. First let me show you something interesting I found out. If you change LDA #200 to LDA #248 you'll see a graphics mode not described in any of the Radio Shack or Motorola literature I've seen. It seems to be a combination between the G3C and G3R modes. Anyway it's just what you need if you want to write game programs on a black background with three colors available for graphics. Now change the data in LGR3CDT to 0,1,0 and then try 1,1,0. Now look at Table 2 again and you'll see that LDA #248 is the Video Control Register value for mode G6R. The trick is that when you set the odd bits (numbers 1,4,16,64) of the graphics data you get one color, when you set the even bits (numbers 3,12,48,192) you get yet another color. Anyone who doesn't beleive this try changing the FCB 0 in PG1BGD and PG2BGD to 170 and 85, and you'll see two different colored pages flashing before your eyes.

Enough controversy, for now, go back to Table 2 in the Color Basic manual and try substituting some of the values as indicated in the program listing. Don't be afraid to try different data than what is listed. Maybe you'll come up with some other different modes. Also for those of you who want to learn more about graphics read the descriptions of the data bytes in Table 4 on page 264 and try modifying the data in PG1GRX and PG2GRX to get your own graphics. The subroutines in this program are not necessarily the most efficient that could be written because I wanted to keep things on an easy to understand level. For example, in the STRBGD subroutine, loading as many registers as possible with the backgroud data and pushing them onto the page memory will greatly increase the execution speed.

One more thing before I finish, the EXIT routine is very useful in graphics programs for returning to the editor assembler graphics page after executing the G command to run the program from the SDS80C Abug Monitor. If you are attempting to run this program on a different editor assembler you may have to change the local labels (AQ,BQ, etc.) so that they are all different, and modify the EXIT routine to meet your editor assembler's return from execution requirements.

0001	0600			NAN BRXHODES
0002	0600	8608	START	LDA #200
0003	0602	<b>B7FF22</b>		STA #FF22
0004	0605	CE064E		LDU #GR3CDT
0005	0608	170049		LBSR SWNODE
0006	060B	CE0669	LOOP	LDU <b>#</b> P61 <b>B6D</b>
0007	060E	170062		LBSR STRBGD
0008	0611	<b>CE067C</b>		LDU #GRP1DT
0009	0614	170089		LBBR STRORX
0010	0617	CE0688		LDU #PAGIDT
0011	061A	1700B0		LBSR SWPASE
0012	061D	CE066E		LDU #P82B8D

#### **EXPLORING GRAPHICS MODES**

0013	0620	170050		LBSR STRBOD	
0014	0623	CE068E		LDU #GRP2DT	
0015	0626	170077		LBSR STRORX	
0016	0629	CE06BF		LDU #PAS2DT	
0017	062C	17009E		LBSR SWPAGE	
0018	062F	BDAIC1		JSR SAICI	
0019	0632	8150		CNPA #150	
0020	0634	2403		RHR FIIT	
0021	0636	16FFD2		LARA LOOP	
0022	0639	8600	EXIT	LDA TO	
0023	063B	B7FF22		STA SFF22	
0024	063E	CE0651		LDU 4BRAIDT	
0025	0641	170010		LBSR SWNODE	
0026	0644	CE06C6		LDU #PAGADT	
0027	0647	170083		LBSR SWPAGE	
0028	064A	3F		SWI	
0029	0648	16FFB2		LBRA START	
0030	064E	010000	<b>GR3CDT</b>	FCB 1.0.0	
0031	0651	000000	GRAIDT	FCB 0.0.0	
0032	0654	8EFFC4	SWNDDE	LDX ##FFC4	
0033	0657	A6C0	A2	LDA .U+	
0034	0659	2604		BNE BO	
0035	065B	A784		STA .X	
0036	065D	2002		BRA CO	
0037	065F	A701	Bə	STA 1.X	
0038	0661	301E	63	LEAX -2.X	
0039	0663	8CFFC0		CNPX ##FFC0	
0040	0666	24EF		BHS A9	
0041	0668	39		RTS	
0042	0669	00	Peibed	FCB 0	
0043	066A	0E002600		FDB 3584,9728	
0044	066E	00	P8286D	FCB 0	
0045	066F	26003E00		FDB 9728,15872	
				•	
0046	0673	3712	STRBGD	PULU A, X	
0047	0675	A780	Aa	STA "X+	
0048	0677	ACC4		CNPX .U	
0049	0679	26FA		BNE A9	
0050	067B	39		RTS	
0051	067C	0207	GRP1DT	FC8 2,7	
0052	067E	OFOF		FDB 3855	
0053	0680	3030CECCOA	PEIERX	FCB 48,48,206,204,10,128	
0054	0686	2220149042		FCB 34, 32, 26, 144, 66, 4, 16, 16	

0055 06	BE 0207	GRP2DT	FCB 2,7
0056 08	90 270F		FDB 9999
0057 06	92 F03C0EC00A	P826RX	FCB 240, 60, 14, 192, 10, 128
0058 04	598 22201A9042	2	FCB 34, 32, 26, 144, 66, 4, 64, 4
0059 06	A0 3716	STRERX	PULU A, B, X
0060 08	A2 3406		PSHS B,A
0061 06	A4 4F	AÐ	CLRA .
0062 06	645 E6CO	BƏ	LDB ,U+
0063 06	A7 E786		STB Á, X
0064 06	5A9 4C		INCA
0065 06	AA A1E4		CNPA ,8
0066 06	SAC 26F7	•	BNE BO
0067 08	AE 308820		LEAX 32,X
0068 04	5 <b>B1 6A61</b>		DEC 1,S
0069 06	B3 26EF		BNE AS
0070 00	b <b>B</b> 5 3506		PULS A, B
0071 06	B7 39		RTS
0072 04	5BB 000000000	PAGIDT	FCB 0,0,0,0,1,1,1
0073 04	BF 0000010000	PAG2DT	FCB 0,0,1,0,0,1,1
0074 06	SC6 000000000	PABADT	FCB 0,0,0,0,0,1,0
0075 06	CD 8634	SWPAGE	LDA #\$34
0076 06	CF B7FF03		STA SFF03
0077 06	D2 B6FF02		LDA \$FF02
0078 04	505 B6FF03	AÐ	LDA SFF03
0079 06	D8 2AFB		BPL A9
0080 08	DA B6FF02		LDA SFF02
0081 06	DD B6FF03		LDA \$FF03
0082 04	EO BEFFD2		LDX #\$FFD2
0083 06	E3 A6C0	Ba	LDA .U+
0084 04	E5 2604		BNE CO
0085 04	E7 A784		STA .X
0086 04	E9 2002		BRA Da
0087 06	EB A701	Ca	STA 1.1
0088 04	ED 301E	Da	LEAX -2.X
0089 04	EF 8CFFC4		CNPX #SFFCA
0090 04	F2 24EF		BHS B2
0091 06	F4 39		RTS
0092 06	FS		FND START
EXIT	0639 GR3CDT	064E 8R4	IDT 0651 GRP1DT 047C
GRP2DT	OGSE LOOP	OLOB PAL	IDT 0688 PAG2DT 04RF
PASADT	06C6 P81B6D	0669 PB1	SRX 0680 PB2BBD 044F
PG2BRX	0692 START	0600 ST	BBD 0673 STRERY 0440
SUMODE	0654 SUPARE	OACD	



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 Computer program did you mail your hard earned cash only to receive a turkey because the magazine the ad appeared in doesn't review Color Computer Software? If you have any of these symptoms you're suffering from Color Computer Blues!

Color Compute

## But take heart there is a cure!

# It's COLOR COMPUTER NEWS.

The monthly magazine for Color Computer owners and only Color Computer owners. CCN contains the full range of essential elements for relief of CC Blues. Ingredients include: comments to the ROMS, games, program listings, product reviews, and general interest articles on such goodies as games, personal finances, a Kid's page and other subjects.

The price for 12 monthly treatments is only \$21.00 and is available from:

maonogon, m	REMarkable Software P.O. Box 1192 Muskegon, MI 49443		
<u>.</u>			
State	Zip		
sue.			
	sue.		

SPACE INVADERS by Space Cadet Enterprises is designed to be just like the original arcade game. It has white invaders on a black background, There is five (5) rows, eleven (11) invaders in each row, total of fifty-five (55). Invaders are shaped very similarly to the arcade version. On screen scoring uses clearly defined program generated numerals, Remaining tanks are graphically represented. The board number is displayed as is Hi-Score, saucer value and current score. Joysticks are not required, the buttons on the keyboard are your controls. This simulates the button controls on the original arcade game. An added plus is that after a saucer is hit it travels accross to the right onto the "saucer pile". The saucer pile graphically illistrates how many saucers have been hit. The saucer turns blue or red after being hit and be hit a second and third time if your missiles are the same color as the saucer. The sound effects are good and add much to the game.

Many game variations can be created. Overall game speed, number of invader bombs, speed of invader bombs, and frequency of saucer appearances are all user controlled.

The 256x192 Hi-res graphics are used. The game portion of the program is all machine language. Requires 16K memory.

For more information write: Space Cadet Enterprises, 2150 Terra Linda Drive, Salt Lake City, Utah 84117

#### EPROM PROGRAMMER FOR THE TRS-80 COLOR COMPUTER

The 1248-EP EPROM programmer verifies EPROM erasure, compares firmware to software, program individual bytes and/or blocks of data in all popular 1, 2, 4, & 8K-by-8, 5 volt only, 24 PIN EPROM's. The programmer is totally menu driven by resident firmware in EPROM. The unit has an on-board power supply for the programming voltage, a quality ZERO INSERTION FORCE (ZIF) socket and provisions for decoding the firmware to any 2K position within the cartridge memory map for efficient memory map utilization.

In combination with the TRS-80 COLOR COMPUTER the 1248-EP Programmer, and THE MICRO WORKS SDS80C, Editor/Assembler Monitor makes a high performance, cost effective software development station for MC-6800/6809 microprocessor systems.

The 1248-EP is available from stock from: COMPUTER ACCESSORIES OF ARIZONA 5801 East Voltaire Drive Scottsdale, Arizona 85254 The cost for the programmer, including easy to understand instructions is \$94.95.

Please make checks payable to the above address.

#### DISKFIX

Want a "GOOD" disk directory? Use the DISKFIX commands, "DIRT" (to display on screen) "DIRP" (to display on printer). Directory will show Filename, Extension, Type, Format, Granule, Track, and Sectors used. Also number of Granules and storage bytes used and left for file usage.

Ever wanted to get-back file you "KILLED" by mistake? Use then FIX command! List all "KILLED" disk files on display or printer. Reactivate any or all "KILLED" files or use the PATCH command to fix any byte on any track or sector.

#### Do you want faster disk I/O?

Use the COMPress command to reformat all disk files in continuous sectors. SPECIAL INTRODUCTORY PRICE: \$14.95 ON RADIO SHACK FORMAT DISK

MICRONICS Route 1, box 309-A Reva, Virginia 22735

> NEW PRODUCT RELEASE by: Ann Curtis P.O. Box 1110 Del Mar, CA 92014

The Micro Works is pleased to announce the release of Color Forth, a high-level language for the Radio Shack Color Computer.

Color Forth is a highly interactive language like BASIC, with the structure of Pascal and execution speed close to that of Assembly Language. You will find many advantages in using Color Forth; it will be faster to write programs than using BASIC or Assembly, and execution speed is 5 to 20 times that of BASIC!

Color Forth consists of the standard FORTH Interest Group (FIG) implementation of the language plus most of FORTH-79, and a super screen editor with split screen display. Mass storage is via cassette interface. Color Forth also contains a decompliler and other aids for learning the inner workings of this fascinating language. It auto-configures to 4K, 16K or 32K models. Color Forth contains 10K of ROM, leaving your RAM for your programs! The 112-page manual describes the many hardware specific features of the implementation, including a glossary and complete source listing. Color Forth, written by Talbot Microsystems, comes to you in ROMPACK for \$109.95.

#### MICRO COMPUTER POLLUTION CONTROL by: Electronic Specialists, Inc. 171 South Main Street P.O. Box 389 Natick, MA 01760

Electrical pollution drives Micro Computers bananas! Power line electrical noise, hash and spikes often cause erratic computer operation. In addition, severe spikes from lightning or heavy machinery may damage expensive hardware.

•

Many systems create their own pollution! Disks and printers often create enough electrical interference to disrupt an entire program. Nearby electronic equipment is affected as well.

ELECTRONIC SPECIALISTS' recently announced MAGNUM ISOLATOR is designed to control severe electrical pollution. Incorporating heavy duty spike/surge suppression, the MAGNUM ISOLATOR features four individually quad-Pi filtered AC sockets. Equipment interactions are eliminated and disruptive/damaging power line pollution is controlled. The MAGNUM ISOLATOR will control pollution for an 1875 watt load. Each socket can handle a 1000 watt load.

Severe AC power line pollution can be controlled with the MODEL ISO-17 MAGNUM ISOLATOR for \$181.95.

> NEWS RELEASE by: Sue Searby Box 668 4403 Manchester Ave. Encinitas, CA 92024

Computerware introduces another dynamite graphics arcade game for the Radio Shack Color Computer.

You are the Starship Chameleon, a special intergalaxian vessel with the assignment of protecting the planet below from the aerial attack of enemy invaders. You have the unique capability to change color at the push of a button in order to destroy the on-coming super bombs and anti-matter bombs that have been launched by the enemy Gabolatoks above. But watch out for the semi-intelligent aerial bombs! They home in on your every move, seeking to destroy you! This fast moving game of 9 skill levels, offers an exciting challenge of skill and strategy for the beginner and/or best of the graphic arcade players. It is available on cassette or disk and requires a Radio Shack Color Computer with 16K of memory.

Starship Chameleon is on the shelf today at Computerware, Box 668, 4403 Manchester Ave., Encinitas, CA 92024, (714) 436-3512 and costs only \$24.95 on cassette or \$29.95 on disk plus \$2.00 shipping and handling.

> NEWS RELEASE by: Sue Searby Box 668 4403 Manchester Ave. Encinitas. CA 92024

Computerware introduces The Address Factory, a mailing list program for the Radio Shack Color Computer.

The address Factory is perfect for club newsletters, church mailings, business customer lists, and personal party lists. It records Name, Address, City-State, Zip, and a Special Code of 27 characters for each person on your mailing list. You can add or delete names or change any information easily from your Color Computer keyboard. The program can print mailing labels or a listing of all or any selected subset of your names. It sorts the names by Zip Code or Special Code.

The Address Factory, accompanied by a complete instruction manual, is available on cassette or disk and requires a Radio Shack Color Computer with 32K of memory. A printer is required for printing reports.

The Address Factory is on the shelf at Computerware at Box 668, 4403 Manchester Ave., Encinitas, CA 92024, (714) 436-3512. Price is \$17.95 on cassette and \$22.95 on disk plus \$2.00 shipping and handling.

> NEWS RELEASE by: Sue Searby Box 668 4403 Manchester Ave. Encinitas, CA 92024

Computerware introduces The Home Money Minder, a checkbook manager program for the Radio Shack Color Computer.

The Home Money Minder can tell you in a nutshell how much money you spent on what and where your income came from. You do this by recording all of your checkbook's activities - each deposit, check, and bank charge. By assigning each to any of your pre-assigned account codes, the computer can summarize all of your expenses, income, and cash flow.

Yes, The Home Money Minder helps balance the checkbook, but it also provides such reports as: Summary of Expenses (this month and this year), Summary of Income Sources, list of all checkbook transactions. These summaries make tax time a snap!

If you own property or have another outside interest, this is a must for keeping track of expenses and income. Just set up your own account assignments and your information is automatically organized for you as you enter your checkbook information.

The Home Money Minder requires a Color Computer with 32K, Extended BASIC, and a cassette player.

The Home Money Minder is available today from Computerware, Box 668, 4403 Manchester Ave., Encinitas, CA 92024, (714) 436-3512 for only \$19.95 on cassette plus \$2.00 shipping and handling.

#### NEW SUPERMAN COMIC BOOK FROM RADIO SHACK FEATURES WONDER WOMAN AND THE TRS-80 COMPUTER WHIZ KIDS.

Radio Shack, a division of TANDY Corporation, now offers a new adventure with Superman and Radio Shack's TRS-80 microcomputers in a full-color, educational comic book entitled "The Computer Masters of Metropolis!"

The 36-page comic book, a follow-up to "Victory by Computer", stars the TRS-80 Computer Whiz Kids, Superman and special guest-star, Wonder Woman\* - plus arch-villain Lex Luthor\*. An easy-to-read storyline incorporates facts about different kinds of computers and how they can be used.

"The Computer Masters of Metropolis" is available for free distribution to schools, clubs, youth groups and interested individuals from Radio Shack stores and participating dealers. The comic book is designed as a motivational learning aid for young people, offering an innovative approach to building interest in reading as well as computer science. It is Radio Shack's third sponsored Superman comic.

#### # # #

\*Superman, Wonder Woman and Lex Luthor are copyrighted characters of DC Comics, a division of Warner Communication.



#### NEW COMPUTER DEMONSTRATOR LEARNING AID FROM RADIO SHACK ILLUSTRATES BASIC COMPUTER FUNCTIONS.

Radio Shack, a division of TANDY Corporation, now offers both parents and educators an inexpensive way to introduce young children to the way a computer operates with a cardboard training aid and accompanying manual workbook. The Radio Shack Computer Demonstrator (62-1080) is available for \$3.95 at Radio Shack stores, Computer Centers and participating dealers.

The cardboard Computer Demonstrator measures an easily-manageable 8 1/2 X 16 inches. It uses sliding cardboard strips to illustrate various computer functions. These include a program line number indicator; an equal/unequal number comparing unit; "keyboard" input; "TV" output; a storage unit; a register; and a print function completed by the user. Arrows on the demonstrator card indicate the sequence of functions by charting the direction of work flow.

The accompanying Computer Demonstrator booklet includes step-by-step direction, an explanation of computer instruction codes and three workbook "programs" to "run". These include an exercise in addition, a Celsius/Fahrenheit conversion, and a random number selector.



#### RADIO SHACK'S TRS-80 SELECTED AS OFFICIAL COMPUTER FOR FIFTH ANNUAL NATIONAL COMPUTER CAMP.

Radio Shack, a division of TANDY Corporation, was pleased to learn that the TRS-80 microcomputer was selected as the official computer of the Fifth Annual National Computer Camp. The Camp offers children 10–18 an opportunity for hands-on experience with educational and recreational computing. The Camp will hold one- and two-week sessions from July 11 to August 6, 1982 at two locations: Westminster Preparatory School in Simsbury, Connecticut and Woodward Academy in Atlanta, Georgia.

An added feature of this year's camp is a special week-long session designed for children and adolescents with diabetes mellitus. This session of the camp, the first of its kind anywhere, will be held August 1 through 6 at the Simsbury, Connecticut campsite. Members of the Division of Pediatric Endocrinology at The University of Connecticut Health Center will be on hand full time to provide medical support for the campers. Among the goals of this special camp are the evaluation and development of computer programs to illustrate the interaction of exercise, dietary elements and insulin treatment in diabetes therapy.

Dr. Michael Zabinski of Fairfield University in Fairfield, Connecticut, established the National Computer Camp in 1977 as a way to give youngsters an opportunity to learn about computers first-hand in a recreational environment. Dr. Zabinski has written several texts on computers, including Introduction to TRS-80 Level II BASIC and Computer Programming and, more recently, TRS-80 for Kids.

The National Computer Camp features small group instruction and ample "computer time" for all participants. Campers are grouped by their experience with computers, and no previous computer experience is necessary. Programs include computer instruction, computer game tournaments, computer workshops, movies and guest speakers, plus optional recreational activities including tennis, swimming, volleyball, soccer, softball and basketball.

Additional details on the National Computer Camp are available from:

Michael Zabinski, Ph.D., at (203) 795-3049 or by writing to: National Computer Camp Box 624D Orange, CT 06477

#### SOFTWARE VENDOR DIRECTORY SIXTH EDITION

Micro-Software Services, Inc. formerly Micro-Serve, Inc. proudly presents the Sixth Edition of the SOFTWARE VENDOR DIRECTORY. The Directory is a research and reference document of indexed listings for more than 1,800 software vendors, 123 hardware vendors and 22 operating systems. The 1,800 vendors provide 12,300 software products classified into 300 categories.

The Software Vendor Directory is the original completely cross referenced directory dedicated exclusively to the microcomputer industry. Our publication has existed for 2-1/2 years and has received wide acceptance. It is currently being used by computer stores, Corporate Research Libraries, Manufacturers, Software Houses and end users. It is essential for every developer, distributor, and user of microcomputer software.

The Software Vendor Directory is published every six months. We offer the SUBSCRIPTION UPDATE SERVICE to all of our customers. It is provided to insure that the subscribers are kept well informed of the ongoing growth of the microcomputer marketplace. The contents of the binder are replaced with a completely new edition at a very reasonable rate.

#### NEW PRODUCTS

The Subscription Update Service is a crucial investment for those serious in keeping in step with this exciting challenging world of microcomputers.

The Directory is also available on DISK. It uses a software product named IC-IRS by Island Cybernetics and runs under CP/M. It is provided on two 8" single sided, single density IBM standard disks. This product is available through Micro-Software Services, Inc. and can also be an excellent Data Base Manager. It can be used to locate vendors, provide demonstrations, or in helping you gather information on the microcomputer marketplace.

The Software Vendor Directory is provided in an attractive, sturdy three ring binder for \$57.95 for a single copy. The Subscription Update Service is available for \$100.00 which includes the current edition PLUS two completely revised editions throughout the year. The Disk is only available with the Update Service for \$260.00. (Disks are completely replaced twice throughout the year.) Prices include shipping and handling within North America, Overseas orders outside North America please add \$20.00 (Payment in U.S. dollars). Orders can be paid by check, money order, VISA, Master Card or C.O.D. (add \$2.00). Contact Micro-Software Services, Inc., P.O. Box 482, Nyack, New York 10960 or call us at 914-358-1340.



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