COLOR COMPUTER NEWS

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APRIL 1982
ISSUE NO. 8

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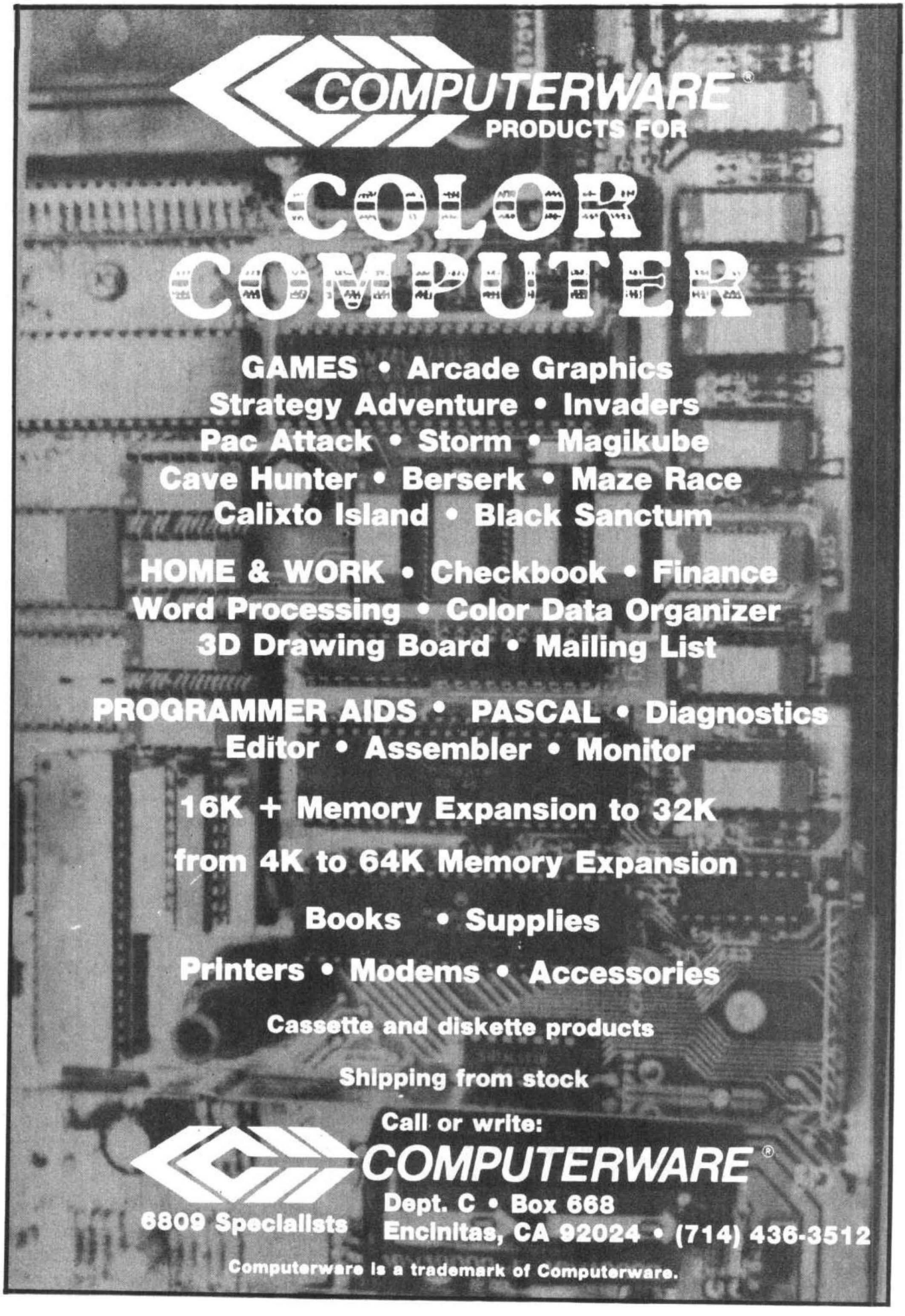
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REMarks
by Bill Sias

As I write this we are only 3 days behind schedule, fantastic when compared with the fact that just 4 weeks ago we were 9 weeks behind schedule. It appears that this should be the last late issue. I apologize to all of the folks whose letters seem to have been ignored, Barb and I are answering them as rapidly as possible. Right now our main priority is to get back on schedule and in fact to get at least one issue ahead. I had hoped to not be forced to "get ahead" because I felt that it was necessary to have all information as current as possible, but with the 4 to 6 weeks that delivery takes the information is old (relitively) anyway. We may start reserving a page or two for last minute whatevers. Our goal is, by mid summer, to be mailing at least 3 weeks prior to the cover date.

Last issue I made the statement that to date none of the rumors we've printed have been in error, of course simply making that statement assured that I would slip-up. I did, please see Comment Corner for the truth about BASIC 1.1.

For those of you interested in the 64K upgrade from the February issue but not desiring to modify your computer Level 4 Products (a Radio Shack authorized repair center) has informed me that they will install the 64K chips and perform the modification for $140.00 plus return shipping. They would appreiciate it if you would call first to determine the return shipping charges. For you folks that would like a Radio Shack discontroller, you may purchase it alone for $169.00. Their phone number is (313) 525-6200 and their address is 32429 Schoolcraft Livonia, MI 48150. Be sure to mention CCN when you call.

This month marks the end of our first calendar year of publishing CCN. Alot of things have happened in a short twelve months. We've grown from 28 to 64 pages, 1 advertiser to 30 last time I looked, from all but one article written by me to only one written by me. There have been bad times also. Most memorable is the deadline I missed in January, due to the move and the snows. REMarkable has seen several employees come and go and we've suffered on a couple of occassions from bad advice from trusted folks. All in all it's been a very good year and I'm looking forward to the next. The real proof of the success of the year gone by will be coming soon as we start to send out the first renewal notices.

Elsewhere in this issue you'll notice a listing of available back issues. I heard about a case recently where a fellow bought an original #1 for $15.00. There are very few copies of any issue left and it's too expensive to reprint them. Several folks have suggested that we bind all of the 1981 issues together into one volume so that's the way we'll do it. The advantages of doing it all together are much better than printing separately, in that we can pass the cost savings on to you. Ordering the back issues individually now costs $13.00, the bound version will sell for $9.95. Since the cost to print such a large book is extremely high we are printing them on a reservation basis only. We also have a minimum quantity so we can't print less than 300. If you want one, order it now, checks for this won't be cashed until we go to the printer with the order.

For over a year now I've been telling everyone how great the 6809 is and during that entire year I've been running the business on Z-80 equipment. It recently became apparent that the computers we're using now just can't handle the amount of work we need them to do anymore. In making a decision I made a list of everything we needed and looked for a system that fit the bill. The list was:

1. Either a 6809 or a 68000 CPU.
2. The ability to go multi-user.
3. At least 56K of RAM.
4. Interfacable to a hard disk.
5. The available operating systems had to be easy to use yet should allow me as a programmer to get into the heart of the thing.
6. Most of the software the business would need would have to be available "off the shelf" since the transition will be hard enough without having to write all our programs from scratch.
7. The computer and software must have been available for at least a year, since I don't have the time or desire to debug a new product.
8. Least important, but still a consideration, it had to look nice.

Before this sounds like a pay-off I should mention that the manufacturer doesn't know that I'm writing this. I have to admit that I was prejudice since I've wanted a Gimix for almost two years now, I still don't have one at home but at least we have one here now. The configuration I decided on is 56K now (128K when we go on line completely), four RS-232 ports for two users plus printers, two parallel ports for printers, one 40 track double density disk drive for compatibility with the Color Computer and 2 Qume Data track Thinline 8 inch drives, I plan on adding the hard disk as soon as we are completely on line. The

first terminal is a Hazeltine Esprit and the second will be one better suited to word processing, I hear that there is one with an 80 by 60 display. The operating systems I chose were Flex and OS-9, and languages are BASIC09, TSC Extended Basic, XForth and Dynasoft PASCAL 1.4. I picked two text processors Stylograph and DynaStar. I also picked up Spelltest for proofing articles. I plan on converting my old accounting system since that's the one I'm most familiar with anyway and I'll probably write my own mailing list program since our needs are quite special. The reason I'm writing all of this is because I've had lots of calls from people wanting my advice on what system they should install in their businesses, and while I'm not stating that this is the ultimate system it looks to me like an excellent solution to our specific problems. I'll keep you informed as we install and go on line.

For those of you that "came on" after the February issue, we are running some contests. The first is a BASIC program that will solve all 880 solutions to a four by four magic square. I've gotten two calls from people that wanted to know if it was fair to load all the solutions into DATA lines and just print them. NO, the key word is SOLVE, from first solution to last solution. Contest number two is the best portrait problem. The computer must draw a portrait of some recognizable person in either BASIC or machine language, machine language programs must include source code. Contest number three is the program that does the best rendition of the William Tell Overture, you can tell a true classical music buff if he/she can listen to the William Tell Overture without thinking of the Lone Ranger. Again, either BASIC or machine language and machine language programs must include Source code. Contest number four is the best program that assists with another hobby. We've already received some entries for this one and the competition is STIFF. The entries must include an explanation of what the other hobby is and how this program assists. Last, send a postcard with our name, address, city, state and zip code and at the end of the contest we'll draw five and award them with life subscriptions. The usual disclaimers, all entries become the property of REMarkable Software Inc., and none will be returned, advertisers, their employees, and employees of REMarkable Software are disallowed. Since we have been behind schedule I'm extending the deadline for all submissions until June 1, 1982, any entered after June 1, 1982 will be disqualified. The P.O. box is usually faster, but if you wish you can send it right to our office at 2370 Henry St. Muskegon, MI 49441.

I guess that now that we've finished our first year I should introduce the CCN staff, those of you with issue #2, none of those people are with us anymore, except the one in the middle of the drawing. Currently the staff consists of myself, Barb Bectel, John Fleener, and George Sias. Barb is our Editor and keyliner, John is the gofer and shipper and George is the justincase, fills in with whatever needs to be done. Other folks that should be thanked for helping us through this first year are: Paul and Sue Searby of Computerware who were our first contracted advertiser and contributed much moral support, Bob Lentz, Andrew Phelps and Ann Curtis of the Micro Works who were our second contracted advertisers and still provide techincal help and advice. Jim Perry, the original editor of 80 Microcomputing, and Exatron for the hours of free consultation about format of CCN and for being an early advertiser, Jack and Fran at Computer Plus for their advice about necessary equipment, helping to distribute CCN and for advertising, and Tom Rosenbaum of Spectral Associates, although they are no longer with us Tom was the first advertiser CCN had and he contributed two excellent articles about the Color Computer. This is by no means all of the people that have made this year as good as it was but these are a few of the folks that beleived in what I was trying to do early in our short history. Last and certainly not least Radio Shack, without them none of this would have been possible.

BEGINNERS' TIPS

One word you'll be typing a LOT is PRINT. For some reason, "they" don't tell you immediately, but you can save time and fingers by using the ? for PRINT. Also, it's often followed by quotes. So hit lower right Shift Key with right 4th finger, the ? with middle finger, and still holding the Shift Key down, hit the quotes (upper left on the 2 key) with the left - An old cranktypist like myself would say left fourth finger, but any finger will do. Practice this a few times, and the first month you'll save time enough for one more session.

Justin B. Snyder

EXCITING NEWS FOR COLOR COMPUTER USERS

FLEX, OS-9 and the Radio Shack Disk System ALL on the SAME Color Computer

Would you believe that you can run FLEX, OS-9 and Radio Shack disk software on the same Color Computer, and all you have to do is change the disk? That's right, just change the disk. If you have a 32K Color Computer with the Radio Shack disk system, all you need to do is make a trivial modification to access the hidden 32K, as described in the Feb. issue of COLOR COMPUTER NEWS and the April issue of '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 advantages. First, it gives you 48K from zero right up to FLEX. This means that *ALL* FLEX compatible software will run with *NO MODIFICATIONS* and *NO PATCHES!* There are no memory conflicts because we moved the screen up above FLEX which leaves the lower 48K free for user programs.

What you end up with is 48K for user programs, 8K for FLEX and another 8K above FLEX for the screens and stuff. We have a multi screen format so you can page backward to see what scrolled by and a Hi-Res screen that will enable us to have 24 lines by 42 character display 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 density, 35, 40 and 80 track drives. If you use double sided drives, the maximum is three drives because we use the drive 3 select for side select. When you are running the Radio Shack disk, it will work with the double sided drives but it will only use one side and only 35 tracks. Using 80 track drives is okay, but will not be compatible with standard Radio Shack software. You can also set each drive's stepping rate and drive type. (SS or DS - SD or DD)

In case you don't understand how this works, I'll give you a brief explanation. The Color Computer was designed so that the roms in the system could be turned off under software control. In a normal Color Computer this would only make it go away. However, if you put a program in memory to do something first (like boot in FLEX or OS-9), when you turn off the roms, you will have a full *64K RAM* System with which to run your program (FLEX or OS-9). When the roms are turned off, it is as if you had removed them from the computer. They are gone!

Now, we need the other half of the 64K ram chips to work, and this seems to be the case most of the time, as the article states. Of course, you could also put 64K chips in.

Some neat utilities are included.

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

NEW LOW PRICE INCLUDES OVER 25 UTILITIES!

FLEX Editor	$ 50.00
FLEX Assembler	$ 50.00
FLEX Standard BASIC	$ 65.00
FLEX Extended Business BASIC	$100.00

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

TRS-80 COLOR COMPUTER COMPLETE WITH 64K RAM, 24K ROM, SINGLE DISK DRIVE AND FLEX, SET UP AND READY TO RUN FOR ONLY $1,375. Includes 60 day extended warranty. If you have a Computer, call about RS disk controllers and drives.

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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 — Sophisticated full-screen editor
Real lower case characters — Powerful text formatter
Works with any printer — Special MX-80 driver
Runs in 16K or 32K — Disk & cassette I/O

requires absolutely no hardware modifications

TELEWRITER

Telewriter is the powerful word processor designed specifically for the Color Computer. It can handle almost any serious writing job and it is extremely easy to use. It has all the advanced features you need to create, edit, store, format and print any kind of text. With Telewriter you can quickly produce perfect, finished copy for letters, reports, term papers, articles, technical documentation, stories, novels, screenplays, newsletters. It is also a flexible and efficient way to take notes or organize ideas and plans.

51 x 24 DISPLAY

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

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

FULL SCREEN EDITOR

The Telewriter editor is designed for maximum ease of use. The commands are single key (or single key plus control key), fast, and easy to remember. There is no need to switch between insert modes and delete modes and cursor movement modes. You simply type. What you type is inserted into the text at the cursor, on the screen. What you see on the screen is always the current state of your text. You can move quickly through the text with one key cursor movement in all 4 directions, or press the shift key simultaneously for fast, auto-repeat. You can jump to the top or bottom of the text, the beginning or end of a line, move forward or backward a page at a time, or scroll quickly up or down. When you type past the end of the line, the wordwrap feature moves you cleanly to the next.

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

— Color Computer News, Jan. 1982

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

FORMAT FEATURES

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

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

— The RAINBOW, Jan. 1982

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

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

CASSETTE AND DISK I/O

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

AVAILABLE NOW

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

Cognitec
704 Nob Ave.
Del Mar, Ca. 92014

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

Sir:

I've been told there is no way to merge two independent pograms on cassette into the CC. Is there some way to relocate the first program after loading from cassette, so that loading the second program does not overlay the first? Perhaps your readers can suggest a way.
J Oisher
Hartsdale, NY

Our issue #4 contained an article called CSAVE Insurance by Jorge Mir that showed how to have two programs in memory at the same time. After you have both of them in memory you could move the pointers back to their original location and you would have combined both programs. The proceedure goes like this:

A. POKE 25,6: POKE 26,1: POKE 27,6
B. CLOAD"program with lowest line numbers"
C. C=PEEK(27): D=PEEK(28)
D. X=INT(C*256+D-2)
E. C=INT(X/256)
F. D=INT(X-256*C)
G. POKE 25,C: POKE 26,D
H. CLOAD"program with high line numbers"
I. POKE 25,6: POKE 26,1.

You should now have both copies in memory and a list will display both. All of this is done in the immediate or command mode.

Bill:

I am a beginner in the world of computers. Upon purchasing the Color Computer, my knowledge was and still is next to none. Luckily, friends of mine had been involved in microcomputers and assisted me in various problem areas and pointed me in the direction of Color Computer News.

Even though many of your articles have been above my level, good and useful has been obtained in each issue to date. Also of great value are your reviews pertaining to games and new products-honest and accurate! Also, advertisements are a must and a plus!! Keep it up.

In your January issue you requested all program listings on cassette and how it would be helpful if the program (BASIC) were saved in ASCII format. How would one save a program from Basic to ASCII? On page 38 of January's issue, C.J. Roslund wrote an article entitled "Variable Name Lister"; what exactly is the purpose and function of the program? One more question..I am interested in finding a way to disable the Auto Exec in my 16K TRS-80 Color Computer--any suggestions?!

Being a newcomer with computers, I found Chromasette to be a real asset. Each month I receive a cassette accompained with an informative sheet explaining the programs contained on cassette plus tid-bits. By reviewing their programs in depth (running individual lines), one can learn a great deal. Thanks to Chromasette I was able to create a program containing a "Menu" and that gave me a feeling of accomplishment!

Well, perhaps in the future more newcomers will share their problems, thoughts and accomplishments with all you experienced operators.
Sincerely,
Susan Bouchard
Millinocket, ME

To save a BASIC program in ASCII format you type CSAVE"name",A. The purpose behind the variable name lister is to diplay the names of the variables used by your program, the reason for doing so is to aid in debugging the program. Often the error in a program line is really caused by an error in some other line and the fastest way to find the error is to check values held by the variables used in the line, the lister will tell you the names of these variables.

Dear Bill,

I read somewhere about some hardware & software for monitoring the weather, but can't seem to remember where. Can you or any of your readers help me out?
Sincerely,
Bob Van Halder
P.O. Box 7063
Salem, OR 97303

Dear Bill:

I really enjoyed the January issue of CCN. The reviews and articles were great.

I've got this tremendously powerful machine at my command and I don't know how to command it.

I also would like to know about the Exatron "thing", as they call it in their sale literature. Anyone out there have enough experience with it to give it a review?

Finally, the letter from Ronald Beatty mentioned the Vitamin E, poke routine. I assume he's talking about Poke 65495,0. I don't have disk, but the instruction hangs up my computer to the point where I have to turn it off to regain

control. I tried it on the local Radio Shack demo computers, and the 16K Extended computer hung up also. However, the 4K machine wasn't affected. Has anyone else had any of this trouble?

Again, thanks for the good issue. Hope to see some more soon.
Sincerely,
John Boals
Mansfield, OH

Some of the early Color Computers weren't able to operate at the higher clock rate. At one point we assumed that it was slow PIAs, but replacing them with the B versions didn't help consistantly. In some cases replacing the 6809 with a 68B09 helped. Essentially it works on some and not on others. Lousy answer, huh.

Dear Bill,

I am an absolute novice at machine language programming. I have just entered and tried to use the "Monitor" program from the CCN July/August 1981 issue (You remember, the one you wrote on a Saturday morning?).

I need your help in trying to understand how to use it (maybe you supplied additional information in the September/October issue that I have not been able to get).

The questions I have are:

1. How can you use this monitor to examine and edit an existing machine language program that is stored on tape.
2. How can I prevent overlaying your monitor program when I call in another Basic program (with embedded machaine language routines).
3. Not knowing much about getting in and out of machine language routine (USR), I need to understand what statements #7000 "Argument to be Passed" means and what inputs to provide.
4. Do you have any other literature or helpful information that I could review to help me understand the use of this program better?

It appears to me that the only use for the monitor program is in conjuction with a machine language program that is being written under control of the monitor.

I would appreciate any help you can give me on these questions.
Sincerely,
Gary Griffith
Raleigh, NC

Your last statement is quite true, its only real use is with programs written by it, to do anything more than simple programming you need an Editor and an Assembler. The answers to your questions are:

1. You can only examine programs that are in memory.
2. See J Oisher's letter.
3. The argument to be passed is an integer that will be placed in the A register.
4. The best book on 6809 Assembly Language programming available (my opinion) is Lance Leventhal's 6809 Assembly Language Programming. This book is available from The Micro Works and Computerware for $16.95

Dear Bill,

I purchased my 16K with Extended Basic Color Computer in January 1982 and the darn thing turned a 44 year old man into a 10 year old kid; sent my wife to her mother and three days later I crawled from "Computer room" to living room trying to regain reality only to find that I was chief cook, dish-washer, maid and walking (no car).

I immediately checked the Radio Shack warranty and was disappointed to find that such items were excluded. Oh well, I did get the dog. Of course you know I am only kidding about all the above. Anyway, after a week or two I was hungry for new and fresh information. I managed to convince RS that I needed a copy of the TRS-80 magazine and yes, you guessed it, they sold me a used Nov/Dec 1981 copy and January 1982 copy.

I subscribed to CCN using an outdated ad (you were not monthly) requesting $9.00 for 6 issues. I also mailed out for catalogs, mag'(s), etc. and good old postal service was the middle man. I waited - and waited - and waited - and got to the point that I just knew someone forgot to put the #%$& zip code on my address. Mean while, back at the Computer room, "Genny" (no not the maid) was getting mighty impatient. There she sat with all that high power intelligence and begging me to hit her on ENTER and RUN. We had a few words and we both felt better and made up.

I waited - and waited - and waited - until one day - BINGO - the mail truck backed up to the front door and made us a happy family again. (Me and Genny or is it Genny and I?). Well, anyway, now I have my own room just like when I was a kid.

My wife asked me, "How many mags did you subscribe to?" I said, "Don't know the post office ran out of stamps and you are over-drawn."

Well, my wife solved our problems. She didn't pay the electric bill.

Hope you get a few laugh(s) out of all the above. One thing for sure tho, I was very excited when I received the January 1982 issue of CCN (even if it was March - waited - and waited).

Why RS pushes the CC and then leaves us happy purchasers hanging without any CC Software or magazines is beyond me. I've seen very little CC information and a train load of Model I, II, III information.

Bill, I know you have a big job to keep all us CC nuts happy but don't stop. To a beginner like me your magazine is a must and just 1/3 of space (in the magazine) for us beginners will help alot.

I noticed some of the programs are hard to distinguish between the letter "O" and the number "0". What happened to the "0"? See, first issue and I am complaining. When my wife gets all these magazine subscriptions paid up I'll mail your $12.00 to cover current (monthly) 12 issue price so don't stop at 6 issues.

I suppose the reason some of us CC beginners are not sending in information for CCN to publish is because we feel stupid. I mean, we purchase a computer and spend half the night figuring out where to turn the darn thing on. Come on all you CC beginners - start writing - (waited and waited and waited). I wrote my first program last week and the name of it was: 10 PRINT "HI". My wife wasn't impressed and you can see why I need CCN.

Bill, I hope you enjoyed reading this as much as I have writing it. I am learning more each day and enjoy my CC very much. I have programmmed "short games" and know in a few "days", I'll be another Ron Krebs. If you think any of this humor is worth space in CCN then go ahead. All remarks to RS may be deleted tho. I don't want to hire a lawyer - don't have those magazine subscriptions paid up yet. Have a nice day Bill and looking forward to next issue of CCN.

Sincerely,
Jerry D. Dodd
Fulton, MS
P.S. "Genny" said PRINT "HELLO"

If it's any consolation my wife hated computers too, until her employer required her to learn to type on a Color Computer (and people say it isn't a business machine).

Bill,

I called you the other day about Rainbow magazine and I mentioned a program that kept crashing.

I was referring to issue #5, January 1982, the program is "BustOut" by Andrew Hubbell.

This is a very good program except whenever the ball reaches the right side of the screen, it crashes and shows a FC "Illegal Function" call in line 48.

Since I'm not a programmer, I haven't been able to correct it though I've tried different changes in the program.

If you get anyone else with this problem I would appreciate seeing the corrections.

Your magazine is the exact thing I have been looking for. Since I bought my Color Computer, I have really gone crazy looking for software and trying to adapt Mod. I-III Basic to run on my computer. At last a magazine that will talk to my computer without beating my head against the wall!

I have run into a couple of guys who have a Color Computer and live about 45 miles away, and we are going to form a user's group.

Those guys didn't know of your magazine until I showed them the January issue.

So don't be surprised to get subsriptions notices!

We don't get any help at all from Radio Shack. And since I'm not a programmer, that's why I was overjoyed with your magazine.

Keep up the good work and I can hardly wait for the next issue.

Thank you,
Victor Hamilton
Kirbyville, TX
P.S. as a suggestion, I would like to see applications such as personal use and business, as well as games. But, heck, I'll take anything I can get!

A lot of people seemed to have problems with BustOut. The strange thing was, that there were no two people with the same problem. The listing is correct as printed.

Dear Bill,

I have enjoyed and found useful information in CCN, particularly program listings, and instructional articles. Would really like to see two things:

1) The step by step development and implementation of a simple machine language program that can be copied, run, studied, ect. to get a "feel" for this effort.

2) Information on the programming and use of EPROM type ROMs such as the 2716. An

article by Ralph Tenny in the January 1982, Micro Publication showed how to install such a unit in the Radio Shack ROM pack. All I need to know now is what to program into it!

I have modified and adapted to the CC several games. If you would be interested, I would be happy to send a tape.

Sincerely yours,
Vernin R. Robinson
Pueblo, CO

I'm interested in modified programs if they have been modified to a large enough extent not to be a violation of the original copyright, or if we can get permission from the copyright holder. EPROMs are nice if you have a program that you use a lot. I see little sense in burning an EPROM for anthing other than utilities or applications software. Maybe you should get a hold of B.E. Thoms

Dear Person,

The CC I feel is the "Best Buy" of the Computers on the market, its got everything I could ever want including an excellent Basic and machine language, lots of hardware to play with (i.e. D/A convert, serial port, external bus), high res graphics, color, sound and all for $549.00 with 4K (Canadian Price). With all this going for it (similar Apple features are over $2000.00 here in Canada) its unfortunate that Radio Shack pushes it as primarily a "Game Machine". I have upgraded my 4K to 32K at a cost of $40.00 and with the help of a friend am proto typing an EPROM PROGRAMMER for 2716/2732 EPROMS'. Once this is completed (2 or 3 weeks) we will be doing an EPROM/STATIC RAM plug in for the external bus. Although new to the world of Home Computers I am "Hooked". By the way, while I think of it I highly recommend Microworks SDS80C/Disassembler/ and CBUG programs.

Programs I would like to see developed are:

(1) A screen dump to allow the use of the EPSON GRAFTRAX option on the MX80

(2) A program to list all files on a tape to the screen at the same time. (Its a pain using SKIPF"*" to find out whats on my tapes, seems rather silly of R.S. not to include such a command).

How about starting an index of CC articles, the readership would send in Magazine, Date, Article Title, you would devote one page to it and as new entries came in, you would drop off the oldest one. Then once a year you would sell a complete tape, or a list of all entries.

I would very much like to see an article on:

(1) Exchanging programs between disk systems. The article should note which, if any, are compatible and how programs coming from a tape can be dumped to the different systems.

(2) A comparison of modems and a list of available data bases would be helpful.

(3) I am very interested in the word processor TELEWRITER, has anyone reviewed its use as a Basic Statement Coder. I understand it could be used but a translation program of some kind might be required, if so how about a "how" article.

(4) How about an article on the quality of cassette tapes and what should be used.

Keep up the good work, and I would be happy to correspond with anyone re the CC and especially anyone using it in a photographic darkroom.

Your Subscriber,
B.E. Thoms
2710 Saratoga, Apt 1010
Gloucester, Ont. K1T 1Z2

Dear Bill,

I just received my first issue of Color Computer News and thought I'd write you about a problem I've been having.

I have been using the Radio Shack disk system with my Color Computer and have had some problems with it. I wonder if you've heard of others having similar problems.

Occassionally the system will lose the directory (or the boot, if it has one). I will be programming away, saving and loading files and programs, when suddenly a save or load will be responded to with the unhappy sound of a stepper motor hunting for a directory, then an I/O error. This can happen after either a read or write. Afterwards, any attempt to access the disk or directory brings an I/O error.

I have also had it record files over other files. For example I have a BASIC program that starts with the original program and ends with another program. Yes, I'm sure I closed all the files before I changed diskettes.

Even with two backups of each diskette I've had it ruin both backup disks when trying to rebuild the original eaten diskette.

Unfortunately, this reminds me very much of the problems with the old TRSDOS 2.1 for the Model I (the reason for the success of NEWDOS!). However, in this case (Color Computer), I believe

the DOS was written by Microsoft, not Tandy or Randy Cook. I had thought better of Microsoft so perhaps my problem is hardware. On the other hand, Radio Shack has yet to put out a first version of a DOS that worked right, thus TRSDOS 2.3B and 1.3, one a fourth version, the other a third version.

Of course I sent it to the service center and of course the service center sent it back saying there was nothing wrong with it.

If you've heard of others with this problem I'd feel better. If you've heard of the cause and perhaps the cure I'd feel even better.

Also, what do you think of the adapted Flex operating systems for the Color Computer? Back when there was only TRSDOS 2.1 for the Model I and it wasn't working, I invested in a version of CP/M for the Model I. It worked OK but it was nonstandard, because of the ROM in the first 16K of memory. Thus I rarely saw any compatable software for this verison of CP/M, except for a few high priced programs from the people who adapted the CP/M system for the Model I originally. All in all, pretty much wasted money.

Thanks for your time.

Sincerely,
Ken Knecht
Yuma, AZ

Speaking of CPM, I was told that there is a company offering a board for the Color Computer that turns it into a 64K Z-80 machine, but I can't imagine why you would want a Z-80 when you have a 6809. You also should look at Andrew Phelps comments at the end of Comment Corner this issue about the disk problem. I disagree about Flex for the Color Computer to this extent, both Frank Hogg's and 68 Micro Journal's versions of Flex are standard Flex. The major difference between "normal" Flex and 68 Micro's are that they have to relocate some programs, Frank Hogg's is "normal" Flex and to date it appears that all Flex software will run on it with the exception of software for specific terminal configurations.

Dear Bill:

First, in response to William H. Sanford's letter in the Mail Call section of your January, 1982 issue, I would like to comment about using a Microline 82A printer (manufactured by Okidata) with a Color Computer. I have a 32K, Extended Basic machine and, with the help of our local Okidata vendor, Loonam Computer Terminals, Inc., was able to determine the proper switch settings and cable requirements. Also, if Mr. Sanford or any other reader would like additional information, they may write me and I will do my best to respond if they enclose a self-addressed, stamped envelope.

Last, but certainly not least, I am very impressed by your journal and find it to be the best value yet for a Color Computer owner.

Sincerely,
Warren Benson
Benson and Benson
Omaha, Nebraska

MICROLINE 82A SWITCH SETTINGS FOR USE WITH A RADIO SHACK COLOR COMPUTER

DIP Switches on Operation Panel Circuit Board:

Switch	Setting	Setting Function
1,2,3,4	Off	Selects ASCII character set
5	On	Selects 7 bit transmission
6	On	As CR is received, printer does a CR and LF
7	Off	Ignore DEL code
8	On	Use serial interface

DIP Switches on Serial Circuit Board:

Switch	Setting	Function
1	On	SSD polority (Space = Ready)
2	Off	
3	Off	Selects 600 baud
4	On	
5	Either	Not Used
6	On	With Parity

Jumper Plugs:

Plug	Setting	Function
1	A	DTR polarity (Space = Ready)
2	B	Data bit 8 is grounded

Cable Connections:

Radio Shack 4 Pin Plug	RS232C Plug
1	Nothing
2	11
3	7
4	3

NOTE 1: Also connect pin 6 to pin 20 within the RS232C plug.
NOTE 2: You may use the following Radio Shack parts to make up a cable:

RS232C plug = part # 276-1559
4 Pin Printer Cable = part # 26-3020

NOTE 3: You may use the printer at 1200 baud by changing DIP switch 2 on the serial interface circuit board from off to on. You will also have to execute the following instructions on the Color Computer before using the printer: POKE 150, 41: POKE 151, 1: POKE 152, 128

End view of Radio Shack 4 pin plug, number to correspond to Radio Shack's numbering system in their Color Computer operation manual.

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SLASHBALL (Available in 4K) – This one is best described as a thinkers arcade game. It rewards fast reflexes and clear thinking – like nothing you have ever seen before. It is one of our best family games for one or two players. $9.95.

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THE COLOR COMPUTER AND EMOTIONALLY DISTURBED CHILDREN

by Erick R. Williams

I decided to purchase a Color Computer. Curiosity was the driving force so I went ahead and bought the simple 4K machine along with the cassette recorder. Having learned BASIC many years ago in high school (though not in college), I had few difficulties in learning to program the Color Computer, though I still consider myself a novice.

I am employed as a Group Life Counselor at the National Children's Rehabilitation Center and, in working with the children in the dorm (inpatients), I described to them my new hobby. After some further conversation concerning the Color Computer (and the fun I was having with it!) the kids began hinting around that "maybe you could bring it to work." Though initially apprehensive, I decided why not it's worth a try and I'll guard the computer with my life!

Initially they played simple games that I CLOADed into the Color Computer. Though this held their attention for a couple of days, they soon began to make subtle suggestions concerning the inadequacies of my programs. Several youngsters, for example, wanted my version of Russian Roullette to count how many times they were successful before they were "shot". Their suggestions concerning other simple games led me to believe that these youngsters, despite their various emotional disturbances, might be able to grasp some of the more abstract concepts of computers and computer programming. I decided to broach the idea of teaching BASIC (on the Color Computer) to a small group of inpatient youngsters, aged nine to fourteen. The Director of Group Life, Robert Smith, was interested and gave me the go-ahead.

Initially they were presented with over-simplified versions of text book BASIC in piece meal increments and at a self pacing rate. They progressed at a rate that was far beyond my expectations and, as a bonus, they were enjoying every minute of it.

As an incentive to write increasingly more complex programs I refused to bring my Color Computer to the dormitory unless their programs were difficult enough that I could not immediately print on paper what the computer would have displayed on the television screen. It was not long before they were presenting me with programs that included nested loops. I then began to bring the Color Computer in more frequently to allow them to RUN their programs.

We had, at this point, our only problem to date, and it is one that many computer hobbiests run up against sooner or later! Addictive over-enthusiasm. Teachers from our school (also part of the residential treatment program) complained that the youngsters involved in the computer program (pun intended) were furiously writing programs during some of their class time. A stern reprimand seems to have thus far cured the problem. We also established a certain time of the evening when program writing and RUNing programs on the Color Computer was O.K.

The benefits thus far are encouraging. Promoting positive social interactions amongst the youngsters is one of our primary treatment goals in the Group Life department. To observe this small group of youngsters sitting at a table, comparing programs, helping each other, and showing tolerance to those less capable has been rewarding. When a child writes a program that successfully RUNs he is so excited and yells for a staff member, "Come see! Come see! It ran! It actually worked!" That alone is worth the time expended.

Educational benefits derived from our use of the Color Computer are also being documented. These youngsters, who had previously been ignorant of the term algebra, are learning how to use variables and what variables mean. The Color Computer (forgive my anthrophomorphism) seems especially forgiving with the children. The error messages, and prompts such as REDO?, are easy enough to keep frustration levels low enough to be manageable.

Currently the youngsters are learning to use the RND function in order to write dice rolling routines for their Dungeons and Dragons game. Their ultimate goal is to write a program that handles as much of the drudgery work as possible. Quite an ambitious goal, but I suspect that given enough time, they can do it.

We, at NCRC, have seen that you can put an emotionally disturbed child in front of a computer and derive some significant benefits. The kids enjoy it, they learn something new, and we plan, at this point, to keep the "project" going.

Other similar institutions are welcome to write us about what we are doing. The address is:

National Children's Rehabilitation Center
301 Children's Center Road
Leesburg, Virginia 22075
c/o Erick R. Williams

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FLEX COMES TO THE COLOR COMPUTER

by Dale L. Puckett

Owners of the Radio Shack Color Computer-which already sports a 6809E microprocessor-will now be able to run the FLEX (a trademark of Technical Systems Consultants, Inc.) operating system. Frank Hogg Laboratory, Inc. of Syracuse, New York is selling it now. His version runs on the standard Radio Shack disk controller so Color Computer owners may have the best of both worlds-fantastic color graphics from Microsoft's Extended Color Basic and access to the growing library of sophisticated systems and applications software running under FLEX.

WHY DO I NEED FLEX ON MY COLOR COMPUTER

In an attempt to answer that question, this article will look at FLEX in great detail. But, first we'll get to the bottom line. FLEX has become the standard operating system for the 6809 and other 68XX microprocessors since its release nearly five years ago. Because it is a standard, nearly every piece of software available for the 6809 is supplied on a FLEX formatted disk.

IT'S ONLY THE BEGINNING

Because of a current 6809 explosion on the hardware scene, the already comprehensive FLEX-based software library will be expanding rapidly in the near future. This hardware boom will even see Apple users running 6809 FLEX software. In fact, ESD Labs Co., LTD of Mission Hills, California is selling an Apple plug-in board called Excel-9 which comes complete with FLEX and the TSC Editor and Assembler. The Mill, from another California firm, is using a 6809 running the OS-9 operating system and I'm predicting that you will soon see it sporting FLEX.

FLEXI, a 6809-based single board micro from The Computerist in Chelmsford, Mass., will be running FLEX as will FOCUS, a stand-alone 6809 system from the same firm.

FOCUS comes with a high quality keyboard, memory-mapped video featuring bit-mapped graphics and user definable characters and dual double-sided, double density disks which give you nearly 650 thousand bytes of storage on line.

All of this new 6809 hardware, added to the several hundred thousand Color Computers hitting homes across the nation means one thing-there is going to be a tremendous demand for FLEX-based software.

SOFTWARE-THE BOTTOM LINE

Frank Hogg first recognized the need for high quality FLEX-based software in 1979. In the three years since he has become the leading international distributor of systems and applications software for the 6809.

A quick look at one of Hoggs recent ads gives Color Computer users an idea of the powerful software that will be instantly available to them when they boot up FLEX. Hogg handles software from the major 6809 houses-TSC and Microware-and several dozen independent authors.

Application programs include: Dataman, a random database management system that may be used for inventory control, work scheduling, mailing lists, sales reports and invoice creation; SPELLTEST, the most versatile Spelling Checker available on the 6809; READTEST, a program that tests and reports the readability of English prose; DynaStar, a cursor-based editor that is extremely easy to use; The Bill Payer System, a series of 28 programs that automate the drudgery of paying the bills; and XFORTH, a interpreter that is totally FLEX compatible and supports an entire family of applications software.

Hogg also supplies the popular Osborne "Some Common Basic Programs" package; Super Sleuth, a disassembler that analizes 6800, 6801, 6809, 6502, 8080 and Z-80 code; Tabula Rasa, a Visicalc-like spreadsheet; and ESTHER an educational and fun experiment with artificial intelligence coded in 6809 assembly language. It is based on the famous MIT ELIZA program.

FLEX-A FAMILY HISTORY

TSC first released FLEX back in 1977 with mini-FLEX, a 4K operating system that resided from $7000 to $7FFF on SWTPC's 6800 system. Soon, that 4K system gave way to FLEX 2.0, and 8K system which lived in high memory between $A000 and $BFFF. When this version came out, the 68XX family fell in love.

We had something going for us that no one else had-a disk operating system that would run on everyone's 68XX machine. It didn't matter what brand you owned. As a bonus FLEX was versatile, reliable and easy to use from a high level language like BASIC or from our own assembly code.

FLEX-THE COMMAND SET

FLEX brings a powerful set of commands to the Color Computer. You will be able to control all disk operations directly from your keyboard. It will also put a smorgasbord of disk access and file management routines at your fingertips.

In fact, the Utility Command Set will probably be the most important part of the FLEX system for the average Color Computer owner. More than two dozen commands reside on a system disk and are loaded into memory when needed. They let you do things like save, load, copy, rename, delete, append or list disk files. Simple English words actually become commands to your disk drives. A complete listing of the standard FLEX utilities is shown in Listing 1.

There are two major parts to the FLEX system-the File Management System (FMS) and the Disk Operating System (DOS). Together they give you fully dynamic file space allocation, automatic removal of bad sectors on a disk, automatic space compression and the ability to match the system to your Color Computer.

HARDWARE RE@UIREMENTS

FLEX requires 8K of high memory and a minimum of 12K of low memory. The 6809 version runs at $C000 to $DFFF. On the Color Computer you can gain access to this memory by making the simple modification printed in an earlier Color Computer News.

A minimum of two disk drives is assumed by most FLEX utilities. However, Hogg is supplying a Single Disk Copy routine written by this author that lets Color Computer users get started with one drive.

FLEX is booted into memory by a single-letter command in the monitor on most systems. Hogg ships FLEX on a disk that will boot directly from the Radio Shack disk system. About two seconds after you boot FLEX a banner is printed and you are asked for a date. As soon as you enter the date, you will see the famous FLEX prompt, "+++". The three plus signs mean that the operating system is waiting for your command. You literally have the world at your fingertips.

FLEX: HOW IT WORKS

Your files are stored in sectors on the disk. Each sector holds 256 bytes of information. Four of these are used to tell FLEX where to read or write its next sector. The remaining 252 hold your data. When you delete a file, the sectors you had been using are automatically released to the system and become available for use by new files. This is known as dynamic allocation.

Color Computer FLEX files have names containing up to eight alphanumeric characters plus a three character extension. The extension tells you and the system what type of information is in the file. APPEND.CMD, for example, is a command which lets you append two files into a third file. STARS.BAS on the other hand is a BASIC source file which runs on one of the many BASIC interpreters available to FLEX users.

Color Computer users may also tell FLEX which drive they want to search for a file. However, most of us use FLEX's default system and work drives. This convention really makes life easy. Plus, there is a utlity command that lets us change drive assignments at any time.

For example, "ASN S=0, W=1" will assign drive zero as the system drive and drive one as the work drive. Then, if we type, "LIST THISFILE"-FLEX will go to drive zero and read in the command files LIST. It will then go to drive one and list THISFILE.TXT to the terminal.

FLEX: REDIRECTION

If you would like to list THISFILE on your printer instead of on your Color Computer screen, simply type: P LIST THISFILE. If you want to build a disk file that contains a catalog of all your command files on the disk in your work drive, type: O CATALOG CAT. This will open up the output file CATALOG.OUT and direct the output of CAT to this file instead of the Color Computer screen. Later you can LIST the output file.

Any errors you make are reported to you in English on your Color Computer. FLEX does this by maintaining a random file of error messages on your system disk. If the file management system or DOS generates an error, the system reads the error number and finds the corresponding record on the file and lists it to your screen.

FLEX: THE MEMORY MAP

FLEX is a great operating system because it is completely documented. For example, the programmers manual lists every memory location containing any information of interest. Color Computer users can check a handy chart and know

Subscribe to CCN

Color Computer News

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!

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just where to PEEK to find out which character FLEX is using for a backspace or how many columns they have on their screen, etc. Listing Two shows where to find this information.

TSC has completely documented 22 routines which may be called by Color Computer programmers. They are vectored from a jump table so they are always at the same location, even though the particular version of FLEX owned by the user may vary.

This means that you can write a program on your Color Computer and sell it to someone running a GIMIX or other SS-50 buss 6809 system and he will be able to run it immediately, with no modification. Think of all the money you can make.

Here's an example from SPELLTEST, my spelling checker program for FLEX systems. I often need to find out if a character is alphanumeric or not. With FLEX it is easy.

```
JSR FMS  go get a character
JSR CLASS alphanumeric?
BCS NONAL it's not, go
(continue process)
```

I get a character by calling FMS. I check it by calling a FLEX DOS routine, CLASS. In two lines of code I have done what would have taken 20 or 30 lines if I had needed to write my own CLASS routine.

Another example comes from READTEST, my readability tester.

```
LEAX NUMPW,PCR  point to word count
LDB #1  use spaces
JSR OUTDEC  print the number
LEAX NUMMSG,PCR  point to message
JSR PSTRNG  let FLEX print it
(continue process)
```

To tell the user how many personal words he has used in his text, I simply point the 6809's X-register to the location of the two-byte (16-bit) word, set the B-register not equal to zero, and call FLEX's OUTDEC to print it.

I then point the X-register to an English language message and call another FLEX routine to print it. Without FLEX, I would have had to write one routine to output a decimal number and another to output a string of characters. This would have taken a lot more code and a lot of time. Listing Three shows the routines that are available to Color Computer users running FLEX.

FLEX: THE FILE MANAGEMENT SYSTEM

FMS lets you talk to your disk hardware. It allocates all file space and takes care of all the record keeping for you. You talk to FMS through a file control block (FCB).

These 320-byte blocks tell FMS the name of a file, the drive it is located on, etc. To talk to a disk file you simply read or write one character at a time to the FCB. Instead of calling an output routine in your Color Computer BASIC ROM, you call FMS. For example, the code below sends the letter "A" to a disk file.

```
LDA "'A  put character in A-reg.
LEAX FCB,PCR  point X-register to FCB
JSR FMS  Send it out to disk
BNE ERROR  go on error
(continue process)
```

When used in this way, your Radio Shack Disk system disk looks no different to your program than your Color Computer screen. You may even have one file open for reading and another open for writing. In fact, you may have as many files as you need open at one time, as long as you have enough memory to assign a separate file control block to each one.

Color Computer programmers, can talk to FLEX's File Management System by using function codes. For example, "1" means open a file for read. To do this you simply store "1" in the first byte of the FCB, point the X-register to the FCB and call FMS. If the operation is successful FMS will return with the carry bit clear. If not, the carry bit will be set and the number code of the error will be found in the second byte of the FCB. You can then read (PEEK) that byte and see if it is something you expected-like perhaps the end of a file. After reading this byte you can take the appropriate action with your program. Listing Four gives you a look at function codes available to Color Computer FLEX programmers.

SUMMARY

FLEX supports random files and can reach any sector in a file after no more than two disk reads. It is very easy to read a specific character in a file by doing a small calculation with the number of bytes in a sector. Color Computer FLEX has many other features that make it a dream to program at the assembly level.

But, here's the most important thing to the Color Computer user just buying a disk system-FLEX is user friendly and its syntax is simple. In fact, if you compare the FLEX manual with the CP/M manual, you'll find that FLEX is much easier to use at the command level, let alone at the assembly language programming level.

When you consider this and add the fact that a large base of extremely sophisticated applications software as well as almost every computer language written for a microcomputer runs under the FLEX system, it is easy to see why there is a 6809-based hardware boom. All of this software is going to make your Color Computer worth a whole lot more than you ever dreamed.

LISTING ONE

NAME	FUNCTION
APPEND	Append two or more files into a third file.
ASN	Assign the System or Work drives
BUILD	Place a short text file on a disk
CAT	List a catalog of the files on a disk to the terminal
COPY	Copy one file to another
DATE	Print or change the system date
DELETE	Delete a file from the disk
EXEC	Use lines of text in a file as command lines
GET	Load a file from the disk into memory
I	Get the input from specified file instead of terminal
JUMP	Execute machine code at Hex address
LINK	Point boot routine to a specific file for start up
LIST	Print a text file on the terminal
MON	Return to the system monitor ROM
NEWDISK	Initialize a new disk in the proper format
O	Re-direct output the specified file
P	Re-direct output to the printer
PRINT	Spool output from the file to the printer
PROT	Set the protection status of a file
QCHECK	Check status of file in print queue
RENAME	Change the name of a file on the disk
SAVE	Save memory to disk
TTYSET	Set terminal parameters
VERIFY	Turn verify mode on or off
VERSION	Print version of program on terminal
XOUT	Delete all files with an .OUT extension
CHECK	Compare two disk files and report to terminal
CMPMEM	Compare binary file on disk to memory
CONTIN	Used to repeat complex EXEC command files
DIR	Similar to CAT, but it prints all directory information
DUMP	Dump a disk file in Hex and ASCII
ECHO	Echo an ASCII string to the terminal
EXTRACT	Take specific lines from one file and put them in another
FILES	Similar to CAT, but not as detailed
FIND	Find a string of characters in a disk file
FREE	Report free space remaining on a disk
HECHO	Echo a hex character to the terminal
MAP	Print the load addresses and transfer address of a file
MEMEND	Read the FLEX MEMEND address and report or change
PDEL	A prompting delete
RUN	Load and execute a position independent program
SPLIT	Split a text file into two new files
ZAP	Delete files in a match list without prompting

The Utilities above are standard with FLEX. Many vendors supply additional commands which use their hardware. For example, GIMIX has a command which reads the time from the clock chip on their CPU card, etc. The Utilities below come in an extra package and may be purchased from TSC.

LISTING TWO

ADDRESS	CONTENTS
$C080-$C0FF	Line Buffer
$CC00	TTYSET Backspace Character
$CC01	TTYSET Delete Character
$CC02	TTYSET End of Line Character
$CC03	TTYSET Depth Count
$CC04	TTYSET Width Count
$CC05	TTYSET Null Count
$CC06	TTYSET Tab Character
$CC07	TTYSET Backspace Echo Character
$CC08	TTYSET Eject Count
$CC09	TTYSET Pause Control
$CC0A	TTYSET Escape Character
$CC0B	System Drive Number
$CC0C	Working Drive Number
$CC0E-$CC10	System Date Registers
$CC11	Last non ASCII character
$CC12	User Command Table Address
$CC14-$CC15	Line Buffer Pointer
$CC16-$CC17	Escape Return Register
$CC18	Current Character
$CC19	Previous Character
$CC1A	Current Line Number
$CC1B-$CC1C	Loader Address offset
$CC1D	Transfer Flag
$CC1E-$CC1F	Transfer Address

$CC20	Error Type
$CC21	Special I/O Flag
$CC22	Output Switch
$CC23	Input Switch
$CC24-$CC25	File Output Address
$CC26-$CC27	File Input Address
$CC28	Command Flag
$CC29	Current Output Column
$CC2B-$CC2C	Memory End
$CC2D-$CC2E	Error Name Vector
$CC2F	File Input Echo Flag
$CCC0	Printer Initialize
$CCD8	Printer Ready Check
$CCE4	Printer Output

The information above is listed to give you an idea of the magnitude of the information the FLEX programmer has available about his operating system. The actual documentation that comes with the system gives complete details.

LISTING THREE

ADDRESS	FUNCTION
$CD00	Coldstart address
$CD03	Warmstart address
$CD06	DOS main Loop Re-entry point
$CD09	Input Character
$CD0F	Output Character
$CD15	Get Character, honors TTYSET parameters
$CD18	Put Character, honors TTYSET parameters
$CD1B	Input into line buffer
$CD1E	Print a String
$CD21	Classify a Character: alpha or no
$CD24	Print a Carriage return/line feed
$CD27	Get Next Character from Buffer
$CD2A	Restore I/O vectors
$CD2D	Get a File specification
$CD30	Load a file
$CD33	Set an Extension code
$CD36	Add B-Register to X-register
$CD39	Output a Decimal Number
$CD3C	Output a Hex Number
$CD3F	Report an Error
$CD42	Get a Hex Number
$CD45	Output a Hex Address
$CD48	Input a Decimal Number
$CD4B	Call DOS as a subroutine
$CD4E	Check Terminal Input Status

LISTING FOUR

NUMBER CODE (decimal)	FUNCTION
1	Open For Read
2	Open for Write
3	Open for Update
4	Close File
5	Rewind File
6	Open Directory
7	Get Information Record
8	Put Information Record
9	Read Single Sector
10	Write Single Sector
11	Reserved
12	Delete a File
13	Rename a File
14	Reserved
15	Next Sequential Sector
16	Open System Information Record
17	Get Random Byte from Sector
18	Put Random Byte in Sector
19	Reserved
20	Find Next Drive
21	Postion to Record N
22	Backup One Record

ROUND IN CIRCLES WITH CO-CO

by Peter W. Roach

"Happiness is Egg-Shaped" may have been true for the British Egg Marketing Board when they coined the phrase a few years ago, but for the CIRCLE command in Radio Shack's Extended Color Basic it is not.

For some while after getting Extended Basic for my TRS-80-CC, I suspected that I had a problem with the height control on both of my TV sets, because CIRCLES came out egg-shaped, tall and narrow, and DRAW "U10 R10 D10 L10" produced a rectagle instead of a square. Soon, however, friends who were also CC owners were making the same comments, and it started to look very much as if Radio Shack and Microsoft had slipped up in combining the hardware and software for this, otherwise, excellent little machine. The question was, what had gone wrong? I decided to try and find out the answer.

The first thing was to get a hold of some information on the MC6847Y Video Display Generator chip. A phone call to the local Motorola office yielded a copy of their Preliminary Information booklet on the device. The first surprise came with the sketch entitled "Format of the Television Screen" which shows a very wide rectangular array of dots labelled as being 256 dots wide by 192 dots high. The number of dots came as no surprise, but the rectangle did, because on my TV the Hi-Res graphics frame is nearly square. Thus, the sketch seemed to confirm my earlier thoughts that perhaps my TV was at fault. This could not be so, though, because my favorite TV personalities were all the right shape. The answer was to do some research into the NTSC Television Standard (the TV Standard used in North America), and try to make sense out of the specifications of the MC6847Y.

A trip to the library revealed the folliwng information. The TV picture is made by transmitting approximately 30 frames each second. Each frame consists of two fields sent alternately, one field consisting of the even numbered picture lines, and the other, of the odd numbered lines. Thus, approximately 60 fields are transmitted every second. Each frame consists of 525 lines, and so each field must consist of 262-1/2 lines and each line takes about 63.56 microseconds to transmit.

Note: The MC6847Y sends information on only one of these fields (the non-interlaced field), and sends all black on the other field.

Having got the basic timing of the TV signal, other things have to be taken into account. The electronics of a TV set, having drawn one line across the screen, have to reset the beam to the left hand side to start the next line. Similarly, having scanned out one field, the beam ends up at the bottom right hand corner of the screen, and has to be returned to the top left corner to start the next field. The devices which move the beam consist of magnetic coils which cannot react instantaneously, so some time has to be allowed to reset the beam. This time is known as the "flyback time". To allow for this flyback time, the NTSC system specifies that the time to draw one line across the screen, what is known as the "Active Line Period" shall be only 52.60 microseconds, of the total 63.56 microseconds of line time. To put it another way, the picture can be said to be 52.60 microseconds wide. In a similar manner, only 242 of the 262-1/2 lines per field are used to build up each picture.

Looking at a TV set, it is obvious that the screen is wider than it is high. Again, the NTSC system specification comes to our rescue. It states that with the parameters described above, the ratio of the height to the width of a television picture should be 3 to 4. The ratio 3/4 is known as the Aspect Ratio of the system.

Now back to our Video Display Generator. The Motorola information booklet tells us that each dot on the display is one picture line high, and one half-cycle of the color sub-carrier long. The color sub-carrier frequency is 3.579545Mhz. From this we can derive that 256 dots will occupy 35.76 microseconds of each line, which is 35.76/52.60 or 67.98 percent of the picture width. Further, as the display is 192 dots high, it occupies 192/242 or 79.34 percent of the picture height. The display area is therefore 79.34 units high by 67.98 units wide, which corrected by the height/width Aspect ratio of 3/4, yields a height/width ratio of the display area on the screen of (79.34/67.98)*(3/4) = 0.88. Eureka! the display is nearly as high as it is wide. It is close to being square, and NOT the wide rectangle shown in the Motorola booklet.

Part of the mystery has been solved, but what about the egg-shaped circles. Well, if the height/width ratio of the display area on the screen is 0.88, then we can say that it is 88 units high by 100 units wide. As the display is 192 dots high and 256 dots wide, then each dot must be 88/192 units high by 100/256 units wide, or 1.17 times higher than it is wide. Now, if we look at

the statement for a "square" at the start of this article, DRAW "U10 R10 D10 L10", we can see that if each dot is 1.17 times higher than it is wide, then our "square" must also be 1.17 times higher than it is wide. Our "square" therefore becomes a rectangle, and to get a true square we must multiply the horizontal movements by 1.17, so the statement for a square becomes DRAW "U10 R12 D10 L12", approximately.

By the same argument, our CIRCLEs are egg-shaped, and in this case the solution is equally simple. The syntax for the CIRCLE is CIRCLE (x,y), r, c, hw, start, end. The answer lies in the "hw" or height/width ratio. The default value for this has been set by Microsoft at 1, but if we want round circles, we simply set this value to 0.88. e.g. CIRCLE (x,y), r, c, 0.88, start, end. This will reduce the height of the circle to make it the same as the width. If we want to go the other way, and make the circles as wide as they are high, we have to reduce the height/width ratio by 0.88, but increase the radius by 1.17, or CIRCLE (x,y), 1.17*r, c, 0.88, start, end.

So here ends the mystery story. Of course, the "roundness" of a circle may not always be important, but when it is, this little trick will be useful. For instance, I recently received a copy of Chromasette magazine (a great investment for the CC owner), and found on it a program to generate maps of the world. I CLOADed it and ran it, only to be presented with a map of an Egg. With a couple of quick EDITs, I proved once more that the world is round.

SPECTACULATOR
Review by Robert E. Foiles

The long awaited Radio Shack rom pack SPECTACULATOR (Cat. #26-3104) is out and in some stores across the country. It took some effort to get hold of a copy of the pack, but with some luck (and a payment in advance) the new tool was at hand.

The format of packaging is much the same as the one for Color Scripsit (and both programs were created by Robert G. Kilgus who has licensed them to Tandy Corp.). The rom pack is accompanied by a well written 43 page manual. Just a word or two on the Manual as a tool for the novice. In the "Advanced Sessions" - which provides "hands-on" material to put into the program as a tutorial - must have been written for those with more experience than a "novice" or someone had second thoughts when the examples were written. The examples call for the student to put a line of text or a formula into the CC. Only after so doing, the novice comes to the end of the line of instruction only to find appended a parentheses with information which was to be entered into the CC before the other material. It is not serious, but for the first time through a new program, the "teacher" should be as clear as possible. A nice addition would have been a pull out printed card with the Summary of the Key Commands. This would have been helpful, but can be overcome by individually typing the information on a sheet for fast reference when working with the program (it is a little bit of a mess to flip open the manual to check a Command and lose your place in the "raw data").

SPECTACULATOR is a very friendly rom pack. It has built into the system "Help List" for each of the 16 (count them 16) Command Sets (and three special functions keys):

MM-Move Marker
EN-Enter Numbers
CF-Column Formula Entry
RF-Row Formula Entry
CA-Calculate
ET-Enter Text
CR-Clear Row
CC-Clear Column
CW-Change Column Width
FR-Display Free Memory
DR-Delete Row
IR-Insert Row
IC-Insert Column
SA-Save on Tape
LO-Load from Tape
LI-List to Printer

Special Keys:

Break-Enter Command Mode
Clear-Backspace
?-Help List

The use of the Commmand Keys allows the operator to create a working spread sheet of 99 columns and 99 rows. The limit of the screen size does not allow viewing of the total worksheet at one time, but with the use of the "MM" Command, every cell of information is callable to screen.

Printing hardcopy of the completed worksheet is limited to the 80 column format adopted by Radio Shack. However, again by using the "MM" command, the operator can print the first 80 columns of data and then by moving the start and stop markers, a second print of 80 columns can be produced (and so you might move and print through the full 99 columns.) The number of rows will print according to any limits you may select, so there is not really any limitations in this area.

The real heart of the program is the number handling ability. If the operation called for in the project at hand requires the answers to appear as "integers" or "decimals", then the program provides for the entry of "I" or "D" preceeding the formula. The default specified in the program (when an "I" or "D" is not entered) is for the results to automatically be expressed in financial mode of dollar and two decimal cents. Trailing zeroes will automatically be deleted and when called for by the length of the results, the column spacing will be increased automatically as well.

The prearranged calculating functions include: add, subtract, multiply, divide, and three special functions. The operator may enter into either row or column formula a "SUM" - "SQR" - "SMT" call. The "SUM" call tells CC to add the values (either from a specific cell to end, or all); the "SQR" call has CC take the square root of the values in the cells (again operator specified...); and the "SUMT" call provides for cumulative totals of the cells (again under operator specification). Once the base data has been entered into the cells of the worksheet, the formula for either row or column may be changed and thus the data may be reworked in so many different ways which gives this program all the high markes for usefullness. To fully enjoy the control over the numbers you are working with, one must have the program in hand (really in CC) and let the program do it to it!!

Needless to say, the program provides for saving all your hard work (that is if you feel typing in text and numbers as the hard work) on tape.

The program is "friendly" to the operator, the calculations are fast, and the results are ready for use on the screen, or as a printed copy, or put into storage on tape. The wait and price were worth it.

64K KORNER

By Frank Hogg

This seems to be turning into a habit, so I've settled on the name '64K Korner' for this column. What we are going to cover here pertains to using 64K RAM in your CC and the different things you can do with it.

One of the questions frequently asked about the 64K mod is what happens to the ROM when you switch to 64K. This has proven to be very difficult to describe over the phone, so in order to make it easier to visualize, we've made up some memory maps of the color computer. In Fig 1 is the map of the 'normal' color computer. This is similar to what you will find in the manual that comes with the CC. Notice the ROM at the middle of memory. This is what we are going to turn off. Note also the areas of memory down low where the screen is and the Basic storage area. These are designated by the ROM and when it is turned off, we can move these wherever we want. One final thing to spot is the area above ROM which is empty. There's no memory there at all.

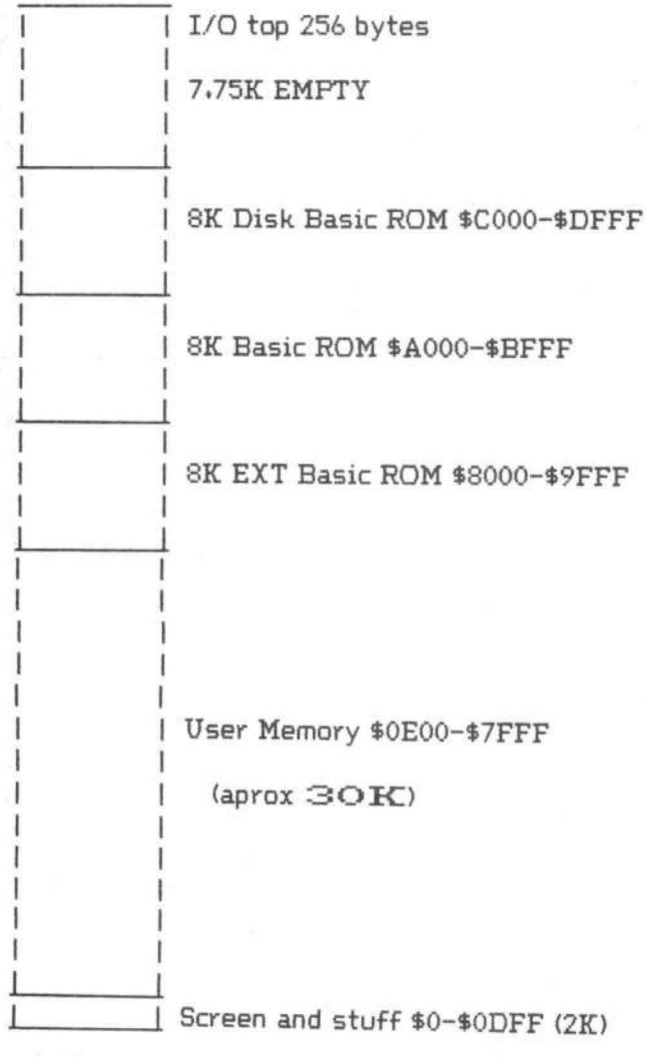

Figure 1 'Normal Color Computer'

Now, let's turn the ROM off and see what we have. Notice that the I/O stayed where it was and everything else disappeared! This is why you must have something in memory before you turn the ROM's off. Otherwise, nothing will happen. So on to figure 3.

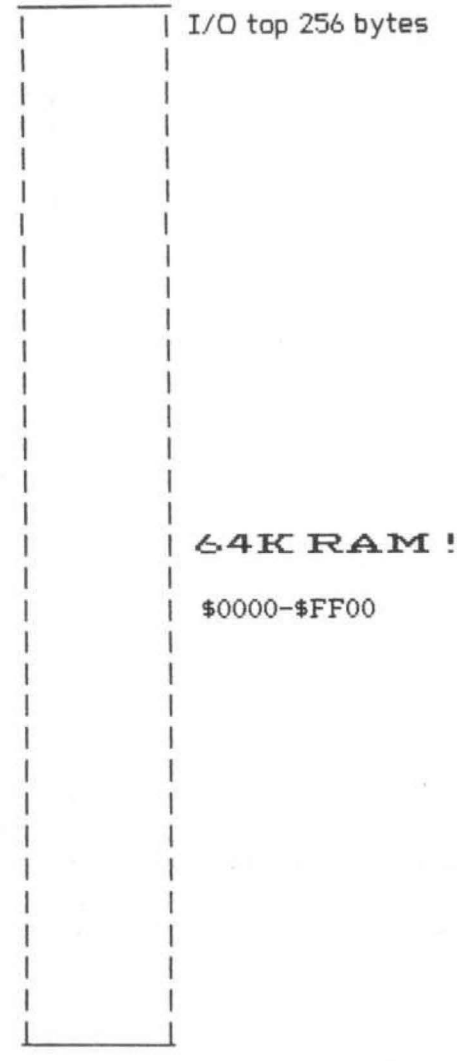

Figure 2 '64K Color Computer'

Now we come to where you can really do something with that 64K. In figure 3, we are showing you the memory map for our FLEX disk operating system on the color computer. With this system the memory is much better utilized. Notice that you have 48K of user memory, as opposed to just over 30K. Also, the RAM above FLEX is used for a multiple screen output and a high res output with 24 lines by 42 characters per line.

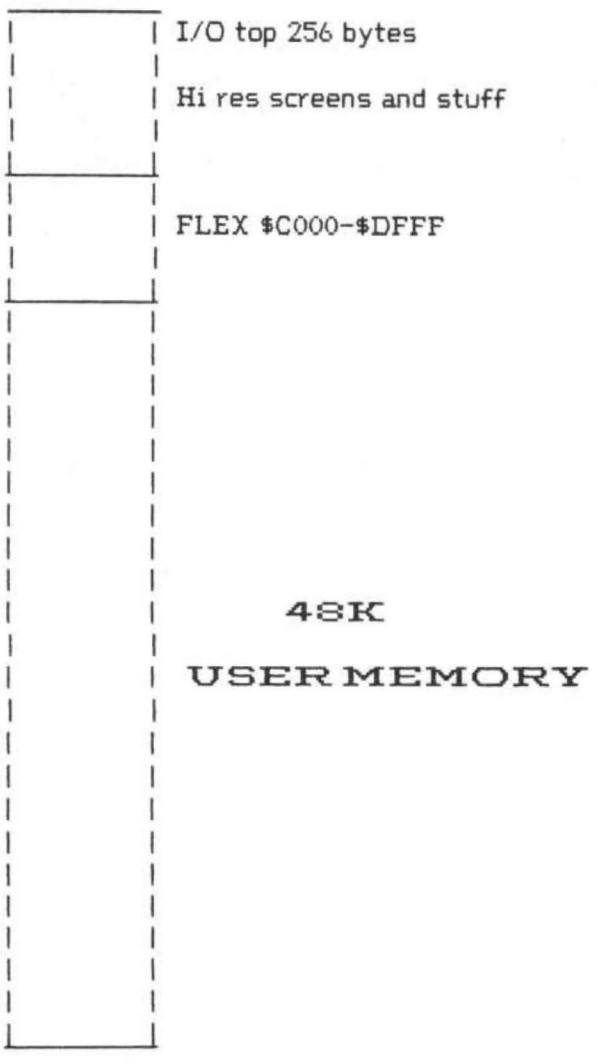

Figure 3 'FLEX Color Computer'

The color computer is quite unique among the so called appliance computers. The CC is the only one with the ability to get rid of the ROM and switch on 64K RAM. This is a very powerful feature of the CC that has not had a lot of attention given to it.

If you are a Basic programmer and never want to change to anything else, the ROM Basic may not get in your way. So why is it such a big deal? Suppose you want to do something different with your CC other than programming in Basic --- word processing for instance. With 64K you can have a much bigger workspace than with 30K. How about using a different language like Pascal or FORTH? The idea is that with a ROM based system you are stuck with that ROM whether you use it or not. In the CC you can do anything you want because you can turn the ROM off. Tell that to someone with an APPLE or Atari and see how they handle it.

The power that's hidden in that little gray box is quite surprising. Let us try to unleash it.

COMMENT CORNER

By Andrew Phelps
The Micro Works

The following is a list of comments which could be added to a disassembly listing of the Color Computer ROM. If you don't have a disassembler yet, let's get going and get one! In any case, this month we'll see how a line is drawn.

Variables, areas, and routines -

Addr	Comments
00B5	CURRENT COLOR * $55
00B6	CURRENT PMODE
00B9	NUMBER OF BYTES PER LINE
00BA	ADDRESS OF GRAPHICS PAGE
00BD	X1
00BF	Y1
00C3	X2
00C5	Y2
00D7	TEMP
00DB	CHANGE FLAG
928F	FIND BYTE/BIT ROUTINE
92A6	BYTE/BIT: PMODES 0,2,4
92C2	BYTE/BIT: PMODES 1,3
92DD	BIT TABLES
9377	SET ONE POINT ON SCREEN
9444	DRAW HORIZONTAL LINE
946C	DRAW VERTICAL LINE
94A1	**** DRAW LINE ****
94E2	THE DRAW LINE LOOP
9506	MOVE UP,DN,LF,RT ROUTINES
9710	COMPARE TWO POINTS

Line-by-line comments -

Addr	Comments
928F	ADDRESS OF ADDRESSES
9292	GET PMODE
9294	TIMES 2
9295	GET RIGHT BIT/BYTE ROUTINE
9297	RETURN
9298	GET BIT/BYTE ADDRESS
929A	JUMP TO IT
929C	ADDRESSES OF ROUTINES WHICH TAKE AN X,Y COORD. AND TURN IT INTO A BYTE ADDRESS IN X AND BIT IN A
92A6	SAVE B,U
92A8	GET # BYTES PER LINE
92AA	GET Y1 (LOWER BYTE)
92AC	MULITPLY IT

This line routine is called when you use the Extended Basic commands LINE or DRAW. It could also be called by an assembly language program, or used as an example in writing your own.

92AD	ADD START OF SCREEN
92AF	MOVE TO X
92B1	GET X1 (LOWER BYTE)
92B3	MOVE RIGHT THREE BYTES
92B4	WHICH IS DIVIDE BY 8
92B5	BECAUSE 8 BITS PER BYTE
92B6	ADD ONTO BYTE ADDRESS
92B7	GET X1 (LOWER BYTE) AGAIN
92B9	GET ONLY THE LOWER 3 BITS
92BB	ADDRESS OF BIT TABLE
92BE	GET APPROPRIATE BIT (TO A)
92C0	RESTORE AND RETURN
92C2	SAVE B AND U
92C4	GET BYTES PER LINE
92C6	GET Y1 (LOWER BYTE)
92C8	MULTIPLY
92C9	ADD GRAPHICS SCREEN ADDR
92CB	MOVE TO X
92CD	GET X1 (LOWER BYTE)
92CF	MOVE RIGHT 2 BYTES
92D0	(SINCE 4 POINTS PER BYTE)
92D1	ADD ONTO BYTE ADDRESS
92D2	GET X1 (LOWER BYTE) AGAIN
92D4	GET ONLY LOWER 2 BITS
92D6	ADDRESS OF BIT TABLE
92D9	GET CORRECT TWO BITS
92DB	RESTORE AND RETURN
92DD	TABLE FOR 1 BIT / POINT
92E5	TABLE FOR 2 BITS / POINT
92E9	NUMBER OF BYTES PER LINE
92EB	ADD TO X
92EC	RETURN
92ED	MOVE BIT TO RIGHT IN BYTE
92EE	RETURN IF BIT STILL THERE
92F0	MOVE BIT BACK ONTO LEFT
92F1	AND MOVE RIGHT ONE BYTE
92F3	RETURN
92F4	MOVE BIT TO RIGHT IN BYTE
92F5	IF OK, GO MOVE ANOTHER BIT
92F7	RESTART BOTH BITS ON LEFT
92F9	AND MOVE RIGHT ONE BYTE
92FB	RETURN
9377	GET OLD BYTE THERE
9379	SAVE IT
937B	SAVE THE NEW BIT POSITION

```
937D  COMPLEMENT TO MAKE MASK
937E  WIPE OUT OLD BITS THERE
9380  SET NEW POINT COLOR
9382  STACK IT FOR A MOMENT
9384  COMBINE NEW AND OLD BITS
9386  WRITE ONTO SCREEN
9388  COMPARE WITH OLD VALUE
938A  CHANGE, OR PREVIOUS CHANGE
938C  SAVE FLAG FOR ANY CHANGE

9444  GET X1
9446  SAVE IT
9448  GET ABS(X1-X2)
944B  IF X2 > X1, NO SWAP NEEDED
944D  GET X2
944F  STORE INTO X1
9451  MOVE DIFFERENCE INTO Y
9453  INCREMENT; Y=NUMBER OF PTS
9455  GET BYTE/BIT ON SCREEN
9458  GET SAVED X1
945A  RESTORE X1
945C  GET ROUTINE TO SHIFT RIGHT
945E  SAVE A
9460  SET ONE POINT ON SCREEN
9463  RESTORE A
9465  MOVE ONE BIT TO RIGHT
9467  COUNT DOWN POINTS
9469  LOOP TIL DONE
946B  RETURN
946C  ADJUST STACK
946E  GET Y1
9470  SAVE IT
9472  GET ABS(Y2-Y1)
9475  IF Y2 > Y1, NO SWAP NEEDED
9477  GET Y2
9479  STORE IN Y1
947B  MOVE DIFFERENCE TO Y
947D  ADD 1; Y=NUMBER OF POINTS
947F  GET BYTE/BIT SCREEN ADDR
9482  GET OLD Y1
9484  RESTORE Y1
9486  GET ROUTINE FOR MOVE DOWN
9488  GO TO LOOP AT 945E
948A  TABLE OF ADDRESSES OF
      ROUTINES FOR SHIFTING
9494  GET ADDRESS OF TABLE
9497  GET PMODE
9499  TIMES 2
949A  GET APPROPRIATE ADDRESS
949C  RETURN
949D  GET ADDRESS OF MOVE DOWN
94A0  RETURN

94A1  ADDRESS OF Y1=Y1+1
94A5  COMPARE Y2-Y1
94A8  IF SAME, GO DRAW HORIZNTL
94AC  IF Y2 > Y1, OK
94AE  GET Y1=Y1-1 INSTEAD
94B2  SAVE ABS(Y2-Y1)
94B4  ADDRESS OF X1=X1+1
94B7  COMPARE X2-X1
94BA  IF SAME, GO DRAW VERTICAL
94BC  IF X2 > X1, OK
94BE  ADDRESS OF X1=X1-1
94C1  IS THE LINE STEEP OR NOT?
94C4  GET Y2-Y1 TO X
94C6  IF ANGLE < 45 DEG, SKIP
94C8  EXCHANGE X AND Y ROUTINES
94CA  EXCHANGE DELTA X & DELTA Y
94CC  PUSH POINT COUNT & ADDR
94CE  PUSH RATIO VALUE
94D0  SHIFT D RIGHT
94D2  IF WE'RE LOW, OK
94D4  WHICH MOVE ROUTINE?
94D8  IF INCREMENTING, OK
94DA  MAKE SURE WE'RE LOW
94DD  PUSH RUNNING COUNT, RATIO
94DF  SET U ACCORDING TO PMODE

      AT THIS POINT, THE STACK
      CONTAINS THE FOLLOWING:
   0  RUNNING COUNT
   2  ADD THIS TO RUNNING COUNT
   4  SUBTRACT THIS FROM DITTO
   6  POINT COUNTER
   8  WHERE TO GO TO BUMP POINT

94E2  GET BYTE/BIT ADDRESS
94E4  PUT THE POINT TO SCREEN
94E7  GET POINT COUNTER
94E9  IF ZERO, WE'RE DONE
94EB  COUNT IT DOWN
94ED  PUT IT BACK
94EF  BUMP TO NEXT POINT
94F2  GET RUNNING RATIO COUNTER
94F4  ADD SMALLER RATIO VALUE
94F6  SAVE NEW COUNTER
94F8  SUBTRACT OTHER RATIO VALUE
94FA  IF LOWER, LOOP
94FC  STORE SUBTRACTED VALUE
94FE  BUMP POINT OTHER DIRECTION
9500  LOOP
9502  ZAP STACK
9504  PULL VALUES AND RETURN
9506  GET X1
9508  INCREMENT
950A  STORE X1
950C  RETURN
950D  GET Y1
950F  INCREMENT
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9511  STORE Y1
9513  RETURN
9514  GET X1
9516  DECREMENT
9518  STORE X1
951A  RETURN
951B  GET Y1
951D  DECREMENT
951F  STORE Y1
9521  RETURN

9710  GET Y2
9712  SUBTRACT Y1
9714  IF HIGHER OR SAME, RETURN
9716  SAVE CONDITION CODES
9718  NEGATE D
971B  RESTORE CC AND RETURN
971D  GET X2
971F  SUBTRACY X1
9721  GO TO 9714 TO TAKE ABS VAL
```

QUESTION: How do I draw a line from an assembly language program?

Set X1, Y1, X2, and Y2, and call the draw line routine at 94A1. Also set the color; this would be $00, $55, $AA, or $FF if you are in a four color mode; it would be $00 or $FF in a two-color mode.

What about PMODE?

This determines which resolution of graphics you are in. If your program is called from Basic, this and all the other variables have been set, and the display hardware initialized. If you are on your own, set PMODE to 0, 1, 2, 3, or 4, and set Bytes Per Line and the address of the graphics page area.

How does it figure the slope of the line?

Suppose the line is at less than 45 degrees (ie, not steep). We will move one point to the right with each point, but sometimes we will move up too. (Or down, of course, but this just an example.) We keep a running total of how far up we should be by adding up each time the total height of the line. Whenever this total exceeds the total length of the line, we go up a point.

What about steep lines, and lines in other directions?

The various values (such as the total height and length of the line) are interchanged so that the same basic loop works for all diagonal lines. Only lines which are completely horizontal or vertical are handled by separate routines.

A few random thoughts after reading February ...

I enjoyed the "Break Disable" article but found it a little involved. Here is my version; I'll leave it in terms of CBUG commands for clarity but it could be rendered into POKEs. It will work on all but very short programs.

```
M 00F8
00F8  32 62 1C AF 7E AD A5 --
M 019A
0198  -- -- 7E 00 F8 -- -- --
```

In February's Mail Call I saw a reference to a bug in Disk Basic's UNLOAD. There are actually several bugs relating to the closing of files. The existence of string arrays can cause a Random CLOSE to crash. Also, closing a random file can delete strings which belong to other files. An I/O error in a COPY will crash the system. And I'm sure you've discovered that FILES has the same bug that PCLEAR has, so beware of putting it in programs. The most interesting bug is FILES 3 and its effect on Hi Res graphics.

COMMENT CORNER

You mentioned that Radio Shack's 32K expansion does not require the 1.1 Rom. NOT TRUE: They use 64K Ram chips, and the 1.1 Rom contains the code which looks for a jumper between the Ramsize input and PB7 of the keyboard PIA, thus telling it to set up the SAM for 64K chips. In short, the 1.1 Rom is needed for Radio Shack's 32K and for any other mod that uses 64K Ram chips.

Rumors, rumors ...

Andrew Phelps
The Micro Works

COLOR COMPUTER SYSTEMS SOFTWARE

EDITOR/ASSEMBLER

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

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

The Assembler features **all** of the following: complete 6809 instruction set; complete 6800 set supported for cross-assembly; conditional assembly; local labels; assembly to cassette tape or to memory; listing to screen or printer; and mnemonic error codes instead of numbers.

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

MODEM COMMUNICATIONS

Make your Color Computer an intelligent printing terminal with off-line storage! The Microtext module is just what you'll need for:

- —Talking to a timeshare system or information service
- —Printing out what is received as it is received
- —Saving received text to cassette tape
- —Re-displaying the received text even while on-line
- —Communications with other computers
- —Using your computer as a general-purpose 300-baud terminal
- —Downloading programs from other computers

The Microtext module is a program pack containing not only firmware but a second serial port so that both your printer and modem can be connected at the same time. Microtext can be configured for any serial printer that will work with the Color Computer, even if it requires line feeds! But even if you don't have a printer, you can keep a permanent copy of your data by storing to cassette tape. Also, any Radio Shack/Centronics-compatible parallel printer may be used by adding the Micro Works' PI80C parallel interface.

For those of you with special terminal applications, Microtext has selectable parity; it sends odd, even, mark or space. With mark parity (which is default) you can send to computers requiring either seven or eight bits. All 128 ASCII codes can be sent. Exchange programs with other Color Computer users! Basic programs may be downloaded from other computers or timesharing systems.

You'll find many uses for this versatile module! Available in ROMPACK, ready-to-use, for **$59.95.**

MACHINE LANGUAGE

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

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

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

LEARN 6809!

6809 ASSEMBLY LANGUAGE PROGRAMMING, by Lance Leventhal, contains the most comprehensive reference material available for programming your Color Computer. **Price: $16.95**

HARDWARE

32K RAM!

MEMORY UPGRADE KITS: Consisting of 4116 200ns. integrated circuits, with instructions for installation. **4K-16K Kit Price: $39.95. 16K-32K Kit** (requires soldering experience) **Price: $39.95**

PARALLEL O!

USE A PARALLEL PRINTER with your Color Computer! Adaptor box plugs into the serial port and allows use of Centronics/Radio Shack-compatible printers with parallel interface. Assembled and tested. **PI80C Price: $69.96**

ROMLESS PAK I — is an empty program pack capable of holding two 2716 or 2732 EPROMS, allowing you up to 8K of program! The PC board inside comes with sockets installed, ready to go with the addition of your custom EPROMs. **Price: $24.95**

SPARE PARTS — SAMs, 6809Es, RAMs, PIAs. Call for prices.

GAMES

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

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

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

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

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THE MICRO WORKS

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GATHERING TAX INFORMATION EVERY 3 MONTHS

by John E. Swartz

The income tax program (F1040TAX) calculates the items on Form 1040. Gathering tax information is a three-month process with me. Every so often I like to go through the tax calculations to determine the score between me and the IRS. This program allows me to do this and save the latestdata in a cassette file. Some of the program's features are:

1. The output includes over 80% of the lines on Form 1040.

2. Each entry consists of 3 variables: L$(n) is the link number from Form 1040; A(n) is the value of the entry, X$(n) is a 16 character description.

3. The options in the program are:

   1) initialize data
   2) read and print file to CRT
   3) change data
   4) store data
   5) exit

4. In option 1, the entries are intiallized from data statements, the tax calculations are made, and the results are printed on the CRT.

5. In option 4, the entries are stored in a cassette file. When storing, a blank leader is inserted to avoid problems when using the same tape location for storing changes a number of times.

6. Option 2 reads the cassette file and prints the data to the CRT.

7. Option 3 allows the A arrray to be changed for any line number.

8. The output is displayed on the screen in sets of 14 lines. Pressing any key will cause the next set of 14 lines to be displayed.

9. The tax calculations are from the 1981 Tax Table for Married Filing Jointly. The other tax columns could be easily added by changing the constants in lines 8000-8190.

10. There is no printer output. This could easily be added by modifying line 1650.

The program Amortize does all the interest and amoritization calculations for any loan repaid in monthly installments.

1. The imputs are:

   amount financed
   interest rate
   time of loan

2. The options of the program are:

   1) amount of monthly payment and total of all payments.

   2) after a specified number of payments, find the unpaid principal, interest and principal already paid, and total amount already paid.

   3) amount of principal and interest in a specified payment.

3. The amortization table is not printed out, but it is calculated in lines 1930-1980.

Line five is a color board game for 2 players in which each player tries to get five markers in a row. It requires joysticks.

```
10 ' FORM 1040 TAXES 1981
12 ' JESS SOFTWARE <C> 1982
80 CLEAR900: CLS
90 NL=57: ' NO OF LINES
92 DIM L$(NL+1), A(NL+1), X$(NL+1)
110 PRINT" OPTIONS: "
120 PRINT"  1. INITIALIZE DATA."
130 PRINT"  2. READ & PRINT FILES TO CRT"
140 PRINT"  3. CHANGE DATA."
150 PRINT"  4. STORE FILES."
160 PRINT"  5. EXIT."
170 INPUT N
180 ON N GOSUB 300, 500, 700, 900, 9999
190 GOTO 110
300 ' INITIALIZE DATA
310 FOR X=1 TO NL: 'READ DATA
320 READ L$(X): READ A(X): READ X$(X)
330 NEXT
340 GOSUB 1200: 'DO CALC
350 GOSUB 1600: 'PRINT DATA
380 RETURN
500 ' READ & PRINT FILES
510 GOSUB 2400: 'READ FILE
520 GOSUB 1600: 'PRINT DATA
530 RETURN
700 ' CHANGE DATA - WILL READ FILE FIRST IF NO DATA
710 IF L$(1) <> "" THEN 740
720 CLS: PRINT: PRINT" DATA NOT INITIALIZED": RETURN
740 GOSUB 3000: ' CHANGE DATA
750 GOSUB 1200: ' DO CALC
760 GOSUB 1600: ' PRINT DATA
770 RETURN
900 ' STORE DATA
910 IF L$(1) <>"" THEN 930
920 CLS: PRINT: PRINT" DATA NOT INITIALIZED."
930 GOSUB 2000: ' SETUP & RUN LEADER
940 GOSUB 2200: ' STORE DATA
950 RETURN
1200 ' DO CALC
1210 A(4)=A(2)+A(3)
1220 A(6)=A(4)-A(5)
1230 IF A(6)<0 THEN A(6)=0
1240 A(18)=A(1)+ A(6)+ A(7)+ A(8) +A(9)+ A(10)+ A(11)+ A(12)+ A(13)+ A(15)+ A(16)+ A(17)
```

For Your Color Computer

MASTER CONTROL

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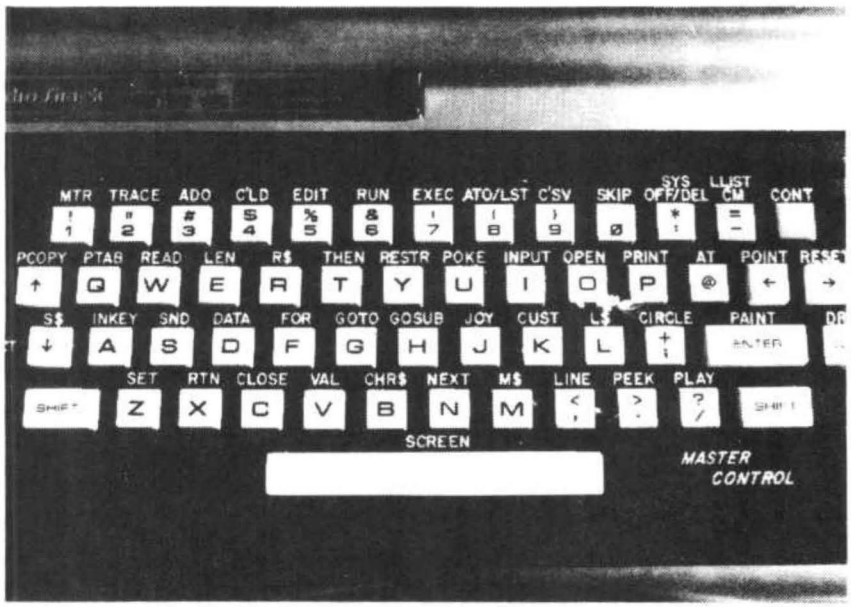

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6 Cassettes – Disk version available soon.

Tape 1		
Keys	4k	NE
Bagels	4k	NE
Find	16k	NE
Darts	4k	NE
Motor	4k	NE
Bomber	4k	NE
Football	16k	EXT
Kapow	4k	NE
Dodge	4k	NE
Tape 2		
Bounce	16k	EXT
Tank	32k	EXT
One Arm	4k	NE
Chute	16k	EXT
Where is it	16k	EXT
Lunar Lander	16k	EXT
Stock Market	4k	NE
Tape 3		
Multiply	16k	EXT
Divide	16k	EXT
Add Sub	16k	EXT
Simple Simon	4k	NE
Hangman	16k	NE
Beast	16k	NE
Count Down	4k	NE
Acey	16k	NE
Genie	16k	NE
Protect	16k	EXT
Tape 4		
Graphics	16k	EXT
Songs	16k	EXT
Joy	16k	EXT
Mortgage	16k	EXT
Checkbook	16k	EXT
Draw 1	16k	EXT
Morris	16k	EXT
Sound	16k	EXT
Tape 5		
Ram	16k	MA
Trace	16k	MA
MMaster	16k	MA
Demo	16k	NE
Disassembler	16k	NE
Basbug	16k	NE
Ohmlaw	4k	NE
Convert	4k	NE
Drawer 2	32k	EXT
Degrees	4k	NE
Tape 6		
Hurdler	32k	EXT
Entrap	16k	EXT
Search	16k	NE
Flip Flop*	16k	EXT
Lost Atom	16k	EXT
Attack	16k	EXT
Cartel*	32k	EXT

MA = Machine language
NE = Non Extended Basic
EXT = Extended Basic

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```
1250 A(26)=A(19)+ A(20)+ A(21)+ A(22)+ A(23)+ A(24)+ A(25)
1260 A(27)=A(18)-A(26): 'ADJUSTED GROSS
1270 A(28)=A(27)
1275 A(30)=A(28)-A(29)
1280 A(32)=A(28)- A(29)- A(31): ' TAXABLE INCOME
1290 GOSUB 8000: ' FIND TAX
1300 A(35)=A(33)+ A(34)
1305 A(41)=A(36)+ A(37)+ A(38)+ A(39)+ A(40)
1310 A(42)=A(35)-A(41)
1312 IF A(42)<0 THEN A(42)=0
1320 A(50)=A(42)+ A(43)+ A(44)+ A(45)+ A(46)+ A(47)+ A(48)+ A(49)
1330 A(55)=A(51)+ A(52)+ A(53)+ A(54)
1340 A(56)=0: A(57)=0
1350 A=A(55)-A(50)
1360 IF A>0 THEN A(56)=A ELSE A(57)=-A
1370 RETURN
1600 ' PRINT DATA - 14 LINES AT  A TIME - PRESS <ENTER> TO CONTINUE
1610 X=0
1620 FOR J=1 TO 14
1630 X=X+1
1640 IF X>NL THEN 1690
1650 PRINTL$(X);TAB(4);: PRINT USING "#####";A(X);: PRINT TAB(10);X$(X)
1660 NEXT
1670 K$=INKEY$
1680 IF K$="" THEN 1670 ELSE 1620
1690 PRINT: PRINT"PRESS <ENTER> TO CONTINUE";: INPUT K$
1700 CLS: RETURN
2000 ' SETUP & RUN HEADER
2010 CLS: PRINT" POSITION TAPE TO SAVE DATA"
2020 PRINT" PRESS RECORD & PLAY BUTTONS"
2030 PRINT" PRESS <ENTER> WHEN READY"
2040 INPUT K$
2050 MOTOR ON: FOR J=1 TO 8000: NEXT: MOTOR OFF
2060 RETURN
2200 ' SAVE DATA
2210 OPEN "O", #-1, "TAX FILE"
2220 FOR J=1 TO NL
2230 PRINT#-1, L$(J); A(J);X$(J)
2240 NEXT
2250 CLOSE #-1
2260 RETURN
2400 ' READ DATA FILE
2410 CLS: PRINT"POSITION TAPE AT START OF FILE"
2411 PRINT"PRESS PLAY BUTTON"
2412 PRINT"PRESS <ENTER> WHEN READY"
2413 INPUT K$
2420 OPEN "I", #-1, "TAX FILE"
2430 FOR J=1TO NL+1
2440 IF EOF(-1) THEN 2470
2450 INPUT #-1, L$(J): INPUT#-1, A(J): INPUT#-1, X$(J)
2460 NEXT
2470 CLOSE #-1
2480 RETURN
3000 ' CHANGE DATA
3010 CLS: : INPUT"WHICH LINE DO YOU WISH TO CHANGE";M$
3020 FOR X=1 TO NL
3030 IF M$=L$(X) THEN 3070
3040 NEXT
3050 PRINT: PRINT"LINE NO. CANNOT BE FOUND"
3060 RETURN
3070 PRINT: PRINT L$(X); A(X); X$(X)
3080 INPUT" WHAT IS NEW VALUE"; A(X)
3090 PRINT: PRINT"DO YOU WISH TO CHANGE ANY MORE";
3100 INPUT M$
3110 IF LEFT$ (M$,1)="Y" THEN 3010
3120 RETURN
8000 ' CALC TAX
8010 T1=(A(32)-1)/100
8020 T2=T1+.5
8030 IF INT(T1)=INT(T2) THEN A1=INT(T1)*100+25 ELSE A1=INT(T1)*100+75: ' TAXABLE INCOME
8036 IF A1<= 16000 THEN 8100
8038 IF A1<= 20200 THEN 8113
8040 IF A1<= 24600 THEN 8117
8050 IF A1<= 29900 THEN 8120
8060 IF A1<= 35200 THEN 8140
8070 IF A1<= 45800 THEN 8160
8080 IF A1<= 45800 THEN 8180
8090 IF A1 > 60000 THEN 8100
8100 PRINT"TAXABLE INCOME IS OUTSIDE PROGRAM"
8110 RETURN
8113 A(33)= INT ((0.24* (A1-16000)+ 2265)* .9875)
8114 RETURN
8117 A(33)=INT ((0.28* (A1-20200)+ 3273)* .9875)
8118 RETURN
8120 A(33)= INT ((0.32* (A1-24600)+ 4505)* .9875)
8130 RETURN
8140 A(33)=INT ((0.37* (A1-29900)+ 6201)* .9875)
8150 RETURN
8160 A(33)=INT ((0.43* (A1-35200)+ 8162)* .9875)
8170 RETURN
8180 A(33)=INT ((0.49* (A1-45800)+ 12720) *.9875)
8190 RETURN
9000 ' DATA INPUT
9009 ' 1
```

```
9010 DATA 7, 30000, SALARY
9020 DATA 8A, 600, INTEREST
9030 DATA 8B, 100, DIVIDENDS
9040 DATA 8C, 0, TOTAL
9049 ' 5
9050 DATA 8D, 400, EXCLUSION
9060 DATA 8E, 0, NET INTEREST
9063 DATA 9, 0, STATE TAX REFUND
9064 DATA 10, 0, ALIMONY REC'D
9065 DATA 11, 0, BUSINESS INCOME
9070 DATA 12, 0, CAPITAL GAIN
9074 DATA 13, 0, 40% CAPITAL GAIN
9080 DATA 14, 0, SUPPLEMENTAL GAIN
9090 DATA 15, 0, FULL TAX PENSION
9099 ' 10
9100 DATA 16A, 0, OTHER PENSIONS
9110 DATA 16B, 0, TAX AMT
9120 DATA 17, 0, TRUSTS ETC
9130 DATA 20, 0, OTHER INCOME
9140 DATA 21, 0, TOTAL INCOME
9149 ' 15
9150 DATA 23, 0, EMPLOYEE EXPENSE
9160 DATA 24, 0, TO IRA
9162 DATA 25, 0, KEOGH PAYMENTS
9163 DATA 26, 0, INTEREST PENALTY
9164 DATA 27, 0, ALIMONY PAID
9165 DATA 28, 0, DISABILITY INCOME
9166 DATA 29, 0, OTHER ADJUST
9170 DATA 30, 0, TOTAL ADJUSTMENT
9180 DATA 31, 0, ADJUSTED GROSS
9190 DATA 32A, 0, FROM LINE 31
9199 ' 20
9200 DATA 32B, 1600, FROM SCH A
9204 DATA 32C, 0, 32A-32B
9210 DATA 33, 4000, EXEMPTIONS
9220 DATA 34, 0, TAXABLE INCOME
9230 DATA 35, 0, TAX
9240 DATA 36, 200, ADDITIONAL TAX
9249 ' 25
9250 DATA 37, 0, TOTAL
9254 DATA 38, 0, POLITICAL CONTR
9255 DATA 39, 0, ELDERLY CREDIT
9256 DATA 40, 0, CHILD CARE
9260 DATA 41, 60, INVEST CREDIT
9270 DATA 45, 90, ENERGY CREDIT
9274 DATA 46, 0, TOTAL CREDITS
9280 DATA 47, 0, BALANCE (TAX)
9282 DATA 48, 0, SELF EMPLOY TAX
9283 DATA 49A, 0, MINIMUM TAX
9284 DATA 49B, 0, ALTERNATIVE TAX
9285 DATA 50, 0, PRIOR-YEAR INVEST
9286 DATA 51A, 0, FICA ON TIPS
9287 DATA 51B, 0, UNCOLLECTED FICA
9288 DATA 52, 0, IRA TAX
9290 DATA 54, 0, TOTAL TAX
9299 ' 30
9300 DATA 55, 5000, FIT WITHHELD
9304 DATA 56, 0, ESTIMATED TAX
9305 DATA 57, 0, EARNED CREDIT
9310 DATA 59, 0, EXCESS FICA
9320 DATA 62, 0, TOTAL WITHHELD
9330 DATA 63, 0, OVERPAID
9339 ' 34
9340 DATA 66, 0, BALANCE DUE IRS
9350 RETURN
9999 END
```

THE COLOR SCRIPSIT WORD PROCESSOR

by Ronald T. Constant

I bought the first Color Scripsit cartridge ever sold anywhere for retail, January 11, 1982. This purchase is one of the few advantages of living near the Radio Shack home office. I have used it extensively to write different materials. I have written magazine articles, school reports, business and technical reports, business and personal letters, outlines for class lectures and general personal writing for myself. Since the cartridge is so simple and quick to use, I seldom use my typewriter or pencil anymore. I appreciate the strong points of ease and speed and have adjusted to the weaknesses of the program.

GENERAL DISCRIPTION

Color Scripsit uses the keyboard just like a typewriter. You do not have to remember and type special codes for tabbing, centering, searching and other special commands. A menu is available at each stage of your work describing all the operations and commands you can use at the time. The cartridge should be inserted before you turn your computer on. The first thing on the screen is a master menu telling you that you can clear memory, work on your text, save on tape, load from tape, print text or change standards such as margin size. As soon as you press the key you want you are ready to work. Instructions for the individual operation are on the screen to guide you all the way. The exception is working on text.

When you work on text, there are a series of menus or instructions for special commands and operations that you can call up at anytime. These special commands are easy to use. The individual menus or instructions guide you so that it is hard to make a mistake. You use the <BREAK> key and the top row of keys <1> through <->, for all commands and operations. You must press <BREAK> and a specific key at the same time. For example, if you wanted to insert text in the middle of a sentence, then you would press <BREAK> and while holding it down press <3>. After you inserted the text, you would press <CLEAR> to stop the insert operation.

The <CLEAR> key is used several ways. It is used in deleting operations and ending various special operations called by the <BREAK> key in conjuction with the top row of keys.

The only other special keys are the four arrow keys. When they are used individually, they simply move the cursor over the text in the direction of the arrow. The up and down arrows can cause the text that is off the screen at the top or bottom to scroll into view if necessary. The left and right arrows can cause the text that is off the screen on either side to move into view if necessary. You need to do this when you have your line width set for more than the 32 spaces on the screen. More about this later when I talk about the window feature. The four arrow keys have special uses when they are used with the <SHIFT> key. If you press <SHIFT> and the left or right arrow key, then you have a left or right tab key. The cursor will move to a tab that you have already set or to either end of the line. The <SHIFT> and up arrow key move the cursor immediately to the beginning of the text. The <SHIFT> and down arrow key move the cursor to the end of the text.

Earlier I said that you do not have to remember much. After reading about all these keys you might have doubts. The solution is simple. A mask on the keyboard describing the individual commands would eliminate almost all memory work. Unfortunately Radio Shack does not supply a mask. They should; they do for their Art Gallery cartridge. To overcome this problem I simply taped short descriptions of each command or operation by the proper key. I used two to five word descriptions and they have worked well. There are 17 keys that need descriptions.

The window feature is very useful. Some word processors require you to use codes to format your text. These codes are mixed in the text. You must visualize what the final product will look like on paper. The window feature allows you to see exactly what your printed copy will look like. No matter how long or wide the text is you can see all of its parts on the screen in the final form.

Characters appear on the screen as quickly as you type them on the keyboard. The exception is when you move to the first of a long text to edit. There is a short delay from the time you press a key and the character appears on the screen. Some of the command operations have this same delay.

Upper and lowercase letters are different from the normal Basic screen. All letters, numbers and symbols are yellow on a red background. Only capital letters are in reversed display; captials are red on a yellow background. On a Basic screen the lowercase letters are reversed.

EDIT FEATURES

The intruction manual is 40 pages long. It

is clear in most instructions and is easy to understand. Some areas are too brief. Here is a brief listing of the main features for working with a text:

- Starting new paragraphs and setting tabs are like a typewriter.
- A line can be aligned left, aligned right or centered.
- Characters, words or blocks of text can be deleted.
- Text can be inserted.
- A block of text can be moved or copied.
- A certain word can be searched for and changed or deleted, even multiple occurences can be automatically pinpointed.
- Words that can be hyphenated can be automatically pinpointed.
- Headings and endings of pages that occur on each page can be entered one time. They will be printed on all pages. Page numbers automatically change for each page depending on the starting page number.
- Text width, margin size, hyphenation size, line per page, first page number and print spacing are all document standards that are on the same menu. They can be set at the same time and changed at anytime.

WEAKNESSES

There are important weaknesses in the features offered by Color Scripsit.

- You can have right justification or left justification but not both at the same time. The automatic hyphenation feature helps to make up.
- There is no way to underline or italicize.
- Superscripts or subscripts cannot be used.
- You cannot set your print size or style.
- Line spacing is uniform throughout a printed document. It cannot be changed in different parts of the same printed document.
- Line length is also uniform. It cannot change within the same printed document. For example, you must use spacing, tabs and careful planning for long quotations.

TIPS FROM MY EXPERIENCE

The instructions for setting tabs are unnecessarily complex in the manual. You can disregard the directions to fill the whole line with spaces and then use the arrow keys. Simply use your space bar like you would on a typewriter and set the tab where you want it.

The manual does not explain how to type standard outlines. Indenting is the problem. You cannot use the tab key in the middle of a sentence because the last word typed on the previous line usually wraps around to the line needing the tab. If you use the space bar you have the same problem. When you set the line length to print the text, the spaces will all be in the wrong place. You have two options. First, you can set your line length at the very beginning and type the outline in its exact form as you go. I don't do this. It is easier to type the text in 32 character lines because all of the immediately preceeding words are on the screen. If the line length is longer than 32, part of the sentence just typed will be off the screen on the left or right. For example, if you set your line length to 64 characters while you are typing the text, onehalf of the previous 13 sentences would be off the screen. Even the manual suggests that you work with a 32 character line until you are ready to print.

Second, you can type the entire text before you format the outline. While typing the outline you can use the tab for the beginning of each sentence or phrase. You can tab for the capital letters, Arabic numberals, lower case letters, etc. You can also tab for the beginning of the sentence or phrase after the letter or number. The problem only comes when a sentence must go to the next line. After you have typed all the text, set your line length. Then go back over the text and use the up or down arrows to scroll it. When you come to words that must be tabbed over to the proper alignment in the outline, follow this sequence:

- Move the cursor to the beginning of the line.
- Press the <BREAK> and <3> keys at the same time.
- Press <ENTER>.
- Press the right tab key (<SHIFT> and right arrow) the proper number of times.
- Press <CLEAR>.

One more word about outlines and other specially indented material. The automatic hyphenation will not work poperly. The tabs are counted as spaces and will not show that the word beginning indented material can have a hyphen.

Do not add hyphens until your final draft. If you do, you might decide to add, change or delete words. When you do, the spacing for the

entire text is changed. Hyphens that were at the end of sentences will now be a the wrong places. They will not print in normal text unless they are at the end of a line, but they will print in an outline in the middle of sentences if you had gone to the extra effort to put them in before editing the text. The main problem is that they use memory space even if you can't see them. If you need to delete hyphens, you can use the standard find and change feature. You can print any rough drafts with the correct line length; just don't add hyphens till the final draft.

If you are at the end of a long text, the up scrolling is very slow. If you need to go back very far into your text to edit, use the <SHIFT> and up arrow keys to go immediately to the beginning of the text. Then use the down arrow key to scroll. It scrolls much faster on long texts, the longer the text, the greater the difference.

If you change your mind on the spacing between lines, be sure to go back over your text. What was originally intended to be a double space on a single spaced document would become a quadruple space when changed to double spacing.

Once printing starts there is no good way to stop the printer if you change your mind. The best thing to do is to press the <BREAK> key which will stop printing on that line and advance the paper to the top of the next page. You will not lose any text. However, you must resume printing at the beginning of the text.

The manual says that you can use the word processor to edit Basic programs. That is a limited one way street. One advantage is that you can type a Basic program using the word processor and its powerful editing features. You can then use the print to tape feature instead of the standard save on tape procedure. The program will be put on tape in standard ASCII files that can be loaded with the normal CLOAD procedure. The hitch is you can't go the other way. If you use CSAVE to put a program on tape from Basic, the word processor can't load it. The other advantage of this program writing ability is that you can join programs together if the programs were written and put on tape using Color Scripsit.

If you have a printer that can print different styles of letters such as double strike or emphasized, then you need to enter the codes before you use the cartridge. Simply enter the proper codes to the printer, turn off the computer and insert the Color Scripsit cartridge.

BUGS

You will use the master menu several times while working with a text. The menu calls for keyboard entries of the number 1 through 6. If you press any other key, a noise sounds letting you know you pressed a wrong key and nothing else happens. There is one important exception. If you accidently press number 7, you get garbage on the screen and lose control of the computer. It will do nothing properly. You lose your entire text. The only solution is to use the reset button.

There is another bug that has shown up twice. I am not certain exactly what I did. I remember pressing <SHIFT> and the up arrow more than one time when going to the beginning of my text. I lost the whole text both times and was not able to get it back. I also lost control of the computer. The only solution was the reset button. It does not happen every time. Now I simply avoid hitting those keys twice to be sure.

CONCLUSION

Overall the Color Scripsit is quick and easy to use. I get good results. It only costs $39.95 which is inexpensive for a word processor, expecially one with the features it has. I wish that Radio Shack had gone ahead and provided a full featured word processor. I would prefer to spend extra money for an excellent system rather than have just a good one.

I bought the Color Computer primarily because I could have a word processor for so little money. Most of the other systems I looked at require disk drive. I have an Epson MX-80 F/T printer and a 16K Extended Basic Color Computer. I have a computer capable of letter quality word processing for less than $1300.00. I don't know of another computer system that can provide all these features so inexpensively.

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TRS 80 IS A TRADEMARK OF TANDY CORP.

AMATUER RADIO AND THE TRS-80 COLOR COMPUTER

by Clayton W. Abrams

During the last few months there has been a lot of talk about the new Radio Shack Color Computer on the SSTV Frequencies (14,230 and 28,680 Mhz). For those of you who are interested, here are some reasons you might consider the Color Computer for your ham radio applications.

My main interest in amateur radio is SSTV. In 1976 I decided to buy a computer system to replace my W0LMD keyboard. At that time, computer components were very expensive, difficult to obtain, and there was almost no software available. I finally selected a SWTPC computer system and within 2 years I had the computer receiving and transmitting SSTV pictures and graphics (ref 1). The project was very rewarding, however it had two drawbacks.

1. The system required a lot of technical background to duplicate.

2. The system required extensive, expensive hardware.

So I continued to look for a low cost system that was easy to use and readily available. I set some goals for the project. I would consider a system only if the following criteria could be met:

1. The hardware had to be available anywhere in the world.

2. The hardware cost had to be as low as possible.

3. The computer must have the capability of displaying SSTV pictures.

4. The interfacing had to be simple and easy to build.

I investigated several different systems like, the Apple, the Atari, and the Pet. The Apple had some of the necessary features, but its price was too high.

When Tandy announced their TRS Color with a list price of $399, I knew my search had ended. After I obtained a 4K unit in late 1980, I spent the first few months reverse engineering it, and found it was the ideal Ham Radio System because:

1. Unlike other TRS models this unit did not have TVI or RFI.

2. The TRS-80C uses the most advanced 16 bit (internial) processor available, the MC6809.

3. The unit has a built in A to D and D to A converter.

4. SSTV can be displayed on the computer with no revisions.

5. The system is easily expandable.

RTTY and CW

To understand how this unit is used in an amateur environment, lets explore the most common application for a ham radio computer, RTTY and CW. In these applications the computer requires an interface which has some signal processing. The receive interfaces are mainly used to remove QRM. The transmit interface is used to provide the proper signals to the ham radio transmitter. On the computer all that is required is a single interface line which can turn off and on at a rapid rate. This line must be controlled by a computer program. In the TRS-80C the external hardware is connected by an interface called the RS-232. Figure 1 contains a schematic of the interface inside the TRS-80C which generates and receives these signals.

The RS-232 is just a notation which is a convenient way of expressing a signal with a predefined voltage level. The input RS-232 interface of the TRS-80C will also accept a normal TTL level. The input or output for this interface is actualy a single bit of a parallel port. If you attach a computer interface for CW and RTTY, this single bit under program control can be programmed to receive and transmit in either mode. The transmit interface for CW is a relay attached to the keying circuit of the tansmitter. The transmit interface for RTTY is an AFSK modulator attached to the microphone input. The receive interface for both RTTY and CW is a demodulator which provides a two state input into the computer for decode. One of the interesting features added to the RTTYCW program is the facility to exchange programs over ham radio. I have been exchanging programs over 2 meters locally with good results.

ANALOG INTERFACES

Probably the biggest asset of the TRS-80C is its ability to process analog signals. We live in an analog world. Digital electronics is foreign to most people. If an electronics device is available which can convert an analog signal to digital, the computer can do something with it. The Color Computer has a built in digital to analog (D/A) converter, and an analog to digital (A/D) interface.

The D/A interface in the computer is used to record programs on the tape recorder and is normally attached to the microphone input. The A/D converter is normally used in the computer to read the location of the joysticks when games

are played. With a little programming you can use these inputs for a purpose that Tandy never intended. To aid you in learning how these interfaces can be used, schematics are provided in figure 2.

SSTV GENERATION

You may wonder how these analog interfaces can be used for amateur radio? The answer is for amateur radio SSTV. Attached is the schematic of a simple SSTV modulator. With this modulator the color computer can be used to generate LSSTV pictures and graphics. A schematic of this modulator is shown in figure 3.

In this mode the entire interface is controlled by software. You can generate pictures or graphics entirely by software. Unlike hardware, software can be changed quickly to create video at almost any rate up to the limits of the processor.

With this modulator the output from the D/A is used to develope the video. When the RS-232 line is dropped low, the interface outputs a sync frequency. When high the output of the SSTV modulator is controlled by the D/A. All that is required to generate a SSTV picture with this interface is a TRS-80C and a software package. The total parts cost is about $15, depending on your junk box. Everything is available mail order from any number of firms.

SSTV RECEIVE

If you can transmit SSTV the next trick is to display a SSTV picture on the TV attached to the computer. A number of firms offer hardware packages to do this, but they all have a high price tag. Since many people have limited budgets for ham radio the TRS-80C makes a good compromise. Additionally, unlike the high priced hardware units the computer can be used for other things. I don't have much room in my ham shack and prefer to have multi purpose equipment.

I was very surprised by the quality of picture that can be displayed on this computer. In some cases the picture is as good as or better than a Robot 400. In order to display pictures on the TRS-80 two built in electronics devices are used in the computer.

One device is called the MC6847 which is a Color Display Generator IC manufactured by Motorola. The second IC is the MC6883 which is called the Synchronous Address Multiplexer IC or the SAM. The SAM chip is used to control the memory addressing of the computer. Under program control you can change the type of video displayed, the memory addressing of where the video memory is located and other functions. The MC6847 is the actual device which displays the TV picture. This device is also very flexable and can be initalized to fourteen modes of video display. These modes range from alphanumeric characters to graphics. I elected to use the graphics mode for SSTV. In this mode displays from 64 pixels on 64 lines to 256 pixels on 256 lines can be displayed with up to eight colors.

Now that you are aware that a SSTV picture can be displayed, lets see how you can get a picture into the computer. To do this you must first have some means of converting SSTV to analog and digital signals. The device that is used in all SSTV receivers is a frequencys from 1500 HZ to 2300 Hz to a DC voltage from 0 to 5 volts. If a frequency of 1200 Hz is present this voltage is converted to a sync pulse. In order to obtain these signals you can tap off a piece of SSTV equipment or build your own front end.

If you have a SSTV receiver the interface is very simple. It will work nicely with a Robot 400, Robot 70 or MXV 100 SSTV receivers. The schematic of the Robot 400 interface is shown in figure 4.

If you have no SSTV equipment the interface can be constructed for about $30. If you are interested, drop me a line with a SASE or IRC's if you are out of the USA and I will provide you with a copy of this schematic.

This interface works by software control. To start the operation the computer must first wait for a vertical sync pulse, by polling the RS-232 input by software. When the pulse is sensed, the program samples the A/D converter to which the SSTV video is attached. As each pixel is received the appropriate value is placed in memory. Once a picture is in computer memory the possibilities are almost endless. Under programming control you can modify, zoom, analyze, or print pictures from the computer. You are only limited by your imagination and your ability to program.

SSTV SOFTWARE

As you must have guessed by now, the secret of using the TRS-80C for ham radio is the software. You will find that this is the critical link to the use of any computer system. Without the proper software the computer is as useful as a pet rock (silicon of course). To program a computer to adequately do all modes of ham radio

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takes a lot of work and equipment. I have been working on some of the programming techniques for SSTV for almost four years. Additionally, to develope code for a large program requires a second larger computer system. In my largest SSTV program I have about 2500 lines of machine language code, and the source listing is about 54 pages in length. It takes about 45 minutes to print a listing of the program on my Epson MX-80 printer. My big computer system (6809) has 62K RAM with three disk drives and lots of interfaces for printers, ham radio etc. This will give you an idea of the size of computer required to develope ham radio programs for a small computer, and why low cost computer programs are not readily available for all home computers.

SSTV RECEIVE SOFTWARE

Let's move on to give you more information on how the computer can be programmed to display a SSTV picture. The computer can be programmed to receive a picture in any one of 14 formats. I chose to use four formats in my SSTV7.4 package. However, only three of these formats were used to display pictures. The formats used were selected by a trial and error technique. Let's discuss the three modes by which the picture can be formatted:

1. High Density Mode- 128 pixels on 128 line, 16 gray levels. This picture format is the same as the Robot 400. Using a 32 K TRS-80C computer three pictures can be placed in memory. In this mode each pixel is four bits, and each byte is composed of two pixels. Since I can store three pictures the total memory required is 24K RAM. This allows me to use the remaining 8K for program. I did provide a feature in the program to quarter frame four pictures into one high density picture. Since the program allows pictures to be transmitted with a two times zoom, a total of 12 SSTV pictures can be stored in memory or on a cassette tape, and transmitted one at a time. This format of picture density cannot be directly displayed on the TV attached to the computer. However, it can be directly transmitted over ham radio. I did provide a routine in the program to inspect the picture in a low density mode, to verify the picture which you are transmitting.

2. Receive Density- 128 pixels on 128 lines, or 128 pixels on 96 lines, 4 gray levels. In this mode a picture takes 4K of memory. In the program I can store up to four pictures in memory or on cassette tape. These pictures cannot be transmitted over ham radio. I did not provide this feature because the picture quality is somewhat reduced. You may wonder how a color display generator can display black and white pictures. It turns out if you disable the color on your TV, or you are using a black and white TV the 4 gray levels or colors become gray levels. For example yellow becomes white on a BW TV, blue becomes black and green and red become gray levels. For some reason some TV sets have difficulties resolving red. I think it is a problem with the MC6847 IC. I tried using a 13 inch Zenith TV and the display of red was poor, but the RCA Color Tract works great. This is the set Tandy uses for their Color Monitor. For this display mode I used the 6C or 4C 6847 Graphics mode. I also found that a Color SSTV picture could be displayed. The quality is not as good as a three memory Robot 400 system. This program option only added about 200 bytes to the program. More on this later.

3. Low Density Mode- 64 Pixels on 64 lines, 4 gray levels. This mode was added to provide a quick inspection of a high density picture and used the 2C graphics mode of the 6847.

SSTV TRANSMIT SOFTWARE

Transmitting of a SSTV picture is a simple concept. A memory picture byte is first loaded into an accumulator and divided into two pixels. An accumulator is part of the inner structure of the microprocessor. Each pixel is then stored into the A/D which causes the frequency to change on the SSTV modulator. You then delay a short time before sending the next pixel to the A/D. After 128 pixels are sent you switch the SSTV modulator to 1200Hz which is the sync frequency. You then delay for 5 or 50 milliseconds depending whether the pulse is horizontal or vertical. To do a two times zoom you transmit each pixel twice, and each line twice. This will give you a two times zoom on the transmission of the picture. Although the principal is quite simple, the software is critical. The correct number of microprocessor machine cycles must be counted, and even the addition or deletion of a single instruction may cause the program to malfunction.

COLOR SSTV RECEIVE SOFTWARE

You may be wondering how color SSTV can be displayed on the computer? The current methods for transmission and reception have not changed very much for the last three years and are rather primitive. The transmission method is to send first a red frame then a green frame then

a blue one. Most people who have the capability to display color receive each picture into one of three memories. Each memory is attached through an electronics multiplexer to create and analog TV signal on the individual guns of a TV picture tube. This method is very effective, but is costly to impliment. The method which I used with the TRS-80C requires no modifications to the computer or the TV set. The MC6847 in the computer takes care of all the formatting of the signals, and only a software algorithm is required to display a color SSTV picture. Lets see how this is done. The first step is to receive three SSTV pictures into memory in specific locations. The next step is to execute a computer program to look at each pixel in each location and combine them into a fourth location to form a picture. To do this you must understand how color SSTV works. When each color SSTV picture is loaded into memory, it is just a normal black and white picture. Each picture memory becomes a component of a composite picture. Lets take for example that you wish to display a red pixel on the TV. The red portion of the color picture will contain a white pixel, and the green and blue portions will contain black pixels. With a little clever programming you can scan three pictures in a few seconds and create a fourth color picture. When you switch to the C mode of the display, the computer will allow only 4 colors to be displayed. I must admit the method is very crude in this implimentation but the principals can be applied to other display IC's.

As you can see with a computer you are not restricted to a dead ended situation as can happen with the hardware scan converters. Your dollar investment is protected from future obselence by the ability to expand the computer as technology advances.

SSTV PICTURE PRINTING

A new and exciting side line of SSTV which is causing a lot of attention on the various amateur frequencys is picture printing. A number of the new generation of printers now being used on computers have a capability of printing pictures with a high resolution graphics mode. One of the most popular printer with this feature is the Epson MX-80. The Epson printer uses a dot matrix print head which is replaceable when worn out. A feature of this printer which was recently announced is Graftrax. This feature is a slight microcode change in the printer which will allow an external program to acccess each wire of the print head and print a specific dot pattern. The Graftrax feature comes from Epson in three 2716 EPROMS and will replace the single ROM which is standard with the printer.

Two dot patterns are possible which display different densitys of print. The lowest pattern of graphics printing 480 dots per line, and the highest is 890 dots per line. Since it is possible to place a SSTV picture in memory with some external hardware and internal software, it would be an interesting exercise to print a picture. Attached is an example of a printed picture. This picture is a combination of a graphics image generated by the computer, and the quarter framed picture was taken from a TV camera. The TV picture was taken from a hardware SSTV scan converter which was constructed seven years ago long before home computing. The image was inputted to the TRS-80C Color Computer by a hardware interface and digitized by a special software package.

CONCLUSIONS

The TRS-80C makes one of the best amateur radio home computers on the market to date. Its flexability and ease to program allow an easy intergration into most ham stations.

If you are interested in obtaining more information on the software packages I have developed for the TRS-80C for RTTY, CW and SSTV drop me a line with a SASE or IRC and I'll provide a copy of my 6 page listing of amateur radio software.

73's Clay Abrams K6AEP

REFERENCES

1. SSTV Meets SWTPC- Parts 1 and 2, 73 Magazine, November and December 1978 by: Clayton W. Abrams

2. Amateur Radio and the TRS-80C Color Computer, A5 Magazine, Jan, Feb, 1982 by: Clayton W. Abrams

FIGURE 1

RS-232 INTERFACE (TRS-80C)

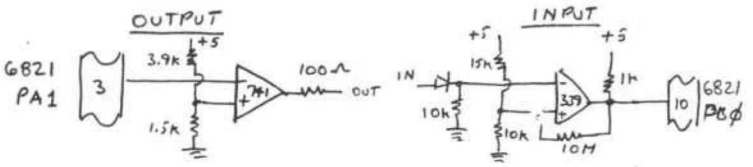


FIGURE 2

TRS-80C ANALOG INTERFACES

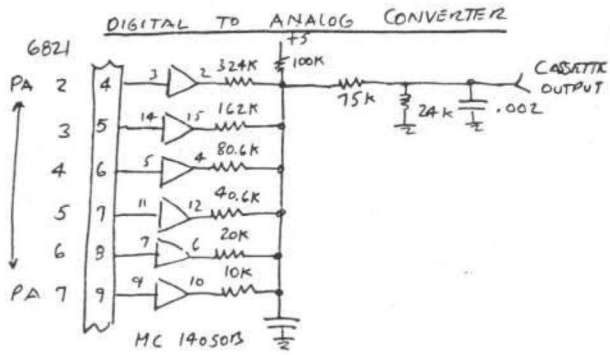
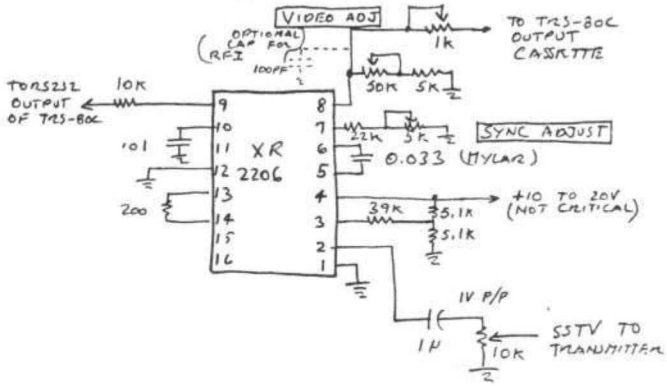


FIGURE 3

SSTV MODULATOR

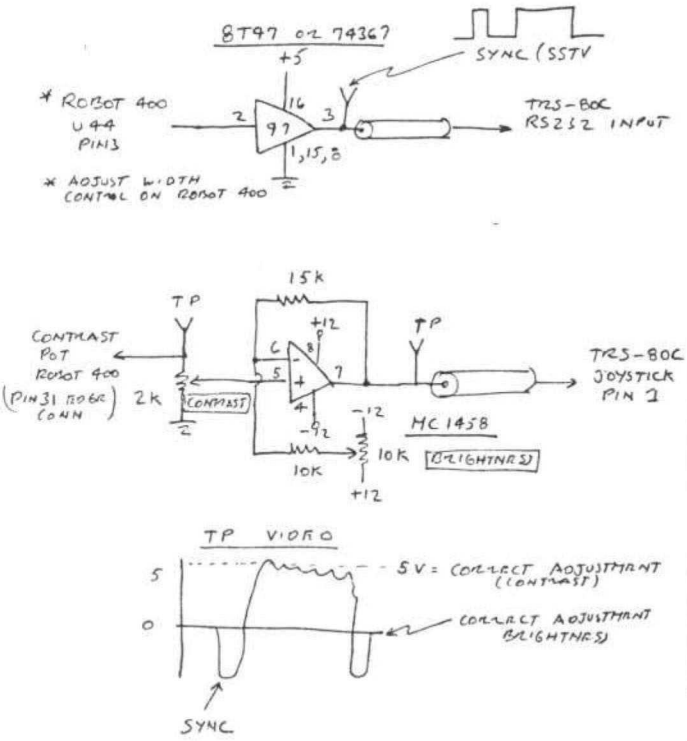


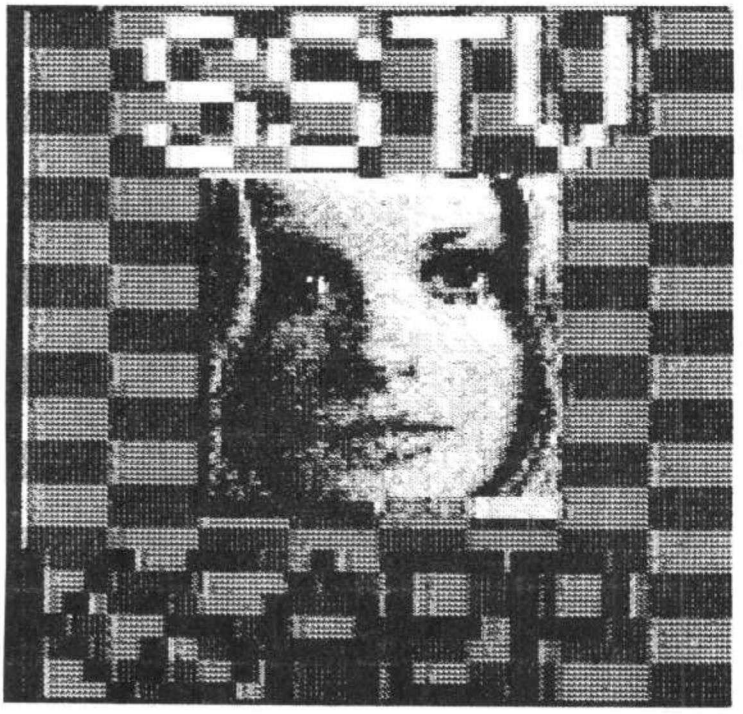
NOTE: 1. CONVERSION TIME APPROX 75 μSEC FOR 4 BITS USING SSTV 7.4 PROGRAM

2. PROGRAMMING TECHNIQUE - SET UP MPX, SEND OUTPUT TO D/A, LOOK IF PA7 HIGH, CORRECT VOLTAGE IS SENSED BY TRIAL AND ERROR.

FIGURE 4

SSTV RECEIVE INTERFACE ATTACHMENT TO ROBOT 400 etc





Now that you have purchased the chips and installed 32K of RAM in you Color Computer, you would probably like to take advantage of this new-found power. First of all, note that there is a new 1.1 version of the Level I ROM: part no. AXX3052, which can be ordered from your local RS store for $36.30. More on this later in the article. (There seems to be some stores that will order this part for you, others will refuse. Tandy's official policy appears to be that they will not supply 1.1 ROMs. Bill)

If you have a LPVII or LPVIII and you have the old ROM, you are aware of the fact that it does not have an 8-bit printer driver routine which is necessary to print the full character set as well as graphics. Tandy will supply you with a free copy of "PTFX16". The problem with this routine is that it resides right in the middle of your 32K of useable RAM effectively giving you your old 16K machine back. If you are in this situation, take heart, all in not lost, simply convert your "PTFX16" to a "PTFX32". Here's how:

type: CLEAR 200, 32639
load tape, press play, then type: CLOADM "PTFX16", 16384
type: POKE 32646, 127

You now have "PTFX32" residing in memory from 32640 to 32767. You can save the new routine to tape by typing CSAVEM "PTFX32", 32640, 32767, 32640.

Another routine that gets in the way of 32K is the $4.95 "SCREENPRINT" routine. It can be fixed although not as easily as "PTFX16". Here's how:

type: CLEAR 200, 32127
load tape, press play, then type CLOAD "SCRPTR", 16384 then type and run the following BASIC program:

```
10 REM SCREENPRINT FIX
20 FORI=1TO79
30 READA$
40 A=VAL("&H"+A$)
50 X=PEEK(A)+&H40
60 POKEA,X
70 NEXT
80 DATA 7D81, 7D8F, 7D95, 7DC2, 7DCB, 7DD0,
7DD5, 7DD8, 7DDF, 7DE4, 7DE9, 7DEC
90 DATA 7DF1, 7DF4, 7DF7, 7DFC, 7E01, 7E06,
7E0B, 7E10, 7E13, 7E1B, 7E20, 7E25
100 DATA 7E2B, 7E35, 7E3B, 7E40, 7E43, 7E48,
7E4B, 7E4E, 7E53, 7E5A, 7E5F, 7E64
110 DATA 7E69, 7E6E, 7E73, 7E7B, 7E80, 7E83,
7E86, 7E89, 7E94, 7E97, 7E9A, 7E9D
120 DATA 7EA5, 7EAC, 7EB0, 7EB3, 7EB8, 7EBD,
7EC5, 7ECA, 7ED0, 7ED3, 7ED6, 7EDE
130 DATA 7EE1, 7EE4, 7EE7, 7EF2, 7EF6, 7EF9,
7EFE, 7F05, 7F0A, 7F13, 7F21, 7F25
140 DATA 7F2B, 7F2E, 7F31, 7F38, 7F41, 7F47,
7F4D
```

You now have relocated "SCRPTR" to the RAM addresses 32128 to 32760. You can save the new routine by typing CSAVEM "SCRPTR", 32128, 32760, 32128. When running "SCRPTR" at the new address, all references to addresses between 15744 and 16376 mentioned in the SCREENPRINT manual should be increased by 16384.

THE NEW COLOR BASIC ROM

Before removing my old ROM, I poked the old BASIC interpreter into locations 16384 thru 32767 of my 32K machine and then CSAVEMed it to tape. After installing the new ROM, I CLOADMed it back and ran the following program which gave me the addresses of the altered code.

```
10 REM NEW ROM TESTER
20 INPUT "OUTPUT TO PRINTER (Y/N)";T$
30 IF T$="Y" THEN DEV=-2 ELSE DEV=0
40 F=0
50 FOR I=40960 TO 49151
60 X=PEEK(I)
70 Y=PEEK(I-24576)
80 IF F=1 THEN 110
90 IF X<>Y THEN F=1: PRINT #DEV, HEX$(I);"-";
100 GOTO 120
110 IF X=Y THEN PRINT #DEV, HEX$(I-1): F=0
120 NEXT I
```

The changes are in order of hexadecimal address:

A01C - an address offset was changed

A024 - an address offset was changed

A027 - A0C2 - revision of primary reset routine. The old ROM checked bit 2 of PIA #2 to see whether the computer had 4K or 16K of memory. In the new routine, if bit 2 is one, memory is checked for RAM starting with $0600 until ROM is discovered. If you somehow replaced level 2 BASIC with RAM, you would then have 40K of continuous RAM accessible by BASIC.

A101 - A104 register change

A155 - changes logo to read Color BASIC 1.1. If you have Extended BASIC, this will not affect the logo on power-up. It will be replaced by the Extended BASIC logo.

A1C1 - A26D - revised keyboard input routine. The joystick fire buttons no longer input

characters to BASIC's routine or the screen. This is an obvious bug that has been corrected.
A2C5 - A2FA - new 8-bit printer driver. You no longer need "PTFX" to use the full character set on you LPVII or LPVIII.
A43F - A440, A6EA - A6EB - revised data file, CLOSE and OPEN routines.
The CLOSE statement will now handle a partially filled buffer without putting "garbage" on your data tape. The OPEN routine will no longer head for "never-never land" if it encounters an error.

BEGINNERS' TIPS

If you have the 16K Extended Basic, and if like me you're faithful to instructions in just the order given, you'll lose the time a fine feature provides. Jump right now to the advanced "Going Ahead" manual, and spend a good solid session on Chapter 10. It's not so difficult that it needs to be placed way off in your "expert" future, and the Edit, Delete, Renum features will save so much time through your "trial-and-error" days (weeks?).

Justin B. Snyder

COCO EXTENDED FIRMWARE ROM's
(How they fit together)
by John R. Griffin

With the addition of the Extended Basic ROM and the Disk System ROM, the TRS-80 Color Computer (affectionately referred to as CoCo) blossoms into a versatile personal computer system. Those who recognized early on that this was a system with great potential, and purchased one of the 4K memory, one Basic ROM machines were treated to a magical transformation. Later when the Extended Basic ROM was released, all one had to do was plug it in and the System was suddenly transformed to include new functions and modifications of some existing functions. For example, the screen print function now sets the display window to the alph-numeric screen any time the function is called. Some of you may have wondered how this transformation takes place. How does the system know that the Extended Basic ROM is plugged in? Why is it necessary to have the Extended Basic ROM in order to add the Disk ROM? Once you know were to look, the technique is quite obvious. When Microsoft developed the firmware for the CC, future expansion was built in. Some of the more dedicated hackers discovered long before Extended Basic appeared how the expansion was to take place.

The story starts with the first Basic ROM. When power is applied to the system, program execution always starts at the same address, which is the cold start routines. They initialize the system display, keyboard, and input/output devices. All of these routines are in the initial Basic ROM addresses $A00E-$A0CA. The Cold Start sequence actually starts at $A027. When the system finishes the initialization it is at address $A0CB. This is where the determination is made as to whether the Extended Basic ROM is present in the system. The Extended Basic ROM occupies address locations $8000-$9FFF. If you inspect the first two bytes, you will find they contain the following:

$8000 = $45 $8001=58

The Switching routine checks to see if locations $8000-$8001 contain the value $4558. When the Extended Basic ROM is there the compare is true and the system branches to address $8002. This is the start of the Extended Basic routines which reconfigure the system to include the Extended functions.

Listing of the switching routine:

CHECK FOR EXTENDED BASIC ROM & BRANCH

```
A0CB 8E 45 48 CHKEBR LDX   #$4558 ;PRE-PLANNED CHECK CODE
A0CE BC 80 00        CMPX  #$8000 ;COMPARE WITH EXT. ROM
TOP
A0D1 10 27 DF 2D     LBEQ   $8002 ;IF SAME BRANCH TO
EXTENDED
        ;ROM ADDRESS $8002
```

Quite simple when planned for ahead of time. Since the plan was to eventually provide a disk for CC, the Extended Rom included the same kind of routine at the end of its initialization sequence to branch forward to the Disk ROM. The listing follows:

CHECK FOR DISK ROM & BRANCH

```
80A6 8E 44 4B CHKDOS LDX  #$444B ;CHECK CODE
80A9 BC C0 00        CMPX #$C000 ;COMPARE TO DOS ROM TOP
80AC 10 27 3F 32     LBEQ  $C002 ;IF SAME BRANCH TO DISK
ROM
```

In all fairness it should be mentioned that the system architecture is primarily determined by the System Address Multiplexer (6883) chip. Motorola determined the general organization of the system in the chip set. Provision for firmware Roms at $8000-$9FFF, $A000-$BFFF, and $C000-$FEFF is cast in silicon. It's intersting to note that there is still one designated Rom space that remains unused at $FF60-$FFBF. Planning for the future by incorporating expansion hooks takes full advantage of this structure.

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

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BOGGLE™

By Robert P. Bussell

One of my familys favorite word games is a game called Boggle from Parker Brothers. It appeared to me that using the Color Computer to play this game would be an interesting project and at the same time provide my children with a simple example of using the RND function and shuffling techniques in game design.

The program has been designed to run on a 4K machine without Extended BASIC. Line 20 is the only line with an Extended BASIC statement in it. The portion of this line containing X=RND(-TIMER) may be deleted. This statement in Extended BASIC reseeds the random number generator so that when the computer is first turned on and the program loaded, a different set of random numbers is generated each time. On a 4K machine you may simulate this statement by executing X=RND(0) a number of times prior to running the program.

The heart of this program is a shuffling algorithm which determines the order in which the sixteen dice are arranged for each game. After selection of the dice, a random selection is made to determine which of the six faces of each die are to be displayed.

The score computation in line 460 demonstrates another feature of BASIC which can be put to good use in many applications. Each of the expressions contained in the parentheses is evaluated to determine if S is equal to the literal value in the expression. If it is equal (true), then the expression is set to -1. If it is not equal (false), then the expression is set to 0.

```
10 DIM BO$(16),M(16),NM$(4),SC(4)
20 X=RND(-TIMER):CLS:PRINT:PRINT'do not enter X=RND(-TIMER)if you do not have extended basic
30 PRINT"THIS IS THE GAME OF BOGGLE.WHEN THE TIMER STARTS,EACH PLAYER SEARCHES THE ASSORTMENT OF LETTERS FOR WORDS OF THREE OR MORE LETTERS.
40 PRINT"WORDS ARE FORMED FROM ADJOINING LETTERS.LETTERS MUST JOIN IN THE PROPER SEQUENCE TO SPELL A WORD.THEY MAY JOIN HORIZONTALLY VERTICALLY,OR DIAGONALLY.NO LETTER CUBE MAY BE USED MORE THAN ONCE IN A WORD.";
```

```
45 PRINT" THE SYMBOL q EQUALS QU."
50 PRINT: PRINT "HIT ANY KEY TO CONTINUE"
60 Q$=INKEY$: IF Q$="" THEN 60 ELSE CLS
70 DATA ABJMOq, DENOSW, ADENVZ, EHINPS,
ELPSTU, BFIORX, AHMORS, ACDEMP, DKNOTU,
EGINTV, ACELRS, EEFHIY, ABILTY, AACIOT,
EGKLUY, GILRUW
80 FOR I=1 TO 16: READ BO$(I): NEXT I
90 GOSUB 310
100 PRINT@256,;: PRINT "NO. OF PLAYERS 1-4"
110 Q$=INKEY$: IF Q$="" THEN 110 ELSE IF
VAL(Q$)<1 OR VAL(Q$)>4 THEN 110
120 PL=VAL(Q$)
130 FOR I=1TO PL: INPUT "PLAYER NAME";
NM$(I): NEXT
140 CLS: FOR JJ=1 TO PL
150 FOR KK=1TO PL: PRINT @32*KK,NM$(KK);"
SCORE ";INT(SC(KK));: NEXT KK
160 IF JJ>1 THEN 270
170 GOSUB 350
180 FOR I=1 TO 4: FOR J=1 TO 4
190 PRINT @170+(32*I)+J*2, MID$(BO$(M
(-4*(I-1)* (I<>1)+J)), INT (6*RND(0)+1),1)
200 NEXT J,I
210 TIMER=0
220 PRINT@5, "TIME REMAINING: "T;
230 X=TIMER: T=INT(180-X/60)
240 IF T<0 THEN 260
250 GOTO 220
260 SOUND 100,5: SOUND 200,9: SOUND 50,2
270 GOSUB 420 'COMPUTE SCORE
280 NEXT JJ
290 GOTO 140
300 'SORT ALGORITHM
310 FOR I=1 TO 16
320 M(I)=I
330 NEXT I
340 RETURN
350 FOR I=1 TO 16
360 K = I+INT (RND(0)*(17-I))
370 T=M(I)
380 M(I)=M(K)
390 M(K)=T
400 NEXT I
410 RETURN
420 SC=0: PRINT@384, "COMPUTE YOUR SCORE
";NM$(JJ)
430 FOR S1=8 TO 3 STEP -1
440 PRINT @416, "WORDS WITH "; S1 ;"LETTERS
"
450 INPUT NW
460 C= SC-11*NW*(S1=8) -5*NW*(S1=7)-
3*NW*(S1=6) -2*NW*(S1=5)- 1*NW*(S1=4)
-1*NW*(S1=3)
470 NEXT S1
480 SC(JJ) = SC+SC(JJ)
490 RETURN
```

COLOR PORT

The COLOR PORT plug-in cartridge adds powerful I/O capability to the TRS-80 Color Computer, resulting in a very cost-effective 6809-based control system. The unit adds two fully programmable 8-bit bidirectional parallel ports with full handshaking, which can be configured by the user for versatile interfacing to peripherals. Full interrupt capability is supported, and important computer voltage and logic control lines are brought out to the standard edge connector.

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The COLOR PORT cartridge comes complete with full instructions and sells without any memory for $129.95. 2K RAM chips are available for $19.95 each, 2K EPROMS are available for $12.95 each. Available from Maple Leaf Systems, P.O. Box 2190, Station C, Downsview, Ontario, Canada M2N-2S9.

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Radio Shack, a division of Tandy Corporation, now offers a compact stand-alone direct connect modem (Bell 103-J compatible) that connects directly to the phone line and supports both manual and auto-answer/auto-originate operation. The new Direct Connect Modem II is available for $249 at Radio Shack Computer Centers, stores and participating dealers.

The Direct Connect (DC) Modem II uses a built-in microporcessor to control its automatic operations; this permits the use of simple ASCII commands from the host computer and nearly elimintaes the software overhead usually required for the operation of such sophisticated a modem.

The DC Modem II has four operating modes: manual answer, manual originate, auto-answer and auto-originate. It also offers

both a local test mode which tests the operation of the unit itself, and a remote loopback test mode which performs a test of the total communication link.

Both pulse and tone dialing can be used - and intermixed. This permits the use of pulse (or "rotary") dialing on telephone circuits or systems that do not support tone dialing, then the use of tone signalling once the call has been completed and the called system accessed. Either standard (10 pulse per second) or "fast" (20 pulse per second) pulse dialing may be selected. Tone dialing uses standard Bell DTMF tones. In addition, single or multiple 2-second pauses may be incorporated anywhere in the dialing sequence; this allows time, for example, for a local system to access an outside line.

The DC Modem II will operate at reates up to 300 baud. Its transmit level is -10 dBm; receive sensitivity is -40 dBm.

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Their Disk Editor and Disk Assembler for the Radio Shack disk operating system. The Editor is a powerful, full featured text editor, that can be used with their disk assembler or as a stand-alone text editor. The assembler supports the entire 6809 instruction set in addition to all addressing modes and includes features like forward and reverse label references, and can assemble programs larger than memory. Introductory price is $79.95 on Radio Shack disk. Also available is the Motorola MC6809 Microprocessor Programming Manual for $11.95. All orders must include $2.00 postage and handling.

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NANOS SYSTEMS

Nanos Systems Corporation recently announced their Color and Extended Basic System Reference Card. The card includes explaination of all color and basic commands, in addition to 16 panels of helpful information. The panels include; graphic code table with magic number conversion, system command table, edit subcommands, print using formats, special character table, logical operators, special keyboard keys, error message table, command set tables, a PLAY to music conversion table, derived function table, token table, hex to decimal conversion, memory map, reserved words list, POKE table, screen layout table, helpful tips, PMODE point map, and control code table. The reference card is printed on card stock for heavy use and all color information in printed in the appropriate color. The card is available now for only $4.95. For orders and other information contact:

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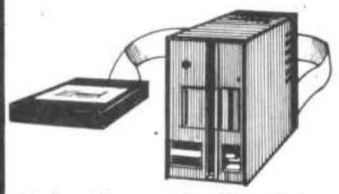

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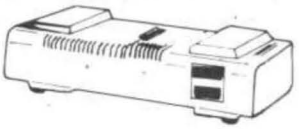

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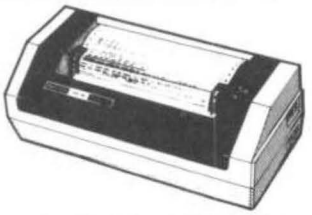

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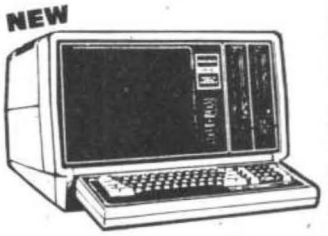

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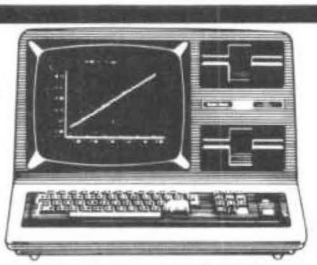

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SCRAMBLER-A WORD SEARCH GAME

by Steven Koeppel

Anyone who has played one of the available hidden word games already knows that educational games can be as much fun as the ever-present "Shoot=em=Ups". Using the dictionary to check opponents "found" words, even the most verbose of players are sure to discover some unknown words.

At their simplest level, these games consist of a number of cubes imprinted with a letter on each of their six sides. These cubes are shaken like dice and settled into a square grid to form a square of random letters. A timer is started and the players begin hunting for scrambled words by joining together adjacent letters. When the timer runs out lists are compared, duplicated words crossed off, and scores computed. After a number of rounds, the player with the highest total is declared the winner. In truth, everyone playing the game is a winner.

As good as this game is, it does have a few rough spots, they are:

1. The cubes do not always lie flat in the grid after shaking and they never fall with all their tops up.
2. It is difficult for more than four players to get a good view of the grid.
3. All players look at the grid from a different angle.
4. You (or your children) can lose cubes.

Okay, now you buy this magazine because you have a computer so let's get rid of these problems and get back on line.

I thought I could write a short program to get the letter grid on the screen and now, three months later, the program is done and anything but short. I am a novice programmer (3 months) so the descriptions and explanations are also for the novices among you.

First of all, I needed letters to choose from. Each of the DATA lines (except the last three, which are for CHR$ graphics) represent one letter cube with six letters. To store up to 25 letters for the largest grid, I used an array called L$. Array T keeps track of which DATA lines have been read (Lines 1290 & 1390) and array P holds the 25 possible PRINT@ positions.

When printing the grid, I used the following concept. We all know the computer can count via the FOR-NEXT loop. Keep in mind that while it is counting e.g. "W=1 to 25", those numbers, 1 to 25 really exist and can be used to

index items in the arrays. Look at line 1500. I could have set a counter, Z, equal to zero and told the computer to PRINT@ P (Z+1), L$ (Z+1), then add Z=Z+1 as line 1505. But why bother when "W" is already incrementing by one each pass through the loop.

In line 1560-1610 when determining the winner, note all the "ands". I originally tried IF P1 > P2 > P3 > P4 > P5 > P6 but found that all parts of the statements must be true, i.e, P4 must be greater than P5 in order to satisfy the THEN command.

Note the statement in line 10, J = RND (-TIMER). Most people are not aware that every time you power up the Color Computer and ask it to PRINT RND (10) it will print the same number. Mine gives 5. The statement J = RND (-TIMER) takes care of this idiosyncrasy and should be inserted in a program line at the beginning of any program that uses random numbers.

Here is hope that you enjoy this game as much as I do. If you come up with any improvements, let me hear from you.

This word game was written for the TRS-80 Color Computer. It uses over 7.5K bytes of RAM at full load and Extended Color Basic with the following modifications:

Delete Lines 340-390

160 CLS: PRINT: PRINT "WHEN THE GRID APPEARS, YOU WILL HAVE A TOTAL OF 3 MINUTES AND 20 SECONDS TO MAKE YOUR LIST."

320 GOSUB 690: PRINT @461, "timer";:FOR X=200 TO 1 STEP-1: PRINT @493, X;

```
5 CLS
10 J=RND(-TIMER)
20 CLEAR 500
30 DIM L$(25), T(25), P(25), G(96)
40 CLS4
50 REM  INTRO TO GAME
55 FOR X=1 TO 300: READ W$: NEXT X
60 PRINT@65, "WELCOME TO THE WORDSEARCH GAME";
61 FOR X=0 TO 95: READG (X): NEXT X: RESTORE
62 FOR X=0 TO 95: PRINT@ 160+X, CHR$ (G(X)+48);: NEXT X
70 PRINT@385, "DO YOU KNOW HOW TO PLAY? <Y/N>";
80 B$=INKEY$: IF B$=""THEN 80
90 IF B$="Y" THEN 260 ELSE 100
100 CLS
110 PRINT" AS THE GAME BEGINS, A GRID OF RANDOM LETTERS WILL APPEAR.(YOU PICK
```

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THE GRID SIZE)."
120 PRINT: PRINT" THE OBJECT IS TO FIND AS MANY WORDS AS YOU CAN BY USING THOSE LETTERS."
130 PRINT: PRINT: PRINT: INPUT" PRESS enter TO CONTINUE";R
140 CLS: PRINT: PRINT"YOU FORM YOUR WORDS BY CONNECT- ING adjoining LETTERS.YOU CANNOTSKIP OVER LETTERS NOR CAN YOU  USE ANY LETTER TWICE IN THE SAMEWORD."
150 PRINT: PRINT: PRINT: INPUT" PRESS enter TO CONTINUE";R2
160 CLS: PRINT: PRINT"WHEN THE GRID APPEARS,  YOU BEGINWRITING. YOU WILL HAVE A TOTAL OF 3 MINUTES AND 20 SECONDS TO MAKE YOUR LIST OF WORDS.": PRINT: PRINT"WHEN THE TIMER REACHES ZERO YOU WILL HEAR A MUSICAL COUNTDOWN FOR THE FINAL 20 SECONDS."
170 PRINT: PRINT: PRINT: PRINT: INPUT"PRESS enter TO CONTINUE";R
180 CLS: PRINT@64, "########### SCORING! ###########": PRINT: PRINT"WORDS SHOULD BE AT LEAST THREE LETTERS LONG, EXCLUSIVE OF ANY 'S' AT THE END. ANY WORD FOUND OR MORE THAN ONE PERSON'S LIST MUSTBE DELETED FROM all LISTS."
190 PRINT: PRINT: PRINT"THE LONGER A WORD IS, THE MORE  POINTS IT IS WORTH SO IT DOES MAKE SENSE TO FIND LONGER AND UNUSUAL WORDS."
200 PRINT@480, "PRESS c TO CONTINUE, r TO REVIEW"
210 B$=INKEY$: IF B$="" THEN 210
220 IF B$="R" THEN 240 ELSE IF B$<>"C" THEN 210
230 IF B$="C" THEN 250
240 PRINT: PRINT: PRINT: PRINT: PRINT: GOTO110
250 REM
260 GOSUB 1800
270 CLS: PRINT@40, "WHAT SIZE BOARD?
1. 3 X 3                2. 4 X 4                3. 5 X 5"
280 INPUT"   SELECT 1, 2, OR 3";S
290 IF S<1 OR S>3 THEN 270
300 CLS: INPUT"     PRESS enter WHEN READY";R
310 REM   START TIMER
320 GOSUB690: PRINT@461, "timer";: FOR X=180 TO 0STEP-1: PRINT@493 , X;
330 FOR T=1 TO 390: NEXT T: NEXT X
340 REM  ESTABLISH MUSIC STRING
350 C$="L8; O3; G; P8; O4; C; P8; O3; G; P8; C;
```

```
P8; G; P8; O4; C; P8; O3; L2; G"
360 D$="L8; G; P8; O4; C; P8; O3; G; P8; O4; C;
P8; E; P4; D; C; O3; B; A; G#"
370 E$="L8; O4; C; P4; O3; A; G; P8; F; P8; E;
P4P8; D; P4P8; C; P2P8; L4; O1; G; C"
380 REM  MUSIC WARNS OF LAST 20 SECONDS
390 PLAY C$+D$+C$+E$
400 CLS
410 FOR X=1 TO 460*5: NEXT X
420 GOSUB 1760
430 PRINT@32, "PRESS spacebar WHEN DONE
SCORING"
440 REM  SHOW SCORING TABLE
450 PRINT@428, "SCORING"
460 PRINT@448, "# OF LETTERS 3, 4 5 6 7 8 &
UP"
470 PRINT@480, "POINTS      1 2 3 5  11  "
480 B$=INKEY$: IF B$<>CHR$(32) THEN 480
490 REM  ENTER SCORES
500 CLS
510 FOR X=1 TO NP
520 PRINT NM$(X); ", ENTER YOUR SCORE"
530 INPUT PS(X)
540 NEXTX
550 REM  CALCULATE AND PRINT
CUMULATIVE SCORES
560 S1=S1+PS(1): S2=S2+PS(2): S3=S3+PS(3)
570 S4=S4+PS(4): S5=S5+PS(5): S6=S6+PS(6)
580 CLS
590 PRINT: PRINTTAB(4) NM$(1), NM$(2)
600 PRINT: PRINT@70, S1: PRINT@82, S2
605 IF S2=0 THEN PRINT@82, " "
610 PRINT: PRINT: PRINTTAB(4) NM$(3), NM$(4)
620 PRINT: PRINT@198, S3: PRINT@210, S4
625 IF S3=0 THEN PRINT@198, " "
626 IF S4=0 THEN PRINT@210, " "
630 PRINT: PRINT: PRINTTAB(4) NM$(5), NM$(6)
640 PRINT: PRINT@326, S5: PRINT@338, S6
645 IF S5=0 THEN PRINT@326, " "
646 IF S6=0 THEN PRINT@326, " "
650 PRINT: PRINT TAB(6) "ANOTHER ROUND?
<Y/N>"
660 B$=INKEY$: IF B$="" THEN660
670 IF B$="Y" THEN GOTO680 ELSE GOSUB
1550: END
680 GOTO 270
690 REM  GAMEBOARD SUBROUTINE
700 CLS
710 REM  ESTABLISH ARRAY T AND CHOOSE 25
RANDOM LETTERS FROM T
720 FOR X=1 TO 25: T(X)=X: NEXT X
730 ON S GOTO 740, 750, 760
740 FOR W=1 TO 9: GOTO 1280
750 FOR W=1 TO 16: FOR D=1 TO 9: READA$, B$,
C$, D$, E$, F$: NEXT D: GOTO 1282
```

```
760 FOR W=1 TO 25: FORD=1TO25:
READ A$, B$, C$, D$, E$, F$:
NEXTD: GOTO 1284
770 DATA B, E, T, M, A, F
780 DATA C, A, S, R, W, E
790 DATA D, L, M, O, A, C
800 DATA T, U, M, E, P, N
810 DATA A, A, A, E, E, E
820 DATA O, O, I, I, U, U
830 DATA J, K, H, A, P, G
840 DATA D, U, N, C, B, G
850 DATA A, A, E, E, I, I
860 DATA C, A, P, E, M, D
870 DATA W, G, L, R, I, U
880 DATA L, G, K, Y, U, E
890 DATA N, E, G, I, T, V
900 DATA M, O, R, A, H, S
910 DATA M, J, QU, B, O, A
920 DATA R, E, L, A, S, C
930 DATA N, O, D, U, K, T
940 DATA X, I, E, E, H, F
950 DATA P, I, N, E, H, S
960 DATA S, E, T, U, P, L
970 DATA T, A, C, I, O, A
980 DATA R, E, V, A, D, N
990 DATA X, O, B, I, R, F
1000 DATA Y, I, T, A, L, B
1010 DATA N, E, W, D, O, S
1020 DATA R, F, S, Y, P, I
1030 DATA M, E, A, E, E, E
1040 DATA T, O, U, W, N, O
1050 DATA M, E, A, G, N, N
1060 DATA C, E, N, C, S, T
1070 DATA P, E, I, C, T, S
1080 DATA S, A, R, A, F, I
1090 DATA T, O, O, O, U, T
1100 DATA M, E, A, G, E, U
1110 DATA QU, J, Z, B, X, K
1120 DATA R, R, Y, R, I, P
1130 DATA F, A, A, A, S, R
1140 DATA W, R, O, V, G, R
1150 DATA D, O, N, T, H, D
1160 DATA T, I, L, C, I, E
1170 DATA F, R, Y, S, I, A
1180 DATA E, E, E, E, A, A
1190 DATA S, E, S, U, S, N
1200 DATA R, O, H, D, N, L
1210 DATA R, O, H, D, L, H
1220 DATA P, L, E, T, C, I
1230 DATA N, N, N, E, A, D
1240 DATA L, O, N, D, H, R
1250 DATA T, T, T, E, O, M
1260 DATA T, I, T, I, E, I
1265 DATA 128, 131, 131, 143, 128, 131, 131, 143,
128, 131, 128, 143, 128, 131, 128, 143, 128, 143,
128, 143, 128, 131, 128, 143, 128, 143, 143, 143,
128, 131, 131, 143
1266 DATA 128, 140, 140, 143, 128, 143, 143, 143,
128, 128, 131, 143, 128, 131, 128, 143, 133, 131,
138, 143, 128, 131, 132, 143, 128, 143, 143, 143,
128, 131, 143, 143
1267 DATA 140, 140, 128, 143, 128, 140, 140, 143,
128, 139, 132, 143, 128, 143, 128, 143, 133, 143,
138, 143, 128, 140, 128, 143, 128, 140, 140, 143,
128, 140, 140, 143
1280 N=RND(9): GOTO1290
1282 N=RND(16): GOTO1290
1284 N=RND(25): GOTO1290
1290 IF T(N)=0 THEN ON S GOTO1280, 1282, 1284
1295 C=RND(6)
1300 FOR X=1 TO N
1310 READA$, B$, C$, D$, E$, F$
1320 NEXTX
1330 IF C=1 THEN L$(W)=A$
1340 IF C=2 THEN L$(W)=B$
1350 IF C=3 THEN L$(W)=C$
1360 IF C=4 THEN L$(W)=D$
1370 IF C=5 THEN L$(W)=E$
1380 IF C=6 THEN L$(W)=F$
1390 T(N)=0
1400 RESTORE
1410 NEXTW
1420 REM  ESTABLISH PRINT@ POSITIONS
1430 P(1)=105: P(2)=108: P(3)=111: P(10)=114:
```

```
P(17)=117: P(4)=169: P(5)=172: P(6)=175:
P(11)=178: P(18)=181
1440 P(7)=233: P(8)=236: P(9)=239: P(12)=242:
P(19)=245: P(13)=297: P(14)=300: P(15)=303:
P(16)=306: P(20)=309
1450 P(21)=361: P(22)=364: P(23)=367: P(24)=370:
P(25)=373
1460 ON S GOTO1470, 1480, 1490
1470 FORW=1TO9: GOTO1500
1480 FORW=1TO16: GOTO1500
1490 FORW=1TO25
1500 PRINT@P(W), L$(W)
1520 NEXT W
1530 RETURN
1540 REM  DETERMINE WINNER
1550 CLS
1560 IF S1>S2 AND S1>S3 AND S1>S4 AND S1>S5
AND S1>S6 THEN 1630
1570 IF S2>S1 AND S2>S3 AND S2>S4 AND S2>S5
AND S2>S6 THEN 1650
1580 IF S3>S1 AND S3>S2 AND S3>S4 AND S3>S5
AND S3>S6 THEN 1670
1590 IFS4>S1 AND S4>S2 AND S4>S3 AND S4>S5
AND S4>S6 THEN 1690
1600 IF S5>S1 AND S5>S2 AND S5>S3 AND S5>S4
AND S5>S6 THEN 1710
1610 IF S6>S1 AND S6>S2 AND S6 >S3 AND S6>S4
AND S6 >S5 THEN 1730
1620 CLS
1630 PRINT@172, USING"%     %"; NM$(1)
1640 GOTO1740
1650 PRINT@172, USING"%     %"; NM$(2)
1660 GOTO1740
1670 PRINT@172, USING"%     %";NM$(3)
1680 GOTO1740
1690 PRINT@172, USING"%     %";NM$(4)
1700 GOTO1740
1710 PRINT@172, USING"%     %";NM$(5)
1720 GOTO1740
1730 PRINT@172, USING"%     %";NM$(6)
1740 PRINT@237, "IS THE": PRINT@301,
"WINNER"
```



```
1750 RETURN
1760 IF S=1 THEN 1767
1762 IF S=2 THEN 1768
1763 IF S=3 THEN 1769
1765 FOR W=1 TO S
1767 FOR W=1 TO 9: GOTO 1770
1768 FOR W=1 TO 16: GOTO 1770
1769 FOR W=1 TO 25
1770 PRINT@ P(W), L$(W)
1780 NEXT W
1790 RETURN
1800 CLS4: PRINT: PRINT: INPUT"HOW MANY
```

```
PLAYERS? (1 - 6)";NP
1810 ON NP GOTO1870, 1860, 1850, 1840, 1830,
1820
1820 CLS2: PRINT: PRINT: INPUT"PLAYER 6
WHAT IS YOUR NAME?";NM$(6)
1830 CLS3: PRINT: PRINT: INPUT"PLAYER 5
WHAT IS YOUR NAME?";NM$(5)
1840 CLS4: PRINT: PRINT: INPUT"PLAYER 4,
WHAT IS YOUR NAME?";NM$(4)
1850 CLS5: PRINT: PRINT: INPUT"PLAYER 3,
WHAT IS YOUR NAME?";NM$(3)
1860 CLS6: PRINT: PRINT: INPUT"PLAYER 2,
WHAT IS YOUR NAME?";NM$(2)
1870 CLS7: PRINT: PRINT: INPUT"PLAYER 1,
WHAT IS YOUR NAME?";NM$(1)
1880 RETURN
2000 REM  ###SCRAMBLE###
2001 REM  A WORD SEARCH GAME
2002 REM  BY STEVEN KOEPPEL
2003 REM  245 MIDLAND AVENUE MONTCLAIR,
NJ 07042
2004 REM  WRITTEN FOR THE TRS 80 COLOR
COMPUTER PROGRAM USES 7.5K BYTES OF RAM
AND EXT. COLOR BASIC
```


BUGS

The following lines were smudged over in the 32K for free article in the February 82 issue.

```
1320 DATA 8E,
41, 00
1330 DATA 6F,
80
```

The program in 1981 Tax in the same issue was printed without appropriate colons, since the program is to long to be printed here a corrected listing is available with an SASE.

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