COLOR COMPUTER NEWS

$2.95

May/June 1982
Issue #9

REMarkable Software
P.O. BOX 1192
MUSKEGON, MI 49443

BULK RATE
U.S. POSTAGE
PAID
MUSKEGON, MI
PERMIT #220

REMarks
by Bill Sias

I feel I should appologize for the date on the front of this issue, but I'm certain you'll forgive me when you see the July issue. I really felt funny about putting two months together when we were so close to being back on schedule but implementing the changes I've been hinting about requires that we be ahead of schedule NOW. Rather frustrating when I think back on how hard we worked to get on without doubling up an issue. This causes another inconvience in that the contest results will appear in the July issue instead of the June issue, since you are now reading the June issue. The entries to the contest so far have been very good. While I haven't judged any of them yet, I have some preliminary results. The best time on contest number one is 23 minutes so far. The best graphic portrait leader is going to be extremely tough to beat. The best rendition of the William Tell Overture contest will have to sound like several instruments to beat the current leader. The most interesting catagory has been a program that relates to another hobby, there have been everything from Ham Radio to Target Shooting and Doll Collecting to Electronic Design.

Since we're talking about changes to the magazine I guess I should let you know what they are all about. Starting with next issue you won't have to squint over the dot-matrix print. The printer we use produces extremely nice print but it's still dot matrix. I tried to find a way to do typesetting but most people that do that sort of thing can't accept data from computers and would have to re-keyboard everything, far too much lag time and expensive. I've found a Word Processor that does proportional spacing on a daisy wheel printer so everything will be printed using that (with the possible exception of program listings). Next issue will also be ninety-six pages long. I stated some time ago that I didn't want to get over 35-40% advertising and this issue is pushing the limit (if not over it).

Starting next issue I'm adding some new departments. The first is a Flex™ Corner and second an OS9™ Corner. Since both of these Disk Operating Systems are standard versions on the Color Computer these columns will be applicable to any computer capable of using either DOS. I personally find the implementation of these systems on the Color Computer very exciting because it closes the gap between ourselves and the rest of the 6809 community. I'm currently looking for someone to take over those columns, I'll personally write the first few. The qualifications necessary include; experience with the particular system and the ability to submit the finished column on disk files in either Flex or OS9 format. If you are interested in heading either of these columns apply with your first column finished and an outline of the route you intend to follow.

Last issue I told you about the Gimix we are implementing and, as I promised, I'll keep you informed here about the progress and problems that have occured. If my ability as a photographer is any good I may even have a photo tour of the Gimix factory for you. So far start-up has gone quite well, every problem encountered so far has been either my fault for not reading manuals or cabling problems (the cables that I made). I plan to have a complete review of the hardware for you in the next issue.

There has been some controversy over the 64K upgrade that Frank Hogg has developed. It appears that some versions of the Color Computer don't require the madification and that in others it causes problems when accessing some devices that connect to the expansion port. My advice at this point is to install the 64K RAMs and run the memory test before making the modification to determine if it's really needed.

Everything has been growing so rapidly that we're forced to move to larger quarters again. This time the move is just three doors down the street so it should go much easier. The new address is 2380 Henry Street with all of the other information remaining the same. The telephone number is changing again also and at this point I'm not sure what it will be but the phone company has promised that when the new lines are installed there will be a message informing you of the new number. I've also added additional lines, hopefully that will stop the constant busy signal. However, phone calls are becoming a problem again. I spend over 6 hours a day on the phone and while I enjoy the conversation, please remember that I have many other responsibilities and if you can discuss it with one of my employees please do so. If it's a techincal or programming problem please have everything at hand when you call, including any manuals or notes that may be applicable. I'm not a "hardware type" so those calls are best directed elsewhere. I've been asked some questions that are impossible to answer on the phone so please evaluate closely just what the question is before you call. I dont't accept collect calls, neither do my employees. I hope this doesn't sound like I want the calls to stop, I don't, but just a reminder to keep all calls as short as possible.

Dear CCN,

I have the Disk Extended BASIC 32K. I also found the same bug in the DOS with regard to opening two or more random files that Richard Bussiere described in the Feb. '82 issue. I found that it is not opening them that creates the problem, but closing them in the "wrong" order that causes the computer to lock up and give you garbage when you try and list the program.

After experimenting a bit, I found that you can get around this problem by "nesting" your OPEN and CLOSE statements similar to "FOR" and "NEXT" statements. For example:

```
OPEN#1
OPEN#2
OPEN#3
CLOSE#3
CLOSE#2
CLOSE#1
```

or

```
OPEN#1
OPEN#2
CLOSE#2
OPEN#3
CLOSE#3
CLOSE#1
```

Since this would "nest" these statements. When you use an "UNLOAD" or "CLOSE" (without the #N) statements, this apparently closes the files in ascending order (I think) which would not necessarily properly "NEST" these statements. This querk is not explained anywhere in the RS Disk Manual. Please forgive them.

Thank You.
Sincerely yours,
Jan Rogers
St. Louis, MO 63105

Editor:

Color Scripsit has been worth the $40 to me. Word Processing on a ROM makes it instantly available and that makes it useful. The documentation is well written and complete in most respects. However, loading BASIC programs into Color Scripsit wasn't covered.

I thought CCN readers might benefit from this hint.

I'd like to hear from anyone that has discovered how to use Color Scripsit to Pretty Print and to compress programs.

HINT: USING COLOR SCRIPSIT TO EDIT BASIC PROGRAMS.

BASIC programs saved on tape can be read by Color Scripsit if they have been CSAVE'd in ASCII format.

```
CSAVE"filename",A
```

Non Extended BASIC users can then use the text editing features of Color Scripsit to edit programs. Extended BASIC users already have good editing capabilities but, Color Scripsit provides a GLOBAL editor which I have found useful to change all occurrences of a program variable.

Regards,
Jim Work
Midland, MI 48640

Dear CCN,

I enjoy your magazine and I have had a great time ordering from the wealth of products advertised. I just wanted to pass along my experiences with certain vendors and perhaps save some people money.

COGNITEC's TELEWRITER - (Reviewed in January CCN) - Beautifully documented package with superb 51-column display. Seems to be bug-free from my brief experience.

MASTER CONTROL - Powerful and fun to use keyboard enhancer. The only flaw is keyboard overlay which doesn't appear very durable. Overlay is aluminized color and cannot be Xeroxed for safe keeping.

WORDCC7 text editor - My copy seems to have fatal bugs. Any other reports of this?

MOSES ENGINEERING LIGHT PEN - Modest hardware for $40. Included joystick. Three cassettes included, two loaded, none ran. Be prepared to write your own machine language program to get useful performance from it. That's what I plan to do.

CER-COMP DISK CONTROLLER - Multitude of hardware and software bugs. My Shugart SA-400L drive won't work with it, my SA-400 will. Circuit board does not have a cover. You can get Bill Vergona personally on the phone, but I still can't recommend anyone but a "hardware hacker" buy it. On the other hand, the text editor, assembler, and disassembler seem to be the best around. The price is good and it's available now, but be prepared to take a risk and do some patching on your own.

Yours truly,
Charles Hall
Raleigh, NC 27607

* How about sharing the programs for the Light Pen and fixes to Bill's controller. I've planned on buying the light pen to play with but just haven't done it as yet.

Dear Sirs,

I have enjoyed reading CCN, especially the articles and programs on machine language. I have recently up-graded my computer to 32K. And after reading the articles on More on 64K in the February and March issues, I wondered what good would 64K be if just one bit in the upper 32K was bad. Also, I'm not the type of person that would dig into my computer cutting wires etc. not knowing what I was doing. And what happens to the ROM after it is disabled?

Can you explain to me what the Comment Corner is. How does one use the information? Is it a machine language?

Second, can you explain why there is only 2 or 4 colors in all the PMODE's. Why not eight. Why two different types of pmodes i.e. PMODE 4,1:SCREEN 1,1 and PMODE 4,1:SCREEN 1,0. Why not make all colors available in each mode.

Third, why only 32 characters per screen line, why not 41,52,64?

Hope to hear from you, Thanks

Mark Heaton

Columbia, SC 29210

* If one bit is bad in the 64K chips you can easily (and relitively cheaply) replace the one chip. I personally feel that it's a good modification even if you don't intend to run Flex or OS9 because you can fix the "bugs" in the ROMs as they are identified. There are at least two companies that will perform the modification for you (Level 4 Products and Computer Plus). I'm not sure I understand the question about the ROM but for all practical purposes it doesn't exist until you re-enable it or press reset. Comment Corner is simply a listing of comments that would be added to a disassembled printout of the BASIC ROM. I disasembled the ROMs to disk and add the comments using the Editor Assembler for printout later plus the fact that it's easier to find the disk than it is to sort through the volumes of paper around here. The answer to the rest of your questions are that each is a function of the hardware.

Dear Sir or Madam:

I would just like to say that I enjoy your magazine very much, and was wondering if you -- or some other reader -- could answer a couple of questions for me regarding the Color Computer.

1. Probably an often asked question: is there any way to get more than 32 characters per line? It's one of the few "flaws" (no, I don't like that word either, but it'll have to do) in the machine. I bet people are working on that, but I haven't seen any solutions except that achieved by Cognitec in the Telewriter.

2. Have you any information on a basic compiler for the 6809? It sure would be handy.

Again, congrats on your magazine, expecially the reviews. And don't worry too much about the amount of advertising.... There are a lot of products I see ONLY in your ads, and it's good to know about them.

Sincerely,

Duff Kennedy

Santa Barbara, CA

* 1. It would require additional hardware or you can simulate it using graphics as in Telewriter and ColorTerm.

2. Frank Hogg Labs has a BASIC compiler for the Color Computer but I think the current version requires Flex or OS9.

Dear Bill,

First I would like to thank you for your great magazine and interesting articles. They have been the only good source of information for me on the Color Computer since I bought it. I've had several dealings with Radio Shack both locally and at Texas. (Hot Line) I must admit they know less about their machine then I do - and that's not alot either! This brings me to my second point.

You had a really great article on inter-facing Color Computer with non-standard printers. I'm trying to connect a teletype machine to mine. I've been able to lower the baud rate to 110 for the teletype, but I can't set the line width to 64 characters. The computer must send a line feed plus a carriage return at the end of each line plus send it when it types the 64th character.

I know your very busy but I would really appreciate any help you could give me on this. As I said Radio Shack is useless. The line print width driver they sent doesn't even work.

Last I would like to call to your attention the basic word processor in the same issue. I typed this in and the majority of the program works. It has several bugs though, for example: The video command and edit mode. I would be interested in any corrections in future articles-better yet I wish you could explain the construction and methods used as you did with the checkbook program you wrote for CCN.

Well thanks again - your magazine has been alot of help to me and I know alot of others

out there. Thanks too for any help you can give me on the printer driver.
Sincerely,
Terrance R Sprys
Armada, MI 48005

* The current issue of TRS-80 Microcomputing has a program that should resolve the problem. It uses the width location in scratchpad to count characters and sends a CR when the current number of characters sent equals the desired number of characters. It's unforunate but impossible to catch every bug in the programs we print, (in fact every magazine has the same problem). We have to depend on readers and authors to provide the necessary corrections and we print them ASAP.

Dear Bill,

After writing you it came to my attention that Radio Shack has come out with a new version of "Videotex", seems they realized the old version will not work properly with 32K. As you know part of the program is to test for the 16K jumper, seems that if it does not see this it sets the machine at 4K max not 32K.

Sorry to say I hear they are charging for replacements, also it is only Rompack for tape, no replacement if you already have an old version Rompack.
Sincerely,
John Burlein Jr
Cape Coral, FL

PS I understand the replacement is $15.95

Gentlemen:

I have been receiving your magazine since the first issue and it is the greatest magazine going for computers.

I do not think in HEX so it is a problem when I come across it. I just can't relate to HEX numbers. I have written a small HEX to DEC conversion program which you can use if you wish. There is no copyright involved in this program.

```
10 CLS
20 PRINT "PROGRAM TO CONVERT HEX# TO DEC#"
30 PRINT "BY KEN CLAUSE, APRIL 1982"
40 PRINT: PRINT
50 PRINT "LETTERS IN HEX ARE TO BE CHANGED TO NUMBERS BEFORE INPUTTING": PRINT: PRINT
60 PRINT "A=10, B=11, C=12"
70 PRINT
80 PRINT "D=13, E=14, F=15"
90 PRINT: PRINT "NUMBERS ARE TO BE ENTERED FROM RIGHT TO LEFT"
100 FOR T=1 TO 2000: NEXT
110 PRINT: PRINT
120 INPUT "FIRST DIGIT" ;A
130 INPUT "SECOND DIGIT" ;B
140 INPUT "THIRD DIGIT" ;C
150 INPUT "FOURTH DIGIT" ;D
160 A = A * 1
170 B = B * 16
180 C = C * 256
190 D = D* 4096
200 T = A +B +C +D
210 PRINT "DEC CONVERSION FOR THE HEX# IS" T;
220 FOR T=1 TO 5000: NEXT
230 GOTO 10
```

Thank you,
Ken Clause
Forked River, NJ

* Some of us think better in HEX and there is the problem, thanks for sharing the program.

COLOR COMPUTER DISK SYSTEM

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

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

DISK OPERATING SYSTEM (DOS)

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

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

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

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

The "BASIC" interface system allows Basic and Basic programs to communicate with the disk system much the same as the R.S. disk system does with a few added features. It includes both Direct and Indirect basic commands, Direct commands can be executed any time and Indirect commands are contained with "Basic" programs. The Direct commands include: LOAD or SAVE (binary/ASCII basic program disk file), CHAIN (load & execute basic program) and CDOS "disk command". The "CDOS command allows you to execute a specific disk command from the free standing disk system, these include: LOAD/SAVE machine language or memory file, REMOVE one or more disk files, CHANGE disk file name, CHECK disk file for errors, ANALYZE disk directory, STRACK set tracks & sides for disk drive, SCMP set compare on/off, RUN load & execute machine language disk program. GOTO execute machine language program at specified address, and NEW initialize disk. If the "CDOS" command is executed without any command following control is passed to CCMD+9 where any of the previously mentioned commands can be executed directly thus providing total control of the entire system. The command system is easy to learn and remember with a minimum of effort on the users part. The BASIC interface system was designed to be compatible with the existing I/O commands used with tape files for easy conversion and upgrading to disk. When using Basic disk files up to 9 files can be active at once with all disk file memory allocation being done automatically at run time, you don't have to reserve file space as with the R.S. disk system. The Indirect basic commands include: Open, Print, Input, Line Input (ext. Basic), EOF, Rewind, Close, Print Using (Ext. Basic), these all function in the same manner as basic tape file I/O.

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

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

SOFTWARE SUPPORT

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

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

SPECIAL LIMITED OFFER

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

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

Manufactured under license from Tall Grass Technologies.

CO RESIDENT EDITOR/ASSEMBLER

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

CO-RES9 **$39.95**

SYSTEM MONITOR

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

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

TRSMON ON TAPE **$19.95**
TRSMON on 2716 Eprom **$34.95**

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

TEXTPRO
TEXT EDITOR/PROCESSOR

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

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

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

SPECIAL INTRODUCTORY PRICE $29.95
RS. DISK VERSION $49.99

DATAPACK
DATA COMMUNICATIONS PACKAGE

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

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

5566 Ricochet Avenue
Las Vegas, Nevada 89110

CER-COMP
(702) 452-0632

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

REGRESSION AND PLOTTING USING HIGH RESOLUTION GRAPHICS (FOR 32K EXTENDED BASIC)

by Dennis D Zaebst
1671 Tonopah Drive
Cincinnati, Ohio 45230

INTRODUCTION

When I first bought my new Color Computer, it seemed natural to use it to perform some of the more difficult, time consuming calculations which cropped up repeatedly in my work. Thus, I immediately set out to write a program which would make maximum use of the high resolution graphics, plot data on a standard x-y coordinate system, and calculate regression statistics.

No one had told me that the Color Computer was supposed to be primarily a game machine, that the CC was not designed for serious applications and problem solving. When I came to realize that many people thought this way, I had already completed writing the program, and was happily using it to solve problems in my work.

When I showed the program to some of my friends who also use the Color Computer, they encouraged me to share this program with other "users". This article and program listing are the result. I sincerely hope that others will find the program useful. I know I have found it to be of great value to me.

PROGRAM DESCRIPTION

The program presented here has a number of interesting features. One of the more challenging problems was creating text and labeled axes on the high resolution screen. The program allows the entry of labels for both the x (horizontal) and the y (vertical) axes through input statements. It then automatically prints these lables in the appropriate locations on the high resolution screen (pmode 4 is used). Any symbol, letter, or number may be included in these labels. The program also prompts you to enter (at the appropriate times) other information required to create the graph.

The primary functions the program performs are as follows:

1) interactive entry of x,y data (up to 150 observations),

2) data review and editing (at any of several points),

3) transformation of either x or y (or both) values using the following functions:

* logarithms
* x or y to any power
* square root
* inverse
* residuals (see discussion below)

4) screen plotting of x,y data on a standard cartesian coordinate system, including, if you wish, the "least squares" line of best fit.

5) screen printing of pertinent regression/correlation statistics (confidence limits are calculated and "t" tests are performed on pertinent parameters (e.g. slope, y-intercept, correlation coefficient etc.)

6) screen plotting of "residuals". This plot allows you to visually determine whether x,y observations are randomly distributed about the regression line. If they are not, that is, if a definite pattern is visible on this plot, then the "model" you have chosen may not be a good one. Perhaps a transformation would help to "linearize" the data somewhat, at the same time improving the fit of the data to the least squares" line.

PROGRAM OPERATION

In general, the program is designed to be as interactive as possible. For the most part, you will need no special instructions. However, you should know that from either the graph output or the statistics table output, inkey$ is used to allow branching to other parts of the program. The appropriate "live" keys are printed at the bottom of the statistics table when you ask for this output. However, these are not listed on the graph to keep this display as neat as possible. These are as follows:

*(q)uit: press "q" to end the program.

*(e)dit: press "e" to review and/or edit data.

*(s)tat: press "s" to branch to statistics output.

*(g)raph: press "g" to display the graph.

*(p)lot: press "p" to re-configure and redraw the graph. This is similar to the above, but you will have to re-enter the scales and captions (this is useful if you don't like the previous graph and want to change one of the parameters).

*(t)form: press "t" to branch to the routine which transforms entered data. This, as with the other routines, can be entered from either the graph or the statistics display.

*(n)ew: press "n" to enter new data. Be sure you are done with the previous data before you press this key, as the old data will be deleted and lost.

When using the transformation of data routine, a few comments are in order. Transformations 1-12 are self explanatory, but 13 (none) and 14 (residuals) may require some explanation. If you have previously done a transformation of the data, you can return to the

original entered data by entering the number 13 when prompted. In fact, this will be necessary if, for example, you have previously transformed the y values and now want to transform only the x values. Otherwise, you will end up with the x values transformed one way and the y values another. It is important to remember also that you should not enter number 14 (residuals) before you have graphed the original data. Until you have done this, the program has not calculated the regression line and cannot calculate the residuals (deviations from the regression line).

LIMITATIONS

The program is relatively easy to use and mostly self explanatory. However, there are some important limitations:

1) When entering the maximum value and the start values for each axis (e.g. 100 and 0 for x-axis, 250 and -10 for y-axis) it is best to follow these rules:

* for maximum values in the range of 1 to 95, choose any integer value.

* for maximum values in the range of 95 to 9995 (995 is the upper limit), choose a number which is divisible by 5 (e.g. 105,9985,200). This is to avoid numbers with more than four characters (including the minus sign and decimal point) which must be drawn as a scale value at some point on the x or y axis. This limitation was imposed in order to keep the scaling on the axes looking as neat as possible, and to maintain seperation of values along the horizontal axis (you will see what I mean the first time you draw a graph).

* for maximum values between 0.05 and 1 (0.05 is the lowest maximum value (such as 0.05, 0.25, 0.5 etc.) which is neatly divisible by five, for the same reason.

* If the start value on either axis is a number other than 0, the difference between the maximum value and the start value should again be neatly divisible by five.

Of course, feel free to experiment by entering different scale values for the x and y axes. The worst thing that can happen is that you will have to re-draw the graph using slightly different numbers if the result is not to your liking. One final note, be sure you enter values for the axes which "cover" the entered observations (for example, the maximum value chosen for the x-axis must be greater than the largest x-value). Otherwise, an "observation out of range" error message will pop up, and you will be returned to the data editing subroutine. You will not lose your data in this instance. You will just have to choose different scale values, or edit an incorrectly enterd data value, whichever is appropriate.

2) The program as written has a built-in limit of 150 observations, takes up about 10K of RAM, and uses all but about 5K of RAM in a 32K system. The limit could probably be raised somewhat higher (perhaps to 200 or 250 observations), but if you do this, be aware of memory limitations. I have not tested the program with sample sizes larger than 150.

3) Since I do not currently have a printer, and since there are so many printer configurations on the market, I have not added a printing routine to obtain hard copy. Of course, a simple screen dump program designed for your printer will get you a printout of the high resolution graph. In the meantime, I have suggested to others that a 35mm color or black & white slide would make a nice presentation.

The program is quite long, can be difficult to type in and de-bug, and tends to be very sensitive to minor typing errors. I would recommend typing it in sections rather than all at once. If you don't have the time, or don't want the hassle, I will be happy to send a copy of the program on cassette tape to CCN readers for $7.95. My address is 1671 Tonopah Drive, Cincinnati, Ohio 45230. You will get faster shipment if you send a postal money order, since personal checks must clear before shipment. Finally, please let me know if you have any questions, corrections, or improvements you would like to bring to my attention.

```
0 CLEAR200:DIMA(150,2):DIMZ(150,
2):DIMAZ$(58):DIMX2(150):DIMY2(1
50):DIMCP(150):DIMTS(34,3):DIMYH
(150):POKE65495,0
1 FORV=1TO34:FORPR=1TO3
2 READTS(V,PR):NEXTPR:NEXTV
3 FORLE=0TO58:READAZ$(LE):NEXTLE

4 PMODE3,1:PCLS:SCREEN1,1:COLOR7
,5:DRAW"BM43,55D80R39E11U58H11L3
9":PAINT(64,88),7,7:DRAW"BM103,5
5D80R39E11U58H11L39":PAINT(120,8
8),7,7
5 DRAW"BM163,55R50D32G20R21D29L5
0U29E20L21U32":PAINT(188,75),7,7
:DRAW"BM73,155":NC$="BR3BU6"
6 EN$="ENTERPRISES, INC.":FORI=1T
O LEN(EN$):L$=MID$(EN$,I,1):DRAW
AZ$(ASC(L$)-32):DRAWNC$:NEXTI:FO
RI=1TO460*6:NEXT
7 CLS:PRINT@32,STRING$(32,"*")
```

```
10 PRINT@100,"LINEAR MODEL REGRE
SSION";:PRINT@174,"AND";:PRINT@2
34,"CORRELATION";:PRINT@303,"BY"
;:PRINT@360,"DENNIS D. ZAEBST";:
PRINT@424,"MARCH 20,1982";
30 PRINT@480,"****PRESS ANY KEY
TO START******";
35 IK$=INKEY$:IFIK$="" THEN 35
80 CLS:INPUT"NUMBER OF X/Y PAIRS
";B:IFB>150 THEN PRINT"SAMPLE TO
O LARGE (MUST BE <=150)":SOUND24
0,1:FORI=1TO460*2:NEXTI:GOTO80

90 FORI=1TO150:Z(I,1)=0:Z(I,2)=0
:NEXTI
100 FORI=1TOB:PRINT"ENTER PAIR N
O."I;
110 INPUT Z(I,1),Z(I,2):NEXTI
115 FORI=1TOB:A(I,1)=Z(I,1):A(I,
2)=Z(I,2):NEXT
120 CLS:PRINT@192,"DO YOU WISH T
O REVIEW AND/OR    EDIT THE ENTE
RED DATA(y/n)?";
125 ED$=INKEY$:IFED$=""THEN125
130 IF LEFT$(ED$,1)="Y" THEN GOS
UB1280
132 CLS:PRINT@192,"DO YOU WISH T
O TRANSFORM THE    DATA (y/n)?";

133 TR$=INKEY$:IFTR$=""THEN133
134 IFLEFT$(TR$,1)="Y"THEN GOSUB
2500:GOTO120
135 PRINT@327,"***PLEASE WAIT***
"
140 GOSUB220:GOSUB340
150 DI$=INKEY$:IFDI$="" THEN 150

160 IFDI$="Q" THEN 210
170 IFDI$="N" THEN 80
180 IFDI$="E" THEN GOSUB1280:GOT
O132
190 IFDI$="S" THEN GOSUB1430:GOT
O150
200 IFDI$="G" THEN GOSUB510:GOTO
150
202 IFDI$="P" THEN GOSUB340:GOTO
150
204 IFDI$="T" THEN GOSUB2500:GOT
O120
205 GOTO150
210 CLS:POKE65494,0:END
220 SX=0:SY=0:XS=0:YS=0:SP=0:MAX
=0:MY=0:MIX=100000:MNY=100000
230 FORI=1TOB
240 SX=SX+A(I,1):SY=SY+A(I,2)
250 X2(I)=A(I,1)^2
260 XS=XS+X2(I)
270 Y2(I)=A(I,2)^2
280 YS=YS+Y2(I)
290 CP(I)=A(I,1)*A(I,2)
300 SP=SP+CP(I)
310 NEXTI
320 XB=SX/B:YB=SY/B
330 XQ=XS-SX*SX/B:YQ=YS-SY*SY/B:
PS=SP-SX*SY/B:BC=PS/XQ:AC=YB-BC*
XB:R=PS/SQR(XQ*YQ)
331 FORI=1TOB
332 IFA(I,1)>MAX THEN MAX=A(I,1)

333 IFA(I,1)<MIX THEN MIX=A(I,1)

334 IFA(I,2)>MY THEN MY=A(I,2)
335 IFA(I,2)<MNY THEN MNY=A(I,2)

336 NEXT:RETURN
340 IFCH=14 THEN 360
342 CLS:PRINT@0,"xmax="MAX;:PRIN
T@32,"xmin="MIX;:PRINT@192,"MAXI
MUM VALUE FOR HORIZONTAL (X)AXIS
 (RANGE 0.05 TO 9995)";:INPUTXN
345 PRINT@288,"HORIZONTAL (X)AXI
S START VALUE  (RANGE -995 TO 99
90)";:INPUTSV:PRINT@402,"SURE(y/
n)?";:SOUND200,5
346 SU$=INKEY$:IFSU$=""THEN346
347 IFLEFT$(SU$,1)<>"Y"THEN342
350 CLS:PRINT@0,"ymax="MY;:PRINT
@32,"ymin="MNY;:PRINT@64,"yint="
;:PRINT@69,USING"####.##";AC;:PR
INT@192,"MAXIMUM VALUE FOR VERTI
CAL (Y)  AXIS (RANGE 0.05 TO 999
5)";:INPUTYN
355 PRINT@288,"VERTICAL (Y) AXIS
 START VALUE   (RANGE -995 TO 99
90)";:INPUTBV:PRINT@402,"SURE(y/
n)?";:SOUND200,5
356 SU$=INKEY$:IFSU$=""THEN356
357 IFLEFT$(SU$,1)<>"Y"THEN350
359 GOTO440
360 CLS:PRINT@0,"ymax="MY;:PRINT
@32,"ymin="MNY:PRINT@132,"***PLO
T OF RESIDUALS***":PRINT@192,"EN
TER SCALE FOR Y-AXIS (VALUE   MU
ST BE GREATER THAN OR EQUAL TOTH
E MAXIMUM ABSOLUTE DEVIATION  OF
 Y-VALUES FROM THE 'PREDICTED'Y-
VALUES)";:INPUTYN:BV=-YN
370 PRINT@402,"SURE(y/n)?";:SOUN
D200,5
380 SU$=INKEY$:IFSU$=""THEN380
```

```
390 IFLEFT$(SU$,1)<>"Y"THEN360
440 NC$="BR3BU6":NY$="BU6BL10":H
M$="BM47,174":HY$="BM10,30"
450 G=0:CLS:IFCH=14 THEN PRINT@6
8,"***PLOT OF RESIDUALS***"
460 PRINT@160,"HORIZONTAL (X) AX
IS CAPTION (UP TO 30 CHARACTERS)
";:LINE INPUT">";A$:IF LEN(A$)>3
0 THEN PRINT@265,"MORE THAN 30 C
HARACTERS";:SOUND200,2:FORDL=1TO
460*2:NEXT:GOTO460
480 PRINT@320,"VERTICAL (Y) AXIS
 CAPTION (UP TO23 CHARACTERS)";:
LINE INPUT">";B$
490 IF LEN(B$)>23 THEN PRINT@416
,"MORE THAN 23 CHARACTERS";:SOUN
D200,2:FORI=1TO460*2:NEXTI:GOTO4
80
491 IFCH=14 THEN RL$="":GOTO510
492 CLS:PRINT@192,"DO YOU WANT T
HE REGRESSION LINE";:PRINT@224,"
ENTERED ON THE GRAPH(y/n)?";
495 RL$=INKEY$:IFRL$=""THEN495
510 PMODE 4,1:PCLS:SCREEN1,0
520 DRAW HM$
530 FORL=1TOLEN(A$):L$=MID$(A$,L
,1):DRAW AZ$(ASC(L$)-32):DRAWNC$
:NEXTL
540 LINE(50,155)-(200,155),PSET
550 LINE(50,155)-(50,5),PSET
560 FORI=65TO200 STEP 15:PSET(I,
154,1):PSET(I,153,1):NEXTI
570 FORI=5TO140 STEP 15:PSET(51,
I,1):PSET(52,I,1):NEXTI
575 IF CH=14 THEN LINE(50,80)-(2
00,80),PSET:FORI=50 TO 200 STEP
2:PRESET(I,80):NEXT:DRAW"BM43,77
"+AZ$(16)
580 DRAW"A3":DRAWHY$
590 FORL=LEN(B$)TO1 STEP-1:L$=MI
D$(B$,L,1):DRAWAZ$(ASC(L$)-32):D
RAW NY$:NEXTL
600 DRAW"A0":SC=XN-SV:CS=SV:SV$=
STR$(SV):LO=LEN(SV$)-1
620 IFLO=1 THEN DRAW"BM41,160"
630 IFLO=2 THEN DRAW"BM38,160"
640 IFLO=3 THEN DRAW"BM36,160"
650 IFLO=>4 THEN DRAW"BM32,160"
655 G=0
660 SC$=STR$(CS+G):L1=LEN(SC$)-1
:L2=LEN(STR$(SV+SC/5+G))-1
665 GOSUB2000
790 FORP=1TOLEN(SC$):L$=MID$(SC$
,P,1)
800 IFP>5 THEN 820
810 DRAWAZ$(ASC(L$)-32):DRAWNC$:
NEXTP
820 G=G+SC/5:DRAWNS$
830 IFSV+G>XN+.0001 THEN 840 ELS
E 660
840 SC=YN-BV:G=0
850 CS=BV:BV$=STR$(BV):LO=LEN(BV
$)-1
860 IFLO=1 THEN DRAW"BM36,152"
870 IFLO=2 THEN DRAW"BM30,152"
880 IFLO=3 THEN DRAW"BM24,152"
890 IFLO>=4 THEN DRAW"BM18,152"
900 SC$=STR$(CS+G):L1=LEN(SC$)-1
:L2=LEN(STR$(SC/5+BV+G))-1
910 IF L2=1 THENNS$="BU3OBL13"
920 IFL2=2 THENNS$="BU3OBL19"
930 IFL2=3 THENNS$="BU3OBL25"
940 IFL2=4 THENNS$="BU3OBL31"
950 FORP=1TOLEN(SC$):L$=MID$(SC$
,P,1)
960 IFP>5 THEN 980
970 DRAWAZ$(ASC(L$)-32):DRAWNC$:
NEXTP
980 G=G+SC/5:DRAWNS$
990 IFBV+G>YN+.0001 THEN 1000 EL
SE 900
1000 FORI=1TOB
1010 X=A(I,1)/((XN-SV)/150)+(50-
(SV/((XN-SV)/150))):Y=155-A(I,2)
/(SC/150)+(BV/(SC/150)):X1=INT(X
)+.5:Y1=INT(Y)+.5
1020 IFX>=X1 THEN X=INT(X)+1 ELS
E X=INT(X)
1030 IFY>=Y1 THEN Y=INT(Y)+1 ELS
E Y=INT(Y)
1045 IFX<50 OR X>200 OR Y<5 OR Y
>155 THEN CLS:PRINT@192,"OBSERVA
TION NO."I"OUT OF RANGE";:PRINT@
256,"X="A(I,1),"Y="A(I,2):SOUND2
00,5:FORDL=1TO460*2:NEXTDL:GOTO1
20
1050 PSET(X,Y,1):PSET(X+1,Y+1,1)
:PSET(X-1,Y-1,1):PSET(X+1,Y-1,1)
:PSET(X-1,Y+1,1):NEXTI
1055 IFRL$<>"Y" THEN RETURN
1060 YI=(AC+(BC*SV))/(SC/150):Y1
=INT(YI)+.5
1070 IFYI>=Y1 THEN YI=INT(YI)+1
ELSE YI=INT(YI)
1080 YI=155-YI+(BV/(SC/150))
1090 YZ=AC+BC*XN:Y3=YZ/(SC/150):
Y4=INT(Y3)+.5
1100 IFY3>=Y4 THEN Y3=INT(Y3)+1
ELSE Y3=INT(Y3)
1110 Y3=155-Y3+(BV/(SC/150))
```

```
1112 LX=((YN-AC)/BC)/((XN-SV)/15
0):M1=INT(LX)+.5:IFLX>=M1 THEN L
X=INT(LX)+51-(SV/((XN-SV)/150))
ELSE LX=INT(LX)+50-(SV/((XN-SV)/
150))
1115 LZ=((BV-AC)/BC)/((XN-SV)/15
0):M1=INT(LZ)+.5:IFLZ>=M1 THEN L
Z=INT(LZ)+51-(SV/((XN-SV)/150))
ELSE LZ=INT(LZ)+50-(SV/((XN-SV)/
150))
1116 IFYI<5 AND Y3>155 THEN 1155

1117 IFYI>155 AND Y3<5 THEN 1157

1119 IFY3<5 THEN 1160
1120 IFY3>155 THEN 1170
1130 IFYI<5 THEN 1180
1140 IFYI>155 THEN 1190
1150 LINE(50,YI)-(200,Y3),PSET:R
ETURN
1155 LINE(LX,5)-(LZ,155),PSET:RE
TURN
1157 LINE(LZ,155)-(LX,5),PSET:RE
TURN
1160 LINE(50,YI)-(LX,5),PSET:RET
URN
1170 LINE(50,YI)-(LZ,155),PSET:R
ETURN
1180 LINE(LX,5)-(200,Y3),PSET:RE
TURN
1190 LINE(LZ,155)-(200,Y3),PSET:
RETURN
1280 FI=1:LA=10
1290 CLS:PRINT@0,"OBS";TAB(5)"X-
VALUE";TAB(19)"Y-VALUE"
1300 PRINT"---";TAB(5)"--------"
;TAB(19)"--------"
1305 IFLA>B THEN LA=B
1310 FORI=FI TO LA:PRINTI;TAB(4)
A(I,1);TAB(18)A(I,2):NEXTI:FI=LA
+1:LA=LA+10:IF FI>B THEN FI=1:LA
=10
1320 GOTO1380
1330 CLS:PRINT@192,"SELECT  OBSE
RVATION TO EDIT";
1340 INPUTNO
1345 PRINT@0,"observation"NO":";
:PRINT@32,"x="A(NO,1),"y="A(NO,2
);:PRINT@64,STRING$(32,"-");
1350 PRINT@256,"NEW X,Y FOR OBS.
"NO;
1360 INPUTU,W
1370 A(NO,1)=U:A(NO,2)=W:Z(NO,1)
=U:Z(NO,2)=W
1380 PRINT@448,"PRESS spacebar T
O CONTINUE LIST":PRINT@491,"eDIT
 xEXIT";
1390 IK$=INKEY$:IFIK$="" THEN 13
90
1400 IFIK$=CHR$(32) THEN 1290
1410 IFIK$="E" THEN 1330
1420 IFIK$="X" THEN RETURN
1425 GOTO1390
1430 ES=PS^2/XQ:US=YQ-ES
1440 CD=R^2:CA=SQR(1-CD)
1450 E1=US/(B-2):SB=SQR(E1/XQ):S
A=SQR(E1*((1/B)+XB*XB/XQ))
1460 CLS:PRINT@128,"ENTER THEORE
TICAL SLOPE VALUE   (E.G. 0 OR 1
)";:INPUTK
1470 PRINT@224,"ENTER THEORETICA
L INTERCEPT      (E.G. 0)";:INPUT
IT
1475 CLS:PRINT@160,"1.95% CONFID
ENCE LIMITS";:PRINT@192,"2.99% C
ONFIDENCE LIMITS";:PRINT@256,"SE
LECT(1 OR 2)";:INPUTCO
1480 TB=(BC-K)/SB:TA=(AC-IT)/SA
1490 IF B-2>30 THEN GOSUB 1830:G
OTO1510
1500 X=TS(B-2,1):Y=TS(B-2,2):Z=T
S(B-2,3)
1505 IFCO=2 THEN UB=BC+(Y*SB):LB
=BC-(Y*SB):UA=AC+(Y*SA):LA=AC-(Y
*SA):GOTO1520
1510 UB=BC+(X*SB):LB=BC-(X*SB):U
A=AC+(X*SA):LA=AC-(X*SA)
1520 TR=R*SQR((B-2)/(1-CD))
1530 CLS:PRINT@1,"****REGRESSION
 STATISTICS****";
1540 PRINT@64,"y-intercept:";:PR
INT@83,USING"####.##";AC
1545 IFCO=2 THEN 1557
1550 PRINT@98,"95% LCL:";:PRINT@
115,USING"####.##";LA
1555 PRINT@130,"95% UCL:";:PRINT
@147,USING"####.##";UA:GOTO1570
1557 PRINT@98,"99% LCL:";:PRINT@
115,USING"####.##";LA
1560 PRINT@130,"99% UCL:";:PRINT
@147,USING"####.##";UA
1570 IF ABS(TA)>=X AND ABS(TA)<Y
 THEN PRINT@162,"INTCP<>"IT"(P<.
05)
1580 IF ABS(TA)>=Y AND ABS(TA)<Z
 THEN PRINT@162,"INTCP<>"IT"(P<.
01)"
1590 IF ABS(TA)>=Z THEN PRINT@16
2,"INTCP<>"IT"(P<.001)"
```

```
1595 IFABS(TA)<X THEN PRINT@162,
"INTCP ND FROM"IT"(P>.05)"
1600 PRINT@192,"slope:";:PRINT@2
11,USING"####.##";BC
1610 IFCO=2 THEN 1635
1620 PRINT@226,"95% LCL:";:PRINT
@243,USING"####.##";LB
1630 PRINT@258,"95% UCL:";:PRINT
@275,USING"####.##";UB:GOTO1640
1635 PRINT@226,"99% LCL:";:PRINT
@243,USING"####.##";LB
1637 PRINT@258,"99% UCL:";:PRINT
@275,USING"####.##";UB
1640 IF ABS(TB)>=X AND ABS(TB)<Y
 THEN PRINT@290,"SLOPE<>"K"(P<.0
5)"
1650 IF ABS(TB)>=Y AND ABS(TB)<Z
 THEN PRINT@290,"SLOPE<>"K"(P<.0
1)"
1660 IF ABS(TB)>=Z THEN PRINT@29
0,"SLOPE<>"K"(P<.001)"
1670 IF ABS(TB)<X THEN PRINT@290
,"SLOPE ND FROM"K"(P>.05)"
1680 PRINT@320,"correlation:";:P
RINT@339,USING"####.##";R
1690 IF ABS(TR)>=X AND ABS(TR)<Y
 THEN PRINT@354,"R<>0 (P<.05)"
1700 IF ABS(TR)>=Y AND ABS(TR)<Z
 THEN PRINT@354,"R<>0 (P<.01)"
1710 IF ABS(TR)>=Z THEN PRINT@35
4,"R<>0 (P<.001)"
1720 IF ABS(TR)<X THEN PRINT@354
,"R ND FROM 0 (P>.05)"
1730 PRINT@384,"coeff/determ:";:
PRINT@403,USING"####.##";CD
1740 PRINT@416,"coeff/alien:";:P
RINT@435,USING"####.##";CA
1750 PRINT@481,"qUITnEWeDITsTATg
RAPHpLOTtFORM";:RETURN
1760 DATA 12.706,63.657,636.619,
4.303,9.925,31.598,3.182,5.841,1
2.924,2.776,4.604,8.610,2.571,4.
032,6.869
1770 DATA 2.447,3.707,5.959,2.36
5,3.499,5.408,2.306,3.355,5.041,
2.262,3.250,4.781,2.228,3.169,4.
587
1780 DATA 2.201,3.106,4.437,2.17
9,3.055,4.318,2.160,3.012,4.221,
2.145,2.977,4.140,2.131,2.947,4.
073
1790 DATA 2.120,2.921,4.015,2.11
0,2.898,3.965,2.101,2.878,3.922,
2.093,2.861,3.883,2.086,2.845,3.
850
1800 DATA 2.080,2.831,3.819,2.07
4,2.819,3.792,2.069,2.807,3.767,
2.064,2.797,3.745,2.060,2.787,3.
725
1810 DATA 2.056,2.779,3.707,2.05
2,2.771,3.690,2.048,2.763,3.674,
2.045,2.756,3.659,2.042,2.750,3.
646
1820 DATA 2.021,2.704,3.551,2.00
0,2.660,3.460,1.980,2.617,3.373,
1.960,2.576,3.291
1830 V=B-2
1840 IFV=40 THEN X=TS(31,1):Y=TS
(31,2):Z=TS(31,3):RETURN
1845 IFV=60 THEN X=TS(32,1):Y=TS
(32,2):Z=TS(32,3):RETURN
1850 IV$=STR$(120/V):MV$=MID$(IV
$,3,4):IV=VAL(MV$)
1860 IFV<40 THEN X=(IV*TS(30,1))
+((1-IV)*TS(31,1)):Y=(IV*TS(30,2
)),+((1-IV)*TS(31,2)):Z=(IV*TS(30
,3))+((1-IV)*TS(31,3)):RETURN
1870 IFV>40 AND V<60 THEN X=(IV*
TS(31,1))+((1-IV)*TS(32,1)):Y=(I
V*TS(31,2))+((1-IV)*TS(32,2)):Z=
(IV*TS(31,3))+((1-IV)*TS(32,3)):
RETURN
1872 IFV>60 AND V<120 THEN X=(IV
*TS(32,1))+((1-IV)*TS(33,1)):Y=(
IV*TS(32,2))+((1-IV)*TS(33,2)):Z
=(IV*TS(32,3))+((1-IV)*TS(33,3))
:RETURN
1874 IF V>120 THEN X=TS(34,1):Y=
TS(34,2):Z=TS(34,3):RETURN
1880 DATA BR4BD6,BR2D3BD2DBR2,BR
D2BR2U2BRBD6,BRD6BR2U6D2RL4BD2R4
BD2,BRNR3GDR3FDGL3R2DU7BR2BD7,NR
BD6UE4UBD5DLR
1890 DATA BDNF5ERFG3DFRE3BD3BL,B
R2DBD5BR2,BR3G2D2F2BR,BR2F2D2G2B
R2,BR4BDG4E2NH2NF2L2R4BD3,BR2BDD
4U2L2R4BD3
1900 DATA BR2BD4DGBR3,BRBD3R3BD3
,BR2BD5DBR,BR4DG4DBR4,BDD4FREU4N
G2HLBR2BD6,BR2NGD6LR2,BDERFDGLGD
2R3
1910 DATA BDERFDGNLFDGLHBDBR3,BR
3G3R3NRU2D5,NR3D3R2FDGLHBDBR3,BR
NR2GD4FREUHL2BD3BR3,R3DG3D2BR3
1920 DATA BDNDERFDGLGDFREUBD2,BD
ERFD2L2HFR2D2GL2BR3,BR3BDDBD2DBD
2BR,BR2BD2DBD2GBR3,BR3BDG2F2BRBD

1930 DATA BRBD2NR3BD2R3BD2,BRBDF
2G2BDBR3,BDER2FG2BD2DBR2,BDER2FD
4GL2HU2R2DBD2BR2
```

```
1940 DATA BDND5ER2FD5U3NL3BD3,NR
3D6R3EUHNL2EUBD5,BDD4FR2EBU3UHL2
BR3BD6,D6R3EU4HL2BR3BD6,NR4D3NR3
D3R4,NR4D3NR3D3BR4,BRNR3GD4FR2EU
2NLBD3
1950 DATA D3NR3D3BR4U6BD6,BRR2LD
6LR2BR,BR2R2LD5GLHBDBR4,D6U3RNE3
F3,D6R4,ND6F2E2D6,ND6DF4DU6BD6,B
DD4FR2EU4HL2BR3BD6
1960 DATA ND6R3FDGL2BR3BD3,BDD4F
R2EHF2HU4HL2BR3BD6,ND6R3FDGNL2FD
2,BRNR3GDFR2FDGL3BR4,R4L2D6BR2,D
5FR2EU5D5BD
1970 DATA D4F2E2U4BD6,D6E2F2U6D6
,DF4DBL4UE4UBD6,D2F2ND2E2U2BD6,R
4DG4DR4
2000 IFL1=1 AND L2=1 THEN NS$="B
R17"
2010 IFL1=1 AND L2=2 THEN NS$="B
R15"
2020 IFL1=1 AND L2=3 THEN NS$="B
R11"
2030 IFL1=1 AND L2=4 THEN NS$="B
R8"
2040 IFL1=2 AND L2=1 THEN NS$="B
R16"
2050 IFL1=2 AND L2=2 THEN NS$="B
R11"
2060 IFL1=2 AND L2=3 THEN NS$="B
R8"
2070 IFL1=2 AND L2=4 THEN NS$="B
R5"
2080 IFL1=3 AND L2=4 THEN NS$="B
R"
2090 IFL1=3 AND L2=3 THEN NS$="B
R5"
2100 IFL1=3 AND L2=2 THEN NS$="B
R9"
2110 IFL1=3 AND L2=1 THEN NS$="B
R10"
2120 IFL1=4 AND L2=4 THEN NS$="B
L"
2130 IFL1=4 AND L2=3 THEN NS$="B
R13"
2140 IFL1=4 AND L2=2 THEN NS$="B
R8"
2150 IFL1=4 AND L2=1 THEN NS$="B
R16"
2160 RETURN
2300 IFL2=1 THENNS$="BU30BL13"
2310 IFL2=2 THENNS$="BU30BL19"
2320 IFL2=3 THENNS$="BU30BL25"
2330 IFL2>=4 THENNS$="BU30BL31"
2340 RETURN
2500 CLS:PRINT@3,"***TRANSFORM F
UNCTIONS***";
2510 PRINT@67,"1.LOG(X)          8
.SQR(Y)";
2520 PRINT@99,"2.LOG(Y)          9
.SQR(X),(Y)"
2530 PRINT@131,"3.LOG(X),(Y)
10.1/X"
2540 PRINT@163,"4.X^N
11.1/Y"
2550 PRINT@195,"5.Y^N
12.1/X,1/Y";
2560 PRINT@227,"6.X^N,Y^N
13.(NONE)";
2570 PRINT@259,"7.SQR(X)
14.(RESID.)";
2580 PRINT@320,"SELECT(1-14)";:I
NPUTCH
2581 IF CH=4 OR CH=5 OR CH=6 THE
N PRINT@384,"EXPONENT";:INPUTPO
2585 CLS0:PRINT@199,"***HANG IN
THERE***";
2590 ON CH GOTO 2600,2610,2620,2
630,2640,2650,2660,2670,2680,269
0,2700,2710,2720,2730
2600 FORI=1TOB:A(I,1)=LOG(Z(I,1)
):NEXTI:GOTO2740
2610 FORI=1TOB:A(I,2)=LOG(Z(I,2)
):NEXTI:GOTO2740
2620 FORI=1TOB:A(I,1)=LOG(Z(I,1)
):A(I,2)=LOG(Z(I,2)):NEXTI:GOTO2
740
2630 FORI=1TOB:A(I,1)=Z(I,1)^PO:
NEXTI:GOTO2740
2640 FORI=1TOB:A(I,2)=Z(I,2)^PO:
NEXT:GOTO2740
2650 FORI=1TOB:A(I,1)=Z(I,1)^PO:
A(I,2)=Z(I,2)^PO:NEXT:GOTO2740
2660 FORI=1TOB:A(I,1)=SQR(Z(I,1)
):NEXT:GOTO2740
2670 FORI=1TOB:A(I,2)=SQR(Z(I,2)
):NEXT:GOTO2740
2680 FORI=1TOB:A(I,1)=SQR(Z(I,1)
):A(I,2)=SQR(Z(I,2)):NEXT:GOTO27
40
2690 FORI=1TOB:A(I,1)=1/Z(I,1):N
EXT:GOTO2740
2700 FORI=1TOB:A(I,2)=1/Z(I,2):N
EXT:GOTO2740
2710 FORI=1TOB:A(I,1)=1/Z(I,1):A
(I,2)=1/Z(I,2):NEXT:GOTO2740
2720 FORI=1TOB:A(I,1)=Z(I,1):A(I
,2)=Z(I,2):NEXT:GOTO2740
2730 FORI=1TOB:YH(I)=AC+BC*A(I,1
):A(I,2)=A(I,2)-YH(I):NEXT
2740 PRINT@257,"***TRANSFORMATIO
N COMPLETED***";:SOUND200,10:FOR
I=1TO460*2:NEXT:RETURN
```

THE ULTIMATE IN COLORCOMPUTING

WORD PROCESSING

THE SUPER "COLOR" WRITER II

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

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

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

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

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

CHECK THESE FEATURES!!

HIGH SPEED & normal operations • 32K Compatible • Window • Key beep • HELP table • 128 character ASCII & graphics • Memory left • Lower case • Full cursor control • Quick paging • Scrolling • Word wrap around • Tabs • Repeat all functions • Repeat last command • Insert character & line • Delete character, delete to end of line, line to cursor, line & block • Block move, copy & delete • Global Search, Exchange & Delete • Merge or Append files • Imbed Control Codes in text • Underline • Superscripts • Subscripts • Headers, Footers & 2 Auxiliary footnotes on odd, even or all pages definable position • Flush right • Non-breakable space • 4 centering modes: 5, 8.3, 10 & 16.7 (CPI) • Full page & print formatting in text • Single sheet pause • Set Page length • Line length, Line spacing, Margins, page numbers • Title pages • Printer baud: 110, 300, 600, 1200, 2400 • Linefeeds after CR • Soft & hard formfeed • Works with 8 bit printer fix • and more!

SUPER "COLOR" WRITER DISK

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

Includes comprehensive operators manual.

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

Manual only, $7.00 Refundable with purchase.

COMMUNICATIONS

THE SUPER "COLOR" TERMINAL

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

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

FEATURES

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

Super "Color" Terminal Disk

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

TAPE $39.95 **ROM PAK $49.95** **DISK $69.95**

Documentation only, $4.00 Refundable with purchase.

16K RAM KIT $15.99

PREMIUM 16K 200 Ns Ram for TRS-80 Color Computer. Includes ram test instructions and a ONE YEAR GUARANTEE. 32K upgrade instructions FREE! (32K requires soldering)

ROMPAK KITS

Put your programs in a ROMPAK or execute tape based programs in a RAMPAK at $COOO. Kit includes 1 socketed P.C. board that holds up to 4, 2716 EPROMs or 4, 2K Static Ram Chips for a total of 8K and a plastic housing to fit the rom port. $24.95

2716 2K 5v EPROM $5.95 ea. **2K Static RAM $19.95 ea.**

COLOR GAMES!!

FEATURING GREAT GRAPHICS & SOUND!

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

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

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

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

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

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

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

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

VISA MasterCard

DEALER INQUIRES ARE INVITED.

NELSON SOFTWARE SYSTEMS

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

P.O. Box 19096 Minneapolis, MN 55419 612/827-4703

A VERSATILE CHRISTMAS CARD PROGRAM

by Frank N. Malaney

The author has written a Christmas card program for use on the TRS-80 Color Computer with Extended Color BASIC which takes advantage of the unique tape filing system which is available on the color computer. It is designed to be "fool-proof" and easy to use without requiring a detailed list of instructions. It is also adaptable to many other mailing list applications such as clubs, churches, and even small business. It will allow for selection of which names on the list are to have address lables printed. It provides for printing of the entire mailing list for record purposes (and for noting persons from whom Christmas cards have been received so that the listing can be quickly updated for next year).

The program uses a menu type of selection which permits the folowing choices: (1) to generate the original list, (2) to update the send-received card information and to change any name and/or address information, (3) to print out the entire list including the send-card and received-card information, (4) to print the desired address lables, and (5) to add additional names to the list. Whenever, a particular function is completed, the user is always returned to the menu. There is no danger of accidentally exiting the program and losing a long list of addresses since the only way to exit is to push either the break or reset button or turn off the computer.

To assist the bumble fingered typist, the computer will print on the screen the complete name and address and ask if it is correct. If it is not correct, the program will loop back and the information can be entered again. This process can be repeated if required.

After the list is complete, or 100 names and addresses have been entered, the entire list will be stored on tape as a single file. When the list is recalled from the tape, the entire list will be entered from the tape at one time. While the limit of 100 names will probably be sufficient for most Christmas card lists, there are other applications where longer lists are required. The solution is to generate additional files of 100 names and call each one sequentially.

Since a tape file is a sequential file, a special subroutine has been added to permit additional entries to the end of the list. This subroutine makes it possible to add names (up to the limit of 100) without having to enter all of the previous entries manually or generating a second file.

A third input subroutine is to update the "received card" - "send card" information. The update of this information is possible only in the subroutine. Another feature of the update subroutine is the ability to change names and addresses as required. It often seems that seldom seen friends move just before Christmas and you find out their new address when you receive their card. This feature allows you to change their address when you record the fact that you received their card.

Two printed output formats are included in the program. The first will print all the names and addresses in the list along with the information on whether a card has been received or a card is to be sent. The second output format will print the name and address on stick-on labels. These labels will be printed only if the "send card" byte contains a "Y".

Now that the features of this program have been described, let's examine how these features have been implemented. First, all of the information associated with each name and address is stored as a single variable or record, A$(), in an array. This array is set by line 80 to have up to 100 records which allows 100 names and addresses to be stored in the memory of the color computer at one time. Each record is exactly 63 bytes long and contain information in the following format:

NAME	POSITION	DESCRIPTION
SC$	1	If a "Y", a label will be printed
RC$	2	If a "Y", a card has been received
T$	3	Title code i.e "Miss", "Mrs.", or "Mr."
F$	4-10	First name
L$	11-22	Last name
S$	23-42	number and street portion of address
C$	43-54	City
ST$	55-58	State
Z$	59-63	Zip code

The biggest advantage of this record type of format is that it only requires one array of 100 elements to store 100 addresses. If a different array were used for each item in the name and address scheme as shown above, then a total of 900 elements would be required and the pointers would require considerable memory (each string variable pointer requires 7 bytes of memory). A second advantage is that the defined length of 63 bytes means that a maximum of 6300 bytes of memory will be required for the full 100 names and addresses. Thus, the "CLEAR7000" will provide adequate storage space for the string data.

To conserve space in the string, the title (Miss, Mrs., Mr.) has been assigned a numerical

code - (1 for "Miss", 2 for "Mrs.", ect.). This simple encoding will save 7 bytes when the title "Mr. & Mrs." is required. Program line 870 shows the encoding of the title. However, the decoding is more difficult and requires the subroutine at line 550 to accomplish.

The disadvantage to this data packing method is that it must be encoded and decoded. The encoding subroutine begins at line 850 and is straight-forward. The only confusion that may arise is if the reader does not realize that, for example, the last name is shorter than the required twelve letters, the extra space in L$ must be filled with blanks. Line 1010 determines the number of actual letters in the last name. Line 1020 verifies that it is no longer than twelve letters. Line 1050 constructs a string, B$, with the required number of "blanks" (from BL$ which contain 12 "blanks"). In line 1060, this string of "blanks" is appended to the string for the last name to form a string which is exactly twelve bytes long. The decoding subroutine begins at line 660 and is a simple example of the use of the "LEFT$" and "MID$" function. The only item which might confuse the reader would be the "blank" unpacking routines on the first name (lines 760 thru 780) and the city (line 790 thru 810). The unpacking of these blanks allows the printing of the first and last name, and the city and state with only a single blank between the two words instead of the multiple spacing that is often found in label printing programs.

The tape file portion of this program has been set up to present a minimum of problems to the operator as is possible with a cassette recorder based file system. If the file is to be outputted to the tape recorder for storage, a message prompt appears on the screen to remind the user to push both the play and record buttons. The entire file will be sent to the recorder at this time.

When the operator selects the "update" or either of the printing routines, the program will ask if the list is in the computer, if it is not, a prompt appears requesting a rewind of the tape and to push the play button. The file will automatically be loaded at this time.

At this point, it might be beneficial to discuss why the effort has been made to enter from the keyboard a file of 100 records into the computer's memory and place the file onto tape in a single write operation. It would have been much simpler from a program writing standpoint to have written each record to tape as the data was entered from the keyboard. When the list was to be printed, the first record would be read and printed, then the second record, etc., until the task was completed. The problem, which comes up, is making permanent changes in the information (a change of address for example). Making a permanent change requires a write operation onto a cassette recorder. This implies that in an updating operation, a rapid mixture of cassette reads and writes would be required. This is simply not possible with the Color Computer cassette hardware. The technique of reading in a large number of records, editing these records and restoring the entire file back onto tape is the best solution.

The extensive use of "GOSUB" should also be pointed out. The greatest criticism of BASIC is that it has no structure that the program writer is forced to observe. This lack of structure makes it difficult to trace a program through its sequence of instructions. The instruction "GOTO" is the biggest contributor to this difficulty. Many programs with excessive numbers of GOTO's also defy efforts to debug or to make minor changes. With a subroutine (which a GOSUB is), the program analyzer knows where the next instruction is, and more importantly, the point to which it must ultimately return. The end of the subroutine can be easily determined by finding the "RETURN" instruction. (Never, but never use a "GOSUB" without a "RETURN"). Nesting of "GOSUB"'s (a subroutine within a subroutine) is allowed and encouraged to clearly define the path of the program. Two "GOTO" instructions can be used almost anyplace in a program where a "GOSUB" and a "RETURN" are used. The difficulty with the "GOTO" is that when nesting occurs, one cannot tell if another nest is being entered or the present nest left.

Since there are a wide variety of printers with many different features, the author feels that some mention of possible problems due to these differences should be discussed.

When the address list (menu option 3) is printed the computer assumes that the printer has a "top-of form" option (i.e., it will position the top of the page for printing when a CHR$(12) is relieved). If your printer does not have this feature, line 1610 should be deleted and line 1760 changed to "GOTO 1620" it will then reprint the headings after every nineteenth record has been printed. If this is not desired, then lines 1650 and 1750 will also have to be deleted and line 1760 changed to "GOTO 1660".

The principal modification which would be made to use this program for club, business, or

church use is to change the prompts for "send card - rec'd card" subroutine beginning at line 1390. For example, a church might use the "rec'd card" for indicating that the person is a member, constituent, or visitor. The "send-card" would be used to designate the persons on the active mailing lists. Once these changes have been made, the program becomes a general mailing list which can be quickly and easily updated.

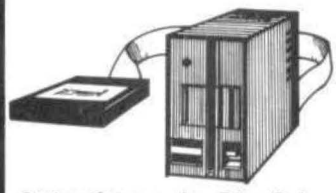
This program was developed to be very simple to use. It was intended for use by someone who was not an experienced programmer or computer operator. Thus, the author attempted to develop a program which would check the input data to assure that each piece of input could not cause the program to "bomb". The program would call for either input or output to the cassette recorder at the proper times with the necessary prompts to the operator. It appears that it was successful in the author's case. The author's wife, who certainly was not experienced at that time, did put our Christmas card list on the computer and printed the address labels.

```
10 'XMASCARD PROGRAM
20 'FRANK MALANEY
30 '8708 MINK ST SW
40 'PATASKALA,OHIO 43062
50 PMODE 0,1
60 PCLEAR1
70 CLEAR7000
80 DIM A$(100)
90 CLS
100 'XMAS CARD ADDRESSING
110 PRINT"TO USE- ENTER NO OF FU
NTION":PRINT"WANTED"
120 PRINT"1- GENERATE XMAS CARD
LIST"
130 PRINT"2- UPDATE SEND-RECV AN
D ADDRESS"
140 PRINT"3- PRINT LIST
150 PRINT"4- PRINT ADDRESS LABEL
S"
160 PRINT"5- TO ADD NAMES TO LIS
T"
170 INPUT F
180 IF F<1 OR F>5 THEN 190 ELSE
220
190 CLS
200 PRINT"NUMBER MUST BE BTWN 1
AND 5"
210 GOTO 110
220 ON F GOSUB 240,1390,1570,178
0,2210
230 GOTO 90
240 'GENERATE LIST AND ADD NAMES
 SUBROUTINE***
250 C=0:D=0
260 CLS     'ENTRY POINT FOR ADDI
NG NEW NAMES
270 C=C+1
280 PRINTC
290 GOSUB 850     'TO DATA ENTRY
SUBROUTINE
300 GOSUB 450      'TO SCREEN PRI
NT SUBROUTINE
310 PRINT"IF NAME AND ADDRESS AR
E NOT"
320 PRINT"CORRECT, ENTER'MOD'. A
FTER ALL"
330 PRINT"ADDRESSES ARE IN, ENTE
R 'EXIT'"
340 PRINT"OTHERWISE, PUSH <ENTER
>."
350 INPUT Q$
360 IF Q$="MOD" THEN 390
370 IF Q$="EXIT" THEN 430
380 IF Q$=CHR$(13) THEN 400 ELSE
 400
390 C=C-1
400 IF C>D THEN D=C
410 IF C=100 THEN 430
420 GOTO 260
430 GOSUB 1940 'TO TAPE OUTPUT S
UBROUTINE
440 RETURN
450 'SCREEN PRINT SUBROUTINE****

460 GOSUB 660
470 CLS
480 PRINT"SENDING CARD-   ";SS$
490 PRINT"RECEIVED CARD-   ";RR$
500 GOSUB 550        'GET TITLE
510 PRINTTT$;" ";FF$;" ";L$
520 PRINTS$
530 PRINTCC$;", ";ST$;"   ";Z$
540 RETURN
550 'TITLE SUB ROUTINE******
560 T=VAL(T$)
570 ON T GOTO 580,600,620,640
580 TT$="MISS"
590 RETURN
600 TT$="MRS"
610 RETURN
620 TT$="MR"
630 RETURN
640 TT$="MR & MRS"
650 RETURN
660 'STRING STRIP SUB****
670 SC$=LEFT$(A$(C),1)
```

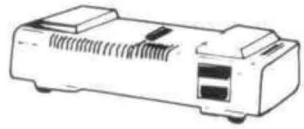
```
680 T$=MID$(A$(C),3,1)
690 RC$=MID$(A$(C),2,1)
700 F$=MID$(A$(C),4,7)
710 L$=MID$(A$(C),11,12)
720 S$=MID$(A$(C),23,20)
730 C$=MID$(A$(C),43,12)
740 ST$=MID$(A$(C),55,4)
750 Z$=MID$(A$(C),59,5)
760 Y=INSTR(F$,"  ")
770 IF Y=0 THEN Y=7
780 FF$=LEFT$(F$,Y)
790 Y=INSTR(C$,"  ")
800 IF Y=0 THEN Y=12
810 CC$=LEFT$(C$, Y)
820 IF SC$="Y" THENSS$="YES" ELS
E SS$="NO"
830 IF RC$="Y" THEN RR$="YES" EL
SE RR$="NO"
840 RETURN
850 'DATA ENTRY SUBROUTINE******

860 PRINT"ENTER NO FOR DESIRED T
ITLE"
870 PRINT"1-'MISS',2-'MRS',3-'MR
'":PRINT"4-'MR & MRS'"
880 INPUT T$
890 PRINT"ENTER FIRST NAME"
900 INPUT F$
910 BF$="        "
920 L=LEN(F$)
930 IF L<8 THEN 960
940 PRINT"FIRST NAME MUST BE <8
LETTERS"
950 GOTO 890
960 B$=RIGHT$(BF$,7-L)
970 F$=F$+B$
980 PRINT"ENTER LAST NAME"
990 INPUT L$
1000 BL$="                "
1010 L=LEN(L$)
1020 IF L>12 THEN 1030 ELSE 1050

1030 PRINT"LAST NAME MUST BE <13
 LETERS"
1040 GOTO 980
1050 B$= RIGHT$(BL$,12-L)
1060 L$=L$+B$
1070 PRINT"ENTER STREET ADDRESS"

1080 INPUT S$
1090 BS$="                    "
1100 L=LEN(S$)
1110 IF L<21 THEN 1140
1120 PRINT"STREET ADDRESS MUST <
21 CHAR'S"
1130 GOTO 1070
1140 B$=RIGHT$(BS$,20-L)
1150 S$=S$+B$
1160 PRINT"ENTER CITY, STATE NOT
E ',','"
1170 INPUT C$,ST$
1180 IF LEN(ST$)<5 THEN1210
1190 PRINT"STATE MUST BE < 5 LET
TERS"
1200 GOTO 1160
1210 L=LEN(C$)
1220 IF L<13 THEN 1250
1230 PRINT"CITY MUST BE <13 LETT
ERS"
1240 GOTO1160
1250 BC$=RIGHT$(BL$,12-L)
1260 C$=C$+ BC$
1270 SB$="     "
1280 L=LEN(ST$)
1290 B$=RIGHT$(SB$,4-L)
1300 ST$=ST$+B$
1310 PRINT"ENTER ZIP CODE
1320 INPUT Z$
1330 IF LEN(Z$)=5 THEN 1360
1340 PRINT"ZIP CODE REQUIRES 5 N
O'S"
1350 GOTO 1310
1360 X$="--"
1370 A$(C)=X$+T$+F$+L$+S$+C$+ST$
+Z$
1380 RETURN
1390 'SUBROUTINE TO UPDATE FILES
 **
1400 GOSUB 2290     'LOAD TAPE SU
B
1410 FOR C=1 TO D
1420 GOSUB 450  'SCREEN PRINT AD
DRESS
1430 PRINT"FOR ADDRESS UPDATE,EN
TER  'Y'"
1440 INPUT X$
1450 IF X$="Y" GOSUB 850
1460 GOSUB 660
1470 PRINT"TO SEND CARD ENTER 'Y
',ELSE 'N'"
1480 INPUT Q$
1490 IF Q$="Y" THEN SC$="Y" ELSE
 SC$="-"
1500 PRINT"IF CARD RCVD, ENTER '
Y', ELSE'N'"
1510 INPUT Q$
1520 IF Q$="Y" THEN RC$="Y" ELSE
 RC$="-"
1530 A$(C)=SC$+RC$+T$+F$+L$+S$+C
$+ST$+Z$
1540 NEXT C
```

From Computer Plus to YOU . . .

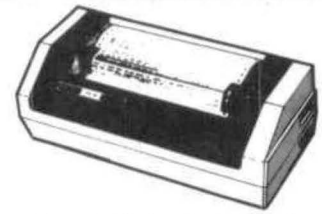
PLUS *after* PLUS *after* PLUS



Color Computer Disc Drive
$470



32K Exp. Int. $334

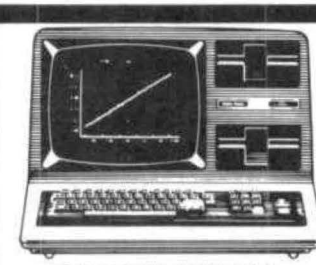


Line Printer VII $315

Color Computer 4K $310
w/16K Ext. Basic $459
w/32K Ext. Basic $525

NEW

Model 16 128K
1 Drive $4299



Model III 16K $839
Model III 48K
2 Disc & RS232C $2059

BUY DIRECT *Here are just a few of our fine offers . . . call TOLL FREE for full information.*

COMPUTERS	
Model II 64K	$3300
Model III 4K LEV I	599
MODEL III 16K	839
MODEL III 32K	945.50
*MODEL III 32K	881.50
MODEL III 48K	1052
*MODEL III 48K	924
Model III 48K 2 Disc & RS232 c	2059
†Model III 48K 2 Disk No RS232 c	1799
Color Computer 4K	310
Color Computer 16K w/extended basic	459
Color Computer 32K w/extended basic	525
‡Color Computer 32K-64K w/extended basic	489
Pocket Computer 2	230
Model 16 1DR 128K	4299
Model 16 2DR 128K	4999

PERIPHERALS	
*Expansion Interface 32K	334
16K RAM N.E.C. 200 N.S. chips	25
DT-1 Data Terminal	599
64K Ram Chips	75
MODEMS	
Lynx Direct Connect MI/MIII	235
Auto Ans./Dial Telephone Interface II	169
R.S. Modem I D.C.	130
R.S. Modem II D.C.	210
PRINTERS	
Daisy Wheel II	1695
Epson MX80	479
Epson MX80 FT	589
Epson MX100	759
Line Printer VII	315
Line Printer VIII	620
Line Printer V	1610
Microline 80	345
Microline 82A	479
Microline 83A	735
Microline 84 Parallel	1090
P. C. Plotter Printer	199
DISK DRIVES	
R.S. Model III 1ST-Drive	712
Traxx Tanoon 40 Track MI	289
R.S. 1 Drive Exp MII	999
Color Computer Drive 0	470
Primary Hard Disk	3999
SOFTWARE	
R.S. Software 10% off list	
Newdos 80 MIII	149
Color Computer Flex D.O.S.	99
ETC.	
Verbatum 5" Double Density	32
Verbatum 8" Data Life	49.95
Ctr-80A recorder	52
C. C Joysticks	22

*Computer Plus New Equipment, with NEC RAM installed. 180 Day Computer Plus Warranty.
†MIII R.S. Drive 0 Tandon Drive 1
‡Color Computer 64K requires Disk 0 and Flex D.O.S.

We have the lowest possible Fully Warranteed Prices AND a full complement of Radio Shack Software.

call TOLL FREE 1-800-343-8124

computer plus

245A Great Road
Littleton, MA 01460
617-486-3193

Write for your free catalog

DEALER INQUIRIES ARE INVITED

Prices subject to change without notice.
Not responsible for typographical errors.

TRS-80 is a registered trademark of Tandy Corp.

AMERICAN EXPRESS MasterCard VISA

```
1550 GOSUB 1940     'TAPE OUT SUB

1560 RETURN
1570 'PRINT LIST ON PRINTER SUBR
OUTINE****
1580 GOSUB 2290    'LOAD TAPE SUB
ROUTINE
1590 PRINT"BE SURE PRINTER IS RE
ADY"
1600 C=1
1610 PRINT#-2,CHR$(12)
1620 PRINT#-2,"SEND RECD"
1630 PRINT#-2,"CARD CARD  NAME";
:PRINT#-2,TAB(43)"ADDRESS"
1640 PRINT#-2,"----- -----  ";:PRI
NT#-2,STRING$(29,"-");:PRINT#-2,
TAB(43) STRING$(25,"-")
1650 FOR E=1 TO 19
1660 GOSUB 660
1670 GOSUB 550
1680 K1$=" "+SC$+"      "+RC$+"
 "+TT$+" "+FF$+" "+L$
1690 PRINT#-2, K1$
1700 PRINT#-2,TAB(43)S$
1710 K2$=CC$+", "+ST$+" "+Z$
1720 PRINT#-2,TAB(43) K2$
1730 IF C=D THEN 1770
1740 C=C+1
1750 NEXT E
1760 GOTO 1610
1770 RETURN
1780 ' PRINT ADDRESS LABLES*****

1790 GOSUB 2290  'CALL TAPE LOAD

1800 FOR C=1 TO D
1810 GOSUB 660
1820 GOSUB 550  'TITLE SUB
1830 IF SC$="Y" THEN 1840 ELSE 1
920
1840 K4$=TT$+" "+FF$+" "+L$
1850 K3$=CC$+", "+ST$+"  "+Z$
1860 PRINT#-2,CHR$(10)
1870 PRINT#-2,TAB(2)K4$
1880 PRINT#-2,TAB(2)S$
1890 PRINT#-2,TAB(2)K3$
1900 PRINT#-2,CHR$(10)
1910 PRINT#-2,CHR$(10)
1920 NEXT C
1930 RETURN
1940 'TAPE FILE OUTPUT SUBROUTIN
E**************************
1950 DY$=STR$(D)
1960 CLS
1970 PRINT:PRINT:PRINT:PRINT"POS
TION TAPE- PUSH PLAY & RECORD"
1980 INPUT"PRESS <ENTER> WHEN RE
ADY";Q$
1990 OPEN"O",#-1,"XMASLST"
2000 PRINT#-1,CY$
2010 FOR Y=1 TO D
2020 PRINT#-1,A$(Y)
2030 NEXT Y
2040 CLOSE#-1
2050 RETURN
2060 'LOAD TAPE TO COMPUTER SUBR
OUTINE ****
2070 CLS
2080 PRINT"REWIND TAPE AND PUSH
PLAY"
2090 INPUT"PUSH <ENTER> WHEN REA
DY";Q$
2100 OPEN"I",#-1,"XMASLST"
2110 IF EOF(-1) THEN 2180
2120 INPUT #-1,DY$
2130 D=VAL(DY$)
2140 FOR C=1 TO D
2150 IF EOF(-1) THEN 2180
2160 INPUT #-1,A$(C)
2170 NEXT C
2180 CLOSE #-1
2190 PRINT"TAPE TRANSFERRED"
2200 RETURN
2210 'ADD MORE NAMES TO THE LIST
 SUBROUTINE****
2220 CLS
2230 PRINT"TO ADD TO THE XMAS CA
RD LIST":PRINT"IT IS NECESSARY T
O LOAD THE OLD":PRINT"LIST FROM
TAPE-PUSH <ENTER>"
2240 INPUT Q$
2250 GOSUB 2060  'LOAD TAPE
2260 C=D
2270 GOSUB 260
2280 RETURN
2290 'TAPE LOAD OPTION SUBROUTIN
E *****
2300 CLS
2310 PRINT"IT IS NECESSARY AT TH
IS POINT"
2320 PRINT"TO HAVE THE LIST IN M
EMORY."
2330 PRINT"IF A TAPE LOAD IS REQ
UIRED"
2340 PRINT"ENTER 'Y'"
2350 INPUT Q$
2360 IF Q$="Y" THEN 2370 ELSE 23
80
2370 GOSUB 2060
2380 RETURN
```

XMAS CARD

```
618 '24FA
620 '8620
622 '4A
624 '26FD
626 '12
628 '12
630 '12
632 '3506
634 '39
640 'note THIS HEX LISTING WAS
HAND COPIED AND MAY CONTAIN
ERRORS
680 '
682 'THE BASIC DRIVER IS LISTED
684 'BELOW AND IS ALL YOU NEED
686 'TO TYPE IN.
688 '
700 CLEAR200,12288
710 DIMA(22)
715 'ENTER THE MACHINE CODE
720 FORX=14848 TO 15031:READA:PO
KEX,A:NEXTX
730 DATA51,141,0,252,48,141,0,24
6
740 DATA 166, 192, 167, 132, 166
, 192
750 DATA 167, 1, 198, 3, 141, 28
, 52, 6, 134, 64
```

```
760 DATA 198, 255, 90, 38, 253,
74, 38, 248, 53, 6
770 DATA 18, 18, 230, 192, 166,
192, 167, 1, 18, 18
780 DATA 18, 18, 18, 18, 166, 13
2, 52, 4, 141, 52
790 DATA 141, 50, 141, 48, 141,
104, 198, 4, 72, 36
800 DATA 4, 141, 29, 32, 2, 141,
 30, 90, 38, 244
810 DATA 198, 5, 166, 1, 72, 36,
 4, 141, 13, 32
820 DATA 2, 141, 14, 90, 38, 244
, 53, 4, 90, 38
830 DATA 209, 57, 141, 8, 141, 6
4, 57, 141, 61, 141
840 DATA 1, 57, 52, 6, 182, 255,
 32, 68, 36, 250
850 DATA 134, 52, 74, 38, 253, 1
98, 2, 134, 255, 183
860 DATA 255, 32, 134, 178, 74,
38, 253, 134, 0, 183
870 DATA 255, 32, 134, 248, 138,
 0, 74, 38, 251, 90
880 DATA 38, 231, 134, 255, 183,
 255, 32, 134, 178, 74
890 DATA 38, 253, 134, 0, 183, 2
55, 32, 53, 6, 57
900 DATA 52, 6, 182, 255, 32, 68
, 36, 250, 134, 32
910 DATA 74, 38, 253, 18, 18, 18
, 53, 6, 57, 0
915 'SET UP CONTROLLER CODE
    TABLE (THERE IS PROBABLY AN
    ALGORITHM TO DO THIS)
920 FORI=1TO22:READA(I):NEXT
930 DATA96,224,32,160,16,144,80,
208,112,240,48,176,0,128,64,192,
40,56,8,24,88,72
940 CLS
950 INPUT"HOUSE CODE A-P";Z$:Z=A
SC(Z$)-64
960 INPUT"UNIT CODE 1-16";D
970 INPUT"COMMAND CODE ON=1 OFF=
2 CLR=3 ALL=4 BR=5 DIM=6";E
980 E=E+16:C=3:IFE<21THEN1000
990 INPUT"NUMBER OF STEPS 1-10";
C:C=C*2+1
995 'SET UP PARAMETER TABLE
     HOUSE/UNIT/STEP/COMMAND
1000 I=15104
1010 POKEI,A(Z):POKEI+1,A(D):POK
EI+2,C:POKEI+3,A(E)
1015 'ASSIGN USR ADDRESS
1020 POKE275,58:POKE276,00
1030 X=USR(0)
1040 GOTO940
```

Sam Mik Software

3424 College N.E.
Grand Rapids, MI 49505

JUST RELEASED:

★COLOR COMPUTER DANCING DEVIL★

Watch him tap dance to music. Program your own routines. Youngsters and adults alike love him. Machine language. A Demon of a deal!

$14.95

MOON LANDER

2 Programs - A real treat!

Train on "Moon Lander" then move up to "Lander II". An outstanding flying experience. Visit the moon on your CC. Ext. Basic. Reviewers say most realistic on the market today! **$15.95**

ML RABBIT

No serious programmer can afford to pass this up!

Make copies of any machine or basic program effortlessly. Even copies programs that automatically execute. Completely automatic. (Caution-Intended to make back-up tapes only).

only $14.95

EDUCATIONAL PROGRAMS

(Now in use in several schools)

(16K Ext. Basic)

ABC 123

★**Math Drill** - Designed for teaching addition, subtraction, multiplication and division to the student of any age.

★**Spelling Test** - Hear your CC talk to you! An outstanding learning tool. Students love to learn with this program. For any age.

★**Word Drill** - Complete package designed by a teacher as a vocabulary teaching aid.

Recommended by teachers as an outstanding learning aid.

$19.95 each
All 3 for $49.97

CASINO - 3 game pak. 3 Vegas games on one tape.
5 Card Draw ★ Slots ★ Acey/Ducey.

Only $14.95

Also: CW Software for Color Computer **$19.95**

CONNECT FOUR

Challenging game played either with two players or against the computer. 4K

$12.95

CCN-SAMPLER SERIES

$7.95 ea.

VISA

Add $1.00 Postage & Handling
Michigan residents add 4% Sales Tax.

MasterCard

★LOOKING FOR NEW SOFTWARE★
—TOP ROYALTIES PAID—

PHONE (616) 364-4791

REVIEW - POLARIS

by Richard Baker
2490 Columbia Street
Eugene, Oregon 97403

Polaris is a copy of the popular coin operated video game entitled Missile Command. The program was written by Device Oriented Games, and it is distributed by Radio Shack.

When I bought my Color Computer a year ago, the only software I bought was sold by Radio Shack. I own 7 program paks and out of all of them my favorite is Polaris. I'll name them to give you an idea on which program I consider worse than Polaris. I own Dino Wars, Pinball, Project Nebula, Skiing, Quasar Commander, Checkers and of course, Polaris. I thought Polaris sounded like a good deal beacause it only cost $30 dollars.

In Polaris, you are the commander of 3 Polaris submarines of which each carries 9 ABMs (antiballistic missiles). You must fire these missiles in hope that you will intercept incoming ICBMs (intercontinental ballistic missiles) that are sent towards your islands by the computer. The computer will also send you MIRVs (multiple independently targeted reentry vehicles) and if you are good enough, the computer will send you highly dextrous smart bombs that avoid the radioactive explosion of your ABMs. Your ABMs rocket to their targets that you give them using the joysticks. The object is to prevent the computer's missiles and bombs from landing on your islands and destroying them. The computer gives you 6 islands at the beginning of the game. The computer's weapons can also destroy your submarines so you have to protect them too. The whole game is in machine language, has real time high resolution graphics, color and sound effects.

The computer sends it's attacks in waves that last about 2 minutes. After each wave has past, you receive bonus points for the remaining missiles and islands that you have. You also get points for the things that you destroyed during that wave. The number of bonus points that you receive depends on the multiplier for that wave. The multiplier is a number that starts at one and increases one every second wave until it reaches 6. If you earned 100 points for one wave and the multiplier was 3 you would get a total of 300 bonus points for that wave. For each ABM you have remaining after each wave you get 1 point, and for every island you have remaining you get 20 points. If you destroy a ICBM you get 5 points and if you destroy a smart bomb you get 20 points. The sum of all the points that you collected for that round is then multiplied times the multiplier. After each wave, the next one is harder. The ICBMs speed up a lot and you start getting smart bombs when the multiplier reaches 4. When the multiplier changes or is on 6, the colors of all the objects change and when you have a high score the colors become more beautiful. Your score is constantly displayed when you are playing and so is your opponents. Yes that's right. Two people can play Polaris. If two are playing the players alternate after each wave. The first player uses the right joystick and the second player uses the left one. To fire your ABMs, you use the ",","." and the "/" keys respectively. If you find this an awkward position, you can use the "z", "x" and "c" keys. When playing a two player game, it is best for one person to use one set of keys and the other person the other. For best results, you should use one hand to fire your missiles and the other hand to control the joystick.

You control where your missiles go using the joystick. You move a cross around the screen that shows where your missiles are going to fly to and detonate at. When the ABM detonates, it makes a radioactive explosion that destroys anything it comes in contact with. Note that smart bombs dodge these explosions. Moving the joystick moves the cross.

The game is over when all your islands have been destroyed by the computer's missiles and bombs. It is wise to protect your submarines and islands closely. Incase you are wondering, every 2000 points you receive a bonus island. If you haven't lost any then the computer stores them in memory.

You may realize the hard way that you shouldn't waste missiles. You may find it a good idea to make a wall of explosions to prevent any of the enemy missiles from getting through. My high score is 53,000 and you should see how hard it is to survive then!

In conclusion, I think Polaris is an excellent game. it does have some possible shortcomings though. For one, unlike many other versions, Polaris doesn't have killer satellites or bombers. Secondly, the sound effects tend to slow down the program. This isn't really serious because the program already has extra fast graphics. On the positive side, Polaris has incredibly smooth graphics. Also, Polaris has no limitation on the number of missiles and explosions on the screen at the same time. The explosions are just like the popular coin operated game. Lastly, Polaris continually gets tougher so you won't get bored of it quickly!

Polaris cost $30.00 and you can buy it at you local Radio Shack store. If there is any questions that you have about Polaris or any of the other games I own please feel free to write to me at: Richard Baker, 2490 Columbia Street, Eugene, Oregon 97403

Comment Corner
by Andrew Phelps
The Micro Works

The following are comments which could be added to a disassembly listing of the Color Computer Rom. The subject this time is disk I/O. The routine which is documented here is called DSKCON by Radio Shack, and is used for all access to the disk hardware (except for the DSKINI command).

For those of you who have a disassembler and have not yet listed the disk controller Rom, a list of areas (Program, Data, Ascii, etc.) has been included in this magazine so that you can make a "clean" listing. If you don't have a disassembler yet, be sure to save these magazines! I'm sure you'll give in and get one sooner or later if you're at all serious about programming the Color Computer.

Variables, areas, and routines -

Addr	Comments
00EA	OPERATION CODE
00EB	DRIVE NUMBER
00EC	TRACK
00ED	SECTOR
00EE	BUFFER ADDRESS
00F0	STATUS RETURNED
097E	TABLE OF CURRENT TRACKS
0982	NMI IN USE FLAG
0983	WHERE TO GO AFTER NMI
0985	MOTOR SHUTOFF COUNTER
0986	CURRENT LATCH DATA
C004	ADDRESS OF DSKCON
D66C	DSKCON
D6C5	RESTORE
D6DE	GET STATUS
D6FD	DELAY 78 mSEC
D705	READ/WRITE SECTOR
D7A2	COMMAND ADDRESS TABLE
D7AE	NMI HANDLER
D7BC	IRQ HANDLER
FF40	OUTPUT LATCH
	BIT 0: DRIVE SELECT 0
	BIT 1: DRIVE SELECT 1
	BIT 2: DRIVE SELECT 2
	BIT 3: MOTOR ON
	BIT 4: PRECOMP (TRACK>21)
	BIT 5: DOUBLE DENSITY
	BIT 6: DRIVE SELECT 3
	BIT 7: HALT ENABLE
FF48	DISK STATUS
FF49	DISK TRACK NUMBER
FF4A	DISK SECTOR NUMBER
FF4B	DISK DATA

Line-by-line comments -

Addr	Comments
D66C	SAVE REGISTERS
D66E	NUMBER OF RETRIES
D670	INIT RETRY COUNTER
D672	DISABLE MOTOR SHUTOFF
D675	GET DRIVE NUMBER
D677	ADDRESS OF DRIVE BITS
D67A	GET CURRENT LATCH DATA
D67D	REMOVE OLD DRIVES, PRECOMP
D67F	ADD NEW DRIVE SELECT BIT
D681	ENABLE DOUBLE DENSITY
D683	GET TRACK NUMBER
D685	IS IT >= TRACK 22?
D687	SKIP IF NOT
D689	SET PRECOMP BIT
D68B	SAVE IN B REGISTER
D68D	SET MOTOR ON BIT
D68F	SAVE NEW LATCH DATA
D692	AND STORE TO LATCH
D695	WAS MOTOR ON BEFORE?
D697	IF IT WAS, SKIP THE DELAY
D699	WAIT 1/2 SECOND
D69C	WAIT ANOTHER 1/2 SECOND
D69F	GET DISK CONTROLLER STATUS
D6A1	IF ERROR, GO RETRY
D6A3	CLEAR STATUS RETURN BYTE
D6A5	ADDRESS OF COMMAND TABLE
D6A8	GET COMMAND
D6AA	TIMES 2 FOR ADDRESSES
D6AB	EXECUTE COMMAND
D6AD	GET RETRY COUNTER
D6AF	GET STATUS
D6B1	IF OK, WE'RE DONE
D6B3	COUNT DOWN RETRIES
D6B4	IF ZERO, FORGET IT & DIE
D6B6	PUT IT BACK ON STACK
D6B8	RESTORE TO TRACK ZERO
D6BA	IF ERROR, GO RETRY AGAIN
D6BC	GO TRY COMMAND AGAIN
D6BE	120 = 2 sec @ 60 Hz
D6C0	INITIALIZE MOTOR OFF COUNT

```
D6C3  RESTORE AND RETURN
D6C5  ADDRESS OF TRACK TABLE
D6C8  GET DRIVE NUMBER
D6CA  SET TO TRACK ZERO
D6CC  RESTORE COMMAND
D6CE  SEND TO DISK CONTROLLER
D6D1  WAIT 7 uSEC
D6D3  WAIT 7 uSEC
D6D5  GET STATUS
D6D7  DELAY 78 mSEC
D6D9  CHECK FOR SEEK ERROR
D6DB  SAVE STATUS CODE
D6DD  RETURN
D6DE  GET A ZERO
D6E0  COUNT DOWN X
D6E2  IF ZERO, WE'VE TIMED OUT
D6E4  GET CONTROLLER STATUS
D6E7  CHECK BUSY BIT
D6E9  LOOP WHILE SET
D6EB  RETURN
D6EC  COMMAND TO TERMINATE
D6EE  ZAP THE HUNG COMMAND
D6F1  WAIT 7 uSEC
D6F3  WAIT 7 uSEC
D6F5  READ TO CLEAR INTERRUPTS
D6F8  "DRIVE NOT READY" STATUS
D6FA  TO STATUS BYTE
D6FC  RETURN
D6FD  GET DELAY COUNT
D700  COUNT DOWN X
D702  LOOP TO DELAY 70000 CYCLES
D704  RETURN
D705  READ COMMAND
D707  SKIP TWO BYTES
D708  WRITE COMMAND
D70A  SAVE THE COMMAND
D70C  ADDRESS OF TRACK TABLE
D70F  GET DRIVE NUMBER
D711  GET ADDRESS OF TRACK ENTRY
D712  GET CURRENT TRACK NUMBER
D714  STORE INTO TRACK REGISTER
D717  IS A SEEK NEEDED?
D719  IF SAME TRACK, NO SEEK
D71B  GET NEW TRACK NUMBER
D71D  OUTPUT TO DATA REGISTER
D720  AND SAVE IN TRACK TABLE
D722  SEEK COMMAND
D724  OUTPUT TO COMMAND REGISTER
D727  DELAY 7 uSEC
D729  DELAY 7 uSEC
D72B  GET STATUS
D72D  IF NO DRIVE, LEAVE
D72F  DELAY 78 mSEC
D731  SEEK OR CRC ERROR?
D733  OK IF NOT
```

COMMENT CORNER

```
D735  SAVE ERROR STATUS
D737  RESTORE AND RETURN
D739  GET SECTOR NUMBER
D73B  STORE TO SECTOR REGISTER
D73E  WHERE TO GO WHEN DONE
D741  TELL THE NMI ROUTINE
D744  GET BUFFER ADDRESS
D746  READ TO CLEAR INTERRUPTS
D749  GET LATCH DATA
D74C  SET THE "HALT ENABLE" BIT
D74E  GET READ/WRITE COMMAND
D750  SET Y REGISTER TO ZERO
D753  ADDRESS OF 1793 FOR SPEED
D756  SET "NMI IN USE" FLAG
D759  INHIBIT IRQ, FIRQ
D75B  SEND COMMAND TO CONTROLLER
D75E  WAIT 7 uSEC
D760  WAIT 7 uSEC
D762  WAS IT A READ COMMAND?
D764  IF SO GO TO READ LOOP
D766  DATA READY BIT
D768  READY FOR NEXT BYTE?
D76A  IF READY GO SEND IT
D76C  COUNT DOWN TIMEOUT
D76E  LOOP UNLESS TIMEOUT
D770  FLAG NMI NOT IN USE
D773  ENABLE FIRQ, IRQ
D775  GO TERMINATE THE COMMAND
D778  GET NEXT DATA BYTE
D77A  SEND TO DATA REGISTER
D77D  ENABLE THE HALT
D780  WRITE LOOP
D782  DATA READY BIT
D784  CHECK DATA READY STATUS
D786  IF READY, GO READ
D788  COUNT DOWN TIMEOUT
D78A  LOOP UNTIL TIMEOUT
D78C  TIMEOUT:  GO CLEAR & LEAVE
D78E  GET THE DATA
D791  STORE IT
D793  ENABLE THE HALT LINE
D796  READ LOOP
D798  ENABLE IRQ, FIRQ
D79A  GET STATUS
D79D  CLEAR NON-ERROR BITS
D79F  SAVE STATUS
D7A1  RETURN
D7A2  ADDRESS OF RESTORE
D7A4  ADDRESS OF NOP (RTS)
D7A6  ADDRESS OF READ SECTOR
D7A8  ADDRESS OF WRITE SECTOR
D7AA  TABLE OF BITS FOR DRIVES
D7AE  CHECK FOR NMI ACTIVE
D7B1  IF NOT, FORGET IT
D7B3  GET ADDRESS FOR WHEN DONE
```

```
D7B6  PUT INTO PC ON STACK
D7B8  NOW FLAG NMI INACTIVE
D7BB  RETURN FROM INTERRUPT
D7BC  CHECK FOR 60 Hz INTERRUPT
D7BF  IF NOT, FORGET IT
D7C1  CLEAR THE INTERRUPT
D7C4  IS MOTOR ON?
D7C7  IF NOT, GO TO EXTENDED'S
D7C9  COUNT DOWN MOTOR COUNTER
D7CA  STORE NEW COUNT
D7CD  UNLESS COUNTED DOWN, LEAVE
D7CF  GET LATCH DATA
D7D2  REMOVE DRIVE SELECT, MOTOR
D7D4  STORE NEW VALUE
D7D7  OUTPUT TO LATCH
D7DA  GO TO EXTENDED'S IRQ
```

QUESTION: How do I call DSKCON to read and write the disk? Set the values in locations $00EA through $00EF to indicate the desired operation. Then JSR [$C004]. This is detailed in Radio Shack's disk Basic manual.

How does DSKCON interface with the disk hardware?

There are two pieces of hardware which are visible to the software. One is the 1793 disk controller chip, which shows up as four registers in locations $FF48 through $FF4B. The other is an 8-bit output port at $FF40 which controls the drive select lines, motor on, and other functions. The purpose of each bit of this latch is given in the "areas" section above.

How is the 1793 operated?

Information about track and sector, etc., is stored in the registers of the 1793. A command byte is then stored in the command register, which initiates the operation. Status information is obtained if a read is done to the command register. For sector reads and writes, a loop is then done to transfer the data via the 1793's data register.

Can the registers be read as well as written?

The track and sector registers of the 1793 can be read back. The data register is either read or written depending on whether a sector is being read or written. The command register becomes the status register when it is read. The data output latch at $FF40 cannot be read, so whatever data is written to it is always written to $0986 as well, so that this byte can be read whenever it is necessary to determine the current output data.

How is the "halt" output used?

When this output is used, the 1793 has the ability to halt the 6809 processor until the next data byte is ready. This allows the data transfer loop to be written with no tests or branches, so that the loop can be made fast enough. This is an example of how to speed a processor up by slowing it down.

How is the non-maskable interrupt used?

The 1793 generates an NMI when it is done with an operation. The NMI routine then changes its return address so that the data tranfer loop will terminate. This scheme saves time since no end checking is required in the transfer loop.

How is IRQ used?

The 60 Hz interrupt is used to time out the disk motor. After 120 such interrupts since the last operation, the IRQ handler shuts off the motor and the drive selects. If a program is

run from disk which inhibits the interrupt, then the motor never shuts off.

What is "precomp"?

Double-density disks such as those used with the Color Computer require that data on inner tracks be recorded in a slightly different way from data on outer tracks. When the track number is greater than or equal to 22, the software sets this output to tell the hardware that it is dealing with an "inner track".

Why are all these variables up in the $0900 area?

The area below the screen was full. Then there are two areas, at $0600 and $0700, which are each one sector long and which are used by the DOS for its I/O. The area starting at $0800 is the drive table, containing 74 bytes of data for each drive. This takes us up to $0928, where DOS's variables start. You can see why it doesn't work to run cassettes which are designed for non-disk system, since they will generally load from $0600 on up.
HERE IS THE LIST OF AREAS WHICH WILL ENABLE YOU TO MAKE A CLEAN DISASSEMBLY OF THE ROM IN RADIO SHACK'S DISK CONTROLLER.

```
S C000 Ascii string
A C002 Addresses
P C008 Program area
D C0F6 Data
A C0F7 Addresses
D C0FB Data
A C0FE Addresses
S C126 Ascii string
A C1DB Addresses
S C201 Ascii string
A C214 Addresses
P C220 Program area
S C278 Ascii string
P C29A Program area
S D272 Ascii string
P D2AC Program area
D D5E7 Data
P D5FF Program area
A D7A2 Ascii string
D D7AA Data
P D7AE Program area
D D7DD Data
E D800 End of disk Rom
(The data in D800 thru DFFF is
garbage and is not used.)
```


BASIC PROGRAMMING HINTS
VARIABLE NAMES

by Regena
120 South 350 East
North Salt Lake, Utah 84054

All microcomputers may use BASIC as their programming language, but each brand of computer has its own form of BASIC. Many special commands are unique for a certain brand. Usually the main differences among brands of BASIC are the commands for graphics and sound.

One other difference you may notice right away is what is allowed for a variable name in TRS 80 Color BASIC. A variable name may be one or two characters in length and may use the characters from A to Z. You may use more than two characters for clarity, but the computer will recognize only the first two characters. Suppose you have a program tallying the number of BLUES and the number of BLACKS. Both of these names would be considered the variable BL and you would get a combined total. You have to be careful naming your variables so two or more of them do not have the same first two letters.

Usually you will want to use variable names that have some meaning--an initial or abbreviation of what the variable is, T for time or SC for score, for example. You may not use reserved words such as OR, FN, TO, ON, IF.

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

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**

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**

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.

GOOD STUFF!

THE MICRO WORKS

MasterCharge/Visa Accepted
California residents add 6% tax.

P.O. BOX 1110, DEL MAR, CA 92014 [714] 942-2400

LIGHT

by Robert Huxster
511 N Monroe Street
Media, PA 19063

This program was written to allow the Color Basic Computer to interface with the "Plug'n Power" controller. Radio Shack provides a machine language program which monopolizes use of the computer. Their program also uses 1/60 second paulses on the input line of the cassette port to run a real time clock and provide for timed control of lights, alarms, etc. For their other computer, Radio Shack provides a short version of the program to allow the user to control devices from Basic programs. The timing functions is lost, however.

The Basic program listed below uses the familiar technique of loading a machine language program from data statements. The machine code is position independent but the addresses in the basic driver would have to be corrected if the code is moved. The code was produced using the monitor presented in CCN V1 N2 and I appologize for the rough edges.

Certain quirks are present because I am planning to modify the program to incorporate an interrupt driven clock for timed control of devices. This would be an advantage in that your controller program would no longer monopolize the computer. (CCN V1 N5) If that project is ever completed I will send it along too.

Specifically, I use the stack pointer U to indicate a table of parameters identifing the "House Code" and "Unit Code" of the "Plug'n Power" module to be addressed. Also here is the "Command Code" and the "Step Number" used in dimming and brightening. For use with a real time clock this table would also contain the day of the week and time that a function is to occur.

```
150 ' ASSEMBLY LIST
152 '
153 '    main
154 '  LEAU #FC,PC SET UP TABLE
156 '  LEAX #F6,PC POINT X TO
157 '              TEMP STORAGE
158 '  LDA U+ HOUSE CODE FROM
159 '         TABLE
160 '  STA X  TO TEMP STORAGE
162 '  LDA U+ UNIT CODE FROM
163 '         TABLE
164 '  STA 1,X TO TEMP STORAGE
166 '  LDB #03 NO. OF CYCLES FOR

167 '          FIRST OUTPUT SIG-

169 '          NAL
170 '  BSR AA BRANCH TO OUTPUT
171 '
172 '  PSHS A,B  DELAY NEEDED

174 '  LDA #40   BETWEEN 1ST AND

176 '  LDB #FF   2ND OUTPUT SIG-

178 'D1DEC B       NAL
180 '  BNE D1
182 'D2DEC A
183 '  BNE D2
184 '  PULS B,A
185 '  NOP
186 '  NOP
187 '
188 '  LDB U+  LOAD NO. CYCLES
189 '          FOR 2ND OUTPUT
190 '          SIGNAL FROM TABLE

191 '          (DERIVED FROM NO.

192 '          OF STEPS)
193 '  LDA U+  COMMAND CODE FROM

194 '          TABLE
195 '  STA 1,X TO TEMP STORAGE
196 '  NOP
197 '  NOP
198 '  NOP (SOME OF THE
199 '  NOP ROUGH EDGES)
200 '  NOP
201 '  NOP
202 '                output
203 'AALDA X+ HOUSE CODE FROM
204 '        TEMP STORAGE
206 '  PUSH B SAVE CYCLE NO.
207 '  BSR PP OUTPUT PULSE
208 '  BSR PP (THREE TIMES)
209 '  BSR PP
210 '  BSR BB OUTPUT BLANK
211 '  LDB #04 LOOK AT THE 1ST
212 'H ASLA     4 BITS OF HOUSE
213 '          CODE
214 '  BCC H1  IF 1 THEN PATTERNA

216 '  BSR CC IF 0 THEN PATTERNB

218 '  BRA H2
220 'H1BSR DD GO TO PATTERN A
222 'H2DEC B  CHECK NEXT BIT
224 '  BNE H
226 '
228 '  LDB #05 LOOK AT FIRST
229 '          5 BITS OF
230 '  LDA 1,X UNIT OR COMMAND
231 '          CODE FROM TEMP
232 '          STORAGE
233 '          (UNIT 1ST SIGNAL
```

```
234 '           COMMAND 2ND SIG)

236 'E ASLA
238 '  BCC E1 IF 1 THEN PATTERNA

240 '  BSR CC IF 0 THEN PATTERNB

242 '  BRA E2
244 'E1BSR DD  GO TO PATTERN A
246 'E2DEC B  CHECK NEXT BIT
248 '  BNE E
250 '
252 '  PULS B CHECK NO. CYCLES
254 '  DEC B
256 '  BNE AA REPEAT IF NOT 0
257 '
258 '  RTS  RETURN TO MAIN
259 '
260 '            pattern a
262 '  BSR PP  OUTPUT A PULSE
264 '  BST BB  OUTPUT A BLANK
265 '  RTS     RETURN TO OUTPUT
266 '
267 '
268 '            pattern b
270 '  BSR BB  OUTPUT A BLANK
272 '  BSR PP  OUTPUT A PULSE
274 '  RTS     RETURN TO OUTPUT
275 '
276 '           pulse(OUTPUTS A
277 'SQUARE WAVE ON THE CASSETTE

278 'OUT LINE)
280 '  PSHS B,A STORE COUNTS
281 'F LDA FF20 LOAD FROM PORT A

282 '           OF PIA#1 (CAS-
283 '           SETTE INTERFACE)

284 '  LSRA
286 '  BCC F CHECK BIT0 (THIS IS

287 '        THE CASSETTE INPUT
288 '        LINE) AND CONTINUE
289 '         ON TIMING SIGNAL
290 '         FROM CONTORLLER
292 '  LDA #34 DELAY
294 'D3DEC A
296 '  BNE D3
297 '
298 '  LDB #02 LOAD NO. PASSES
300 'G LDA #FF
302 '  STA FF20 LOAD PORT A OF
303 '           PIA#1 WITH 1 AT
304 '           EACH BIT (THIS
305 '           OUTPUTS MAXIMUM
306 '           VOLTAGE ON CAS-
307 '           SETTE OUTPUT--
308 '           BITS2-7 OF PORT
309 '           A)
310 '
312 '  LDA #B2 DELAY
314 'D4DEC A
316 '  BNE D4
318 '
320 '  LDA #00
322 '  STA FF20 OUTPUTS 0 VOLTS
323 '           ON CASSETTE LINE

324 '
326 '  LDA #F8 DELAY
328 'D5ORA $00 (DOES NOTHING)
330 '  DEC A
332 '  BNE D5
333 '
334 '  DEC B CHECK NO. OF PASSES

336 '  BNE F CONTINUE IF 0
337 '
338 '  LDA #FF
340 '  STA FF20 OUTPUT MAX VOLTS

341 '           ON CASSETTE LINE

342 '
344 '  LDA #B2 DELAY
346 'D6DEC A
348 '  BNE D6
349 '
350 '  LDA #00 OUTPUT 0 VOLTS
352 '  STA FF20
354 '  PULS B,A RESTORE COUNTS
356 '  RTS RETURN
357 '
358 '           blank(THIS IS
359 '   JUST A DELAY WHILE THE
360 '   CASSETTE OUTPUT LINE
361 '   REMAINS AT 0 VOLTS)
362 '  PSHS A,B STORE COUNTS
364 'G LDA FF20 LOAD FROM PIA#1
365 '           PORT A
366 '  LSRA
367 '
368 '  BCC G CHECK BIT0 FOR IN-
369 '        PUT OF TIMING SIG-
370 '        NAL FROM CONTROLLER

371 '        THEN CONTINUE
372 '
374 '  LDA #20 DELAY
376 'D7DEC A
```

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.

```
378 '   BNE D7
380 '   NOP THESE THREE SPACES
382 '   NOP COULD BE REPLACED
384 '   NOP WITH A BSR TO DO
386 '       SOMETHING USEFUL
388 '       (LIKE UP DATE A REAL
390 '         TIME CLOCK)
392 '   PULS B,A
394 '   RTS          RETURN
395 '
396 'please note I DO NOT HAVE
AN ASSEMBLER, THEREFORE ONLY THE
MACHINE CODE HAS BEEN TESTED,
NOT THE ASSEMBLY LISTING!
397 '
400 '
410 'MACHINE CODE LIST IN HEX
420 '
430 '338D00FC
432 '308D00F6
434 'A6C0
436 'A784
438 'A6C0
440 'A701
442 'C603
444 '8D1C
446 '3406
448 '8640
450 'C6FF
452 '5A
454 '26FD
456 '4A
458 '26F8
460 '3506
462 '12
464 '12
466 'E6C0
468 'A6C0
470 'A701
472 '12
474 '12
476 '12
478 '12
480 '12
482 '12
484 'A684
486 '3404
488 '8D34
490 '8D32
492 '8D30
494 '8D68
496 'C604
498 '48
500 '2404
502 '8D1D
504 '2002
506 '8D1E
508 '5A
510 '26F4
512 'C605
514 'A601
516 '48
520 '8D0D
522 '2002
524 '8D0E
526 '5A
528 '26F4
530 '3504
532 '5A
534 '26D1
536 '39
540 '8D08
542 '8D40
544 '39
546 '8D3D
548 '8D01
550 '39
552 '3406
554 'B6FF20
556 '44
558 '24FA
560 '8634
562 '4A
564 '26FD
566 'C602
568 '86FF
570 'B7FF20
572 '86B2
574 '4A
576 '26FD
578 '8600
580 'B7FF20
582 '86F8
584 '8A00
586 '4A
588 '26FB
590 '5A
592 '26E7
594 '86FF
596 'B7FF20
598 '86B2
600 '4A
602 '26FD
604 '8600
606 'B7FF20
608 '3506
610 '39
612 '3406
614 'B6FF20
616 '44
```

REVIEW - COLORTERM

by Frank DuPont
479 W Wills #209
Detroit, MI 48201

I have been looking for a good general pupose terminal program that was not in ROM, I like to tinker with my software! I also need to communicate with anything from a big IBM 370 to little microcontrolers.

"COLORTERM" has a 51 or 64 column by 21 lines with descenders, the characters are not as good as "TELEWRITER" but they are still very readable. The 64 column character set is impossible to read unless you own a moniter.

The program comes configured for 300 baud, 7 data bits, even parity, one stop bit and half duplex. You can change all of these and make a new tape to suit your needs. But if you have a need to send and receive 8 bits, "COLORTERM" will only receive 7 bits. I have a need to receive 8 bits, so I contacted the author Mr. Dave Martin and he was very helpful. All I had to do was change location 2490 hex from 7F to FF. There are only two baud rates 300 and 110. I wish it had more range, my Z8 runs up to 9600 baud. There is a auto typing feature that works on all keys except shift-clear (back slash).

Special keys not normally found on the Color Computer are:

1. Shift-@ = exponent sign.
2. Shift-right arrow = right bracket.
3. Shift-left arrow = bar.
4. Shift-down arrow = left bracket.
5. Shift-up arrow = underline.
6. Shift-clear = back slash.

Pressing a right-arrow then any of the following letters gives you access to the advanced functions.

1. A = Assistance, this produces a screen full of reminders of each command.
2. B = Reset to basic after restructuring subroutines, this allows you to use the 51 or 64 character subroutine in your own assembly language programs.
3. D = Full or half duplex.
4. E = Erase from cursor to end of line. (Cursor must be at start of line).
5. F = Flip color, gives reverse video on all or part of screen.
6. G = Generate macro message, 2 buffers of 128 characters each, carriage returns can be embeded. Very usefull for signons.
7. H = Home, returns cursor to start of screen.
8. I = Initialize memory buffer, sets the incoming data buffer to the beginning of the buffer area.
9. J = Jumble, sends data in code.
10. K = Klarify, decodes data that was jumbled. If the host computer sends its own characters, such

as leading spaces or line numbers, they will not be docoded properly. But the "Q" command will help you to correct this.

11. L = Limit memory buffer, used to reserve memory to store a file for uploading to a host computer. (See outsend command).

12. M = Macrosend, send one of your macro messages out. (128 characters).

13. N = No code, resets J & K commands.

14. O = Outsend, uploads data file to host or printer. (If your printer can be set for 110 or 300 baud).

15. P = Partial screen, saves a window of data on screen while you scroll thru memory buffer.

16. Q = Displays the substitution code for numbers. As noted in the "K" command, characters sent by host will be jumbled in the decoding. The "Q" command will display the substitution code at the top of the screen while you scroll thru the memory buffer.

17. R = Revise character set. Changes from 51 to the 64 character set.

18. S = Scroll the memory buffer.

19. T-Z = User defined keys, you are given 7 addresses that you can POKE values for any special codes. This is done in Basic before executing Colorterm, then you can save the new program on tape.

I have used Colorterm on the Amdahl computer at Wayne State University, on my little Z8 micro-controler, and on a couple BBS'S. I am very pleased with the results. Dave should get high marks for the effort he has made in correcting bugs and trying to help with special needs, too many companies seem to forget us after selling their wares. For $34.95 US you get a cassette and a small 18 page manual.

QUALITY SOFTWARE FOR TRS-80 COLOR AND OSI

ADVENTURES!!!
For TRS-80 COLOR and OSI. These Adventures are written in BASIC, are full featured, fast action, full plotted adventures that take 30-50 hours to play. (Adventures are inter-active fantasies. It's like reading a book except that you are the main character as you give the computer commands like "Look in the Coffin" and "Light the torch.")
Adventures require 16K on COLOR-80 and TRS-80. They sell for $14.95 each.

ESCAPE FROM MARS
(by Rodger Olsen)
This ADVENTURE takes place on the RED PLANET. You'll have to explore a Martian city and deal with possibly hostile aliens to survive this one. A good first adventure.

PYRAMID (by Rodger Olsen)
This is our most challenging ADVENTURE. It is a treasure hunt in a pyramid full of problems. Exciting and tough!

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

NEW!!
CIRCLE WORLD — We got Kzinti and puppeteers and problems. Our newest and biggest adventure. Requires 12k on OSI and 16K on TRS-80 Color.

NUCLEAR SUB — You are trapped in a nuclear sub at the bottom of the ocean. Escape and even survival is in doubt. Plotted by three of the most sadistic — I mean "creative" minds in adventure programming.

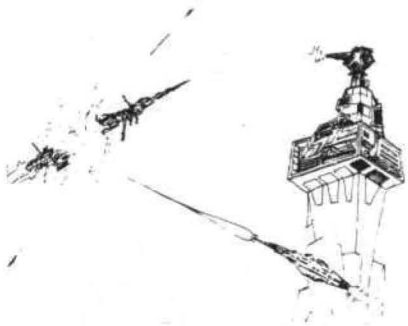
VENTURER!—A fast action all machine code Arcade game that feels like an adventure. Go berserk as you sneak past the DREADED HALL MONSTERS to gather treasure in room after room, killing the NASTIES as you go. Great color, high res graphics, sound and Joystick game for the TRS-80 Color or OSI machines.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

BASIC THAT ZOOOMMS!!
AT LAST AN AFFORDABLE COMPILER FOR OSI AND TRS-80 COLOR MACHINES!!! The compiler allows you to write your programs in easy BASIC and then automatically generates a machine code equivalent that runs 50 to 150 times faster.
It does have some limitations. It takes at least 8K of RAM to run the compiler and it does only support a subset of BASIC—about 20 commands including FOR, NEXT, END, GOSUB, GOTO, RETURN, END, PRINT, STOP, USR(X), PEEK, POKE, *, / , + , - , X , X , = , VARIABLE NAMES A-Z, A SUBSCRIPTED VARIABLE, and INTEGER NUMBERS FROM 0 - 64K.
TINY COMPILER is written in BASIC. It generates native, relocatable 6502 or 6809 code. It comes with a 20 page manual and can be modified or augmented by the user. $24.95 on tape or disk for OSI or TRS-80 Color.

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

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

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



SPACE ZAPPER — Protect your central Star Base from ships that attack from all four sides. Fast reflexes are required as the action speeds up. Great for kids or Dads. This game has high speed high resolution graphics and looks as if it just stepped out of the arcades. — 16K extended or 32K disk. BASIC TRS-80. Color only. $14.95.

Please specify system on all orders

This is only a partial listing of what we have to offer. We have arcade and thinking games, utilities and business programs for the OS1 and TRS-80 Color. We add new programs every week. Send $1.00 for our complete catalog.

AARDVARK - 80
TRS 80 COLOR **2352 S. Commerce, Walled Lake, MI 48088** **OSI**
(313) 669-3110

MAKING EDUCATION MORE COLORFUL

By David Bodnar

In this month's column I would like to take a close look at the research project that I mentioned briefly in the Nov/Dec issue. You may recall that in the school district where I teach we are testing the feasability of teaching 5th and 6th graders with and about computers. I would also like to review something that a lot of educators have been crying for: A QUALITY piece of educational software that delivers just what is advertised and more. Finally I would like to share a program that is the result of the aforementioned research project.

My involvement with kids and the Color Computer started in November of 1980 when I purchased a 4K CC. That machine went to school a week after I bought it and, except for weekends, stayed in my classroom for the rest of the school year. I introduced it to my math class (6th grade) and each child had an opportunity to work through the manual that came with the computer. There was no specific cirriculum. I just had them follow the sequence that was in GETTING STARTED WITH COLOR BASIC. No one was required to go beyond chapter 3, but as you might expect there were a few students that used every available minute to expand their knowledge of the machine.

Other teachers and some administrators began to take notice and a group of us got together in the Spring and tried to find a way to expand our computer horizons for the '81-'82 school year. We decided to apply for funds from the school district's Academy for Research and Development. This is a committee that has a sum of money that it may allocate to allow teachers to persue research projects that might be of interest and value to the school district as a whole.

We asked for enough money to purchase 5 micro-computers. We would place 2 in my school, 2 in another of the district's elementary buildings and the last computer would be used in the other 5 buildings by our traveling elementary resource teacher. We also requested funds for a summer workshop to plan for the school year.

Our proposal was approved and we set about selecting hardware. Even though our experience up to that time was with a Color Computer we took a long, hard look at two other, similarly priced computers that were available in the spring of 1981, the ATARI 400 and the TI 99/4.

After an examination of each we found the Radio Shack product to be superior to the others. The Atari's BASIC was a non-standard dialect that, among other things, would not support string arrays. We also were unimpressed by its flat, toylike keyboard. The TI also had a non-standard BASIC and (at that time) an awkward keyboard. Both of these computers use very slow cassette LOAD and SAVE functions.

The thing that really sold us on the CC was the fact that its BASIC was nearly identical to that used by the high school's DEC PDP 11 mini-computer. This would insure a smooth transition from Elementary to Secondary school. We also had a Radio Shack computer center about 3 miles away that included a repair center, and we were assured that service would not be a problem. (More about that next month!)

We picked up the computer in June and since our summer workshop was scheduled for August, each of the teachers involved in the project was able to take one of the computers home for nearly two months. When we met at the end of the summer each of us had at least some level of proficiency in BASIC programming.

The proposal to the Research Academy stated that our main objective was to teach BASIC so that the computer could be used as a problem solving tool, so our first task was to select materials to help us meet this goal. We decided to use GETTING STARTED WITH COLOR BASIC as the primary means of familiarizing the students with the computer and its language. The book's reading level posed no problem for our students and we felt that its clear, relaxed format would not be threatening to them.

To supplement the Radio Shack book we selected a text that also introduced the BASIC language, not as an end in itself but as a means to solve problems. PROBLEM SOLVING WITH COMPUTERS was written by the Gifted Child Project of the Leon County Schools, Tallahassee Florida. Together with a companion volume that deals with "computer literacy" it makes up a program called COMPUTRONICS. PROBLEM SOLVING is a very structured program that may either be used as a classroom text or as an independent study program. It has activities worksheets and tests that reinforce and evaluate each chapter's main concepts.

During the summer workshop we also wrote tests for the first 7 chapters in GETTING STARTED WITH COLOR BASIC and began work on activity worksheets for each chapter. These worksheets provided additional instructions for some of the pages in the book as well as places for the answers to the the book's activities. They also include several "challenge" activities for those who finish the chapter quickly and wish to apply some of what they have learned.

We also developed a Computer Pretest that was to be given to each student so that we could set a baseline of knowledge before we began any instruction. By giving a similar test at the end of the year we should be able to discover what growth there has been.

Another of our objectives was to teach each 5th and 6th grade student enough about the computer so that he/she could safely turn on the computer, load a program and use that program. To accomplish this we spent the first two weeks of school giving each class two one hour lessons that included instruction in the precautions to be taken when using the computer (do not block vents, avoid turning on and off quickly), the keyboard (back arrow to erase, O and 0 (zero) are different) and loading and running programs from tape. Each child was given a copy of the CC keyboard and a flowchart that could be followed when turning on the computer and loading a program from tape.

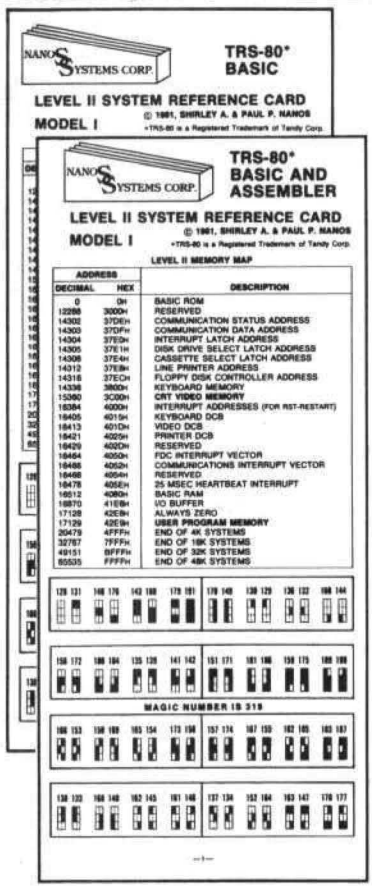
To test their mastery of these concepts and procedures each child had to pass a test that required him/her to load a TYPING TEST (the listing is at end of this column) program from tape and follow the directions that were given by the program. The program times the child as the alphabet is typed in and then as 25 randomly chosen characters are identified. The children recorded their scores and they have been encouraged to take the TYPING TEST at least once a month so that they can see any improvement in speed and/or accuracy.

That gives you a good idea of where we were as of September. Next month I will take a look at what has taken place throughout the first semester of the school year.

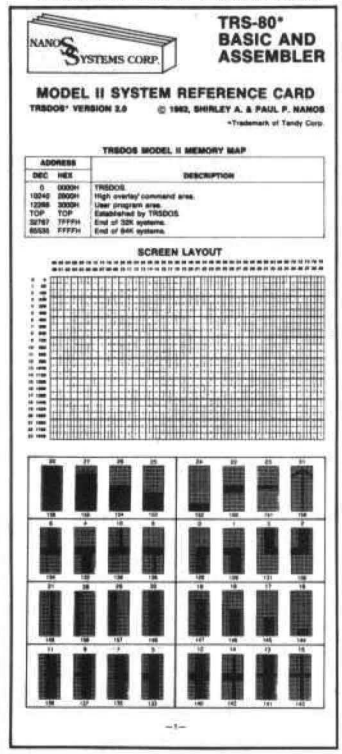
SILLY SYNTAX

SILLY SYNTAX is billed by its author as "A hilarious and outrageous story game for one to ten players". What the ad fails to tell you is that it is a professionally written program that fits in as well at school as it does at home.

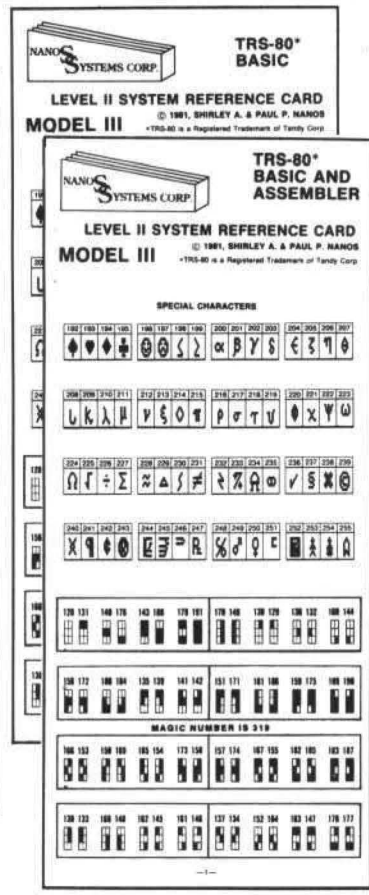
The program plays a "MAD LIB" type of word game. You may recall the MAD LIB books that were popular some years back. They were made up of stories that had blanks where nouns, verbs, adjectives, or names of people had to be filled in. Something like: "I saw the (ADJECTIVE) (VEHICLE) crash into (NUMBER) (ADJECTIVE) (ANIMAL-PLURAL)". The person with the book would ask you for a word to put into each blank and then read you the story that you had helped



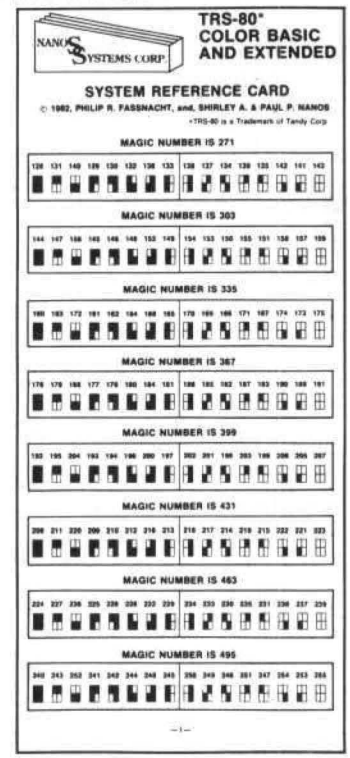
NEW! QUICK REFERENCE



SAVE TIME!



NEW! THROW AWAY THE BOOK



USE THE CARD!

MODEL I

BASIC: Buff & Blue
5 Panels, 10 Pages
(For the Classroom)
Memory Map.
Easy Graphics.
Basic Statements.
Basic Functions.
Basic Facts.
Special Characters.
Basic Commands.
Edit Subcommands.
PRINT USING Examples.
Message & Codes.
Reserved Words.
Special Keys.
Ascii Character Chart,
with Space Compression Codes.
Control Codes.
Basic Internal Codes.
Hex/Dec Conversion Chart.
Screen Line Layout.
BASIC & ASSEMBLER: Buff
8 Panels, 16 Pages
(For the Pro)
Complete Z80 Instructions.
Assembler Instructions,
Commands, Operators.
Editor/Assembler Commands,
and Edit Subcommands.
Flags, Conditions, & Chart.
Internal Routines.
Assembler Error Msgs.
Plus all items in the Basic Card,
except Internal Codes.

MODEL II

BASIC & ASSEMBLER: Green
10 Panels, 20 Pages
(For the Business)
Small Memory Map.
Screen Layout.
Easy Graphics.
Complete Z80 Instructions.
Series-I Assembler Instr,
Commands, Operators, and Edit Subcommands.
Assembler Error Msgs.
Power-up Error Msgs.
Flags, Conditions, & Chart.
Wild Cards, DOS Messages.
SVC Procedure Panel.
Host Logon Panel.
Version 2.0 Lib Command Formats and
System Utility Formats.
Basic Functions & Statements.
DOS File Naming Convention.
Basic Commands & Edit Subcommands.
Special Keys.
Basic Internal Codes and Reserved Words.
Basic Msgs & Codes.
PRINT USING Examples.
Special Characters.
"DO" Utilities & BASIC Command.
Ascii Character Chart with SVC Names and
Numbers.
Control Codes.

MODEL III

BASIC: Blue & Buff
6 Panels, 12 Pages
(For the Classroom)
Special Characters.
Kana Characters.
Euro-Characters.
Memory Map.
Special Keyboard Functions.
Ascii Char Chart w/Space Compression Codes.
Control Codes.
Casette Loading Err Msgs.
Basic Commands, Edit Subcommands, Special
Chars, Basic Statements, Facts, Functions,
Derived Functions, Special Operations (POKEs).
PRINT USING Examples.
Basic Msgs & Codes.
Basic Internal Codes.
Reserved Words.
Screen Line Layout.
BASIC & ASSEMBLER: Blue
10 Panels, 20 Pages
(For the Pro)
Complete Z80 Instructions.
Assembler Instructions, Commands, Operators.
Series I Editor/Assembler Commands & Edit
Subcommands.
Flags, Conditions, & Chart.
Hex/Dec Conversion Chart.
Assembler Error Msgs.
Internal CALL Routines.
Break Processing Procedure.
Plus all items in the Basic card.

COLOR

BASIC & EXTENDED: Grey + 9 Colors.
8 Panels, 16 Pages
(For the Artist)
All Color Graphics.
System Commands.
PRINT USING Examples.
Special Characters.
Special Keys.
Cassette Loading Err Msgs.
Basic Functions & Statements.
Playing Music, Making a Circle,
and Drawing Panels.
Derived Functions.
Messages & Codes.
Musical Notes, by Octave, in Color,
Including Rests and Time.
Memory Map.
Reserved Words.
Internal Codes.
A Page of Tips.
Ascii Char Codes Chart,
Including Inverse Graphics and Color Graphics.
Control Codes.
Color Group Chart.
Pmode Information Summary.
Screen Line Layout.
Extended Graphics Pmode
Illustrations.

Each card is a complete summary of the reference manuals and the microcomputer. Cards are two or more colors, printed on 80 pound Beckett Antique cover stock or a comparable stock, stretch-wrapped in plastic for shipping. They are accordion-foldup cards, in the same style as the traditional IBM reference cards used on the major computers for years. Fold-up size is eight and one-half by three and three-quarter inches, so they will fit easily into the shirt pocket. These cards provide a complete summary of the manuals plus many extras at your fingertips.

RETAIL ORDER FORM

Please send me:

( ) Copies of MODEL I BASIC & ASSEMBLER @ $4.95
( ) Copies of MODEL I BASIC-ONLY @ $2.95
( ) Copies of MODEL II BASIC & ASSEMBLER @ $5.95
( ) Copies of MODEL III BASIC & ASSEMBLER @ $5.95
( ) Copies of MODEL III BASIC-ONLY @ $3.95
( ) Copies of COLOR BASIC AND EXTENDED @ $4.95

Send Check or Money Order to:

NANOS SYSTEMS CORP.
P.O. BOX 24344
SPEEDWAY, IN 46224
(317) 244-4078

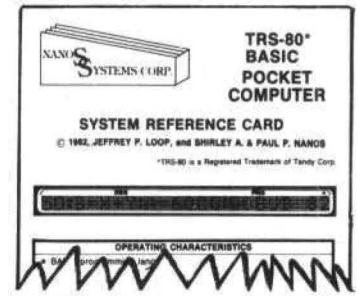
NAME: _____

ADDRESS: _____

CITY _____ STATE _____ ZIP _____

Indiana Residents Add 4 Percent for Indiana Sales Tax

( ) Copies @ $2.95



to create. The result might be: "I saw the dirty bus crash into seven green pigs". Since you did not know the context in which the words were to be used the results were usually very humorous and sometimes embarassing.

SILLY SYNTAX allows the computer to play the role of the person with the book. When you run the program you may load a story from tape. The computer then proceeds to ask you for names, places, verbs, gerunds (verbs ending in "ing"), nonsense words, etc. After all of the words are entered the story is displayed on the screen with your words properly inserted into the text. If you are particularly pleased at your creative efforts the story may be printed on a printer.

Two sample stories are included with the program and others may be ordered, but the real fun comes when you use the program to create your own stories that may then be saved on tape and used by others. When you type in a new story you just use brackets to indicate where each word should appear, as in the example above. The computer then uses the descriptions that are in the brackets when it asks a player to supply words.

Your story may be saved on tape, printed on a printer, extended or edited. The editor is a screen editor that is very easy to learn and use.

The program is very well documented. The 12 page manual goes into great detail in describing how to create, edit, print, and extend stories.

I have used this program with my students and find it to be very valuable in teaching the parts of speech. It is also great motivation for creative writing. The only problem is finding enough free computer time to let students use SILLY SYNTAX.

One final added bonus for those of you who like a challenge. SILLY SYNTAX loads with a CLOADM but requires EXTENDED BASIC! I soon discovered why. The program is written in BASIC but has been very thoroughly protected from being copied by machine language routines. When it is loaded a title screen is displayed while the program loads, then the program self-executes. The (BREAK) key has been disabled and is used to return to the main menu. The reset button erases the program and returns you to BASIC. The program also has an "on error" function so that an IO ERROR on tape input will not "crash" the program. As I said it is very thoroughly protected, but not just to keep you from its inner working. These routines make the program virtually KID PROOF. Children, of all ages, who use the program will not have to worry about an

IO ERROR or an accidentally pressed (BREAK) key aborting the program and destroying their story.

About that challenge...It is possible, using two popular utility programs to LIST this program. Test your understanding of how BASIC stores programs and see if you can get it to list!

SILLY SYNTAX is available from

SUGAR SOFTWARE
2153 LEAH LANE
REYNOLDSBURG, OH 43068
$19.95 + $1.00 POSTAGE & HANDLING

```
50 CLEAR 500
100 CLS
110 PRINT@102,"COMPUTER TYPING T
    EST"
120 PRINT@162, "PART I - DIRECTI
    ONS:
    "
140 PRINT "     IN THIS PART YOU
    WILL TYPE
150 PRINT" THE LETTERS IN ALPHAB
    ETICAL
160 PRINT " ORDER.  START WITH A
     AND END
170 PRINT " WITH Z.     NO ERASIN
    G!!
180 PRINT " IF YOU MAKE A MISTAK
    E GO ON
185 PRINT " WITH THE NEXT LETTER
    ."
190 PRINT" YOU ONLY HAVE ONE CHA
    NCE AND
200 PRINT " YOU WILL BE TIMED.
210 PRINT "   GOOD LUCK!!!"
220 PRINT
230 PRINT " PRESS <ENTER> WHEN R
    EADY TO GO!";
240 INPUT EE$
250 CLS:
    TIMER=0:
    PRINT "BEGIN!"
255 PRINT:
    PRINT:
    PRINT
260 A$=INKEY$
270 IF A$ = " " THEN 310
280 PRINT A$;
290 B$ = B$ + A$
300 IF LEN(B$) = 26 THEN 330
310 T=T+1
320 GOTO 260
330 S=INT(TIMER/60*10)/10
350 R=INT(26/S*10)/10
360 FOR X=1 TO 26
370 IF MID$("ABCDEFGHIJKLMNOPQRS
    TUVWXYZ",X,1)<> MID$(B$,X,1)
     THEN E=E+1
380 NEXT X
385 CLS:
    PRINTTAB(8)"RESULTS- PART I"
390 PRINT:
    PRINT
395 PRINT "TIME:  "TAB(11)S"SECO
    NDS"
396 PRINT
400 PRINT "SPEED:"TAB(11)R "LETT
    ERS/SECOND"
401 PRINT
410 PRINT "ERRORS:"TAB(11)E
415 S1=S:
    R1=R:
    E1=E
420 PRINT:
    PRINT:
    PRINT " WRITE DOWN YOUR SCOR
    E IN YOUR "
421 PRINT" FOLDER AND ON THE CHA
    RT."
422 PRINT
423 PRINT "PRESS <<ENTER>> TO CO
    NTINUE THE TEST"
425 INPUT EE$
430 CLS
440 PRINT@102, "COMPUTER TYPING
    TEST"
450 PRINT@162, " PART II - DIREC
    TIONS:
    "
455 PRINT:
    PRINT " IN THIS PART THE COM
    PUTER
460 PRINT" WILL RANDOMLY ASK YOU
     TO TYPE
470 PRINT "A LETTER, NUMBER OR P
    UNCTUATION
480 PRINT "MARK.YOU WILL BE ASKE
    D TO TYPE
490 PRINT " 25 DIFFERENT CHARACT
    ERS."
500 PRINT " AGAIN YOU WILL BE TI
    MED - SO
510 PRINT "ENTER THE CHARACTER A
    S SOON
520 PRINT " AS YOU CAN - GOOD LU
    CK!!
530 PRINT:
    PRINT"PRESS <ENTER> WHEN REA
    DY TO GO."
```

```
540 INPUT EE$
550 CLS
560 TIMER=0
565 E=0
570 FOR C= 1 TO 25
580 CLS
600 X=RND(90)
610 IF X<33 THEN 600
620 PRINT@ 100, CHR$(X)
640 A$=INKEY$:
    IF A$="" THEN 640
650 IF ASC(A$) =X THEN PRINT "
    CORRECT":
    SOUND 100,1
651 IF ASC(A$)<>X THEN PRINT "
    WRONG":
     E=E+1:
    SOUND 25,1
660 NEXT C
670 S=INT(TIMER/60*10)/10
680 R=INT(25/S*10)/10
685 CLS:
    PRINTTAB(8)"RESULTS- PART II
    "
690 PRINT:
    PRINT
700 PRINT "TIME:"TAB(11)S"SECOND
    S"
710 PRINT
720 PRINT "SPEED:"TAB(11)R"CHARA
    CTERS/SEC."
730 PRINT
740 PRINT "ERRORS:"TAB(11)E
745 S2=S:
    R2=R:
    E2=E
750 PRINT:
    PRINT:
    PRINT" WRITE DOWN YOU SCORE
    IN YOUR "
760 PRINT " FOLDER AND ON THE CH
    ART"
770 PRINT:
    PRINT" <ENTER> TO SEE ALL DA
    TA":
    INPUTEE$
780 CLS:
    PRINT:
    PRINTTAB(13)"TOTALS"
785 PRINT:
    PRINTTAB(10)"PART I";TAB(20)
    "PART II"
790 PRINT:
    PRINT" TIME:"TAB(10)S1"SEC."
    ;TAB(20)S2"SEC."
800 PRINT:
    PRINT" SPEED:"TAB(10)R1"L/S"
    ;TAB(20)R2"C/S"
810 PRINT:
    PRINT" ERRORS:"TAB(10)E1;TAB
    (20)E2
820 PRINT:
    PRINT:
    PRINT
29998 ' REVISED 9-6-81 DGB
29999 END:
      'J.BAUMGARDNER 8-81
30000 CSAVE"TYPETEST"
```

Color computer owners,

32K PLUS DISKS*

$298.00

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

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

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

So what about the *CCI Disk Card*? Well as we said it's only an extra $99.00, but you'll probably want Exatron's *CCDOS* which is only $29.95 – unless you want to write your own operating system. The *CCI Disk Card* uses normal TRS-80 Model I type disk drives, and *CCDOS* will even load Model I TRSDOS disks into your color computer – so you can adapt existing TRS-80 BASIC programs.

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

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

excellence in electronics

exatron

DEALER ENQUIRIES INVITED

Exatron,
181 Commercial Street,
Sunnyvale, CA 94086

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

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

Name .....

Address .....

City .....

State ..... Zip .....

Charge my:

☐ MasterCard Interbank Code .....

☐ Visa Expiration Date .....

Card .....

☐ Check enclosed for .....

☐ Ship COD ($2.00 extra)

Signature .....

*32K RAM plus Disk Interface TRS-80 is a trademark of Tandy

PACKING NUMERIC DATA

P. B. WOODWORTH
SYSTEMS ANALYST
UNIVERSITY OF NEW MEXICO

Conserving storage is important for most diskette systems. Space allocation became an important consideration for me when designing an inventory system to be run on the TRS-80 COLOR COMPUTER. It was necessary to compress the necessary numeric data in order to get the entire inventory onto a single diskette. The means by which this could be accomplished became apparent after reading the "COMMENTS CORNER" by Andrew Phelps in the February issue of the COLOR COMPUTER NEWS. If possible, I suggest that the reader review that article before reading this one.

The floating point format of the COLOR COMPUTER is capable of uniquely storing every integer between 0 and 2↑32. This is because the exponent (byte 1) holds that portion of the number which is a power of two and the mantissa (the last four bytes) the remainder of the integer. The entire hexadecimal number cannot be used due to limitations in the binary/decimal conversion routine.

When designing a system, it is necessary to determine the range within which any particular number will fall. For example, the inventory for any particular item might never exceed 1000, the number of items sold for an entire year for the item might never exceed 4000. The number &H0FFF is 4095 decimal and occupies two bytes. It shows that a two byte field is large enough to hold the quantity in inventory or the total number of items sold during the year. If the sales price of the item were always less than $10,000.00, then the amount multiplied by 100 would become an integer between 0 and 1,000,000. The number &H0FFFFF equals 1,048,575 decimal, so that any amount between 0 and 10,485.75 could be stored in three bytes.

It is better to think in terms of some hexadecimal integer with storage capabliity greater than the largest decimal integer to be stored, than the largest possible value of the decimal integer.

The following is a method by which integers can be quickly and easily converted into hexadecimal format.

If the number to be packed is expressed in terms of 2↑31, then the number will be right justified in the mantissa and it can be extracted. The expression can be created by adding the source integer to 2↑31. (NOTE: The exponential for this number is computed using logarithms and the mantissa is not zero when the expression Z=2↑31 is executed. The last byte must be overlaid by &H00 or errors will result.) Once the integer has been created, the functions PEEK and POKE can be used to manipulate it.

The program below below was used to verify that adding the integer to 2↑31 would actually right justify the integer in the mantissa.

```
 10 A=2↑31: X=VARPTR(A)
 20 POKE X+4,&H00
 30 INPUT "ENTER NUMBER",N: N1=N+A
 40 X=VARPTR(N1)-1
 50 PRINT USING "########";N;
 60 FOR I=1 TO 5: A1=PEEK(X+I)
 70 A1$=HEX$(A1)
 80 IF LEN(A1$)<2 THEN A1$="0"+A1$
 90 PRINT " ";A1$;: NEXT I: PRINT
100 GOTO 30
```

When N=4095, the routine printed:

```
    4095 A0 00 00 0F FF
```

When N=1,048,575, the routine printed:

```
 1048575 A0 00 0F FF FF
```

The numbers are right justified in the mantissas and can be moved to strings. Run the program above one more time after changing the first statement in line 10 to A=2↑27. Now when the numbers 4095 and 1,048,575 are entered the results are:

```
    4095 9C 00 00 FF F0
 1048575 9C 00 FF FF F0
```

The numbers are now left justified in the last two or three bytes of the mantissa rather than right justified. The importance of this will be seen later.

Now that the source integer is expressed in hexadecimal format, it

COLOR COMPUTER USERS

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

Now you can run FLEX, OS-9 and Radio Shack disk software on your Color Computer. If you have a 32K Color Computer with the Radio Shack disk system, all you need to do is make a trivial modification to access the hidden 32K, as described in the Feb. issue of COLOR COMPUTER NEWS and the April issue of '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.

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 plus an online help system are included.

Installing FLEX is simple. Insert the disk and type:

RUN "FLEX"

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

FLEX $99.00
INCLUDES OVER 25 UTILITIES!

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

TRS-80 COLOR COMPUTER COMPLETE WITH 64K RAM, 24K ROM, SINGLE DISK DRIVE AND FLEX, SET UP AND READY TO RUN FOR ONLY $1,275. Includes 60 day extended warranty. If you have a Computer, call about RS disk controllers and drives.

AUTOTASK

WITH MENU

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

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

PRICE $129.95

Includes source on disk!

Manual $10.00

6502 TRANSLATOR
Translator 6502 code to 6809
$75.00

INVENTORY
with MATERIAL
REQUISITION PLANNING
$100.00

SUPER SLEUTH
Disassembler for 6800/6809 or Z80
$99.00

TABULA RASA
Electronic Spreadsheet
$100.00

TRS-80 COLOR COMPUTER

FORTH FOR THE TRS-80 COLOR COMPUTER DISK SYSTEM

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

CC FORTH IS THE ANSWER!!
Includes Editor, 6809 Assembler
String Functions, Disk Data File
Operations and Much Much More!

$99.95

FORTH

FLEX COMPATIBLE FORTH

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

SOFTWARE CATALOG

PROGRAM	OBJECT/WITH ONLY/SOURCE		code
BILLPAYER		169.95	x
PLOT		44.95	x
TABULA RASA		100.00	x
Mailing List		99.95	x
Forms Display		49.95	x
Inventory with Material Requisition Planning		100.00	x
Some Common BASIC Programs		69.95	x
FLEX For Color Computer	99.00		9
X-FORTH (FLEX)	149.95		8 & 9
CC-FORTH (TRS-80 Color)	99.95		9
TOOLKIT #1 (BASIC)	49.95/	69.95	9
TOOLKIT #2	49.95/	69.95	9
AUTOTASK		129.95	9
A/BASIC Compiler	150.00		9
Extended Utilities	49.95/	69.95	9
Password Protection	69.95/	89.95	9
CRASMB (X Assembler)	139.95		9
Personality Modules (1 INC) 6502, 6800, 6805, 6809, Z80, 8080, 1802	25.00	50.00	9 ea
READTAPE		54.95	9
SPELLTEST	199.00/	299.00	9
READTEST	54.95/	74.95	8 & 9
ESTHER	39.95/	59.95	8 & 9
HELP	29.95/	49.95	8 & 9
Job Control Program	49.95/	89.95	8 & 9
DYNASOFT PASCAL (FLEX)	59.95/	89.95	9
DYNASFT PASCAL (OS-0)	69.95/	99.95	9
DYNASOFT Compiler Source		125.00	P
DYNASTAR Screen Editor (OS-9)	149.95		9
SUPER SLEUTH (6800/6809)		99.00	8 & 9
SUPER SLEUTH (Z80)		99.00	8 & 9
CROSS Assembler Macros for TSC ASMB 6800/1, 6805, 6502, Z80, 8080/5		49.95	each
3 FOR		99.95	
6502 Translator		75.00	9
Debugging Simulators 6805 or 6502		75.00	9 ea
STYLOGRAPH 2.0	295.00		9
STYLOGRAPH MAIL MERGE	125.00		9
STYLOGRAPH Spelling Checker	145.00		9

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

Software by Technical Systems Consultants, Inc.	
Flex™ (includes Editor & Assembler)	150.00
UniFLEX™ (includes one year maintenance and update)	450.00
Editor	50.00
Assembler	50.00
68000 Cross Assembler on 6809	250.00
Text Processor	75.00
Extended Basic	100.00
Basic Precompiler (specify standard or extended)	50.00
Pascal (Flex™)	200.00
Pascal (UniFLEX™) (Add $75.00 for one year's maintenance and update)	225.00
Soft/Merge Package	75.00
6809 Flex™ Utilities	75.00
Debug Package	75.00
Diagnostic Package	75.00
Software by Microware Systems Corp.	
OS-9 ™ Level One Operating System	200.00
OS-9™ Level Two Operating System	500.00
BASIC09™	200.00
OS-9™ Macro Text Editor	125.00
OS-9™ Interactive Assembler	125.00
OS-9™ Interactive Debugger (Disk version)	50.00
CIS Cobol Compiler	895.00
Pascal Compiler	400.00

USA add $2.50 for standard UPS shipping & handling
Foreign orders add 20% Airmail
Specify 5" or 8" disk and 6800 or 6809
VISA—MASTER CHARGE—DINERS CLUB ACCEPTED

OUR SOFTWARE IS GIMIX COMPATIBLE

HARDWARE CATALOG

CRT TERMINALS

Terminal		Cash	Credit Card
TVI	910	588.50	605.00
TVI	912/C	709.00	728.00
TVI	920/C	758.00	779.00
TVI	925	759.00	780.00
TVI	950	978.00	1004.00
Zenith	Z19	700.00	719.00
SOROC	IQ130	589.00	605.00
SOROC	IQ135	765.00	785.00
SOROC	IQ135G	831.00	853.00

PRINTERS

Printer		Cash	Credit Card
IDS	445	632.50	650.00
IDS	460G	852.50	876.00
IDS	560G	1094.50	1124.50
Centronics	739	519.00	533.50
Centronics	739-3	641.50	658.79
TI	820	1738.00	1785.50

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

FRANK HOGG LABORATORY
130 MIDTOWN PLAZA
SYRACUSE, NY 13210 (315) 474-7856

DynaStar

WORD PROCESSING SYSTEM FOR OS-9

OS-9 USERS:

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

DynaStar

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

DynaStar Version II is now available and features no-nonsense "what you see is what you get" editing for virtually any terminal with or without cursor addressing (it must be at least able to go to "home"). To edit, simply place the cursor where you want it, and type. Any printable character you type is entered directly into your text, and any non-printable control character causes immediate execution of an editing command. Single keystroke commands permit movement of the cursor in any direction, by character, tab, word, line, or screen full, and deletion of characters, words (left or right) or a whole line. Two keystroke commands augment this set by moving the cursor to the left margin, top or bottom of the screen, beginning or end of the edit buffer, or the beginning of the next paragraph. You can search for any string, replace with any other, do it again, mark original blocks of text, copy, move or delete blocks, read or write to side-files, set tabs and margins, or center the current line.

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

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

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

DynaStar costs only a little more than that line-oriented editor and it is available today. If you're still not convinced that it would be the best thing that ever happened to your video terminal, you can order our "Doubting Thomas" test pak consisting of complete documentation and a special version of DynaStar that lets you edit to your heart's content, but won't update your files. Later when your doubts melt away, you can obtain credit on the full purchase price and join the faithful who bought the whole thing in the first place.

"Doubting Thomas" test pak:	$ 49.95
DynaStar II (for the faithful):	$149.95
DynaForm text formatter:	$149.95
Both purchased together:	$275.00

Note: DynaStar Version I (no macros) will be available at the original price until May 31, and current owners may upgrade to Version II with full credit until June 30.

AVAILABLE SOON FOR FLEX 9

Spelltest

From Dale Puckett

FOR OS-9 AND FLEX

SPELLTEST is the most versatile 68XX spelling checker available.

MENU'S MAKE OPERATION EASY. From the menu you may: Print a list of suspect words; Print a list of valid words; Check each suspect word one by one; Read your text, stopping to check suspect words; Use additional dictionaries for more thorough checking or special applications; Build an additional dictionary of newly accepted words; Write correct text file to disk.

While checking you may: Accept the suspect word; Accept and save in the dictionary; Replace with correct spelling.

Designed to be used by the layman, SPELLTEST is right at home in the office. Ease of use and speed will recover the cost in days.

22,000 word dictionary covers the first 25,000 entries in the American Heritage listing of the most common English words.

500 built in common words (and, or, the, etc.) and 300 specific to your field, filter the text and allows a large file to processed even in small computers.

PRICE $199.00

A/BASIC

Basic Compiler

For OS-9 and FLEX

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

SPECIAL

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

ONLY $150.00

specify OS-9 or FLEX

PLOT

Now you can have GRAPHICS added to all your programs. Just write the data out to a virtual array and call PLOT. PLOT is written in TSC XBASIC and the source is included on the disk.

INFINITE RESOLUTION GRAPHICS ON YOUR TERMINAL OR PRINTER. HISTOGRAMS, BARGRAPHS, XY PLOTS PLUS OTHERS.

IN TSC XBASIC SOURCE INCLUDED ON DISK. $44.95

TOOLKIT NO1

The Basic Programmers *Toolkit*
by Dick Bartholomew

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

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

TOOLKIT NO2

The Programmers *Toolkit*
by Dick Bartholomew

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

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

Dynasoft PASCAL 1.4 for OS-9

Dynasoft Pascal 1.4 includes all the features of the FLEX version 1.3 with the following enhancements: Chain, Fread, Fwrite, Seek, Open, Create, Close, Delete, Fork, Send, Wait, Sleep, Settime, Time, Getstatus, Setstatus, SetPriority, GetProcID, and JSR. This is an excellent and fast program, small enough to write utilities but powerful enough for things like DynaStar.

Object only $69.95
Add for run-time source on disk $30.00
Add for source of Dynasoft Pascal itself $125.00

CRASMB

MULTI CPU CROSS ASSEMBLER FOR 6809 FLEX
by Frank Hoffman

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

PRICE $139.95

Includes one 8 bit *CPM* of your choice (not source)
Additional *CPM's*
8 Bit $25.00 *Source $25.00 extra.*

THE BILL PAYER SYSTEM™

THE BILL PAYER is a package of 10 menu driven programs in TSC Extended Basic. This powerful system helps you keep track of your bills. You can create a vendor list, enter invoices to be paid, generate reports about them, print your checks and much more. Uses random access files.

Explore Package now included at the same price.

THE PURCHASE ORDER system adds purchase orders to the BILL PAYER. This package of programs adds another level of control to your expenditures. Prints out purchase orders and keeps track of purchases. Requires the Bill Payer to work.

INCOME/EXPENSE LEDGER. This valuable package is most appreciated at tax time. Allows up to 99 income and expense numbers. Ties into the PURCHASE ORDER system, and the Bill Payer.

Includes manual and source supplied on disk in TSC Extended Basic.

THE BILL PAYER
PURCHASE ORDER
INC/EXP. LEDGER — ALL FOR $169.95

can be extracted from the mantissa using the PEEK function and placed in a string using the CHR$ function. If the name where the source integer is stored is N, then:

```
110 X=VARPTR(N)+1
120 FOR I= 1 TO 3
130 X$=X$+CHR$(PEEK(X+I))
140 NEXT I
```

This extracts the hexadecimal number and stores it in the string X$. In order to rebuild the number, the process is reversed. If X$ is the string, A=2↑31, and N is the target variable, then:

```
200 N=A: X=VARPTR(N)+1
210 FOR I=1 TO 3
220 A1=ASC(MID$(X$,I,1)
230 POKE X+I,A1
240 NEXT I
250 N=N-A
```

The two routines show the process for a three byte variable; they would have to be modified slightly for two byte variables.

In the prior examples, the HEX numbers &H0FFF and &H0FFFFF have been used. They could have been &HFFFF (65535) or &HFFFFFF (16,777,275). Look again at the numbers resulting from adding 4095 to 2↑31 and 2↑27. The numbers were:

```
A0 00 00 0F FF
9C 00 00 FF F0
```

When the second mantissa is shifted and added to the first, the result is:

```
  00 FF F0 00
+ 00 00 0F FF
= 00 FF FF FF
```

Now there are two integers between 0 and 4095 stored in three bytes.

The same result can be obtained by taking the mantissas of the two three byte integers, shifting, and adding. This time a five byte string holding two numbers between 0 and 1,048,575 is produced. The numbers share the center byte, reducing overall space utilization by a byte. When this savings is spread over a 4000 item inventory, the 4000 bytes saved could mean the difference between getting the entire inventory on a single diskette or having it split across two diskettes.

Thus, It becomes a matter of concatenating the two strings once they have been extracted from the numbers. If the two strings are X1$ and X2$, and X1$ contains &HFFF0 and X2$ &H0FFF, then:

```
500 X$=LEFT$(X1$,1)+CHR$(ASC(
    RIGHT$(X1$,1))+ASC(LEFT$(
    X2$,1)))+RIGHT$(X2$,1)
```

will combine the two integers into a single string (HEX FF FF FF) where the central byte is shared by both integers. To split the combined integer back apart, the following routine, where X$ is the source string, and X1$ and X2$ are the target strings would be used.

```
600 X1=0: X3=ASC(MID$(X$,2,1)
610 X1=INT(X3/16)*16: X2=X3-X1
620 X1$=LEFT$(X$,1)+CHR$(X1)
630 X2$=CHR$(X2)+RIGHT$(X$,1)
```

The trade off where increased processing time is offset by the increase in the number of items stored should be evaluated. Before a system is written using these techniques, time the routines to see if the degradation in response time will be too severe. For most inquiry and response systems, the disk access time probably will be more significant than the time needed for integer/string manipulation.

One topic not discussed in this article is sign tracking and the problem of being able to tell if a particular integer carries a negative or positive sign. The inventory application refered to is designed so that quantities on hand or numbers of items sold can never be less than zero. For amounts which can go negative, the high order bit is used for a sign. This will permit an amount of about + or - $5,000.00 when the integer is packed into two and one-half bytes. When being processed, the number will

be unpacked, the sign extracted, and then divided by 100 to return it to dollars and cents format.

If anyone devises any routines which are more elegant or faster, I would be very interested in seeing them.

BASIC PROGRAMMING HINTS
LINE NUMBERS

by Regena
120 South 350 East
North Salt Lake, Utah 84054

Have you got a full memory program and want to get it running without revamping a lot of code? Try RENUMbering your program. Many programmers arrange their programs with a section of code starting at 1000, the next section starting at 2000, etc. When the program is complete, you may then renumber the program starting with Line 100 and using increments of 10. To conserve memory by using shorter line numbers, you may use RENUM 5,,5 to renumber the whole program with line numbers incremented by 5. If you're sure you won't be adding lines and really need the memory, you may RENUM 1,,1 to renumber the whole program with line numbers starting with 1 and incrementing by 1.

80-U.S.

THE TRS-80 USERS JOURNAL

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

80-U.S. will keep you up to date on new products, software and hardware. Each issue will have listings of programs, reviews, tutorials. 80-U.S. is the complete "How to" Journal for the TRS-80!

If you haven't taken a look at 80-U.S., here is a no-risk opportunity to do it now. Become a trial subscriber now under the protection of a *full* money-back guarantee!

PLEASE enroll me as a trial subscriber to 80-U.S. and bill me just $16. I understand I reserve the right to cancel my subscription any time, for any reason, and receive a refund for the balance of my subscription. If I should decide to cancel after receiving my first issue I will simply mark my bill *cancel* and keep the first issue *FREE!*

Name _____

Address _____

City _____ State _____ Zip _____

☐ I prefer to enclose payment now.

Visa/MC # _____

Exp. Date _____

Canada & Mexico: $25 per year, other foreign subscriptions $30 surface mail, $72 per year via airmail.

80-U.S. Journal
3838 South Warner Street
Tacoma, Washington 98409
(206) 475-2219

Order # CCN

TRS-80 is a Registered Trademark of the Tandy Corp.

64K KOLUMN

by Frank Hogg

DISK SYSTEMS

Before we get into the discussion on the different disk systems for the Color Computer, I would like to answer some of the questions that have come up about the 64K upgrade and FLEX for the Color Computer in general.

There are four versions of the Color Computer. They are B, C, D, and E. Version B and C have been around for a while now and because of the amount of work involved, I think it might be better to have Radio Shack or one of the companies that do this type of work do the 64K upgrade for you. Radio Shack instructs its service centers to replace these boards. One of these companies, 'Computer Plus' 800-343-8124 advertises in this magazine, Another company, Level IV of Livonia Michigan, 313-525-6200 also does this work. The D and E boards are quite different and easy to upgrade. The chips used are 4164's and you'll need 8 of them. Both of the above companies will do the mod and/or sell you the chips with instructions. If you don't feel secure in doing the modification yourself, by all means have them do it for you. If you have the D board, you'll need the 1.1 ROM. The E board has it already.

I would like to clear up some confusion about the 32K that Radio Shack talks about and the 32K that other companies have. Radio Shack uses 1/2 of a 64K chip for its 32K, while other companies use piggyback 16K's to achieve the 32K. The 1.0 ROM initializes the SAM for the 16K 4116 chip while the 1.1 ROM initializes for the 64K 4164's. Half good 64K chips and good 64K chips have the SAM initialized the same way. Therefore, the TYPE of chips you have to achieve the 32K will determine whether you need the 1.0 or 1.1 ROM. I don't think that the 1.0 ROM will work with 4164's, but I'm not sure as I haven't tried it.

FLEX is brought up on the system by just typing RUN "FLEX" . This loads in a small BASIC program which in turn loads in a machine language program. The machine language program then switches the computer to map type 1, which is 64K RAM and no ROM. It then loads in FLEX from the same disk. FLEX comes up with its date request, and after you tell it the date the familiar '+++' prompt is displayed. The FLEX boot is on the same disk as FLEX, but they coexist because of the fact that Radio Shack DOS has its directory on track 17, and FLEX has its directory on track 0. The links in the two systems point around each other, so there is no conflict. This is just on a disk that you would use to boot. Once in FLEX, you can use an all FLEX disk. Because FLEX resides in RAM you have to boot FLEX whenever you turn the computer on.

The first question involves FLEX on the Color Computer.

Is the version we sell a 'standard' FLEX, and what FLEX software has to be modified to run on Color Computer FLEX?

This is a relatively straightforward pure version of FLEX. Most software that runs under FLEX now, will run under the Color Computer FLEX that we sell. We've even included such things in the console I/O drivers as cursor addressing, cursor up, down, right, left, etc., plus some additional things in order to make it even more compatible with the typical FLEX system. There are some things that are different. The screen size, which is only 16X32, makes it a little difficult to use software that was designed for a 24X80 screen. Several companies that create FLEX software are modifying their software that requires the larger screen to run on the Color Computer FLEX system. We have included within the console I/O drivers the capability to echo the output that would normally go to the screen to go to both the screen and the printer. Typing a control 'P' will toggle the printer on and off. This will allow using the printer as a hard copy terminal. It is a very handy tool for other uses, too. It will enhance many utilities that display a screen full of information by putting it on the printer.

We are using a 'software' keyboard rather than a hardware keyboard. We poll the keyboard for 'get a key' rather than read a register in an ACIA as in many standard FLEX systems. The modifications that have to be made to a program to use a parallel keyboard are the same modifications that would be made for the Color Computer. These are documented with those programs that access the keyboard directly, so there's no problem there.

The third area is the use of interrupts. Very few FLEX programs use interrupts at all, but those that do will have to be changed to use the Color Computer. The interrupt vectors are in

low memory in the Color Computer. Because this is user memory, we have not implemented printer spooling in this version of FLEX, but it may be done in the future.

Other than these minor differences, the system is a straightforward standard FLEX system. Software created on Color Computer FLEX will work on other FLEX systems and vice versa. The disks are compatible also.

How do you tell if a particular piece of software will work with Color Computer FLEX?

Most software packages will state if there are some special considerations such as those outlined above. Most software houses (ours included) try to stay away from problems and therefore do not produce non-standard software. The small screen size is a problem with software that uses menus or displays. There should be few problems in general. Over the next months, we will be checking out what programs will not work and how to correct them. However, there are several hundred software packages that run under FLEX and most of them will work as is. It's going to take some time to check them all out.

As you can see, what we have is a very 'standard' FLEX. All FLEX compatible software will run on your $1K Color Computer, just like it does on the $6K GIMIX, Smoke Signal, or SWTPC machines. As a matter of fact, you can run FLEX just like them, plus you can run OS-9 too (only GIMIX can do both). You can also run Radio Shack DOS and nobody else can do all three but the Color Computer. The Color Computer with FLEX and/or OS-9 is one verrrrry impressive machine.

What is the best disk drive to buy?

The Radio Shack disk controller has a 8K ROM on the card. The Radio Shack DOS (such as it is) is in this ROM. Because this controller can be purchased for less than $200 (and that includes the 8K ROM), it is clearly the system of choice. It gives you the standard Radio Shack capability and in addition is the one we're supporting for FLEX and OS-9. The Radio Shack controller will support as much as 3 million bytes of unformatted disk storage. We are not bringing FLEX or OS-9 up on the Exatron controller.

It is NOT necessary to buy drive 0 from Radio Shack and, as a matter of fact, it is

probably a better idea to buy a different brand such as MPI, Tandon, Shugart, etc. I think that the best choice for the Color Computer is to have two double sided, double density, 40 track drives, like Tandons or MPI B52's. Radio Shack will only write on one side and only 35 tracks of the double sided 40 track drive, but for FLEX and OS-9 you can use both sides and 40 tracks---the best of both worlds. When Radio Shack comes out with software for the disk, it will work fine with these drives.

DISK OPERATING SYSTEMS

Now to the question of the disk systems themselves and how they compare. We're going to look at Radio Shack DOS and FLEX.

In order to compare them, we first must talk a little about what they are. I don't want to go into the higher level uses of the disk systems, but rather the nuts and bolts, just to get a general understanding about what these systems are.

The Radio Shack system is fairly simple. The disk is one sided, double density and is divided into 35 tracks, with one track set aside for the directory. The remaining 34 tracks are divided into granules, with 2 granules per track for a total of 68. Each granule has 9 sectors, each sector composed of 256 bytes, for a total of 2304 bytes per granule. On the directory track, which is only partially used, are enough entries for 68 files, plus an allocation map of the sectors on the disk. As the smallest file is 1 granule, 68 entries are all you'll ever need.

When you save a file on the disk, the name is put in the directory. The allocation map, also on the directory track, is checked to find the nearest available granule. The data is then put on the disk wherever there is room. Finally, the allocation table is rewritten to reflect the new information. When you delete a file from the disk, the allocation table is updated to show that granule is now available.

The smallest file you can store on a disk is one granule or 9 sectors long. If you save 1 byte on the disk, you would use all of those 9 sectors. The disadvantages are obvious. It is a waste of disk space and limiting as to the number of files you can put on the disk.

USING THE DOS

The DOS is very basic in the system calls available to assembly language programmers. There is just one call to the DOS to read or write a single sector from the specified drive into a particular memory area. This call will return an error code that you can check. You can also perform a restore to track 0. There is NO support in the documentation about those routines in the ROM to do things like access the directory, update the allocation table, check for a filespec already in the directory or any of the other useful routines that must be in the ROM.

The other disadvantage to this system is that it is designed around a 35 track single sided, double density disk. That is the only system that works. It will not use the other 5 tracks of a 40 track drive, nor will it use the other side of double sided drives. They will work fine on the system, but it will only use the same amount of space it uses on the 35 track drive. Even if you wanted to use something else, it would not let you. Of course, you could change what's in the ROM, but that would be quite a task.

Now on to the FLEX operating system and how FLEX handles the disk. FLEX is a full DOS, a real disk operating system with great documentation.

Many think that with the Radio Shack system they have a disk operating system. Well, it is if all you want to do is store and retrieve data and files to and from the disk. But disk operating systems can be much more than that, much more elaborate and useful to the programmer and user than just those basic functions. Actually, the Radio Shack DOS is really just an extension of the BASIC with some functions for saving and loading to the disk, not much more complicated than those for tape. It also has a few utilities like copy and backup.

What does FLEX do that is so much better and so much different?

Let's examine first what a FLEX disk is made up of.

There is no standard number of tracks or sectors on a FLEX disk. It really doesn't matter to FLEX. The first 5 sectors of track 0 on all FLEX disks are the only standard portion of the disk. It is always single density. It can be double sided or single sided. The first two sectors are the boot sectors that are read in by a program in ROM in the traditional FLEX system. In Color Computer FLEX, we have the boot in the Radio Shack portion of the disk. This boot reads in the rest of the DOS from the disk. Sector three is the 'System information record', or SIR. Stored here is information about the configuration of this particular disk. FLEX can look at the SIR and determine the size, number of tracks, sectors per track, and the total number of sectors on the disk. The name and the date that the disk was initialized and pointers to the beginning and end of the chain of free sectors are stored here.

Sector 5 is the first sector of the directory. The directory is a linked list that initially takes up the rest of track 0, but will grow beyond that when necessary. As more files are added, sectors are taken from the free chain and added to the directory. In the beginning, track 0 from sector 5 to the end of track 0 is set aside for the directory. On a single sided disk, this would allow for 5 sectors at 10 entries each or 50 entries. On a double sided disk, you would start with 15 sectors or 150 entries before sectors would be taken from the free chain. Remember that FLEX will enlarge the directory as needed.

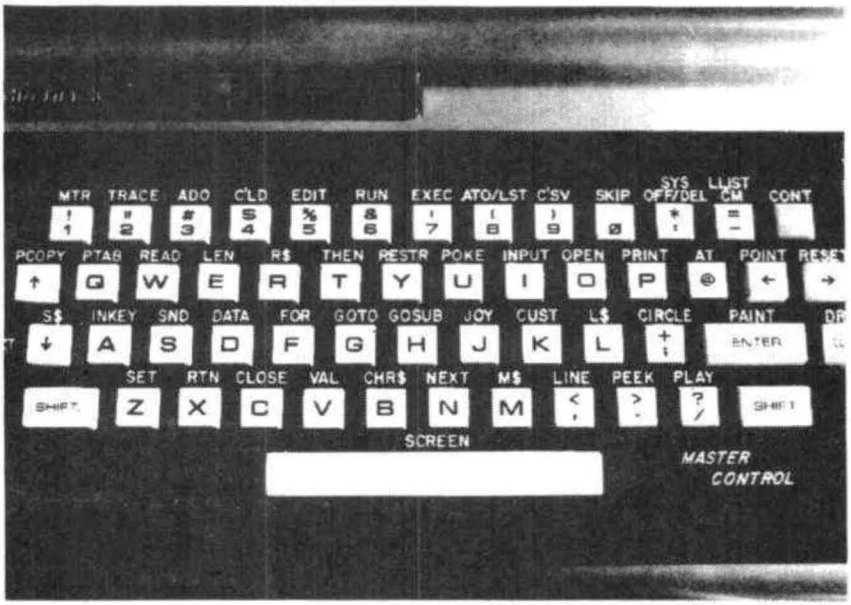
The rest of the disk is formatted as a linked list where each sector points to the next sector in the list. This is called the free chain. When space is needed on the disk for whatever reason, FLEX takes the sectors it needs from the free chain for the file. The directory entry reflects where on the disk the file is and how many sectors it uses. There is no limitation on the size of a file. It may be as small as 1 sector or as large as the entire disk.

All files except random access files are stored on the disk in the same way. Text files are stored with a space compression feature invisible to the user. With space compression, 2 spaces and over are stored as a $09,n where n is the number of spaces. This saves quite a lot of disk space.

It is a little more interesting when you deal with random access files, normally there would be no way for the system to know where a particular record (sector) is on the disk without looking thru the entire file. This is because during the course of saving and deleting files from the disk the free chain will become fragmented over the entire

For Your Color Computer

MASTER CONTROL



Requries 16-32K

1. 50 preprogrammed command keys. Standard and Extended command.
2. Direct control of motor, trace, and audio from keyboard.
3. Automatic line numbering.
4. Programmable Custom Key.
5. Direct Run Button.
6. Keyboard overlay for easy program use.
7. Easy entry of entire commands into computer.

Load Master Control into your machine then either type in a BASIC program or load one in from tape to edit. Cuts programming time by 50% or more **$24.95**

For The Radio Shack
Color Computer*

COLOR BONANZA

Some 4K, Some 16K, Some 32K

Written by E.R.I.

50 PROGRAMS
In One Package

Distributed by:

SSM SOFT SECTOR MARKETING, INCORPORATED

*The Color Computer is a product of Radio Shack, division of the Tandy Corporation

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

List **$49.95**
6 Cassettes – Disk version available soon.

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

C.O.D. – certified check, M.O. or cash only. Most orders shipped next day. All orders must have shipping included. Please add 2% or $2.50, whichever is higher for shipping. Michigan residents, please add 4% tax. Add extra $1.50 for C.O.D. Personal checks take 3 weeks to clear. Out of the country orders add $10.00 extra shipping.
*TRS-80 is a product of Radio Shack, div of the Tandy Corp

SSM SOFT SECTOR MARKETING, INCORPORATED
6250 Middlebelt • Garden City, Michigan 48135
Order Line **800-521-6504**
Michigan Orders & Questions **313-425-4020**

The American Express® Card
Don't leave home without it.™

MasterCard
VISA®

The Quality Continues . . .

disk. FLEX knows where the beginning and end of a file is, but how does it know where individual records are? FLEX takes care of this by adding 2 sectors to the beginning of every random file. These two sectors have a list of all of the sectors that are in a particular file and where they are on the disk. Therefore, any random access can be achieved by a maximum of two disk reads, one to the table in front of the file and then to the actual data sector itself. In practical use with several business programs that we have, random access is usually done in a second or two.

FLEX not only maintains the date the disk was created but the date that each file was created. This is useful in determining what file is the newest of several you might have.

There are other things about the disk structure itself that make it worthwhile to consider, but the primary thing about a FLEX system is that it can support any type of disk format. There is no limitation in the software itself. You can have a single sided 35 track drive on drive 0, a double sided 40 track drive on 1 and a double sided 80 track drive on 3. FLEX is able to handle all types with total aplomb.

What about documentation and access to the operating system?

Last month in the April issue of CCN, Dale Puckett had an excellent article on the features of FLEX and the ease of use of the operating system. I don't want to waste space repeating it, but just let me say that FLEX overcomes all the shortcomings the are apparent in the Radio Shack DOS.

Next month I will discuss the OS-9 operating system and how it works with the disk. We plan to release OS-9 sometime in June.

ExIBMer (NOW RETIRED)
For the FIRST TIME — Makes available to the PUBLIC
His personal collection of superior programs for the

TRS-80 COLOR

SEE HOW THE PROFESSIONALS DO IT!!
ALL PROGRAMS ARE OVER 14K LONG!!

TALKING GRAPHIC DEMONSTRATION

Like no other Computer Program that ever existed! Your CoCo will talk to you with a beautiful musical background and tell all about himself while displaying dozens of action packed hi-resolution graphic demonstrations. Programs RUN non-stop for 12 FANTASTIC minutes from 1 CLOAD.
"This demonstration is MANDITORY. You and your CoCo deserve this program." Quote The Rainbow.
$24.95T ★

THE DISK DOCTOR — Cure that sick feeling and utter frustration caused by CRASHED I/O ERROR and UNREADABLE disks. Will SALVAGE M/L, BASIC, DATA, ASCII, even MPP Pictures. Menu driven for easy use. 100% visable operation lets you see what you are doing. Automatic SALVAGE to NEW disk. All in OPEN BASIC!
$49.95D ★

MPP-TUTORIAL — Programming tool of the professionals — "lets you EASILY create superior graphics without using the tedious DRAW, PAINT, LINE, PSET, CIRCLE, etc. commands. I have seen the results, and they are INCREDIBLE — If you want to see and use the full graphic potential of your CoCo, this program is — REQUIRED!" Quote Chromasette.
$34.95T or D ★

EL CASINO — Three STARTLING action packed hi-res graphic games that have received RAVE reviews. All programmed with MPP. Each game is over 14K long.
All three games below..... **$49.95T or D ★**

DICE GAME — The ONLY crap game that allows 4 players to make 12 Field Bets before every roll..... **$24.95T or D ★**

BLACK JACK — Gives you the FAMOUS CARD COUNTER sold for hundreds of dollars elsewhere..... **$24.95T or D ★**

SLOT MACHINE — Looks like a $30,000 Casino machine. Sounds like one, too. Adjustable pay-off..... **$24.95T or D ★**

★ T = 16K-EXTENDED ★ D = 32K-DOS ★ POSTAGE PAID ★ 704-452-4673

SUPERIOR GRAPHIC SOFTWARE

406 LITTLE MOUNTAIN ROAD — WAYNESVILLE, N. C. — 28786

(TVS) and Fort Worth Star-Telegram launch STAR-TEXT ™ - low-cost electronic home information service.

Radio Shack, a division of Tandy Corporation, and the Fort Worth Star-Telegram are today launching STAR-TEXT ™, an electronic "newspaper" home information service. STAR-Text will be available through Tandy Videotex Service (TVS), operated by Radio Shack for the local Fort Worth (Tarrant County, Texas) area.

At the outset, STAR-Text will provide primarily three kinds of information, including hard news, entertainment information and shopping information. This information will be available to subscribers for $5 per month through the Star-Telegram.

Hard news will include local, state, national and international stories;sports news and scores; weather and business news. It will be gathered from the newspaper's local staff; from its bureaus in Washington, Austin, and the Mid-Cities (Dallas-Fort Worth corridor); and from the wires of Knight-Ridder, the Associated Press, the New York Times and others. This information will be updated continuously 16 hours a day, 7 days a week.

Entertainment information includes movie reviews, what's-playing-where, restaurant reviews, and listings of concerts, live theater and ticket agencies.

Shopping information will include consumer advice, plus classified-type advertising and some sponsored informational and product information.

Subscribers to STAR-Text will be able to access this information through home terminals or specially-equipped personal computers connected to a telephone.

STAR-Text is Tarrant County's first electronic home information service. It is being marketed through the advertising strength of the Star-Telegram; the retail strength of Radio Shack, retailers of TRS-80 personal computers and videotex terminals; and the direct mail capabilities of both organizations. Demonstrations for potential subscribers are available at 37 area Radio Shack retail locations.

Announcing: COLORSOFT™ Software for the TRS-80™ Color Computer

Color Software Services offers a wide range of programs including games, educational, financial, and home/personal applications software for the TRS-80 Color Computer. The current catalog lists over 50 software items. These programs are for 4K, 16K and 16K Extended BASIC and 16K disk BASIC systems.

All COLORSOFT software comes with a limited guarantee and full instructions for using the program. In addition, Color Software Services provides after-the-sale support for all software sold under the COLORSOFT trademark. This assures all purchasers of COLORSOFT software that detailed instructions for correcting any "bugs" that are identified after the sale will be provided FREE OF CHARGE.

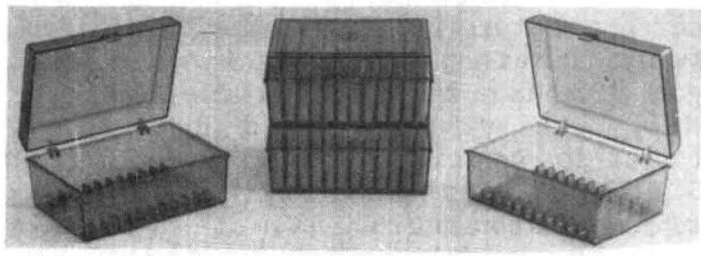
In addition to its line of COLORSOFT software, Color Software Services can provide consultation and/or custom programming services for special applications. A complete catalog and $2 discount coupon are available for $1.00 by writting to: Color Software Services, PO Box 1723, Greenville, TX 75401

Announcing: GOLDLABEL™ Blank Cassettes and the CASSETTE CADDY

Color Software Services is introducing its GOLDLABEL line of digital data quality magnetic tape in a premium five screw cassette shell. These cassettes contain low noise, high frequency response magnetic tape that is made in the U.S.A. GOLDLABEL cassettes are available at $8.00 per dozen in C-10 length and at $11.00 per dozen in C-30 length. Shipping charges are $2.00 per dozen tapes.

The CASSETTE CADDY is a handy storage unit that holds one dozen cassettes. The CADDY is a stackable, hinged-top smoked-plastic container that can help eliminate cluttered work areas. The CASSETTE CADDY sells for $3.95 with purchase of one dozen cassettes or individually for $5.49.

Additional information is available from:
Color Software Services
PO Box 1723
Greenville, Texas 75401



ACTION GAMES

The fastest growing producer of computer games for your 6809 has the products you have waited for!!

NEW! ARCADE GAMES FOR THE COLOR COMPUTER

CAVE HUNTER

COLOR BERSERK

Fast paced action • Super Hi-Res Graphics
Dynamite sound effects • Runs in 16K of memory

These games will astonish you with their Detail and Quality. They set a standard for others to follow.

— ADVENTURES —

Calixto Island • The Black Sanctum

Highly acclaimed by reviewers • Challenging situations
Fast, efficient machine language • Runs in 16K of memory
Save game in progress

Adventures on 5¼ TSC FLEX disc (specify 6800 or 6809)	ea. $24.95
Both adventures on single disc	$39.95
Adventures for color computer	ea. $19.95
Color Berserk for color computer	ea. $24.95
Cave Hunter for color computer	ea. $24.95

Shipped prepaid in continental U.S. California residents, please add 6% tax.

VISA

— MORE COMING SOON —

WE HONOR master charge THE INTERBANK CARD

MARK DATA PRODUCTS

23802 Barquilla, Mission Viejo, CA 92691 • (714) 768-1551

TRS 80 IS A TRADEMARK OF TANDY CORP.

2MHZ 6809 SYSTEMS

GIMIX offers you a variety to choose from!

38 MB WINCHESTER SYSTEM $17,498.99

HARDWARE FEATURES:

- ★ 2MHz 6809 CPU
- ★ 512KB Static RAM
- ★ 8 RS232C Serial Ports
- ★ 2 Parallel Ports
- ★ DMA Double Density Floppy Disk Controller
- ★ Dual 8" DSDD Floppy Disk System
- ★ Dual Winchester Subsystem with Two19 MB 5¼" Winchester Drives

SOFTWARE FEATURES:

- ★ OS-9 LEVEL TWO Multi-User Operating System
- ★ OS-9 Debugger
- ★ OS-9 Text Editor
- ★ OS-9 Assembler

19 MB WINCHESTER SYSTEM $8998.09

HARDWARE FEATURES:

- ★ 128K Static Ram
- ★ 2MHz 6809 CPU
- ★ 19 MB 5¼" Winchester DMA Subsystem
- ★ 4 RS232C Serial Ports
- ★ 1 MB 5¼" Floppy Disk Drive
- ★ DMA Double Density Floppy Disk Controller

SOFTWARE FEATURES:

- ★ OS-9 LEVEL TWO Multi-User Operating System
- ★ OS-9 Text Editor
- ★ OS-9 Debugger
- ★ OS-9 Assembler

128KB MULTI-USER SYSTEM $6997.39

HARDWARE FEATURES:

- ★ 2MHz 6809 CPU
- ★ DMA Double Density Floppy Disk Controller
- ★ 128KB Static Ram
- ★ 2 RS232C Serial Ports
- ★ Dual 8" DSDD Floppy Disk System

SOFTWARE FEATURES: Your choice of either UniFLEX or OS-9 LEVEL TWO. Both are Unix-like Multi-User/Multi-Tasking Operating Systems.

56KB FLEX/OS-9 "SWITCHING" SYSTEM $4148.49

HARDWARE FEATURES:

- ★ 2MHz 6809 CPU
- ★ 56K Static Ram
- ★ 2 RS232C Serial Ports
- ★ DMA Double Density Floppy Disk Controller
- ★ 2 Built-in 5¼" 40tr DSDD Disk Drives (80 Track DSDD Drive Option . . add $400.00)

SOFTWARE FEATURES:

- ★ GMXBUG monitor — FLEX Disk Operating System
- ★ OS-9 LEVEL ONE Multi-tasking operating system for up to 56K of memory

WINCHESTER SUBSYSTEMS

Winchester packages are available for upgrading current **GIMIX** 6809 systems equipped with DMA controllers, at least one floppy disk drive, and running FLEX, OS-9 LEVEL ONE or OS-9 LEVEL TWO. The packages include one or two 19MB (unformatted) Winchester drives, DMA Hard Disk Interface, and the appropriate software drivers. The Interface can handle two 5¼" Winchester Drives, providing Automatic Data Error Detection and Correction: up to 22 bit burst error detection and 11 bit burst error correction.

Dual drives can be used together to provide over 30 MBytes of on line storage -- or use one for back-up of the other. (More convenient and reliable than tape backup systems.

#90 includes one 19MB Drive, Interface, and Software **$4288.90**
#91 includes two 19MB Drives, Interface, and Software **$6688.91**

Contact GIMIX for systems customized to your needs or for more information.

50 HZ Export Versions Available

GIMIX Inc. reserves the right to change pricing and product specifications at any time without further notice.

1337 WEST 37th PLACE
CHICAGO, ILLINOIS 60609
(312) 927-5510
TWX 910-221-4055

GIMIX INC.