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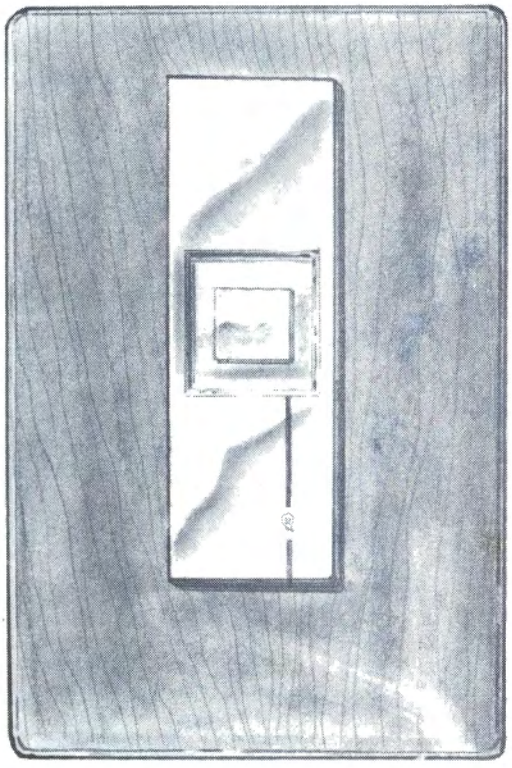

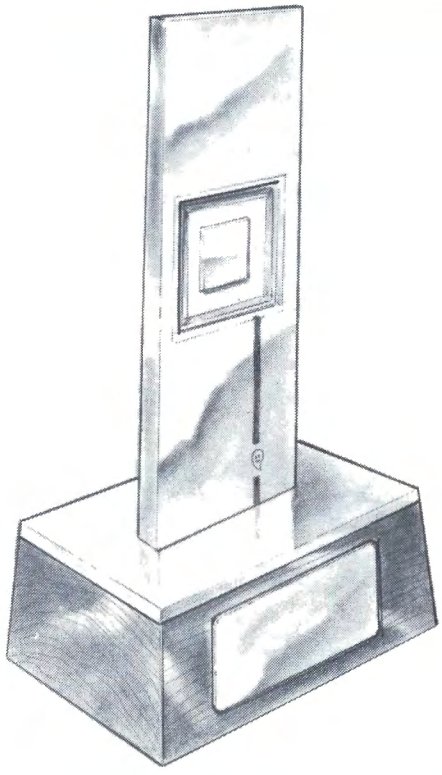

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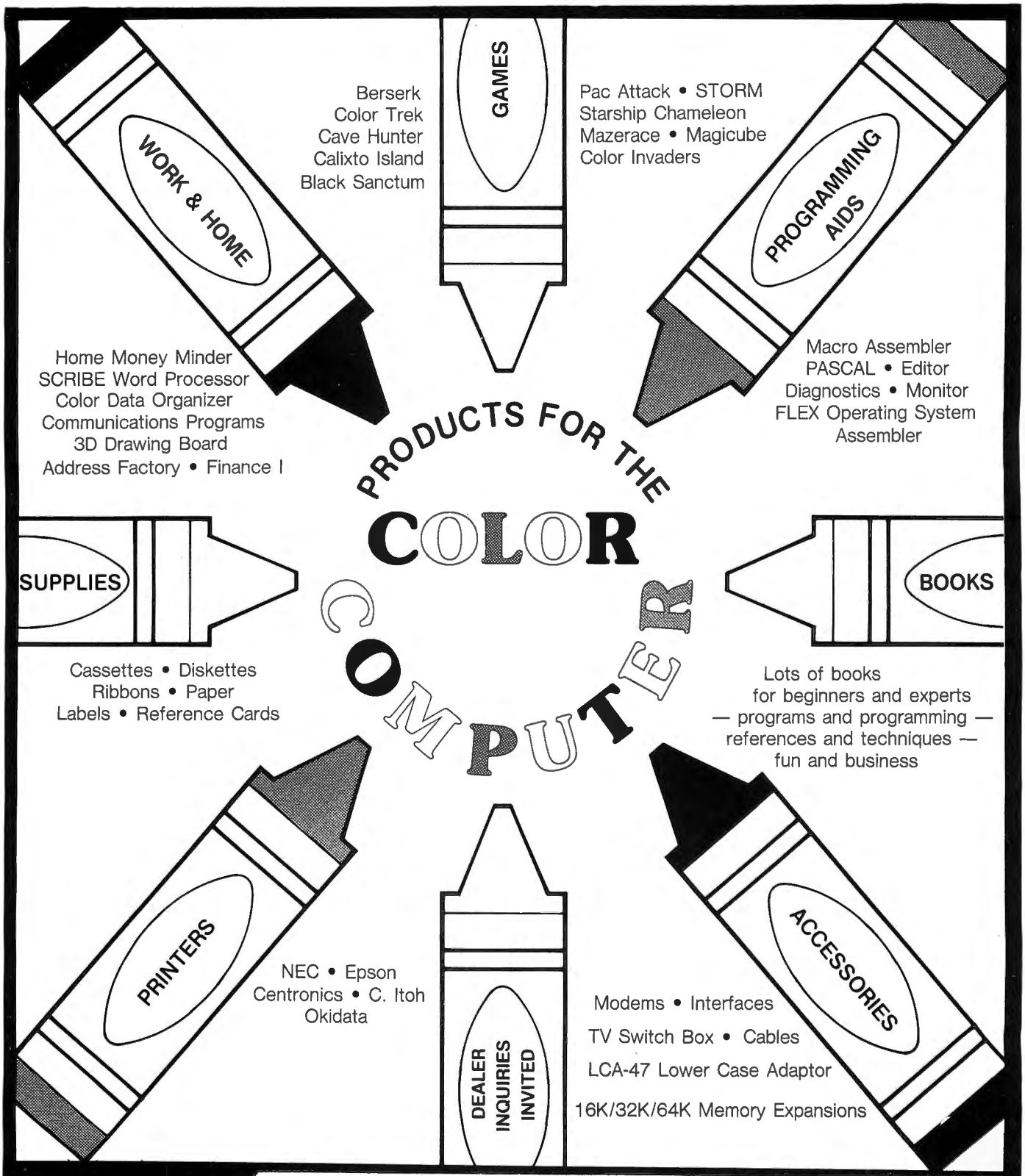

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INDEX

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 <u>underline.</u> DynaForm has its own macro facility with string variables, nested include files, a full merge-print capability for generating form letters and mailing lists, and it can generate an index automatically, sorted alphabetically or by page number. You can call it from DynaStar to proof-print the active edit buffer, or by itself to print a disk file while you edit another.

DynaStar II $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 OR FLEX

SPELLTEST is the most versatile 68XX spelling checker available.
MENU'S MAK[illegible] From the menu you may: Print a [illegible] list of valid words; [illegible]e; Read your text, st[illegible] additional dictionar[illegible] pecial applicati[illegible] newly accepte[illegible] While c[illegible]rd; Accept an[illegible]n correct spelli[illegible] Desig[illegible]s right at home i[illegible] will recover the cost 22,000 w[illegible] entries in the America[illegible] most common English word[illegible] 500 built in c[illegible] etc.) and 300 specific to your fiel[illegible] and allows a large file to processed even in small computers.

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PRICE $199.00

A/BASIC

Basic Compiler

For OS-9 or 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 Pasca[illegible] features of the FLEX version 1[illegible] enhancements: Chain, Fread, F[illegible] Close, Delete, Fork, Send, Wa[illegible]e, Getstatus, Setstatus, SetP[illegible] This is an excellent and fast p[illegible] write utilities but powerful end[illegible]aStar.

Version 1.5 Now Available 40% Faster

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

CRASMB

MULTI CPU CROSS ASSEMBLER FOR 6809
FLEX OR OS-9
by Frank Hoffman

CRASMB is a conditional macro assembler with the cabability 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.

FLEX 139.95 with any CPM	OS-9 200.00 with 6809 CPM
CPM's 25.00 each	35.00 each
CPM source 25.00 each	35.00 each

Specify FLEX or OS-9 when ordering

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.

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

THE BILL PAYER
PURCHASE ORDER
INC/EXP. LEDGER

ALL FOR $169.95

COLOR COMPUTER USERS

FHL COLOR FLEX, THE MOST POPULAR DOS FOR THE 6809 FROM THE LARGEST SUPPLIER OF FLEX SOFTWARE IN THE WORLD!

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 you to have a 24 line by 51 character display. 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.

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.

Color FLEX includes an external terminal program that lets you use a standard terminal hooked to the RS-232 port. This will let you use a full sized keyboard with a 24x80 display. Your printer is then hooked to the terminal. The system will automatically control the printer. No hardware or software modifications are required.

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. We have 100 packages ourselves. Open your Color Computer to a whole new world of software with FLEX.

FLEX $99.00
INCLUDES OVER 25 UTILITIES!
DOES NOT REQUIRE ADDITIONAL HARDWARE!

OPTIONS

ED/ASM is a very powerful editor/assembler package. ED has all the features of TSC's editor with the addition of screen type editing, MACRO capability, and a math package. With the math package you can perform simple or complex formulas with the answer in HEX, DECIMAL and BINARY! In its simplest form it can be used for base conversions. You can also create a MACRO and pass parameters to it. Works with files larger than memory. It has many additional features.

AMS is also compatible with TSC's assembler. It has MACROS and conditionals, it has more powerful MACROS than TSC's. ASM was created by taking our CRASMB program and making a 6809 only version of it. Nothing else was removed. Both programs have been set up for FHL Color FLEX and cost ONLY 100.00.

DBASIC allows the use of the standard Disk Extended Color Basic under FLEX. All disk input and output operations are done through FLEX and are completely capatible with the normal FLEX utilities. This means that files and programs written to disk by DBASIC may be manipulated by FLEX editors, sort/merge, etc. It also means that these files are not compatible with standard Disk Color Basic files. However, the cassette files are compatible and provide a means of conversion. Also included is a DBASIC program to read a Radio Shack Disk and write to a FLEX disk.

All of the BASIC language components described in the Radio Shack manuals are implemented, with the following exceptions:

1. Random files are not supported. FIELD, LSET, RSET etc. will be of no use.
2. BACKUP, COPY, and DSKINI are not implemented and will give syntax errors. Use the equivalent FLEX utilities instead.
3. A new BASIC command called FLEX has been implemented. FLEX will terminate DBASIC and return to FLEX.
4. DSKI$ and DSKO$ are completely implemented.

DBASIC is only $30.00 when purchased with Color FLEX. $40.00 later.

Other languages available include; FORTH, Pascal, Fortran77, 'C,' A/BASIC compiler, plus more.

Application packages include; A/R, G/L, A/P, Inventory, Electronic Spreadsheets, Accounting, Database programs and more. SEND FOR LIST.

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

OSM

OS-9/FLEX MACRO ASSEMBLER
by Frank Hoffman

For FLEX or OS-9, Create FLEX or OS-9 binary files from either FLEX or OS-9. OSM is a MACRO assembler like CRASMB. It is compatible with TSC's Assembler, but it has more powerful MACROS. OSM makes it easy to move FLEX programs to OS-9. In OS-9 it gives MACRO capability like TSC's assembler and is compatible with TSC source files. OSM was used by the author to move CRASMB to OS-9.

PRICE $125.00
Specify OS-9 or FLEX

AUTOTASK

WITH MENU
PRICE $129.95
Includes source on disk!
Manual $10.00

6502 TRANSLATOR
Translator 6502 code to 6809
$75.00

SUPER SLEUTH
Disassembler for 6800/6809 or Z80
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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
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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

We Have DynaCalc For Flex $200.00

SOFTWARE CATALOG

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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
Some Practical BASIC Programs		69.95	x
OSM OS-9/FLEX Macro Assembler	125.00		9
DBASIC (For Color FLEX only)	40.00		9
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CRASMB for OS-9	200.00		9
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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
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Assembler	50.00
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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
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REMarks
by Bill Sias

If it seems like I'm writing this in a hurry it's only because I am. My vacation is rapidly approaching and it's amazing how many things I have to accomplish before I can leave. My vacation is the last week in July and the first two in August and if any Hams are interested I have my two meter rig in the car primarily on 144.110 MHz but occasionally on local repeaters. Exact schedules are hard to determine but I'll be in Denver for a couple days probably about July 25 & 26. I'll be leaving there and heading for Southern California arriving the 28th or 29th. On either the 30th or 31st I'll start moving North on 395 into Oregon and starting home. If you happen to hear me (WD8JUJ) on your repeater be sure to say hello. I'll be back home (to work) on August 17th. I'm looking forward to picking the brains of our Southern Californian advertisers.

The Z-80 gets an awful lot of undeserved "Good Press" considering how inferior it is compared to the 6809 and I think it's time we did something about it. On our cover you will find the first step in making the world know the power of the 6809. The 6809 Achievement Award will be given monthly to the most inovative use for a 6809 MPU. The award program is sponsored as a combined effort by Gimix, Inc. and REMarkable Software, Inc.. The user of the application will receive the plaque shown on the front cover and the designer of the application will receive a $200.00 cash prize. Note that since we are promoting the 6809 in general this is not limited to the Color Computer but to any 6809 computer whether manufactured or specially designed for the application. The rules are simple, and since we're new at this may have to change as we go, the application must use a 6809, must be a completely original work and must be completed. Entries must include all possible information and, where applicable, photographs of the equipment and application. A photograph of the designer and a short biography would also be in order. All photographs should be glossy and preferably in color (just in case). Please also include the Name, address and a telephone number for the newspaper(s) in the applicants area. This is not limited to hobbiests but can be a job related application provided the employer is aware that the entry is being made. Although this is designed as a monthly award we will not be giving awards just to make sure we have one each month, it's got to be good! As we work out the bugs in the program I'll keep you informed.

We've been on schedule for three issues now! I guess all we had to do was increase the number of pages to get things together. However, (don't you hate it when someone gives you good news and follows it with a "However") we need lots more articles. How about sending in that new discovery you made or whatever? I finally found an author for the OS9 Corner, Dr. Chuck Adams. Dr. Adams is a professor of computer science in Texas and will be a real asset to CCN. His plan now is to inform you about OS9 from a first-time user point of view and continue to get more indepth as our knowledge of OS9 becomes more complete. Welcome aboard Chuck! Flex Corner is still "up for grabs" but I do have some strong candidates at this point. I'm also adding another column which will be NEW PRODUCTS RECEIVED. This column will be a single paragraph about all of the New Products we've received at CCN up to the date we write the column. This column will not attempt to review the products merely to describe the products that have appeared on our doorstep.

In the process of getting back on schedule we've gotten behind in sending out renewal notices. You could help us out alot by sending in your renewal before you get a notice. In fact if you will send in your renewal now I will give you a choice of two special deals! 1. You can renew for another year for only $18.00 instead of the $21.00 price tag, or 2. renew for 2 years for $36.00 and you'll get the two years added to your subscription plus I'll send you a Nanos Systems Color Computer Quick Reference Card (a $4.95 value). In order to qualify for these "deals" you must write "RENEWAL" on the lower left hand corner of the envelope.

Perhaps next issue I'll bore you with my vacation pictures!!

How to read the new mailing labels.

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

Dear Sirs:

I have some fixes for the Word Processor which was listed in the February, 1982, issue of CCN. I believe I have found all the errors and the program works as it should. I enjoy using it and am writing this letter on it, using my new NEC8023 Printer. By the way, this printer works like a dream with my C80.

The fixes are as follows.

1. COMPILE did not work. The fix is, change line 690 to 690 Y=Y-I: IF Y<0 THEN Y=0
2. VIDEO did not work. The fix is, change the 150 in line 60 (150 is the third line number from the end of the ON GOTO) to 1950.
3. INSERT could not be done at line 0, which would be nice for changing the title of a manuscript and other headings. The fix is to add a line 125 which reads 125 IF C<0 THEN C=0
4. The last fix is in line 1770. Change the 170 in that line to 1790. The IF THEN then reads IF PN$<>"Y" OR (P1$="N" AND X=1) THEN 1790.

Sincerely yours,
Elton E. Beougher
Hays, KS

Dear Bill,

Recently I have noticed a lack of graphic games and ideas in your magazine. I know everyone is showing the CoCo is more than a "game machine", but our CoCos can do good BASIC games, as shown by "Space Patrol" (March, 1982) and many other past programs.

In regard to Ken Clause's letter (May/June, 1982) on converting HEX# to DEC#, why not just use BASIC's VAL command, as in the following program;

```
10 INPUT "TYPE IN HEX#"; A$
20 A$ = "&H" + A$
30 PRINT "DEC# IS"; VAL(A$)
```

Sincerely,
Steve Hartford
Glendale, CA

* It proves that there is more than one way to do anything.

Dear CCN,

I have really enjoyed my subscription and read most of the magazine every month. In the May/June issue Ken Clause's letter caught my eye. I have written several short programs to convert numbers among several bases. I am enclosing a listing for three.

I wrote these programs before installing my Extended BASIC ROM. So they work on the level I machine and are unnecessary on the Extended BASIC machine.

Listing 1 is the program to do the same conversion as Mr. Clause's program. I think this program may be easier to use since it is not necessary to convert A to 10, B to 11, ect. Also, I used Inkey$ so its not necessary to use the enter key.

Listing 2 is a program which converts decimal to hexidecimal if the decimal number is between 0 and 65535 (0-FFFF).

Listing 3 is related to the others in that the program converts from one base to another. The program may be of interest because of the techniques employed rather than the utility of the program.

Please excuse my hand-written listings and keep up the good work.

LISTING 1

```
1 REM HEX TO DEC
5 CLS
10 DIM H$(15), H(3)
15 FOR I=0 TO 15: READ H$(I): NEXT I
20 DATA 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F
25 FOR I=0 TO 3: READ H(I): NEXT I
30 DATA 4096, 256, 16, 1
35 PRINT "ENTER A HEXADECIMAL NUMBER"
40 FOR J=0 TO 3
45 A$=INKEY$: IF A$="" THEN 45
50 FOR I=0 TO 15
55 IF H$(I)=A$ THEN DEC=DEC+H(J)*I:
H$=H$+A$: F=1
60 NEXT I
65 IF F<>1 THEN F=0: DEC=0: H$="": PRINT
"INPUT ERROR": SOUND 150,10: GOTO 35
70 F=0
75 NEXT J
80 PRINT "HEXADECIMAL"  H$ "="; DEC
85 PRINT: FOR T=1 TO 500: NEXT: RUN 10
```

LISTING 2

```
1 REM DEX TO HEX
10 DIM H$(15), H(3), A(3)
15 FOR I=0 TO 15: READ H$(I): NEXT I
20 DATA 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F
25 FOR I=0 TO 3: READ H(I): NEXT I
30 DATA 4096, 256, 16, 1
35 INPUT "ENTER A DECIMAL NUMBER"; DEC:
N=DEC
```

```
40 IF N<0 OR N>65535 THEN 35 ELSE H$=""
45 FOR I=0 TO 3
50 A(I)=INT(N/H(I))
55 N=N-A(I)*H(I)
60 H$=H$+H$(A(I))
65 NEXT I
70 PRINT TAB (9) DEC "= $"; H$
```

LISTING 3

```
10 DIM TWO(7)
20 FOR I=0 TO 7: READ TWO(I): NEXT I
30 DATA 1, 2, 4, 8, 16, 32, 64, 128
40 CLS
50 FOR I=1 TO 255
60 PRINT "DEC"; I "= ";
70 FOR J=7 TO 0 STEP -1
80 IF I AND TWO(J) THEN PRINT "1"; ELSE
PRINT "0";
90 NEXT J
100 IF I AND 15 THEN PRINT ELSE INPUT "
ENTER"; ZZ$: PRINT
110 NEXT I
```

Sincerely,
Don Gray
Dalton, GA

Dear Bill,

I enjoy your mag and have learned alot but I would like to suggest you run a few articles on peripheral assessments. Most of us have started small, (4K) added extra RAM and Extended BASIC, and our bank books have almost recovered so we are ready to invest in another upgrade. Line printer VII prices are falling but so will the Okidata 80 and 82. How much trouble could we have trying to print to the parallel "80" out the side port? Would it be worth the trouble building interface when LPVII is just as good (or better) and is serial?

Secondly, in all the assembly articles I have, they always tell you how to hook a subroutine in the Extended BASIC ROM. Gee thats great, I figure another $500.00 of magazine articles and I'll know the addresses of everything. How did you find out all these addresses? A disassembler, RS technical manual, Motorola fact sheet, experimentation??? I have Levinthols "6809" book which is great for learning concepts but you need the address of your system's PIA's ACIA's ect. Also, many of his sample programs are already resident in ROM - why bother writing a keyboard poll when I know its in ROM (POLCAT). How about adding a small assembly program at the end of the "Comment Corner" for us beginners to play with demonstrating a piece of the dissassembly with a JSR, (XXXX)?

Thirdly, keep the information articles coming. I would like you to explain more thoroughly the amount of space needed for string variables. How do you decide how much space you need with the "clear" for a dimension A$(100). Are the active variables stopped at the beginning of the RAM or just the pointers to the variables. (I think I already know this answer). I would like more information on memory, how to get a full 32K out of my "32K" if I am running a string sort in machine language that wouldn't need the BASIC interpreters. (Of course I couldn't use POLCAT, CHROUT, etc., then could I).

Forthly, please edit this so it makes sense because I am talking way over my head. (Well, if I knew what I was talking about would I be writing you??)

Thank you,
Michael Jirka
Omaha, NE

* I can't publish articles that I don't receive. I've probably written more about this than any other subject, so if someone out there has been holding out on the Hardware Reviews get it in here. As far as getting addresses, all of your options are correct, to make a long story short I usually try to locate the I/O ports first and then search the code for references to those addresses. Once you have the I/O down the rest is much easier. I will do my best to keep the information coming. All of us here are working hard to make sure that CCN is the most informative magazine you buy.

Dear Bill,

A friend of mine recently purchased a CC to set pages for offset printing. He purchased a Smith-Carona TP-1, daisy wheel printer from a vendor in PA and upon hooking it up, found it didn't handshake with the computer. After going through back issues of CCN, I found in the Feb. '82 edition an article entitled "RS-232 THE PHYSICAL CONNECTION". I examined the owner's manual on the printer and found the printer uses RS-232 pin #4 to transmit a device ready signal. In accordance with the article I jumpered pin #4 to pin #2 on the RS-232 plug at the printer. The whole thing worked great. Thanks.

One minor adjustment to the manufacturer's documentation must be made! In setting the baud rate, reverse the bottom four rocker switches from the page of instructions provided. Set the whole thing to 7-bits, no parity, 600 baud.
Sincerely,
David Monroe
Springfield, OH

* Thanks for sharing the information. The TP-1 is an exciting printer as you are apparently finding out.

Question! Do you have a consulting service to advise readers of which accessories (such as black boxes) will be useful on the Color?
T.C. Oakford
Quincy, IL

* No, useful is a relative thing and it's impossible for me to know enough about your application over the phone to offer good advice about accessories. When time is available I will answer any questions I can over the phone.

Dear Bill (or whoever reads this)

I just received May/June #9. Needless to say I was disappointed in getting a double month issue. I hope July is on time and worthwhile. Frankly, you are not up to snuff anymore. Your articles are slanted to the heavy user, who is into things us amateurs don't understand. Just to type in and debug your Regress article would take hours and hours. Your X-Mas Card program is a waste of time. How many people with a Color Computer also have the plug in driver controller? Your 64K column also is for what percentage of CC users? Someone told me that if you upgrade to 64K using Frank Hogg's system you eliminate I/O inputs from ROMpack put-etc. All that 64K is! is an ad for Hoggs system! You're right about the number of ads - too many for your type of magazine. Not one game! For shame! Any chance of your putting out a tape as does Rainbow?

I guess that's about enough. I hope some of my comments sink in.
Sincerely,
Ben Zimney
Far Rockaway, NY

* Well Ben, I read the letters that my staff selects for this column and the answers here are my own. CCN is slanted toward the more technical user and probably will always be that way. I often here complaints that there is no information available for the beginner, that has got to be the most untrue misconception surrounding the hobbiest computer market. Everything I pick up is slanted to the beginner. Isn't it time that the intermediate and advanced hobbiests got an even shake on this thing. I remember a conversation not long ago with a fellow that thought Comment Corner was a waste of space and earlier this week he called again to tell me that it's now his favorite part of CCN, times change and so do people. A wise fellow once said that "The only sign of life is growth" I believe that and I also believe that one of the most important things anyone can do for themselves is to never stop learning and being challenged by new things. Nothing is too difficult if you try. Pardon my soapbox.

Dear Bill!

Here are a couple of useful little routines that many CC users will like.

The first is great for everyone who has found specifying variables as coordinates with DRAW to be cumbersome. You can POKE the X and Y coordinates instead, and get a 20% improvement in execution speed! The 2 statements below do the same thing, but the second one is simpler and faster!

```
a) DRAW"BM" + STR$(X) + "," + STR$(Y) + "R10 D10 L10 U10"
b) POKE200,X: POKE202,Y: DRAW "R10 D10 L10 U10"
```

You can make things even faster by initializing the addresses and variables. This technique is best for loops. See how much faster line 30 is in the program below than when you use a or b.

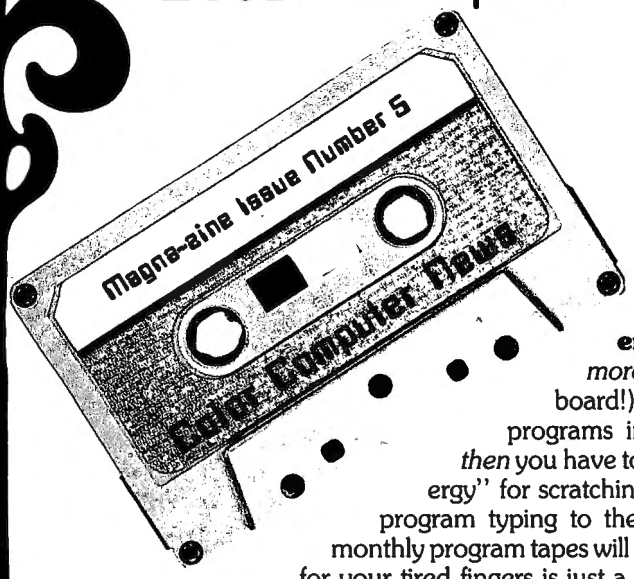
```
10 A=200: B=202: S$="R10D10L10U10"
20 X=RND(255): Y=RND(191)
30 POKE A,X: POKE B,Y: DRAWS$
40 GOTO 20
```

The next tidbit is a program for those people who have a disk drive and a printer -- it prints out disk directories. It works by POKEing a short machine routine into low RAM that when executed, sets the output switch to the RS-232 and then calls the disk ROM DIR routine.

```
10 FOR M=122 TO 129
20 READ A: POKE M,A: NEXT
30 DATA 134, 254, 151, 111, 189, 203, 207, 57
```

To use the routine, RUN the program, and EXEC 122 from inside a BASIC program (Note!

Color Computer News Magna~zine



This New Device Will Give You A Three Weeks Vacation!!!

Well actually, the "vacation" is from the tedium of hand typing the programs published in **Color Computer News**. Even if you are a fairly good typist (i.e. you use *more* than two fingers, and you *don't* have to look at the keyboard!) it would take you about *twelve hours* to type in most of the programs in an average **Color Computer News** issue — and *then* you have to de-bug the programs on top of that! Save your "finger energy" for scratching your head while you think great thoughts and leave the program typing to the **CCN Magna-zine Service**. We guarantee that our monthly program tapes will save even the fastest typist many hours of frustration!! Relief for your tired fingers is just a **CLOAD** away!

Each month, CCN Magna-zine subscribers receive a top quality digital cassette which contains about a half dozen programs from their favorite CC-80 magazine, **Color Computer News**. Subscriptions are available for just $42.00 (plus postage) for a full 12 issues and can start with any issue number you specify. Single issues are also available for the low price of just $6.00 each plus postage. Subscription postage for first class service in the U.S. and Canada is just $6.00 per year. Postage to all other countries is $15.00 per year (sent via AO Air Mail). Single issue postage is $1.00 per tape (domestic) or $2.00 for overseas. (Florida residents add $.30 sales tax for single tape purchases only.)

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To start your own subscription to the **CCN Magna-zine**, just fill out the coupon (a photo copy or a plain piece of paper with the proper information is just fine!) and mail it to: **CCN Magna-zine Service**, Box 68, Safety Harbor, Florida 33572. Include your check (personal checks are OK) or money order and be sure to indicate which **Color Computer News** issue you want your subscription to begin with if it is anything other than the next as yet unpublished issue number.

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YES! *Sign me up for a one year's subscription to the CCN Magna-zine! Enclosed is my check money order for the full amount (including postage) of $48.00 (domestic and Canada) or $57.00 (overseas).*

NAME _____

STREET ADDRESS _____ *APT. #* _____

CITY _____ *STATE* _____ *ZIP* _____

Begin with issue number _____ ***instead of the next regular issue.***

When using EXEC 122 inside a program, follow it by a POKE 111,0) or in command mode whenever you want a printout of a disk directory. Once the program is run, the machine code will remain in memory as long as the computer is on. A NEW will have no effect. (See note below).

Note: The area in RAM where the code resides is used by the cassette routines. If you do cassette I/O, you will have to rerun the program before attempting to EXEC it. In the unlikely event that both cassette I/O and printed directories are necessary in the same program, place the machine code in some other area of memory, like the 1st graphics page at $E00.

Note for multiple drive users: Use the DRIVE statement first to print directories from drives other than 0.

Sincerely,
Alexander Benenson
New York, NY

* Nice work! Thanks for sharing.

Dear Bill,

First off, I would like to say how much I enjoy reading CCN and wish you much success in your future plans for CCN as you have defined them in the May/June issue, sounds great.

Speaking of the May/June issue, I noted with interest, Ken Clause's letter and program for converting hex to decimal numbers, however there is a simpler method and takes up no memory space.

Just (for example) type ?&HFFFF and 'ENTER' the machine will respond with the decimal equivalent 65535. This works with hex &H0000 through &HFFFF (decimal 0 through 65535). This can be done anytime even while typing in a program. (Now if someone could find a way to go from decimal to hex).

Hope this tidbit is worth printing in one of your future issues Bill.

Sincerely,
W.R. Vance
Cheshire, MA

Dear CCN,

Could you please advise your readers that a new Bulletin Board System for the Color Computer is online in Toronto. The telephone number is (416) 494-7001 and the name is "COLOR-80". The board is up evenings and weekends. Other hours will be determined by demand.

Thank-you.
COLOR-80
Toronto

* Consider it done.

Dear Bill,

I enjoy your magazine, and am glad to mention that I saw it advertised in CCN when I ordered software. Keep up the good work, as amateurs like me need all of the technical and practical help we can get. I don't have the time or the knowledge to write my own programs. So it is helpful that I have a reliable source for good programs at reasonable prices. Your magazine and its advertisers fits this nicely.

One of the fastest ways to build up a working tape library is to subscribe to cassette magazine services.

The newest entry in this field is T & D Subscription Software, P.O. Box 256-C, Holland, MI 49423. Their first issue just came out, as well as a beautiful action graphic cover it has 9 assorted programs. All of the programs are well documented on a full size fact sheet, action games, adventure games, educational games, practical quizzes, 6 all time favorite songs, how to write your own song, how to mix 58 bar drinks, has a feature that will tell you what you can make if you list your left over bar supplies & liquor, and a monthly calendar from the year 1 until the end of time, to show the day of the week.

This is a fast and easy way to increase your CoCo's usefulness. The cost is under $1.00 per program.

Regards,
Richard Greer
Chicago, IL

Dear Bill,

I just got the July issue of CCN, and your magazine is looking better all the time. Reading your mail call prompted me to share with you some of my experiences with the Color Computer. First, I am using Nelson Software System's SUPER COLOR WRITER, in the ROMPAK version, and I am very pleased with it. I have the early 1.0 version, which was less expensive than the new version now being sold. Actually, I ordered mine before the product was actually released, so I had to wait awhile. When I first received the

program, I did find a bug in the word wrap-around routine that occasionally deleted spaces between words. I called Nelson and was told to ship my ROMPAK back, and that a new, correct ROMPAK would be sent to me as soon as they received my old one, and I had the new pak about a week later, so I have received excellent customer service from them. The other annoyance was interfacing to my Okidata Microline 82A printer: it seems the 82A disregards long sequences of carriage-returns, so software form-feeds won't work with it. The solution is to change the Color Writer's default CR-only mode to CR and Line Feed (by giving "LFY" as a format command), and changing the switch on the printer. This means that SW6 on the operation panel circuit board DIP switch must be turned off for operation with the Color Writer, and then turned back on for use with BASIC. This DIP switch is accessable only by dismantling the printer's cover, so I soldered another DIP switch to the back of the PC board, turning off all the switches on the original DIP switch, and the new switch is accessable with the access cover removed (i.e., without dismantling the printer).

The other thing I wish to share is my experience with Radio Shack's Audio Spectrum Analyzer program pak. This thing was only $20.00, so I decided to gamble. Hooking it up to my stereo, it looked real good. Audio is input through the cassette port, and the display is colorful and impressive: it seemed to do what a spectrum analyzer should. Evaluating it with some electronics test equipment told a different story. For example, it couldn't tell the difference between a sine, triangle or square wave: all produced a single line at the fundamental frequency. Since the cassette input is just a simple comparator, this is a reasonable response. Obviously, the program measures the time between zero-crossing of the input signal, and from these times calculates frequencies, which explains why the frequency scale is accurate. But a comparator (acting as a one-bit A-to-D converter) cannot give enough information for spectral analysis. The "amplitudes" displayed are probably calculated from how often different time periods are measured in the input signal. Thus, what we have here is a toy "Audio Spectrum Analyzer", and it mimics spectral analysis very well, with superb graphics and ease of use. And it has a "Kaleidoscope" mode which produces a very pretty display, similar to the kaleidoscope program in the CC BASIC manual, that changes with the music. This is the only redeeming part of this program. The name is misleading, and it doesn't do what it says it does.

Also, I have had a lot of fun with Space Patrol, by Mark Barnes, in the March issue. I was very impressed with what he was able to do with Extended BASIC.

Sincerely,
Avery Davis
Atlanta, GA

Dear Bill,

I would have written sooner, but I just received my printer. I would like to thank all of you at REMarkable Software for rescuing me from "limbo". That period from February 1981 (when I purchased my unit) until November 1981 (when I received my first issue of CCN) was mighty lonely. If it weren't for the fellowship of another distraught CC user in California (we can be called henceforth, the A(tlantic) & P(acific) Connection), CHROMASETTE, and finally CCN, (* You have it backwards, we came first and then CHROMASETTE) I would have given up long ago (especially in light of Wayne Green's DOOMSDAY" prediction). By the way, the only reason that I maintain my subscription to 80-MICRO is due solely to articles written for the CC by Dennis Kitz...and those have, lately, been few and far between.

While perusing through other computer mags, I came upon an interesting chart which compiled data on a number of recorders which could not be used with the TI-99/4. It included comments, features and price range. Ex.:
GE 3-5151A...Has tone control, works fine...$40-50

I use a GE 3-5091A (rebuilt) which works fine, and features a counter and automatic recording level $20. I previously used a seven year old GE M8405A and was able to CSAVE (without error) on my second attempt and was a workhorse until the record function no longer worked (froze). It featured automatic recording level but had no counter (drawback) and cost was $18. I recently went on a trip and brought along the computer but no recorder. I borrowed a K-MART 3342 which CLOADed well but was very touchy on CSAVE and didn't have remote control $20-24. I switched to a GE-5151A which features tone control (I set it midway), automatic level control but no counter, works well. Why don't we compile such a list? I would be happy to collect the data if anyone is interested. How about a list of TV's...I understand that some people are

experiencing a bit of trouble with resolution. I use a fifteen year old QUASAR portable which is unable to contend with the color in hi-res graphics.

One of the purposes of my recent trip was to obtain a free printer. It was being turned out to pasture although it still worked. Naive as I was, I expected no problems with interfacing it to my unit. Was I wrong! Luckily, I was armed with the February issue (invaluable) of CCN. First things first! The printer was a TI SILENT 700 TERMINAL and at the end of it's cable was a male DB25 plug. The CC cable which I had purchased was a 4-Pin DIN to DB25 plug. OK, first problem...I need a female adapter. See the accompanying table for the adaptation. Next problem, I need a driver. As it turns out the BASIC driver which appeared in the February is correct, once de-bugged...

RADIO SHACK PRINTER PATCH from Feb. CCN p.36

```
110 DATA 52, 20, 214, 111, 193, 254
120 DATA 38, 11, 129, 13, 38, 7, 190
130 DATA 160, 2, 173, 3, 134, 10, 53
140 DATA 20, 57
150 FOR D=1000 TO 1021
160 READ E:POKE D,E:NEXT D
190 POKE 1021, PEEK (359)
200 POKE 1022, PEEK (360)
210 POKE 1023, PEEK (361)
220 POKE 359, 126: POKE 360, 3: POKE 361, 232
230 POKE 150, 180
240 POKE 151, 30: POKE 152, 0
```

I added line 230 to account for the 300 BAUD RATE and line 240 to account for line delay. Further information can be obtained by reviewing the February issue of CCN.

As far as BASIC programs are concerned the above fixes/patch work well. Machine Language is another story altogether. This is where I cry UNCLE!!! Since ML is "Greek to me" and since three of my ML programs did not print out with the patch, I have broken down and bought a LINE PRINTER VII. Although not perfection (I have the 1.0 ROM - so I need an 8-bit driver routine), it's a start.

RS CABLE ADAPTATIONS FOR SILENT 700 TERMINAL

RS# 26-3014		FEMALE		RS# 26-3020
4-pin DIN to DB25		ADAPTER*		4-pin DIN to 4-pin DIN
FROM				FROM
PIN 2	TO-->	SOCKET 8	<--TO	PIN 2
PIN 3		SOCKET 3		PIN 4
PIN 7		SOCKET 7		PIN 3
PIN 8		SOCKET 20		PIN 1

*Install jumpers between:

SOCKETS 20, 6 and 8
SOCKETS 22, and 23
SOCKETS 4 and 5

Helene M. LaBonville
Bedford, NH

Dear Mr. Sias:

Friday (July 9) was a happy day at my house. I received the July issue of CCN. I was very impressed with it. I still have a problem in that I did not receive the May-June issue. If our letters cross in the mail, forgive me but I am trying to complete a set with all the issues of CCN.

I would very much like to get my hands on a copy of issue #5 as well. At the time it was published, I was not a subscriber.

Please find enclosed a short subroutine that you may want to publish in your letter section. It could be added to a larger program and used to print a text screen. The two things I like about it over other screen-print routines I have seen is that the tabs can be easily changed and you don't have to refigure the tabs for the printer. The way it is with other screen-print routines you do not have an option to move the printed text over from the left side of the paper and if you punch note-book holes in it you lose some of the text.

Maybe one of these days I will be able to figure the "machine language" codes necessary to tab the printer. Until then, I will use this program.

```
30000 FOR I=1024 TO 1504 STEP 32
30010 FOR N=0 TO 31: P=PEEK(I+N)
30020 IF P=96 THEN PRINT#-2," ";: GOTO 30070
30030 IF P>96 THEN P=P-64: GOTO 30060
30040 IF P<=26 THEN P=P+96
30050 IF P<=64 THEN P=P+64
30060 PRINT#-2, TAB(25) CHR$(P);
30070 NEXT N
30080 PRINT#-2
30090 NEXT I: RETURN/END OR GOTO
```

Sincerely,
Stan Saunders
Columbus, OH

IF YOU OWN A COLOR COMPUTER

THEN YOU NEED

THE COLOR COMPUTER TOOLKIT

The software development tool that let's you takes charge of your personal computer. It's full of tools, aids, bells and whistles useful to the COLOR COMPUTER BASIC programmer, in one easy to use software package.

Just look at these features:

- Light Characters on Dark Background with CURRENT LINE HIGH-LIGHTING ; or Normal Characters
- SCREEN EDITOR with: Arrow Key controlled Cursor ; open up space / delete and close up space
- Enabling selective line renumber / copy / move / merge ; or Normal EXT.BASIC's line editor
- KLICK on Keypress ; or Normal Silent Keys / Klick Tone modifiable by use of SOUNDn,n Command)
- PROTECT the current BASIC Program from being wiped out by CLOAD, NEW, etc; or from being LISTed.
- RESTORE / MERGE a BASIC Program with a PROTECTED BASIC program
- MERGE BASIC with Machine Code Routines so Machine Code "invisible" & CSAVE/CLOADable
- GLOBAL SEARCH and PRINT of COMMAND or TEXT strings in BASIC lines ; with NEXT Command ".."
- DELETE all REM's (either REM or ' type)
- DELETE all Spaces (not in PRINT Strings or REMARK's)
- 9 Key Controlled / Abortable SCREEN PRINT DELAY's (slow LISTing's / DIR's!)
- 9 Key Controlled / Abortable BASIC RUN DELAY's ; SINGLE STEP(S) Mode with Line Number display
- ASCII / HEX Memory DUMPS to Screen or Printer
- MEMORY EXAMINE / MODIFY with HEX / ASCII / DEC input or output
- Memory BLOCK-MOVE for relocating Machine Code Programs
- BREAK KEY DISABLE / ENABLE (Pause still functional)
- VARIABLE NAME LIST / String-Byte Memory Usage / Top of Memory Address Display
- Transparent to the User, Install it and forget about it until you need it
- TEN USER DEFINED FUNCTION KEYS accessible with <SHIFT-DOWN ARROW; NUMBER> (BASIC MACRO's)
- FAST Machine Code to BASIC DATA Statement PACKER for storing Machine Code in BASIC
- Recovery of LOST BASIC Programs after NEW, BACKUP, DSKINI, etc
- Automatic Linefeed for Printer's that don't / double space LISTings, or Normal PRINT
- CLOADM to CSAVEM Address / Backup Tool (Name, Start, End, Execute)
- Modified TRON Display (.LN. replaces [LN])
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- Entire System Totally REMOVABLE anytime
- Works on TAPE and / or DISK
- BASIC Runs up to 1/3 FASTER through the Toolkit (5-10% typical)

THE COLOR COMPUTER TOOLKIT is a 5 K-byte RELOCATABLE program that loads anytime without bothering your BASIC program or variables or top of memory address. (It assumes you have cleared enough for it)

All the tools may be turned on and off at will including the TOOLKIT itself, and any tool can be used in conjunction with any other tool.

The tools are available with simple 3 or 4 letter commands entered in direct mode, with the entire instruction set viewable by use of the .HELP command:

.VAR	.OLD	.MMRG	.MPRG	.BRON	.BROF	.SCON	.SCOF	.KLON
.KLOF	.BRON	.BROF	.DARK	.LITE	.PROT	.REST	.TXON	.TXOF
.PDEL	.PDEL	.DELR	.DELS	.SNLF	.DBLF	.DUMP	.MEMO	.BYE
.BLOC	.ECON	.ECOF	.HELP	.GBL	..(next)			

The TOOLKIT works on 16/32 K EXT and/or DISK BASIC systems.

$29.95 TAPE
$34.95 DISK

****

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This is the CLASSIC Game of LIFE, with several unique features:

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- Tape and Disk Compatible

$16.95 on Tape

ARIZIN
P. O. BOX 8825
SCOTTSDALE, ARIZONA 85252

CROSS-REFERENCE GENERATOR

by Mike Donahue
342 Hillcrest Avenue
Blackwood, NJ 08012

The capability to produce a cross-reference list of a source program has been available to large system users for a long time. CCXREF now provides this extremely valuable tool for the users of the Color Computer.

CCXREF can generate a list of every Variable name in a BASIC program, and the line number of each line referenced by a RUN, THEN, GOTO, or GOSUB statement. Along with each variable name or line number is a list of the lines in which they appear. A sample output of CCXREF, run on itself, is provided following the program listings.

This program is most useful when you are debugging, trying to improve performance or readability, or when just documenting a completed BASIC program. Have you ever removed a block of code that was thought to be unused, or tried to combine program statements to conserve valuable memory, only to have the program crash at some inoportune time because of a UL error. A reference to a deleted line was probably missed. With a cross-reference you can see if a line is referenced before deleting it.

Debugging can also be made less painful when all of the places in a program where a variable has been modified, or all of the paths to a routine can be located with one quick glance at a cross-reference listing.

The input to CCXREF is a Color Computer BASIC program that has been CSAVED in ASCII format (eg CSAVE "CCXREF",A). This file should be syntactically correct. Unpredictable results may occur if any sytax errors are detected.

CCXREF supports the following options:

"P" - The use of this option will cause both the Input Listing (if selected), and the Cross-Reference Listing to be directed to the system printer. Each page of printed output is titled with the program name and a page number.

"I" - Will generate a listing of the input file to the printer (if selected). A list will always be generated on the screen regardless of whether or not this option is selected.

V - The V option causes all variable names in the program to be included in the Cross-Reference listing.

"L" - use of the L option signals the program to include as part of the Cross-Reference listing, all line numbers that have been referenced in RUN, THEN, GOTO, or GOSUB statements.

"D" - This option causes all duplicate references to either a data name or a line number on the same program line to be included in the Cross-Reference output. For example, in the folliwng statement, two references to the same variable (X) will be generated.

```
10 X = X+1
```

"C" - This option allows the user to specify the line width of their output. This is initially set to 32 (screen width) and should only be changed when printer output has been requested (Option "P").

"N" - Specifies the number of lines to be printed on each page of output. This value is ignored unless the "P" option has been requested.

"F" - Tells the program the name of the ASCII file that is to be processed. If this field is not entered, the next file encountered on the cassette will be used. This value is also used in the header line of each page of printed output.

In addition to the above options, CCXREF produces a Summary page at the end of the run. This page contains such information as number of program lines, number of program statements (multiple statements can be contained on a line), number of labels, number of references, and the average number of statements processed per minute.

The program contains three major phases.

1) The INITIALIZATION phase contains all the user interface. Variables are initialized and DIM'ed instructions are issued, and the options are selected.

2) In the EXTRACTION phase, each input statement is read from cassette. It is then tokenized. This tokenization is accomplished by a call to an assembly language routine (refer to listing 2) If you are unfamiliar with BASIC's tokenization process, refer to Andrew Phelp's "Comment Corner" in the March 1982 issue of Color Computer News. The input line is then scanned and all references to variable names along with all line number references are extracted, and stored in the Reference Table (R$). The Input listing is also generated in this phase.

3) The Report phase is responsible for selecting and formatting the output, according to the options selcted in the INITIALIZATION phase.

```
PSHS   U,Y,CC      SAVE BASIC'S REQUIRED REGS
LDY    <$A6        GET BASIC'S NEXT CHAR POINTER
PSHS   X,Y         SAVE ALONG WITH INPUT POINTER
LDU    2,X         SET OUTPUT AREA POINTER
LDX    2,X         GET INPUT ADDRESS
LEAX   5,X         INPUT STARTS AT +5
JSR    $B829       GO TOKENIZE
PULS   X,Y         RESTORE NEXT PTR AND INPUT ADDR
TFR    U,D         GET END ADDRESS
SUBD   2,X         CALCULATE LENGTH OF OUTPUT
STB    0,X         PUT IN OUTPUT DESCRIPTOR
STY    <$A6        RESTORE NEXT CHARACTER PTR
PULS   PC,U,Y,CC   RESTORE REGS AND RETURN
```

LISTING 2. Tokenization subroutine.

A discussion of the table handling techniques used to store the references might prove interesting at this point. The main criteria used in this design were memory conservation, and processing speed. Each variable name or referenced line number is stored as a 5 byte entry in the dimensioned array R$. A variable name entry is stored in the following manner. The first two bytes are the variable name (BASIC only uses the first two anyway), followed by a "$" if it's a string entry, and two parens "()" if part of an array. This is also the way a variable name appears on the cross-referenced line numbers are stored as 5 digit number, right justified, and zero filled. This allows for the largest allowable line number (63999). As each reference is extracted from an input statement, the line number is compressed into 2 bytes (1140-1170) and appended to the end of it's corresponding entry in the reference table. Keeping in mind that the maximum string size is 250 characters, it is possible to store up to 122 references for each table entry. The table is kept in sequence by variable name. This sequencing provides for faster table searching and eliminates the need for sorting in order to produce the cross-reference output.

An interesting little assembly language routine was developed to interface with BASIC's screen scrolling routine. This routine causes the top 3 lines of the screen to be saved for header usage. The remaining 13 lines are scrolled as they are printed on. A call to this routine causes the last 12 lines on the screen to be scrolled up 1 line. The last line is then cleared. It should be followed by a PRINT@488 statement that ends in a semi-colon to prevent BASIC from using it's own scrolling routine. Refer to Listing 3 for the source code of this routine.

```
PSHS   X,B,A       SAVE REGS BASIC EXPECTS
LDX    #$460       SET START OF SCREEN ADDRESS
JMP    $A34E       MERGE INTO BASIC'S SCROLL RTN.
```

LISTING 3. Screen scrolling routine.
CCXREF requires 16K and Extended BASIC

The use of the vitamin E option (poke 65495,0) has been intentionally omitted to ensure compatibility for all users. For those of you who have this capability, the following four lines added to the program will increase performance by approximately 25%.

```
535 POKE 65495,0
635 POKE 65494,0
665 POKE 65494,0
695 POKE 65495,0
```

Finally, the print routines were written for an OKIDATA 82A. The only problem in using other printers, are the control characters used in the heading routine.

OKIDATA control characters
CHR$(12) = FORM FEED
CHR#(31) = DESIGNATES WIDE CHARACTERS
CHR$(30) = DESIGNATES 10 CPI
If your printer does not have these codes, the appropriate characters or routines must be inserted.

LINE NOS.	ROUTINE
10	PCLEAR 1
20- 40	INPUT NEXT CHARACTER
90- 210	SCAN FOR VARIABLES
220- 260	VALIDATE LINE REFERENCE
280- 380	PRECESS A VARIABLE OR LINE REFERENCE
390- 500	CREATE ENTRY IN REFERENCE TABLE
510- 520	SKIP TO SPECIFIED CHARACTER
530- 650	INITIALIZATION ROUTINE
660- 770	MAIN PROCESSING LOOP
780- 840	INPUT LIST ROUTINE
850-1130	REPORT GENERATION
1140-1170	PACK LINE NUMBER FROM 5 BYTES INTO 2
1180-1210	UNPACK LINE NUMBER FROM 2 BYTES TO 5
1220-1300	PRINTER HEADING ROUTINE
1310-1380	SUMMARY PROCESSING
1390-1830	OPTION SELECTION ROUTINES
1840-2370	INSTRUCTION ROUTINES AND TEXT
2380	DATA FOR MACHINE LANGUAGE SCROLL ROUTINE
2390	DATA FOR MACHINE LANGUAGE TOKENIZATION ROUTINE
2400	PCLEAR AND RESET

TABLE 1. Location and usage of program subroutines.

VAR.	USAGE
A$	INPUT STATEMENT
C$	CURRENT CHARACTER BEING PROCESSED IN THE TOKENIZED INPUT STRING
CE	CURRENT NUMBER OF ENTRIES IN THE REFERENCE TABLE
CX$	HEADER CONSTANT
D$	IS USED TO ELIMINATE DUPLICATE REFERENCES IN THE PRINT ROUTINE
FI$	INPUT FILE NAME
H1$	HEADER CONSTANT
H2$	HEADER CONSTANT
HC$	HEADER CONSTANT
HD$	HEADER CONSTANT
HF$	HEADER CONSTANT
HI$	HEADER CONSTANT
HL$	HEADER CONSTANT
HN$	HEADER CONSTANT
HP$	HEADER CONSTANT
HV$	HEADER CONSTANT
I	MISC. COUNTER
I1	SCREEN POINTER USED IN OPTION SELECTION
I2	SCREEN POINTER USED IN OPTION SELECTION
IL	MAXIMUM RESPONSE LENGTH FOR OPTIONS
IN$	OPTION INPUT
IO	INPUT LISTING OPTION FLAG
J	MISC. COUNTER
L$	CONTAINS THE TOKENIZED INPUT LINE
LB$	CONTAINS THE VARIABLE OR LINE NUMBER REFERENCE WE ARE CURRENTLY PROCESSING
LC	PRINTER LINE COUNTER
LN$	CONTAINS THE CURRENT LINE NUMBER BEING PROCESSED IN TWO BYTE FORMAT
LO	LINE NUMBER OPTION FLAG
LP	MAXIMUM NUMBER OF LINES TO PRINT PER PAGE
LW	MAXIMUM LINE WIDTH TO PRINT
LX$	HEADER CONSTANT
NL	NUMBER OF INPUT LINES PROCESSED
NL$	WORK AREA USED TO PACK AND UNPACK THE LINE NUMBERS
NR	NUMBER OF REFERENCES PROCESSED
NS	NUMBER OF STATEMENTS PROCESSED
NT	NUMBER OF LABELS(TAGS) PROCESSED
PC	PRINTER PAGE COUNTER
PD	CURRENT OURPUT DEVICE 0=SCREEN -2=PRINTER
PL$	WORK AREA USED IN FORMATTING INPUT LIST
PO	PRINTER OUTPUT OPTION FLAG
PP	DUMMY CALL ARGUMENT
R$()	REFERENCE TABLE
RC	NUMBER OF REFERENCES THAT CAN BE PRINTED ON A LINE OF OUTPUT
SK$	SEARCH ARGUMENT IN SKIP TO CHARACTER RTN,
SS	SUBSCRIPT USED TO SEARCH THROUGH REFERENCE TABLE
T1$	TOKEN HOLD AREA
T2$	TOKEN HOLD AREA
TT	ELAPSED TIME COUNTER
UR$	USER RESPONSE STRING
VO	VARIABLE OPTION FLAG
X	MISC. COUNTER
Y	MISC. COUNTER

TABLE 2. Variables and their usage.

```
CXREF1.3
      PAGE 1
                              CROSS-REFERENCE
LABEL   REFERENCES

00020   00060 00080 00180 00220 0
0240 00250
        00270 00300 00520
00050   00730
00060   00060
00070   00120
00080   00150 00170 00210
00090   00100 00110
00160   00090 00180
00220   00100
00260   00230
00270   00280 00290
00280   00110 00260
00350   00320
00360   00330 00340
00370   00280 00290
00380   00300
00390   00360
00470   00420
00480   00410
00500   00470
00510   00140
00520   00200 00520
00530   02400
00660   00680 00750
00760   00660
00780   00690
00800   00810
00820   00780
00830   00830
00850   00830 00830
00860   00770
00910   00890
00920   00900
00990   00900 00910
01010   00960 00980
01040   01090
01070   01050
01100   01020
01140   00060
01180   00960
01220   00800 00860 01070 01110 0
1310
```

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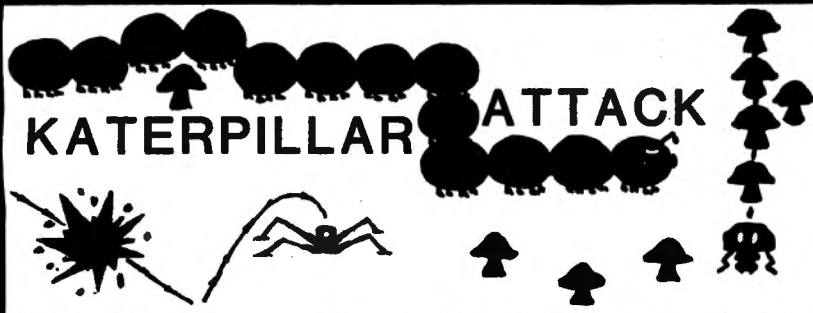

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```
01310   00770
01390   00540
01470   01720 01740 01780 01810 0
1830
01480   01570
01580   01490 01500 01510 01520 0
1530 01540
        01550
01590   01560
01610   01620 01650 01660 01680
01670   01640
01690   01630
01730   01700
01750   01690
01790   01760
01820   01750
01840   00540
```

CXREF1.3
PAGE 2

CROSS-REFERENCE

LABEL REFERENCES

```
02010   02030
02340   02090 02190 02270 02320
02350   02350
02360   01460 02340
02370   02100 02200 02280
02400   00010
A$      00670 00680 00700 00710 0
0790
        00820
C$      00030 00040 00060 00060 0
0060 00090
        00100 00100 00110 00110 0
0120 00130
        00140 00160 00180 00190 0
0190 00200
        00280 00280 00290 00290 0
0300 00310
        00380 00510 00520 00520
CE      00390 00390 00400 00440 0
0440 00450
        00480 00490 00490 00500 0
0880
CX$     00570 01930 01950 02050
D$      00860 01010 01020 01030
DD      01010 01400 01710 01730
FI$     00640 00640 01250 01250 0
1400 01830
        01830
H1$     00650 00860 01270 01270 0
1310
H2$     00650 00860 01280 01310
HC$     01430 01900 02230
HD$     01420 01890 02210
HF$     01440 01920 02290
HI$     01420 01860 02130
HL$     01420 01880 02170
HN$     01430 01910 02250
HP$     01420 01850 02110
HV$     01420 01870 02150
I       00610 00610 00940 00950 0
0970
I1      01490 01500 01510 01520 0
1530 01540
        01550 01560 01590 01650 0
1660 01660
        01660 01670 01670 01670 0
1670
I2      01590 01600 01600 01600 0
1650 01670
        01690 01700 01700 01710 0
1710 01710
        01710 01710 01730 01730 0
1730 01730
        01730 01750 01770 01770 0
1770 01790
        01800 01830
IL      01560 01580 01650
IN$     01470 01660 01660 01670 0
1670 01670
        01700 01760 01790 01800 0
1820
        01820 01820 01830
IO      00780 01400 01710 01730
J       00020 00020 00030 00040 0
0050 00920
        01040 01040 01050 01060 0
1090 01100
        01120
L$      00030 00040 00710
LB$     00080 00310 00310 00320 0
0330 00340
        00340 00350 00350 00350 0
0350 00350
        00350 00350 00370 00370 0
0380 00380
        00390 00410 00420 00450 0
0490
LC      00550 00800 00810 00810 0
0810 00810
        01070 01080 01080 01110 0
1120 01120
        01220
```

```
CXREF1.3
      PAGE 3
                    CROSS-REFERENCE
LABEL   REFERENCES


LN$     00450 00470 00490 00980 0
1010 01020
        01030 01060 01160 01180 0
1190 01190
        01190 01200 01200 01200
LO      00910 01400 01710 01730
LP      00800 01070 01110 01400 0
1770 01800
LW      00550 00810 00810 00810 0
1250 01270
        01400 01770 01800
LX$     00860 00870 01940
NL      00720 00720 01350
NL$     00050 00060 00060 00950 0
1140 01140
        01150 01150 01150 01160 0
1160 01180
        01180
NR      00450 00450 00470 00470 0
0490 00490
        01340
NS      00070 00070 01360 01370
NT      00450 00450 00490 00490 0
1330
PC      01220 01220 01250
PD      01060 01080 01120 01320 0
1330 01340
        01350 01360 01370 01710 0
1730
PL$     00790 00810 00810 00810 0
0810 00810
        00810 00820 00830 00830 0
0830 00830
        00830 00830
PO      00780 00870 00930 01230 0
1400 01710
        01730
PP      00850
R$()    00390 00410 00420 00450 0
0470 00470
        00480 00480 00490 00600 0
0890 00890
        00930 00930 00940 00950
RC      00550 01050
SK$     00200 00510 00520
SS      00390 00390 00400
T1$     00070 00160 00170 00220 0
0240
T2$     00070 00160 00160 00230 0
0230 00250
        00250
TT      00740 00740 01370
UR$     01480 01490 01500 01510 0
1520 10530
        01540 01550 01560 01570 0
1610 01620
        01630 01640 01660 01660 0
2010 02020
        02030
VO      00900 01400 01710 01730
X       00480 00480 00480 00480 0
0610 00610
        00610
Y       00400 00410 00420 00430 0
0470 00470
        00480 00490 00500 00500 0
0880 00890
        00890 00930 00930 00940 0
0950 00990
```

Sample output of CCX REF.

```
10 GOTO 2400
20 J = J+1
30 IF J > LEN(L$) THEN C$=CHR$(0
):RETURN
40 C$=MID$(L$,J,1):RETURN
50 J=0:NL$=""
60 GOSUB 20:IF C$=>"0" AND C$<="
9" THEN NL$=NL$+C$:GOTO 60 ELSE
GOSUB 1140
70 T1$="":T2$="":NS=NS+1
80 LE$="":GOSUB 20
90 IF C$ > CHR$(127) GOTO 160
100 IF C$ => "0" AND C$ <= "9" G
OSUB 220:GOTO 90
110 IF C$ => "A" AND C$ <= "Z" G
OSUB 280:GOTO 90
120 IF C$ = ":" GOTO 70
130 IF C$ = CHR$(0) THEN RETURN
140 IF C$ = CHR$(34) GOSUB 510
150 GOTO 80
160 T1$=T2$:T2$=C$
170 IF T1$=CHR$(255) GOTO 80
180 IF C$=CHR$(255) GOSUB 20:GOT
O 160
190 IF C$ = CHR$(130) OR C$ = CH
R$(131) THEN RETURN
200 IF C$ = CHR$(134) THEN SK$ =
 ":":GOSUB 520
210 GOTO 80
```

```
220 IF T1$ = CHR$(255) GOSUB 20:
RETURN
230 IF T2$ = CHR$(142) OR T2$ =
CHR$(167) GOTO 260
240 IF T1$ <> CHR$(129) GOSUB 20
:RETURN
250 IF T2$<>CHR$(165) AND T2$<>C
HR$(166) GOSUB 20:RETURN
260 GOSUB 280:RETURN
270 GOSUB 20
280 IF C$ => "A" AND C$ <= "Z" G
OSUB 370:GOTO 270
290 IF C$ => "0" AND C$ <= "9" G
OSUB 370:GOTO 270
300 IF C$ = "$" GOSUB 380:GOSUB
20
310 IF C$ = "(" THEN LB$=LB$+"()
"
320 IF LEN(LB$)<5 GOTO 350
330 IF LEN(LB$)=5 GOTO 360
340 LB$=LEFT$(LB$,5):GOTO 360
350 IF LEFT$(LB$,1)<"A" THEN LB$
=STRING$(5-LEN(LB$),"0")+LB$ ELS
E LB$=LB$+STRING$(5-LEN(LB$)," "
)
360 GOSUB 390:RETURN
370 IF LEN(LB$) > 1 AND LEFT$(LB
$,1) > "9" THEN RETURN
380 LB$ = LB$+C$:RETURN
390 IF LB$>LEFT$(R$(INT(CE/2+.99
9)),5) THEN SS=INT(CE/2+.999) EL
SE SS=1
400 FOR Y = SS TO CE
410 IF LB$ < LEFT$(R$(Y),5) GOTO
 480
420 IF LB$ = LEFT$(R$(Y),5) GOTO
 470
430 NEXT Y
440 CE=CE+1
450 R$(CE)=LB$+LN$:NR=NR+1:NT=NT
+1
460 RETURN
470 R$(Y)=R$(Y)+LN$:NR=NR+1:GOTO
 500
480 FOR X = CE TO Y STEP -1:R$(X
+1) = R$(X):NEXT X
490 R$(Y)=LB$+LN$:CE=CE+1:NR=NR+
1:NT=NT+1
500 Y=CE:NEXT Y:RETURN
510 SK$=C$
520 GOSUB 20:IF C$=SK$ OR C$=CHR
$(0) THEN RETURN ELSE GOTO 520
530 CLEAR 4000,16346
540 GOSUB 1840:GOSUB 1390
550 RC=INT((LW-7)/6):LC=999
560 CLS
570 PRINT@6,CX$
580 PRINT@41,"INPUT LISTING"
590 PRINT STRING$(32,"-")
600 DIM R$(250)
610 FOR X = 16347 TO 16383:READ
I:POKE X,I:NEXT X
620 DEF USR0=16347
630 DEF USR1=16355
640 IF FI$="NO NAME" THEN OPEN "
I",-1,"" ELSE OPEN "I",-1,FI$
650 H1$=" INPUT LISTING":H2$=" "

660 IF EOF(-1) GOTO 760
670 LINE INPUT#-1,A$
680 IF LEN(A$)=0 GOTO 660
690 GOSUB 780
700 A$="      "+A$+CHR$(0)
710 L$=USR1(A$)
720 TIMER=0:NL=NL+1
730 GOSUB 50
740 TT=TT+TIMER
750 GOTO 660
760 CLOSE #-1
770 GOSUB 860:GOSUB 1310:STOP
780 IF NOT IO OR NOT PO GOTO 820

790 PL$=A$
800 IF LC>LP GOSUB 1220
810 IF LEN(PL$)<=LW THEN PRINT#-
2,PL$:LC=LC+1 ELSE PRINT#-2,LEFT
$(PL$,LW):LC=LC+1:PL$="      "+RI
GHT$(PL$,LEN(PL$)-LW):GOTO 800
820 PL$=A$
830 IF LEN(PL$)<32 THEN GOSUB 85
0:PRINT@448,PL$ ELSE GOSUB 850:P
RINT@448,LEFT$(PL$,31):PL$="
 "+RIGHT$(PL$,LEN(PL$)-31):GOTO
830
840 RETURN
850 PP=USR0(0):RETURN
860 H1$="CROSS-REFERENCE":H2$=LX
$:D$=" ":GOSUB 1220
870 IF NOT PO THEN PRINT@32,LX$
880 FOR Y = 1 TO CE
890 IF LEFT$(R$(Y),1) =>"0" AND
LEFT$(R$(Y),1)<="9" GOTO 910
900 IF VO GOTO 920 ELSE GOTO 990

910 IF NOT LO GOTO 990
920 J=0
930 IF PO THEN PRINT#-2,LEFT$(R$
(Y),5); ELSE PRINT@448,LEFT$(R$(
Y),5);
940 FOR I = 1 TO (LEN(R$(Y))-5)/
2
950 NL$=MID$(R$(Y),(I-1)*2+6,2)
```

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COMPARISON CHART	SUPER COLOR WRITER			THE COMPETITION		
System Size	4K	16K	32K	4K	16K	32K
TAPE Text space	N A	8K	24K	N/A	2K	18K
ROMPAK Text space	2 5K	15K	31K	N/A	N A	N A
DISK Text space	N A	6 5K	22 5K	N/A	0 5K	16 5K
Right Justify		YES			NO	
Video Window		YES			NO	
Edit any ASCII File		YES			NO	

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```
960 GOSUB 1180:GOSUB 1010
970 NEXT I
980 LN$="DONE":GOSUB 1010
990 NEXT Y
1000 RETURN
1010 IF NOT DO AND LN$=D$ THEN R
ETURN
1020 IF LN$="DONE" THEN D$=" ":G
OTO 1100
1030 D$=LN$
1040 J=J+1
1050 IF J>RC GOTO 1070
1060 PRINT#PD,TAB((J-1)*6+7);LN$
;:RETURN
1070 IF LC>LP GOSUB 1220
1080 LC=LC+1:PRINT#PD," "
1090 J=0:GOTO 1040
1100 IF J=0 THEN RETURN
1110 IF LC>LP GOSUB 1220
1120 J=0:LC=LC+1:PRINT#PD," "
1130 RETURN
1140 NL$=HEX$(VAL(NL$))
1150 NL$=STRING$(4-LEN(NL$),"0")
+NL$
1160 LN$=CHR$(VAL("&H"+LEFT$(NL$
,2)))+CHR$(VAL("&H"+RIGHT$(NL$,2
)))
1170 RETURN
1180 LN$=STR$(VAL("&H"+HEX$(ASC(
LEFT$(NL$,1))))*256+VAL("&H"+HEX
$(ASC(RIGHT$(NL$,1)))))
1190 LN$=RIGHT$(LN$,LEN(LN$)-1)
1200 LN$=STRING$(5-LEN(LN$),"0")
+LN$
1210 RETURN
1220 LC=6:PC=PC+1
1230 IF NOT PO THEN RETURN
1240 PRINT#-2,CHR$(12) CHR$(31)
1250 PRINT#-2,FI$;STRING$(LW/2-L
EN(FI$)-7," ");"PAGE";STR$(PC)
1260 PRINT#-2,CHR$(30)
1270 PRINT#-2,TAB(INT(LW-LEN(H1$
))/2);H1$
1280 PRINT#-2,H2$
1290 PRINT#-2," "
1300 RETURN
1310 H1$="     SUMMARY":H2$=" ":G
OSUB 1220
1320 PRINT#PD," "
1330 PRINT#PD,"NUMBER OF LABELS
    =";NT
1340 PRINT#PD,"NUMBER OF REFEREN
CES =";NR
1350 PRINT#PD,"NUMBER OF LINES
    =";NL
1360 PRINT#PD,"NUMBER OF STATEME
NTS =";NS
1370 PRINT#PD,USING "STATEMENTS/
MINUTE     = ##.#";(NS/(TT/60/60)
)
1380 RETURN
1390 CLS
1400 PO=0:IO=0:VO=-1:LO=-1:DO=0:
LW=32:LP=16:FI$=""
1410 PRINT@3,"CURRENTLY SELECTED
 OPTIONS"
1420 PRINT@65,"NO      ";HP$;"
 NO      ";HI$;"     YES     ";HV$;
"     YES     ";HL$;"     NO      ";
HD$
1430 PRINT@257,"32      ";HC$;"
  16      ";HN$
1440 PRINT@352,"NO NAME  ";HF$
1450 PRINT@425,"ENTER OPTIONS"
1460 GOSUB 2360
1470 IN$=""
1480 UR$=INKEY$
1490 IF UR$="P" THEN I1=65:GOTO
1580
1500 IF UR$="I" THEN I1=97:GOTO
1580
1510 IF UR$="V" THEN I1=129:GOTO
 1580
1520 IF UR$="L" THEN I1=161:GOTO
 1580
1530 IF UR$="D" THEN I1=193:GOTO
 1580
1540 IF UR$="C" THEN I1=257:GOTO
 1580
1550 IF UR$="N" THEN I1=289:GOTO
 1580
1560 IF UR$="F" THEN IL=8:I1=352
:GOTO 1590
1570 IF UR$=" " THEN RETURN ELSE
 GOTO 1480
1580 IL=3
1590 I2=I1
1600 IF I2=352 THEN PRINT@I2,"
      "; ELSE PRINT@I2,"    ";
1610 UR$=INKEY$
1620 IF UR$="" GOTO 1610
1630 IF UR$=CHR$(13) GOTO 1690
1640 IF UR$=CHR$(08) GOTO 1670
1650 IF I1-I2+1>IL GOTO 1610
1660 PRINT@I1,UR$;:I1=I1+1:IN$=I
N$+UR$:GOTO 1610
1670 IF I1>I2 THEN I1=I1-1:PRINT
@I1," ";:IN$=LEFT$(IN$,LEN(IN$)-
1)
1680 GOTO 1610
1690 IF I2>193 GOTO 1750
```

```
1700 IF LEFT$(IN$,1)="Y" THEN PR
INT@I2,"YES"; ELSE PRINT@I2,"NO
";:GOTO 1730
1710 IF I2=65 THEN PO=-1:PD=-2 E
LSE IF I2=97 THEN IO=-1 ELSE IF
I2=129 THEN VO=-1 ELSE IF I2=161
 THEN LO=-1 ELSE IF I2=193 THEN
DO=-1
1720 GOTO 1470
1730 IF I2=65 THEN PO=0:PD=0 ELS
E IF I2=97 THEN IO=0 ELSE IF I2=
129 THEN VO=0 ELSE IF I2=161 THE
N LO=0 ELSE IF I2=193 THEN DO=0
1740 GOTO 1470
1750 IF I2>289 GOTO 1820
1760 IF VAL(IN$)<>0 GOTO 1790
1770 IF I2=257 THEN PRINT@I2,"32
 ";:LW=32 ELSE PRINT@I2,"16 ";:L
P=16
1780 GOTO 1470
1790 PRINT@I2,MID$(STR$(VAL(IN$)
)+"  ",2,3);
1800 IF I2=257 THEN LW=VAL(IN$)
ELSE LP=VAL(IN$)
1810 GOTO 1470
1820 IF IN$="" OR LEFT$(IN$,1)="
 " THEN IN$="NO NAME"
1830 FI$=LEFT$(IN$+"          ",8)
:PRINT@I2,FI$;:GOTO 1470
1840 CLS
1850 HP$="'P' - PRINTER OUTPUT "

1860 HI$="'I' - INPUT LISTING  "

1870 HV$="'V' - VARIABLE NAMES "

1880 HL$="'L' - LINE NUMBERS   "

1890 HD$="'D' - DUPLICATES     "

1900 HC$="'C' - NO. CHARS/LINE "

1910 HN$="'N' - NO. LINES/PAGE "

1920 HF$="'F' - INPUT FILE NAME"

1930 CX$="COLOR XREF GENERATOR"
1940 LX$="LABEL  REFERENCES"
1950 PRINT@70,CX$
1960 PRINT@171,"WRITTEN BY"
1970 PRINT@202,"MIKE DONAHUE"
1980 PRINT@231,"342 HILLCREST AV
E."
1990 PRINT@262,"BLACKWOOD, N.J.
08012"
2000 PRINT@422,"INSTRUCTIONS ? Y
/N"
2010 UR$=INKEY$
2020 IF UR$="N" THEN RETURN
2030 IF UR$<>"Y" GOTO 2010
2040 CLS
2050 PRINT@38,CX$
2060 PRINT@96,"INPUT TO THIS PRO
GRAM IS A BASICPROGRAM FILE THAT
 HAS BEEN SAVEDIN ASCII FORMAT."

2070 PRINT@224,"ANY SYNTAX ERROR
S CONTAINED IN  IT MAY CAUSE RES
ULTS THAT ARE   UNPREDICTABLE."
2080 PRINT@352,"A LISTING OF THE
 INPUT FILE WILLALSO BE GENERATE
D ON THE SCREEN WHEN THE PRINT O
PTION IS CHOSEN."
2090 GOSUB 2340
2100 GOSUB 2370
2110 PRINT@64,HP$
2120 PRINT@102,"ALL SELECTED OUT
PUTS WILL       BE DIRECTED TO T
HE PRINTER"
2130 PRINT@160,HI$
2140 PRINT@198,"A LIST OF THE IN
PUT FILE        WILL BE PRODUCED
"
2150 PRINT@256,HV$
2160 PRINT@294,"ALL PROGRAM VARI
ABLES           WILL BE CROSS-RE
FERENCED."
2170 PRINT@352,HL$
2180 PRINT@390,"ALL PROGRAM LINE
 NUMBERS        WILL BE CROSS-RE
FERENCED."
2190 GOSUB 2340
2200 GOSUB 2370
2210 PRINT@64,HD$
2220 PRINT@102,"ALL DUPLICATE RE
FERENCES        TO EITHER A VARI
ABLE NAME       OR A LINE NUMBER
 ON THE         SAME PROGRAM LIN
E WILL BE       LISTED."
2230 PRINT@256,HC$
2240 PRINT@294,"MAXIMUM NUMBER O
F CHARS TO      BE LISTED ON A L
INE."
2250 PRINT@352,HN$
2260 PRINT@390,"MAXIMUM NUMBER O
F LINES TO      BE LISTED ON EAC
H PAGE OF       OUTPUT."
2270 GOSUB 2340
2280 GOSUB 2370
2290 PRINT@64,HF$
2300 PRINT@102,"NAME OF FILE TO
BE CROSS-       REFERENCED. IF B
LANK THE        NEXT FILE ON THE
 CASSETTE       WILL BE USED."
```

CROSS-REFERENCE

```
2310 PRINT@256,"TO SET ANY OPTIO
NAL VALUE, KEY  THE OPTION LETTE
R IMMEDIATELY   FOLLOWED BY THE
DESIRED VALUE   AND <ENTER>"
2320 GOSUB 2340
2330 RETURN
2340 GOSUB 2360
2350 IF INKEY$<>" " GOTO 2350 EL
SE RETURN
2360 PRINT@483,"PRESS <SPACE> TO
 CONTINUE";:RETURN
2370 CLS:PRINT@7,"AVAILABLE OPTI
ONS":RETURN
2380 DATA 52,22,142,4,96,126,163
,78
2390 DATA 52,97,16,158,166,52,48
,238,2,174,2,48,5,189,184,41,53,
48,31,48,163,2,231,132,16,159,16
6,53,225
2400 PCLEAR 1:GOTO 530
```

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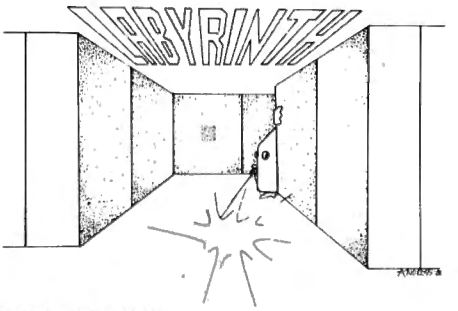

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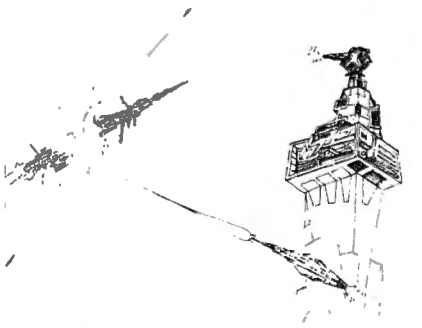

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TECHNIQUE : COMBINING PROGRAMS ON YOUR COLOR COMPUTER USING "CLOAD"

By: Donald E. Dunlap
6840 Tanya Terrace
Reynoldsburg, OH 43068

Combining several programs from tapes on your TRS-80 Color Computer is as easy as PEEK, PEEK, POKE.

Normally, when you CLOAD a program, any program already in memory is over-written and lost. Here is a way to combine programs by adding succeeding programs onto the end of the current program. However, some precautions must be observed when using this technique.

All programs after the first must have their line numbers higher than the line numbers of the root program. Unlike a "merge" technique, this technique does not combine programs or replace identical line numbers. It simply "tacks on" a program at the end of the one already in memory. This small limitation can be overcome by using the RENUM command as shown in the example following. Note: the program to be "tacked on" may be resequenced after the operation has begun, it does not have to have the higher line numbers to begin with.

The technique is accomplished as follows:

Step 1:

CLOAD the first program. My first program had 210 as its highest line number.

Step 2:

Type : PRINT PEEK(25); PEEK(26)

The computer will print two decimal numbers on the screen. For example:

30 1

These two numbers will vary depending on whether you have a 4K computer, 16K computer, or if you have used the PCLEAR command before using this procedure. This doesn't matter in the least, just write down those two numbers as 25 = X1 and 26 = Y1 where X1 is the first decimal number on the screen, and Y1 is the second.

Step 3:

(Note: before proceeding, ascertain that you know the highest line number of the program currently in memory.)

Type: PRINT PEEK(27); PEEK(28)

The computer will again print two decimal numbers on the screen:

In my example, the computer printed 31 and 85. Again, write down these two numbers as X2 = (the first number on the screen) and Y2 = (the second).

Step 4:

Type: POKE 25,"X2"

(where X2 = the number provided by Step 3)

POKE 26, "Y2" -2

(where Y2 = the second number provided by Step 3, minus 2.)

For instance, in my case I entered:

POKE 25,31

POKE 26,83

(since my Y2 = 85, and 85 - 2 = 83)

If your number "Y2" should turn out to be a "0" or a "1" you must do the following instead:

Type: POKE 25,"X2" - 1

(subtract 1 from X2)

POKE 26,nn

(If Y2 = 1, nn = 255)

(If Y2 = 0, nn = 254)

Now you are ready to load the next program.

Step 5:

Type: CLOAD

(at this point the computer begins loading the second program from tape)

Step 6:

Type: LIST

Look at the first line number of the program you have just loaded. Don't panic. Your first program is still in memory, you just can't see it at this point. Determine if the first line number of this second program is less than the highest line number of the first. If this second program has line numbers within the range of the first, you must renumber it starting with higher line numbers. This is a simple process on the Color Computer, just use the RENUM command.

In my example, my second program had line numbers 5 - 210 which were in the range of the first. Therefore a RENUM had to be issued. So I typed, RENUM 500, 5. This renumbered the second program starting with line 500. It is very important that the numbers follow a low to high sequence since that is the only way the computer can store the resulting concatenated programs.

And now for the magic:

Step 7:

We are ready to combine the two programs. You must look back at Step 2 and retrieve the two numbers I asked you to write down. In my case, they were 30 and 1.

Type: POKE 25,"X1"

(where "X1" is the first decimal number from Step 2, in my example, 30)

POKE 26,"Y1"

(where "Y1" is the second number from Step 2)

That is all there is to it. Type "LIST" and you should see both programs combined.

At this point, you may add, change, or delete lines as you wish, the programs are now considered as one.

Summary:

COMBINING WITH CLOAD

I used this technique to combine 13 short graphics programs into one long graphics demonstration program. To accomplish this, I just combined the first and second programs as shown above, and then repeated Steps 3 through 7. Be sure you have enough memory to hold all the code.

Another application could be to store the DATA lines for a program as a separate tape. The DATA lines could then be used as a data base for more than one program.

Memory location 25 and 26 is a pointer to where the BASIC program starts in your Color Computer. If you do the following, you can find the starting address of the program:

```
PRINT (PEEK(25)*256) + PEEK(26)
```

Following is the actual input used to accomplish my example on my computer:

```
(CLOAD THE FIRST PROGRAM)
PRINT PEEK(25); PEEK(26) result: 30 1
PRINT PEEK(27); PEEK(28) result: 31 85
POKE 25,31
POKE 26,83
(CLOAD NEXT PROGRAM)
(RENUM IF NECESSARY)
POKE 25,30
POKE 26,1
Mission accomplished!
```

REVIEW OF MASTER CONTROL

by Larry Grady
999 Ridge Ave.
Manasquan, NJ 08736

After using CoCo for the better part of a year I was generally very impressed with its power and versitility. There were however several features lacking in CoCo that I had grown accustomed to at work. The terminals we use have "Macro Key" capability. This enables you to program a series of keystrokes to form freqently used instructions that are executed with usually 1 to 3 keystrokes. It is a great time and error saver and is often the case, user hostle system. Another important feature CoCo lacks is automatic line numbering.

You all can understand that when I saw Soft Sector Marketing's ad for MASTER CONTROL I slinked to the cookie jar for cash and then off to the post office. Not quite a week later an envelope arrived with an overlay, tape and brief instructions.

According to the instructions I could enter strings of characters with a two keystroke sequence. As one of the keys is always the same (down arrow key) and an overlay is supplied keying in basic should be duck soup. For instance (down arrow) (R) causes "RIGHT$(" to be entered. A single key (more about that later) called a custom key can be programed to literately any key stroke sequence. MASTER CONTROL comes with the key programed to make three copies of itself! You can set the line number the autonumbering will start with as well as the increment. A two keystroke sequence conveniently turns auto line numbering on and off. Complete instructions for loading MASTER CONTROL are included for either a 16K or 32K CoCo.

Before I continue let me say CoCo is far more friendly and useful with MASTER CONTROL than without-I wouldn't be without it, however a few words are necessary which I hope SSM will take in the spirit they are intended.

The overlay which is supplied is not as pictured in their ads. It is a silver colored reflective die cut foil about 4 by 11 inches backed with adhesive. I am reasonably handy and decided to aply the overlay as instructed.

I thoroughly cleaned CoCo with Fantastic and wiped it off with a damp cloth. I peeled the backing from the overlay. Then the fun began. The blankety blank thing stuck to me, the keys, itself, the kids (they were helping), everything except the keyboard frame. Time and persistance prevailed and with only a few rips and wrinkles it was on. However, from that day to now, when using CoCo, first and often push down that overlay as it curls up. A plastics engineer friend said Radio Shack probably uses a mold release that very few adhesives would stick to.

Please SSM supply a rigid overlay that the user could tack glue if he wished. A good product for SSM would be a overlay with separate self stick functions like the one supplied by HEWLET PACKARD for their HP-41C calculator. With the "Macro Key" capability described below such a product would be ideal. While we are on the subject of the overlay, that reflective surface is very annoying. It is hard to look at the keyboard without catching a reflection from somewhere. Radio Shack had it right with a dark mat finished background.

Moving on to actually using the program. Alan Schwartz is to be congratulated on an inovative and highly useful program. It is written in machine language and from the first worked as the very brief but adequate instructions indicated. I am not a typist, and use two fingers most of the time, but I move right along and MASTER CONTROL does not seem to slow CoCo down at all. The first few days living with MASTER CONTROL the kids and I keyed in some programs from CCN and RAINBOW. MASTER CONTROL makes that task much faster and far less error prone.

A very useful capability provided by MASTER CONTROL is auto line numbering. This is most useful if the published program has been renumbered for equal increments between lines (are you listening RAINBOW and CCN?). It is also very handy for original programs, especially if you are like me. Have you ever been engrossed in the beautiful intricate logic of the program and keyed it in only to look at the screen and see rows of ?SN ERROR OK. The OK is cruel irony. I also find that the readability of my programs has improved because I go to a new line more frequently and use more comments. Auto line numbering is a winner.

As I used MASTER CONTROL I found that while there are a lot of commands there are a lot missing. Gee thought I, it would be nice to be able to reprogram the keyboard depending on what type of program I was working on. Maybe? If? Armed with CCEAD (Color Computer Editor, Assembler, Debugger from EIGEN SYSTEMS, PO BOX 10234, Austin Texas a $6.95 jewel) and a Disassembler (a real jewel from Feb. 82 CHROMASETTE tape magazine, PO BOX 1087, Santa Barbara, CA 93102) I fearlessly looked into the guts of MASTER CONTROL.

Low and behold, by George, I think I got it! A late night and vola the accompanying Basic

The Platinum Worksaver©

...Programming Made Easy

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NUMERIC KEYPAD

We've solved another Color Computer weakness. Press a control key and letters J, K, L, U, I, O, P become number keys 1-7. Numbers 8-0 remain in their normal positions. The key pad numbers are clearly labeled on the overlay.

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Platinum Enhanced 16K Color Computer	vs.	Regular 16K Extended Color Computer
• Relocate, join, duplicate individual and unique sets of lines at the push of a button		• **Retype** entirely any lines to be moved or joined
• Create the following using only 31 keystrokes: CLS:A$-Strings$ (15"") + MID$ (CL$, 6, 2). To change the – symbol to = requires only 3 keystrokes!!!!		• **Type** that line using 47 keystrokes. To change the symbol, **Backspace** and **retype** using 33 more strokes!
• Retain the sequence of commands in temporary memory with special reserved key		• **Retype** lost lines!
• One keypush and the right side of the keyboard converts to a numeric Keypad		• **Stretch** those fingers!
• Correct bugs while your program is running, without losing data.		• Oops! **Lost** data! **Retype, Reload** and **Save** data while swearing a lot.
• Edit programs, data and strings using the full screen editor.		• NO CAN DO!

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- *Fully labeled acetate keyboard overlay*
- *Complete instructions*
- *Loads in seconds, takes less than 2K*

FEATURE	Full Screen Editing	Dynamic Editing	Single Function Keys	Numeric Keypad	Price
Platinum Enhanced 16K Color Computer	yes	yes	yes	yes	$ 629.**
TRS-80* Model III	no	no	no	yes	$ 999.
TRS-80* Model II	no	no	no	yes	$3450.

The PLATINUM WORKSAVER costs $30.00 plus $3.00 S&H (NY residents add 7% tax). To order write:

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platinum software

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**$30.00 plus $599. suggested price for 16K Color Computers (we do not sell the computers).

program. This program allows you to fully exploit the potential of MASTER CONTROL.

Using this Basic program I have reprogramed MASTER CONTROL's key definition table to gain a custom keyboard for graphic, string or mathematical programs. Even created a keyboard to emulate for Hewlet Packard "RPN" calculators.

For the most part since the overlay is useful (and partially stuck on) I use those functions supplied plus some new functions and modifications to standard functions.

For example the LLIST macro I now use sets CoCo clock slow, sets the baud rate, sends several control characters to the printer, and LLIST all with three (count 'em) three keystrokes. An example of a useful new function is combining the commands and instructions necessary to load two or more basic programs at the same time. The three step procedure is accomplished by the redefined < > ? keys. First key (DA) (down arrow) then < load low numbered tape, key (DA) then > load the high numbered tape then key (DA) then ? easy as 1,2,3.

Since by definition programers are never completely happy with someone elses program it is impossible to create an ideal keyboard (having more functions than keys does not help). For instance if you are doing a graphics program you want the macro to generate 'line(' if however you are doing a data entry program 'lineinput' would be more convenient. The ability to change any or all keys is a powerful tool and one you will not stop using once you start.

Even with the basic programs ability to change any key in practice you will not find yourself changing the keyboard often once it is comfortable to you. That is when you will appreciate the custom key. With no fuss you can insert any string of keystrokes you find yourself repeating. For example in a section of code you are using 'USR2 (VARPTR(AA$(X)))' often, 20 keystrokes per use after the first can be saved (not to mention errors).

In summation, I believe MASTER CONTROL to be a great time and error saver well worth the price of $24.95 plus $2.50 P&H. Modesty forbids my stating how much more power my program gives MASTER CONTROL.

MASTER CONTROL is a copyrighted program by Alan Schwartz.

Marketed by Soft Sector Marketing, 6250 Middlebelt, Garden City, MI 48135 (800) 521-6504 in Michigan (313) 425-4020

```
30000 '************************
**********
30010 '*******
      *******
30020 ' MACRO KEY REDEFINITION P
ROGRAM
30030 '****** FOR 'MASTER CONTRO
L *********
30040 '*******
      ********
30050 '************************
**********
30060 '
30070 '
30080 'ON TAPE "MCMACRO4 REV 3/1
9/82
30090 '
30100 '*NOTE:MASTER CONTROL IS A
 PROGRAM COPYRIGHTED IN 1981 BY
30110 'SOFT SECTOR MARKETING,INC
.
30120 '6250 MIDDLEBELT
30130 'GARDEN CITY,MICHIGAN 4813
5
30140 '(313) 45-4020
30150 '
30160 '
30170 'THIS PROGRAM
30180 'COPYRIGHT 3/14/82 BY
30190 'LARRY GRADY (201)223-5366

30200 '999 RIDGE AVE
30210 'MANASQUAN,N.J. 08736
30220 '
30230 CLS3
30240 PRINT@32,"*******MACRO KEY
 GENERATOR******COPYRIGHT 1982
BY                LARRY GRADY FOR
                  SOFT SECTOR MARK
ETING INC.        COPYRIGHTED PROG
RAM"
30250 PRINT"      MASTER CONTROL
                ********************
************THIS PROGRAM CANNOT
REDIFINE THE <BREAK> OR<K> KEYS.
 IF YOU WISH MEMORY CHANGE UTILI
TY PRESS     QUICKLY (@@) A SECON
D(@@)<ENTER>WILL EXIT TO BASIC
30260 '
30270 '*****THSI SECTION SETS UP
S THE CONSTANTS NESSARY TO INTER
FACE TO MASTER CONTROL
30280 '
30290 SP=256*PEEK(157)+PEEK(158)
'ADDERSS OF START OF MASTER CONT
ROL
```

```
30300 PT=SP+(&H7CE0-&H7B00)'ADDE
RSS OF PONTER TO 'K' END OF MAN
TABLE
30310 IFPT<2^14THENTM=&H3FFF ELS
ETM=&H7FFF '"TM"IS TOP OF MEMORY

30320 OF=256*PEEK(PT)+PEEK(PT+1)
 'OFFSET FROM "PT +2" TO "K" POI
NTER
30330 KM=OF+PT+2 'ADDRESS OF THE
 START OF MAIN AREA
30340 ST=SP+(&H7DF3-&H7B00) 'ADD
RESS OF THE START OF MAIN TABLE
AREA
30350 '
30360 '**** THIS SECTION INPUTS
KEY TO BE MODIFYED AND EXITS TO
BASIC
30370 '   WHEN A QUICK TWO KEY <
@><@> SEQUENCE IS DECODED
30380 '
30390 'PRINT"<@@>END/<KEY> TO BE
 REDEFINED?";
30400 RK$=INKEY$:IFRK$=""THEN304
00 ELSEPRINTRK$:TIMER=0
30410 IFRK$<>"@"THEN30440
30420 Q$=INKEY$:IFQ$=""ANDTIMER<
60THEN30420
30430 IFQ$="@"THEN31070 'TIS IS
MAIN EXIT TO BASIC OR UTILITY AF
TER '@@' IS ON SECOND*******
30440 IFRK$="K"THENPRINT"TO MODI
FY KEY(K) USE MC CUSTOM KEY CHAN
GE ROUTINE,PLEASE":GOTO30390
30450 IFLEN(RK$)<>1THEN30390
30460 BA=0:BE=0'CLEAR PREVIOUS B
EGINING AND END OF KEY MACRO
30470 '
30480 '****THSI SECTION FINDS BE
GINING OFFSET OF MACRO TO BE CHA
NGED
30490 '
30500 FORX=ST TOKM-1
30510 IFPEEK(X)<>&H7D THEN30540
30520 IFPEEK(X+1)<>ASC(RK$)THEN3
0540
30530 BA=X+1:X=KM-1
30540 NEXTX
30550 IFBA=0THENPRINT"NOT FOUND"
:GOTO30290
30560 '
30570 '
30580 '
30590 '***** THIS SECTION PUTS O
LD MACRO IN T$ AND FINDS "EA" AD
DRESS OF END OF OLD MACRO
30600 '
30610 T$=""
30620 FORX=BA+1 TO KM
30630 IFPEEK(X)=&H7D THENX=KM:GO
TO30650
30640 T$=T$+CHR$(PEEK(X)):EA=X
30650 NEXT
30660 IFEA=0 OR EA>TM THENPRINT"
ERROR IN EA=";EA:STOP
30670 PRINTT$
30680 '
30690 '*** THIS SECTON INPUTS NE
W MACRO AND CHECKS IF ENOUGH MEM
ORY AVAILABLE
30700 '
30710 PRINT"@@ TO END/INPUT DATA
 INTO MACRO"
30720 LINEINPUT C$:IFC$=""THENPR
INT"<ENTER> IS A ILEGAL MACRO,PL
EASE2:GOTO30290
30730 IFC$="@@"THEN30390
30740 RB=0'"RB"IS USED TO STORE
BYTES OF MEMORY LEFT;"LB"IS ADDR
ESS OF LAST BYTE USED
30750 FORX=KM TO TM
30760 IFPEEK(X)=&H7D THENLB=X:AB
=TM-LB:X=TM
30770 NEXTX
30780 T=LEN(T$):C=LEN(C$)
30790 IFRB<C-T THENPRINT"NOT ENO
UGH MEMORY LEFT":GOTO39719
30800 '
30810 '****THIS SECTION INSERTS
THE NEW MACRO AND EXPANDS OR
30820 '        CONTRACTS THE MACR
O TABLE AS NESSARY
30830 '
30840 IFC<>T THEN30910
30850 '*****REPLACEMENT MACRO SA
ME LENGTH AS OLD
30860 FORX=1TOC
30870 POKE(BA+X),ASC(MID$(C$,X,1
))
30880 NEXTX
30890 PRINT"DONE,ANY MORE?"
30900 GOTO30290
30910 '***REPLACEMENT MACRO LONG
ER THAN OLD
30930 FORX=LB TO EA+1STEP-1
30940 POKEX+(C-T),PEEK(X)
30950 NEXTX:GOTO31010
30960 '*****REPLACEMENT MACRO SH
ORTER THAN OLD
30970 FORX=EA+1TOLB
30980 POKEX+(C-T),PEEK(X)
30990 NEXT
```

```
31000 '***** ADJUST "K"POINTER T
O NEW LOCATION
31010 OF=OF+(C-T):O=INT(OF/256)
31020 POKEPT,O:POKEPT+1,OF-(O*25
6)
31030 GOTO30860
31040 '
31050 '***POKE TO MEMORY UTILITY

31060 '
31070 CLS3
31080 PRINT"IF YOU WANT TO EXIT
TO BASIC     PRESS <@@> IF YOU WI
SH TO MODIFYMORE KEYS PRESS <M>,
 OTHERWISE"
31090 INPUT"INPUT STARTING ADDRE
SS, IF HEX USE&HXXXX WHERE XXXX
IS HEX     INTERGER OTHERWISE ENT
ER DECIMAL  INTERGER";S$:IFS$="M
"THEN30230
31100 IFS$="@@"THENEND ELSE S=IN
T(VAL(S$))
31110 IFS<OORS>65435THENPRINT"OU
T OF RANGE, PLEASE INPUT VALAD":
GOTO31090
31120 FORX=STO (&HFFFF)
31130 P=PEEK(X)
31140 PRINTHEX$;TAB(6);X;TAB(13)
;P;TAB(18);HEX$(P);
31150 IF(P>32 AND P<91)OR(P>96 A
ND P<123)THENPRINTTAB(22);CHR$(P
)
31160 PRINTTAB(25);:INPUTY$:IFY$
="@@"THENX=&HFFFF:GOTO31200
31170 Y=INT(VAL(Y$)):IFY=OTHEN31
200ELSEIFY(1 OR Y>255 THEN PRINT
"RANGE INVALID2:GOTO31200
31180 IFX>&H7FFFTHENPRINT"ERROR
ROM":GOTO31200
31200 NEXTX:GOTO31070
```

Summer Software Selection For Your TRS-80 Color Computer

the PROGRAM STORE

Voyager I

From Avalon Hill

You're on board a spaceship infested with killer robots in this graphic science fiction game. You must clear the 4-level 144-location ship of robots and arm it to self-destruct. Can you do it and escape before you, too, are blown up? High-speed graphics are represented in 3-D perspective representing your eye's view; with instant switching to floor plan maps. Extended BASIC required.

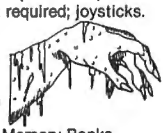
16K Tape, $19.95

Ghost Gobbler

From Spectral Associates

In this new and exciting version of the popular arcade game, use your joysticks to move your Ghost Gobbler through the maze, eating dots and power pills to score points. 8 bonus shapes, super sound, and 16 skill levels. Extended BASIC not required; joysticks.

16K Tape, $21.95



Creatavader

By Fred Scerbo from Illustrated Memory Banks

Create your own antagonist, and fire away! Pick your pet target, or use ours: tv sets, killer tomatoes or smiley faces. Use the joystick to fire your cannon and clear the screen. Look out for the secret target defender! Extended BASIC and one joystick required.

16K Tape, $18.95

Madness and the Minotaur

From Spectral Associates

Classic adventure game with 200 rooms, assorted friendly and dangerous creatures, 8 magic spells and —of course—treasures. The computer obeys two-word commands such as "get lamp" to move you through your journey. You must enter the castle of King Minos, descend into the labyrinth and collect all the treasures you can.

16K Tape, $19.95

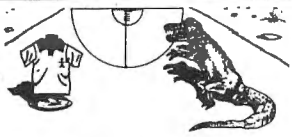
Color Computer Blockade

By Terry Kepner from Interpro

Compete against a friend or the computer in this real-time, full color arcade game with sound effects. Use your joysticks to draw a barrier around your opponent while avoiding the trap being set for you. Requires joysticks.

Level I 4K/16K or Level II with Extended BASIC

Tape, $14.95



Gator Zone

By Scerbo and Jammalo from Illustrated Memory Banks

Revenge on the Preppies at last!! The Preppy Craze has gotten completely out of control. You must journey to the planet "Preptune" to stop the 'gators from invading earth in assorted garment forms. Use your shirt shields and lasers to protect you as you aim the crosshairs and press the fire button on your joystick. Get the gators before they get your shirts! 3 levels of difficulty. Extended BASIC required; joysticks.

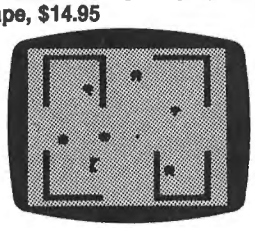
16K Tape, $18.95

Moon Lander

By Greg Zumwalt from American Small Business Computers

Pilot your spacecraft over the moon's landscape and try to land it amid the mountains and craters. While carefully controlling your fuel consumption, use your joysticks to maneuver your craft and control your velocity against the forces of gravity. Be careful to avoid the asteroids drifting through space.

16K Tape, $14.95



Robot Battle

From Spectral Associates

Can you dodge the never-ending horde of robots while avoiding the fatal touch of the Android? Realistic voices and 16 skill levels provide a tremendous arcade type challenge. Does not require Extended BASIC; joysticks.

16K Tape, $21.95

The Super "Color" Terminal

From Nelson Software Systems

Time Share, Smart Terminal, High-speed Data Transfer and Videotex. Turns your Color Computer into a Super-smart terminal with all the features of VIDEOTEX plus much more. Communicate with Dow Jones, Compuserve and computers like TRS-80 Models I, II, III, APPLE, etc. via modem or RS-232 direct. Save the data to tape, or print it! Cuts on-line costs to a minimum.

Disk, $69.95 ROM Pak, $49.95

TRS-80 Color Basic

By Bob Albrecht from John Wiley & Sons

Step-by-step guide to the unique color, sound and graphic capabilities of your new Color Computer. No previous experience is required. Teach yourself BASIC—there's a whole chapter on typical programming problems and solutions.

Softcover, $9.95

TRS-80 Programs and Applications for the Color Computer

By Alfred Baker from Reston

Handy guide to your Color Computer: how to play games, balance your checkbook, use your computer as a teacher, etc. With chapters on color and sound, art and music. Helpful for beginning or experienced computer user.

Softcover, $14.95

Color Computer Scarfman

From The Cornsoft Group

Use the keyboard or joysticks to move your Color Scarfman through the maze to gobble up little yellow dots while avoiding 5 red monsters. If Scarfman can eat a yellow plus (+), a monster turns blue and can be eaten. Each time you clear the screen, the level and point value increase. Extended BASIC not required.

4K Tape, $19.95

Scepter of Kzirgla

From Rainbow Connection Software

Real-time graphics adventure game with arcade sound for the color computer. 13 floors of dungeon with monsters, treasure chests, hidden trap doors ... even a flying magic carpet! All in your quest to find the Scepter of Kzirgla. Whatever you do, don't get caught in the poisonous gas cloud! Extended BASIC required.

16K Tape, $16.95, 16K Disk, $21.95

Master Control

From Soft Sector Marketing

This is a BASIC language program designed to decrease typing time and error while providing direct control of motor, trace, audio and run. With Automatic Line Numbering and a custom key you can re-use or change at any time; plus 50 preprogrammed command keys. Can be used on a 32K system.

16K/32K Tape, $24.95

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MODEMS, TERMINALS AND BULLETIN BOARDS FOR BEGINNERS

By: Randy W. Graham
2115 Buford Road
Richmond, VA 23235

"Don't call us; we'll call you," is an obsolete saying for all the personal computerists who have discovered the mushrooming field of computerized bulletin boards. All over the country there are electronic graffiti boards staying open all night and weekends, just hoping to hear from you. They are all free to all for the cost of the phone call---and nights and weekends who cares about that? And their numbers are increasing almost daily. All it takes is a call to talk computer-to-computer to new and old friends. Calling these installations is a pleasant change of pace when you get tired of programming, debugging and defending the universe against asteroids. It is a new form of the ham operator's DXing and your Color Computer is ideally suited to this new phase of computering.

To join the crowd, you will need some hardware, some software and some instructions. I will run through the process in that order with an introduction tailored to us CC owners---all extraneous instructions for other systems stripped away. And in the process, if you are a beginner like me, we will learn some new buzzwords with which to impress your friends.

HARDWARE

To use your CC as a communicator, you will need a modem and a telephone right beside your computer. A modem (first buzzword) is an electronic device which attaches to your computer and converts the computer's electrical pulses bit by bit into audible sounds which the telephone lines know how to handle very handily. "Modem" is short for modulator/demodulator and, contrary to all logic and rules of English, is pronounced with a long "o".

There are two types available. Acoustic-coupled modems have a microphone and speaker to talk and listen to your telephone's handset. Direct-connect units hook right into the phone lines. Radio Shack sells both kinds as do a lot of other companies. Both types do the job they are supposed to do quite well. In a minute we are going shopping for one. But first, we have some other planning to do at home.

I mentioned that you must have a phone beside the computer. Are you going to take the CC out in the hall or bring the phone to you? You can bring it in with an extension cord, also available from Radio Shack. First look at your phone cord where it hooks to the plug in the wall. If you have a little flat wire with a little squeeze clamp like a miniature clothespin, you have the new modular type. Fine, the adapter cord is going to fit. Do you have a round wire with a square plug with four pins when you unplug it? You will need an adapter with your cord. Do you have some other kind of connection? You need help. You may also be able to get that at the Radio Shack store, too. Of course, you can also get Ma Bell to send one of her boys around to install an extension near your computer. Ma told me she would have to charge me $40.00 for that little job. Speaking of Ma Bell, when you get your direct-connect modem home you are supposed to tell her you are using one. I did and could just imagine some big surcharge. But, the fellow just asked for some numbers that are right there on the unit. No charge. You can be a good citizen for free.

One more thing before you go shopping. Do you want to keep moving the phone back and forth? Maybe it will be better to buy another phone to sit by the computer. You can get a "Y" connector at the nearest extension and run your cord to your new phone. When you have all these needs worked out, we are ready to go shopping.

If you decide on a Radio Shack unit, they will sell you a cable to attach it to your CC's I/O port. If you shop elsewhere, better take along your owner's manual to make sure you get a cable that will plug in right. Radio Shack's direct-connect which I use lists for $149.00; cords and adapters cost about $10.00 more. The modem-to-computer cable is another $4.95. When you get home and start to hook it up, there will be a wonderful moment when a male connector meets a male connector under the desk. You need a coupler which is sold separately. Back to Radio Shack, and while you are there, ask the clerk why he didn't tell you you would need one. Let me know what he says. Or profit by my experience and get one on the first trip.

You have now completed the hardware phase. The manual which comes with the modem has nice diagrams that are easy to follow to make the hookup. You will not hurt yourself or the phone in plugging it all together; telephones work on low voltage. Once hooked up, the phone will function normally as a phone even when the system is not on.

SOFTWARE

The next item you need to communicate with other computers is a terminal program. When online (are you watching those buzzwords---this

is one if written as one word without a hyphen), you are not using a computer; you are using a "smart terminal" (another good one). This transformation is accomplished with a machine language program. Radio Shack calls theirs "Videotex" and you can get one custom tailored to your CC. Mine is on cassette and is loaded by the "CLOADM" command and "EXEC". The local store is now stocking them in ROMpacks. They work the same way except that you just plug them in and power up.

This same hardware/software setup is used to access Compuserve and you will get instructions and a preliminary password with your Videotex package. This is why most of us make the investment; bulletin boards are an extra pleasure.

GOING ONLINE

Hook up your modem with the power off, load your terminal program and you are ready to go. If you are using Videotex, when you execute the program, you will get a blank screen. Radio Shack says you are in the storage mode and anything you enter can be uploaded later. I have not found any use for this mode yet. When you hit BREAK, the screen says "PLACE CALL".

Pick up the phone and place your call in the usual way. You will hear the phone ringing and then a steady beeping tone. This is the host computer saying "Hello". If you are using an acoustic-coupled modem, put the handset on the cradle. If you are using a direct-connect, flick the switch to ORIGinate. You will hear a second deeper tone. This is your terminal saying "Hello" back. You can hang up the phone now. As long as the "CD" light is on, you are connected.

At this point, you will probably get some garbage on the screen. There is another step to take to make sure the two machines are talking the same language. The usual protocol is to hit ENTER. The host system may ask you to do it again. Every time it asks you to enter "C/R", just hit ENTER. With a little luck, you now get an identification of the system and a nice welcoming message. Congratulations---you are online!

The system will now start asking you some personal questions: name, city & state, and telephone number. I guess they keep logs of callers. ("Look, Harry, we got one from Fairbanks, Alaska.") One system asks for your Social Security Number and when you comply it scolds you for giving your number to strangers. Decide now on a standard form of your name to use. When you logon (are you still underlining new words?) in the future, the system will tell you if you have a message waiting.

The system, still trying to insure good communications, may ask you some other questions. Do you need nulls? No, these are for printers. Do you need linefeeds? Yes. Otherwise, leave the options alone. The systems default to standards which you can read OK with your CC.

Typically, you will now be asked if this is your first time. If you say "Yes," you will be given a longer explanation of how the system works and why. You will also be introduced to "Sysop" by name and home telephone number. This is the human who tends the machine the way a farmer feeds his cows. Thank him for his good work.

After the welcome and the get-acquainted routine, you will be asked "FUNCTION ?" and given a string of letters. The last character is usually "?". Type this and the system will list the commands by which you can manage your visit. Typing "Help" at this point will usually do the same. Pay attention to this list. Is it running too fast? Usually, CNTRL-S will stop the display and "S" or "R" will restart it. With the CC, whenever you see CNTRL and something, hold the down-arrow key while depressing the other key. Control characters are non-ASCII characters which do not print but which the microprocessor can handle according to program instructions. They are used to do nonprinting things in the program.

About that list of functions. I have already said to leave most of the switches (options) alone. Ones that you will want to check out are "Q" or "S" for "Scan" or "Quick scan". This will give you a list of messages on the bulletin board with the author, addressee and subject. Some systems run backwards from the most recent. You were told when you logged on the number of the next message. Back up from that number about 25 or 50. Note any you might be interested in reading, stopping the display if necessary.

At the end of the scan, you will be taken back to the command mode with its list of functions. Now go to "R" to read them. You will be asked to enter the message number. When you are through, a C/R will take you back to functions. So will a CNTRL-C (or BREAK). This is true for all the functions you are in. Also, "Help" will usually get you further instructions for the function you are in.

Want to leave a message? This is usually "E". Address it to "All" and give it a catchy title

so that users will pick it up when they scan. What can you talk about? Use the same strategies you use to strike up acquaintances anywhere. Other computerists want to get to know you as much as you want to know them. Penpalism has a whole new lease on life

The last command you will use is "G" for "Goodbye". The computer will give you a friendly farewell by name and ask you if you have any comments. This is your chance to talk to Sysop. After you logoff, you may again see garbage on your screen and it may say "OFF LINE". Hang up the phone (acoustic) or flick the switch to OFF on your direct-connect.

Want to relive that wonderful moment? The computer has been scrolling all that stuff through memory and the last number of pages (dependent on your memory) is still there. On Videotex, hit the up-arrow key and it will take you to the first page still resident. The down-arrow key will now advance a page at a time and the up arrow will back up a page. When you are all through with that call, press CLEAR which dumps the memory. You are now back in that mysterious storage mode. Hitting BREAK will take you back to "PLACE CALL" and you are ready to do phenomenal things to your phone bill all over again.

SOME PROBLEMS

You may notice as soon as you access a bulletin board that the lines don't fit your screen. Most of them seem to be formatted for the Apple's 40-character line. The wraparound on the CC is not too much of a nuisance. Learn to love it.

You may also notice that when you type letters, they may not appear immediately on the screen as you are accustomed to seeing. This is because of the echo phenomenon. When you hit a key, the byte is sent immediately to the host computer. It then sends that same byte back to your screen, asking in effect, "Is this correct?" That is part of being a terminal.

Sometimes you will call a number, you will get a tone but cannot logon successfully. My advice is to hang up and try another number.

A more serious problem sometimes is that you cannot save the product of your adventuring. We have been talking about using TRS's Videotex program. As a CC owner, you are well aware that when you load any of their software, you are putting yourself into the hands of the Great Big Gringo in Fort Worth who knows what is best for you. Perhaps this doesn't bother you. If you call their toll-free busy signal and ask them why you cannot print out your searches, they will chuckle and say that your modem is plugged into the I/O port and so there is no place for a printer. If you ask them why you cannot save to tape, reload later and print it, the chuckle is replaced by a giggle and they say they did not plan it that way.

They just do this to foster the spirit of free enterprise. There are plenty of people who will help you save and print. Some ideas require you to write your own terminal program; others involve some exotic wiring. But there are software vendors who will help you achieve a more versatile terminal capability.

The best one I have found is The Micro Works' Microtext module. This is a ROMpack that plugs into the side slot and allows many more local options. How about printing? The module has a pigtail coming out the side which has a plug exactly like the one on the back of your computer. If you have a printer that will plug into and run on the CC, it will plug into the Microtext. Isn't that neat? I wish it didn't cost $59.95 but it does and it is worth it.

TIME TO CALL

Now you have everything you need: hardware, software and instructions. If only you knew someone to call. It is tempting to give you a nice long list of numbers. Trouble is, it would be someone else's list and I would be using it without giving proper credit. Besides, I have not called all the numbers and cannot guarantee that they are all still operative. Instead, I am going to let you get your list the same place I got mine. Many bulletin boards have lists of other numbers you can call. I am going to give you a couple I know about and let you check out their list for yourself.

In the process, you will find that some bulletin boards represent special interests. They are called by different names: ABBS, CBBS, Forum-80 and many others. Don't worry, you will be able to read and access all of them with your CC and terminal program. Some say they have games to play or programs to download. A couple say they have medical information in their data bases. One says that it deals in sexual topics (a sort of electronic locker room?) I did not check that one out. I found one in London and tried to call it but could not get on. The standards must be incompatible.

BULLETIN BOARDS

TRY THESE NUMBERS

(703) 734-1387 in Fairfax, VA is AMRAD (Amateur Radio Research & Development). As you can see from their name, they are interested in ham radio as well as computers. Their list is arranged by states and tells you when the list was updated.

(714) 772-8868 in Anahiem, CA is "IF" Magazine, an online magazine about computing with articles, features, ads and everything. I spend entirely too much long distance money reading their good stuff. Their list has helpful comments to guide your selection.

(813) 383-9666 in Los Angeles is operated by Novation who makes modems. You can test your modem and terminal on this system. Their list has 415 entries and you cannot stop it while it is running. But you can request numbers by specified area codes to find ones near you.

(301) 344-9156 in Greenbelt, MD is operated by NASA to support the program for citizens to send up experiments on the space shuttle. Read all about it.

(301) 593-7033 is HEX in Silver Springs, MD and is devoted to computers and handicapped persons, a new and promising field.

(703) 978-7561 in Fairfax, VA is operated by the editors of a magazine devoted to the use of computers for geneological research. Find the monkeys in your family tree!

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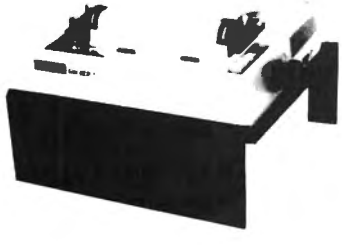

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MILEage MONitor

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

There seems to be little agreement on all of the causes of high gasoline prices these days, but virtually everyone agrees that it is a real problem. Now more than ever there are real financial benefits to maintaining the best gas mileage for your car. I was delighted to discover in the July, 1981 BYTE just the program to do the job of monitoring gas mileage (p. 230-248). Unfortunately Jerry Lobdill's program is written for the HP-67, whose language has absolutely no resemblance to BASIC. Fortunately, Jerry included enough description of the program to make it possible to write a BASIC program. I have been using the program for several months now and am very impressed with its ability to monitor gas mileage performance and to warn when the old clunker needs attention.

MILE MON uses a sophisticated technique called the Kalman filter to make use of all data entries while having to store only the most recent. Based on past performance, MILE MON predicts the mileage you should expect and then compares it to the actual mileage. A warning is provided if the deviation is outside a predetermined range. This can serve as an indication that a tuneup or something more serious is required. If you are interested in the technicalities of how the Kalman filter works, you can read Jerry Lobdill' article. I am going to provide only the BASIC listing and enough information for it to do the job for you.

Hopefully, MILE MON is pretty much self-documenting with its menu and prompts for input. To begin use of the program, you should have certain data ready: odometer readings at a first and second fill-ups and price/gallon and total cost of the second fill-up. You might want to make up some figures to practice the use of MILE MON at first. Pressing 0 in response to the menu initializes the program with your input of the first odometer reading and arough guess of your gas mileage. Don't worry about how good your guess is; when MILE MON given you the actual mileage you can re-initialize. Pressing 2 in the menu then allows you to enter the rest of the data, and MILE MON calculates and displays estimated mileage, actual mileage, deviation, sum of deviations, total miles driven since initialization, total cost of those miles, and cost/mile. After returning to the menu, pressing 3 will allow you to record these results.

Future uses of the program involve using menu choice 1 to input past results before entering current data. One of the strong points of this program is that the amount of data recorded on tape is very small yet is a function of all data entered in the past. The values of various constants are those which Jerry Lobdill determined worked well for his two very different cars. If you plan an extended highway trip, Jerry says that it would be a good idea to change what he calls plant noise variance from 0.02 to 0.2 (statement 190) for a couple of fill-ups before taking the trip.

If you are interested only in using MILE MON and are uninterested in BASIC programming, you should skip the rest of this article. But if you are like me, you are always interested in how other programmers approach the Color Computer's powerful Extended BASIC. My personal style is to eliminate all unnecessary spaces (the ones included here are for readability and are not in my personal copy). I also strive to use as few statement numbers as possible without exceeding the 132-character line of my Epson MX-80. I think that one of the most desgusting features of many BASIC programs is a zillion GOTOs that have you chasing all over the program like a maze. Yet it seems that some programmers have as thier style the quest of seeing just how many GOTOs can be used in a single program.

Finally, after using more primitive BASICs, I am delighted with our ability to use meaningful variable names. I approached MILE MON as an exercise in providing useful names, within the restrictions of having the first two letters of all variables different (since those are the only ones that BASIC looks at), the reserved BASIC words, and my own limited creativity. The following is a list of important variables and what they represent:

LIMIT = one of the values in the Kalman filter which triggers a warning if exceeded
EXCEED = another value like LIMIT
PAST = previous odometer reading
NOW = present odometer reading
PRICE = price of gasoline in dollars/gallon
AMOUNT = cost of most recent fill-up
ESTIMATE = predicted mileage estimated by MILE MON
MILEAGE = actual mileage calculated by MILE MON
DEVIATION = MILEAGE - ESTIMATE
ALLDEV = sum of DEVIATIONs
DISTANCE = miles driven since initialization of MILE MON
SUMCOST = total cost of miles driven since initialization

NUM = number of entries to MILE MON since initialization
ERROR = estimate of the variance of the error in ESTIMATE
GAIN = gain in confidence that MILE MON has in present ESTIMATE
HIGH = flag that is set if one of the limits is exceeded
ADHIGH = flag set if ALLDEV is too high

The following are some comments for particular statements about which you might have some questions:

100 The use of INKEY$ allows instantaneous response to menu choices but does make it easier to make a mistake. The only serious mistake is initializing the program when you don't want to, and this is avoided by making it choice 0.

140 MILE MON is designed to have one copy of the program at the beginning of the tape and then the data file "MILEAGE" immediately after the program. In use of the program, one inserts the tape, presses PLAY, enters CLOAD, RUN, and then presses "1" in response to the menu. The tape should not be rewound at this point.

150 Instead of having INKEY$ respond to any key press, I require a "1", because I have sometimes had a problem with INKEY$ returning a value when no key was being pressed (no, there was no joystick involved).

200 ALLDEV is not calculated until after 3 entries have been made. This is due to the nature of the Kalman filter.

220 Here the flags HIGH and ADHIGH are made false (0), and if appropriate, are made true (-1) in statements 240 and 250. They are then evaluated in 270 and 280 to determine whether a warning should be issued.

320 At this time the tape is at the end of the data file. Because it and the program are so short, it seems most convenient simply to rewind the tape and allow SKIPF to get by the program.

330 The FOR-NEXT places a gap between program and data which prevents accidental erasure if you monkey with the program and re-record it.

```
10 '      MILEage MONitor
20 '      Lane P. Lester
30 ' Liberty Baptist College
40 'Lynchburg, Virginia 24506
```

```
50 LIMIT=1.26
  :EXCEED=2.53
60 'Menu
70 CLS:PRINT@8,"MILEAGE MONITOR"
  :PRINT@64,"PRESS NUMBER OF DES
IRED FUNCTION"
80 PRINTTAB(6)"0. INITIALIZE MON
ITOR",TAB(6)"1. INPUT RECORDED D
ATA",TAB(6)"2. ENTER CURRENT DAT
A",TAB(6)"3. RECORD DATA AND END
"
90 K$=INKEY$
  :IFK$<"0"ORK$>"3"THEN90
   ELSEONVAL(K$)+1
   GOSUB110,130,160,320
  :GOTO70
100 'Start Monitor
110 CLS:PRINT"ENTER INITIAL VALU
ES:"
   :INPUT"1. ODOMETER READING =
";PAST
   :INPUT"2. MILEAGE ESTIMATE =
";ESTIMATE
   :ERROR=5
   :RETURN
120 'Input Recorded Data
130 CLS:PRINT"LOADING RECORDS."
   :OPEN"I",-1,"MILEAGE"
   :INPUT#-1,NUM,PAST,ERROR,ESTI
MATE,ALLDEV,DISTANCE,SUMCOST
   :CLOSE:SOUND200,2
   :CLS:PRINT@64,"PRESS <STOP>"
   :PRINT"PRESS "1" TO CONTINUE"

140 IFINKEY$<>"1"THEN140
    ELSERETURN
150 'Enter Current Data
160 CLS:PRINT"INPUT DATA:"
   :PRINT"1. COST OF FILL-UP"
   :INPUT"    =";AMOUNT
   :PRINT"2. PRICE PER GALLON"
   :INPUT"    =";PRICE
   :PRINT"3. ODOMETER READING"
   :INPUT"    =";NOW
170 'Calculation of New Values
180 SUMCOST=SUMCOST+AMOUNT
   :DISTANCE=DISTANCE+NOW-PAST
   :MILEAGE=(NOW-PAST)*PRICE/AMO
UNT
   :PAST=NOW
   :GAIN=ERROR/(ERROR+0.4)
   :ERROR=(1-GAIN)*ERROR+.02
190 NUM=NUM+1
   :DEVIATION=MILEAGE-ESTIMATE
   :IFNUM=>3THENALLDEV=ALLDEV+DE
VIATION
200 'Display Results
210 CLS:HIGH=0
   :ADHIGH=0
220 PRINTUSING"ESTIMATED MILEAGE
 = ##.##";ESTIMATE
   :PRINTUSING"   ACTUAL MILEAGE
 = ##.##";MILEAGE
   :PRINTUSING"CURRENT DEVIATION
 =+##.##";DEVIATION;
230 IFABS(DEVIATION)>LIMIT THENH
IGH=-1:PRINT"  *"
    ELSEPRINT
240 PRINTUSING"SUM OF DEVIATIONS
 =+##.##";ALLDEV;
   :IFABS(ALLDEV)>EXCEED THENHIG
H=-1
   :ADHIGH=-1
   :PRINT"  *":PRINT
    ELSEPRINT:PRINT
250 PRINTUSING"       TOTAL MILES
 = ####.#";DISTANCE
   :PRINTUSING"        TOTAL COST
 = $$##.##";SUMCOST
   :PRINTUSING"         COST/MILE
 =   $#.##";SUMCOST/DISTANCE
   :ESTIMATE=ESTIMATE+GAIN*(MILE
AGE-ESTIMATE)
260 IF HIGH THENPRINT@291,"* = L
IMIT EXCEEDED"
270 IF ADHIGH THENPRINT@355,"PRE
SS "0" TO RESET SUM/DEV"
280 PRINT@387,"PRESS "1" TO CONT
INUE"
290 K$=INKEY$
   :IF K$<"0"ORK$>"1"THEN290
    ELSEIFK$="0"THENALLDEV=0
300 RETURN
310 'Record Data
320 CLS:PRINT"REWIND TAPE AND PR
ESS <PLAY>."
   :SKIPF"MILE MON"
   :SOUND200,2
   :CLS:PRINT@64,"PRESS <RECORD>
."
   :PRINT"PRESS "1" TO CONTINUE.
"
330 IF INKEY$<>"1" THEN330
    ELSEMOTORON:FORI=1TO999:NEXT
   :OPEN"O",-1,"MILEAGE"
   :PRINT#-1,NUM,NOW,ERROR,ESTIM
ATE,ALLDEV,DISTANCE,SUMCOST
   :CLOSE:SOUND200,2
```

word's worth

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Unless otherwise specified, all software is supplied on FLEX-format, 35-track, single-sided 5" disk. Prices good until November 1st, 1982. Shipping via first class mail is already included, except add $2.00 for orders shipped outside North America. Add $35 for "overnight" parcel service to Canada, which still takes at least three days, or $12 for "express mail" in US. Add $2 handling for Visa/MC. Allow 3 weeks for non-certified check. Purchase order must be accompanied by payment. Texas residents: add $0.25/disk. Release 2.1 of WW Small-C09 is scheduled for 1st quarter '83. The phone number is for our answering service. You may call to request further information to be mailed, or place a Visa/MC order 8:30-4:30 weekdays (CDT). For fastest response to technical questions, send #10 SASE.

DIGITS

by John R. Bogan
1201 Vancouver Ave.
Burlingame, CA. 94010

Do you want to mix alphanumerics with your graphics programs? If so the following program is for you. First its limitations. As configured it only works in PMODE 4 (the highest resolution graphics mode), expect some trouble in making it work for other modes. Also, it only displays the ten digits but it is easy to modify to include the alphabetic and special characters if you want. Finally, the GET INPUT routine is practically worthless except for demonstrating and testing the rest of the routines. It is meant to be torn out and replaced by a graphics program.

How to use this program. Just follow the simple instructions on your screen as they are displayed. The X and Y coordinates that are asked for refers to the upper left hand corner of the 5 x 7 matrix that contains the digit to be displayed. Beware, it is possible to overlap digits if you desire.

How the program works. The heart of the program is the DISPLAY DIGIT routine and the eleven DATA statements. If you understand how characters are displayed by selectively setting points in a 5 x 7 (or 7 x 9) matrix than you should have no trouble understanding how this program works. Ten of the DATA statements contain a representation of the X and Y coordinates of a 5 x 7 matrix. Thus the data elements range from 11 (1,1) to 57 (5,7). The first DATA statement contains a pointer for each digit that points into the array DA which contains the X,Y coordinates. The first element pointed to is the number of X,Y elements for that particular digit and is used for loop control.

Have fun and if you have a better/faster/smaller way to mix graphics and alpha numerics I'd love to hear about it.

```
p10 '************
20 '* MAINLINE *
30 '************
40 GOSUB 190 'GET INPUT
50 GOSUB 510 'INIT ARRAYS
60 PMODE 4,1
70 SCREEN 1,0
80 PCLS
90 FOR COUNT=1 TO NUM
100 DIGIT=IP(COUNT,1)
110 XC=IP(COUNT,2)
120 YC=IP(COUNT,3)
130 GOSUB 730 'DISPLAY DIGIT
140 NEXT COUNT
150 GOTO 150
160 '************
170 '* GET INPUT *
180 '************
190 DIM IP(10,3)
200 CLS
210 PRINT"ENTER # DIGITS TO BE D
ISPLAYED"
220 INPUT "MAXIMUM IS 10"; NUM
230 IF (NUM>0) AND (NUM<11) THEN
 260
240 PRINT"INPUT MUST BE BETWEEN
0 AND 11"
250 GOTO 210
260 FOR COUNT=1 TO NUM
270 CLS
280 PRINT"ENTER X COORD FOR DIGI
T " COUNT
290 INPUT "0<=X<=251";XC
300 IF (XC>-1) AND (XC<252) THEN
 330
310 PRINT"X COORD IS OUT OF BOUN
DS"
320 GOTO 280
330 PRINT"ENTER Y COORD FOR DIGI
T "COUNT
340 INPUT "0<=Y<=185";YC
350 IF (YC>-1) AND (YC<186) THEN
 380
360 PRINT"Y COORD IS OUT OF BOUN
DS"
370 GOTO 330
380 PRINT "ENTER DIGIT TO BE DIS
PLAYED"
390 INPUT "FROM 0 TO 9";DIGIT
400 IF (DIGIT>-1) AND (DIGIT<10)
 THEN 430
410 PRINT"DIGIT MUST BE BETWEEN
0 AND 9"
420 GOTO 380
430 IP(COUNT,1)=DIGIT
440 IP(COUNT,2)=XC
450 IP(COUNT,3)=YC
460 NEXT COUNT
470 RETURN
480 '***************
490 '* INIT ARRAYS *
500 '***************
510 DIM INDEX(10), DA(156)
520 FOR COUNT=0 TO 9
530 READ INDEX(COUNT)
540 NEXT COUNT
550 FOR COUNT=1 TO 156
560 READ DA(COUNT)
570 NEXT COUNT
```

```
580 RETURN
590 DATA 1,18,32,47,62,77,93,111
,123,141
600 DATA 16,21,31,41,12,13,14,15
,16,52,53,54,55,56,27,37,47
610 DATA 13,31,32,33,34,35,36,37
,22,13,17,27,47,57
620 DATA 14,12,21,31,41,52,53,44
,35,26,17,27,37,47,57
630 DATA 14,12,21,31,41,52,53,34
,44,55,56,47,37,27,16
640 DATA 14,31,41,22,42,13,43,14
,24,34,44,54,45,46,47
650 DATA 15,11,21,31,41,51,12,13
,23,33,44,55,46,37,27,16
660 DATA 17,21,31,41,51,12,13,14
,15,16,27,37,47,56,55,44,34,24
670 DATA 11,11,21,31,41,51,52,43
,44,35,36,37
680 DATA 17,21,31,41,12,52,13,53
,24,34,44,15,55,16,56,27,37,47
690 DATA 15,21,31,41,12,52,13,53
,24,34,44,54,55,46,37,27
700 '*****************
710 '* DISPLAY DIGIT *
720 '*****************
730 GOSUB 860 'CLEAR 5 X 7 SPACE

740 POYNTER= INDEX(DIGIT) 'GET P
OINTER INTO ARRAY DA
750 LAST= DA(POYNTER) 'GET NUMBE
R OF ELEMENTS
760 FOR VAR=1 TO LAST
770 TEMP= DA(POYNTER+VAR) 'GET E
LEMENT
780 X= INT(TEMP/10) 'EXTRACT X C
OORD
790 Y= TEMP-(X*10) 'EXTRACT Y CO
ORD
800 PSET(XC-1+X, YC-1+Y) 'SET PO
INT
810 NEXT VAR
820 RETURN
830 '*********************
840 '* CLEAR 5 X 7 SPACE *
850 '*********************
860 FOR A=XC TO XC+4
870 FOR B=YC TO YC+6
880 PRESET(A,B)
890 NEXT B
900 NEXT A
910 RETURN
920 END
```

COMMENT CORNER

By: Andrew Phelps
The Micro Works

The heart of the BASIC interpreter is a routine which does this: Get next statement. Do it, and Loop. It isn't long, and doesn't do too much, but this "interpret loop" is what causes everything to happen.

Another similar loop is the one which runs when no BASIC program is running. It is called the "idle loop", and does this: Print "OK", Get line, Go interpret it. It is a loop since Interpret will return to it when it reaches the end of the line.

Before commenting these, we might as well document an often-used routine which runs in RAM. This is the "get next character" routine at $009F, and it is called by Idle, by Interpret, and by virtually every statement in BASIC.

Addr Comments
009F INCREMENT LOWER BYTE OF ADDRESS (A7)
00A1 SKIP NEXT INCREMENT UNLESS CARRY
00A3 INCREMENT HIGH BYTE OF ADDRESS (A6)
00A5 GET NEXT BYTE FROM BASIC PROGRAM
00A6 (THIS IS THE ADDRESS; IT IS STORED INSIDE THE LDA INSTRUCTION)
00A8 JUMP TO AA1A

AA1A GREATER THAN A NUMBER?
AA1C IF HIGHER OR SAME, RETURN
AA1E IS IT A SPACE?
AA20 IF NOT, SKIP
AA22 IF SPACE, GO GET ANOTHER BYTE
AA24 SUBTRACT 30, SO THAT AFTER THE NEXT SUBTRACT WE WILL BE BACK WHERE WE WERE
AA26 SUBTRACT DO, SO THAT "BHS" WILL BRANCH IF NOT A NUMBER.
AA28 RETURN

This routine is called at two addresses. It is called by JSR $9F to bump the address and get the next byte, and it is called by JSR $A5 to get the same byte as last time.

By placing this routine in low memory (it is put there on power-up), it can be called by shorter JSR statements.

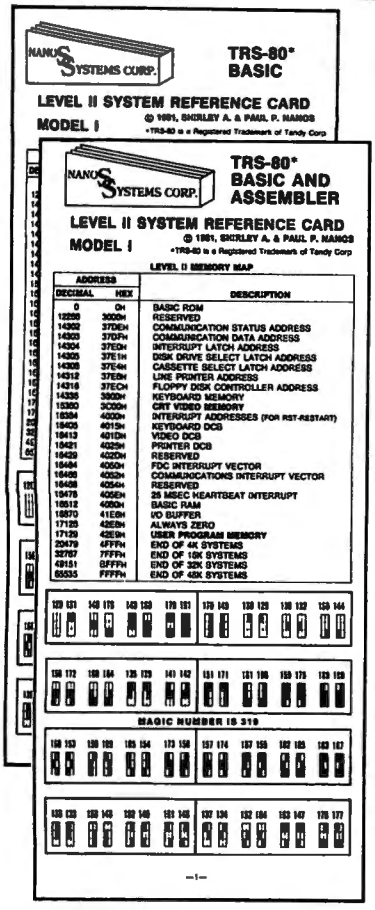
Note that spaces are skipped by this routine. That is why spaces are always ignored in BASIC, except inside words which are to be tokenized.

Anyway, on to the idle loop, the interpret loop, and the associated routines "execute line" and "check keyboard".

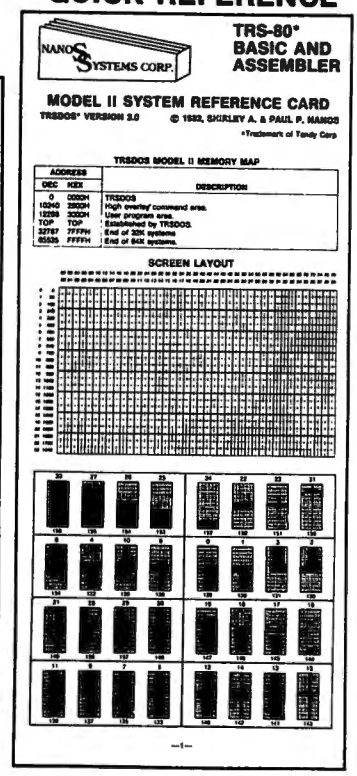
Addr Comments
AC73 START IDLE LOOP, GET DEVICE PARAMETERS
AC76 GET ADDRESS OF "OK"
AC79 PRINT "OK"
AC7F GET FFFF (ILLEGAL LINE #)
AC82 STORE AS CURRENT LINE #
AC84 IF BREAK KEY, GET NEW LINE
AC86 END OF FILE?
AC88 CLOSE FILES AND RESTART
AC8C SET ADDRESS FOR GET BYTE
AC8E GET NEXT CHARACTER
AC90 IF BLANK LINE, LOOP
AC92 IF NUMBER, GO INSERT LINE
AC94 GET ERROR CODE
AC96 IS LINE FROM KEYBOARD?
AC98 IF NOT, ?DS ERROR
AC9A TOKENIZE THE LINE
AC9D JUMP TO ADCO IN THE INTERPRET LOOP

AD9E START OF INTERPRET; HOOK
ADA1 ENABLE INTERRUPTS
ADA3 GO CHECK KEYBOARD
ADA5 GET ADDRESS OF THE BYTE BEFORE THE LINE
ADA7 SAVE THE ADDRESS
ADA9 GET THAT BYTE
ADAB IF NEW LINE, OK
ADAD COLON BETWEEN STATEMENTS?
ADAF IF SO, OK
ADB1 NO; SYNTAX ERROR
ADB4 GET UPPER BYTE OF LINK
ADB6 SAVE IT
ADB8 OFF END? LEAVE
ADBA GET LINE NUMBER; X=X+1
ADBC SAVE IT
ADBE SAVE ADDRESS OF NEXT BYTE
ADC0 GET NEXT CHARACTER
ADC2 GO EXECUTE LINE
ADC4 LOOP

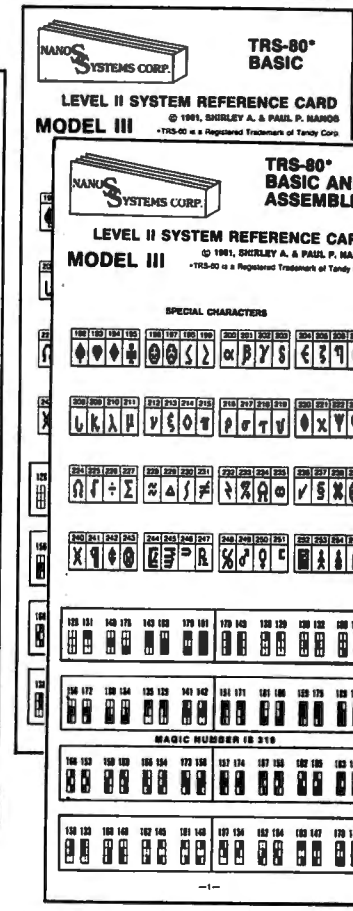
ADC6 START OF EXECUTE LINE; IF NOTHING ON LINE, RTS
ADC8 IS THE FIRST BYTE < 0 ?
ADC9 IF PLUS, GO DO VARIABLE =
ADCD IS TOKEN; IS IT A COMMAND?
ADCF NO; CHECK IF EXTENDED
ADD1 GET TOKEN TABLE ADDRESS
ADD4 A = A * 2
ADD5 MOVE TO B REGISTER
ADD7 FORM ADDRESS OF ADDRESS
ADD8 GET NEXT BYTE
ADDA GO TO WHATEVER ROUTINE IS



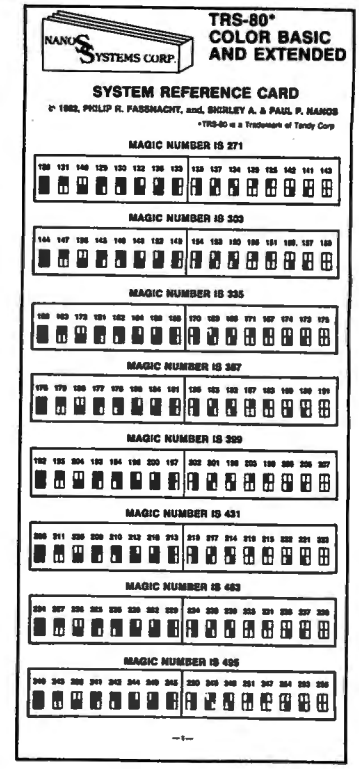
NEW! QUICK REFERENCE



SAVE TIME!



NEW! THROW AWAY THE BOOK



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PRINT USING Examples.
Basic Msgs & Codes.
Basic Internal Codes.
Reserved Words.
Screen Line Layout.
BASIC & ASSEMBLER: Blue
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Series I Editor/Assembler Commands & Edit
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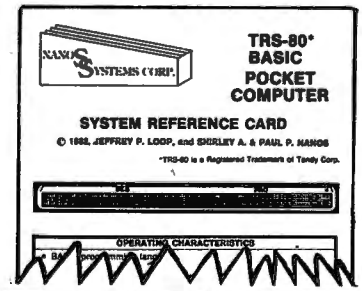

APPROPRIATE FOR THIS TOKEN

ADDC COMPARE WITH LAST TOKEN #
ADDE SYNTAX ERROR IF A NON-COMMAND TOKEN
ADE0 MUST BE EXTENDED; GO CHECK
ADEB CHECK KEYBOARD ROUTINE; CALL POLCAT
ADEE RETURN IF NOT KEY DOWN
ADF0 IS IT BREAK?
ADF2 IF SO, GO BREAK PROGRAM
ADF4 SHIFT-@ PAUSE?
ADF6 IF SO, GO PAUSE
ADF8 SAVE FOR INKEY$
ADFA RETURN
ADFB CALL POLCAT AGAIN
ADFD LOOP TIL KEY DOWN
ADFE GO PROCESS KEY

And one other thing! Extended has its own version of the interpret loop, so that it can do the trace function. Here is the Extended version!

82BB ENABLE INTERRUPTS
82BD CHECK KEYBOARD
82C0 GET BYTE BEFORE LINE
82C2 SAVE THAT ADDRESS
82C4 GET THAT ACTUAL BYTE
82C6 IF ZERO BETWEEN LINES, OK
82C8 COLON BETWEEN STATEMENTS?
82CA IF SO, OK
82CC IF NOT, SYNTAX ERROR
82CF GET HIGH BYTE OF LINK
82D1 SAVE IT
82D3 IF NON-ZERO, OK
82D5 DONE; LEAVE
82D8 GET LINE NUMBER
82DA SAVE IT
82DC SAVE ADDRESS FOR GET BYTE
82DE TRACE ON?
82E0 NO; SKIP
82E2 LEFT BRACKET
82E4 PRINT IT
82E7 LINE NUMBER
82E9 PRINT IT
82EC RIGHT BRACKET
82EE PRINT IT

82F1 GET NEXT BYTE
82F3 SAVE CONDITION CODES
82F5 IS IT CSAVE?
82F7 GO DO CSAVE
82F9 IS IT CLOAD?
82FB GO DO CLOAD
82FD RESTORE CONDITION CODES
82FF GO EXECUTE LINE
8302 LOOP

It's a little hard to follow some of the addresses in the interpret loops. Note the use of LDA ,X++ and LDD ,X+ which are not what you'd expect. Note that X is only incremented once at $ADBA since the call at $ADC0 will increment the pointer before using it. Or you can trust that it all works.

Let's look at what happens when you type "RUN". The machine is in the idle loop, and has just typed "OK". A new line is read from the keyboard ("RUN"), and since the first character is not a number, we know that it is direct statement. It is tokenized, where it is converted to one byte ($8E) which means RUN. Now we jump to the bottom of the interpret loop, which gets the next character ($8E) and calls Execute Line. Here we form the index into the token table ($AB83) which points at the RUN processor ($AE75). When RUN runs, it changes the pointer in $00A6 to point to the beginning of the program in memory. When we reenter the interpret loop, and check for break, etc., we now have a valid pointer to continue execution. The interpret loop will keep looping until a break, STOP, END, or a zero at the end of the program.

Note that the idle loop is also used to read programs in ASCII off of tape. This is why the unit number is checked when a direct statement is entered, since this would not be allowed if input is from tape.

VENUS LANDER

by Steve Sullivan
5768 Cottage Ave.
Kansas City, MO 64133

This program is my BASIC version of the game "Lunar Lander". The object of this version, as in all others, is to land your module on a smooth surface at a slow speed. Fuel is gained by landing safely, the most fuel given for the most difficult landings. The most points are awarded for the slowest landings. In this version, three different terrains have been included, but I have made provisions for adding more (I'll explain below).

After instructions, the program begins by asking what difficulty level is desired, 1 being the easiest. It would probably be a good idea to start out on one, since it uses up the least amount of fuel and is easiest to maneuver in. The difference between the levels is that the harder the level, the more difficult it is to slow the ship and the quicker it decends when the rockets aren't being fired. When the level is chosen, "PRESS ANY KEY TO START" will appear. The reason it takes awhile is that the computer is painting in the scene (those of you "lucky" enough to have 1.0 BASIC will be able to press the joystick button to continue). When the scene appears, it will be one of three landscapes that are picked at random. You will see the ship somewhere near the top and it will begin moving downward. Press the right joystick button to fire the engines (on level 1 it shouldn't take too long to slow it down, but on level 3 it takes awhile). The ship's horizontal movement is controlled by moving the right joystick right or left. I have intentionally made this sluggish. You'll notice that when the ship is moving rapidly in one direction, it takes awhile to slow it down and get it going in the opposite direction. This is my program's version of inertia. You will also notice that the left/right movements seem much more responsive when this ship is hovering or moving slowly. Remember these two factors while playing the game.

The three landing spaces in each scene should be obvious; the three flattest places that the ship will fit onto. When you have slowed down enough and are near the pad, it is a good idea to stop the ship from drifting right or left. You should then set it down by firing your rockets in spurts.

There are four ways to crash: by landing at too great a vertical or horizontal speed, by not landing with your ship COMPLETELY on the pad, by hitting one of Venus' walls (yes, Venus does have walls), or by hitting an object in flight. The permissible landing speeds are controlled in line 350, T being the vertical speed and U being the horizontal one. You may want to change these figures as you get better. The way the program tells if the ship has landed explains the other three. In order to keep the animation fairly quick, the program only checks the points just to the outside and below the legs. If either of these are black, the program is passed to the crash or land subroutine that begins at line 350. If the variable X of the PUT statement is not one of the landing pad coordinates, the ship crashes because it has either hit an object or has hit the side of the screen, explaining the "Venus wall". If the coordinate is correct, the program checks to see if the points below and outside of those checked are also both black. If they are, the ship has safely landed. If they are not, the ship has either hit an object at the same level as a pad or is not on the pad all of the way.

If the ship crashes, you will be informed of how much fuel and how many points you have lost (if you had any to begin with). If you land, you will be treated to a song (picked randomly in line 430) and you'll learn about your gained points and fuel. Play will continue in either case until you run out of fuel. If you ever find that the fire button doesn't work, this is what has happened.

Now, to the subject of adding your own terrain. First, put the lines to draw the scene after 690. It's a good idea to have 3 pads to keep things easy on yourself (I have found the best pad width to be somewhere around 25 points). Make sure that the points below and outside the edges are both black, due to what I explained above. When the screne has been drawn, you must find the value of 13 variables (not as hard as it sounds). First, you need to find the vertical coordinate of the landing pads. The best way I have found to do this is to simply change line 150 to go to your drawing subroutine and then simply run the program and land your ship on one of the pads. When the ship crashes, and you're sure it was in a legal place, break the program during the explosion and print the variable X. This will give you X1. X2 will probably be X1-1, so go ahead and put that in the program. Check lines 350 through 370 to see what you're looking for. Use the same procedure for the other two landing pads to find X3 & X4 and X5 & X6. X2, X4, and X6 are included because sometimes, due to the way the ship moves, it jumps to the landing subroutine after skipping 3 spaces going downward. This makes the ship land two points above the surface

COLOR COMPUTER NEW!

MACRO-80C

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

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

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

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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; conditional assembly; local labels; assembly to cassette tape or to memory; listing to screen or printer; and mnemonic error codes instead of numbers.

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instead of one, which would make it crash every time this happens, which wouldn't be correct. Thus we simply add another variable so it won't crash. The next three variables we need are F1, F2, and F3. These are the extra fuel values that are assigned to the landing pads. F1 would be the amount of fuel you would give for a landing on the X1 pad, F2 for the X3 pad, and F3 for the X5 pad. SX and SY are the coordinates for the upper left hand corner of the ship at the start of each scene. T is the starting increment to be added to X (vertical position) each time and U is the increment to be added to I (horizontal position) each time (you should probably keep these around 1). After you have filled in all of this information, run the program and keep landing at the sites to make sure it is working correctly. If it isn't, the trouble is probably the X value that you found above. Just experiment until you get it right. When the scene works, simply change line 150 to add your scene and you are ready to go.

I have found this a truly fun game to program because there are so many things to play around with and change. Feel free to do the same. You may even come up with an idea for a game of your own.

```
10 POKE65495,0:R=RND(TIMER):CLS0
:PLAY"V31L10003":FORX=0TO15:PRIN
T@X*32+10,"lunar"CHR$(128)"lande
r";:PLAY"N"+STR$(INT(X*.75)+1):F
ORY=1TO(X)^2.2:NEXT:PRINT@X*32+1
0,STRING$(12,CHR$(128));:NEXTX:P
RINT@231,"by"CHR$(128)"steve"CHR
$(128)"sullivan";
20 CLEAR1000:PMODE0,1:PCLEAR4:PM
ODE4,1:PCLS1:COLOR0,1:FORX=1TO18
00:NEXT:CLS:PRINT@224,"DO YOU WA
NT DIRECTIONS";:INPUTAN$:IFLEFT$
(AN$,1)<>"Y"THEN70
30 CLS:PRINT:PRINT" THE OBJECT O
F THIS GAME IS TO   LAND YOUR LU
NAR LANDER MODULE   SAFELY ON A
SMOOTH SURFACE.","  ON EACH LANDS
CAPE, THERE ARE","  THREE SUCH LA
NDING PADS.","  YOUR SHIP WILL BE
 DESTROYED IF   YOU HIT ANY OBJEC
T OR TRY TO"
40 PRINT" LAND AT TOO GREAT A SP
EED","  EITHER VERTICAL OR LATER
AL.":PRINT" USE YOUR RIGHT JOYST
ICK TO","  GUIDE DIRECTION AND TH
E RIGHT   BUTTON TO FIRE ENGINES
."
50 PRINT:PRINT" PRESS ANY KEY TO
 CONTINUE":A$=INKEY$
60 A$=INKEY$:IFA$=""THEN60
70 CLS:PRINT:PRINT" WHAT GRAVITY
 LEVEL DO YOU WANT? (PRESS 1,2,O
R 3)":A$=INKEY$
80 A$=INKEY$:V=VAL(A$):IFV<1 OR
V>3 THEN 80
90 PRINT:PRINT" THE SCREEN IS NO
W BEING DRAWN":IFV=1 THEN IN=.1:
MI=2ELSEIFV=2THENIN=.15:MI=2.2EL
SEIN=.2:MI=2.4
100 DIMA(6),D(6):F=4000:ST=1
110 A$="U3E2R2NU1R2F2D3G2R2D1L2F
2D2NR1NL1U2H2L4G2D2NR1NL1U2E2L2U
1R2NR4H2"
120 B$="S4"+A$+"BD3BR3D2R1ND1R1U
2"
130 PCLS1:DRAW"BM100,100S4"+A$:P
AINT(102,100):GET(97,91)-(111,10
8),A,G:PCLS:DRAW"BM100,100"+B$
140 PAINT(102,100):GET(97,91)-(1
11,108),D,G
150 ON RND(3) GOSUB 550,640,660
160 PRINT:IFST=1THENPRINT" PRESS
 ANY KEY TO START":ST=0ELSEPRINT
" PRESS ANY KEY TO CONTINUE":A$=
INKEY$
170 A$=INKEY$:IFA$=""THEN170ELSE
PLAY"T255L255V3103":FORX=1TO31:P
LAY"N5V-":NEXT:LINE(0,0)-(256,19
1),PSET,B:LINE(1,1)-(255,190),PS
ET,B:SCREEN1,0:CLS
180 X=SY:I=SX
190 J=JOYSTK(0):IFJ<20THENU=U-.0
5
200 IFJ>45 THENU=U+.05
210 IFABS(U)>1.5THENU=SGN(U)*1.5

220 I=I+U:P=PEEK(65280):IF(P=126
ORP=254) AND F>0THEN260
230 T=T+IN:IFT>MI THEN T=MI
240 X=X+T:IFPPOINT(I-1,X+17)=0OR
PPOINT(I+15,X+17)=0THEN350ELSEQ=
INT(I):W=INT(X):PUT(Q,W)-(Q+14,W
+17),A,PSET
250 GOTO190
260 T=T-.07:IFT<-.9THENT=-.9
270 F=F-15:X=X+T:IFX<6THENX=6
280 IFPPOINT(I-1,X+17)=0 OR PPOI
NT(I+15,X+17)=0 THEN350ELSEQ=INT
(I):W=INT(X):PUT(Q,W)-(Q+14,W+17
),D,PSET:GOTO190
290 PRINT:PRINT" YOU LOST THE SH
IP"
300 PRINT:PRINT" YOUR FINAL SCOR
E WAS";:IFS<0THENPRINT" 0"ELSEPR
INTS
```

THE 1248—EP EPROM PROGRAMMER

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

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

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

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

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

THE CK4 PROM/RAM CARD

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

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

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

"COCO" GETS A BREADBOARD

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

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

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

MORSE ENCODER/DECODER KIT

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

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

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

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

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

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

ALIEN ENCOUNTER

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

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

CAPTURE

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

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

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

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

```
310 POKE65494,0:PLAY"V31O1T1L6N6
N4L4..N1":POKE65495,0
320 PRINT:PRINT" DO YOU WANT TO
PLAY":PRINT" AGAIN (Y/N)":A$=INK
EY$
330 A$=INKEY$:IFA$<>"Y"ANDA$<>"N
"THEN330ELSEIFA$="Y"THENCLEAR:GO
TO70
340 POKE65494,0:END
350 PUT(Q,W)-(Q+14,W+17),A,PSET:
X=W:I=Q:P1=PPOINT(Q-1,W+20):P2=P
POINT(Q+15,W+20):IFP1=10RP2=1THE
N380ELSEIFT>1.75ORABS(U)>1.4THEN
380ELSEIF X=X1 OR X=X2 THEN S1=P
G:FU=F1:GOTO430
360 IFX=X3 ORX=X4 THEN FU=F2:GOT
O430
370 IFX=X5 OR X=X6 THEN FU=F3:GO
TO430
380 PUT(Q+SGN(U),W+T+1)-(Q+14+SG
N(U),W+T+18),A,PSET
390 FORY9=2TO13:CIRCLE(Q+7,W+10)
,Y9,0:NEXT:FORY9=1TO13:CIRCLE(Q+
7,W+10),Y9,1:NEXT
400 POKE65494,0:PLAY"T255L25501V
30;2;3;5;5;6;2;3;5;2;6;3;1;V25;2
;7;3;1;4;7;7;3;1;5;3;7;1V20;1;6;
4;7;3;1;4;7;3;1;6;2;1;6;3;3;V15;
;1;6;3;5;7;2;5;1;1;6;4;1;6;3V10;
2;7;2;1;4;7;3;1;8;8;3;1V5;1;5;8;
3;1;6;2;3;6;1;9;1;6;2;3;4"
410 POKE65495,0:IFF<=0THEN290ELS
EZ=ABS(INT(T*40)):FU=INT(2*RND(2
0)+Z):C=S:IFS>0THENS=S-Z:CLS:PRI
NT:PRINT" YOU LOST"Z"POINTS"," I
N THE CRASH"
420 PRINT:PRINT" YOU LOST"FU"FUE
L UNITS":F=F-FU:GOTO490
430 ON RND(4) GOSUB510,520,530,5
40
440 FORQ=1TO500:NEXT:GOTO470
450 PLAY"T5L102N1P6N6P6L1.N10P6"
:PLAY"T4L8P203N2L1.N1"
460 S1=INT(((1.9-T)*75)):FU=FU+S
1+RND(50):DRAW"S4BM5,20R10NR10D2
0BR20U20R15D20NL15BR10NR15U20BR1
5D20BR10NR15U20R15BR10D10ND10R15
NU10D10BR10U20R10F5D10G5NL10BR15
NR15U20R15D20BR10NU20E10F10U20BR
10ND20F20U20BR10D15BD3D2":RETURN

470 CLS:PRINT:PRINT:PRINT" YOU G
AINED";S1:PRINT" POINTS AND"FU+S
1"FUEL UNITS":C=S:S=S+S1
480 F=F+FU+S1
490 IFS<0 THEN S=0
500 PRINT:PRINT" YOUR SCORE IS";
S:PRINT:PRINT" YOU HAVE";F;"UNIT
S OF FUEL":A$=INKEY$:FU=0:GOTO15
0
510 PLAY"V3103T4L2N1P20":GOSUB46
0:PLAY"L100N3;4;5;6;7;8;9;10;L8N
11P28L8P28N11;P28;11;L1P18N11":R
ETURN
520 PLAY"V31T6L203N1P2L18N1;2;3;
4;5;P4L4N1P4N5P4":GOSUB460:PLAY"
T4L1.N10":RETURN
530 PLAY"V20T7L102N1P6N6P6L1.N10
P6":GOSUB460:PLAY"V31T5L8P203N2L
1..N1P8":RETURN
540 POKE65494,0:SOUND140,11:SOUN
D180,11:GOSUB460:SOUND176,4:SOUN
D165,4:SOUND154,4:SOUND200,12:SO
UND180,17:POKE65495,0:RETURN
550 PCLS
560 LINE(0,0)-(256,192),PSET,B
570 CIRCLE(0,140),30,,1,.75,0:LI
NE(30,140)-(30,160),PSET
580 DRAW"S4BM30,160E15R25F15D10R
5"
590 Y3=90:Y4=120:FORU7=170TO50 S
TEP -10:LINE(Y3,U7)-(Y4,U7+10),P
SET,BF:Y3=Y3+1.2:Y4=Y4-1.2:NEXT
600 DRAW"BM120,170E10R7D20R24U20
R10F10R12U60R11U40R24D40R11D60R1
5"
610 LINE(205,69)-(227,69),PSET:L
INE(206,68)-(226,68),PSET
620 PAINT(128,190)
630 X1=126:X2=127:X3=50:X4=49:X5
=162:X6=161:F1=250:F2=900:F3=130
0:SX=3:SY=3:T=1:U=1.3:RETURN
640 PCLS1:DRAW"S12BM0,145F1D2F3D
8R8U12R2U4E7R8F5R3F6R2D1R1E2F3R2
E3R1E2F3R1F3R2D6R8U6R2E3F2R4":PA
INT(128,192):X1=101:X2=100:X3=16
0:X4=161:X5=169:X6=168:F1=200:F2
=1150:F3=700:SX=3:SY=3:T=1:U=.5:
RETURN
650 RETURN
660 PCLS1:DRAW"C0S4BM0,110R4D1R1
D1R1D1F3R1F1R2F2R2F2R5F3D1F1R1D3
6R44U24E1R1E2R2E2R2E1R1E1R1E2R3E
4U2E2U1E2R2E4R1E1R25U22R3F2R5F2R
5"
670 DRAW"R1F1R3F1R5F2R4F2R1F3R3F
4D3F3R6D2F2R3F2R3D1R2D1R2D1F4R2F
3R2F3D3F3R2D4F1D1F1D5R25U8U13E1R
1E8R4"
680 LINE(38,62)-(63,162),PSET,B:
LINE(37,63)-(64,63),PSET:LINE(37
,64)-(64,64),PSET
```

VENUS LANDER

```
690 FORX8=62TO142 STEP25:LINE(38
,X8)-(63,X8+25),PSET:LINE(63,X8)
-(38,X8+25),PSET:LINE(38,X8)-(63
,X8),PSET:NEXT:PAINT(128,191)
700 X1=44:X2=43:X3=94:X4=95:X5=1
33:X6=132:F1=1100:F2=700:F3=500:
SX=128:SY=5:T=1:U=1.3:RETURN
```

BUGS

In the July 1982 issue, In PROGRAM I of the article GRAPHICS AND ANIMATION FOR THE COLOR COMPUTER, written by Steven M. Ostrom, there was a typographical error on page 50. Line 20 should read:

```
20 FOR A=224 TO 255 'PICK START AND STOP
POINTS
```

The program will not work unless the number 225 is replaced with the correct number 255.

REVIEW - GHOST GOBBLER

by: Karen Petty
4551 Hercules Drive
West Valley City, VT 84120

I really don't know a great deal about my husband's computer, except I always know where to find him when I need him, sometimes until three in the morning.

I am learning a little about the color computer, sometimes with a new book of his, sometimes with a new game, and guess who is his chief guinea pig when he writes a new program? That's right! ME! He has come up with some very good ones.

The other day he received another order from Spectral Associates, like the others, it took only two weeks to get here. It was this super new game called Ghost Gobbler. It is a version of the arcade game, Pac Man. He was impressed with a couple of things that didn't mean too much to me. For example there are four copies of the game on each side of the tape. For you other "widows" that is an added plus to any program. He was also impressed by a statement on the instruction sheet that said, "If the tape should ever be accidentally erased or become unusable for any reason, Spectral Associates will replace the tape for $1.50 if the original tape is returned post paid". Wow what a company! What a friend!

I really have to confess, my husband let me play this marvelous game and to my amazement, I enjoyed it. It's not complicated like some of the space games are. It moves at the speed you want it to go. It has 16 different skill levels (my favorite level is 0). It keeps track of who had the nine highest scores by name, score and level of play. For the same person to play a new game you either type "Y" in response to the new game question or press the fire button on the joystick.

The game consists of a maze that is full of little plus marks. These plus marks are food for the Gobbler that you control with the right joystick. You get 10 points for each plus mark you gobble.

You have to be careful though, because there are four ghosts that would love to have the Gobbler for lunch. You have a total of four Gobblers. There are two ways to prevent the ghosts from eating your point Gobbler.

(1) You can usually out run them using the joystick.

OR

(2) You can eat an energizer dot. If you do this, the ghosts turn blue and become scared. In this state the Gobbler can eat the Ghost. You get 200 points for the first ghost, 400 points for the second ghost, 800 points for the third ghost, and 1600 points if you get all four, but be careful, you don't know how long they will remain scared. There are four of these energizer dots on the screen. Once your Gobbler has eaten all the plus marks and all the energizer dots you are given a new screen.

The ghosts start each screen in a prison in the center. There is only one opening to the prison, and they can only come out one at a time.

Also, for extra points, there are bonus shapes that will appear twice during each screen for a very short period of time right beneath the prison. The first bonus shape is a plum worth 100 points, the second shape is three cherries worth 300 points, they will appear on screens 2 and 3. The third shape is a pear worth 500 points, it appears on screens 4 and 5. The fourth shape is a mushroom and it appears on screens 6 and 7. Either my husband or I have seen all of these shapes. The instruction sheet says "There are four more. A bell for screens 7 and 8 for 1000 points, a happy face for screens 10, 11, and 12 for 2000 points, a mug for screens 13, 14, 15, and 16 worth 3000 points and a strawberry for screens 17 and up worth 5000 points".

When you reach 10,000 points two things happen, first you get an additional Gobbler and second whether you want it or not, your skill level automatically increases by two.

When the skill level goes up three things happen.

(1) Your Gobbler moves slower.
(2) The Ghosts follow the Gobbler more closely.
(3) The scared Ghosts run away more cleverly.

On the negative side, sometimes the joy sticks don't react fast enough and my husband says (I've never seen this) that sometimes the scared Ghosts eat his Gobbler.

All in all I think this is one of the funnest games my husband has bought. The instructions that come with it are easy to understand, you can choose the level of speed you are most comfortable with and with a little practice you can get a very good score.

So remember gals, let your husbands do the dishes sometimes while you enjoy the game.

TELEWRITER™
the Color Computer Word Processor

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 × 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.

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.

. . . truly a state of the art word processor. . . outstanding in every respect.
— The RAINBOW, Jan. 1982

The only one with all these features for your TRS-80 Color:

51 column × 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

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.

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 (LPVII, LPVIII, MX-80, Okidata, NEC 8023, C. Itoh 8510, Centronics, GE Terminet, Smith Corona TP-1, etc.). 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.

The disk version can be simply customized to the precise number of drives in your system. From the disk menu, you can list any directory (including free space) to the screen or to the printer, rename or delete files, set the default drive and return to BASIC.

ASCII COMPATIBLE
Telewriter turns your Color Computer into the most powerful, lowest cost, word processor in the world today. But that's not all. The simple ASCII conversion program provided with Telewriter (for both cassette and disk) means you can use the full power of the Telewriter editor for creating and editing BASIC and assembly language programs. It means you can use Telewriter to prepare or edit text files used with any data communications program.

Telewriter costs $49.95 on cassette and $59.95 on disk. To order, send check or money order to:

Cognitec
704 Nob Ave.
Del Mar, CA 92014

Or check your local software store. If you have questions about Telewriter, call us at (714) 755-1258 weekdays, 7AM-4PM PST.

And now you can get a complete text processing/communications package direct from Cognitec.

Telemaster-1: gives you Telewriter along with Colorcom/E, the most flexible smart terminal program available for the Color Computer. Package price: $94.95.

Telemaster-2: gives you Telewriter plus Spell 'n Fix—the professional FLEX spelling checker, now available for the Color Computer. Package Price: $109.95.

Telemaster-3: includes Telewriter, Spell 'n Fix, and Colorcom/E—all 3 for $154.95.

Please specify disk or cassette. Allow 2-3 weeks for personal checks. Add $2 for shipping and handling. California residents add 6% state tax. Send SASE for copies of reviews from major Color Computer and TRS-80 magazines.

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

HOMEBREW 64K CONVERSION

By: Christopher R. Hawks
307 Sexauer Avenue
Elgin, IL 60120

After reading Frank Hogg's article (Feb. CCN), I began to wonder how I could put 64K chips in my computer. I was able to obtain 64K chips by mail for a lot less than the Radio Shack upgrade. Because I had the 1.1 version of Extended BASIC, which will initialize for the RAMs, I was all set. Or so I thought.

I discovered to my dismay, that the 64K chips would not just plug in. It seems that three of the pins require different connections than the 16K chips. I checked the new CC technical manual ($14.95) and looked at the schematic. It seems that the revision E board has several jumpers for 32K operation (64K chips). Happily some of these are for the pins in question. It seems all that I had to do was disconnect pin #1 (mine require no connection), get +5 volts to pin #8 (instead of pin #9), and tie all pin #9s to pin #35 of SAM (MM6883). The only other thing is to tell SAM about the change. More on that later. Since Frank Hogg's modification is reversable, I wanted mine to be also. I decided on a plug in mod.

I required only a few items for this conversion. I used 8 dual inline pin sockets, 1 33 (symbol unknown) resistor, some 30 gr. wire-wrap wire, and soldering iron. I began by bending both pin #1 and pin #9 of the socket straight out from the body. This is so they will not plug into the board. Next I soldered a jumper from pin #8 to pin #9 so that pin #8 will get +5 volts. If your chips need +5 volts to pin #1, jump from #1 to #8 as well. See Fig. 1. If you feel that it should have a capacitor to ground to eliminate local noise, you can put it between pin #1 and pin #16 (ground). Remember, however, that pins #9 and #16 must plug into the sockets on the board. Next bend pin #9 of the 64K chips straight out from the body of the chip. (This is the one on the bottom right while holding the chip with end with the notch up.) This pin will connect to pin #35 of SAM. Remember to hold the chips by the ends and keep yourself grounded when bending the pins. I used a large piece of aluminum foil and rested my arm on it while doing my work. This is to keep from damaging the chips with static electricity.

Now, open your computer by laying it upsidedown on a towel to protect it. Remove the screws. Place upright, and remove the cover. Gently unplug the keyboard and lay it aside. Remove the R.F. shield. You may have to cut the

plastic wire ties. Using a small screw driver or nailfile slowly work the 16K chips out working from end to end. Wrap them in aluminum foil if you want to save them. Like to send your computer back to the shack. Gently ease the modified sockets into the sockets on the board. Make sure they are oriented with the jumper towards the keyboard area. Next install the 64K chips with pin #9. The next step is to tie all of the pin #9s together as shown in Fig. 2. Leave a loop as shown and install a 33 (symbol unknown) resistor as shown to pin #35 of SAM.

All that remains now is to inform SAM that it has 64K chips. According to the tech manual the center pin of the jumper located between the PINs (U8 and U4) should be connected not to one of the side pins but to "TTSL". According to a friend of mine who understands assembly language, this can be any of U8's pins 13-17. This is because the 1.1 ROM stores a number in the keyboard and then checks to see if the "RAMSIZE" pin #12 (U4) has changed. If it has, then memory is not 4K or 16K and is initialized as 32K. So all that remains is to remove the jumper entirely and jump the center pin to one of U8's pins #13-17. I chose #17. See Fig. 2.

Temporarily connect up your computer for the famous "Smoke test". Power up and a "PRINT MEM" should reveal over 24K memory. Anything else, check your work. If all is well you can reassemble or push on with Frank Hogg's Mod. I did and its great.

64K KORNER

By Frank Hogg

This column is written for you, the user of the 64K Radio Shack Color Computer. However, this is a big job and I would like some help with it. If you have anything that I could use in the column, please send it to me. Please don't call!, mail it to me. It is just too hectic at the lab to take information like this over the phone.

It seems that everyone is moving to new and larger facilities, first CCN and now us. I don't want to give out the address yet, as the lease hasn't been signed, but it is only a 1/2 mile from our present location so the phone won't be changed, just the address. The new place is 3 times larger than what we have now, and this will make it easier. We are also thinking of installing a toll free (to you) watts (800) line for our customers. More next month.

Because of our involvement with FLEX and OS-9, this column has been mostly about that. One of the main reasons to put FLEX on the CC is to be able to use all that software available to FLEX users. However nice that may be, it does cost money, somtimes quite a lot of money. That doesn't mean that you can't make use of the extra memory, you just have to do it in a different way. This month, and I hope more so in the future, I want to cover other things that can be done with the CC and 64K. So to answer the question, "Now that I've got 64K, what do I do with it?", here goes.

Just where is the other 32K we are always talking about? How can you use it with Basic?

The other 32K RAM cannot be used with Basic because it resides in the same area as the Basic ROM does. You can have either the Basic ROM or RAM but not both at the same time. With RAM on, you can put anything you want there, including a copy of BASIC. Let's explore that possibility.

Look at the memory map in Fig 1, notice that Extended Basic (ECB) resides under Color Basic (CB). That means that we could change some things in CB to use that extra 8K. The only bad thing here is that we would loose ECB and the features it provides. But you could use CB just for I/O with a machine language program and have all that memory available to you.

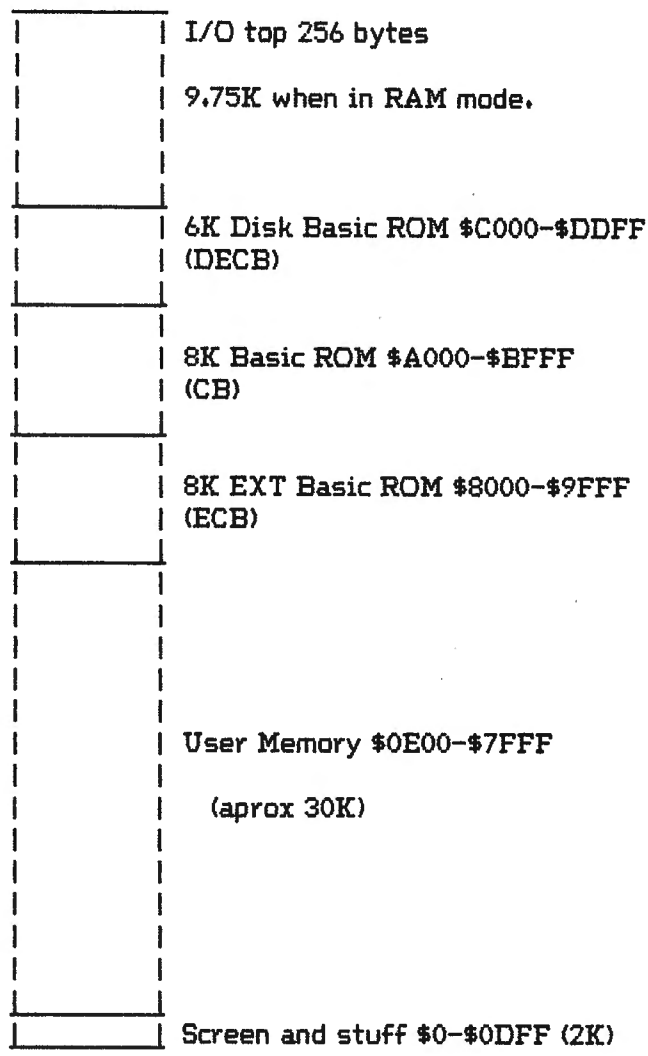


Figure 1

Look at the almost 10K above DECB. It would be tough to let Basic use that, but you could do some other things, like a Hi-Res screen, with 51X24 like FLEX's, rather than the standard 16X32.

How about some extra features like 'ON ERROR GOTO'. This is one of CB's weakest points. Whenever you have any type of error, your program crashes and leaves you back in Basic. With 'ON ERROR GOTO' you can handle errors and your program stays in control.

You can always use the upper memory for USER calls with machine language programs.

How about enhancing Basic's editor.

There are many things that can be done, all you need is the time and the will to do them. It looks like FLEX and OS-9 will keep us busy for quite some time to come, so we will not be doing any of this ourselves. If you do anything along these lines, send it to me or CNN. I would like to see other things done in addition to what we are doing with that other 32K.

Address your replys to:

64K Korner
c/o Frank Hogg Laboratory, Inc.
Midtown Plaza
Syracuse, NY 13210

>>> NOTICE <<<

By the time you read this we will have two new additions to FHL Color FLEX. Both are free. Return your original FLEX master disk, with a copy of your invoice, and enough postage to cover return postage.

The first is the 51X24 display (we advertised a 24X42 but we needed 51X24 for the business software). This resides above FLEX and has cursor addressing and erase to end of line. The second is a pair of programs to allow the use of an external terminal with the printer hooked to it. This is then connected to the RS-232 port of the CC and gives you the advantage of 24X80 display and up to 19,200 baud (depending on your terminal).

You can also take this opportunity to purchase DBASIC at the lower $30 price, rather than $40. DBASIC is RS disk basic reading and writing to FLEX disks. This way RS Basic programs can be run under FLEX. A utility included will allow reading RS Disk files and writing to FLEX. (ASCII only)

ON MODIFYING PACKAGED ROM PROGRAMS

By: Mark Rothstein
3123 Walnut Avenue
Owings Mills, MD 21117

Occasionally we all find programs that meet a critical need ... that is, except for one problem with the program that makes it essentially useless. This happened to me recently when I purchased the cartridge programs Spectaculator and Scripsit from Radio Shack. When I tried to run these programs I found that they wouldn't operate with my 300 baud printer! If the program had been on cassette, I would have fixed the baud rate and been quickly on my way. Since the programs were in ROM, however, I had to find some other way of solving my problem. In this article I will describe the procedures I followed to make my fix. This procedure can be applied to other ROM programs and relocates the program to a convenient area of RAM.

1. THE PROCEDURE

The procedure for altering the program to run in RAM involves four steps. These are:
Copy the program,
Decide where in RAM to put it,
Modify it to execute in that RAM area, and
Fix the original problem.

2. COPYING THE PROGRAM

Radio Shack has been quoted as saying that their ROM programs can't be copied. However, copying the program only involves a little trick. One small note first: The original designer of the program put a lot of time and effort into writing it. He gets paid from a share of the program revenue. Copying the program is legal and "right" only if you purchase the program. As purchaser and licensee you and I have the right to copy the programs and modify them for our own use.

To copy the program, examine the cartridge: Turn it over and slide back the protective shield; you will expose a printed-circuit board edge connector with 14 to 20 edge connections visible. (See Figure 1.) This is a small piece of scotch tape on the left-most edge connection. This is cartridge pin 8. Cut the tape off cleanly so that it covers only that metal strip. This is what Radio Shack uses to make the cartridge program take over control of the computer. We have now disabled this feature.

To copy the program to tape, execute:
CSAVEM "PROGRAM NAME", &HC000, &HDFFF, 'HC000.
This will copy the program to cassette tape with a starting address of $C000.

3.0 LOCATING THE PROGRAM IN RAM

In the Color Computer, there are three convenient places or ways to store the program in RAM. I will describe all three. The one chosen depends on RAM memory size, memory implementation, and computer warranty. These choices are labeled 64K, cartridge RAM, and 32K RAM.

3.1 64K RAM

For those who have a computer converted to 64K of RAM, congratulations: the solution is relatively easy. The tape program can be copied directly to RAM at $C000 and it will execute from there with only one change -- see the memory size alteration (Section 4.3). Be sure to copy level 1 BASIC, however. Both programs access the $A000 to $A00C subroutine calls.

3.2 CARTRIDGE RAM

The second alternative is to install 8K of RAM via the cartridge connector. There are a few ways of doing this. One acquaintance of mine has built an S-100 interface and has put his memory on the S-100 bus. Another way is to build or buy a cartridge with 8K of RAM inside. The Micro Works, for instance, manufactures a nice memory, limited I/O board they use to package their cartridge products. This board can hold six 2716-type IC's in the address space $C000 to $EFFF. A user may burn his version of a ROM program into four 2716's or he can slightly modify the board to hold six Hitachi 6116's -- 2K X 8 RAMs -- in place of the 2716's.

The advantage of this alternative is that it doesn't void the Radio Shack warranty. Also no extra change is required to make the program run. The disadvantage is cost. The Eprom version will cost about $50, but in RAM it will be about $70. This is just the cost of the 64K conversion!

3.3 INTERNAL 32K RAM

The third alternative is to relocate the program into a convenient, already existing, RAM address space. In my 32K machine, that is the top 8K of memory. I suppose that it could be located at the top 8K of 16K of memory only that would not leave much workspace. When the program goes into the top section of my memory it goes into locations $6000 to $7FFF.

The advantages of this approach are cost and maintenance of the warranty. The disadvantage is that it requires a lot of extra work to get the program relocated. The remainder of this article is devoted to a discussion to the required changes.

4.0 CHANGES TO THE PROGRAM

Changes to the program fall into four classes. These are changes to absolute addresses, changes to address tables, changes to

memory size, and changes to solve the original problem.

4.1 ABSOLUTE ADDRESSES

One step necessary to relocating a program is to locate all those instructions which reference absolute addresses which are in program address space. Instructions which typically do this are:

JMP LDX * CMPX *
JSR LDY * LDD *

The program given in listing 1 automatically checks for these instructions: when it finds one, it checks to see if the address is in the range $C000 to $DFFF. If it is, then it prints out the address and instructions and relocates the address reference to $6000 to $7FFF. The output for Scripsit (the output for Spectaculator is too long to include here) is given in Table 1. These locations must be checked against a hexadecimal dump of the program to ensure that a wrong change isn't made. The program given in Listing 2 provides such an output dump.

4.2 ADDRESS TABLES

The second step in relocating a program is to find all of the Tables that contain addresses and change the entries to an appropriate new value. In this step I have examined the hexadecimal dumps of both programs and I found an Address Table at $C4C4 to $C4F5 in Scripsit, and an Address/Command Table at $C0CF to $C0B7 in Spectaculator. (The Address/Command Table has two bytes of ASCII string followed by two bytes of Address.) All of the Addresses have to be changed into the range $6000 to $7FFF in order for the program to operate.

4.3 MEMORY SIZE

One last step remains to be done. That is to set the size of the memory available for workspace. The ROM-based programs merely determine were RAM ends and set their pointers accordingly. Our version will set a fixed, appropriate value.

In Scripsit, the memory routine is located at $C62B thru $C63C. To make the program run in a 32K RAM computer, I just changed the

C62B 8E8000 LDX *$8000

TO

C62B 8E6000 LDX *$6000

No change is needed if External RAM is used or if the computer has 64K of RAM. However the 64K computers do have an extra 8K from $8000 to $9FFF where level 2 BASIC resides. To use this area, change the above instruction to

C62B 8EA000 LDX *$A000.

A different change is required for Spectaculator. Its memory size routine is located at $D19F thru $D1B4. The simplest change is to alter the code at $D1AD to:

D1AD 12 NOP
D1AE 8E5FFE LDX *$5FFE

For the 32K computer; for the external RAM computers, no change is required; for the 64K machines, the address can be set to $9FFE for maximum workspace.

With all these changes, the program should now work as originally designed. Be sure to save a copy onto tape before running the program.

4.4 PROGRAM CHANGES

Now that all the other changes have been made, I began a leisurely look through the code to find the printer routines. In Scripsit, the 600 baud delay is set at address

CE0F 8E00AE LDX *$00AE.

For 300 baud this value has to be slightly more than doubled. The value $0160 works just fine:

CE0F 8E0160 LDX *$0160

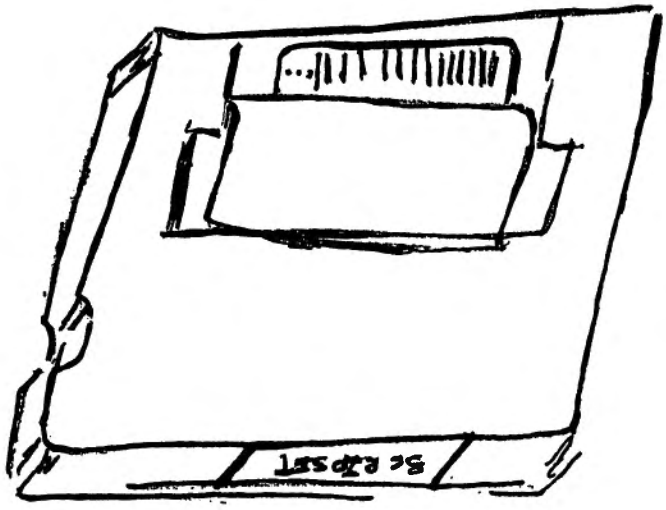
Spectaculator uses the basic level 1 serial driver for output. A $B4 has to be stored in location $0096 to set the printer to 300 baud. Incidentally, version 1.0 of level 1 BASIC has a bug in the printer routine--it outputs seven data bits plus two stop bits. This won't work in some printers; they require a program fix which Radio

Shack distributes free on cassette to level 1 purchasers. Unfortunately when the ROM version of Spectaculator is used, there is no way of loading in the print fix. When RAM is used, however, space for the fix can be reserved. The fix can even be loaded as part of the program.

5.0 SUMMARY

I have just described a way in which cartridge ROM-based programs can be converted so that they execute in RAM at a different address space. This allows minor changes to be made in a ROM program to customize it to your system.

Figure 1
SLIDING BACK THE COVER ON THE PROGRAM CARTRIDGE REVEALS AN EDGE CONNECTOR.



Listing 1
AUTOMATIC ADDRESS MODIFIER

```
10 'AUTOMATED ADDRESS MODIFICATI
ON PROGRAM
20 'MARK ROTHSTEIN
25 '
30 'LOCATES "JMP", "JSR", "LDD #
", "LDX #", AND "CMPX #" INSTRUC
TIONS.
40 'CHECKS TO SEE IF THE ADDRESS
 IS IN THE RANGE $C000 TO $DFFF
50 'IF IT IS THEN THE ADDRESS IS
 CHANGED TO $6000 TO $7FFF
60 'ALSO, THE ADDRESS OF THE CHA
NGED LOCATIONS ARE PRINTED OUT F
OR VERIFICATION.
70 '
80 'IT ASSUMES THAT THE PROGRAM
HAS BEEN MOVED INTO ADDRESSES $6
000 TO $7FFF.
90 '
100 CLS:FORI=&H6000 TO &H7FFF
110 PRINT@0,HEX$(I);
120 P=PEEK(I):Q=PEEK(I+1):R=PEEK
(I+2)
130 '
140 'INSTRUCTION SEARCH
150 IF P<>&HBD AND P<>&H7E AND P
<>&H8C AND P<>&H8E AND P<>&HCC T
HEN 230
160 '
170 'ADDRESS RANGE CHECK
180 Q1=INT(Q/16):IF Q1<>12 AND Q
1<>13 THEN 230
190 '
200 'YES. MAKE THE CHANGE.
210 PRINT#-2, HEX$(I)" "HEX$(P);
HEX$(Q);RIGHT$("0"+HEX$(R),2),
220 POKEI+1,Q-&H60
230 NEXTI
240 PRINT@32,"ALL DONE."
250 STOP
```

Listing 2
HEXADECIMAL/ASCII DUMP

```
 10 'HEXADEXCIMAL/ASCII DUMP
 20 'FROM $6000 TO $7FFF
 30 'MARK ROTHSTEIN
 40 '
 50 CLEAR500
 60 DIM P(15)
 70 AD=&H6000:'STARTING ADDRESS
 80 ED=&H7FFF:'ENDING ADDRESS
 90 K=-1
100 A$=HEX$(AD)+"  ":K=K+1:IF K<
16 THEN 120
110 K=0:A$=STRING$(4,CHR$(10))+A
$
120 '
130 FOR I=0 TO 15:Q=PEEK(I+AD):P
(I)=Q
140 B$=HEX$(Q):IF Q<16 THEN B$="
0"+B$
150 A$=A$+B$+" ":IF I=7 THEN A$=
A$+" "
160 NEXT I
170 '
180 A$=A$+"  "
190 '
200 'ASCII
210 FOR I=0 TO 15
220 IF P(I)<32 OR P(I)>127 THEN
P(I)=46
230 A$=A$+CHR$(P(I)):NEXT I
240 '
250 PRINT#-2,A$
260 AD=AD+16:IF AD<ED THEN 100 E
LSE STOP
```

LEARNING CURVES
A REAL LIFE USE OF MICROCOMPUTERS IN AEROSPACE

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In the aerospace industry we live and die by the LEARNING CURVE. Every budget, every proposal, every forecast of manpower and equipment needs is based upon the predictions of this Oracle of future performance. I have been developing programs on my TRS 80 Color Computer to speed up my own work. My own approach is based on the needs of the production environment in which we work. Readers may find it useful to see a version that has survived the guantlet of everyday use.

Very briefly, in practice a LEARNING CURVE is a straight line drawn on a piece of logarithmic graph paper showing a continuing reduction in unit costs. See Fig. 1. The curves are given names like 76%, 80%, 90%, etc, indicative of the relative reduction in costs as the number of production units doubles. For example, if the 15th Super Bomber took 1,000,000 hours to put together, then on an 80% curve you can expect No. 30 to be produced for 800,000 hours, and No. 60 for 640,000. Out at unit 1000 you will be rolling them off the line for just a bit over a quarter million hours a piece.

The calculations involved use logs and exponents which Extended BASIC handles easily. With my 16K I have to start out with a POKE 25,6 to make sure I have enough room. Later on a list of definitions for the variables and the basic math formulas will be given so that you should have no trouble figuring out what is going on as the program runs.

The major attraction of Learning Curves is that it allows a rational approach to forecasting. Anyone can extrapolate along a straight line - even an engineer.

If you tried to make it work on regular grid paper you would get a real "curve" that would be difficult to use. See Fig. 2. Another good feature of Log paper is the compression of the scale by a factor of ten for each cycle. You can see on Fig. 1 how neatly 1000 units is shown on an 8 1/2 X 11 sheet.

The normal manual method of working with these curves is to use a table. A factor read from the table is multiplied by the value of the first unit to get an answer. The process is similar to using a set of Log or Trig tables. In this case, however, the book gives factors for calculating: a unit value, a cum total for a group, or an average, for any unit, on any curve. For practical considerations of size, the listed curves usually range from 60% to 95% in increments of 1%, and the units run from 1 to several thousands. After the first thousand or so the unit entries often go by steps of five.

The curves in my program are of the STRAIGHT LINE UNIT type. That's the kind I use every day in my work. Other curves called STRAIGHT LINE CUM AVERAGE can also be used. The results aren't very different in the long run but at the start they vary considerably. It's a case of how you interpret real life data against the theory. Each side has good arguments. But it is really not possible to set up controlled experiments to cover all the conditions involved. Our industry is oriented to the Unit Line. In our previous example, if we had been talking STRAIGHT LINE CUM AVERAGE, and the average at 15 was 1,000,000 then the average at 30 would be 800,000 etc.

My program was put together on a TRS 80 Color Computer with 16K. Since I do not have a printer there are program lines such as 1115 and 1130 that are there just to make sure I copy data before it scrolls off the top of the screen. I also have steps to check each input (210, 260, and 1135 for example) to take care of my propensity for typing errors. Obviously some of the spacing of my print lines is just to make things come out in whole words on the screen within the confines of the 32 character by 16 line spacing.

The use of Logs and exponents are needed in various places, as might be expected. Some of my choices for variable names may seem strange, like T1 for the first unit, but it just reflects everyday "shop talk". Someone in the dim past started speaking of T1, T500... etc. and it stuck. B is used for the exponential factor for each curve because that is used in the math equation for such a line, (Y=ax**b). I also use Z for 1+B because it was easier for me to keep track of it when 1+B was required as an exponent. Major variables and the basic formulae are given below to make it easier to follow the program operation as it is described.

Formulae Variables

B=Exponent for each slope value. Also B1 & B2
T1=Value of the first unit
TU=Value of any unit
U=Any unit number
C,CM,CT=A Cum Total for a group of units
TF=Number of the first unit in a Group
TL=Number of the last unit in a Group
SF=Number of the first unit in a series of individual units

SL=Number of the last unit in a series of individual units
SU & SZ=Set Up hours when needed as a separate entity
NS=The number of Set Ups in a production run
BP=The Bend Point Unit No. when a combination of two curves is needed. I call this a DOGLEG Curve. See Fig. 4
TP=The value of the BP Unit
TA & TB are used to keep track of the T1 values for the first part and the last part, respectively, of a DOGLEG combination curve.
BS & BU are the Base Value and Base Unit Number used to identify the starting point of any estimating system.
In our business we often set our estimating standards at unit 500.
B = (LOG(S0/100)/LOG(2)
Z = 1 + B
TU = EXP(LOG(T1) + (LOG(U)*B))
T1 = EXP(LOG(TU) - (LOG(U)*B))
C = (T1/Z)*(((TL+.5) Z) - ((TF-.5) Z))
T1 = (CT*Z)/(((TL+.5) Z) - ((TF-.5) Z))
Note: Using the DOGLEG version requires the program to combine two sets of calculations and to check on which sides of the Bend Point it is operating.

Program Operation

The first thing the program does is ask if you want to see the list of options. Once you have used the program awhile, you can probably go direct to the one you want.

The options named AA, AB, AC, AH, and AJ are general solutions. I have added AD, AE, AF, and AG as "standard" versions which I happen to use very often. The standard options contain constant Slope and Base Unit Values so that only one piece of input data is needed. It speeds up the use and eliminates a possible source of errors. Those of you wanting to adopt this type of program can just leave them out or put in your own versions.

You make your choice of NAME, then the program asks for the category of values you are looking for: UNIT, CUM, or a SERIES OF UNITS. Note that you will also be asked to check for errors after each input.

When the calculations are done you will be asked if you want more of that type of calculation before moving on to your next choice of categories.

After your requirements have been filled, the program will ask if you want to go back and pick another option from the listing.

In the case of the SERIES OF UNITS category you are asked to request only 10 at a time simply because it makes a good fit on my screen. With a printer there would be no restrictions, and you could put in a request for a thousand individual units.

The last item on the menu (LS) is for calling a Least Squares Analysis and will be explained below. It used to be a separate program "LSTSQRS" before being merged into the present format.

In case you still wonder if LEARNING CURVES really work in the real world, I've thrown in Fig. 3. This is data from a program that has been in production for many years. In spite of the ups and downs the trend is solidly there. I can assure that the next time we bid a follow-on proposal and establish operating budgets, this "picture" will be our base; which brings us to the other half of Learning Curve Analysis, finding the line that best fits a bunch of actual data.

You can take a plot like Fig. 3 and "eyeball" the slope and get pretty good at this after a few years practice. The more scientific approach is to calculate a Least Squares Regression Line. The LS option included in the menu does just that. It was adapted by my son, Peter, from a standard regression analysis program by David Noller and Gary E. Whitehouse in the May, 1981 issue of Industrial Engineering. It was changed to work in Logs. I also had him add in an error check for my benefit. The format of the output gives the % slope and the value of two points, T1 & T100, so that you can draw the line through the data points and see the "fit". After looking at it you may find that a DOGLEG version might be better. In that case you can split up the values into subgroups and analyze each with its own Least Squares Line.

Try reading some points off Fig. 3, the more the better, and plug them into the program. You should come out around 78%. Make sure you enter the -1 unit at the end of your input so that the program will move into its calculation phase.

Conclusions

I think many smaller businesses could benefit from the use of these programs, if they are not already making use of this technique in their operations. I can remember, years ago, when I was working for a manufacturer of radio tubes (yes, that long ago) trying to come up with a projection of start-up costs. Not knowing about Learning Curves caused me to "reinvent the wheel". At that time, the boss was very happy with my results, and I was too ignorant to realize how much time I had wasted.

Appendix I & II give Examples and Answers if you want to try the program. It would be a great help to get a pack of Log paper and plot the results as you go along.

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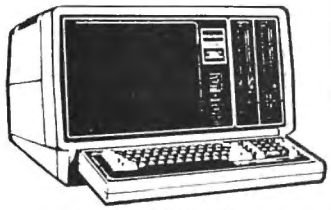

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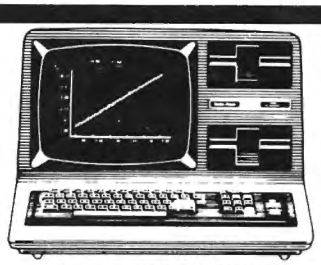

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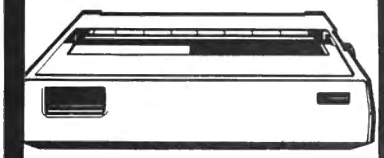

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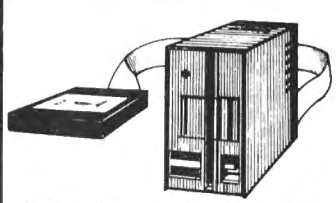

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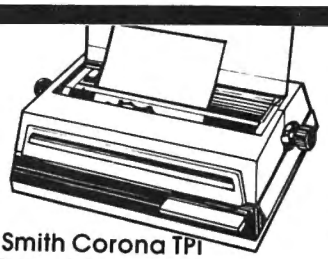

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Appendix I

Four examples will give you a chance to test the operation of the programs and your understanding of LEARNING CURVES.

Example 1. T1 & Slope
Given: T1 = 1234 hrs. Slope=76%
Find: T65, T100, T500
Cum for 1-212
Cum for 125-310
Each Unit value from 1-10
Answers: Use AA
T65=236, T100=199, T500=105.
Cum 1-212=50670, Cum 125-310=27747.
Series 1-10=1234, 938, 799, 713, 652, 607, 571, 542, 517, 496.
Note: When the program asks for the first unit in a group, it is talking about input for a CUM calculation. When looking for a list of individual unit values it uses the word SERIES.

Example 2. A unit other than T1 & Slope.
Given: T500=575 hrs. on an 80% curve.
Find: T1, T420
Cum 1-600
Cum 25-195
Each Unit value from 35-41
Answers: Use AB
T1=4251, T420=608
Cum 1-600=476143, Cum 25-195=169444.
Series 35-41=1354, 1341, 1330, 1318, 1307, 1297, 1286.
Note: This is a very usual combination for estimating. Estimating standards usually represent some theoretical point down the curve, (T100, T500, T1000) where standard data can be applied with a reasonable degree of accuracy.

Example 3. DOGLEG CURVE
Given: Slope of 80% "flattening out" to 85% at unit 100.
Estimating Base Unit=T500
Estimated Base Hours @ T500=850 hrs.
Note: This is a curve combination like Fig. 4.
Find: T1, T100
Cum 75-200
Each Unit value from 96-105
Answers: Use AC
T1=5460, T100=1240.
Cum 75-200=146961.
Series 96-105=1256, 1252, 1248, 1244, 1240, 1237, 1237, 1231, 1228, 1226.
Note: You can use this same example to check AE because it contains the rules for my Standard Bonding operations estimating procedure which has this particular DOGLEG condition "built in". When using AE you only have to input the 850 hr. value.

Example 4. Separate Run Time and Set Up values.
Given: Run Time=200 hrs. @ unit T1000
Set Up Time=500 hrs. for each batch of 20 units.
Slope=90%
Run Time factor= 1.25, Set Up factor=1.90.
Note: Very often the separate RT & SU values are taken from data on the factory Operation Sheets. Usually you have to factor these values up to include shop performance in order to get a value that reflects actual times. If not needed just input a 1.0
Find: Total hours needed to produce 200 units.
Answers: Use AJ
Number of Set Ups=200/20=10
Total Run Time=74996
Total Set Up = 9500
Cum 1-200 = 84496

Appendix II
Least Squares Regression Analysis

Here are some values taken from Fig. 4 for use in checking the operation of the "LSTSQRS" program. The proper method would be to include every possible data point.

Unit #	Unit HRS.	Unit #	Unit HRS.
1	48500	70	8800
2	40000	80	8000
4	33000	90	7800
6	26500	100	8000
8	20000	125	6800
10	18000	150	6600
12	17000	175	6000
15	19000	200	6300
20	12000	220	5900
25	10500	250	5200
30	12000	270	5000
35	12500	300	4800
40	11500	330	4800
45	10250	350	5200
50	10400	380	4700
60	9200	400	5100
		420	4650
		450	4500
		480	4450
		500	4350
		520	4400
		550	4380

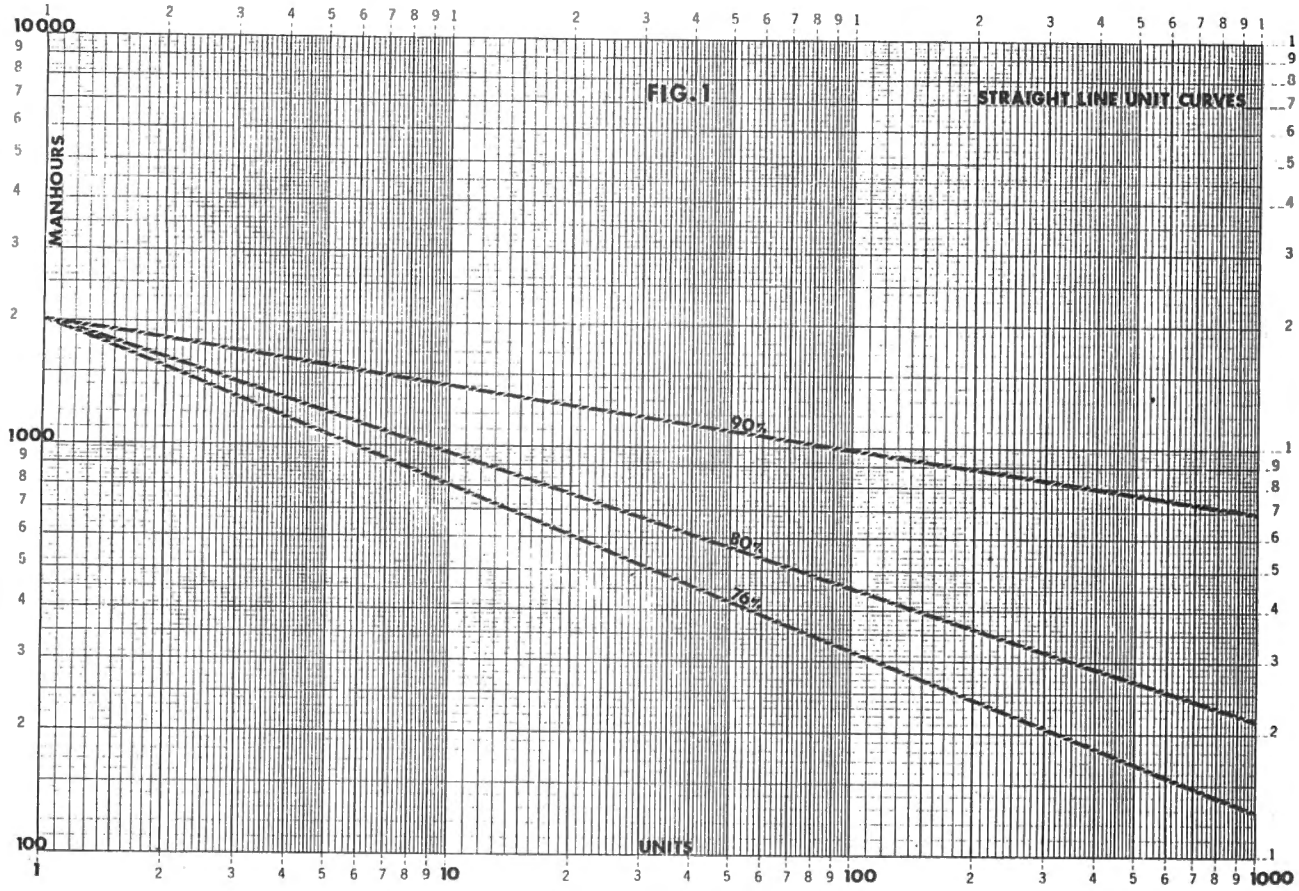


FIG. 1
STRAIGHT LINE UNIT CURVES
MANHOURS
UNITS
90%
80%
76%
10000
1000
100
1
10
100
1000

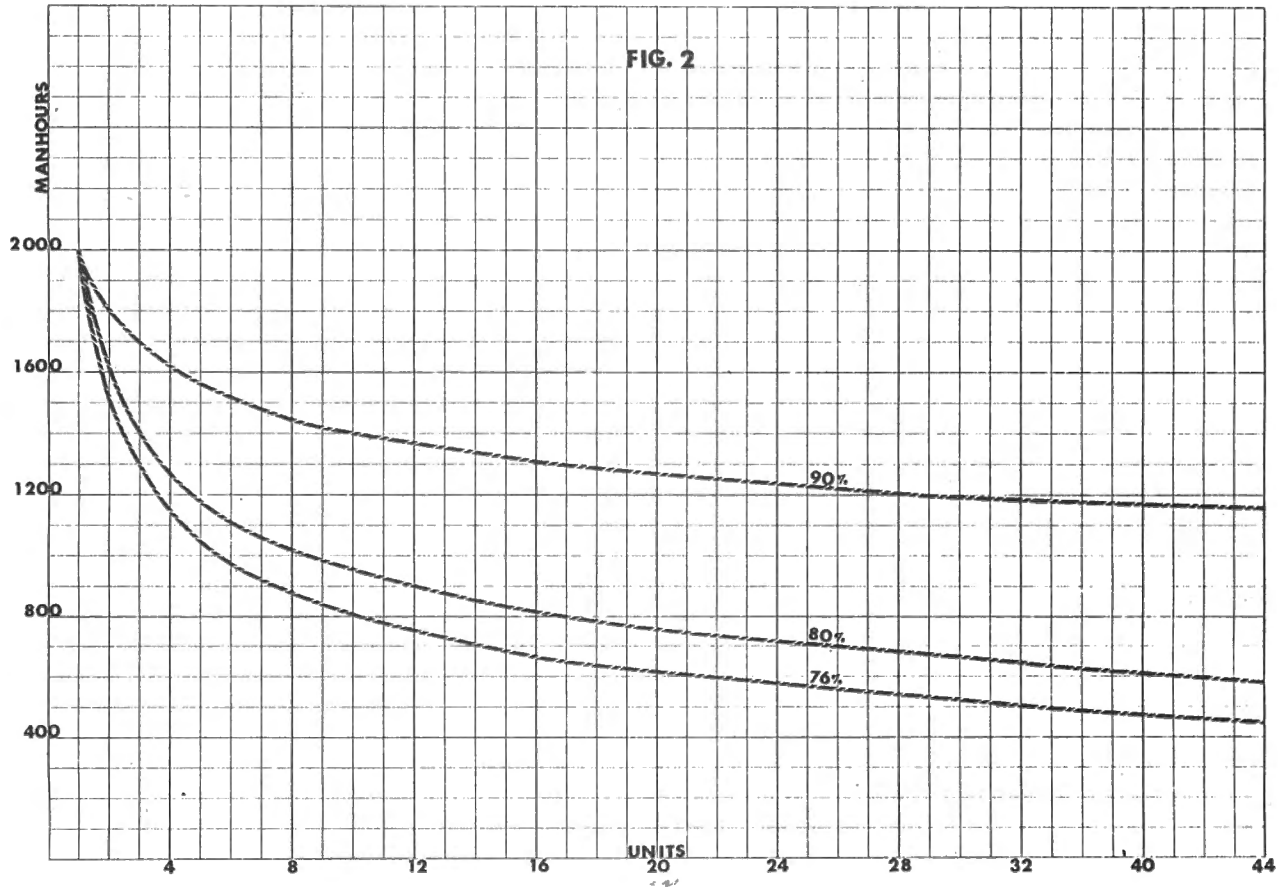


FIG. 2
MANHOURS
UNITS
90%
80%
76%
2000
1600
1200
800
400
4
8
12
16
20
24
28
32
40
44

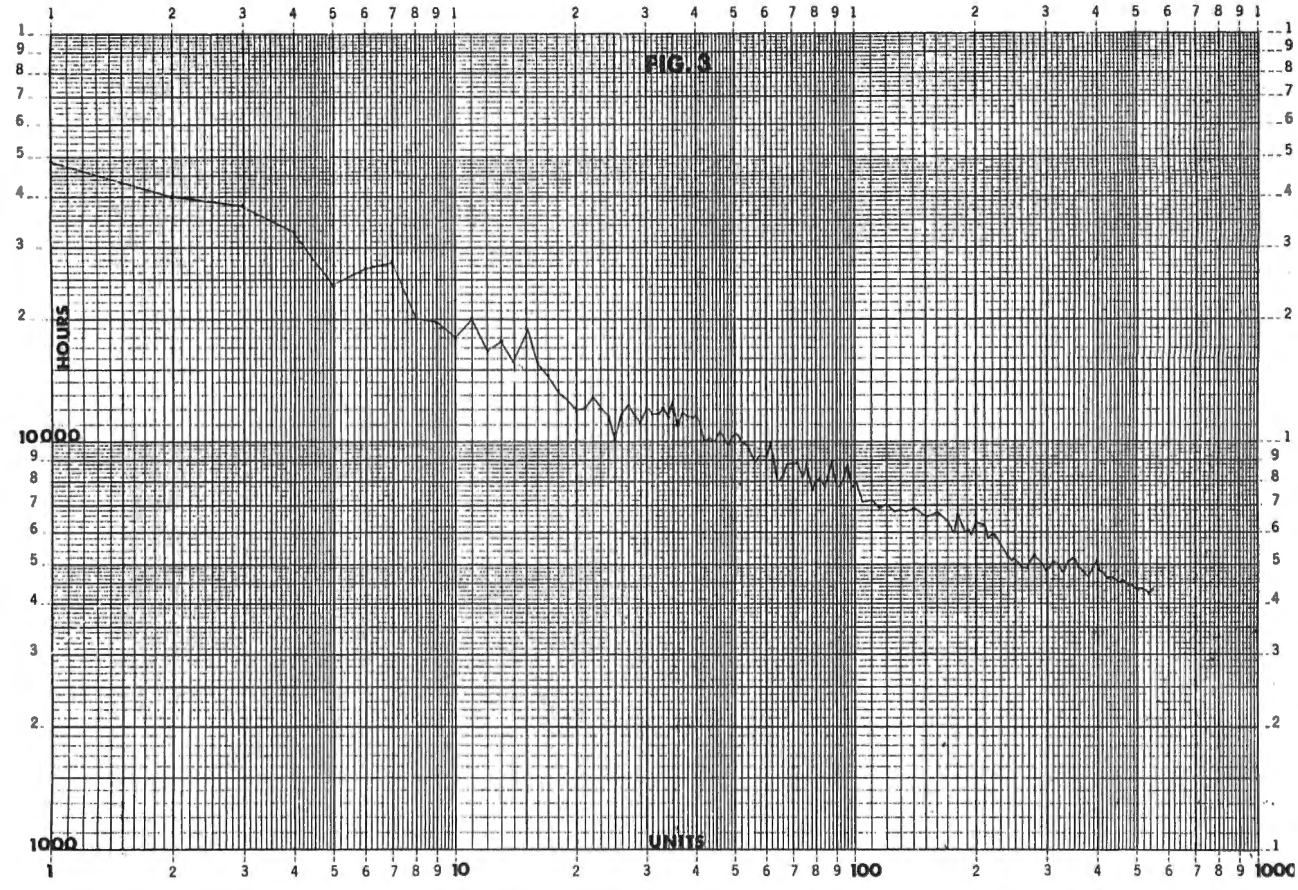


FIG. 3
HOURS
UNITS

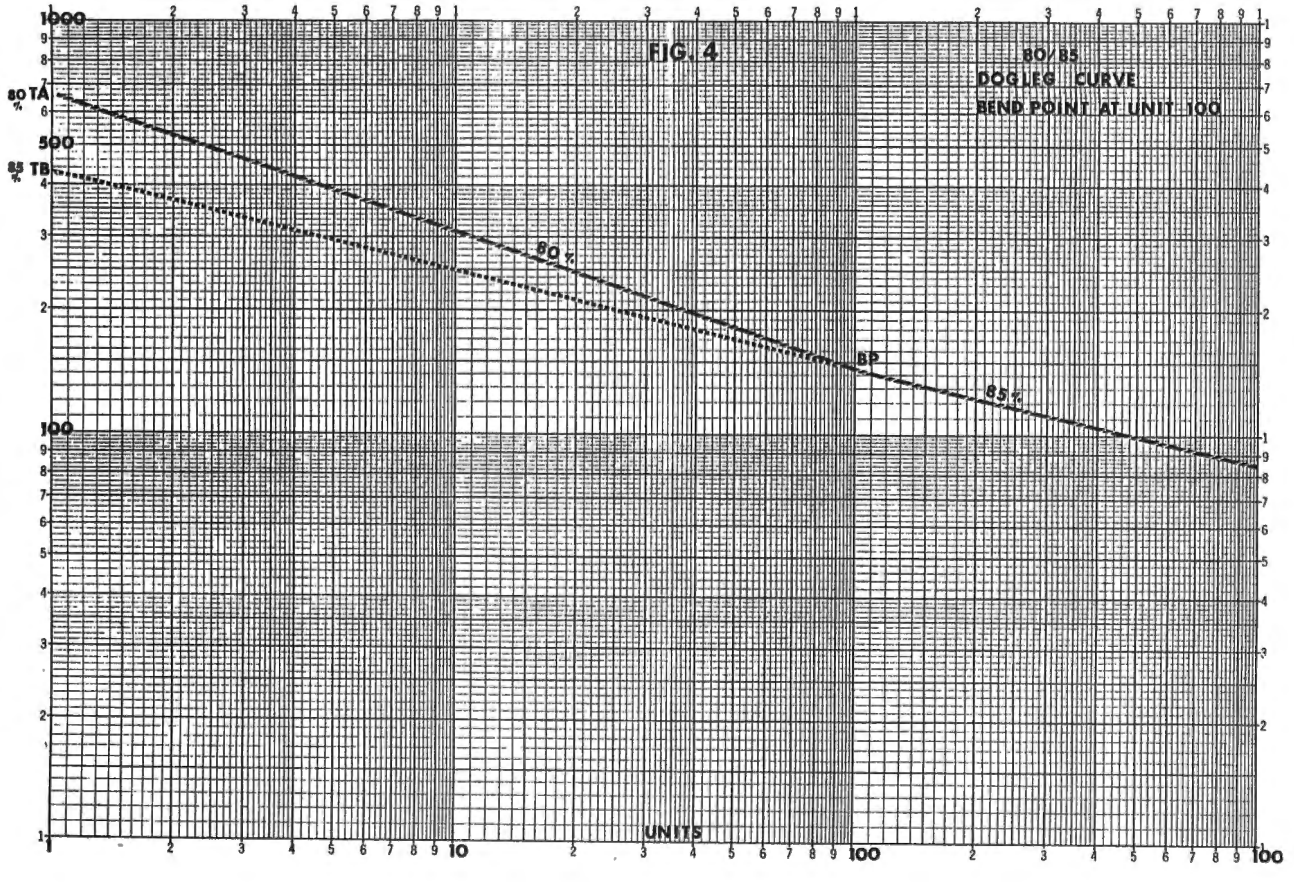


FIG. 4
80/85
DOGLEG CURVE
BEND POINT AT UNIT 100
80 TA
85 TB
80 %
85 %
BP
UNITS

Build performance into your system

with OS-9** software tools

Unix*-based, multitasking, modular, and versatile: these key features are some of the reasons why more 6809 computer manufacturers have selected OS-9 as their standard operating system than any other. And OS-9 has been put to work by thousands of users in almost every conceivable computer application in business, science, industry, education, and government.

Your operating system should not be a barrier between you and your computer. OS-9 is very friendly and easy to use. Its modular structure makes it easy to customize, plus its comprehensive documentation shows you exactly how to interface it to just about any I/O device.

OS-9's advanced features unleash the performance potential of almost any 6809 computer — large or small. In many respects the OS-9/6809 combination is more powerful than many *minicomputers!*

There are two basic versions of OS-9. Both have the same basic features and capabilities. OS-9 Level One runs on small to medium sized systems having up to 64K memory. The Level Two version runs on medium to large size systems having memory management hardware and up to 1 megabyte of memory, and includes record and file locking for multiuser database applications.

Here are just a few reasons why you should insist on OS-9 for your microcomputer system.

- Over 40 utility commands
- Friendly "Shell" command interpreter
- Tree-structured multilevel file directories
- Full timesharing support with log-in and file security
- Fast, secure random and sequential access files
- Comprehensive English language error messages
- Compact real-time multitasking executive
- Hardware or software memory management
- Device independent interrupt-driven I/O
- Fully ROMable for small control systems
- Standard versions available from manufacturers of most popular 6809 computers

OS-9 PASCAL Language Compiler

- most complete and versatile PASCAL available for the 6809
- capable of generating P-code for interpretive execution while debugging OR
- highly optimized 6809 assembly language source code output for maximum speed
- "virtual memory" P-code interpreter lets you run large PASCAL programs

CIS COBOL * Compiler**

- ideal for most demanding business applications
- features ISAM, Debug, ACCEPT/DISPLAY and Interprogram Communications modules
- retains full compatibility with CP/M software
- meets ANSI 1974 Level One COBOL standard and is GSA certified
- Also available-FORMS 2 automatic program generator for easy interative design of screen oriented applications.

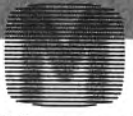
BASIC09 Structured Basic Interactive Compiler**

- fastest and most comprehensive full Basic language available for the 6809
- combines standard Basic with the best features of PASCAL
- features compiler speed, interpreter friendliness and superlative debugging facilities
- option available: Run B...a ROMable run-time system for compiled Basic 09

C Language Compiler

- complete implementation of the UNIX version 7 C language
- includes INT, CHAR, SIGNED, UNSIGNED, FLOAT AND LONG data types, structures, unions, standard C library and a full preprocessor with macro definitions
- generates fully reentrant 6809 assembly language source code output

For more information contact your computer supplier, or



MICROWARE

Microware Systems Corporation
5835 Grand Avenue, Des Moines, Iowa 50312 515-279-8844 • Telex 910-520-2535

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```
5 CLS
10 PRINT"LEARNING CURVES: REV.2
NOV,1981"
15 PRINT" STRAIGHT LINE UNIT MET
HOD."
20 PRINT" R.GIOVANONI: FILE:LRNC
URVE
25 PRINT
30 INPUT" WANT TO SEE THE LISTIN
G";A$
35 IF A$="YES" THEN 40 ELSE 90
40 CLS:PRINT
45 PRINT"*NAME**********GIVEN*
50 PRINT"  AA.....  T1 & SLOPE"
55 PRINT"  AB.....BASE UNIT * SL
OPE"
60 PRINT"  AC.....DOGLEG CURVES"

85 PRINT"  AH.....CUM TOTAL&SLOP
E"
88 PRINT"  AJ.....RUN TIME SETUP
*SLOPE"
89 PRINT"  LS.....LEAST SQR. ANA
LYSIS
90 PRINT:INPUT" ENTER CHOICE FRO
M LIST";B$
95 INPUT" ANY MISTAKES YET";Y$
100 IF Y$="YES" THEN 30
105 IF B$="AA" THEN 150
110 IF B$="AB" THEN 200
115 IF B$="AC" THEN 450
120 IF B$="AD" THEN 250
125 IF B$="AE" THEN 300
130 IF B$="AF" THEN 350
135 IF B$="AG" THEN 400
140 IF B$="AH" THEN 500
145 IF B$="AJ" THEN 550
147 IF B$="LS" THEN 1705
150 CLS:PRINT" AA: GIVEN: T1 & S
LOPE"
155 PRINT" ENTER T1&SLOPE":INPUT
" T1=";T1:INPUT" SO=";SO
160 INPUT" ANY ERRORS";W$
165 IF W$="YES" THEN 150
170 B=(LOG(SO/100))/.69315:Z=1+B

175 GOSUB 1000
180 INPUT" WANT TO RUN PROGRAM A
GAIN";M$
185 IF M$="YES" THEN30 ELSE END
200 CLS:PRINT" AB: GIVEN:BASE UN
IT,BASE HRS.    SLOPE"
205 PRINT" ENTER UNIT NO.,UNIT V
ALUE AND    SLOPE":INPUT" BU=";BU
:INPUT" BS=";BS:INPUT" SO=";SO
210 INPUT" ANY ERRORS";W$
215 IF W$="YES" THEN 200
220 B=(LOG(SO/100))/.69315:Z=1+B

225 T1=EXP(LOG(BS)-(LOG(BU)*B))
230 GOSUB 1000
235 INPUT" WANT TO RUN PROGRAM A
GAIN";M$
240 IF M$="YES"THEN 30 ELSE END
425 INPUT" WANT TO RUN PROGRAM A
GAIN";M$
450 CLS:PRINT" AC: DOGLEG CURVES
: GIVEN DATA:     SLOPE 1: SLOPE
2: BEND POINT:    BASE UNIT: BASE
 VALUE"
455 INPUT" S1=";S1:INPUT" S2=";S
2:INPUT" BP=";BP:INPUT" BU=";BU:
INPUT" BS=";BS
460 INPUT" ANY ERRORS";W$
465 IF W$="YES"THEN 450
470 B1=(LOG(S1/100))/.69315:Z1=1
+B1
475 B2=(LOG(S2/100))/.69315:Z2=1
+B2
480 GOSUB 1200
485 INPUT" WANT TO RUN PROGRAM A
GAIN";M$
490 IF M$="YES" THEN 30 ELSE END

500 CLS:PRINT" AH: GIVEN: CUM HR
S,SLOPE,FIRST  & LAST UNIT IN GR
OUP":INPUT" CH=";CH:INPUT" SO=";
SO:INPUT" TF=";TF:INPUT" TL=";TL

505 INPUT" ANY ERRORS";W$
510 IF W$="YES" THEN 500
515 B=(LOG(SO/100))/.69315:Z=1+B

520 T1=(CH*Z)/(((TL+.5)^Z)-((TF-
.5)^Z))
525 GOSUB 1000
530 INPUT" WANT TO RUN PROGRAM A
GAIN";M$
535 IF M$="YES" THEN 30 ELSE END

550 CLS:PRINT" AJ: GIVEN: BASE R
UN HRS: BASE   UNIT NO.: SETUP H
RS & SLOPE.":PRINT" ONLY RT IS O
N CURVE."
555 PRINT" ENTER RUN HRS,BASE UN
IT,SETUP   HRS, & SLOPE."
560 INPUT" RT=";RT:INPUT" BU=";B
U:INPUT" SU=";SU: INPUT" SO=";SO

565 INPUT" DO YOU WANT RT OR SU
FACTORS";X$
```

```
570 IF X$="YES" THEN 575 ELSE 58
5
575 INPUT" RT FACTOR= 1.--";FR:I
NPUT" SU FACTOR= 1.--";FS
580 RT=RT*FR:SU=SU*FS
585 INPUT" ANY ERRORS";W$
590 IF W$="YES" THEN 550
595 B=(LOG(80/100))/.69315:Z=1+B

600 T1=EXP(LOG(RT)-(LOG(BU)*B))
605 GOSUB 1000
610 INPUT" WANT TO RUN PROGRAM A
GAIN";M$
615 IF M$="YES" THEN 30 ELSE END

1000 INPUT" DO YOU WANT A UNIT V
ALUE";C$
1005 INPUT" DO YOU WANT A CUM VA
LUE";D$
1010 INPUT" DO YOU WANT A SERIES
 OF UNITS";E$
1012 INPUT" ANY ERRORS";W$:IF W$
="YES" THEN 1000
1015 IF C$="YES" THEN 1020 ELSE
1050
1020 INPUT" WHAT UNIT DO YOU WAN
T";U:IF U=1 THEN PRINT" T1="T1:G
OTO1035
1025 TU=EXP(LOG(T1)+(LOG(U)*B)):
PRINT
1030 PRINT" UNIT"U"="TU
1035 INPUT" WANT ANOTHER UNIT";K
$
1040 IF K$="YES" THEN 1020
1050 IF D$="YES" THEN 1055 ELSE
1105
1055 SZ=0+SU
1060 IF SZ>0 THEN PRINT" HOW MAN
Y SETUPS":INPUT"NS=";NS
1065 PRINT" ENTER FIRST&LAST UNI
T OF GROUP":INPUT" TF=";TF:INPUT
" TL=";TL
1067 INPUT" ANY ERRORS";W$:IF W$
="YES" THEN 1060
1070 CM=(T1/Z)*(((TL+.5)^Z)-((TF
-.5)^Z)):C=INT(CM+.5)
1075 IF SZ>0 THEN 1080 ELSE 1089

1080 SU=INT(SU*NS+.5)
1082 PRINT
1085 PRINT" RT"TF"-"TL"=",C:PRIN
T" SU"TF"-"TL"=",SU:PRINT"CUM"TF
"-"TL"=",C+SU:GOTO 1095
1089 PRINT
1090 PRINT" CUM"TF"TO"TL"="C
1095 INPUT" WANT ANOTHER CUM";L$
1100 IF L$="YES" THEN 1060
1105 IF E$="YES" THEN 1110 ELSE
RETURN
1110 IF C$="YES" OR D$="YES" THE
N 1115 ELSE 1130
1115 INPUT" COPY UNIT OR CUM DAT
A & HIT OK";F$
1120 IF F$="OK" THEN 1130
1125 PRINT" REDO!!!":END
1130 PRINT" ENTER FIRST&LAST SER
IES UNITS.  MUST BE IN INCREMENT
S OF 10 OR  LESS AT A TIME":INPU
T" SF=";SF:INPUT" SL=";SL:PRINT"
   MAX 10 AT A TIME!!!!"
1135 INPUT" ANY ERRORS";W$:IF W$
="YES" THEN 1130
1136 CLS
1137 PRINT TAB(9)"UNIT"," HRS"
1138 PRINT
1140 FOR U=SF TO SL
1145 TU=EXP(LOG(T1)+(LOG(U)*B))
1150 PRINT TAB(10)U,INT(TU+.5)
1155 NEXT U
1160 INPUT" DO YOU NEED ANOTHER
10";G$
1165 IF G$="YES" THEN 1170 ELSE
RETURN
1170 INPUT" COPY DATA THEN HIT O
K";H$
1175 IF H$="OK" THEN 1130 ELSE 1
125
1180 RETURN
1200 IF BP<BU THEN 1205 ELSE 122
0
1205 TB=EXP(LOG(BS)-(LOG(BU)*B2)
)
1210 TP=EXP(LOG(TB)+(LOG(BP)*B2)
)
1215 TA=EXP(LOG(TP)-(LOG(BP)*B1)
)
1217 GOTO1235
1220 TA=EXP(LOG(BS)-(LOG(BU)*B1)
)
1225 TP=EXP(LOG(TA)+(LOG(BP)*B1)
)
1230 TB=EXP(LOG(TP)-(LOG(BP)*B2)
)
1235 INPUT" DO YOU WANT A UNIT V
ALUE";C$
1240 INPUT" DO YOU WANT A CUM VA
LUE";D$
1245 INPUT" DO YOU WANT A SERIES
 OF UNITS";E$
1247 INPUT" ANY ERRORS";W$:IF W$
="YES" THEN 1235
1250 IF C$="YES"THEN 1255 ELSE 1
300
```

```
1255 INPUT" WHICH UNIT DO YOU WA
NT";U:PRINT
1257 IF U=1 THEN PRINT" T1="TA:
 GOTO 1280
1258 IF U=BP THEN PRINT" UNIT"U"
="TP:GOTO 1280
1260 IF TU<BP THEN 1265 ELSE 127
0
1265 TU=EXP(LOG(TA)+(LOG(U)*B1))
:GOTO 1275
1270 TU=EXP(LOG(TB)+(LOG(U)*B2))

1274 PRINT
1275 PRINT" UNIT"U"="TU
1280 INPUT" WANT ANOTHER UNIT";K
$
1285 IF K$="YES" THEN 1255
1300 IF D$="YES" THEN 1305 ELSE
 1400
1305 PRINT" ENTER FIRST&LAST UNI
T OF GROUP":INPUT" TF=";TF:INPUT
" TL=";TL
1307 INPUT" ANY ERRORS";W$:IF W$
="YES" THEN 1305
1310 IF TF=>BP THEN 1335
1315 IF TL=<BP THEN 1340
1320 C1=(TA/Z1)*(((BP+.5)^Z1)-((
TF-.5)^Z1))
1325 C2=(TB/Z2)*(((TL+.5)^Z2)-((
BP+.5)^Z2))
1330 CM=C1+C2:GOTO 1345
1335 CM=(TB/Z2)*(((TL+.5)^Z2)-((
TF-.5)^Z2)):GOTO1345
1340 CM=(TA/Z1)*(((TL+.5)^Z1)-((
TF-.5)^Z1))
1345 C=INT(CM+.5)
1348 PRINT
1350 PRINT" CUM"TF"TO"TL"="C
1355 INPUT" WANT ANOTHER CUM";L$

1360 IF F$="YES" THEN 1305
1400 IF E$="YES" THEN 1405 ELSE
 RETURN
1405 IF C$="YES" OR D$="YES" THE
N 1410 ELSE 1425
1410 INPUT" COPY UNIT OR CUM DAT
A & HIT OK";F$
1415 IF F$="OK" THEN1425
1420 PRINT" REDO!!!":END
1425 PRINT" ENTER FIRST&LAST SER
IES UNITS.  USE INCREMENTS OF 10
 OR LESS":INPUT" SF=";SF:INPUT"
SL=";SL:PRINT"  MAX 10 AT A TIME
 !!!!"
1427 INPUT" ANY ERRORS";W$:IF W$
="YES" THEN 1425
1430 IF SF=>BP THEN 1497
1435 IF SL=<BP THEN 1540
1437 GOSUB 1600
1440 FOR U=SF TO BP
1445 TU=EXP(LOG(TA)+(LOG(U)*B1))

1450 PRINT TAB(10)U,INT(TU+.5)
1455 NEXT U
1460 FOR U=(BP+1) TO SL
1465 TU=EXP(LOG(TB)+LOG(U)*B2)
1470 PRINT TAB(10)U,INT(TU+.5)
1475 NEXT U
1480 INPUT"DO YOU NEED ANOTHER 1
0";G$
1485 IF G$="YES" THEN 1490 ELSE
RETURN
1490 INPUT" COPY DATA THEN HIT O
K";H$
1495 IF H$="OK" THEN 1425 ELSE 1
420
1497 GOSUB 1600
1500 FOR U=SF TO SL
1505 TU=EXP(LOG(TB)+(LOG(U)*B2))

1510 PRINT TAB(10)U,INT(TU+.5)
1515 NEXT U
1520 INPUT" DO YOU NEED ANOTHER
10";G$
1525 IF G$="YES" THEN 1530 ELSE
RETURN
1530 INPUT" COPY DATA THEN HIT O
K";H$
1535 IF H$="OK" THEN 1425 ELSE 1
420
1540 GOSUB 1600
1550 FOR U=SF TO SL
1555 TU=EXP(LOG(TA)+(LOG(U)*B1))

1560 PRINT TAB(10)U,INT(TU+.5)
1565 NEXT U
1570 INPUT" DO YOU WANT ANOTHER
10";G$
1575 IF G$="YES" THEN 1580 ELSE
RETURN
1580 INPUT" COPY DATA THEN HIT O
K";H$
1585 IF H$="OK" THEN 1425 ELSE 1
420
1590 RETURN
1600 CLS
1605 PRINT TAB(9)"UNIT","HOURS"
1610 RETURN
1705 CLS
1710 PRINT"LEAST SQUARES ANALYSI
S FOR USE":PRINT"WITH LEARNING C
URVES."
```

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, Meteroids, 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	**$30.00**
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```
1720 PRINT"THIS IS A REGRESSION
ANALYSIS";PRINT"DONE IN LOGS FOR
 USE WITH A";PRINT"STRAIGHT LINE
 UNIT CURVE."
1725 PRINT"DATA CONSISTS OF THE:
";PRINT"UNIT NO. & ACTUAL UNIT H
OURS."
1730 PRINT"AFTER YOUR LAST DATA
INPUT YOU";PRINT"MUST ENTER UNIT
 NO. -1 TO TELL";PRINT"PROGRAM Y
OU HAVE FINISHED."
1735 PRINT:INPUT"READY";YY$:IF Y
Y$="YES" THEN 1737 ELSE STOP
1737 CLS: PRINT: PRINT
1740 N=0: SX=0: SY=0: XX=0: XY=0

1745 INPUT"ENTER UNIT NO."; X
1750 IF X<0 THEN 1800
1755 INPUT"ENTER UNIT HRS.";Y
1760 INPUT"ANY ERRORS";AA$
1765 IF AA$="YES" THEN 1745
1770 N=N+1
1775 SX=SX+LOG(X)
1780 SY=SY+LOG(Y)
1785 XX=XX+LOG(X)^2
1790 XY=XY+LOG(X)*LOG(Y)
1795 GOTO 1745
1800 B=(N*XY-SX*SY)/(N*XX-SX^2)
1805 A=(SY/N)-B*(SX/N)
1810 SL=EXP(B*LOG(2)) : S=INT(SL
*100+ .5)
1815 T1=INT(EXP(A))
1820 TE=INT(EXP(LOG(T1)+(LOG(100
)*B)))
1825 CLS: PRINT: PRINT
1830 PRINT" BEST FIT SLOPE=" S"%
"
1835 PRINT"T1="T1,"T100=" TE
1840 PRINT: PRINT
1845 INPUT"DO YOU WANT ANOTHER U
NIT VALUE";BB$
1850 IF BB$="YES" THEN 1855 ELSE
     1875
1855 INPUT"WHICH UNIT DO YOU WAN
T";U
1860 TU=INT(EXP(LOG(T1)+(LOG(U)*
B)))
1865 PRINT"UNIT" U "=" TU
1870 GOTO 1845
1875 INPUT"WANT TO RUN LEAST SQR
.AGAIN"; CC$
1880 IF CC$= "YES" THEN 1705 ELS
E     1885
1885 INPUT"WANT TO USE LEARNING
CURVES NOW";DD$
1890 IF DD$="YES" THEN 30 ELSE 2
000
2000 PRINT"GOODBYE, I'VE ENJOYED
 WORKING   WITH YOU."
```

JUSTPRIN

by James A. Hornsby
115 Rising Sun Circle
Fort Mitchell, Kentucky 41017

The Word Processor published in the February CCN offers an opportunity to dabble with this application at a bargain price. I have found it quite useful as an easily modifiable tool. In fact the changes have become so extensive that CCN has agreed to publish the entire listing at the end of this article.

I particularly liked the right justification capability, though it was a bit slow. At about the same time I became interested in programs which would dump a line of text to the printer then go do other processing until the printer was ready for more text. I knew that I could not use the printer subroutine at $A2BF since it dumps a line of text until the printer says it is busy and then goes into a loop until the printer is ready for more text. There is an 8 bit serial output subroutine at $8E0C which does not tie itself up in a loop. I could use it if I checked the printer busy signal in my own subroutine. The desire to do right justification more quickly and to make more efficient use of the computer time resulted in a machine code program called "JUSTPRIN".

This program justifies normal standard text similar to te BASIC Word Processor's justification subroutine. One exception is that it does the right justification at print time. After each line is sent to the printer and while the printer is busy, then the next line is justified. This makes more efficient use of the computer time. The second exception is that proportional spaces are added after each character instead of adding extra spaces between words. (standard spaces are 12 dot spaces wide while proportional spaces can be from 1 to 9 dot spaces wide)

Right justification of proportional print is a little more difficult. The BASIC Word Processor composes lines of certain number of characters. If a word would cause the line to be too long, then the entire word is moved to the next line. This is adequate logic for standard print but not for proportional print. (in normal standard print all the characters are 12 dot spaces wide) In proportional print, some characters are shorter and some are longer. A j is 9 dots wide while a W is 23 dots wide. The best way to justify this text is to compose lines of a certain number of dot spaces. I have modified the Compile command to compile lines of certain number of dot spaces. It will do this if you answer the prompt 'TO PROPORTIONAL (Y/N)?' with a 'Y'.

Please note that the compiled proportional text always has a dot length of 1200 since the 'JUSTPRIN' uses a fixed dot length of 1200. If you want to experiment with variable dot lengths then change &H7E68 and &H7E69. (1200 decimal=04B0 hexidecimal so POKE &H7E68, &H04: POKE &H7E69, &HB0) Next change DT in line 20 to one less than the value in &H7E68 and &H7E69. (DT=1200-1=1199) If the new dot length is too long when used with a tab, then wrap-around will result. Also right justification of that line will cause thing like only 5 characters in the printed line. I have not found it necessary to have the dot length variable but you may need it.

To use 'JUSTPRIN', first CSAVE "CCWORD9", then CSAVEM "JUSTPRIN", &H7C00, &H7F3D, &H7C1C on the same tape, after CCWORD9. Now then you are ready to use the program, just CLOAD "CCWORD9". Now type RUN and it will CLOADM "JUSTPRIN" and delete line 5 automatically. Type RUN again and you are now ready to enter text from the keyboad or tape. To print standard text, type P and answer the prompts. (check Line Pinter VIII switches) When you are prompted 'TAB?' then enter a 10 unless you want a different tab. With the prompt 'NUMBER OF LINES?' then enter the number of lines of text with that tab. (For a letter you might enter a tab of 50 and # of lines of 3, then a tab of 10 and the # of lines in the rest of the letter. This would cause an inside address to be tab'd to the right side of the page.) You will be prompted for tabs until the number of lines exceeds the number of text lines. It will then start the printing.

For proportional print type C and answer 'Y' to 'TO PROPORTIONAL?'. When the Compile is done then proceed as for standard print.

The following outline may be usedful as reference.

1 APPLICATION

A Color computer with Extended BASIC and 32K memory

B Line Printer VIII with function selection switches open except switch 2 is closed

C CCWORD9

2 OBJECTIVES

A To right justify normal standard or normal proportional by inserting proportional spaces between characters

B The heading will be elongated and underlined and printed after a tab.

C The left margin is adjustable

D To print without justification if required.

E To advance the paper to the top of the next page after each page is printed.

3 LIMITATIONS

A All text should be normal standard or all normal proportional (no mixing or elongation)

B Page and line number will not be printed

C The first lines should consist of one space only, since the heading is passed to 'JUSTPRIN' in A$(0).

D Printer control codes can not be imbedded in the text.

E Proportional text is compiled to a fixed dot lenth of 1200.

The following summary lists significant changes made to the Word Processor:

Some of the commands have been deleted and others have been modified extensively. The legal commands now are:

A ADD

This command has been changed very little.

C COMPILE

This command has been changed so the 'do not justify marks' will not be buried. It also compiles lines to a certain dot length to enable right-justification of proportional print. This requires that "JUSTPRIN" be in memory

D DELETE

This command does not leave blank lines now.

E EDIT

This command has been changed very little.

F FORMAT

This command has been changed so that pressing ENTER instead of an appropriate entry causes the parameter to remain the same.

I INSERT

This command has not been changed.

K KILL

This command has not been changed.

L LOAD

This command has been changed to load from cassette.

M MOVE

This command has been changed so that it no longer requires blank lines at the destination lines nor does it leave blank lines.

P PRINT

This command has been changed to utilize a USR call to allow right-justification at print time.

R REPLACE

This command has not been changed.

S SAVE

This command has been changed to save to cassette.

V VIDEO

This command has been changed to separate the control logic from the printer format. (i.e., line numbers are always printed) After reviewing the lines on the screen, press the spacebar to go to the next group of lines or a number (1 to 9) to go to the beginning of that page. Pressing the spacebar after the last line of text has been displayed causes a return to the menu.

```
5 CLEAR 13000,&H7BFF:CLOADM:DEL5

10 CLS:PRINT TAB(5) "BASIC WORD
PROCESSOR":GOTO 3000
20 CLEAR 13000,&H7BFF:NL=360:DIM
 A$(NL),S(25),T(25):DEFUSR0=&H7C
1C:DEFUSR1=&H7F29:DT=1199
30 B$=CHR$(30):C$=CHR$(191):N$="
N":PN$="N"
40 S$=" ":H$=S$:G$="ST":LA=0:A$(
0)=" ":P=1:FP=1:PL=45:VL=6:LL=60
:LM=10:U=32:V=27
50 CLS:PRINT TAB(5)"BASIC WORD P
ROCESSOR":L=LA:IT=0:R=0:A$="":GO
SUB 1370:PRINT"COMMAND? ";
55 A$=INKEY$:IF A$="" THEN 55
60 A=ASC(A$)-64:IF A > 0 THEN ON
 A GOTO 80,70,510,760,790,1250,7
0,70,1400,70,1560,1570,1670,70,7
0,1730,70,1840,1860,70,70,1950,7
0
70 GOTO 50
80 CLS:D=0:IF LA = 0 THEN L = 1:
GOTO 120 ELSE IF L<=0 THEN L=0:G
OTO 120
90 IF NL=LA+1 THEN 200 ELSE IF L
 > FL+12 THEN B = L - 12 ELSE B
= FL
100 FOR II = B TO L:X = LEN(A$(I
I)):D=D + INT((X+4)/64-.01)
110 GOSUB 2030:NEXT II:L=L+1
120 C=(L-FL+D)*64:IF C > 447 THE
N PRINT:PRINT:C=446
130 PRINT@C,USING"### ";L;:PRINT
A$(L);:P=LEN(A$(L))+1:C=C+P+3:K=
L+1
140 PRINT@C,C$;:A$=INKEY$:PRINT@
C,S$;:IF A$="" THEN 140
150 GOSUB 280:ON A-7 GOTO 340,39
0,290
160 IF A=13 THEN A$=S$:GOTO 200
ELSE IF A=21 THEN 360 ELSE IF A
= 12 THEN 440
170 IF A = 93 THEN 410 ELSE IF A
 = 10 THEN 310 ELSE IF A = 91 TH
EN 460
180 IF A = 92 THEN IF LA < L THE
N LA = L:GOTO 50 ELSE 50
```

```
190 PRINT@C, A$;:A$(L)= A$(L) +A
$:IF P <= LL THEN P = P + 1:C =
C + 1:GOTO 140
200 IF R THEN 50 ELSE IF NL <= K
 THEN PRINT:PRINT"FILE FULL":LA
= NL - 1:FOR Z=1 TO 100:NEXT Z:G
OTO 50
210 IF LEN(A$(K)) THEN L = K:GOS
UB 1410
220 IF K > LA THEN LA = K
230 IF A$ = S$ THEN 270
240 FOR M = LL+1 TO 2 STEP -1:A$
 = MID$(A$(L),M,1):IF A$<> S$ TH
EN NEXT M:GOTO 270
250 A$(K)= RIGHT$(A$(L),LL-M+1):
A$(L) = LEFT$(A$(L),M-1):PRINT@C
-LL+M-1,STRING$(LEN(A$(K))," ")
260 PRINT@C-LL+M-1, B$;:L=K:GOTO
 120
270 A$(L)=LEFT$(A$(L),LL):L=K:GO
TO 120
280 A = ASC(A$):RETURN
290 IF P > LL THEN 200
300 PRINT@C, CHR$(92);:A$(L) = A
$(L) + CHR$(92):A$=S$:GOTO200
310 IF P > LL THEN 200
320 C = (L-FL + D)*64+4:IF C > 4
52 THEN C = 452
330 GOSUB 1210:P = 1:A$ = S$:GOT
O 200
340 IF P = 1 THEN 140
350 C = C - 1:PRINT@C,B$;:P = P
- 1:A$(L) = LEFT$(A$(L),P-1):GOT
O 140
360 IF P = 1 THEN 140
370 A$(L)="":P = 1:C = (L - FL +
 D)*64+4:IF C > 452 THEN C = 452

380 PRINT@C,STRING$(60," ");:PRI
NT@C, B$;:GOTO 140
390 IF P > LL - 6 THEN 140
400 A$(L)=A$(L) + STRING$(5,S$):
C = C + 5:P = P + 5:GOTO 140
410 IF P > LL THEN 200
420 C = (L - FL + D)*64+4:IF C >
 452 THEN C = 452
430 GOSUB 1230:P = 1:A$ = S$:GOT
O 200
440 IF P > LL THEN 200
450 PRINT@C, CHR$(95);:A$(L) = A
$(L) + CHR$(95):A$=S$:GOTO 200
460 C = C -(LEN(A$(L))):A$(L) =
STRING$((LL-LEN(A$(L)))/2,32) +A
$(L) + CHR$(95)
470 PRINT@C, B$; (A$(L)); CHR$(9
3);:A$=S$:GOTO 200
510 INPUT "FIRST LINE TO COMPILE
";F:IF F<0 THEN F=0
520 INPUT "LAST LINE TO COMPILE"
;Z:IF Z>LA THEN Z=LA
525 INPUT "TO PROPORTIONAL (Y/N)
";Z$:IF Z$="Y" THEN G$="PR" ELSE
 G$="ST"
530 IF F>=Z THEN GOTO 70 ELSE CL
S:PRINT "COMPILING":L=F
535 K=L+1
540 X=LEN(A$(L)):X$="":IF X<2 TH
EN GOTO 620 ELSE IF Z$="Y" THEN
DA=USR1(A$(L)) ELSE IF X<=LL THE
N GOTO 600 ELSE GOTO 550
545 IF DA <= DT THEN GOTO 600 EL
SE GOTO 550
550 A=ASC(RIGHT$(A$(L),1)):IF A=
92 OR A=95 THEN FOR I=LA TO K ST
EP -1:A$(I+1)=A$(I):NEXT I:A$(K)
="":LA=LA+1:Z=Z+1
555 FOR I=X TO 1 STEP -1:A$=MID$
(A$(L),I,1)
560 IF A$<>S$ THEN X$=A$+X$:NEXT
 I:GOTO 600 ELSE IF X$="" THEN N
EXT I
580 A$(L)=LEFT$(A$(L),I-1):IF LE
N(A$(K))=0 THEN A$(K)=X$:GOTO 54
0
590 IF (LEN(A$(K))+LEN(X$)+1) >2
50 THEN FOR II=LA TO K STEP -1:A
$(II+1)=A$(II):NEXT II:A$(K)="":
LA=LA+1:Z=Z+1
595 A$(K)=X$+S$+A$(K):GOTO 540
600 X=LEN(A$(L)):IF X<2 THEN GOT
O 620 ELSE FOR I=X TO 2 STEP -1
610 IF RIGHT$(A$(L),1)=S$ THEN A
$(L)=LEFT$(A$(L),I-1):NEXT I ELS
E I=2:NEXT I
620 L=L+1:IF L<Z-1 THEN GOTO 535

625 FOR L=F TO Z-1:K=L+1
630 DA=USR1(A$(L)):X=LEN(A$(L)):
Y=LEN(A$(K)):X$="":IF X=0 OR Y=0
 THEN GOTO 750
640 A=ASC(RIGHT$(A$(L),1)):IF A=
92 OR A=95 THEN GOTO 750
660 FOR I=1 TO Y:A$=MID$(A$(K),I
,1)
670 IF A$<>S$ THEN X$=X$+A$:NEXT
I ELSE IF X$="" THEN NEXT I
680 IF Z$="Y" THEN X$(0)=X$+" ":
DX=USR1(X$(0)) ELSE GOTO 685
682 IF DT-DA < DX THEN GOTO 710
ELSE GOTO 690
685 IF LL-X<I THEN GOTO 710
690 Y=Y-I:IF Y<0 THEN Y=0
700 A$(L)=A$(L)+S$+X$:A$(K)=RIGH
T$(A$(K),Y):GOTO 630
710 X=LEN(A$(L)):IF X<2 THEN GOT
O 730 ELSE FOR I=X TO 2 STEP -1
```

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```
720 IF RIGHT$(A$(L),1)=S$ THEN A
$(L)=LEFT$(A$(L),I-1):NEXT I ELS
E I=2:NEXT I
730 IF Y<2 THEN GOTO 750 ELSE FO
R I=Y TO 2 STEP -1
740 IF LEFT$(A$(K),1)=S$ THEN A$
(K)=RIGHT$(A$(K),I-1):NEXT I ELS
E I=2:NEXT I
750 NEXT L:I=0:FOR L=0 TO LA:IF
A$(L)="" THEN NEXT L ELSE A$(I)=
A$(L):I=I+1:NEXT L
755 LA=I-1:GOTO 50
760 INPUT"FIRST LINE TO DELETE";
F:IF F < 0 THEN F = 0
770 INPUT"LAST LINE TO DELETE";Z
:IF Z > LA THEN Z = LA
780 IF F > Z THEN 70 ELSE ZZ=(Z+
1)-F:FOR I=F TO Z:A$(I)="":NEXT
I:LA=LA-ZZ:FOR I = F TO LA:A$(I)
 = A$(I+ZZ):NEXT I:GOTO 1950
790 CLS:INPUT"EDIT LINE";L:IF L
< 0 OR L > LA OR A$(L) = "" THEN
 70
800 C = 4:P = 1:X$(0) = A$(L)
810 CLS:II = L:GOSUB 2030:N =1:Q
$ = ""
820 GOSUB 910:IF A > 47 AND A <
58 THEN Q$ = Q$ + A$:N = VAL(Q$)
:GOTO 820
830 M = 0:IF A = 8 THEN Y = -1:G
OSUB 940 ELSE IF A = 9 OR A = 0
THEN Y = 1:GOSUB 940
840 IF A = 97 THEN A$(L) = X$(0)
:GOTO 800
850 IF LEN(A$(L)) >= LL THEN 870

860 IF A = 93 THEN GOSUB 1230 EL
SE IF A = 91 THEN GOSUB 1210
870 IF A > 98 THEN ON A - 98 GOS
UB 960,1030,2080,2080,2080,1050,
1060
880 IF A = 115 THEN GOSUB 1150 E
LSE IF A = 120 THEN GOSUB 1200 E
LSE IF A = 108 THEN 800
890 IF M = 1 THEN N = 1:Q$ = "":
GOTO 820 ELSE IF R THEN PRINT@16
0,; ELSE 810
900 IF LL < X THEN PRINT "LINE";
 L;"HAS";X;"CHARACTERS":FOR Z=1
TO 100:NEXT Z:GOTO 50 ELSE 1950
905 A$=INKEY$:IF A$="" THEN GOTO
 905 ELSE GOTO 50
910 X$ = MID$(A$(L),P,1)
920 PRINT@C, C$;:A$ = INKEY$:PRI
NT@C, X$;:IF A$ = "" THEN 920
930 GOSUB 280:X=LEN(A$(L)):IF A
= 13 OR A = 92 THEN R = 1:RETURN
 ELSE IF A = 91 OR A = 10 OR A =
 12 THEN GOSUB 1000 ELSE RETURN
940 M = 1:FOR I = 1 TO N:P = P +
 Y:IF P > X THEN P = X:RETURN
950 IF P < 1 THEN P = 1:RETURN E
LSE C = C + Y:NEXT I:RETURN
960 Q = P:D = C:FOR I = 1 TO N:G
OSUB 910:IF R OR A = 27 THEN P =
 Q:C = D:RETURN
970 PRINT@C, A$;:GOSUB 1130:P =
P + 1:GOSUB 1140:A$(L) = L$ + A$
 + R$
980 A = U:C = C + 1:IF P <= X TH
EN NEXT I
990 P = Q:C = D:RETURN
1000 IF A = 91 THEN GOSUB 1210 E
LSE IF A = 10 THEN GOSUB 1070
1010 IF A = 12 THEN A$(L) = A$(L
) + CHR$(95):R = 1
1020 RETURN
1030 IF P + N - 1 > X THEN N = X
 - P + 1
1040 GOSUB 1130:Q = P:P = P + N:
GOSUB 1140:A$(L) = L$ + R$:P = Q
:RETURN
1050 GOSUB 1130:A$(L) = L$ + S$:
PRINT@C, B$
1060 GOSUB 910:IF R OR A = 27 TH
EN RETURN
1070 IF A = 10 THEN A$(L) = A$(L
) + CHR$(92):R = 1:RETURN
1080 IF A = 95 THEN 790 ELSE IF
A = 12 THEN A$(L) = A$(L) + CHR$
(95):R = 1:RETURN
1090 PRINT@C, A$;:IF A = 8 THEN
Y = -1:GOSUB 940:GOTO 1060
1100 IF A = 9 THEN Y = 1:GOSUB 9
40:GOTO 1060 ELSE IF P > X THEN
X = P
1110 GOSUB 1130:GOSUB 1140:A$(L)
= L$ + A$ + R$:PRINT@C, B$;A$ +
R$
1120 C = C + 1:P = P + 1:GOTO 10
60
1130 L$ = "":IF P < 2 THEN RETUR
N ELSE L$ = LEFT$(A$(L),P - 1):R
ETURN
1140 R$ = "":IF P > X THEN RETUR
N ELSE R$ = RIGHT$(A$(L),X-P+1):
RETURN
1150 GOSUB 910:Q = P:D = C
1160 FOR I = 1 TO N:F = 0:FOR J
= Q + 1 TO X:D = D + 1
1170 IF MID$(A$(L),J,1) = A$ THE
N F = 1:Q = J:J = X
```

```
1180 NEXT J:NEXT I:IF F THEN P =
 Q:C = D
1190 A = U:RETURN
1200 A$(L) = A$(L) + S$:P = X +
1:C = P + 3:GOTO 1060
1210 A$(L) = STRING$((LL - LEN(A
$(L)))/2,32) + A$(L) + CHR$(95):
R = 1
1220 PRINT@C, B$; (A$(L)); CHR$(
93):RETURN
1230 A$(L) = STRING$(LL - LEN(A$
(L)),32)+A$(L)
1240 PRINT@C, B$; A$(L);:RETURN
1250 CLS:PRINT"LINE LENGTH =";LL
;:PRINT TAB(17);:INPUT"NEW =";XX
:IF XX<>0 THEN LL=XX ELSE PRINT
STRING$(10,08);LL
1260 PRINT"LINE SPACES =";S;:PRI
NT TAB(17);:INPUT"NEW =";XX:IF X
X<>0 THEN S=XX ELSE PRINT STRING
$(10,08);S
1270 PRINT"LINE #S =";N$;:PRINT
TAB(17);:INPUT"NEW(Y/N)";X$:IF X
$<>"" THEN N$=X$ ELSE PRINT STRI
NG$(12,08);" = ";N$
1280 PRINT"FIRST LINE =";FL;:PRI
NT TAB(17);:INPUT"NEW =";XX:IF X
X<>0 THEN FL=XX ELSE PRINT STRIN
G$(10,08);FL
1290 PRINT"LEFT MARGIN =";LM;:PR
INT TAB(17);:INPUT"NEW =";XX:IF
XX<>0 THEN LM=XX ELSE PRINT STRI
NG$(10,08);LM
1300 PRINT"PAGE LENGTH =";PL;:PR
INT TAB(17);:INPUT"NEW =";XX:IF
XX<>0 THEN PL=XX ELSE PRINT STRI
NG$(10,08);PL
1310 PRINT"PAGE #S =";PN$;:PRINT
 TAB(17);:INPUT"NEW (Y/N)";XX$:I
F XX$<>"" THEN PN$=XX$ ELSE PRIN
T STRING$(12,08);" = ";PN$
1320 PRINT"FIRST PAGE =";FP;:PRI
NT TAB(17);:INPUT"NEW =";XX:IF X
X<>0 THEN FP=XX ELSE PRINT STRIN
G$(10,08);FP
1340 PRINT "CHAR TYPE =";G$;:PRI
NT TAB(17);:PRINT "NEW(ST,PR)=?"
;:LINE INPUT XX$:IF XX$="ST" OR
XX$="PR" THEN G$=XX$ ELSE PRINT
STRING$(12,08);" = ";G$
1360 PRINT"HEADING = ";H$:LINE I
NPUT"NEW =";XX$:IF XX$<>"" THEN
H$=XX$ ELSE PRINT STRING$(LEN(H$
),08);H$
1365 GOTO 50
1370 CLS:PRINT"LEGAL COMMANDS AR
E:":PRINT
1380 PRINT"A  ADD","C  COMPILE",
"D  DELETE","E  EDIT","F  FORMAT
","I  INSERT","K  KILL","L  LOAD
","M  MOVE","P  PRINT","R  REPLA
CE","S  SAVE","V  VIDEO"
1390 PRINT:PRINT"PRESS 'SHIFT CL
EAR'TO RETURN    FROM A,E,I,R TO
 COMMAND MODE":RETURN
1400 INPUT"INSERT AT LINE";L:IF
L < 1 OR L > LA THEN 70
1410 IF NL = LA + 1 THEN PRINT"F
ILE FULL":FOR Z=1 TO 100:NEXT Z:
GOTO 50 ELSE IF R THEN 50
1420 FOR I = LA TO L STEP -1:A$(
I+1) = A$(I):NEXT I
1430 A$(L) = "":LA = LA + 1:L =
L - 1:IF IT THEN RETURN ELSE IT
= 1:GOTO 80
1560 CLS:INPUT"REALLY KILL (Y/N)
";A$:IF A$ = "Y" THEN GOTO 10 EL
SE GOTO 50
1570 INPUT "WHAT LETTER DO YOU W
ANT";Z$
1580 CLS:PRINT "LOADING FROM TAP
E:"Z$
1590 OPEN "I", -1, Z$
1610 INPUT #-1, LA,LL,S,N$,FL,LM
,PL,PN$,FP,G$,H$
1620 FOR I = 0 TO LA
1640 LINE INPUT #-1, A$(I)
1650 NEXT I
1660 CLOSE -1:GOTO50
1670 INPUT"FIRST LINE TO MOVE";F
:IF F < 0 THEN F = 0
1680 INPUT"LAST LINE TO MOVE";Z:
IF Z > LA THEN Z = LA
1690 IF F > Z THEN 70 ELSE INPUT
"FIRST NEW LINE";N:ZZ=1+(Z-F)
1692 IF F>N THEN F=F+ZZ:Z=Z+ZZ
1694 FOR I=LA TO N STEP -1:A$(I+
ZZ)=A$(I):A$(I)="":NEXT I:LA=LA+
ZZ:FOR I=F TO Z
1700 IF LEN(A$(N)) THEN PRINT"LI
NE";N;"NOT EMPTY":FOR I=1 TO 100
:NEXT I:GOTO 50
1710 A$(N) = A$(I):A$(I) = "":N
= N + 1:IF N > LA THEN LA = N
1720 NEXT I:GOTO 780
1730 CLS:INPUT "PRINTER SET FOR
8 BITS (Y/N)";Z$:IF Z$="N" THEN
GOTO 50 ELSE IF G$="ST" THEN POK
E &H7C06,LL:POKE &H7C09,0 ELSE I
F G$="PR" THEN POKE &H7C06,126:P
OKE &H7C09,1 ELSE GOTO 1250
1735 HF=0:IF A$(0)<>" " THEN FOR
 I=LA TO 0 STEP -1:A$(I+1)=A$(I)
:NEXT I:A$(0)=" ":LA=LA+1:HF=1
```

```
1740 INPUT "RIGHT JUSTIFICATION
(Y/N)";Z$:IF Z$="Y" THEN POKE &H
7C0A,1 ELSE POKE &H7C0A,0
1750 CLS:A=&H0460:II=-1
1760 PRINT@0,STRING$(64," "):PRI
NT@0,"";:INPUT "TAB";L:INPUT "NU
MBER OF LINES";I:POKE A,L:POKE A
+1,I:A=A+2:II=II+I:IF II<LA THEN
 GOTO 1760
1770 R=1:PRINT@7,"PRINTING"
1780 IF LA=-1 THEN CLS:PRINT@231
,"NO TEXT TO PRINT":FOR II=1 TO
500:NEXT II:GOTO50
1785 IF LEN(H$)=1 THEN HH$="" EL
SE HH$=H$
1790 HT=INT(LL/2)-((LEN(HH$)/2)*
2)+LM:A$(0)=" "+HH$:POKE &H7C02,
0:POKE &H7C03,LA:POKE &H7C04,PL:
POKE &H7C08,HT:RV=USR0(A$(0))
1810 IF HF=0 THEN GOTO 50 ELSE F
OR I=0 TO LA:A$(I)=A$(I+1):NEXT
I:LA=LA-1:GOTO 50
1840 INPUT"REPLACE LINE";L:IF L
< 0 OR L > LA THEN 70
1850 R = 1:A$(L) = "":L = L - 1:
GOTO 80
1860 INPUT "PLEASE NAME THIS LET
TER";Z$
1870 CLS:PRINT "SAVING PRESENT L
ETTER ON TAPE AS:";Z$
1880 OPEN "O", -1, Z$
1890 PRINT#-1, LA,LL,S,N$,FL,LM,
PL,PN$,FP,G$,H$
1910 FOR L = 0 TO LA
1920 PRINT #-1, A$(L)
1930 NEXT L
1940 CLOSE -1:GOTO 50
1950 IF LA<0 THEN GOTO 50 ELSE C
LS:L = LA:X=FP-1:XX=FL
1960 FOR M=XX TO LA STEP PL:X=X+
1:IF M>LA THEN NEXT M:GOTO 2021
1970  PRINT H$; TAB(LL-7) "PAGE"
;:PRINTUSING"###";X
1980 FOR I = M TO M + PL -1 STEP
 VL:IF I > LA THEN I=M+PL-1:NEXT
 I:GOTO 2020
1985 Z=M+1:FOR II=I TO I + VL-1:
IF II>LA THEN M=LA:I=M+PL-1:II=I
+VL-1:GOTO 2005 ELSE IF II/Z > P
L-1 THEN II=I+VL-1:GOTO 2005
1990 IF S THEN PRINT STRING$(S-1
,10)
1995 IF II>M AND II=I THEN PRINT
:PRINT:PRINT
2000 GOSUB 2030
2005 NEXT II:IF I>LA THEN GOTO 2
016
2010 PRINT "NEW PAGE?"
2015 A$=INKEY$:IF A$="" THEN GOT
O 2015 ELSE XX=VAL(A$):IF XX>0 A
ND XX<10 THEN XX=XX-1:X=XX:XX=XX
*PL:GOTO 1960
2016 NEXT I
2020 NEXT M:L = LA
2021 IF INKEY$="" THEN GOTO 2021
 ELSE GOTO 50
2030 Y = LEN(A$(II)):IF Y THEN A
 = ASC(RIGHT$(A$(II),1)) ELSE A
= 0
2040 PRINT USING "### ";II;
2050 PRINT A$(II);
2060 IF A = 32 THEN PRINT CHR$(9
3);
2070 IF Y <> 60 THEN PRINT
2075 IF Y <27 THEN PRINT
2080 RETURN
3000 PCLEAR1:GOTO 20
4000 PRINT#-2,CHR$(13)
5000 A$="CCWORD9":A=(40-LEN(A$))
:PRINT#-2,CHR$(27);CHR$(14);CHR$
(15);TAB(A);A$;CHR$(14);CHR$(27)
;CHR$(15)
6000 PRINT#-2,CHR$(13)
8000 PRINT HEX$(PEEK(25));:PRINT
 HEX$(PEEK(26)):STOP
```

SOFTWARE REVIEW
TAKE IT ALL OFF WITH THE STRIPPER

By: James G. Kriz
5517 Williston Drive
Parma, OH 44129

I teach programming at a 2 year college. As a teacher, I stress straight forward, well documented, clearly written programs. In BASIC this means plenty of remarks, one statement per line number, and proper spacing within statements. I, of course, like to practice what I preach.

On the other end of the scale, as an owner of an 80C who wants to get the most out of his computer, I find that the most efficient BASIC programs do not match what I teach. The most efficient programs in terms of memory usage and execution speed are those without remarks, without spaces, and with multiple instructions per line. Until now this has presented me with a problem: do I write straight forward, well documented, properly spaced programs that will be easy to read and maintain; or do I write faster running, more memory efficient programs that will take two hours to figure out if I want to change them two months from now? I am happy to say that I found the answer!

I recently ordered and received from Eigen Systems Inc., a program called The Stripper. The Stripper is a menu driven, machine language program that has three functions. It will operate on a BASIC program in memory and delete remarks, remove spaces, and pack lines.

To use The Stripper, first CLOAD the BASIC program to be "stripped". Do not use the PCLEAR 0 (POKE25,6: NEW) option for loading since The Stripper occupies the first graphics page. Also, do not run the program once it is loaded. Next, CLOADM the Stripper and EXEC. A menu will be displayed giving four options:

1 - DELETE REMARKS
2 - PACK LINES
3 - REMOVE SPACES
4 - EXIT

The instructions recommend that for most efficient "stripping", the user first delete remarks, then remove spaces, and finally, pack lines. I have found this to be true so far in my use of The Stripper. Along with the menu, the size of the BASIC program is displayed on the screen. This allows the user to see how much savings are effected by the use of The Stripper. The amount of memory saved will, of course, vary according to how you program now, but my "textbook example" programs have been reduced by an average of around 20 percent! The DELETE REMARKS option deletes all remarks from the BASIC program. It recognizes both REM and the ' even if they are on a line with an instruction. The REMOVE SPACES option removes all spaces between entries in a BASIC statement. Since it is working on the tokenized program in memory it can remove spaces that might not be possible to remove otherwise. Not to worry though, it is "smart" enough not to remove spaces from text lines or data statements. The PACK LINES option will pack instructions into multiple statement lines whenever possible. In my use of it so far, it has handled the potential problems of lines referred to in GOTO's, GOSUB's, and IF statements with no problems.

The Stripper has been the answer to my problem. I can now write programs properly documented with remarks, one instruction per line, and properly spaced for easy reading. When the program is running properly, I "strip" it for the version I will use. If I decide to make a change at some later date it is a relatively simple matter to change the original, easy to read program and then "strip" it again for the revised version.

The Stripper comes on a machine language cassette that loaded without any problems. It is accompanied by a four page, easy to understand set of instructions. It also comes with something I would like to see more software firms provide - a Warranty. If you are not satisfied with your purchase you may return it within two weeks of receipt for a full refund!

I should point out one potential problem that my son discovered when using The Stripper on a program he wrote. He cuts corners wherever he can and he discovered that he did not need the closing quotes on simple statements like:

```
10 PRINT "HELLO
20 GO TO 10
```

In this case the 80C would print a continuous stream of HELLO's. However, if that simple program were "stripped", it would read:

```
10 PRINT "HELLO: GOTO10
```

If you try to RUN it you will get

```
HELLO: GOTO10
OK
```

This is not really a Stripper problem - proper programming techniques would eliminate the error - it is just a warning to other "shortcutters" out there.

The Stripper is available from:

Eigen Systems
P.O. Box 10234
Austin, TX 78766

The price is an extremely reasonable $7.95.

AIR RAID

By: Craig Hunt
12609 Etruscan Drive
Herndon, VA 22071

Oh no, not again! It looks like you're stuck defending another city. Endless waves of attacking aircraft are relentlessly bombing this peaceful city. You command a battery of defensive missles. You alone can stop the "Air Raid"

"Air raid" is a medium resolution graphics game written in Extended BASIC and intended to run on a 16K Color Computer. The playing screen displays three attacking aircraft, one of which may be a helicopter, flyng in from the left to attack the peaceful city located in the right corner of the display. You control the positioning and firing of your land based defensive missles with the right joystick. At the base of the screen is displayed a running total of your score, a count of missles fired, and total or the percentage of damage inflicted on your city. The game ends when damage to the city reaches 100 percent.

In each round of play a squadron of three enemy aircraft proceed across the sky dropping bombs as they go. Horizontal movement of the right joystick provides incremental movement of the missle launcher. You are provided five defensive missles for each round of play which are launched by the joystick fire button. The "SHOT" count displayed on the screen keeps you informed of the number of missles you have launched in this round. Be careful! If your missle launcher is struck by a bomb, you will be unable to fire more missles in the round.

Points are scored for each enemy object destroyed. Bombs score 100. Airplanes score 200, and the helicopter scores 300. It is possible to hit a bomb close enough to an aircraft to destroy both. If this happens points are scored for both objects destroyed.

Aircraft which penetrate your defenses will drop bombs on your city. Each hit on the city will cause 15 percent damage. If damage reaches 100 percent, the city will explode and the game will end. At this point you may choose the REPLAY by pressing "R" or the QUIT by pressing "Q".

The flight of bombers is straight across the sky. As the game proceeds successive waves of bombers will fly faster depending on how well you score. Helicopters are not limited to straight forward flight. The helicopter may go in any direction except backwards.

Lines 10 to 40 of the program incorporate Charles Roslund's technique for increasing the speed of BASIC programs by disabling the break key. This code is not necessary for the game. Of course all remarks should be deleted. Even with the deletions, this program may be long for those with typing phobia. If it is I will mail a copy on cassette anywhere in the U.S. for $5.00. Outside the U.S. please include the amount of the correct postage.

A note about Sadare Software. Sadare is the name I use when programming for my children SAra, DAvid, REbecca. The "Antimath" game was for my six year old David. This program is written for my ten year old Sara. She loves a shoot 'em up. I hope some of you will enjoy it too.

```
5 'BREAK DISABLE
10 IF PEEK(&H3EB9)<>&H32 THEN CL
EAR 200,&H3EB0: FOR I=&H82B9 TO
&H831E: POKE I-&H4400,PEEK(I): N
EXT ELSE 40
20 FOR I=0 TO 2: POKE &H3EBD+I,1
8: NEXT: I=&H3F1E
30 POKE I,&H26: POKE I+1,3: POKE
 I+2,&H7E: POKE I+3,&H83: POKE I
+4,&H22: POKE I+5,&H7E: POKE I+6
,&HA4: POKE I+7,&H4C
40 POKE &H19B,&H3E: RUN 50
45 'TITLE PAGE
50 PCLEAR 2: CLEAR 500
60 CLS(3)
70 PRINT@204,"AIR RAID";
80 PRINT@392,"COPYRIGHT 1982 BY"
;
90 PRINT@425,"SADARE SOFTWARE";
100 FOR X=150 TO 225: SOUND X,1:
    NEXT
110 PMODE 1,1
120 PCLS
125 'INITIALIZE ARRAYS
130 DIM AP(10),AH(8),AB(1),DM(1)
,MX(5),MY(5),BX(8),BY(8)
140 FOR X=6 TO 8: BX(X)=228: NEX
T
145 'DRAW HELICOPTER
150 DRAW"BM12,28;C6;D6R26U4L12D8
R10H2;BM22,26;R6F2E2R6;BM34,32;L
8"
160 GET(12,26)-(40,38),AH,G
165 'DRAW AIRPLANE
170 DRAW"BM20,8;D8R4E2R12G6R8E6R
6H2L4H4L6F4L18U4L2;BM24,14;L4"
180 PAINT(44,12),6,6
190 DRAW"BM50,12;C7;L4"
200 GET(20,8)-(54,20),AP,G
205 'DRAW BOMBS
210 DRAW"BM34,50;U2E2;BM32,46;F2
"
```

```
220 GET(32,46)-(36,50),AB,G
230 PCLS
235 'DRAW MISSLE
240 DRAW"BM122,160;D6R2L4"
250 GET(120,160)-(124,166),DM,G
260 MX(0)=120: MY(0)=160
270 FOR X=1 TO 5: MX(X)=999: MY(
X)=999: NEXT X
275 'DRAW CITY
280 DRAW"BM216,172;D2R30U4H2U2D2
G2H2U8L2D6L4U4H2U2H2U2D2G2D4L2D4
L4U4D2G2D6L2H2U4"
290 PAINT(230,170),7,7
300 COLOR 6,5
310 LINE(220,166)-(224,174),PSET
,BF
320 LINE(232,170)-(240,174),PSET
,BF
330 COLOR 5,8
340 LINE(230,174)-(230,160),PRES
ET
350 LINE(0,176)-(255,191),PRESET
,BF
355 'SET-UP NUMERAL ARRAY'
360 DIM Q$(9)
370 DATA "D8R4U8L4","BM+2,0;D8",
"R4D4L4D4R4","R4D8L4;BM+2,-4;L2"
,"D4R2;BM+2,-4;D8","BM+4,0;L4D4R
4D4L4","BM+4,0;L4D8R4U4L4","R4D8
","BM+2,+4;R2D4L4U8R4D2","BM+0,+
8;R4U8L4D4R4"
380 FOR X=0 TO 9: READ Q$(X): NE
XT X
385 'DRAW STRINGS FOR LETTERS
390 LS$=",178;L4D4R4D4L4"
400 LC$=",178;L4D8R4"
410 LR$=",178;D8;BR4;U2H2E2U2L4"

420 LE$=",178;L4D8R4;BU4;L2"
430 LT$=",178;L4R2D8"
440 EQ$=",180;R4;BD4;L4"
445 'DRAW TEXT
450 DRAW"BM8"+LS$+";BM16"+LC$+";
BM20,178;"+Q$(0)+";BM28"+LR$+";B
M40"+LE$+";BM44"+EQ$
460 DRAW"BM110"+LS$
470 DRAW"BM114,178;D8;BR4;U8D4L2
"
480 DRAW"BM122,178;"+Q$(0)+";BM1
34"+LT$+";BM138"+EQ$
490 DRAW"BM174,186;U4R4U4L4D4"
500 DRAW"BM186"+LE$+";BM190"+LR$
+";BM202"+LC$+";BM210"+LE$
510 DRAW"BM214,186;U8R4D8;BM226"
+LT$+";BM230"+EQ$
520 DRAW"BM84,178;"+Q$(0)+";BM14
6,178;"+Q$(0)+";BM246,178;"+Q$(0
)+"BM76,178;"+Q$(0)+"BM68,178;"+
Q$(0)
530 CF$="T255;O1;V15;2;3;4;5;9;4
;1;3;2;9;1;4;1;5;9;2;1;2;9;1;2"
540 CX$="T255;O1;V31;1;10;1;3;4;
1;5;5;6;V20;3;5;4;6;9;8;2;1;2;9;
1;2"
550 SCREEN 1,1
555 'MAIN LOOP (560-990)
557 'CHECK MISSLES,BOMBS,SPEED
560 IF MX(1)<>999 OR MX(2)<>999
OR MX(3)<>999 OR MX(4)<>999 OR
MX(5)<>999 THEN 910
570 IF BY(0)<>0 OR BY(1)<>0 OR B
Y(2)<>0 OR BY(3)<>0 OR BY(4)<>0
OR BY(5)<>0 THEN 970
580 IF W>5 AND S2<1 THEN 590 ELS
E IF W>10 AND S2<2 THEN 590 ELSE
IF W>15 AND S2<8 THEN 590 ELSE W
=W+1
585 'PICK RANDOM ALTITUDE
590 P3=RND(5)
600 P2=RND(5)
610 IF P3=P2 THEN 600
620 P1=RND(5)
630 IF P1=P3 OR P1=P2 THEN 620
640 X3=0: Y3=((P3-1)*20)+4: I3=P
3+4+W: YC=Y3
650 X1=0: Y1=((P1-1)*20)+4: I1=P
1+4+W
660 X2=0: Y2=((P2-1)*20)+4: I2=P
2+4+W
670 AR=0: BN=0: FOR X=0 TO 5: BX
(X)=((RND(5)-1)*8)+AR: BY(X)=0:
AR=AR+40: NEXT X
680 PUT(X1,Y1)-(X1+34,Y1+12),AP,
PSET
690 PUT(X2,Y2)-(X2+34,Y2+12),AP,
PSET
700 F=0: QX=146: Q=F: GOSUB 1100

710 IF P3/2=FIX(P3/2) THEN Y3=Y3
-2: PUT(X3,Y3)-(X3+28,Y3+12),AH,
PSET: YC=YC-2 ELSE PUT(X3,Y3)-(X
3+34,Y3+12),AP,PSET
715 'JOYSTICK POSITIONS MISSLE
720 IF F=5 THEN 780 ELSE J=JOYST
K(0): IF J>20 AND J<42 THEN 750
ELSE IF J<21 AND MX(0)=0 THEN 75
0 ELSE IF J>41 AND MX(0)=208 THE
N 750 ELSE LINE(MX(0),MY(0))-(MX
(0)+4,MY(0)+6),PSET,BF
730 IF J<21 THEN MX(0)=MX(0)-8 E
LSE MX(0)=MX(0)+8
```

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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
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```
740 IF MX(0)<0 THEN MX(0)=0 ELSE
 IF MX(0)>208 THEN MX(0)=208
750 PUT(MX(0),MY(0))-(MX(0)+4,MY
(0)+6),DM,PSET
755 'CHECK FIRE BUTTON
760 FM=PEEK(65280): IF FM=255 OR
 FM=127 OR F=5 THEN 780 ELSE F=F
+1: QX=146: Q=F: GOSUB 1100
770 PLAY CF$: MX(F)=MX(0): MY(F)
=MY(0)-10: LINE(MX(0),MY(0))-(MX
(0)+4,MY(0)+6),PSET,BF: PUT(MX(F
),MY(F))-(MX(F)+4,MY(F)+6),DM,PS
ET
775 'CHECK FOR BOMB DROP
780 IF P1>P2 AND P1>P3 THEN X=X1
: Y=Y1 ELSE IF P2>P1 AND P2>P3 T
HEN X=X2: Y=Y2 ELSE X=X3: IF P3/
2=FIX(P3/2) THEN Y=Y3+2 ELSE Y=Y
3
790 IF BN<6 AND BX(BN)>X-1 AND B
X(BN)<X+26 AND BY(BN)=0 THEN BY(
BN)=Y+16:  PUT(BX(BN),BY(BN))-(B
X(BN)+4,BY(BN)+4),AB,PSET: BN=BN
+1
795 'UPDATE AIRCRAFT 1
800 IF P1=0 THEN 840 ELSEIF X1<>
221 THEN LINE(X1,Y1)-(X1+I1,Y1+1
2),PSET,BF ELSE LINE(221,Y1)-(25
5,Y1+12),PSET,BF: P1=0: GOTO 840

810 X1=X1+I1
820 IF X1>221 THEN X1=221: BY(6)
=Y1+20: IF PPOINT(BX(6)+2,BY(6))
=5 THEN PUT(BX(6),BY(6))-(BX(6)+
4,BY(6)+4),AB,PSET
830 PUT(X1,Y1)-(X1+34,Y1+12),AP,
PSET
835 'UPDATE AIRCRAFT 2
840 IF P2=0 THEN 870 ELSE IF X2<
>221 THEN LINE(X2,Y2)-(X2+I2,Y2+
12),PSET,BF ELSE LINE(221,Y2)-(2
55,Y2+12),PSET,BF: P2=0: GOTO 87
0
850 X2=X2+I2: IF X2>221 THEN X2=
221: BY(7)=Y2+20: IF PPOINT(BX(7
)+2,BY(7))=5 THEN  PUT(BX(7),BY(
7))-(BX(7)+4,BY(7)+4),AB,PSET
860 PUT(X2,Y2)-(X2+34,Y2+12),AP,
PSET
865 'UPDATE AIRCRAFT 3
870 IF P3/2=FIX(P3/2) THEN 1000
```

```
880 IF P3=0 THEN 910 ELSE IF X3<
>221 THEN LINE(X3,Y3)-(X3+I3,Y3+
12),PSET,BF ELSE LINE(221,Y3)-(2
55,Y3+12),PSET,BF: P3=0: GOTO 91
0
890 X3=X3+I3: IF X3>221 THEN X3=
221: BY(B)=Y3+20: IF PPOINT(BX(B
)+2,BY(B))=5 THEN PUT(BX(B),BY(B
))-(BX(B)+4,BY(B)+4),AB,PSET
900 PUT(X3,Y3)-(X3+34,Y3+12),AP,
PSET
905 'MOVE MISSLES,CHECK IMPACT
910 FOR G=1 TO F: IF MX(G)=999 T
HEN 960 ELSE U1=PPOINT(MX(G),MY(
G)): U2=PPOINT(MX(G)+4,MY(G)): I
F U1<>5OR U2<>5 THEN 1140 ELSE L
INE(MX(G),MY(G))-(MX(G)+4,MY(G)+
6),PSET,BF
920 IF MY(G)=0 THEN MX(G)=999: G
OTO 960 ELSE IF PPOINT(MX(G),MY(
G)-10)<>5 OR PPOINT(MX(G)+4,MY(G
)-10)<>5 THEN MY(G)=MY(G)-10 ELS
E MY(G)=MY(G)-20: IF MY(G)<0 THE
N MY(G)=0
930 U1=PPOINT(MX(G),MY(G)): U2=P
POINT(MX(G)+4,MY(G))
940 PUT(MX(G),MY(G))-(MX(G)+4,MY
(G)+6),DM,PSET
950 IF U1<>5 OR U2<>5 THEN 1140
960 NEXT G
965 'UPDATE BOMBS
970 FOR B=0 TO 8: IF BY(B)=0 THE
N 980 ELSE LINE(BX(B),BY(B))-(BX
(B)+4,BY(B)+4),PSET,BF: BY(B)=BY
(B)+10: PUT(BX(B),BY(B))-(BX(B)+
4,BY(B)+4),AB,PSET: IF BY(B)>139
THEN GOSUB 1280
980 NEXT B
990 IF P1=0 AND P2=0 AND P3=0 TH
EN 560 ELSE 720
995 'MOVE HELICOPTER RANDOMLY
1000 IF P3=0 THEN 910 ELSE D=RND
(8)
1010 IF X3+28<228 THEN IF PPOINT
(228,Y3+8)<>5 OR PPOINT(228,Y3-2
)<>5 THEN 910
1020 IF D=2 AND P3>P1 AND P3>P2
THEN 1040
1030 IF D=1 THEN IF Y3-18=Y2 OR
Y3-18=Y1 THEN 1040 ELSE YC=Y3-20
 ELSE IF D=2 THEN IF Y3+22=Y2 OR
 Y3+22=Y1 THEN 1040 ELSE YC=Y3+2
0 ELSE IF D=3 THEN 910
```

```
1040 LINE(X3,Y3)-(X3+28,Y3+12),P
SET,BF
1050 IF X3=227 THEN P3=0: GOTO 9
10
1060 X3=X3+I3: IF X3>227 THEN X3
=227: BY(8)=Y3+20: IF PPOINT(BX(
8)+2,BY(8))=5 THEN PUT(BX(8),BY(
8))-(BX(8)+4,BY(8)+4),AB,PSET
1070 Y3=YC: IF Y3<2 THEN Y3=2 EL
SE IF Y3>82 THEN Y3=82
1080 PUT(X3,Y3)-(X3+28,Y3+12),AH
,PSET
1090 GOTO 910
1095 'DRAW NUMERALS
1100 LINE(QX,178)-(QX+4,186),PRE
SET,BF
1110 IF Q=10 THEN Q=0
1120 DRAW"BM"+STR$(QX)+",178;"+Q
$(Q)
1130 RETURN
1135 'MISSLE IMPACT ROUTINE
1140 CIRCLE(MX(G)+2,MY(G)+2),8,8
:PAINT(MX(G),MY(G)+2),7,8:PLAY C
X$+CF$:PAINT(MX(G)+2,MY(G)+2),5,
5:U1=U1-4:U2=U2-4
1150 ON U1 GOTO 1160,1180,1200
1160 ON U2 GOTO 1170,1180,1200
1170 STOP
1180 S1=S1+1: IF Y1+6=MY(G) THEN
 P1=0: X1=221 ELSE IF Y2+6=MY(G)
THEN P2=0: X2=221 ELSE LINE(X3,Y
3)-(X3+28,Y3),PSET: X3=221: IF P
3/2=FIX(P3/2) THEN S1=S1+1: P3=0
ELSE P3=0
1190 GOTO 1240
1200 FOR X=0 TO 5
1210 IF BX(X)=MX(G) THEN IF BY(X
)=Y1+16 THEN P1=0: X1=221 ELSE I
F BY(X)=Y2+16 THEN P2=0: X2=221
ELSE IF BY(X)=Y3+16 THEN P3=0: X
3=221 ELSE IF BY(X)=Y3+18 THEN P
3=0: X3=221: S1=S1+1: LINE(X3,Y3
)-(X3+28,Y3),PSET ELSE 1220 ELSE
 1230
1220 BY(X)=0: S1=S1+1: GOTO 1240

1230 NEXT X
1235 'DISPLAY SCORE
1240 MX(G)=999: S1=S1+1:  IF S1>
9 THEN S1=S1-10: S2=S2+1: Q=S2:Q
X=60: GOSUB 1100
1250 Q=S1: QX=68: GOSUB 1100
1260 IF S2=10 THEN S2=0: S3=S3+1
: Q=S3: QX=52: GOSUB 1100
1270 GOTO 960
1275 'BOMB IMPACT ROUTINE
1280 IF BX(B)<216 AND BY(B)<160
THEN 1340
1290 IF BX(B)>215 THEN D1=D1+5:
Q=D1: QX=246: GOSUB 1100: D2=D2+
1: Q=D2: QX=238: GOSUB 1100 ELSE
 1310
1300 IF D1=10 THEN D1=0: D2=D2+1
: Q=D2: QX=238: GOSUB 1100
1310 CIRCLE(BX(B)+2,BY(B)-2),4,7
: PAINT(BX(B)+2,BY(B)+2),8,5: PL
AY CX$ : PAINT(BX(B)+2,BY(B)+2),
5,5: BY(B)=0
1320 IF BX(B)=MX(0) THEN F=5
1330 IF D2=10 THEN Q=0: QX=246:
GOSUB 1100: GOTO 1350
1340 RETURN
1345 'END GAME
1350 FOR X=0 TO 20: SO=RND(255)
1360 IF SC=0 THEN SC=1 ELSE SC=0

1370 SCREEN 1,SC: SOUND SO,1
1380 NEXT X
1390 LINE(216,174)-(246,174),PSE
T
1400 DRAW"BM228,172;C8;U16L4H2U1
H1U2E2R3U1R3U1R5F1R2D3F1D1L1D3L1
D1L4D15BL2NU10L2NU11;BM228,172;C
7;BR2U18BU2L2U1L2U2BR4F1R1BU1BR2
L3D1L2D1BD3BL2D1L2"
1410 PLAY CX$+";V25;7;8;1;2;2;6;
9;6;7;5;1;2;1;6;6;9;3;4;8;9;6;5;
4;8;5;1;9;3;5;5;V20;4;6;7;5;5;8;
9;1;4;5;4;3;4;3;7;5;3;4;9;1;2;3;
4;9;2;3;"+CF$+";V10;1;2;1;9;4"
1420 PAINT(228,170),8,5:PAINT(22
8,170),5,5
1430 I$=INKEY$: IF I$="" THEN 14
30
1440 IF I$="R" THEN RUN
1450 IF I$="Q" THEN CLS: END
1460 GOTO 1430
```

REMINDER

This is a reminder to all Subscribers and new readers. For any Subscription or back issue orders our phone number is (616) 728-9100. We accept Visa and Master charge.

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Color Computer News

Are you tired of searching the latest magazine for articles about your new Color Computer? When was the last time you saw a great sounding program listing only to discover that it's for the Model I and it's too complex to translate? Do you feel that you are all alone in a sea of Z-80's? On finding an ad for a Color Computer program did you mail your hard earned cash only to receive a turkey because the magazine the ad appeared in doesn't review Color Computer Software? If you have any of these symptoms you're suffering from Color Computer Blues!

But take heart there is a cure!

It's COLOR COMPUTER NEWS.

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

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aNOTHER mICROCOMPUTER fAIR TO BE HELD FOR THE FIRST TIME

The "aNOTHER mICROCOMPUTER fAIR" will be held Sunday, Sept. 26, 1982, from 11 am to 5 pm at the Nature Center For Environmental Activities, 10 Woodside Lane, Westport Conn.

The fair is sponsored by The Apple Users Group and the Fairfield County TRS-80 Users Group. It will feature seminars, demonstrations, and round tables on subjects ranging from games to business applications, exhibitor's booths, and a flea market.

Admission will be $2 for the general public (students and senior citizens, $1). Additional information can be obtained by writing to amfAIR, Box 696, Westport CT 06881.

RADIO SHACK INTRODUCES AMAZINGLY LOW-COST TRS-80 COLOR GRAPHIC PRINTER.

Radio Shack, a division of TANDY Corporation, is adding a surprisingly inexpensive four-color printer with graphics plotting capability to the company's growing computer peripherals line. The TRS-80 Color Graphic Printer (26-1192) is available (late third quarter 1982) for $249.95 at Radio Shack stores, Computer Centers and participating dealers.

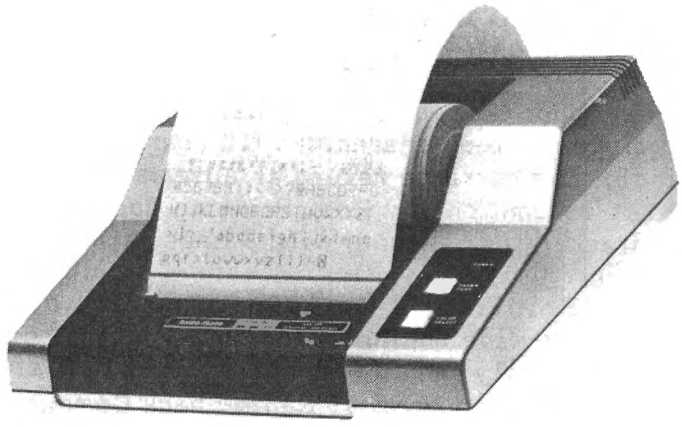
The TRS-80 Color Graphic Printer can create anything from "doodles" to four-color pie charts, as well as more standard text and graphics. 96 ASCII characters are available in four colors (red, blue, green, black), as well as image plotting using several commands (see below).

This new Color Graphics Printer offers several unique features. These include four-color printing in black, red, green and blue using replaceable "mini" ballpoint pens with a rated 250 meter (825 foot) life, and plain paper printing on widely-available 4.5-inch rolls. The graphics mode offers 0.2 mm/step resolution on a 96 millimeter X-axis (divided into 480 steps), with a Y-axis limited only by the paper remaining on a standard 150-foot roll; and a selection of 16 character widths from 5 to 80 characters per line. The text mode offers 80 and 40 character per line text printing at 12 characters per second. Both parallel and serial interfaces are built in.

Special graphic commands include backspace, reverse line feed, change colors, change line type (solid or 15 types of dashed lines), change print direction (normal left-to-right, top-to-bottom, upside down or bottom-to-top), move without drawing, draw between points and draw axes.

The 8-bit parallel interface is compatible with Radio Shack TRS-80 Model I, Model II, Model III and Model 16 computers and DT-1 Data Terminal. The RS232-C serial interface is compatible with Radio Shack TRS-80 Model I/III computers (if RS232-equipped), Color Computers, Model II and Model 16 computers and PT-210 Portable Data Terminal (if RS232-equipped).

The Color Graphics Printer measures 3x8.4x8.64 inches HxWxD (75x210x216 mm) and weighs 1.76 pounds (0.8 kg). It operates from 120 VAC 60 Hz power (23 Watt) through a UL-approved 9.8 VDC (1.2 Amp) plug-in supply module (included).



RADIO SHACK BREAKS PORTABLE TERMINAL PRICE BARRIER WITH NEW TRS-80 PT-210 PORTABLE DATA TERMINAL.

Radio Shack, a division of TANDY Corporation, is introducing a new under-$1000 portable printing data terminal. The new TRS-80 PT-210 Portable Data Terminal (76-1001) is available for $995.00 at Radio Shack Computer Centers or the expanded computer departments of selected Radio Shack stores and dealers. This new offering - Radio Shack's first venture into the highly-active portable printing terminal marketplace - incorporates all the most-popular "must-have" features - including a full "typewriter" keyboard, a quiet thermal printer and a 110/300 baud (Bell 103 A compatible) acoustic telephone coupler - in a compact, attractive portable package. It provides exceptional value for applications where hard copy of in-computer information or information provided by videotex or other on-line services is needed.

An optional add-on RS232C Interface Module (76-1002) - available for $69.95 at Radio Shack Computer Centers or the expanded

computer departments of selected Radio Shack stores and dealers - can be user (plug-in) installed. This facilitates use of the terminal as a local (to a computer or selected peripheral) "front end" dumb terminal and/or printer. RS232C is also a convenient way to connect the terminal to a direct connect modem.

The PT-210 features a full-size ASCII keyboard, generating a total of 99 codes, including 67 printable characters, 32 terminal control characters, and offers a switch-selectable digital keypad. 110 baud or 300 baud operation may be switch selected, as may half-duplex or full-duplex operation and odd-parity/even-parity/no-parity modes.

Its quiet non-impact thermal printer uses a 35-element (5 x 7) matrix and offers variable contrast control. 71 characters are printable, with lower case letters automatically printed as their upper case equivalents. Each 8-inch line can include up to 80 characters (10 characters per inch), and carriage return as automatic at the 81st column on any line. Printing speed is 50 characters per second, with 6 lines per vertical inch.

Printing is on 100-foot rolls of 8 1/2-inch-wide thermal paper; packages of six individually-wrapped rolls (76-1003) are available for $24.95 at Radio Shack Computer Centers or the expanded computer departments of selected Radio Shack stores and dealers.

Indicators include a 1/4-second tone "bell", a power-on lamp, a carrier detect lamp and a character error detect lamp.

The PT-210 is housed in a sleek silver-gray case measuring 15 1/2 x 14 1/2 x 5 inches, and weighing 15 pounds with paper installed. It is FCC registered, and UL-listed for 120 VAC 60 Hertz operation. The line cord is detachable for easy portability. A light duty black vinyl dust cover and one roll of paper are included.

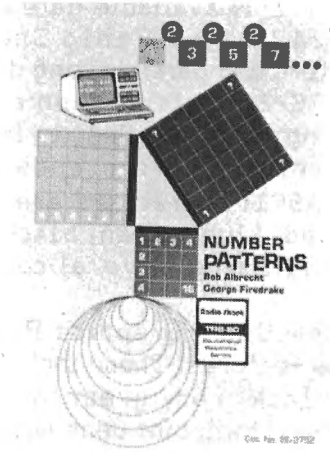
A foam-padded duluxe vinyl Travel Case (76-1010) is available separately at Radio Shack Computer Centers or the expanded computer departments of selected Radio Shack stores and dealers for $24.95.

RADIO SHACK ADDS NUMBER PATTERNS BOOK TO EDUCATIONAL RESOURCE SERIES.

Radio Shack, a division of TANDY Corporation, now offers educators a booklet that not only acquaints students with the basics of number pattern theory, but also reinforces computer skills using the TRS-80 microcomputer.

Number Patterns (26-2752) by Bob Albrecht and George Firedrake is available for $2.50 at Radio Shack stores, Computer Centers and participating dealers.

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



RADIO SHACK INTRODUCES NEW 16K VERSION OF TRS-80 COLOR COMPUTER.

Radio Shack, a division of TANDY Corporation, now offers a new configuration of the company's popular TRS-80 Color Computer (26-3004) that offers 16K of memory and standard Color BASIC, and is available for $399.95 at Radio Shack stores, Computer Centers and participating dealers. The earlier 16K version with Extended Color BASIC (26-3002) continues to be available.

All Radio Shack TRS-80 Color Computers are produced in Texas at the newly-expanded TANDY Home Computers facility.

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RADIO SHACK OFFERS CONVENIENCE FEATURES IN NEW VALUE-PRICED DUOFONE TAD-114 TELEPHONE ANSWERING SYSTEM.

Radio Shack, a division of TANDY Corporation, offers advanced convenience features in their new value- prices DuoFONE TAD-114 (43-314) dual cassette telephone answering system, available for $179.95 at Radio Shack stores and participating dealers.

The TAD-114 can be set to answer automatically on the first ring, or on the fourth to fifth ring. The unit's voice-activated recording feature conserves tape by stopping either at the end of the caller's message, or when a selected thirty second or three minute time limit has been reached. A mechanical counter keeps track of remaining message tape.

The TAD-114 comes with a remote control (requires 9 V battery, not included) to check messages or reset the unit from any phone. An "audible review" feature makes it easy to get to any desired selection for playback, and a built-in condenser microphone simplifies recording the outgoing message.

The "call-monitor" function allows listening-in to identify a caller before deciding whether to pick up the phone or let the unit take a message.

The U.L. listed DuoFONE TAD-114 plugs into any 120 V AC outlet and is connected to phone lines with a mini-modular jack (included). The answering unit measures 2-3/4 x 9-3/4 x 7-1/4 inches and the remote device measures 1 x 3-1/4 x 2-1/4 inches.

"SHOOTOUT AT THE OK GALAXY"

(Avalon Hill's trademark name for its Search and Destroy science fiction computer game).

Several month's ago the Avalon Hill Game Company asked me to "convert" their popular game for the Apple II and Atrari computers, so that Color Computer People could enjoy it too.

After many long hours of machine language programming, and much experimentation with the higher resolution semi-graphics modes, we have a very enjoyable piece of software for owners of the Color Computer.

The game requires a minimum 16K system, runs in both extended or non-extended versions, utilizes joysticks and is sold on cassette. This game features the fast action machine-language graphics and sounds which BASIC just can't give. And there are 15 levels of play from too-easy to too-difficult, so everyone (age 10 and above) will enjoy it.

SCENARIO

You are the pilot of an interceptor space craft - the S.S.S. Demona - in one of human civilizations deep space patrol zones, part of the Federate Fleet Command. With you in the patrol zone is also an energy resupply ship, upon which your powerful interceptor is dependent. (Note - critics of the interceptor have claimed that as a tactical weapon it was "too" dependent upon external resupply).

Suddenly, a large number of enemy assault fighters appear everywhere in your patrol zone. These light fighters are faster and more manuverable than your interceptor, but they don not use energy-consuming shields. (Their pilots are grown from genetically manipulated spores, of which there are abundant supplies).

Your interceptor is blessed with powerful weapons, defensive shields and hyperspace drives, but is cursed by its energy consumption. The enemy tacticians know this, and the first assault wave is trying to destroy your interceptor by first destroying your supply ship.

The Avalon Hill Game Company has granted me permission to sell a limited number of "signature" editions of this game to my own customers. Many of you have bought "Brickaway" or "Gauntlet" games from me know that I know I sell my software in brown paper sacks. "Shootout" (I'm glad to say) arrives in a beautifully printed "book shelf" box, with printed instruction booklet and plastic cassette tray.

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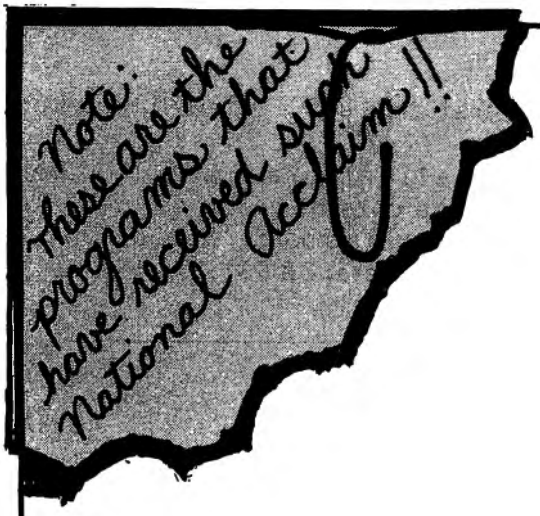
P.S. If you are in a hurry to receive your copy of "Shootout", place your order, using any major credit card, by calling toll-free 1-800-638-9292. Ask for operator #77.



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SEMINAR TO PROMOTE PROFIT FROM PERSONAL COMPUTERS

Goleta, CA--Technology Seminar Group announces an exciting new seminar entitled "Using Personal Computers for Full or Part Time Income Production". The two day workshop is designed to aid the owner of a personal computer in the creation, building, and maintenance of a business using his/her computer as its center or as an adjunct.

The seminar will examine the current state and future of microcomputer markets and will offer "real world" examples of business that can be started with an outlook of tangible success. Important to the presentation will be actual case studies of individuals and couples who have started, and are now operating, successful enterprises centered around their computer system. Attendees will be given examples of start-up costs, methods of promoting the business, and realistic estimations of the income possible from the business.

The seminar will be directed by Victor Wild and J. Norman Goode. Victor Wild is an entrepreneur, consultant, business writer, and lecturer. He has started successful medical electronics, computer test equipment, and fiber optics businesses. He is the author of the two-volume series entitled "Your Fortune in the Microcomputer Business".

J. Norman Goode is the editor and publisher of Micro Moolighter Newsletter, the only national publication devoted exclusively to advising owners of home-based computer businesses. He has sixteen years experience in all phases of the computer industry including operations, programming, systems analysis, and management. He has started several successful home-based businesses with a minimum of capital and is currently a consultant in the area of business start-up and system analysis.

A host of other guest speakers will include William Peeler, Ph.D., whose specialty is advertising and promotion, and several other computer entrepreneurs who will present their methods of success.

The seminar is scheduled for September 11-12 at the Miramar Hotel in Santa Barbara, California. A second session will be presented at the Airport Marriott in Los Angeles on October 16-17. Cost of the two day presentation is $295. A 10% discount is granted for pre-registration and a 40% discount is allowed for an attendee's spouse. The fee covers the cost of all materials, lunch on the first day, and a farewell reception the final day.

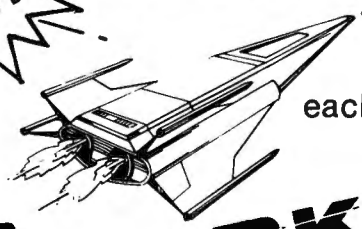
Registration forms and further information may be obtained from Cristy Rude, Seminar Coordinator, Technology Seminar Group, 1 South Fairview, Goleta, CA 93117 or by calling (805) 967-8444.

COLOR COMPUTER
ACTION GAMES
FAST=EFFICIENT=MACHINE LANGUAGE

ARCADE GAMES

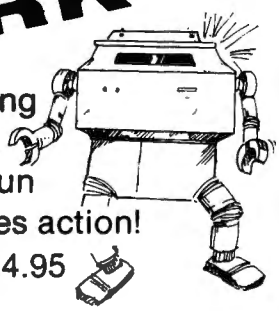
NEW!

ASTRO BLAST



A new super hi-res space game.
Wave after wave of alien attackers. . .
each one a different and unique challenge to your skills.
CASSETTE (16K) . . . $24.95
DISC (32K) . . . $29.95

COLOR BERSERK



They're calling this one a "classic". You'll have hours of fast-paced fun zapping robots. Super hi-res action!
CASSETTE (16K) . . . $24.95
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CAVE HUNTER

Outsmart the creatures that pursue you as you hunt for treasure in a maze of cave passages. Lots of colors and sounds!
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"Finally . . . software worthy of the Color Computer." K.C. Westerly, RI
"The ads and reviews were right. Great stuff!" R.S. Los Angeles, CA

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A challenging puzzle with an occasional twist of humor. There's a treasure waiting to be discovered!
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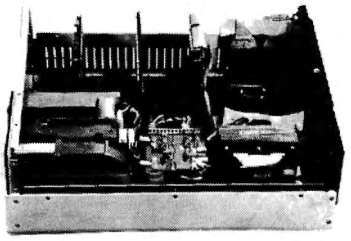
FLEX - OS-9 LEVEL ONE - UNIFLEX - OS-9 LEVEL TWO

ONLY GIMIX Systems can be configured to run any of these.

GIMIX systems utilize the most powerful 6809 operating systems: FLEX, UniFLEX, OS-9 LEVEL ONE and TWO -- the systems the PROs use. This means a wide selection of software to choose from as well the ability to develop sophisticated, multi-user/multi-tasking programs on your **GIMIX** System.



The GIMIX CLASSY CHASSIS™ consists of a heavy-weight aluminum mainframe cabinet which provides more than ample protection for the electronics and 1 or 2 optional 5¼" drives.

Backpanel connectors can be added for convenient connection of terminals, printers, drives and other peripherals.

A 3 position locking keyswitch enables users to disable the front panel reset button to prevent accidental or unauthorized tampering with the system.

The **GIMIX** system mother board provides fifteen 50 pin slots and eight 30 pin I/O slots -- the most room for expansion of any SS50 system available. The on board baud rate generator features 11 standard baud rates, 75 to 38.4K, for maximum versatility and compatibility with other systems. Extended address decoding allows the I/O block to be addressed anywhere in the 1 megabyte address space. All components feature Gold plated connectors for a lifetime of solid connections. All boards are fully buffered for maximum system expansion.

Each **GIMIX** Mainframe System is equipped with an industrial quality power supply featuring a **ferro-resonant constant voltage transformer** to insure against problems caused by adverse power input conditions such as A.C. line voltage fluctuations etc. The supply provides 8 volts at 30 amps and plus or minus 16 volts at 5 amps, more than enough capacity to power a fully loaded system and two internal drives.

The 2MHz GIMIX 6809 PLUS CPU board includes a time of day clock with battery back-up and 6840 programmable timer to provide the programmer with convenient, accurate time reference. Later addition of 9511 or 9512 arithmetic processors is provided for on the board. The unique **GIMIX** design enables software selection of either OS-9 or FLEX, both included in many complete **GIMIX** systems.

GIMIX STATIC RAM boards require no complicated refresh timing cycles or clocks for data retention. GIMIX memory boards are guaranteed for 2 MHz operation with no wait state or clock stretching required.

Our low power NMOS RAM requires less than 3/4 amp at 8V for a fully populated 64K board. For critical situations, our non-volatile 64K byte CMOS static RAM boards with built in battery back-up retain data even with system power removed. A fully charged battery will power this board for a minimum of 21 days. A write protect switch permits CMOS boards to be used for PROM/ROM emulation and software debugging.

The GIMIX DMA controller leaves the processor free to perform other tasks during disk transfers - an important feature for multi-user/multi-tasking systems where processor time allocation is critical. The DMA board will accomodate up to 4 drives 5¼" or 8" in any combination running single or double density single or double headed. Programmed I/O Disk Controllers are also available.

GIMIX systems are designed with ultimate **RELIABILITY** in mind. You can choose from the below featured systems or select from our wide variety of components to build a custom package to suit your needs.

GIMIX 2MHz 6809 System including: CLASSY CHASSIS, 6809 PLUS CPU BOARD, 56KB STATIC RAM, 2 SERIAL PORTS W/CABLES, GMXBUG MONITOR, FLEX, and OS-9 LEVEL 1 . . . . . **$3248.49**
FOR TWO 5¼" 40 TRACK DSDD DRIVES ADD . . . . . **$ 900.00**
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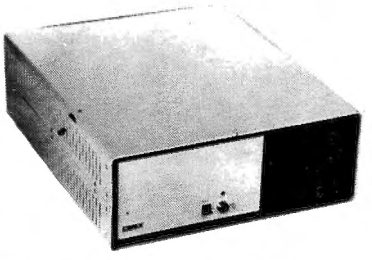
50HZ Versions Available, 8" Drives Available — Contact GIMIX for Prices and Information.

The Sun Never Sets On A GIMIX!

GIMIX users are found on every continent, including Antarctica. A representative group of GIMIX users includes: **Government Research and Scientific Organizations** in Australia, Canada, U.K. and in the U.S.; NASA, Oak Ridge, White Plains, Fermilab, Argonne, Scripps, Sloan Kettering, Los Alamos National Labs, AURA. **Universities:** Carleton, Waterloo, Royal Military College, in Canada; Trier in Germany; and in the U.S.; Stanford, SUNY, Harvard, UCSD, Mississippi, Georgia Tech. **Industrial users** in Hong Kong, Malaysia, South Africa, Germany, Sweden, and in the U.S.; GTE, Becton Dickinson, American Hoechst, Monsanto, Allied, Honeywell, Perkin Elmer, Johnson Controls, Associated Press, Aydin, Newkirk Electric, Revere Sugar, HI-G/AMS Controls, Chevron. **Computer mainframe and peripheral manufacturers,** IBM, OKI, Computer Peripherals Inc., Qume, Floating Point Systems. **Software houses;** Microware, T.S.C., Lucidata, Norpak, Talbot, Stylo Systems, AAA, HHH, Frank Hogg Labs, Epstein Associates, Softwest, Dynasoft, Research Resources U.K., Microworks, Meta Lab, Computerized Business Systems.



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