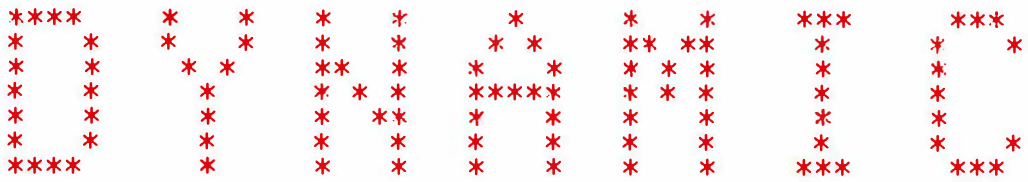
ENGINEERING NOTES
on
Radio Shack Color Computers

August 1986
Vol. 3 No. 7

$1.95



PROGRAMS

* MORSE CODE
* ORGANIZE VCR TAPES
* DISK DISASSEMBLER
* ML SUBTRACT

INSTRUCTIONAL SERIES

* HAM RADIO & COMPUTERS (New Series)
* WRITING PROGRAMS (Part 17)
* INTERFACING COMPUTERS (PART 7)
* ML PROGRAMMING (Part 4)

SERVICES

* NEW PRODUCTS
* PRODUCT REVIEWS
* QUESTIONS & ANSWERS
* OERATING HINTS

DYNAMIC COLOR NEWS is published monthly by DYNAMIC ELECTRONICS, INC., P.O. Box 896, Hartselle, AL 3564Ø, phone (2Ø5) 773-2758. Bill Chapple, BA, BSE President; Dean Chapple, Sec. & Treas. ; John Pearson, Ph. D. Consultant; Bob Morgan, Ph. D., Consultant.

Entire Contents (c) by DYNAMIC ELECTRONICS INC., 1986. DYNAMIC COLOR NEWS is intended for the private use of our subscribers and purchasers. All rights reserved. Contents of this newsletter may not be copied in whole or in part without written permission from DYNAMIC ELECTRONICS INC. Subscriptions are $15/yr for U.S.A. & Canada, $3Ø other foreign.

The purpose of this newsletter is to provide instruction on Basic & Machine Language programming, Computer theory, operating techniques, computer expansion, plus provide answers to questions from our subscribers.

The submission of questions, operating hints, and solutions to problems to be published in this newsletter are encouraged. All submissions become the property of Dynamic Electronics if the material is used. We reserve the right to edit all material used and not to use material which we determine is unsuited for publication.

We encourage the submission of Basic and Machine Language Programs as well as articles. All Programs must be well documented so the readers can understand how the program works. We will pay for programs and articles based upon their value to the newsletter. Material sent will not be returned unless return postage is included. Basic & ML programs should be sent on a tape or disk & comments should be sent as a DAT or BIN file.

****
* DYNAMIC COLOR NEWS *
* August 1986 *
* Editor and Publisher *
* Bill Chapple W4GQC *
* Secretary *
* Dean Chapple *
****

CONTENTS

ML Programming 4
(Part 4)
ML Subtract Program 5

Interfacing Computers 6
(Part 7)
Organize VCR Tapes 8

Ham Radio & Computers 11
(Part 1)
Morse Code Program 13

Disk Disassembler. 16

Editor's Comments 2Ø

Basic Programming 2Ø
(Part 17)
New Products 23

Product Reviews 24

Questions & Answers 25

256K & 512K MEMORY UPGRADES

If you have a 64K computer with sockets for the SAM and 4164 chips then you can update it to 256K or 512K. The ramdisk allows programs to be retain within your computer and loaded as needed. Features include:

* 40 Track Single Disk Swap Can serves as second drive.
* Fast 35/40 Track Ramdisk (2 Ramdisks with 512K).
* 32K to 200K printer spooler (400K with 512K RAM).
* More then 30 PMODE 4 screens at once.
* Pager configures computer for 8 (16 with 512K) 32K pages.
* OS-9 Ram Disk 35-40 track single sided or 40 track double sided with 512K.
* Memory is protected when the computer is reset.
* Solderless installation.
* Miniature toggle switch can force computer into 64K mode.
* Compatible with all software.

Software is supplied on tape or disk execept OS-9 is not available on tape. Specify your choice when ordering. Assemblies are complete ready to install with memories and 64K mode switch. Order ME-16 for 256K assembly, ME-14B provides extra 256K for ME-16. ME-16A for 512K assembly.

ME-16 - 256K RAM	$99.95
ME-14B - Second 256K for ME-16	79.95
ME-16A - 512K RAM	169.95

128K UPGRADES

ME-10A Upgrades 64K Korean Computers to 128K. $49.95

ME-12 - Upgrades all 64K computers with 4164 memory chips to 128K. $49.95

VIDEO REVERSER

An integrated circuit that mounts on the 6847 and reverses the video reducing eye strain. Minor soldering for CC-2. $9.95

MEMORY SAVER
(Uninterrupted Power Source)

Our UPS saves your programs from being lost due to power failures by providing power to the memories from its battery. The assembly consists of a control circuit, battery, miniature toggle switch and a light emitting diode (LED). The control circuit and battery mount under the keyboard or can be mounted outside. The switch enables the UPS and the LED glows when power is available. For all computers with 5 volt memories. $59.95

MEMORY MANAGER
(New Product)

A complete set of software for managing the second 32K memory bank for 64K and larger computers. Run Basic programs in both banks, continue a basic program from one bank to the other, use the second bank for a RAM DISK, configure the computer for the all RAM mode and store programs in the upper memory. $27.95 cassette, $29.95 disk.

24 hr phone. Checks, VISA & MC cards. Add $3 ship.

DYNAMIC ELECTRONICS INC.
P. O. Box 896 (205) 773-2758
HARTSELLE, AL 35640

ML PROGRAMMING
(Part 4)

In this series we are showing how to write machine language programs. Last month we discussed using add with carry. Our examples used the immediate and extended addressing modes. For review, if you want to place a numerical value into a register, then the immediate mode is used. This takes two bytes with the first one being the op code and the second one being the value. The basic equivalent is A=V where V is the value.

With extended addressing the op code is in the first byte and the next two bytes contain a vector that points to the memory location. If we want to load A with the value in 30000, then this is extended addressing and occupies 3 bytes.

Last month we also covered the "AND" operator. When two numbers are "ANDED" , each corresponding bit is compared and if both are a "1" then the result is a "1" for that bit. The AND operator is used to remove individual bits from a byte.

CONDITIONAL CODE REGISTER (CC)

Last month we introduced the conditional code register. The CC register contains 8 bits which are defined as follows:

BIT	VALUE	DEFINITION
0	0,1	Carry
1	0,2	Overflow
2	0,4	Zero
3	0,8	Negative
4	0,16	IRQ Mask
5	0,32	Half Carry
6	0,64	FIRQ Mask
7	0,128	Entire Flag

We used the carry bit in our addition program. We recovered it from the CC register by ANDING the CC register with "1". The other bits can be recovered by using the AND operator.

SUBTRACTION

We are familiar with subtraction using decimal arithmetic. Consider the following examples:

```
(1)  125 - 35 = 90
(2)  50 - 75 = -25
```

The first example presents no problems. In the second example, we are trying to take away more than we have. In other words we are trying to take 75 when we only have 50. Notice our answer is 25 with a "-" sign. This means that we have taken away 25 more than we had.

Let's look at what happens when we use the borry. Consider the following subtraction using decimal numbers.

```
65-19
```

The first step in the subtraction process is to try to subtract 9 from 5. To do this we need to borry 1 from the 6 which reduces it to 5. We could rewrite the procedure as follows:

```
65 = 6*10 +5 =5*10+15
19 =          1*10 +9
```

Now the result can be easily obtained by subtracting like terms.

```
5*10-1*10=4*10
15-9=6

R=4*10 + 6 =46
```

BINARY SUBTRACTION

Each byte can have a value from 0 to 255 (#FF) which represents 256 different values since 0 is a value. If we use the borry, we add 256 to our result. This is called 2's complement numbers. Don't let the terminology 2's complement confuse you. It just means that 256 was added to the result. Consider the

following example.

```
10-25
```

The answer is obviously -15. But computers can only handle positive numbers. If we borry 256 then the answer in 2's complement numbers will be:

```
A=256-15=241
```

The value of 241 will be in a register after the subtraction. We can tell if a borry was made by removing the carry bit from the CC register.

This month we wrote a ML subroutine similar to the one last month. For subtraction, the carry bit is set (=1) if a borry was used in the process. If the carry is set, then our answer will be PEEK(M) - 256.

ML SUBTRACT PROGRAM

This program will be similar to the addition program we presented last month. We will use the same memory locations for placing our numbers.

```
500 First number
501 Second number to subtract
503 Result in register
504 Carry bit
```

The result will be PEEK(503)-256 * PEEK (504).

The ML subroutine can start at 510 and will be as follows:

```
510 #B6 (182) LDA Extended
511 1  ' MS byte of 500
512 F4 (244) 'LS byte of 500
513 B0 (176) 'SUBA extended
514 1   'MS byte of 501
515 F5 (245) 'LS byte of 501
516 B7 (183) 'STA extended
517 1   'MS byte of 503
518 F7 (247) 'LS byte of 503
519 1C (28) 'AND CC with 01
520 1
521 1E (30)  'EXG Registers
522 9A (154) 'B & CC
523 F7 (247) 'STB Extended
524 1  'MS byte of 502
525 F6 (246) 'LS byte of 502
526 39 (57) 'RTS
```

ML SUBTRACT PROGRAM

This program occupies memory from 510 to 526. Values are read from the data statement and poked into the memory location. The first number is poked into 500 and the number to subtract is poked into 501. The machine language subroutine subtracts the numbers and puts the result in 503. If a borry was used then the carry bit was set and a "1" was store in 502. When the carry is set due to a borry, the 2's complement result appears in 503. Therefore 256 will have to be subtracted from the value in 503 if the carry was set. You can review the operation by peeking the values in 500-503.

```
5 ?"ML SUBTRACTION PROGRAM
10 ?"PROGRAM 8-1-86
20 ?"COPYRIGHT (c) 1986
30 ?"dYNAMIC eLECTRONICS iNC.
40 'READ IN DATA
50 FOR J=510 TO 526
60 READ A: POKE J,A: NEXT J
70 ?"ENTER VALUES TO SUBTRACT
80 INPUT"FIRST VALUE";X
90 INPUT "SECOND VALUE";Y
100 POKE 500,X: POKE 501,Y
110 EXEC 510' CALL SUBTRACT SUB
120 A=PEEK(502): B=PEEK(503)
130 V=B - 256*A 'IF CARRY=0 THEN
    A IS THE RESULT
140 PRINTX"-"Y"="V
150 GO TO 80
200 DATA 182,1,244,176,1,245,183
    ,1,247,28,1,30,154,247,1,246
    ,57
```


BACK ISSUES

Back issues of DCN are available for $1.95 each, 3 for $5, or 12 for $15 pp.

Foreigners other than Canada add $2 for Air Mail postage.

INTERFACING COMPUTERS
(Part 7)

In this series we are showing methods for interfacing color computers to external devices. Last month we gave an example program for generating ASCII when a key is pressed. We made a sound program that gave a high pitched sound for each "1" and a low pitched sound for each "Ø". The individual bits were stripped from the ASCII character and their value printed on the screen.

Let's briefly review the process of sending an ASCII character from the keyboard. The output is a logical "1" until a key is pressed. Then a "Ø" or start pulse is sent. Next follows the 7 or 8 data bits and a parity bit. One or two stop bits complete the character. A "1" is sent until the next character is processed.

RESTORING the CHARACTER

The "Ø" and "1" bit elements can be either represented by tones or voltages. Tones are required for storing data on a cassette recorder or transferring data on a telephone line or radio link. Voltages are used for peripherals in the same location or up to a few thousand feet depending upon the baud rate.

Let's consider the procedure for restoring the serial byte. The baud rate or transfer rate must be known and set at both the receiving and sending devices. Of course the unit of time is the second. A second is too long so we can use terms that divide a second into thousands and millions. These are as follows:

```
millisecond (ms)= 1sec/1ØØØ
microsecond (us)= 1sec/1ØØØØØØ
1 second= 1ØØØ ms =1ØØØØØØ us
```

If we say we have .Ø1 seconds then this is equivalent to 1Ø ms or 1ØØØØ us.

The timing procedure begins when the level changes from a "1" to a "Ø". This is indicated by A and B in figure 1. To see if a bit is a "Ø" or "1" it is necessary to look at a memory location in the middle of the timing period. T1 if Figure 1 is the center of the start bit. T2-T9 are the centers of the data bits. TA and TB are the centers of the stop bits.

At the end of each time period, a memory location is peeked and a bit is unmasked by the AND operator. The bits are combined to form the byte.

Machine language programs or subroutines are required for fast baud rates. We will develop the machine language subroutines and show how to link them to basic for control. There is an operation in machine language programming that we will need so are introducing it this month.

SHIFTING BITS

As the bits are removed from a memory location, it is necessary to preserve them so that the original byte can be restored. Let's demonstrate the concept of shifting with the following example.

```
B7 B6 B5 B4 B3 B2 B1 BØ

1  Ø  Ø  1  1  Ø  Ø  1
```

Let's assume that all bits are shifted right one location and a 1 is shifted into B7. After the shift we will have.

```
B7 B6 B5 B4 B3 B2 B1 BØ

1  1  Ø  Ø  1  1  Ø  Ø
```

Notice the the bit that was in BØ is lost.

Suppose we shift the bits at

SPECTROGRAM

MAGAZINE FOR COLOR COMPUTER USERS.

* Programs for business, home management, self-improvement, games, and utilities
* Reviews of Color Computer products
* Tutorials on programming in Assembly, C, Pascal, and Basic
* Contests

As an introductory offer, you can order the first year of SPECTROGRAM Magazine at 40% off the cover price. For $18, you will receive 12 issues of the magazine that could become the most informative addition to your Color Computer system.

We want to establish a line of two-way communication between our staff and our readers as an aid in serving your needs. Please enclose any comments or special requests with your subscription form.

GROUP RATES: $15 with orders of five or more subscriptions!

PLEASE SEND ME 12 ISSUES OF SPECTROGRAM MAGAZINE FOR $18 *(40% OFF THE COVER PRICE).*

Name: _____

Address: _____

City: _____

State: _____ Zip: _____

( ) Check Enclosed ( ) Visa ( ) Mastercard

Card # _____ Exp. Date: _____

Mail to: SPECTROGRAM Magazine
P.O. Box 138
Rockford, IL 61105
(815)968-9600

COMPUTER TYPE:
( ) 64K Color Computer
( ) 32K Color Computer
( ) 16K Color Computer
( ) 4K Color Computer
( ) Other--Specify _____

PERIPHERALS:
( ) Printer Type _____
( ) Modem Type _____
( ) Disk Drive (0) (1) (2) (3)
( ) Multi-Pak Interface
( ) Other--Specify _____

LANGUAGES:
( ) Extended Basic
( ) Color Basic
( ) Disk Basic
( ) Basic09
( ) Pascal
( ) C Compiler

PROGRAM PREFERENCE:
( ) Business
( ) Games
( ) Graphics
( ) Tutorials
( ) Utilities
( ) Home Management
( ) Self-Improvement

BEST

WE'VE CHOSEN THE BEST OF OVER 450 PROGRAMS AND PACKAGED THEM FOR YOU! 10 TO 12 PROGRAMS EACH PACKAGE. COLOR COMPUTER ONLY.

#1 Home Management I
Budget
Checkbook Balancer
Cost of Living
Tinycalc
Electronic Datebook
Account Manager
Stock Market
Word Processor
Lottery Analyst
Coco Database
Coco Terminal
Bartender

NEW!

#2 Home Management II
Video Cassette Organizer
Home Product Evaluation
Electric, Gas & Water Cost
Baseball Manager
Car Manager
Ham Radio Log
Home Inventory
Personal Directory
Recipe Machine
Disk Labeler
Password Scrambler
Disk Directory Print

#3 Education
Flash Card
Spanish Lessons
Typing Tutor
Creativity Test
Arithmetic Football
Cost of Living
Math Tutors 1, 2
Trigonometry Tutor
Typing Game
Word Tests
Talking Alphabet
Clown Dunk Math

NEW!

#4 Adventures
Treasures of Barsoom
Kiffer Mansion
College Adventure
Coco-Terrestrial
Escape
Zector
Skid Row
Quest
Naughde
Haunted House

#5 Games
Trek
Galactic Conquest
Warlords
The Power Sword
Steps
Robot Bomber
Force Field
Rat Attack
Caterpillar Cave
Meteor

#6 Utilities
Disk Dir Prot
Dir. Pack & Sort
Disk Zapper
Roll Out
Doss Boss
Disk Backup
51'24 Editor
51'24 Screen
Autocopy
Fastsort
I O Error Ignorer
Text Screen Print

Some of these programs above can sell for $29.95 each

VISA

RAINBOW CERTIFICATION SEAL

$29.95 each
TAPE OR DISK
★★ SPECIAL ★★
BUY 2 PACKAGES AND GET THIRD ONE FREE

THE GREATEST SOFTWARE DEAL ON EARTH!

GET 12 DISKS OR TAPES A YEAR CONTAINING OVER 120 QUALITY PROGRAMS. A SUBSCRIPTION TO T & D SOFTWARE CONSISTS OF 10 READY-TO-LOAD PROGRAMS DELIVERED BY FIRST CLASS MAIL EVERY MONTH.

NO, WE ARE NOT THE SAME AS THE RAINBOW ON TAPE. IN FACT, MANY SUBSCRIBERS HAVE WRITTEN IN AND SAID THAT WE ARE MUCH BETTER THAN RAINBOW ON TAPE!

PRICES

	TAPE OR DISK
1 YEAR (12 Issues)	70.00
6 MO. (6 Issues)	40.00
1 ISSUE	9.00

Michigan Residents Add 4%
Overseas Add $10 to Subscription Price
Personal Checks Welcome!

★ 16k-64k Color Computer
★ Over 3800 Satisfied Customers
★ Back Issues Available From
★ July '82 (Over 450 Programs)

OUR LATEST ISSUE CONTAINED
1. INCOME PROPERTY MANAGEMENT
2. BILL BOARD 2
3. MOUNTAIN BATTLE
4. THE TEN ROUND FIGHT
5. COCO - KEENO
6. HIGH RESOLUTION HOCKEY
7. LOGIC
8. ON SCREEN SCALE
9. LIBERTY SHIP
10. SINGLE STEP RUN

RAINBOW CERTIFICATION SEAL

★ THIS MONTH ONLY ★

SUBSCRIBE FOR A YEAR AND RECEIVE A FREE PACKAGE OF YOUR CHOICE. INDICATE WHICH ONE

1. Home Man I	4. Adventures
2. Home Man II	5. Games
3. Education	6. Utilities

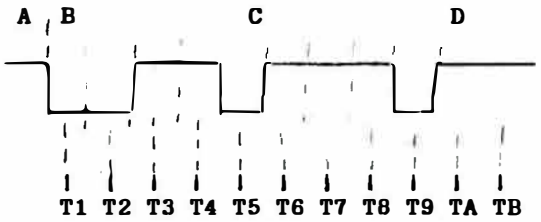
GET ISSUE #45 ABOVE FOR ONLY $3.00

MasterCard

T & D SUBSCRIPTION SOFTWARE, P.O. BOX 256C, HOLLAND, MI 49423 (616) 396-7577

the end of each data interval in figure 1 and that the new bit is shifted into B7. After 8 shifts the original byte would be contained in BØ - B7.

Next month we will continue with our terminal program development. There is much information we can present on this subject. After we finish the terminal program, we can explore the cartridge port and the joystick ports.



TIMING for DECODING ASCII BITS

A - Indicates a 1 & waiting for start bit
B - Start bit.
C - 8 data bit interval (T2-T9)
D - 2 stop bit interval (TA-TB)

FIGURE 1

* * * * * * * ** * * * * * * * *
*
* **DCN PROGRAMS** on **Tape** or **DISK** *
*
* A collection of the programs *
* from May, June, & July 1985 *
* DCN. The collection includes *
*
* 1. 64K All RAM Program *
* 2. 2-Bank address file Pgm. *
* 3. Alarm Clock Program *
* 4. Loan Interest Program *
* 5. Character Generator pgm. *
* 6. Bank Switching Program *
* (Allows full use of other *
* 32K bank for 64K comp.) *
*
* **Order DCN-1** *
*
* Tape $9.95, Disk $11.95 *
* Add $2 shipping, Foreign $3 *
*
* * * * * * * ** * * * * * * * *

ORGANIZE VCR TAPES

This program was supplied by Microcom Software and is used by permission.

With the VCR's becoming increasingly popular, this program makes an excellent addition to any software library. It allows you to organize your tapes and save them to cassette or disk for later retrieval.

Before you use this program, you should number your tapes starting from Ø1. Then, use the ADD TAPES option from the menu to add the tapes. Note: If you have more than one show on a videotape, you can use the COUNTER # option to enter the COUNTER # for that program. If you do not wish to enter information for any of the fields, simply press <ENTER> for that field.

Use the EDIT/DELETE TAPES option to edit or delete tapes from the computer memory. Use the SORT TAPES option if you want the tape titles to be sorted alphabetically. Then, use the SAVE TAPES option to save tapes to cassette or disk. To load back the info in the computer, use the LOAD TAPES option.

The PRINT SELECT INFO is the heart of this program which allows you to view selected information. First, enter if you to view the information on screen or printer. The program will then display the different fields. Here is how to use them:

Example #1 - If you want to print all PG movies, press <ENTER> for all fields except the RATINGS and enter option 2 at the RATINGS option. Example #2 - If you want to print all PG COMEDY tapes, press <ENTER> for all fields except RATINGS and CATEGORY and enter selected information for these fields. All the required information will be retrieved and printed on

screen or printer!!

VCR TAPES
(PROGRAM LISTING)

```
10 PCLEAR 1:CLEAR 6000:MAX=200
20 DIM TN(MAX),N$(MAX),R$(MAX),C
   $(MAX),T$(MAX),CT(MAX)
30 PT=0
40 GOTO 60
50 CLS:PRINT@4,"** VIDEO TAPE OR
   GANIZER **":RETURN
60 CLOSE #K:GOSUB 50:K=0:PRINT:P
   RINT:PRINT"              - menu
   -":PRINT:PRINT"(1) ADD TAPES"
   :PRINT"(2) EDIT/DELETE TAPES"
   :PRINT"(3) LOAD TAPES FROM CA
   S/DSK":PRINT"(4) SAVE TAPES T
   O CAS/DSK":PRINT"(5) SORT TAP
   ES":PRINT"(6) PRINT SELECT IN
   FO
70 PRINT:PRINT"       SELECT ==>"
   ;:LINEINPUT S$:ON VAL(S$) GOT
   O 100,270,390,460,530,620
80 GOTO 60
90 STOP
100 REM ENTER MOVIES
110 CLS
120 PT=PT+1:CLS:PRINT:GOSUB 130:
   GOTO 240
130 PRINT"#"PT:PRINT:PRINT
140 INPUT"tape #";TN(PT)
150 PRINT:PRINT"title:";:LINE IN
   PUT N$(PT):PRINT:CLS:PRINT" -
    rating -":PRINT:PRINT"(1) G"
   :PRINT"(2) PG":PRINT"(3) PG-1
   3":PRINT"(4) R":PRINT"<ENTER>
    = IGNORE RATING"
160 PRINT:LINE INPUT"RATING ==>"
   ;R$(PT):IF R$(PT)="" THEN R$(
   PT)="5"
170 CLS:PRINT " - category -",,,
   ,
180 PRINT"(1) ADULT":PRINT"(2) A
   DVENTURE":PRINT"(3) CHILDREN/
   CARTOON":PRINT"(4) COMEDY":PR
   INT"(5) DRAMA":PRINT"(6) EDUC
   ATIONAL":PRINT"(7) FAMILY":PR
   INT"(8) HEALTH/FITNESS":PRINT
   "(9) HORROR":PRINT"(10) MYSTE
   RY":PRINT"(11) MUSICAL"
190 PRINT"(12) OTHER"
200 PRINT:PRINT"CATEGORY ==>";:L
   INEINPUTC$(PT):IF C$(PT)="" T
   HEN C$(PT)="0"
210 PRINT:PRINT"play time (HH-MM
   ):";:LINEINPUTT$(PT):PRINT"ta
   pe counter #";:INPUT CT(PT)
220 IF T$(PT)="" THEN T$(PT)="--
   ---"
230 RETURN
240 CLS:PRINT@224,"ANY MORE MOVI
   ES (Y/N):";:LINEINPUTQ$
250 IF Q$="Y" THEN TP=TP+1:GOTO
   100
260 GOTO 60
270 CLS:PRINT@224,"edit tape tit
   le:";:LINEINPUT T$
280 IF PT=0 THEN 60 ELSE FORI=1
   TO PT:IF INSTR(N$(I),T$)=0 TH
   EN 380
290 GOSUB 300:GOTO 310
300 CLS:PRINT"#"I:PRINTSTRING$(3
   2,"*");:PRINT"tape #"TN(I):PR
   INT"title:";N$(I):PRINT"ratin
   g:";:A=VAL(R$(I)):GOSUB740:PR
   INT:PRINT"category:";:A=VAL(C
   $(I)):GOSUB 760:PRINT:PRINT"p
   lay time:";T$(I):PRINT"tape c
   ounter #";CT(I):PRINTSTRING$(
   32,"*");:RETURN
310 PRINT:PRINT"'G FOR PREVIOUS
   TAPE":PRINT"'DOWN ARROW' FOR
   NEXT TAPE":PRINT"'E' TO EDIT"
   :PRINT"'D' TO DELETE":PRINT"'
   M' FOR MENU":EXEC 44539:A=PEE
   K(135):IF A=ASC("B) THEN I=I-
   1:IF I<1 THEN I=1:GOTO 290 EL
   SE 290
320 IF A=10 THEN I=I+1:IF I>PT T
   HEN I=PT:GOTO 290 ELSE 290
330 IF A=ASC("M") THEN I=PT+1:NE
   XT I:GOTO 210 ELSE IF A=ASC("
   E") OR A=ASC("D") THEN RE=PT:
   X=PEEK(136)*256+PEEK(137):X=X
   -(32*5):X=X-1024:PRINT@X,"",,
   ,,,,,,,:IF A=ASC("D") THEN 35
   0 ELSE PRINT@X,"* enter new d
   ata *":PRINT:PT=I:GOSUB 140:P
   T=RE:GOTO 290
340 GOTO 290
350 PRINT@X,"DELETE - ARE YOU SU
   RE (Y/N):":EXEC 44539:A=PEEK(
   135):PRINT CHR$(A):IF A<>ASC(
   "Y") THEN 290
360 IF PT=1 THEN I=PT+1:PT=0:GOT
   O 380 ELSE IF I=PT THEN PT=PT
   -1 ELSE FOR J=I TO PT-1:TN(J)
   =TN(J+1):N$(J)=N$(J+1):R$(J)=
   R$(J+1):C$(J)=C$(J+1):T$(J)=T
   $(J+1):CT$(J)=CT$(J+1):NEXTJ:
   PT=PT-1
370 I=PT+2:NEXT I:I=1:T$=N$(1):G
   OTO 280
380 NEXT
390 REM READ DATA
```

```
400 CLS:PRINT:PRINT"load from":G
   OSUB 480
410 OPEN"I",#K,"VTAPES/DAT"
420 I=PT+1:CLS:PRINT@230,"READIN
   G DATA"::PRINT:PRINT
430 IF EOF(K)=0 THEN INPUT #K,TN
   (I),N$(I),R$(I),C$(I),T$(I),C
   T(I):PRINT".";:I=I+1:GOTO 430
440 PRINT:PT=I-1:PRINT "      "P
   T"LOADED ":EXEC 42961:EXEC:EX
   EC:GOTO 60
450 STOP
460 REM SAVE DATA
470 CLS:PRINT:PRINT"save to":GOS
   UB 480:GOTO 500
480 :PRINT@224-64,"(1) DISK OR (
   2) CAS:";:LINEINPUTQ$:Q=VAL(Q
   $):IF Q=2 THEN K=-1 ELSE K=1
490 RETURN
500 OPEN"O",#K,"VTAPES/DAT"
510 CLS:PRINT@224-64,"      WRIT
   ING DATA":PRINT:FORI=1 TO PT:
   PRINT #K,TN(I):PRINT #K,N$(I)
   :PRINT#K,R$(I):PRINT#K,C$(I):
   PRINT#K,T$(I):PRINT#K,CT(I):P
   RINT".";:NEXT
520 CLOSE #K:GOTO 60
530 REM SORT
540 CLS:ST=0
550 FORI=1 TO PT-1
560 FORJ=I+1 TO PT
570 IF N$(I)<=N$(J) THEN 590
580 N$=N$(I):TN=TN(I):R$=R$(I):C
   $=C$(I):T$=T$(I):CT=CT(I):N$(
   I)=N$(J):TN(I)=TN(J):R$(I)=R$
   (J):C$(I)=C$(J):T$(I)=T$(J):C
   T(I)=CT(J):N$(J)=N$:TN(J)=TN:
   R$(J)=R$:C$(J)=C$:T$(J)=T$:CT
   (J)=CT
590 ST=ST+1:IF ST/4=INT(ST/4) TH
   EN CLS:PRINT@230,"SORTING .."
   :ST=0
600 NEXT J,I
610 GOTO 60
620 REM PRINT SELECTED INFO:
630 CLS:PRINT@4,"print select in
   formation":PRINT@224,"output
   to (1) screen OR      (2)
   printer:";:LINEINPUTSP$:CLS:S
   P=VAL(SP$):PRINT@4,"print sel
   ect information":PRINT:RE=PT:
   PT=0:GOSUB 150:PT=RE:IF SP=1
   THEN K=0 ELSE K=-2
640 IF K=-2 THEN PRINT#-2:PRINT
   #-2,"TITLE"TAB(40)"RATING"TAB
   (48)"CATEGORY"TAB(60)"TIME"TA
   B(65)"COUNTER#":PRINT#-2,"---
   ----------":PRINT#-2
650 IF C$(0)="0" THEN C$(0)=""
660 IF R$(0)="5" THEN R$(0)=""
670 IF T$(0)="-----" THEN T$(0)=
   ""
680 FOR I=1 TO PT
690 IF INSTR(N$(I),N$(0))<>0 AND
    INSTR(R$(I),R$(0))<>0 AND IN
   STR(C$(I),C$(0))<>0 AND INSTR
   (T$(I),T$(0))<>0 THEN 700 ELS
   E 720
700 IF K=0 THEN GOSUB 300:PRINT:
   PRINT"PRESS <ANY KEY> TO CONT
   INUE":EXEC 44539:GOTO 720
710 PRINT#-2,N$(I);:A=VAL(R$(I))
   :PRINT#-2,TAB(40)"";:GOSUB 74
   0:PRINT#-2,TAB(48)"";:A=VAL(C
   $(I)):GOSUB 760:PRINT #-2,TAB
   (60)T$(I)" "CT(I)
720 NEXT I:GOTO 60
730 STOP
740 IF A=1 THEN PRINT #K,"G"; EL
   SE IF A=2 THEN PRINT#K,"PG";
   ELSE IF A=3 THEN PRINT#K,"PG-
   13"; ELSE IF A=4 THEN PRINT#K
   ,"R"; ELSE PRINT#K,"NONE";
750 RETURN
760 IF A=1 THEN PRINT #K,"ADULT"
   ; ELSE IF A=2 THEN PRINT#K,"A
   DVENTURE"; ELSE IF A=3 THEN P
   RINT#K,"CHILDREN"; ELSE IF A=
   4 THEN PRINT #K,"COMEDY"; ELS
   E IF A=5 THEN PRINT #K,"DRAMA
   "; ELSE IF A=6 THEN PRINT #K,
   "EDUCATIONAL";
770 IF A=7 THEN PRINT#K,"FAMILY"
   ; ELSE IF A=8 THEN PRINT#K,"H
   EALTH"; ELSE IF A=9 THEN PRIN
   T #K,"HORROR"; ELSE IF A=10 T
   HEN PRINT #K,"MYSTERY"; ELSE
   IF A=0 OR A=11THENPRINT#K,"MU
   SICAL" ELSE IFA>11 THEN PRINT
    #K,"OTHER"
780 RETURN
```

```
+ ++ + ++ + ++ ++ ++ + ++ + ++ +
+                               +
+        RENEWAL TIME?          +
+                               +
+ The date beside your name on +
+ the address label indcates +
+ the last issue you will re- +
+ ceive. Send in your renewal +
+ if you want to continue re- +
+ ceiving technical informa- +
+ tion on Color Computers. +
+ This is the last issue for +
+ those with 8/86.          +
+                               +
+ + ++ + ++ + ++ ++ ++ + ++ + ++
```

HAM Radio & Computers

by Bill Chapple, W4GQC

I have been requested to develop some programs and hardware for HAM radio use. As background information, I have been involved with amateur or ham radio since 1954. Since high school, I have been an experimenter and have built equipment and antennas. Most hams buy commercial equipment these days although a few build accessories and antennas.

Let me define the purpose of ham radio before continuing. Ham radio operators engage in two way communications and experiment with radio waves. In times of disasters, hams provide communications to civil defense organizations and relay messages from victims of the disaster stricken areas. Hams relay messages from civilians and armed service personnel overseas. Hams can communicate with each other worldwide over the numerous radio frequencies allocated to them through the Federal Communications Commission (FCC). If their relatives are hams, then relatives can talk to each other over long distances by their ham radios.

Repeaters are very popular on the higher frequencies. Some repeaters are connected to telephone lines. These can be accessed by a ham in an automobile or by a portable unit. I have made a telephone call over a distance of about 20 miles with my hand held unit with only 1 watt of power. A repeater receives a signal and retransmits it on a different frequency. There are even satellite repeaters. These open up a new dimension in communications. For years hams have been communicating by bouncing signals off of the moon.

Everyone is familiar or at least has heard of Morse code

A TRS-80 Color Computer users magazine

Sell or trade your unwanted programs or hardware in this monthly mazazine. Find great buys. List your Club or BBS. Full of Tips, articles, reviews and programs all for your COCO. A HELP column for you to get quick help with a problem.
Classified ads are only $.15 per word, and it will be read by over 8000 new COCO owners.

Yes I would like to subscribe to COCO ADS.

__ 1 Year basic third class mail $10.00
__ 1 Year First Class Mail $16.00

Name_____

Addr_____

City_____

Zip _____
Please send all orders to

P D SOFTWARE
P O BOX 13256
HOUSTON, TX 77256

where characters are sent using dots and dashes. Morse code is used by hams world wide. This is the most efficient mode of communications and was greatly used through World War 2.

COMPUTERS & HAM RADIO

Many of the hardware items that hams once built can now be replaced by a computer. For example, a teletype machine used to be considered the ultimate for communications. With it you could type a message from the keyboard and have it printed on a similar machine in a different city. The computer with a printer can now replace the teletype with greatly improved performance at a fraction of the cost.

Electronic keyers were and still are being used to send Morse code. Now the computer can send and receive the code, displaying the messages on the screen.

Computers can be used to contain information about different stations contacted. The call letters of a station can be typed into the computer and information about the station can be displayed quickly on the screen.

Computers can be used to predict the location of a satellite. Then they can be used to position the antenna array. Computer programs can be exchanged by hams over radio waves similar to the way programs are exchanged over telephone lines. ASCII up to 300 baud is allowed on the frequencies below 30 Megahertz.

BECOMING a HAM

Becoming a ham involves learning the Morse Code, FCC rules and regulations, and some radio theory. There are several grades of licenses. Licenses are issued by the FCC. The American Radio Relay League (ARRL), Newington, CT 06111 is a nonprofit organization dedicated to the promotion of ham radio. The ARRL publishes study guides and other books that are useful to hams.

MORSE CODE PROGRAM

We want to present two Morse code programs. The first will be for those who want to learn the code or improve their speed. Later we will present a program that could be used for on the air contacts for those who have licenses. The Novice and Technician licenses require 5 words per minute. This is not hard to obtain and our program this month is designed to help learn the code. If you are interested in becoming a Ham then we suggest that you check around and see if there is a local ham radio club in your area. The club can provide all the information you will need, and may have volunteer examiners to give you the test for your license.

Our Morse Code program will sound the Morse Code for a keyboard character, display the character on the screen, and print beside it the elements. For Morse there are two basic elements the Dash (D) or Dah and the Dot or Dit (I). It is easier to think of the elements as a dah and a dit rather than a dot and a dash. Let's let a "D" stand for the dah and an "I" stand for a dit. A dah is equal to 3 dits. The space between elements equals one dit. The display for our program will be similar to the following:

```
A  ID
B  DIII
C  DIDI
```

The program will handle all letters, numbers, the comma, question mark, and period. To aid in learning, we can make the computer randomly pick a letter and make the sounds for that letter. The letter and the

Morse elements will be printed on the screen. You can write down the letter and later look at the screen to see if you wrote it down correctly.

MORSE CODE
PROGRAM

```
10 'PROGRAM 8-2-86
20 'cOPYRIGHT (c) 1986
30 'dYNAMIC eLECTRONICS iNC.
40 PRINT"MORSE CODE PROGRAM
50 PRINT"RIGHT ARROW INCREASES S
   PEED","LEFT ARROW DECREASES S
   PEED
60 DIM N$(100):Z=1:X=100 'THIS S
   ETS UP AN ARRAY FOR THE CHARA
   CTERS
70 FOR K=0 TO 99:N$(K)="":NEXT K
    'EMPTY THE ARRAY
75 'CHARACTERS FOLLOW
80 N$(46)="IDIDID":N$(44)="DDIID
   D":N$(63)="IIDDII"' . & , & ?
90 N$(48)="DDDDD":N$(49)="IDDDD"
   ' 0 & 1
100 N$(50)="IIDDD":N$(51)="IIIDD
   " '2 & 3
110 N$(52)="IIIID":N$(53)="IIIII
   ":N$(54)="DIIII":N$(55)="DDII
   I"'4,5,6,7
120 N$(56)="DDDII":N$(57)="DDDDI
   ":N$(65)="ID":N$(66)="DIII"'8
   ,9,A,B
130 'N$(65)=A
140 N$(67)="DIDI":N$(68)="DII":N
   $(69)="I":N$(70)="IIDI":N$(71
   )="DDI":N$(72)="IIII":N$(73)=
   "II"'C,D,E,F,G,H,I
150 N$(74)="IDDD":N$(75)="DID":N
   $(76)="IDII":N$(77)="DD":N$(7
   8)="DI":N$(79)="DDD":N$(80)="
   IDDI"'J,K,L,M,N,O,P
160 N$(81)="DDID":N$(82)="IDI":N
   $(83)="III":N$(84)="D":N$(85)
   ="IID":N$(86)="IIID":N$(87)="
   IDD"'Q,R,S,T,U,V,W
170 N$(88)="DIID":N$(89)="DIDD":
   N$(90)="DDII"'X,Y,Z
180 PRINT"1 SEND CHARACTERS FROM
    KEYBOARD 2 COMPUTER SEND RAN
   DOM CHAR
190 INPUTV
200 IF V=1 THEN 290
205 'THIS SELECTS CHARACTERS AT
   RANDOM
210 A=RND(50):B=A+48
220 IF B>64 THEN 230 ELSE IF B>5
   7 THEN 210
230 P$=INKEY$:IF P$=CHR$(9) THEN
    Z=Z-1 ELSE IF P$=CHR$(8) THE
   N Z=Z+1 'THIS ADJUSTS THE SPE
   ED
240 IF B>90 THEN 210 '90 IS A Z
   WHICH HAS THE LARGEST NUMBER
250 FOR R=1 TO1500: NEXT 'THIS I
   S A DELAY
260 P=B:P$=CHR$(P)
270 PRINTP$,N$(P) 'PRINT THE CHA
   RACTER & ELEMENTS
280 GO SUB 380:GO TO 210 '380 SO
   UNDS THE CHARACTER THEN GO TO
    210 FOR THE NEXT CHARACTER
290 GO SUB 310
300 GO TO 290
310 X=100
320 P$=INKEY$:IF P$="" THEN 320
330 P=ASC(P$):IF P=8 THEN Z=Z+1:
   GO TO 320 'DECREASE SPEED
340 IF P=9 THEN Z=Z-1:GO TO 320
   'INCREASE SPEED
350 IF P=32 THEN 370 '32 IS A SP
   ACE. PRINT IT BUT DONT SOUND
   IT
360 IF N$(P)="" THEN 320
370 PRINTP$;
380 P=ASC(P$):IF P<33 THEN 320
390 N=P
400 L=LEN(N$(N))
410 IF N$(N)="" THEN 320
415 'THE NEXT SECTION STRIPS THE
    ELEMENTS AND SOUNDS EACH ONE
420 FOR J=1 TO L:X$=MID$(N$(N),J
   ,1):IF X$="D" THEN Y=3 ELSE I
   F X$="I" THEN Y=1
430 W=Y*Z 'W IS THE SPEED
440 IF W<1 THEN W=1
450 SOUND X,W:FOR P=1 TO W:NEXT
460 NEXT J
470 RETURN
```

OPERATING HINT

Convert from Hex to Decimal & Decimal to Hex by the following extended basic commands.

Decimal = &H (HEX NUMBER)
HEX = HEX$ (DECIMAL NUMBER)

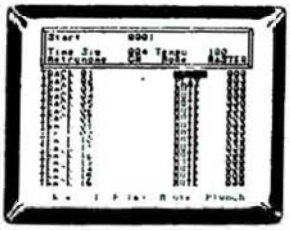
What Happens When You Own A
COLORCHESTRA™ MIDI SEQUENCER?

All Of A Sudden, Synthesized Music Production, And Recording Becomes Very, Very Simple.

COLORCHESTRA, (from the author of CoCo MIDI), links together your Tandy 64K Color Computer and MIDI equipped keyboard synthesizer or rhythm drum machine and makes it simple to create masterpieces of music.

By incorporating menus and graphic icons, all there is to recording in real time is pushing a few keys.

A. Select track recording icon.



B. Select starting measure, time signature, tempo and recording track.

C. Simply play keyboard and hit break key when done.

THAT'S IT!

Once the track is entered, auto correction, transposing, and filtering may be implemented. And **COLORCHESTRA™** works with you to record up to **8,000 notes** utilizing as many as **16 tracks**...awesome.

But it doesn't stop here - **COLORCHESTRA™** is crammed with a myriad of other outstanding professional features...

- ✔ Solo capabilities on any track
- ✔ Tempo range from 30-250 beats per minute
- ✔ Audible and visual metronome
- ✔ Programmable measure locator
- ✔ Sequencer will record from any MIDI Channel (1-16)
- ✔ Each track can output to any MIDI channel (1-16)
- ✔ Records full spectrum of MIDI data including program changes, pitch bends, all 128 MIDI controllers (modulation wheel, breath controller, sustain pedal, etc.)
- ✔ Will sync to drum machines
- ✔ MIDI thru on input
- ✔ Programmable time signature

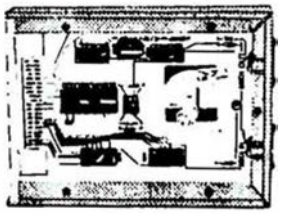
- ✔ Real time velocity modification
- ✔ All 16 tracks can be filled
- ✔ Software filter removes specific MIDI parameters from recorded music such as pitch bend, program change, velocity data, modulation wheel, MIDI controller

- ✔ Transposition of notes up or down any number of octaves in half steps
- ✔ Auto correct feature for timing errors
- ✔ Stores composed music on tape or diskette
- ✔ Works with any disk operating system (Radio Shack, JDOS, ADOS, etc.)

THE COLORCHESTRA SYSTEM PACKAGE

HARDWARE

Encased between clear plastic panels and hand finished american walnut is **COLORCHESTRA's** sequencer board. Not just the edge connector, but every circuit trace is plated in 7 mil gold for optimum interface connection.



Two dependable, heavy duty 8' MIDI cables with metal jacketed end connectors are included.

SOFTWARE MEDIA

In addition to the hardware cartridge and cables, the **COLORCHESTRA™** System Package includes type set documentation in its own ring binder for easy reference and updating.

And for your convenience, both tape and diskette are supplied-so, if you need a back up it'll be there.

COLORCHESTRA™. A simple answer to your MIDI music production and HORIZON puts it all together for an introductory price of **149.95.....**

COLORCHESTRA™ system complete - $149.95. Call any day (ex. Sun.) to order. We ship same day. We accept check, COD, Visa, Master Card. Shipping add 3.00, COD add 2.00. Louisiana residents add 7.8 sales tax. Call for audio demonstration.

COLORCHESTRA Copyright 1985 C.W. Lanusse III

HORIZON
SOFTWARE CORPORATION

RAINBOW CERTIFICATION SEAL

318-942-1938 P.O. Box 289 Opelousas, Louisiana 70570

DISK DISASEMBLER

This utility will disassemble a machine language program on disk. The machine language code is translanted into the original asembly language mnemonics. The results are printed on the screen or a printer. Include the file name and extension when entering the machine language program to be disassembled.

This program is supplied by T & D Software and is used by permision. See their advertisement on page 7.

```
Ø PMODEØ:GOTO6ØØØØ:REM COPYRIGHT
    (C) T&D SOFTWARE 1986 diskas
   em
1 CLEAR5ØØØ:CLS:Z=1:ZZ=Ø
2 CLS:PRINT@8,"MACHINE LANGUAGE"
   :PRINT@1Ø2,"ON DISK DISASSEMB
   LER":PRINT@2Ø3,"WRITTEN BY":P
   RINT@299,"JIM BARNES":PRINT@3
   87,"FOR THE COCO-2 DISK SYSTE
   M":PRINT@489,"PRESS ANY KEY";
3 IF INKEY$=""THEN3
4 DIMO1$(3),R$(11),P$(7),G(68),V
   (68)
5 GOTO 1Ø8
6 R$(Ø)="D":R$(1)="X":R$(2)="Y":
   R$(3)="U":R$(4)="S":R$(5)="PC
   ":R$(8)="A":R$(9)="B":R$(1Ø)=
   "CCR":R$(11)="DPR":INPUT"OUTP
   UT TO PRINTER";Q$:PRINT:IFLEF
   T$(Q$,1)="Y" THEN LP=1
7 P$(Ø)="CCR":P$(1)="A":P$(2)="B
   ":P$(3)="DPR":P$(4)="X":P$(5)
   ="Y":P$(7)="PC"
8 OØ$="NEG     COMLSR   RORASRA
   SLROLDEC   INCTSTJMPCLR"
9 O1$(1)="        NOP SYNC
     LBRALBSR    DAA ORCC    NDC
   CSEX EXG TFR "
1Ø O1$(2)="LBRALBRNLBHILBLSLBHSL
   BLOLBNELBEQLBVCLBVSLBPLLBMILB
   GELBLTLBGTLBLE"
11 O1$(3)="LEAXLEAYLEASLEAUPSHSP
   ULSPSHUPULU    RTS ABX RTI CW
   AIMUL     SWI "
12 O2$="SUBCMPSBC333ANDBITLD ST
   EORADCOR ADD333JSR222222"
13 PN=1
14 IFOA>EA THEN IFXX=9 THEN RETU
   RN ELSE END ELSELN$="":AD$=""
   :CM$="":O$="":DC=OA:GOSUB81:L
   N$=HX$+" "
15 GOSUB96:B1=PK
16 IFPN=1THEN2ØELSEX=B1 AND2Ø7:I
   FPN=3THENIFB1=47THENOP$="SWI3
   ":GOTO88ELSEIFX=131THENOP$="C
   MPU":GOTO7ØELSEIFX=14ØTHENOP$
   ="CMPS":GOTO7ØELSE87
17 IFB1=63THENOP$="SWI2":GOTO88E
   LSEIFB1>32ANDB1<48THEN22
18 IFB1=143ORB1=2Ø7THEN87ELSEIFX
   =131THENOP$="CMPD"ELSEIFX=14Ø
   THENOP$="CMPY"ELSEIFX=142THEN
   OP$="LDY"ELSEIFX=143THENOP$="
   STY"ELSEIFX=2Ø6THENOP$="LDS"E
   LSEIFX=2Ø7THENOP$="STS"ELSE87
19 GOTO7Ø
2Ø IFB1>127THEN65
21 IFB1=16ORB1=17THENPN=B1-14:GO
   TO15
22 LN$=LN$+" ":IFB1<16ORB1>63THE
   NOP$=MID$(OØ$,(B1 AND15)*3+1,
   3)ELSEX=(B1 AND48)/16:OP$=MID
   $(O1$(X),(B1 AND15)*4+1,4)
23 IFB1>127THEN65ELSEIFB1>63THEN
   61ELSEIFB1>47THEN6ØELSEIFB1>3
   1THEN31ELSEIFB1>15THEN26
24 IFOP$="    "THEN87
25 GOSUB95:GOSUB75:AD$="<"+HX$:G
   OTO88
26 ONB1-17GOTO88,88,87,87,33,33,
   87,88,27,87,27,88,36,36
27 IFB1=28THENOP$="ANDCC"
28 GOSUB95:GOTO3Ø
29 GOSUB93:GOSUB8Ø
3Ø GOSUB75:AD$="#"+HX$:GOTO88
31 IFPN=2THEN33ELSEOP$=RIGHT$(OP
   $,3):GOSUB95:GOSUB1Ø3
32 X=ABS(B2):GOSUB79:GOSUB75:AD$
   =O$+HX$:GOSUB81:CM$=HX$:GOTO8
   8
33 GOSUB8Ø:GOSUB1Ø4
34 DC=ABS(B2):GOSUB81:GOSUB76:AD
   $=O$+HX$:DC=OA+B2
35 GOSUB81:CM$=HX$:GOTO88
36 GOSUB98:GOTO88
37 GOSUB95:B1=PK:R=(PK AND96)/32
   +1:IFPK>127THEN39ELSEX=PK AND
   31:X=X+(X>15)*32:IFX<ØTHENO$=
   "-
38 X=ABS(X):GOSUB79:GOSUB75:AD$=
   O$+HX$+","+R$(R):GOTO88
39 T=PK AND15:IFT=7ORT=1ØORT=14T
   HEN87ELSEIFT=12ORT=13THENR=5
4Ø ONT+1GOTO41,42,43,44,45,46,47
   ,3,48,49,3,51,52,53,3,54
41 AD$=","+R$(R)+"+":GOTO88
```

```
42 AD$=","+R$(R)+"++":GOTO55
43 AD$=","+"-"+R$(R):GOTO88
44 AD$=","+"--"+R$(R):GOTO55
45 AD$=","+R$(R):GOTO55
46 AD$="B,"+R$(R):GOTO55
47 AD$="A,"+R$(R):GOTO55
48 GOSUB96:GOSUB1Ø3:X=ABS(B2):GO
   SUB79:GOTO5Ø
49 GOSUB8Ø:GOSUB1Ø4:DC=ABS(B2):G
   OSUB81
5Ø GOSUB75:AD$=O$+HX$+","+R$(R):
   GOTO55
51 AD$="D,"+R$(R):GOTO55
52 R=5:GOTO48
53 R=5:GOTO49
54 GOSUB8Ø:AD$="("+HX$+")":GOTO8
   8
55 IF(B1 AND16)=ØTHEN88ELSEAD$="
   ("+AD$+")":GOTO88
56 IFRIGHT$(OP$,1)="S"THENP$(6)=
   "U"ELSEP$(6)="S
57 GOSUB95:FORY=ØTO7:PK=INT(PK)/
   2:IFPK=INT(PK)THENNEXTELSEAD$
   =AD$+P$(Y)+",":NEXT
58 IFLEN(AD$)<>ØTHENAD$=LEFT$(AD
   $,LEN(AD$)-1)
59 GOTO88
6Ø IFB1<52THEN37ELSEIFB1<56THEN5
   6ELSEONB1-55GOTO87,88,88,88,2
   8,88,87,88
61 X=(B1 AND48)/16:IFOP$="   "OR
   OP$="JMP"ANDX<2THEN87ELSEONX+
   1GOTO63,64,37
62 GOSUB93:GOSUB8Ø:GOSUB76:AD$=H
   X$:GOTO88
63 OP$=OP$+"A":GOTO88
64 OP$=OP$+"B":GOTO88
65 IFB1=135ORB1=143ORB1=199ORB1=
   2Ø5ORB1=2Ø7THEN87ELSEX=B1 AND
   143-128:OP$=MID$(O2$,X*3+1,3)
   :IFRIGHT$(OP$,1)=" "THENOP$=L
   EFT$(OP$,2)
66 X=B1 AND15:IFX<12ANDX<>3   T
   HENIFB1>191THENOP$=OP$+"B":GO
   TO7ØELSEOP$=OP$+"A":GOTO7Ø
67 IFB1>191THEN69ELSEIFX=3THENOP
   $="SUBD"ELSEIFX=12THENOP$="CM
   PX"ELSEIFX=14THENOP$="LDX"ELS
   EIFX=15THENOP$="STX"ELSEIFB1=
   141THENOP$="BSR":GOTO31
68 GOTO7Ø
69 IFX=3THENOP$="ADDD"ELSEIFX=12
   THENOP$="LDD"ELSEIFX=13THENOP
   $="STD"ELSEIFX=14THENOP$="LDU
   "ELSEIFX=15THENOP$="STU"
7Ø X=(PK AND48)/16:ON4-X GOTO62,
   37,25
71 X=PK AND15:IFX=3ORX>11THEN29E
   LSE28
72 LN$=LN$+HX$:IFB1<63THEN73ELSE
   IFB1=63THENOP$="SWI2"ELSEX=B1
   AND79:IFX=3THENOP$="CMPD"ELSE
   IFX=12THENOP$="CMPY"ELSEIFX=1
   4THENOP$="LDY"ELSEIFX=15THENO
   P$="STY"ELSEIFX=78THENOP$="LD
   S"ELSEIFX=79THENOP$="STS"ELSE
   88
73 IFX<17ORX>47ORX=52ORX=53THENO
   P$="":GOTO88ELSEOP$="L"+OP$
74 LN$=LN$+HX$:IFB1=63THENOP$="S
   WI3"ELSEX=B1AND79:IFX=3THENOP
   $="CMPU"ELSEIFX=12THENOP$="CM
   PS"ELSE88
75 IFLEN(HX$)=2THENIFHX$<"ØA"THE
   N78ELSE77
76 IFHX$<"ØØØA"THEN78
77 HX$="$"+HX$:RETURN
78 HX$=RIGHT$(HX$,1):RETURN
79 HX$="":GOTO83
8Ø GOSUB96:B2=PK:GOSUB96:DC=B2*2
   56+PK
81 HX$="":HB=INT(DC/256):LB=DC-H
   B*256
82 X=HB:GOSUB83:X=LB
83 Y=INT(X/16):IFY>9THENY=Y+7
84 HX$=HX$+CHR$(Y+48)
85 X=X-INT(X/16)*16:IFX>9THENX=X
   +7
86 HX$=HX$+CHR$(X+48):RETURN
87 OP$="":AD$=""
88 LN$=LN$+STRING$(15-LEN(LN$),3
   2)+OP$
89 LN$=LN$+STRING$(2Ø-LEN(LN$),3
   2)+AD$
9Ø IFCM$<>""THENLN$=LN$+STRING$(
   27-LEN(LN$),32)+CM$
91 IFLP=1THENPRINT#-2,"
    "+LN$:ZZ=ZZ+1:IF ZZ=55 THENG
   OSUB1Ø6
92 PRINTLN$:GOTO13
93 L=LEN(LN$):IFL<9THENL=8
94 LN$=LN$+STRING$(L-LEN(LN$),32
   ):RETURN
95 GOSUB93
96 GOSUB97:X=PK:GOSUB79:LN$=LN$+
   HX$:RETURN
97 IFXX=9THENGOSUB175:OA=OA+1:RE
   TURN ELSEGOSUB173:OA=OA+1:RET
   URN
98 GOSUB95:X=(PK AND24Ø)/16:GOSU
   B99:AD$=AD$+",":X=PK AND15
99 IFX>11THEN87ELSEIFR$(X)=""THE
   N87ELSEAD$=AD$+R$(X):RETURN
1ØØ T=Ø:FORX=1TOLEN(AD$):Y=ASC(M
   ID$(AD$,X,1)):IFY<48ORY>7ØOR(
   Y<65ANDY>57)THENT=-1:RETURN
```

```
101 Y=Y-48:IFY>9THENY=Y-7
102 T=T*16+Y:NEXT:RETURN
103 B2=PK+(PK>127)*256:DC=OA+B2:
   GOTO105
104 B2=DC+(DC>32767)*65536
105 IFB2<ØTHENO$="-":RETURNELSER
   ETURN
106 Z=Z+1:ZZ$=STR$(Z):PRINT#-2,C
   HR$(10);CHR$(10);CHR$(10);CHR
   $(10);CHR$(10);CHR$(10);CHR$(
   10);CHR$(10);CHR$(10);CHR$(10
   );CHR$(16);"65";"PAGE ";STR$(
   Z)
107 ZZ=Ø:RETURN
108 CLS
109 INPUT"DRIVE NUMBER";D
110 INPUT"FILE NAME";F$
111 FOR A=3 TO 11
112 DSKI$D,17,A,A$,B$
113 FOR B=1 TO 128 STEP 32
114 IF LEFT$(F$,LEN(F$)-4)=MID$(
   A$,B,LEN(F$)-4) THEN IF RIGHT
   $(F$,3)=MID$(A$,B+8,3) THEN D
   $=A$:GOTO 118
115 IF LEFT$(F$,LEN(F$)-4)=MID$(
   B$,B,LEN(F$)-4) THEN IF RIGHT
   $(F$,3)=MID$(B$,B+8,3) THEN D
   $=B$:GOTO118
116 NEXTB:NEXTA
117 CLS:PRINT"FILE "F$" NOT FOUN
   D":END
118 G(1)=ASC(MID$(D$,B+13,1))
119 BY=ASC(MID$(D$,B+14,1))*256+
   ASC(MID$(D$,B+15,1))
120 DSKI$D,17,2,AA$,BB$
121 FOR A=1 TO 68
122 V(A)=ASC(MID$(AA$,G(A)+1,1))
123 IFV(A)-192>Ø THEN 128
124 G(A+1)=V(A)
125 NEXT
126 STOP
127 '***START ADDRESS***
128 G2=G(1):SE=1
129 GOSUB 168
130 ST=ASC(MID$(AA$,4,1))*256+AS
   C(MID$(AA$,5,1))
131 PRINT:PRINT"START ==> "HEX$(
   ST)
132 '***END ADDRESS OF PROGRAM**
   *
133 LE=ASC(MID$(AA$,2,1))*256+AS
   C(MID$(AA$,3,1)):PRINT"END
   ==> "HEX$(ST+LE-1)
134 '***EXEC ADDRESS***
135 G2=G(A):SE=V(A)-192
136 GOSUB168
137 IF BY>128 THEN AA$=BB$:BB=BY
   -128 ELSE BB=BY
138 EX=ASC(MID$(AA$,BB-1,1))*256
   +ASC(MID$(AA$,BB,1))
139 PRINT"EXEC  ==> "HEX$(EX)
140 '***READ THE FIRST SECTOR***

141 'PRINT:PRINT"START WHERE?":P
   RINT:PRINT"<S>TART ADDRESS":P
   RINT"<E>XEC ADDRESS":PRINT"<Y
   >OU DECIDE"
142 'S$=INKEY$:IFS$="S" THEN 534
   ØELSEIFS$="E" THEN 7000ELSEIF
   S$="Y" THEN 8000ELSE5336
143 IF A=1 THEN M=5:GOSUB 151
144 SE=1:G2=G(1):GOSUB168
145 AB=1
146 M=5
147 IFBY-10>LE THEN 204 ELSEPRIN
   T:PRINT"START WHERE?":PRINT:P
   RINT"<S>TART ADDRESS":PRINT"<
   E>XEC ADDRESS":PRINT"<Y>OU DE
   CIDE"
148 S$=INKEY$:IFS$="S" THEN 149
   ELSE IF S$="E" THEN 181 ELSE
   IF S$="Y" THEN 187 ELSE 148
149 SA=ST:OA=ST:EA=ST+LE-1:GOTO6
150 '***READ LAST GRAN***
151 IF XX=2 THEN 157
152 IF XX=3 THEN 164
153 IF XX=4 THEN GOSUB 166
154 LL=1:IF V(A)-192=LL THEN 161
155 SE=1:G2=G(A):GOSUB168
156 XX=2:RETURN
157 PK=PEEK(RM+M):IF M=255 THEN
   M=Ø:GOTO159
158 M=M+1:RETURN
159 LL=LL+1:IF V(A)-192=LL THEN
   161
160 SE=SE+1:G2=G(A):GOSUB168:RET
   URN
161 SE=V(A)-192:G2=G(A):GOSUB168
162 XX=3
163 RETURN
164 PK=PEEK(RM+M):IFM=BY THEN EN
   D
165 M=M+1:RETURN
166 GOSUB 154:GOTO 151
167 STOP
168 IFG2>33THENG1=G2+2ELSEG1=G2
169 TR=INT(G1/2):IFG1/2<>INT(G1/
   2)THENSS=9ELSESS=Ø
170 RM=&H600
171 DSKI$D,TR,SS+SE,AA$,BB$:RETU
   RN
172 '***GET PK VALUE***
173 IF XX>1 THEN 151
174 IF G(AB)=G(A) THEN XX=4:GOTO
    166
175 PK=PEEK(RM+M)
```

WE HAVE ALL THAT YOU NEED TO SUCCEED

UTILITIES/BOOKS

UTILITY ROUTINES for the TANDY & TRS-80 COCO (Vol 1)

This powerful book for Basic and ML Programmers, includes program explanation, memory requirements and an annotated source listing for the utility routines given below. These routines if bought individually will cost you HUNDREDS OF DOLLARS.

These are 100% Position Independent ML Utilities and require no ML programming knowledge.

COMMAND KEYS: Access commands with 2 keystrokes.
CURSOR STYLES: Over 65000 cursor styles
ERROR SKIP: 'ONERR GOTO' for Basic Programs.
FULL LENGTH ERRORS: Get real word error messages.
KEY CLICKER: Ensure key input accuracy
REPEAT KEY: Repeat ANY key
REVERSE VIDEO (Green & Red) Eliminate eye-strain.
SPOOLER: Don't wait for those long printouts.
SUPER SCROLLER: Save/view scrolled lines.
TAPE-TO-DISK: Copy Basic and ML programs.
AND MUCH MUCH MORE!!!

For 16K/32K/64K Cassette or Disk Systems, CoCo I & CoCo II.

BOOK $19.95

THESE ROUTINES (READY-TO-RUN) ON CAS/DISK:

$24.95

BOTH BOOK AND CASSETTE or DISK:

$36.95

OTHER "MUST" BOOKS

UNRAVELLED SERIES: These 3 books provide a complete annotated listing of the BASIC/ECB and DISK ROMs.

COLOR BASIC UNRAVELLED: $19.95
EXTENDED BASIC UNRAVELLED: $19.95
DISK BASIC UNRAVELLED: $19.95
ALL 3 UNRAVELLED BOOKS: $49.95
RAINBOW GUIDE TO OS-9 (Book): $18.95
RAINBOW GUIDE TO OS-9 (2 Disks): $29.00
BASIC PROGRAMMING TRICKS: Tips and tricks for Basic Programmers. Only **$14.95**

SUPER TAPE/DISK TRANSFER

- Disk-to-Disk Copy (1 – 3 passes)
- Tape-to-Disk Copy
- Tape-to-Disk Automatic Relocate
- Disk-to-Tape Copy
- Tape-to-Tape Copy

Copies Basic/ML programs and DATA files.
32K Disk System
(Disk to Disk Copy requires 64K)

DISK ONLY **$24.95**

BEST OF COCO TIME '85

(UTILITIES)

18 best selected utilities from COCO-TIME 1985 like:

- **In Memory Disk Drive for 64K Cassette Users**
- **CoCo Disk Zap**
- **Basic Program Packer**
- **Tape Encryption (Basic)**
- **Disk Encryption (Basic)**
- **Graphics Screen Dump for DMP Printers**
- **Basic Search**
- **EZ Disk Master**
- **Function Keys**
- **Graphics Zoom**
- **Tape Index System**
- **40K Basic (for 64K Cassette Users)**
- **Alpha Directory** • **Banner Creator**
- **LIST/DIR Pause** • **Disk Mailing List**
- **Super INPUT/LINE INPUT**
- **Tape-to-Tape Copy**

Disk or Cassette Only For **$26.95**

UTILITY BONANZA I

Includes 20 best-selected utilities:

- **40K Disk Basic** • **Disk Cataloger**
- **Super Tape-to-Disk Copy (with Automatic Relocate)**
- **Disk-to-Tape Copy**
- **LList Enhancer (with page numbering!)**
- **Graphics Typesetter (two text sizes!)**
- **LARGE DMP Graphics Dump**
- **X-Ref for Basic Programs**
- **Hidden 32K (Use the "hidden" 32K from your 64K CoCo)**
- **Basic Stepper (Super Debugger!)**
- **RAM Disk (for Cassette & Disk Users)**
- **Single Key Printer Text Screen Dump**

AND MUCH, MUCH MORE!!!

DISK (64K Req.) ONLY **$29.95**

OTHER SOFTWARE . . .

Telewriter-64	(Cas) **$47.95**	(Dsk)	**57.95**
Telepatch (Dsk)			**19.95**
CoCo Max (Cas)			**67.95**
CoCo Max II (Dsk)			**77.95**
CoCo Max Upgrade (Dsk)			**18.95**
Pro Color File (Dsk) (includes SIMON)			**54.95**
Dynacalc (Dsk)			**79.95**
Autoterm (Cas)			**36.95**
(Latest Version) (Dsk)			**46.95**

COCO UTIL II (Latest Version): Transfer CoCo Disk files to IBM compatible computer. Transfer MS-DOS files to CoCo. ONLY **$36.95**

DISK ANTI-PIRATE: Best copy-protection program for disk Basic and ML programs. ONLY **$59.95.**

HIDE-A-BASIC 1.1: Best copy-protection program for Cassette Basic programs. ONLY **$24.95.**

(Both Disk Anti-Pirate & Hide-A-Basic 1.1 for ONLY **$79.95**)

CABLES/HARDWARE

UNIVERSAL VIDEO DRIVER: Use your monochrome or color monitor with your CoCo (ALL CoCos). Includes audio connection. Easy installation – no soldering. ONLY **$29.95**

INTRONICS EPROM PROGRAMMER: Best EPROM Programmer for the CoCo. Lowest Price Anywhere – **$137.95.**

RS232 Y CABLE: Hook 2 devices to the serial port. ONLY **$18.95.**

MICROCOM 2 POSITION SWITCHER: Select any one of two RS232 devices (printers/modems) from the serial port. ONLY **$29.95.**

MICROCOM 3 POSITION SWITCHER: Select any one of three RS232 devices (printers/modems) from the serial port. ONLY **$34.95.**

Y CABLE: Use your Rompak with your Disk System. ONLY **$24.95.**

DISKETTES (10): BONUS Brand SS/DD diskettes for the CoCo. 100% Guaranteed. **$12/box.**

MICROCOM SOFTWARE
P.O. Box 214
Fairport, N.Y. 14450
Phone (716) 223-1477

Our software/books are available at all leading dealers in USA, Canada and Australia. To Order: **Order by phone & get a $2 refund for your phone call.** VISA, MC, Am Ex, Check, MO. Please add $3.00 shipping and handling (USA & CANADA, other countries $5.00). COD add $2.50 extra. NYS residents please add Sales Tax. Immediate shipment. Dealer inquiries invited.

24-HOUR ORDER HOT LINE (7 DAYS A WEEK): (716) 223-1477

```
176 IF M=255 THEN 178 ELSE M=M+1
177 RETURN
178 IF SE=9 THEN SE=1:M=Ø:AB=AB+
   1:IF G(AB)=G(A) THEN RETURN E
   LSE G2=G(AB):GOSUB168:RETURN
179 M=Ø:SE=SE+1:G2=G(AB):GOSUB 1
   68:RETURN
18Ø '***START AT EXEC***
181 IF EX<ST THEN 186
182 IFEX>ST+LE-1 THEN 186
183 IF EX=ST THEN 149
184 EE=EX:GOSUB2ØØ:SA=EX:OA=EX:E
   A=ST+LE-1:GOTO6
185 STOP
186 PRINT:PRINTHEX$(EX)" IS OUT
   OF RANGE":END
187 CLS:PRINTF$:PRINT:PRINT"STAR
   T ==>"HEX$(ST):PRINT"END   ==
   >"HEX$(ST+LE-1):PRINT"EXEC  =
   =>"HEX$(EX):PRINT
188 INPUT "HEX START ADDRESS";HS
   $:INPUT"HEX END ADDRESS";HE$:
   PRINT
189 HS=VAL("&H"+HS$):HE=VAL("&H"
   +HE$)
19Ø IF HS<ST THEN 196 ELSE IF HS
   >ST+LE-1 THEN 196
191 IF HE<HS THEN 197 ELSE IF HE
   >ST+LE-1 THEN 197
192 IF HS=ST THEN SA=HS:OA=HS:EA
   =HE:GOTO6
193 EE=HS:GOSUB2ØØ:SA=HS:OA=HS:E
   A=HE:GOTO6
194 '
195 STOP
196 PRINTHEX$(HS) " IS OUT OF RA
   NGE":END
197 PRINTHEX$(HE)" IS OUT OF RAN
   GE":END
198 STOP
199 '***READ DISK AT DIFF START
   ADDRESS***
2ØØ GR=INT((EE-ST)/23Ø4)+1
2Ø1 V1=EE-ST:V2=(GR-1)*23Ø4:V3=V
   1-V2:SE=INT(V3/256+1)
2Ø2 V3=(SE-1)*256:BS=V1-V2-V3+5
2Ø3 G2=G(GR):M=BS:GOSUB168:AB=GR
   :RETURN
2Ø4 XX=9:PRINT:PRINT" THERE IS M
   ORE THEN ONE PROGRAM":PRINT"
            IN THIS FILE":PRINT"
   WILL ATTEMPT TO DISASSEMBLE T
   HEM"
2Ø5 S(1)=ST:EE=LE:ST=Ø:GOSUB2ØØ
2Ø6 L(1)=LE
2Ø7 TL=LE+5
2Ø8 FOR J=2 TO 1ØØ
2Ø9 L(J)=PEEK(&H6ØØ+M+1)*256+PEE
   K(&H6ØØ+M+2):S(J)=PEEK(&H6ØØ+
   M+3)*256+PEEK(&H6ØØ+M+4)
21Ø TL=TL+L(J)+5:IF TL>256 THENT
   L=TL-256
211 IFTL=BY THEN 214
212 EE=EE+5+L(J):GOSUB2ØØ
213 NEXTJ
214 J=J-1:FORSS=1TOJ:PRINT"START
   ==>"HEX$(S(SS)),"END====>"HEX
   $(L(SS)+S(SS)-1):NEXTSS
215 EE=L(1)+5:GOSUB2ØØ:SA=S(1):O
   A=S(1):EA=S(1)+L(1)-1:M=5:GOS
   UB6
216 FOR I=2 TO J
217 EE=EE+L(I)+5:GOSUB2ØØ:SA=S(I
   ):OA=S(I):EA=S(I)+L(I)-1:M=I*
   5
218 FOR II=2 TO I:M=M+L(II-1):IF
   M>256 THEN M=M-256
219 NEXTII:SE=SE-1:IFSE=Ø THEN S
   E=1:GOSUB6 ELSE GOSUB 6
22Ø NEXTI
6ØØØØ PCLEAR1:GOTO1
```


CHECKERS-32K
by
Applied Machine Intelligence

CHECKERS-32K is a you-vs.-the-computer checkers game for the COLOR COMPUTER. It has a high-resolution graphic display, 4 skill levels, many options, and makes comments. CHECKERS-32K is written almost entirely in assembly language for high speed calculation. Randomness is provided throughout the game, especially in the opening. CHECKERS-32K is available on disk or tape for Extended or Non-Extended BASIC systems with at least 32K of RAM and comes with a manual and key/display card. For prompt del., send $3.95 plus 85 cents for shipping and handling to: Applied Machine Intelligence P.O. Box 358 Salida, CO 81201 Specify disk or tape Extended BASIC or Non-Extended BASIC.

RAINBOW CERTIFICATION SEAL

EDITOR'S COMMENTS

The hot 100 degree temperatures we had recently here in North Alabama is quite a contrast to the cold -10 degrees we had last Winter. This week we had a change in temperature with the highs in the low 90's. The weather seemed cool although 90 degrees is still hot.

We always compare things. What comprises a first class computer system? Some may think that a 64K computer with a disk drive and printer is the ultimate. If you upgraded from a 16K cassette to a 64K disk, then this would appear to be the case. This may be an inferior system to a person who has a 512K computer with a 30 Megabyte hard disk. Recently I purchased two of the 16K basic color computers. These were close outs and can be upgraded to any level. They were at a low price and I couldn't pass a bargain.

One thing that people do not understand is that a computer will not do anything without instructions. You may pay $500, $1000, or more for a computer system. However, if you do not have adequate software then it will not be of much use. One of the purposes of Dynamic Color News is to provide instruction on writing programs. We have covered material and given examples for writing some very powerful programs. For example we developed a complete graphics program in our computer graphics series. Also we developed a ramdisk program in our large memory series.

This month we are starting a series on computer applications for ham radio. I have been involved with ham radio since 1954. Although everyone may not be interested in ham radio, the programs we will be developing should be of interest to everyone because they will be applications of the principles we have covered in our programming series. If you are interested in writing your own programs for some special application, we suggest you study our programs to see how programs can be organized.

Radio Shack has released information on the Color Computer 3. We are listing its specifications in our new products section. These are 128K machines and can be upgraded to 512K.

We are now in our slack period. With school starting soon, everyone seems to be trying to get in a few days vacation. We are hurrying to finish this month's issue and the September issue so that we can take a few days off the first of September. We appreciate the letters and phone calls we have received.

BASIC PROGRAMMING

In this series we have been defining the basic commands and showing how to use them. For the past few months we have been looking at the edit commands. This month we want to look at a new print command.

PRINT USING

Some calculations give results that are not very pretty when printed. As an example suppose X=10/9. X will be 1.11111111111. If this is a calculation involving money, we are only interested in dollars and cents. We would want the result to be rounded up or down to the nearest cent for printing. Of course we would want the computer to retain all of the result. In other words we do not want the computer to round off the value, but we want the rounded off value to be printed.

A number can be rounded off with basic by a procedure similar to the following:

```
10 X=10/9
15 X=INT(100*X+.5):X=X/100
```

Statement 10 calculates X and will give 1.1111111111 for the value. The first part of statement 15 gives X=111 and the second part gives X=1.11. Notice that all of the 1's after the first two 1's to the right of the decimal are eliminated.

The print using extended basic command saves all of this trouble. We are going to discuss one of these commands. The "#" symbol is used to tell how many characters are to be reserved for the result. Let's assume that we want 3 characters, a decimal point, and two characters to be the format for our result. If we let X$="***.**" and we wanted to print our previous result of X, we would enter.

```
PRINT USING X$;X
or PRINT USING "***.**";X
```

and the following would be printed:

```
 1.11
```

Two blank spaces would preceed the result since X$ allows 3 characters before the period.

PROGRAMMING

Last month we presented an inventory file program that stored its information in memory starting at 9000. Each block of information occupied 25 bytes. Within these 25 bytes were three items which were the number, description, and value of each item. The information in the file could be saved as a machine language program and new information loaded. This type of operation is compatible with disk or ramdisks. For large files, blocks of data can be chain loaded giving the appearance of continuous data.

This month we want to look at some proramming principles. Let's consider last month's program. Suppose we want to consider a file near the middle of the data. If we knew the number of the file, then we would know where it started by multiplying the file number by 25. We could move backwards in the file with the down arrow by subtracting 25 from the memory or we could move forward by adding 25 to the memory. We could update the information by rewriting the information in the file once we located it in memory.

DATA SEARCHING

Suppose we want to search for an item such as a "HAMMER". We would like to enter a "MATCH MODE" where we can enter an item and have the computer search for a match. We do not want to search for the match ourselver because this would be too time consuming and straineous. So we will let the computer do the searching.

How is a match subroutine written? We reserved blocks 5-16 for the description of the item in inventory. We can start at the beginning block and compare each character in the description stored in memory with each character of the item we are trying to find. If any character does not match then we go to the next data block and start comparing characters again. When we find a match, then we know the data block number and can display all of the information in that data block.

What about the files that are on the disk or ramdisk? A control program should be written that will load and search all of the files on the disk for the

required information. The length of the program would then be limited by the number of disks that contain our files.

DATA SORTING

Suppose we have an address file of 5000 names and wish to sort them by zip codes. Let's assume that the files are stored on disk or ramdisk in blocks of 500 names. This means that we will have 10 files to contain the names.

There are several approaches that could be taken. One approach would be to have a file set up nummerically. Would could designate them as follows:

NAME	ZIP CODE RANGE
ZIP0	LESS THEN 10000
ZIP1	10000 - 19999
ZIP2	20000 - 29999
ZIP3	30000 - 39999
ZIP4	40000 - 49999
ZIP5	50000 - 59999
ZIP6	60000 - 69999
ZIP7	70000 - 79999
ZIP8	80000 - 89999
ZIP9	90000 - 99999
ZIPA	FOREIGN

These file names could be on a disk or ramdisk. We handle the zip code problem by entering the addresses in the proper zip code location for our bulk mailing. We use the Telewriter word processor and use the search feature to find the location to enter a new subscriber. We could store the files on disk as indicated if we had more names that we could carry in one file.

How do we sort data? Suppose we had 5000 names and want to place them in alphabetical order. One way to think of sorting is to visualize an index card with the data written on it for each name. We can obviously save time if we go through the list and form a second list of just the names beginning with "A". We can repeat and place all names beginning with "B" in another pile. When we finish we will have 26 files assuming we have names beginning with each letter of the alphabet. Now we can place each name in each file in alphabetical order.

Our procedure will be to use basic as our control program and machine language subroutines for speed. There is a lot of material to cover on this subject so we will continue next month.

128K MEMORIES

Want more memory for your **64K computer?** Most programs are designed for a 32K computer. We now include **bank-switching software** at no extra charge so that our **128K memories** will give you access to **4-32K memory banks.**

The assemblies consist of a second set of chips with sockets mounted on them. You remove your chips and plug in our assemblies. Your chips are then plugged into the sockets. A miniature toggle switch is included that allows hardware selection of either 64K bank. The banks are completely independent and you can put any program in either bank.

Programs can also be placed in the normally unaccessable second 32K of memory in each 64K bank. This means you can have use of **4-32K programs.**

We have upgrades for the **8 chip 4164 memories** plus the 2 chip **41464 Coco-2** computers. For soldered in chip assemblies, we can install the upgrades. Call for details.

ME-10 128K for 8- chip 4164 $49.95
ME-12 128K for 2- chip 41464 $49.95

Add $3 shipping, free catalog

DYNAMIC ELECTRONICS
BOX 896 (205) 773-2758
HARTSELLE, AL 35640

OPERATING HINT

To double your computer's speed, POKE 65495,0. To return to normal speed ,POKE 65494,0.

NEW PRODUCTS

This section is available free for producers and dealers of color computer products. These products have not been reviewed by us but are included for our reader's information.

CHECKERS-32K

Checkers-32K is an exciting game written by Roger S. Young and marketed by Applied Machine Intelligence. A graphics display of a checker board appears when the program is run. The user selects the checker to move by pressing the space bar. A 24 page booklet is included with instructions on playing the game and the rules of checkers. It has 4 skill levels, a high-resolution graphics display, and makes comments as the game is played. It requires a 32K computer and is available on either tape or disk.

Applied Machine Intelligence., P. O. Box 358, Salida, CO 812Ø1. $3.95 +.85 shipping.

Color Computer 3

Radio Shack has introduced the Color Computer 3. It has features not available in the Color Computer 2. For example it comes with 128K of memory which can be expanded to 512K. For graphics, displays of 16Ø x 192, 32Ø x 192, or 64Ø x 192 can be selected. It has text displays of 32 x 16, 4Ø x 24, or 8Ø x 24. A Color Computer 2 mode makes it compatible with CC-2 software. It has 16 colors for the lower resolution graphics and 4 colors for the higher resolution graphics. A television can be used for the lower resolution graphics or text displays, or a monitor can be used

TELEWRITER 64 WORD PROCESSOR

This excellent word processor will handle all of your writing requirements. With its full screen editor, any part of the text can be quickly accessed with the arrow keys. Phrases or paragraphs can be inserted, deleted, or copied to another part of the text.. The completed writing can be saved to a cassette or disk or printed on any printer. Features include:

3 display formats of 51, 64, or 85 columns **x** 24 lines
True lower case characters
User-friendly full screen editor
Right justification
Drives any printer
Runs in 16K, 32K, or 64K computers
Menu driven disk and cassette I/O

Disk $59.95, Tape $49.95
Add $3 shipping

We are adding other products. Let us know what you need.

COMMERCIAL PRINTING

We can fill most printing requirements. We can print Resumes, Brochures, Envelopes, Business Cards, Advertisements, Sales flyers, etc. No sales tax for out of state orders. Send draft of your work and we will call and give a quote and delivery date.

DYNAMIC ELECTRONICS
Box 896 (2Ø5) 773-2758
Hartselle, AL 35640

for the higher resolution text or graphics displays. It has 21 commands in Enhanced Extended Basic, a cassette I/O port, 2 joystick ports, an RS-232C serial port, plus a cartridge port. The cost is $219.95. Contact your local Radio Shack store or computer center for availability.

PRODUCT REVIEWS

This section is open to all producers and dealers of color computer products. We will review your product free of charge and write an editorial on the product. We do not use a rating system but will explain what the product does, and what can be expected from it. Any comments about the review from the firm submitting the product will be printed in a later issue.

CHECKERS-32K

How good are you at the exciting game of checkers? Would you like to improve your skill but can't find a challenger? Then CHECKERS-32K is for you. The computer will challenge you to a game.

The program requires a 32K computer and displays a checker board with checkers in high resolution graphics. When it is your move, the computer helps you by flashing the checkers that can be moved. Press the space bar and a checker will change color. If you do not want to move that checker, press the space bar again and another checker will change color. To move the checker press the enter key, and a space to which the checker could be moved will change color. If you do not want to move to that space, press the enter key and another available space will change color. When the space selected is the one to which you want to move, then press the "E" key. The computer moves the checker and then makes its move. Any checkers that are jumped are removed from the board.

The computer gives comments when outstanding plays are made either by the computer or the player. This makes the game much more interesting.

The game can be saved and reloaded for continuation at a later time. When a checker becomes a king, a crown is drawn on it. There are 4 levels of play and numerous options that can be selected for the game.

We found the game to be very interesting and professional. The high resolution screen gives a very good representation of a checker board. One good thing about using the computer is that the checkers do not get lost. Checkers-32K is available on disk or tape for 32K basic or extended basic. This program is a trendous buy and it would be hard to find another program of this caliber at such a low price.

Applied Machine Intelligence, P. O. box 358, Salida, CO 81201. $3.95 + $.85 S/H.

PREMIUM QUALITY DISKS

You don't have to pay a lot for QUALITY disks. Our disks are boxed in **tens** complete with labels, sleeves, and write protect tabs. Don't confuse these with cheaper disks as they carry a **lifetime** waranty and will be replaced should they become defective. Single sided double density.

Order **DSK-1** **$8.95 + 1.50 S/H**

DYNAMIC ELECTRONICS
BOX 896 (205) 773-2758
HARTSELLE, AL 35640

QUESTIONS & ANSWERS

These are questions that have been asked us. If you have a question please write and we will answer it here.

QUESTION: You mention using memory PEEKS and POKES but the only examples you give are for PEEKS. How do you use POKES?

ANSWER: PEEKS allow you to look into memory and see what value is there. POKES allow you to change the value in memory. It may appear that we just use PEEKS but look at the POKE commands in our machine language demonstration programs. We POKE the values into memory after we REAM them from our DATA statements.

The printer baud rate is selected by POKING a value into location 15Ø. Your operater's manual explains this. There are many POKES that can be done to make the computer perform differently. Many of our OPERATING HINTS suggest POKES that can be made.

CLASSIFIED ADS

1. 1Ø cents a word, $3 minimum.
2. Name,Address, & Telephone listed free.
3. Send payment with ad.
4. Closing date 1st of the preceeding month. Ex. Nov ad closing is Oct. 1.

COLOR COMPUTER SOFTWARE
- REDUCED PRICES -

TERMINAL PROGRAM

DYTERM - Allows a Color Computer to interface with Modems, Terminals, or other Computers using the ASCII port. 3ØØ-24ØØ baud, 1 or 2 Stop bits, 7 or 8 bit words, variable parity. $9.95 Disk $11.95

DECIMAL ML ASSEMBLER

DISASM is a 68Ø9 Assembler-Disassembler that allows machine codes to be assembled using English mnemonics & decimal arithmetic. It supports all 68Ø9 codes and is especially useful for beginners. $1Ø.95, Disk $12.95

MULTIPROGRAM MANAGER (MPM)

The **MPM** allows up to 5 programs to be loaded into a 32K computer. Run, Delete, or Add programs to the menu. Quickly jump from one PGM to another. Save all PGMS at once. $9.95 , $11.95 Disk

Call anytime **(2Ø5) 773-2758**

DYNAMIC ELECTRONICS INC.
P. O. Box 896
Hartselle, AL 35640

DISPLAY ADS

(Rate sheet 2 - March 1986)
Closing 1st of preceeding month.

Pages	1 time	2 times	3 times
*2	25	23	22
1	30	27	25
1/2	23	20	18
1/3	19	17	15
1/4	15	13	12

* We can use colored paper at no extra charge if ads are on both sides.

We can do ads in Red, Blue, or Brown. No all one color ads will be accepted. For color ads send artwork for each color. Add 40% for each color. Example: One page black and red for 3 times costs $25 + 10.00 = $35.00 each month.

DCN PROGRAMS on Tape or DISK

This is our second collection of programs from Dynamic Color News. This collection includes:

1. Check book program. Data in remark statements. Prints to screen or printer.

2. Ball Team Sort Program. with information on sorting.

3. Card Shuffling Program. (Using Random Numbers)

4. Student Study Program. Randomly picks questions and answers.

5. Address File Program. Print mailing labels, search for address by name, zip code, city, or state.

Order DCN-2

Tape $9.95, Disk $11.95
Add $2 shipping, Foreign $3

****
* Please sign me up for one year for the DYNAMIC COLOR NEWS. I want *
* to receive instruction on programming, Computer Theory, Operating *
* Techniques, Computer Expansion, plus information on New Products, *
* and Product Reviews. I understand that there will be no charge *
* for answers to questions printed in the Newsletter. *
*
* Cost $15 USA & Canada, $30 foreign. *
*
* Name _____ Mail payment to *
* Address _____ Dynamic Electronics Inc *
* City _____ P. O. Box 896 *
* State & Zip _____ Hartselle, AL 35640 *
* Enclosed is a check ___ *
* charge to VISA ___ MC ___ Number _____Exp._____ *
*
****

DYNAMIC ELECTRONICS INC.
P. O. Box 896 (205) 773-2758
Hartselle, AL 35640

BULKRATE
U.S. POSTAGE
PAID
HARTSELLE, AL
35640
PERMIT NO. 21