

RADIO SHACK COLOR COMPUTER

MAGAZINE

December 1986  
Vol. 3 No. 11

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DYNAMIC



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- \* TERMINAL PROGRAM

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The purpose of this magazine 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 magazine 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 magazine. 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.

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*   DYNAMIC   COLOR   NEWS   *
*
*           December 1986   *
*
*   Editor and Publisher   *
*   Bill Chapple W4GQC    *
*
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#### CONTENTS

ML Programming . . . . .	4
CoCo 3 . . . . .	6
OS-9 . . . . .	9
Lucky Money . . . . .	11
(Game)	
Interfacing Computers . . . . .	16
DYTERM Terminal Program . . . . .	16
Basic Programming . . . . .	20
(Sorting)	
Editor's Comments . . . . .	24
Ham Radio & Computers . . . . .	25
Product Reviews . . . . .	30
New Products . . . . .	32
Questions & Answers . . . . .	33
DCN Cumulative Index . . . . .	35

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# ML PROGRAMMING

## (PART 8)

by John Galus

In this part of the series we will examine the architecture of the 6809 micro contained in the Color Computer and other tools necessary to become an Assembly language programmer. As you may know within the Color Computer is the 6809 micro-processor. This chip is the "brains" of our computer but it does nothing itself and we must program it by "feeding" it numbers to perform a preset group of functions. This CPU (Central Processing Unit) can only work with numbers and this is where "machine language" comes into play. By feeding the processor the correct sequence of numbers we can get the computer to do something for us. Since this type of programming is difficult at best, Assembly language was developed to provide an easier method of programming on the machine level. Our Color Computer is divided into RAM (Random Access Memory) and ROM (Read Only Memory). We can write to or read information in RAM. ROM can be only read the Basic interpreter within our computer is in ROM. RAM and ROM are organized into what are called "bytes". The normal configuration for the Color computer is 32K (1K = 1024 bytes) of RAM and 32K of ROM. These RAM and ROM are located by a number or "address" from 0 to 65535 (hex \$FFFF). A byte is broken down into 8 binary digits or BIT. Two bytes make up a WORD or a 16 bit binary digit. The 6809 is a WORD or 16 bit micro that can access memory up to only 64K at any one time. Here is an illustration of how this breaks down.

```

7 6 5 4 3 2 1 0
0 0 0 0 0 0 0 0
8 BITS, ONE BYTE

```

```

00000000 00000000
2 BYTES, ONE WORD

```

One BIT can be either 0 or 1, on or off. This is due to the fact that a computer is nothing but a high speed "switching" device and as you know a switch can only be in one of two positions either "on" or "off". Each bit position is numbered according to the power of 2 they represent.

### POWERS OF TWO

```

7 6 5 4 3 2 1 0
0 0 0 0 0 0 0 0
128 64 32 16 8 4 2 1

```

### VALUE OF POSITION

For example the number 39 represented in Binary or "BASE 2" notation is 00100111 or 32+4+2+1. Numbers in Binary are hard to remember so we other use what are called Hexadecimal or Hex numbers. Hex numbers are used in Basic by using the &H symbol or using the HEX\$ command. The symbol \$ is used to denote that the value is in hexadecimal. Hexadecimal numbers are equivalent to the decimal values of 0 to 15, \$0 to \$F.

DECIMAL	HEXADECIMAL	
0	0	1
2	2	3
4	4	5
6	6	7
8	8	9
10	A	B
12	C	D
14	E	F

As you can see from the list decimal and hexadecimal numbers from 0 to 9 are the same but from 10 on its a whole new ball game. To convert a binary num-

ber to Hex we break up each byte of a value in four bits and find its hexadecimal equivalent.

10011011

1001 1011

9 B

One byte is represented in Hexadecimal by two hex numbers. In the above example the value contained in the byte was equivalent to \$9B (decimal 101). Two bytes (16 bits) make up four hex numbers for example the hex number \$F8E6 equals.

F 8 E 6 HEX=

1111 1000 1110 0101 BINARY=

15x16 3rd power+ 8x16 2nd power+ 14x16 1st power+ 6x16 0 power

=61440 + 2048 + 224 + 6

=63718 DECIMAL

Hex numbers are known as "base 16" numbers we are familiar with decimal or "base 10" numbers. Binary and Hexadecimal notation may at first appear strange but with a little work they will soon become comprehensible. Let's look at the architecture of the 6809 micro. Within this micro are a number of high speed locations known as REGISTERS. Registers are not represented by memory addresses but by letters. There are nine registers within the 6809 CPU. These registers are represented as follows.

```
*****
A * B *
*****
ACCUMULATORS ONE BYTE ONE BYTE
```

COMBINE TO FORM "D" REGISTER.

```
*****
* X *
```

```
***** X INDEX
TWO BYTES (16 BITS)
```

```
*****
* Y *
***** Y INDEX
```

```
*****
* U *
***** USER
STACK
```

```
*****
* S *
***** SYSTEM
STACK
```

```
*****
* PC *
***** PROGRAM
COUNTER
```

```
***** * CC *
***** CONDITION CODE
```

```
***** * DP *
***** DIRECT PAGE
```

The A and B registers are also called the "Accumulators" these registers are used in the 6809 math operations. These two registers can be used together as one 2 byte (16 bit) register called the "D" register. The A register holds the most significant byte of the value while the B register holds the least significant byte value. The X and Y registers are called the Index registers and are used as pointers to memory. The U and S registers are Stack registers. The S stack register is the system stack where return addresses are placed during a subroutine call. The U stack is the User stack register this register can be used as an extra stack under the programmers control. The User stack can also serve as another Index register if desired. The PC is the Program Counter which is used by the computer to point to where the next instruction or data to be

accessed is located in memory. The CC is the Condition Code register records the results of operations performed by the processor. The program's flow can be altered by checking these codes using the "Branch" commands. The DP is the Direct Page register which is involved in setting the "page" used by the processor usually this register contains a zero pointing to the zero page of memory. These registers are what we will be manipulating to make the CPU operate. If you have EDTASM+ you could examine the contents of these registers by entering ZBUG by entering "Z" in the Editor mode and then typing "R" and pressing Enter. A computer operates by performing basically three functions. It "Fetches" or get information such as instructions or data. It then "Decodes" this data and "Executes" the appropriate commands. This information is what we must supply to the computer and is what we call a program. Maybe someday computers may be able to program themselves but as of today its still up to the hardworking programmer to make these curious machines serve and entertain us. That's all for now next time we will begin to examine the Assembly language instructions' "mnemonics" so that we can begin some real Assembling.

## COCO 3

This month we want to look at the memory map for the COCO 3 and compare it with the memory map for the COCO 2. The COCO 3 computers are advertised as having 128K of memory with expandability to 512K.

The operating memory for the CC-3 is in the upper 128K of the 512K memory map. This is from 393216 (\$60000) to 524287 (\$7FFFF). The upper 64K is similar to the memory map for the older computers. Let's look at what is stored in the other or lower 64K.

First let's look at the text buffer. In the 32 character mode there are 32 characters by 16 lines. This requires 1024 bytes and uses the same memory as the older computers. The COCO 3 also has a high resolution text display. This requires additional memory and an 8K block is reserved in the lower second memory bank for this purpose. It is located at from 450460 (\$6C000) to 450559 (\$6DFFF). This is in the the upper half of the second 64K memory bank. An advantage of having the hi-res text buffer located there is that it frees all of the normal 32K for programming.

Another nice advantage of the extra 64K of memory is that it is used for the high resolution graphics screen. The lower 32K of the second 64K memory is reserved for this purpose. Again this means that if you are using high resolution graphics you can write a program that is about 28K bytes long since memory for the graphics display is not required in the normal 32K memory bank. For nongraphics programs this memory could be used for storing and retrieving data by using the LPOKE and LPEEK commands.

There is another 8K bank from 425984 (\$68000) to 434175

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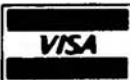
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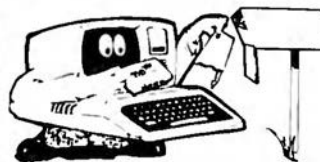
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(\$69FFF). This is used for the high resolution GET and PUT buffer memory.

Another 8K is reserved for secondary stack area. This is from 434176 (\$6A000) to 442376 (\$6BFFF).

The last 8K memory block is from 450560 (\$6E000) to 458751 (\$6FFFF). This is unused and can be used by basic for data.

### SUMMARY

The 128K bytes for a COCO 3 occupy the upper 128K in the 512K memory block. The computer basically operates using the upper 64K of memory. This is similar to the operation of the older computers. The lower 64K is reserved as follows:

- Lower 32K for Hires graphics.
- Next 8K for Hires GET/PUT.
- Next 8K for secondary stack area.
- Next 8K for Hires text screen.
- Last 8K is unused.

There are many questions that we have about the new Color Computer 3. As we become more familiar with it we will find the answers to these questions and pass the information on to our readers. We will present more information next month.

As stated last month, some software is not compatible and we do not recommend selling your older computer and purchasing a new CC-3 unless you are aware of this problem. You may want to keep your old one until more new software is available. However if you just use the normal 32K then you should not have any problems. The standard color computer disk drives and cassette recorders work fine. Also there will not be any problems with printers.

If you have a question about the color computer 3 please write us and we will answer them in our Question and Answer section.



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## OS-9

In our October 1986 issue we started looking at OS-9. OS-9 is an operating system than requires a 64K computer and a disk drive. An operating system does not do calculations but is designed for easy file creation and manipulations.

This month we want to look at creating and deleting directories. First backup the system master disk and use this disk for your files. To create a directory type a command similar to the following:

**MAKDIR WORK <ENTER>**

This is easy to remember as MAKDIR is an abbreviation of "make directory".

A subdirectory can be created. Suppose we want to make a directory of maintenance under WORK. We can create the subdirectory CAR by entering:

**MAKDIR/DØ/WORK/CAR <ENTER>**

### DELETING DIRECTORIES

If a directory contains a sub directory then all of the files in the sub directory will be deleted with the directory. The following is an example of deleting a directory:

**DEL/DO/WORK**

### RENAMING A DIRECTORY

The name of a directory can be changed with the RENAME command. Suppose we want to change the name of the directory DO/WORK to DO/PLAY. Then we would enter the following:

**RENAME /DO/WORK PLAY**

To verify that the file has been

renamed type LIST DO/play and the file will be listed and should contain the same information as the original file.

### CREATING & EDITING FILES

First let's pick a name for our file. Since this is our first file let's call it "FIRST". To get the editor started type:

#### EDIT FIRST

The file will be created and the following prompt will appear:

**E:**

To insert lines just type them in after pressing the space bar. After typine in the line, press ENTER and again the E: will be displayed. The first location is reserved for commands. After typing in a few lines you will want to go to the top of the buffer and review your work. To do this type:

#### CLEAR 7 ENTER

The preceeding command will take you to the beginning of the buffer. Now to list all lines type:

**L\***

You can move down a line at a time by pressing the ENTER key. If you want to insert a line just type it in at the proper location and it is automatically inserted. To delete a line just type D in the first space and the line will be printed and deleted.

### SAVING YOUR WORK

One thing that is nice about an operating system is that it does most of the hard things for you. You don't have to worry about formats, just enter the

proper commands. The command for terminating the file is "Q". So press the "Q" key and then the enter key and the updated file is saved.

### LISTING THE FILE

After saving the file, list it to verify that all of the lines were saved. Do this by typing:

#### LIST FIRST

After entering the command, all lines of the file FIRST will be listed.

We have heard that the OS-9 manuals are sometimes hard to understand and our experience has verified this. We hope that this section will make it easier for our readers.

To do calculations with OS-9 will require a machine language program or Basic-09. An assembler is included with the package to assemble machine language programs. Basic-09 is very expensive and you can verify this by contacting your Radio Shack Computer Center.

The OS-9 format is different from disk basic. This is not a good design feature since an operating system should be compatible with basic and ASCII files. As an example MS/DOS is the operating system for IBM compatible computers. A basic program can be printed on the screen or to a printer by MS/DOS control if it were saved in ASCII format. This feature is desirable and should have been included with OS-9.

Remember that OS-9 is an operating system and is supposed to make it easier for manipulating files. If you will review what we did this month, you can see how easy it was to edit our lines in our file. If you are a beginner and are considering starting with OS-9, it probably will be confusing to you. It

would be better to start OS-9 after being experienced at basic programming.

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## LUCKY MONEY (GAME)

Lucky Money is a game for 2-5 players where each player tries to gain the most money in five rounds and a jackpot round. In each round each player gets three spins to try to win cash while trying to avoid ZEROS and other bad things.

This program is provided by T & D Subscription Software (See their advertisement on page 7) and is used by permission.

```

1 REM COPYRIGHT (C) T&D SOFTWARE
  1986      lucky money
5 PMODE0:GOTO60000
10 CLEAR800:DIMB$(30,6),B(30,6):
  CLS:M=RND(-TIMER)
20 PRINT@260,"";:INPUT"NUMBER OF
  PLAYERS 2-5";P:P=ABS(INT(P))
  :IFP<2ORP>5THEN20
30 FORG=1TO6:FORI=1TO30:READB$(I
,G):NEXTI:FORI=1TO30:READB(I,
G):NEXTI,G
40 DATA$500,$300,ZERO,SPINS+,$10
00,$100,$600,BIG BUCKS,$900,$
700,LOSE $,$400,$500,$200,$10
0,$300,$350,SPINS+,SPINS-,$15
00,LITTLE $,$700,$250,ZERO,$1
00,SPINS-,$150,$450,ZERO,$900
50 DATA500,300,,.2,1000,100,600,
.1,900,700,.4,400,500,200,100
,300,350,.2,.3,1500,.5,700,25
0,,100,.3,150,450,,900
60 DATA$2000,$1500,mystery$,$200
,SPINS-,ZERO,DOUBLE BANK,$500
,BANK $500,$2500,BIG BUCKS,ZE
RO,$50,$750,$900,$1900,SPINS+
,$400,$300,SPINS+,$100,LITTLE
$, $5000,$150,$600,$750,SPINS
-,$1900,ZERO,LOSE $
70 DATA2000,1500,.6,200,.3,,.7,5
00,500.8,2500,.1,,50,750,900,
1900,.2,400,300,.2,100,.5,500
0,150,600,750,.3,1900,,.4
80 DATA$300,ZERO,$400,ZERO,$3000
,BANK $900,SPINS+,$4000,BIG B
UCKS,$350,SPINS-,ZERO,$1500,$
50,$4500,$1000,SPINS+,mystery
$,LITTLE $,LOSE $,$2000,$2000
,$500,$2500,ZERO,$3000,SPINS-
,$3500,$200,$300
90 DATA300,,400,,3000,900.8,.2,4

```

```

000,.1,350,.3,,1500,50,4500,1
000,.2,.6,.5,.4,2000,2000,500
,2500,,3000,.3,3500,200,300
100 DATABANK $1000,LOSE $,myster
y$,DOUBLE BANK,$5000,$2000,$1
000,SPINS-,SPINS-,SPINS+,$130
0,$700,BIG BUCKS,$2500,$7500,
SPINS+,$100,$300,$200,$2400,$
7000,ZERO,$5000,ZERO,$2000,ZE
RO,$2100,$900,ZERO,ZERO
110 DATA1000.8,.4,.6,.7,5000,200
0,1000,.3,.3,.2,1300,700,.1,2
500,7500,.2,100,300,200,2400,
7000,,5000,,2000,,2100,900,,
120 DATABIG BUCKS,$500,$1500,$40
00,SPINS+,LITTLE $,$3000,$100
0,LOSE $,SPINS-,"$10,000",ZER
O,ZERO,$5000,ZERO,mystery$,$2
500,$2500,SPINS-,SPINS+,ZERO,
DOUBLE BANK,PRIZE,SPINS-,ZERO
,$1500,$3500,SPINS+,"$15,000"
,ZERO
130 DATA.1,500,1500,4000,.2,.5,3
000,1000,.4,.3,10000,,5000,,
.6,2500,2500,.3,.2,,.7;.9,.3,
,1500,3500,.2,15000,
140 DATAZERO,$1000,$2000,ZERO,"$
10,000", $5000,ZERO,$3000,$100
0,ZERO,BIG BUCKS,mystery$,ZER
O,$2000,"$40,000",ZERO,"$25,0
00", $500,ZERO,$5000,"$50,000"
,ZERO,"$20,000","$30,000",ZER
O,ZERO,"$1 0 0,0 0 0",ZERO,$5
500,ZERO
150 DATA,1000,2000,,10000,5000,,
3000,1000,,.1,.6,,2000,40000,
,25000,500,,5000,50000,,20000
,30000,,100000,,5500,
160 CLS8:PRINT@69,"THIS IS THE G
AME OF";:PRINT@129,"$$$$$$$$
LUCKY MONEY$$$$$$$$";
170 PL$="T4L8DEFEFDEFEP16L32DDDP3
2L16DP18C#P18DP2":PLAYPL$
180 FORI=1TOP
190 PRINT@196,"NAME OF PLAYER" I;
:LINEINPUTN$(I):N$(I)=LEFT$(N
$(I),8)
200 PRINT@262,"IS "N$(I)" CORREC
T";:INPUTI$:IFLEFT$(I$,1)="N"
THEN190
210 Q$=STRING$(32,239):PRINT@192
,Q$;:PRINT@256,Q$;:NEXT:R=1:G
OSUB830
220 CLS2:PRINT"PLAYER";:PRINT@16
,"BANK SCORE";
230 PRINT@64,"";:
PRINT@64,"#1: "N$(1);:PRINT@1
28,"";:PRINT@1

```

```

28,"#2: "N$(2);
240 IFP>2THENPRINT@192,"
      ";:PRINT@192,"#3: "N$(
3);
250 IFP>3THENPRINT@256,"
      ";:PRINT@256,"#4: "N$(
4);
260 IFP>4THENPRINT@320,"
      ";:PRINT@320,"#5: "N$(
5);
270 FORI=1TOP:PRINT@64*I+16,BM(I
):NEXT:FORX=1TOP:SP(X)=3:NEXT
:FORI=1TO1700:NEXT:T=1
280 M=RND(-TIMER):CLS3:PRINT"PLA
YER #\"T\": "N$(T);
290 PRINT@64,"CURRENT BANK: "BM(
T):PRINT@96,"CURRENT MONEY:"P
M(T):PRINT"SPINS: "SP(
T):IFSP(T)>.THEN340 ELSEFORF=
1TO1000:NEXTF
300 N=.:FORI=1TOP:IFSP(I)=.THENN
=N+1
310 NEXTI
320 IFN=P THEN620 ELSESET=T+1:IFT>
P THENT=1
330 GOTO280
340 PRINT@320," PRESS P TO PASS
OR ANY OTHER KEY TO PLAY
EXCEPT BREAK. "
350 I$=INKEY$:IFI$="" THEN350 EL
SEIFI$<>"P" THEN380
360 X=T+1:IFX>P THENX=1
370 SP(X)=SP(X)+SP(T):SP(T)=.:T=
X:GOTO280
380 PRINT@320," WHEN YOU WANT
TO STOP THE ARROW, PRESS
ANY KEY BUT BREAK.":PRINT"
GET READY. "
:FORI=1TO1200:NEXT
390 CLS0:FORI=1TO30:PRINTB$(I,R)
,:NEXT:BL=1:SP(T)=SP(T)-1
400 PRINT@(BL-1)*16+14," ";:BL=R
ND(30):PRINT@(BL-1)*16+14,"_"
;
410 SOUNDNRND(255),1:IFINKEY$=""
THEN400
420 PRINT@480,CHR$(255)"
      ";:PRINT@481,B$(BL,R)
;:B=B(BL,R)
430 IFB=.THENIFR<6 THENNPM(T)=.:S
P(T)=.:PZ=0:GOTO610 ELSEBM(T)
=.:PLAY"L4T2O1CCCC":RETURN
440 IFINT(B)=B THENNPM(T)=PM(T)+B
:IFR<6THEN610 ELSEBM(T)=BM(T)
+B:GOTO610
450 IFB=.1THENX=R*1000*RND(10):F
ORI=1TO400:NEXT:PRINT@480,"
      ";:PRINT@480,"$

```

```

"X;:PM(T)=PM(T)+X:IFR<6THEN61
0 ELSEBM(T)=BM(T)+X:GOTO610
460 IFB=.2THENX=RND(4):PRINTX;:S
P(T)=SP(T)+X:GOTO610
470 IFB=.3THENX=RND(4):IFX>SP(T)
THENX=SP(T):PRINTX;:SP(T)=.:
GOTO610 ELSEPRINTX;:SP(T)=SP(
T)-X:GOTO610
480 IFB=.4THENNPM(T)=.:GOTO610
490 IFB=.5THENX=RND(10*R):PRINTX
;:PM(T)=PM(T)+X:GOTO610
500 IFB=.6THENX=RND(10000*R):PRI
NTX;:PM(T)=PM(T)+X:IFR<6THEN6
10 ELSEBM(T)=BM(T)+X:GOTO610
510 IFB=.7THENBM(T)=BM(T)*2:GOTO
610
520 IFB=.9THEN540
530 B=B-.8:BM(T)=BM(T)+B:GOTO610
540 CLS7:PRINTN$(T)" WON";
550 IFRND(100)<13THENPZ$="A NEW
CAR VALUED AT $":V=(RND(5)+6)
*1000+RND(999):PZ$=PZ$+STR$(V
)+" !":GOTO600
560 IFRND(100)>90THENPZ$="A NEW
MOTORBOAT WORTH $":V=(RND(4)+
3)*1000+RND(999):PZ$=PZ$+STR$(
V)+" !":GOTO600
570 IFRND(100)<62THENPZ$="A NEW
REFRIGORATOR/FREEZER VAL
UED AT $":V=RND(2)*100+800+RN
D(400):PZ$=PZ$+STR$(V)+" !":G
OTO600
580 IFRND(4)<3THENPZ$="A NEW DIS
HWASHER WORTH $":V=RND(220)+6
00:PZ$=PZ$+STR$(V)+" !":GOTO6
00
590 PZ$="A TRASH COMPACTER VALUE
D AT $":V=RND(230)+389:PZ
$=PZ$+STR$(V)+" !"
600 PM(T)=PM(T)+V:PRINT@64,PZ$:P
Z=T:B$(23,5)="ZERO":B(23,5)=.
:FORI=1TO600:NEXT
610 FORI=1TO1000:NEXT:IFR<6THEN2
80 ELSERETURN
620 CLSP:PRINT@233,"END OF ROUND
"R;:R=R+1
630 FORI=1TOP:BM(I)=BM(I)+PM(I):
PM(I)=.:NEXT
640 IFR<6THENPRINT@262,"GET READ
Y FOR ROUND"R;:FORI=1TO1000:N
EXT:GOTO220
650 CLS0:FORI=.TO7:PRINT@I*32,ST
RING$(32,143+I*16);:NEXT:PRIN
T@264,"JACKPOT ROUND!";:PLAYP
L$
660 PRINT@288," ONE PLAYER WILL
BE PICKED TO PLAY THE JACKP
OT. THAT PERSON WILL GET ON

```

```

E SPIN. IF IT IS MONEY IT
WILL BE ADDED TO HIS"
670 PRINT"BANK SCORE. IF IT IS Z
ERO HE LOSES HIS ENTIRE BA
NK. PRESS A
KEY.";
680 IFINKEY$="" THEN680 ELSECLS0
690 M=RND(-TIMER-(RND(-P))):T=RN
D(P):PRINT" THE PERSON WHO WI
LL BE PLAYING WILL BE NUMBER"
T", "N$(T)".":PRINT"
GET READY.":FORI=1TO1450:NEX
T:GOSUB390:CLS4
700 CLS8:PRINT"PLAYER";:PRINT@16
,"BANK MONEY";
710 PRINT@64," ";
:PRINT@64,"#1: "N$(1);:PRINT@
128," ";:PRINT
@128,"#2: "N$(2);
720 IFP>2THENPRINT@192,"
";:PRINT@192,"#3: "N$
(3);
730 IFP>3THENPRINT@256,"
";:PRINT@256,"#4: "N$
(4);
740 IFP>4THENPRINT@320,"
";:PRINT@320,"#5: "N$
(5);
750 FORI=1TOP:PRINT@64*I+16,BM(I
):NEXT
760 X=1:FORI=1TO5:IFBM(I)>X THEN
X=BM(I):XP=I
770 NEXT
780 PRINT@384,"THE WINNER IS:NUM
BER"XP" WITH":PRINT"$"BM(XP)
790 IFPZ=XP THENPRINT"IN CASH AN
D PRIZE" ELSEPRINT"ALL IN CAS
H"
800 C$=CHR$(128):PRINT"press"C$"
a"C$"key"C$
810 IFINKEY$="" THEN810 ELSECLS:
PRINT@228,"WANT TO PLAY AGAIN
? Y/N"STRING$(224,128);
820 A$=INKEY$:IFA$="Y" THENRUN E
LSEIFA$="N" THENEND ELSE820
830 CLS6:PRINT"DO YOU WANT INSTR
UCTIONS? <Y/N>"
840 A$=INKEY$:IFA$="N"THENRETURN
ELSEIFA$<>"Y"THEN840
850 CLS:PRINT" LUCKY MONEY IS A
GAME FOR TWO TO FIVE PLAYERS
. THE OBJECT OF THE GAME IS
TO HAVE THE MOST MONEY AT
THE END OF THE JACKPOT ROUND.
":PRINT
860 PRINT" THE GAME CONSISTS OF
5 ROUNDS OF PLAY AND THE JAC
KPOT ROUND. EACH ROUND EVERY

```

```

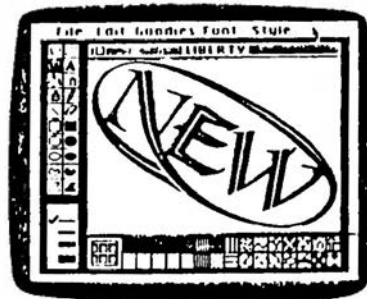
PLAYER GETS 3 SPINS TO TRY
TO EARN MONEY. FOR EVERY SPIN
THE PLAYER IS ASKED IF HE W
ISHES TO SPIN OR PASS HISOR H
ER SPINS TO THE NEXT PLAYER."
870 GOSUB940:CLS:PRINT" TO PASS
PRESS THE 'P' KEY. TO SPIN P
RESS ANY OTHER KEY EXCEPT BRE
AK.":PRINT
880 PRINT" AT THE END OF EACH RO
UND A","SCOREBOARD IS POSTED
SAYING THE TOTAL AMOUNT IN TH
E PLAYER'S BANK.":GOSUB940
:CLS
890 PRINT" THE PLAYER HAS TWO AC
COUNTS. ONE IS THE PLAYER B
ANK, WHICH CANNOT BE LOST E
XCEPT IN THE JACKPOT ROUND
. THE OTHER IS THE PLAYER'S C
URRENT MONEY, WHICH ISTHE MON
EY EARNED IN THAT ROUND. IT C
AN BE LOST BY HITTING A ZERO"
;
900 PRINT"OR BY HITTING THE 'LOS
E $' SPACE"STRING$(32,46)" AT
THE END OF THE ROUND, THE
CURRENT MONEY IS PUT INTO THE
BANK.":GOSUB940:CLS
910 PRINT" THESE ARE THE RULES F
OR THE FIRST FIVE ROUNDS.
THE JACKPOT ROUND IS GENERAL
LY THE SAME. ANYDIFFERENT DET
AILS ARE EXPLAINED THEN.":GOS
UB940:CLS
920 PRINT" $","MONEY"," LITTLE $
","SMALL CASH"," BIG BUCKS","
THOUSANDS OF $"," SPINS +","1
TO 4 SPINS",," GAINED","
SPINS -","1 TO 4 SPINS",,"
LOST"
930 PRINT" ZERO","LOSE ALL CURRE
NT"," $ AND SPINS"," LOSE
$","LOSE CURRENT $"," mystery
$","MYSTERY MONEY"," BANK $",
"$ GOES DIRECTLY",," TO BA
NK":PRINT" DOUBLE BANK","DOUB
LE BANK"," PRIZE","WIN A PRIZ
E":GOTO940
940 Q$=CHR$(128):PRINT@490,"pres
s"Q$"a"Q$"key"Q$;:EXEC44539:R
ETURN
60000 PCLEAR1:GOTO10

```

## OPERATING HINT

To double your computer's speed, F0KE 65495,0. To return to normal speed ,F0KE 65494,0.

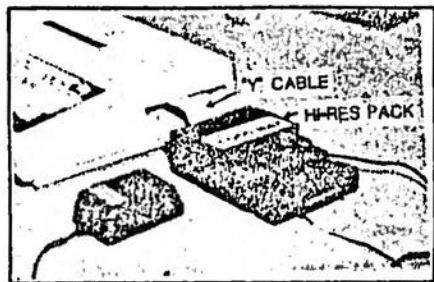
# CoCo Max II™



You'll use it all the time and love using it.

## What is CoCo Max?

Simply the most incredible graphic and text creation "system" you have ever seen. A Hi-Res Input Pack (more on the pack later) is combined with high speed machine language software. The result will dazzle you.



CoCo Max disk system, with Y-cable.

## Is CoCo Max for you?

Anyone who has ever held a pencil or a crayon for fun, school or business will love it. A 4 year-old will have fun doodling, a 15 year-old will do class projects and adults will play with it for hours before starting useful applications (illustrations, cards, artwork, business graphics, flyers, charts, memos, etc.) This is one of the rare packages that will be enjoyed by the whole family.

## What made CoCo Max an instant success?

First there's nothing to learn, no syntax to worry about. Even a child who can't read will enjoy CoCo Max. Its power can be unleashed by simply **pointing** and **clicking** with your mouse or joystick. With **icons** and **pull down menus**, you control CoCo Max intuitively; it works the same way you think.

Don't be misled by this apparent simplicity. CoCo Max has more power than you thought possible. Its blinding speed will astound you.

It lets you work on an area 3.5 times the size of the window on the screen. It's so friendly that you will easily recover from mistakes: The **undo** feature lets you revert to your image prior to the mistake. As usual, it only takes a single click.

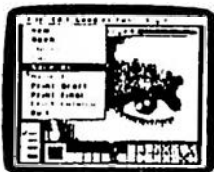
Later, we will tell you about the "typesetting" capabilities of CoCo Max II, but first let's glance at a few of its graphic creation tools:

With the **pencil** you can draw free hand lines, then use the **eraser** to make corrections or changes. For straight lines, the convenient **rubber-banding** lets you preview your lines before they are fixed on your picture. It's fun and accurate. Lines can be of any width and made of any color or texture.

The **paint brush**, with its 32 selectable brush shapes, will adapt to any job, and make complicated graphics or calligraphy simple. For special effects, the **spray can** is really fun: 86 standard colors and textures, all available at a click. It's like the real thing except the paint doesn't drip.

CoCo Max will instantly create many shapes: circles, squares, rectangles (with or without rounded corners), ellipses, etc. Shapes can be filled with any pattern. You can also add hundreds of custom patterns to the 86 which are included.

The **Glyphics** are 58 small drawings (symbols, faces, etc.) that can be used as rubber stamps. They're really great for enhancing your work without effort.



Pull down menus



Zoom in!

## Control Over Your Work

CoCo Max's advanced "tools" let you take any part of the screen, (text or picture) and perform many feats:

- You can move it around
- Copy it
- Shrink or enlarge it in both directions
- Save it on the electronic **Clipboard**
- Flip it vertically or horizontally
- Rotate it
- Invert it
- Clear it, etc. etc.

All this is done instantly, and you can always **undo** it if you don't like the results.

For detail work, the **fat bits** (zoom) feature is great, giving you easy control over each pixel.

To top it all, CoCo Max II works in color. Imagine the pictures in this ad in color. If you own a Radio Shack CGP-220 or CGP-115, you can even print your work in full color!

There is so much more to say, such as the capability to use CoCo Max images with your BASIC programs, the possibility to use CoCo Max's magic on any standard binary image file. There are also many advanced features such as the incredible **Iasso**.



Inside the Hi-Res Input Pack

## Why a Hi-Res Input Pack?

Did you know that the CoCo joystick input port can only access 4096 positions (64x64)? That's less than 10% of the Hi-Res screen, which has 49152 points! (256x192). You lose 90% of the potential. The Hi-Res Input Pack distinguishes each of the 49152 distinct joystick or mouse positions. That's the key to CoCo Max's power. The pack plugs into the rom slot (like a rom cartridge). Inside the pack is a high speed multichannel analog to digital converter. Your existing joystick or mouse simply plugs into the back of the Hi-Res Pack.

## Electronic Typesetting...

You'll be impressed with CoCo Max's capability. Text can be added and moved around anywhere on the picture. (You can also rotate, invert and flip it...) At a click, you can choose from 14 built in **fonts** each with 16 variations. That's over 200 typesyles!



Examples of printouts

## Printing Your Creations

There are a dozen ways to print your work. All are available with a click of your joystick (or mouse) without exiting CoCo Max. Your CoCo Max disk includes drivers for over 30 printers!





## INTERFACING COMPUTERS

In this series we have been discussing ways and developing hardware and software for interfacing computers. The serial ASCII port is about the only thing that is standard on different computers. We developed a hardware interface that converted the plus and minus voltage variations from this port into a 0 to 5 volt TTL level for interfacing with logic or another computer.

We have spent several months on this subject and this month we are presenting our "DYTERM" terminal program which we developed in 1983. As previously stated, Basic is too slow for assembling and disassembling the bits from an ASCII word. Therefore machine language subroutines are required to give us the speed needed. We used a unique procedure for the machine language subroutines. The second statement in the program is a remark statement that contains the machine language subroutines.

To make room for the machine language programs type statement 10 and a '. Then enter as many spaces as you can. A total of 249 spaces are required. Then you can poke the values into these spaces. The only requirement is that a 0 can not be present as basic will think that a new statement is starting. We wrote our ML subroutines so that a 0 would not be present.

If you want to type in the program we suggest you save the machine language part until you have the other line typed. Run the program and then break it. Type ?R ENTER. R is the value where the machine language subroutines start. You can poke the values indicated in our table into these memory locations. Then save the combination as some name such as "DY-

TERM". When you load "DYTERM" the machine language subroutines will be loaded with statement 10.

We reserved memory locations 4000-4015 for memory to contain the parameters such as baud rate, word length, etc. So make sure the program does not overlap these areas. For extended basic a PCLEAR 1 will protect the parameter memory.

### DYTERM TERMINAL PROGRAM

```
5 GO TO 20
10 '
15 '
20 POKE 4006,1: POKE 4005,7:R=25
  6*PEEK(25)+PEEK(26)+17
25 CLS
30 PRINT"      THIS IS DYTERM":P
  RINT:PRINT"COPYRITE (c) 1983
      DYNAMIC ELECTRO
      NICS INC.      ALL RIGHTS R
      ESERVED.":PRINT
35 PRINT"mACHINE LANGUAGE PROGRA
  MS ARE      IN STATEMENT 10
  ":PRINT
38 FORJ=1TO1000:NEXTJ
40 PRINT"      FEATURES ARE AS FOL
  LWS":PRINT
50 PRINT"* BAUD RATES OF 300 TO
  2400
60 PRINT"* eVEN, ODD, AND NO FAR
  ITY.
70 PRINT"* wORD LENGTH OF 7 OR 8
  BITS.
75 PRINT"* 1 OR 2 STOP BITS.
80 PRINT
84 A=PEEK(150):IF A>170 THEN B=3
  00 ELSE IF A>80 THEN B=600 EL
  SE IF A>35 THEN B=1200 ELSE B
  =2400
86 P=PEEK(4008):IF P=0 THEN P$="
  NO"ELSE IF P=1 THEN P$="EVEN"
  ELSE IF P>1 THEN P$="ODD"
90 PRINT
95 IF P>0 THEN POKE 4005,7
100 PRINT"1 BAUD RATE= ";B
110 PRINT"2 STOP BITS= ";PEEK(40
  06)
120 PRINT"3 WORD LENGTH= ";PEEK(
```

```

4005)
130 PRINT"4 ";P$ PARITY"
135 BE=256*PEEK(4012)+PEEK(4013)
138 EN=256*PEEK(4014)+PEEK(4015)
140 PRINT"5 BEGINNING OF DATA BK
="BE
150 PRINT"6 ENDING OF DATA BLOCK
="EN
190 PRINT:PRINT"sELECT NUMBER TO
SET PARAMETER"
200 A$=INKEY$: IF A$="" THEN 200
205 IF A$="1" THEN 300 ELSE IF A
$="2" THEN 400 ELSE IF A$="3"
THEN 500 ELSE IF A$="4" THEN
600 ELSE IF A$="5" THEN 700
ELSE IF A$="6" THEN 736
210 GO TO 1000
300 PRINT"THIS SELECTS BAUD RATE
305 PRINT"1 300 BAUD":PRINT"2 60
0 BAUD":PRINT"3 1200 BAUD":PR
INT"4 2400 BAUD
310 POKE 149,0:PRINT"ENTER NUMBE
R FOR BAUD RATE"
320 Y$=INKEY$: IF Y$="" THEN 320
325 IF Y$="1" THEN POKE 150,187 E
LSE IF Y$="2" THEN POKE 150,8
7 ELSE IF Y$="3" THEN POKE 150
,42 ELSE IF Y$="4" THEN POKE
150,19
330 GO TO 80
400 PRINT"THIS SETS STOP BITS
410 Z=PEEK(4006):Z=Z+1: IF Z>2 T
HEN Z=1
420 POKE 4006,Z:GO TO 80
500 PRINT"THIS SETS WORD LENGTH
510 Z=PEEK(4005):Z=Z+1:IF Z=9 TH
EN Z=7
520 POKE 4005,Z:GO TO 80
600 PRINT"THIS SETS PARITY":PRIN
T"0 NONE":PRINT"1 EVEN":PRINT
"2 ODD
605 PA$=INKEY$: IF PA$="" THEN 6
05
610 PA=VAL(PA$): IF PA>2 THEN 60
0
620 POKE (4008),PA
630 GO TO 80
700 PRINT"THIS SETS THE BEGINNIN
G OF DATA"
710 INPUT "BEGINNING OF DATA";BE
720 IF BE=0 THEN 736
730 MS=INT(BE/256):LS=BE-256*MS:
POKE 4012,MS:POKE4013,LS
735 GO TO 80
736 PRINT"THIS SETS THE ENDING O
F DATA":INPUT "ENDING OF DATA
";EN
738 IF EN=0 THEN 80

```

```

740 MS=INT(EN/256):LS=EN-256*MS:
POKE 4014,MS: POKE 4015,LS
780 GO TO 80
1000 CLS:PRINT"tHIS IS THE TERMI
NAL PROGRAM
1010 PRINT"sHIFT DOWN ARROW CHAN
GES FROM TRANSMIT TO RECEIV
E. tO STOP RECEIVING CHARA
CTERS PRESS ANY KEY AND YOU
ARE IN THE TRANSMIT MODE. tRA
NSMIT MEANS TO SEND CHARAC
TERS FROM THE COMPUTER & REC
EIVE MEANS TO BRING
1015 PRINT"CHARACTERS INTO THE C
OMPUTER. rECEIVED CHARACTER
S ARE AUTO- MATICALLY PLACE
D IN THE DATA BLOCK AS THE
Y ARE RECEIVED. pRESS ANY
KEY TO CONTINUE.
1017 X$=INKEY$: IF X$="" THEN 10
17
1020 CLS
1030 PRINT"1 rECEIVE CHARACTERS"
:PRINT"2 tRANSMIT CH FROM KEY
BOARD ":PRINT"3 tRANSMIT CH F
ROM DATA BLOCK":PRINT"4 wRITE
CH IN DATA BLOCK":PRINT"5 rE
VIEW CH IN DATA BLOCK
1040 PRINT"6 gO TO PARAMETERS":P
RINT" <ENTER NUMBER FOR FUN
CTION>"
1042 A$=INKEY$: IF A$="" THEN 10
42
1050 IF A$="6" THEN 80 ELSE IF A
$="3" THEN 1800 ELSE IF A$="1
" THEN 1090 ELSE IF A$="4" TH
EN 1400 ELSE IF A$="5" THEN 1
600
1060 IF A$="2" THEN 1080
1070 GO TO 1000
1080 GO SUB 1200
1090 PRINT" RECEIVE MODE":FOR
J=1 TO 100: NEXT J
1092 EXEC R+169:GOTO1080
1200 A$=INKEY$: IF A$="" THEN 12
00
1210 A=ASC(A$):POKE4010,A
1220 IF A=91 THEN RETURN ELSE IF
A=95 THEN 1000
1230 PRINTA$;:EXEC R+11
1240 GO TO 1200
1400 PRINT"tHIS WRITES CHARACTER
S TO THE DATA BLOCK":PRINT:
GO SUB 1500
1410 PRINT:PRINT"tHIS WRITES CHA
RACTERS TO MEM. eNTER <1> TO
START AT BEGINNING OR PRESS
<ENTER> TO CONTINUE.

```

2050 M=M+5:GOTO 2010

```
1412 INPUT AX
1415 IF AX=0 THEN 1425
1420 M=256*PEEK(4012)+PEEK(4013)
1425 A$=INKEY$: IF A$="" THEN 14
25
1428 A=ASC(A$):PRINTA$;
1430 IF A=91 THEN 1000 ELSE IF A
=8 THEN M=M-1: GO TO 1425
1440 IF A=12 THEN 1600
1445 POKE M,A
1450 M=M+1:IF M>256*PEEK(4014)+P
EEK(4015) THEN PRINT"OUT OF B
UFFER MEMORY": GO TO 80
1490 GO TO 1425
1500 PRINT"THE CLEAR KEY SWITCHE
S FROM WRITE TO REVIEW OR
REVIEW TO WRITE AND THE S
HIFT DOWN ARROW RETURNS TO T
HE MENU.
1510 PRINT:RETURN
1600 PRINT"THIS REVIEWS CHARACTE
RS IN THE DATA BLOCK"
1610 PRINT "PRESS THE <ENTER> KE
Y TO CON- TINUE AT LAST MEM
ORY LOCATION OR PRESS <1> T
O START AT THE BEGINNING."
1615 AY$=INKEY$: IF AY$="" THEN
1615
1620 IF AY$="1" THEN M=256*PEEK(
4012)+PEEK(4013)
1630 A=PEEK(M):A$=CHR$(A):PRINTA
$;
1635 B$=INKEY$: IF B$="" THEN 16
50
1640 B=ASC(B$):IF B=91 THEN 1000
ELSE IF B=12 THEN 1410
1650 M=M+1: GO TO 1630
1680 FOR J=1 TO 100: NEXT J
1800 PRINT"THIS TRANSMITS CHARAC
TERS FROM THE DATA BLOCK. de
PRESS ANY KEY TO RETURN TO TH
E MENUE AT ANY TIME.
1810 EXEC R+206:GO TO 1000
2000 R=9746:M=R
2005 INPUT"ENTER 1 FOR PRINTER";
P
2010 PRINTM;:IF P=1 THEN PRINT#-
2,M;
2015 FOR J=0 TO 4:A(J)=PEEK(M+J)
2020 S$=STR$(A(J)):L=LEN(S$)
2030 PRINTS$;:IF P=1 THEN PRINT#
-2,S$;
2035 FOR K=L TO 5:PRINT" ";:IF P
=1 THEN PRINT#-2," ";
2037 NEXT K
2040 NEXT J
2045 PRINT:IF P=1 THEN PRINT#-2,
" "
```

The following are the machine language values that must be poked into statement 10. Run the program and press the break key. Then ?R. This is the location where the machine language subroutines start. A simple utility which can be added to DYTERM is as follows:

```
2100 INPUT"ENTER MEMORY";M
2110 INPUT"ENTER VALUE";X
2120 POKE M,X:M=M+1:GOTO 2110
```

Statements 2000-2050 can be used to verify that the data was entered properly. Change the value in line 2000 to agree with your value of R.

DYTERM is a basic program and can be modified to suit your requirements. This will conclude our ASCII discussions. Next month we will take a new subject on interfacing computers.

## SUPER PROGRAMMING AID



"Best value of the year", see the review in the July Rainbow.

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9746	134	3	214	150	90
9751	38	253	74	38	248
9756	57	182	15	165	183
9761	15	169	127	255	32
9766	141	234	79	183	15
9771	167	182	15	170	132
9776	1	39	3	124	15
9781	167	72	183	255	32
9786	122	15	169	118	15
9791	170	141	208	125	15
9796	169	38	229	246	15
9801	168	182	15	167	132
9806	1	93	39	13	193
9811	1	39	3	67	132
9816	1	72	183	255	32
9821	141	179	182	15	165
9826	183	15	164	134	255
9831	183	255	32	141	166
9836	122	15	164	125	15
9841	164	38	241	57	18
9846	79	95	253	15	169
9851	134	1	214	150	203
9856	1	87	90	38	253
9861	74	38	245	182	255
9866	34	132	1	70	118
9871	15	170	182	15	169
9876	76	129	9	39	17
9881	124	15	169	134	3
9886	214	150	203	1	90
9891	38	253	74	38	246
9896	32	222	182	15	170
9901	246	15	165	193	7
9906	38	5	132	127	183
9911	15	170	57	18	190
9916	15	172	182	255	34
9921	132	1	77	38	52
9926	141	174	189	161	193
9931	77	38	235	23	255
9936	65	182	15	170	188
9941	15	174	39	224	167
9946	128	189	163	10	32
9951	222	190	15	172	189
9956	161	193	77	38	208
9961	166	128	183	15	170
9966	189	163	10	23	255
9971	41	188	15	174	38
9976	234	57	134	255	95
9981	31	2	247	255	2
9986	230	164	193	255	39
9991	182	32	239		

## OPERATING HINT

You can disable the cartridge port with POKE 65314,54. Enable it with POKE 65315,52.

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## BASIC PROGRAMMING

In this series we are showing how to write basic programs. Our procedure is to cover a few commands and then give programming applications. We have been looking at disk commands and want to add a few more this month.

### MORE DISK COMMANDS

#### MERGING PROGRAMS

Have you ever wished you could combine the best of two programs into one program? The merge command allows you to do this. To use merge, one program is loaded into the computer and the second program is saved on disk as a basic program with an ASCII extension. This second program can be merged with the first.

Suppose the first program has line numbers from 1 to 999 and the second program has line numbers above 1000. Then the programs can be merged or combined and the lines for both programs will appear in the program in the computer's RAM. This combined program can then be saved as a new program.

#### EXAMPLE

Let's load a program into the computer and have it to start with line number 2000. We can use the renumber command to set the first statement at 2000. Enter the following command:

```
RENUM 2000
```

Now let's save this as TOP with the ASCII extension. Enter the following:

```
SAVE "TOP",A
```

Now load in the program for

the bottom part. Renumber it so that its line numbers are less than 2000. Now you can merge the TOP part with the following:

```
MERGE "TOP"
```

The programs will be merged and the line numbers will be the same as for both programs. You can renumber the combination and save the combined program.

#### VERIFY COMMAND

If you want to make sure data is properly transferred to or from a disk then you can use the verify command. This forces each transfer to be checked which will help prevent errors. It takes a little longer when using verify but can be worth it if you want your information checked. To enable verify enter:

```
VERIFY ON
```

To disable verify then enter:

```
VERIFY OFF
```

#### PROGRAMMING

For the past few months we have been looking at an address file. We developed a file that would handle 100 names and this month we want to look at sorting.

Let's briefly review what we are doing. If you think we are too repetitive please bear with us as there are some who think we don't give enough detail. Our program will handle 100 addresses. We reserved blocks of 100 bytes for each address starting in memory at 10000. The number of addresses used is poked into 9999. The first address is from 10000 to 10099 and the second is from 10100 to 10199. With this organization we can do two things easily.

First of all we can quickly



find the beginning of each file. The following formula will allow us to do this:

$$M = 10000 + 100 * (F-1)$$

M is the memory for the start of the file and F is the file number. You can verify that this equation is correct.

We know how many bytes into the file we have to skip to pick off various pieces of information since we ordered the data. The first 15 bytes are the name of the addressee. For sorting on names we can compare the first 15 bytes of files we are comparing.

### SORTING

This month we wanted to add the sort section to our program that we have been developing. Sorting can be accomplished with FOR-NEXT loops but can become confusing quickly. Therefore we thought it would be worth while to spend time explaining how to sort. Fortunately we stored the ASCII values of the names in memory and can use these values for comparison. Let's take some names and look at placing them in alphabetical order.

1. Jones, FA
2. Smith, RA
3. Allen, SP
4. Wallace, GW
5. Allen, AC

We want the first file to contain the name of the person with the lowest order in the alphabet.

Our procedure will be to compare each letter with the corresponding letter of the file being compared. To start, we will compare the "J" from (1) with the "S" from (2). The ASCII for "J" will be in location 10000 and the ASCII for "S" will be in location 11000. Since J<S we have the smallest in the first location.

Now let's compare the first with the third. Since "J" > "A" we need to exchange the files. The > symbol means greater than and the < symbol means less than. We will have a subroutine that will exchange files for us. After exchanging (1) with (3) we will have:

1. Allen, SP
2. Smith, RA
3. Jones, FA
4. Wallace, GW
5. Allen, AC

We just finished comparing (1) with (3) and the smaller is in (1). Now let's continue and compare (1) with (4). Since "A" < "W" then the smaller is in (1).

Next we compare (1) with (5). If the characters are equal we continue comparing until we reach the end which was 15 characters for the names. All characters are the same until we reach 2 spaces after the comma. Since (1) > (5) we need to exchange (1) and (5) and can do so with our exchange subroutine. After this exchange we will have:

1. Allen, AC
2. Smith, RA
3. Jones, FA
4. Wallace, GW
5. Allen, SP

Notice that all we have done is place the proper name into the first position. Next we will start with the second name and compare it with the rest. After the first comparison we will have:

1. Allen, AC
2. Jones, FA
3. Smith, RA
4. Wallace, GW
5. Allen, SP

Since the "J" in Jones is

less that the "W" in Wallace we will not exchange these two. However we will exchange (2) and (5) and our results will be after two passes:

1. Allen, AC
2. Allen, SP
3. Smith, RA
4. Wallace, GW
5. Jones, FA

The first names are in the proper position. Now lets work on the third position. Since "S" is less than "W" we will not exchange them. Comparing (3) with (5) we notice that "J" < "S" and these two should be switched. After switching (3) and (5) we will have

1. Allen, AC
2. Allen, SP
3. Jones, FA
4. Wallace, GW
5. Smith, RA

Next we compare (4) with the rest. Since (5) is our last file we need to switch (4) and (5). We will then have:

1. Allen, AC
2. Allen, SP
3. Jones, FA
4. Smith, RA
5. Wallace, GW

Notice that the names are in the proper order. Now how do we do this with basic? Since we know where the names are located in memory, we will have the following relations from our original ordering:

- 10000 Jones, FA
- 10100 Smith, RA
- 10200 Allen, SP
- 10300 Wallace, GW
- 10400 Allen, AC

Now if we have another array of B\$(N) where N can be from 1 to 5, then we have the tools for sorting: Let's look at the following example program:

```

10 FOR J=0 TO 4
20 FOR K=J+1 TO 4
30 M1=100*J+10000
40 M2=100*K+10000
50 FOR X=0 TO 14
60 M3=M1+X:M4=M2+X
70 'COMPARE CORRESPONDING
   BYTES
80 IF M3>M4 THEN 200 'EX-
   CHANGE FILES
90 NEXT X
100 NEXT K
110 NEXT J
120 GO TO 220
200 ?"EXCHANGE SUBROUTINE":
   RETURN
220 ?"FILES ARE IN ORDER

```

The exchange subroutine will have to be written in 200. How would you do this from basic? The following is an exmple method:

```

200 FOR P=0 TO 99
201 A1=M1+P:A2=M2+P
202 B1=PEEK(A1):B2=PEEK(A2)
203 POKE A1,B2:POKE A2,B1
204 NEXT P
205 RETURN

```

Notice that the program exchanges corresponding bytes in the two memory defined by A1 and A2.

Next month we will get back to our file program. We have had many requests for such a program. Since we are going to be doing sorts, we felt it necessary to look at sorting before proceeding.

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## EDITOR'S COMMENTS

We are very excited about the advances that are being made in the computer field. I have had exposure to many various types of computers and the computing power per dollar of cost is much higher than it was a few years ago. The IBM compatible clones are dropping in price and more features are being added. I have not found the IBM compatibles to have any advantage over the color computers when it comes to writing basic programs. In fact the color computer seems to run a program about as fast or faster than a clone. Another thing I have observed is that software and hardware is more expensive for IBM compatible clones.

The new color computer 3 seems to be an excellent computer. This month we are discussing its memory map. All of the 128K is assigned. The amount of memory available to the user is 32K the same as the earlier computers.

We are again looking at OS-9. If you are interested in what OS-9 can do for you then you will want to read this section.

In our programming section we have been developing an address file with sort capability. If you are interested in sorting data then this should be of interest to you as we show in detail how to sort files.

John Galus is continuing our Machine Language Programming series. We have been very successful in writing our programs using basic and calling machine language subroutines whenever we need speed or to do a task that basic can not do. If you are interested in this then you should read his editorial.

In our Interfacing Computers section, we are completing our serial interfacing series. Included is our terminal program "DYTERM". Next month we will start on a new subject in this series.

There is much interest in our Ham Radio series. There are many applications for using computers with ham radio. Most of the software has been written for Comodore computers. We have covered some software and are looking at a Morse Code keyer for on the air use.

We want to thank each of you for your support and interest in Dynamic Color News. This month we are changing the name from a newsletter to a magazine. Also we are having an after Christmas sale with most of our products reduced in price. We appreciate the letters you have written and have some answers in this issue. Again thanks for your support.

Bill & Dean

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## HAM RADIO & COMPUTERS BY BILL CHAPPLE W4GQC

In this section we are looking at software and hardware applications for Ham Radio. Last month we showed how to make a hardware interface and gave a DX program. This month we want to continue and look at sending Morse code from the computer for on the air contacts. First let me briefly talk about the equipment I am using.

I have two entirely different high frequency transceivers. The first is an old tube type Swan 500CX. The second is a solid state Yaesu FT-757GX which I purchased in July of this year. During Thanksgiving I put the Yaesu in my car and operated mobile while I drove to Tifton, Georgia to visit my Dad WB4VDE. This was my first mobile experience with the Yaesu. I have

used the Swan in a mobile installation and it does a tremendous job, but the 6 amperes filament requirement for heating the tubes, additional power supply, and larger size would make a cumbersome package for my small Ford Escort. I am using a Hustler mobile bumper mounted antenna with a 3 antenna adapter onto which I connected antennas for 75, 40, and 15 meters. My Dad and I were able to talk on 75 meters (3.9 MHz) most of the way.

Also for my fixed station I have a Heathkit SB-200 linear amplifier. Either of my transceivers will drive the linear to about 1000 watts input which gives me good performance from my house.

### MORSE CODE KEYS

Last month we showed how to cause a voltage to change in our interface circuit by doing a memory poke. To output a value

(V) do the following memory poke:

POKE 65312, 2\*V

V can be either 0 or 1. Now if we take our Morse code program we developed in August and make a few changes by adding memory pokes and eliminating the sound for high speed, we should easily get a Morse keyer program.

### INTERFACING THE TRANSMITTER

With the two transmitters I have, the Yaesu should be easy to interface. The Yaesu is microprocessor controlled and should connect directly to our interface board. The Swan will require a buffer of some sort between the transmitter's keying circuit and our interface circuit because of the high keying voltage. There are two ways to isolate this voltage. Perhaps the easiest way is by using a relay. This will work fine but may not work fast for high speed keying. The second way is to use a high voltage switching transistor with proper drive circuitry.

I've really been enjoying using the Yaesu in my car so I decided to interface the Swan. Also I decided upon using a relay for the keying. This is a little slow and I will want to change it, but it serves my purpose at present. For Novice or General Class operation, the speed should be adequate. Our Morse code program which we developed in August can be modified also. The computer can be made to run at twice the speed. You can do this with all computers except the CC-3 by poking 65495,0. To change back to the normal speed poke 65494,0.

Another factor that slows the keyer down is using the sound commands. We can operate on the software and eliminate the sound commands since most transceivers

have a CW sidetone. We will look at this next month.

I decided to put the pieces together and see if I could send Morse code with a color computer. I made a relay driver for our interface circuit last month. A diagram of it is shown in Figure 1.

### RELAY DRIVER

Referring to Figure 1, notice that we need a transistor two resistors, a diode, and a capacitor. The 1489 interface chip converts the ASCII from the computer to a 0-5 volt signal. When the voltage is high, current can flow through R1 turning on the transistor. This pulls in the relay and causes the relay contact to close keying the transmitter. The diode is to protect the transistor from inductive kick from the relay coil that occurs when the transistor turns off. Resistor R2 is used to stabilize the transistor and the capacitor is used to prevent radio frequencies (RF) from keying the transmitter. To complete the hardware modification, I wire the relay contacts across my hand key so the transmitter would be keyed when the contacts closed.

It took only a few minutes to wire the relay and drive circuit on my interface board. Next it was necessary to modify the Morse code software program on page 13 in our August edition. The original line was:

```
450 SOUND X,W:FOR P=1TOW:NEXT
```

I made the following change in line 450:

```
450 POKE 65312,2:SOUND X,W:  
POKE65312,0: FOR P=1 TO W: NEXT
```

When a "2" is poked into 65312, the relay turns on and the transmitter is keyed. When a "0" is poked into 65312, the transmitter is turned off. The



normal code character generation is not disturbed by this procedure.

### ON THE AIR TESTS

It was now time to try out the keyer on the air. I turned on my Swan and Heath SB 200 amplifier. Although the software was not as fast as I normally desire, it was adequate for me to contact several stations and verify that the interface was working. During the holidays I want to experiment some more and maybe next month I will have a better software package.

I am sure I will want to have the computer receive Morse code too. As I have stated previously, we used to manufacture Morse code copies using discrete components. Now all we need is a computer, interface, and software. Any software or hardware that I develop for my ham radio use will be presented here. If you have another type computer, the software and hardware we have presented can be made to work on it with only minor modifications. 73's until next month. - Bill

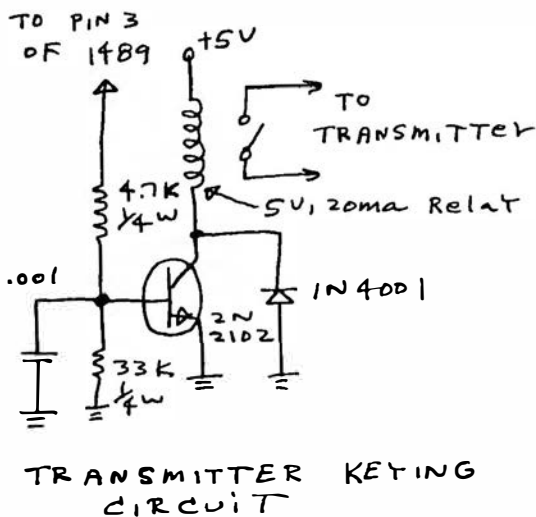


FIGURE 1

## HAM RADIO PROGRAMS

This is a collection of 3 programs for Ham Radio use. These are supplied on tape or disk and are Color Computer 3 compatible.

**MORSE** - This program allows a key to be pressed and then sounds the Morse equivalent. The speed is varied with the right and left arrows. It also will send random characters. This is an excellent tool for developing code speed for the the Novice, Technician, or General class licenses.

**DX** - Consists of two parts. The first part allows notes to be typed onto the screen. The second part allows the countries for a letter or number prefix to be displayed. To go from one part to the other press the down arrow. The notes are reprinted after going to the DX section. This provides a way to write notes for your QSO's and eliminates DX station lists.

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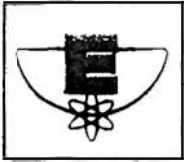
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## PRODUCT REVIEWS

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.

### VINCENT VAN COCO

Vincent Van CoCo is a comprehensive graphics program that is easy to use. It requires a 32K Color Computer with either a cassette or disk drive plus two joysticks. We used the disk version for this review.

This program has some unique features. A picture can be scrambled and saved. This causes it to lose its identity. It can be unscrambled by pressing one key. Also the screen can be enlarged or shrunk. The screen can be toggled between two pictures. A picture can also be scrolled vertically or horizontally.

To run the program type 'RUN"VANCOCO"'. The program comes up and gives a title. The color can be adjusted by pressing the reset button. Next press the enter key and you are in the graphics mode.

The two joysticks are used to control the two cursors. If it is desired to have a line drawn between the two points just press "L". Pressing "B" draws a box and pressing SHIFT"B" draws a filled box. To draw a circle press the "C" key and you will be asked for the radius. Enter the number for the radius desired. To draw a round circle press "N" to return. Additional questions are asked for drawing an elongated circle or ellipse.

If it is desirable to move a part of the picture to another location, GET and PUT can be used. Move the two dots to form the corners of a square enclosing the desired portion of the drawing. Get the figure by pressing "G". Then move the main cursor to the upper left corner of the location for a copy of the figure. Pressing "O" displays an outline of the box. If this is the desired location, then press "P" and the figure will be put in the designated area.

There is a text generator included with 4 different text styles. If it is desired to label part of the drawing, pressing "T" will enter the text mode and characters can be typed from the keyboard. Press BREAK to exit the text mode.

Controls are included for increasing or decreasing the speed of the cursors. The cursor brightness can also be controlled. There are also commands for setting the color.

Van COCO is a good drawing program. It would not work on our CoCo 3, but we received our review copy back in the Spring so perhaps an updated version is in the works. A finished drawing can be saved to tape or disk. There were several sample drawings that came with the disk and they were very interesting to observe. There is no erase command which would help in case an error were made. However a filled box with a color equivalent to the background could be used for erasing errors. Vincent Van CoCo sells for \$17.95 for tape and \$19.95 for disk versions.

ROCOCO Software  
3019 Sylvester Drive  
Hartland, WI 53029

### ULTRA TELEPATCH

Ultra Telepatch is a Tele-

writer-64 enhancer that requires a 64K computer with a disk drive. It is CoCo 3 compatible. To use the program, an original version of Telewriter plus a formatted disk is required. Also a copy of the Ultra Telepatch disk should be made and the original placed in a safe place.

Formatting a new disk requires several disk swaps for a single drive. To start insert the Ultra Telepatch disk into the drive and type RUN"PATCHER". Instructions are printed on the screen for doing the various swaps. The following programs are on the new system disk:

T/BAS, ULTRA TW/64, TSPool/BAS, TPRINT/BAS

To run the program type RUN "T". This is similar to the RUN "U" command for the original program. Now let's look at some of the features.

**Block Move:** Mark the beginning and ending of the block. Then move the cursor to the location for the move and press CLEAR T. The block will be moved to the new location.

**Visible Carriage Returns:** This is enabled or disabled by entering CLEAR I. **Key Beep:** Enabled or disabled by entering CLEAR L.

**Key Repeat:** Just hold a key down and it will repeat.

**Type Ahead:** A buffer is included to allow up to 16 keys to be remembered while the computer is refreshing the screen.

**Justify:** This is not cleared after a file has been printed as was the case with the original version.

**Reset:** Returns control to the editor when the reset button is pressed.

**Disk I/O:** The disk I/O menus are stored in RAM and do not have to be loaded from disk.

**Lowercase:** Always on in the editor and off in the menus.

**Overstrike:** This allows characters to be written over old characters. This is enabled with a CLEAR O.

**Word Delete:** To use this place the cursor in the space preceding a word and press CLEAR Y and the word will be deleted.

**Braces:** Left and right brace characters can be generated by entering CLEAR H or CLEAR J.

The parameters can be changed in the boot program by modifying lines in the program. Instructions are included for making these changes. These parameters control baud rate, upper and bottom margin, left margin, characters per line, etc. After modifying the boot program, the changes will be permanent.

Included in the program is "TSPool". This allows a file to be printed to a disk instead of a printer. This saves time if you want to see how the text will look before printing it. If you have a title of a section appearing as the last line, then you can easily spot this after reloading the TSPool file.

Two more programs are included. "2COL DIR" allows the disk directory to be printed in two columns.

The other program is "TO-DISK". This forces TW64 to come up with the disk menu. This is handy if you always load a disk program at start up.

We found Ultra Telepatch to work as advertised. We also used it on the CoCo 3 with good success. The required patches for the new computer are included. The program adds features omitted from Telewriter 64

and makes a good word processor much better.

Bob van der Poel Software  
17435 - 57 Avenue  
Edmonton, Alberta  
Canada T6M 1E1

## 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.

### MEMORY MINDER TM

J & M Systems of Albuquerque, New Mexico has released a new version of Memory Minder TM that runs both quick and comprehensive diagnostic checks of disk drive systems.

The new release includes a write test, is faster than the original version; and in addition to 5.25 inch 360K drives, will test 5.25 inch 720K drives as well as 3.5 inch 720K and 5.5 inch 1.2 MB floppy drives. A different precision alignment disk is required for each of the above drives.

Version 2.0 also displays easy to understand screen graphics, and includes adjustment and alignment instructions for those who wish to undertake these adjustments themselves. Current owners of Memory Minder TM may upgrade to the new version 2.0 under a special program from J & M. Full Details and information are available from:

J & M Systems  
15100-A Central S.E.  
Albuquerque, NM 87123  
(505) 292-4182

## DYPRINT

DYPRINT is a program that allows signs or banners to be printed on a standard printer. It will also allow a PMODE 4 graphics picture to be printed on a printer in the normal print mode. For printing signs, the basic characters are made in a 27 x 21 array and printed side-ways down the paper. The size can be selected for any multiple of the basic array. By selecting printer parameters such as compressed or expanded print, any size letters can be formed. They can also be made dark by enabling the double strike feature of the printer. Signs can be made that will be seen at a large distance. They can be covered with clear plastic for waterproofing.

The graphics print feature is compatible with any PMODE 4 graphics picture. A picture can be drawn with COCO MAX or any other graphics program and DYPRINT can be used to blow it up. The picture can be printed with 2 or 4 passes on the printer, and the different sections taped together to form a large printed picture of the original. DYPRINT is compatible with the CoCo 3.

The cost of DYPRINT is \$19.95 for tape or disk plus \$3 S/H.

Dynamic Electronics Inc.  
P. O. Box 896  
Hartselle, AL 35640

## OPERATING HINT

Disk Programs - You can quickly remove disk programs from a disk by typing "DIR" to display the programs. Then chain kill commands for the programs you don't want. Example: KILL "FIRST/BAS":KILL "PGM/BIN": KILL "LAST/DAT":<ENTER>. This saves having to type DIR after deleting each program.



## QUESTIONS & ANSWERS

These are questions that have been asked us. If you have a computer question please write and we will answer it here. For a quick reply send \$10 with your question.

**Question:** I have seen the review of your programs MEMORY MANAGER and RAMDISK in the Rainbow magazine. I am interested if one of these could help me with a program I am developing. I am updating files of data, now on disk, several times during the running of a main program. It would be better if I could do this updating in main memory, without reading and writing these files several times, with all the delay resulting from the many disk accesses. Could you send me any descriptive literature on these programs, and if possible point me to the right program if one might be useful.- Bob Fowler

**Answer:** Bob a ramdisk will greatly speed up the reading from and writing to files. Your software would have to be modified a little to use our ramdisk. If you have one of the older computers with 8 memory chips, it can be upgraded to 256K with our ME-16. This has a ramdisk that is software compatible with a standard disk and can be configured for a second disk without any modifications to your software.

**Question:** Bill thank you for your letter. My program uses 6-8K buffers and is written for a cassette based system. I modified the loading offset so that it loads at 0E00 and moves down to 0600 to run. This way I can load it off disk. To get out of the program I do a cold start to disk basic. I can only

save Buff 0 and about half of Buff 1. The rest of the buffers are wiped out with a cold start.

I would like to move the 6-8K buffers to the 2nd 64K RAM bank before I do a cold start to basic & then save them to disk. Also I would like to be able to pull the buffer back off the 2nd 64K bank when the program is running so I can display the pictures.

Is this possible? I have to do a cold start to basic so the disk parameters are put back in the 0600 area. K8YPU Chuck Evola

**Answer:** For our reader's information, Chuck has a slow scan television adapter and is trying to save pictures to disk. The program is on cassette. Chuck has one of our 128K memory upgrades with two 64K switch selectable memory banks. The program has 6 buffers reserved from \$3500 to \$F4FF.

Chuck first of all it is hard to comment on a program without seeing it. Your biggest problem seems to be that you are using the disk system memory for your program. When you load and relocate the program to \$600, this is in the disk system area. The upper 4 buffers are in the upper 32K ROM area and are lost when you reboot your disk system. I would suggest you sacrifice the first buffer and relocate your program into this area leaving your disk operational. You can use the memory manager software to save 3 pictures in the second 32K bank plus the picture in the area for buffer 2 will give you 4 pictures you can have in the computer. Your software needs to be modified so that the computer does not go into the all ram mode.

If you get this working, you can load the same program into the second bank. This will give you a total of 8 pictures you can have in the computer at one time.

**Question:** I have a color computer 2 and was wondering what up grade kits I can use on it. I looked inside and I don't see a 4164 chip, so I listed the chips I did see and hope you can tell me what upgrades and software I can use with this model.

Also I would like to have a disk drive but don't want to pay \$300. Do you know where I can obtain a good unit at a reasonable cost?

Your newsletter seems very good and so I will sign-up. Please could you send me a list of programs featured in earlier issues? I would like a program that would list, sort, search, transfer video titles to a printer.

I have a program now, but it has two major draw backs. One, it can only list about 20 titles in memory and two, there is no provision for having data on the screen transferred to a printer so I can have a list made. Please get back to me soon. Thank you, Gregory Young.

**Answer:** Gregory from your list I believe the 8040364B are your memory chips. First determine how much memory you have. You can do this by entering ?MEM 'ENTER'. If the number is greater than 20000 then you have a 64K computer. Memory chips are the small ones in either 18 pin packages or 16 pin packages. If you have 8 chips in 16 pin packages then they are 4164 types. If you have two chips in 18 pin packages then they are 4464 types.

The 8 chip version can be upgraded with our ME-16 to 256K. The 2 chip version can be upgraded to 128K with our ME-10A or 256K with our ME-18. Other manufactures have upgrades too. Spectrum Projects has a plug in cartridge that will upgrade any computer to 256K or 512K. However this requires a multipack interface.

Disk drives are on sale at

Radio Shack Stores for \$199.95. We have covered programs similar to the type in various issues of this publication. We print an index of articles and programs about every other month. One is included on the inside back cover of this issue.

**Editor's Note:** We appreciate the letters and questions. If you are a beginner and are having problems with software and hardware, this is normal. Computers are like anything else, it takes time so don't give up. - Bill

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# DYNAMIC COLOR NEWS SUBJECT INDEX

We have listed our subjects by Volume and Issue. Our first issue, Vol 1-1, was February 1984. The first and second year we printed 11 issues each. This listing is complete through Volume 3-11 or December 1986.

## Basic Programming

Immediate mode, Vectors 1-1  
Variables 1-2  
Arrays, Read, Data 1-3  
Data Handling Techniques 1-8  
Memory Searching 1-9  
Random Numbers 1-10, 1-11  
FOR- NEXT Loops 2-5  
DIM, Arrays, IF-THEN 2-7  
Branching, ASCII, Strings, Peeks 2-8  
Word Processor Development 2-9  
LEFT\$, RIGHT\$, MID\$, LEN, VAL 2-10  
Seperate Data Files 3-1  
EXEC Command 3-2  
Deleting & Inserting Data in Files 3-3  
Editing Statements 3-4, 3-5  
Seperate files 3-5  
Print Using, Data Sorting 3-7  
Tracing Programs 3-8  
Disk Commands 3-9,10,11  
Sorting Data 3-11

## ML Programming

Microprocessor, EXEC 1-1  
Indexed Addressing 1-2  
Data Relocation & Branching 1-3  
Sound Subroutine 1-10,1-11  
Bank Switching Subroutine 2-2  
Block Move Subroutine 2-3  
64K All RAM 2-6  
2-Bank Subroutines 2-9  
Move Basic Program to Upper Mem. 3-3  
ML Programming (Part 1) 3-4  
ML Addition 3-5, 3-6  
ML Subtraction 3-7  
Disk Disassembler 3-7  
ML Data Move 3-8  
ML ASCII Output Subroutines 3-8  
Cursor Move Subroutines 3-9  
Assembly Language Programming 3-10,11

## Articles

Memory Expansion 1-2  
ASCII 1-3, ASCII & BASIC 1-4,  
Interfacing ASCII Devices 1-5

Powerful Remarks-Word Processing 1-5  
Uninterrupted Power Sources 1-5  
Word Processing 1-6  
Computer Generated Sound 1-9, 1-10  
Large Memory Programs 2-1 thru 3-4  
Computer Graphics 2-1 through 3-5  
Writing Programs 2-2  
CoCo Heat Problem 2-6  
Graphics, Lines, Bar Graphs, 2-8  
Large Memory Pgms, Basic Vectors 2-8  
Using Page -1 2-9  
Circle Command 2-10  
Draw Command 3-1  
Interfacing Computers 3-2 to 3-11  
Basic Basic 3-1, 3-2  
Graphics Scalling 3-2  
Ramdisk Improvements 3-2  
Page -1 Program Development 3-4, 3-5  
Developing a Drawing Program 3-4  
Introduction to OS-9 3-9, 3-11  
Ham Radio & Computers 3-7 to 3-11  
Color Computer 3 3-10,11

## Programs

Multiprogram Manager 1-1  
Utility 1-4  
Remark Print (Word Processing) 1-5  
Check Book with Data in Remarks 1-6  
Memory Search 1-8  
Ball Team Sort 1-9  
Sound Generator 1-10  
Card Shuffling 1-10  
Sound Learning 1-11  
Bank Switching Program 2-3  
Gas Mileage 2-4  
Graphics Demo 2-4  
Grade Book 2-5  
Character Generator 2-6  
Alarm Clock 2-6  
Address File 2-7  
Student Study 2-7  
Line Demo 2-7  
Vector Corrector 2-8  
Fast Food 2-8  
Draw Bar Graphs 2-8  
Word Processing 2-9  
Bar Graph with Character Gen. 2-9  
Ram Disk 2-10  
Recipe 2-10  
Electric Cost 2-10  
Circle Demo 2-10  
Check Book 2-10  
Inventory (Strings for Data) 2-11  
ARC & Circle Demo 2-11  
Ship War Game 2-11  
Ram Delete Subroutine 3-1  
Draw Demo 3-1, 3-2  
Bouncing Ball Game 3-1  
File Demo (Seperate Data

Electronic Billboard 3-2  
RamDisk Subroutines 3-2  
Tanks (game) 3-3  
Draw Demo (GET & PUT) 3-3  
Move Programs to Upper RAM 3-3  
ROULETTE (game) 3-4  
RESTORE - Restores erased pgms 3-4  
Graphic Draw Program 3-4, 3-5  
Memory Peek (Page -1 Program) 3-5  
Chords (Music Program) 3-5  
Inventory (Seperate files) 3-5, 3-6  
Graphics zoom, ASCII Demo, Astro Dodge Game 3-5  
Organize VCR Tapes 3-7  
Morse Code Program (Ham Radio) 3-7  
Disk File 3-8  
Antenna Design (Ham Radio) 3-8  
Money Chase (Game) 3-9  
Multiple Choice Test 3-9  
Dueling Cannons 3-10  
DX Program (Ham Radio) 3-10  
Star Constellations 3-10  
Dyterm Terminal Program 3-11  
Lucky Money 3-11

## Hardware Projects

Installing an interrupt Switch 1-4  
Video Reverser 2-1  
Add a Second Port 2-9  
Interfacing Computers 3-9  
Hardware ASCII Interface 3-10

## Product Reviews

Spectrum DOS 1.0 2-6  
Thunder RAM 2-7  
Telewriter Enhancer (Telepatch) 2-8  
Lowercase Character Generator 2-8  
Basic + 2-9  
COCO Calender 2-11  
Assembly Language Programming (Book) 3-2  
Schematic Drafting Processor 3-3  
String Variable Equation Solver 3-4  
Advanced Basic Programming Aid 3-5  
Super Programming Aid, CoCo keyboard 3-6  
Checkers -32K 3-7  
TX Word Processor 3-8  
Banner 3-9  
CoCo Max II 3-10  
Ultra Telepatch 3-11  
Van CoCo 3-11

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