

Radio Shack Color Computer

MAGAZINE

January 1987
Vol. 3 No. 12

\$1.95



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PLUS MUCH MORE**

DYNAMIC COLOR NEWS is published monthly by DYNAMIC ELECTRONICS, INC., P.O. Box 896, Hartselle, AL 35640, phone (205) 773-2758. Bill Chapple, BA, BSE President; Dean Chapple, Sec. & Treas. ; John Pearson, Ph. D. Consultant; Bob Morgan, Ph. D., Consultant.

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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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*****
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*   DYNAMIC COLOR NEWS
*
*   January, 1987
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*   Bill Chapple W4GQC
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*   Dean Chapple
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CASSETTE CONTROL SWITCH

by

JAMES DEAN

Note: This article explains how to add a switch to a cassette recorder so that MOTOR ON and MOTOR OFF commands do not need to be typed in to find the starting of a program. The earlier computer recorders did not have this feature. With this modification, the speed with which cassette programs can be found can be greatly improved with recorders which do not have the bypass feature - Editor.

Someday I do plan on owning disk drives but until that day I must rely heavily upon my recorder. Even those of you who own disk drives still must use the recorder from time to time and the problem that comes up all the time (besides it's obvious slowness) is that it is difficult to position tapes to avoid I/O errors when loading.

There are different ways of doing this. You can use the AUDIO ON - MOTOR ON functions and then enter a character to cause an error and which cancels the commands.

The second way is to remove the ear phone and remote plugs from the recorder and use the play and stop buttons until you find the end of a program and then finally reconnecting the cables.

The method I propose here is a hardware modification that alleviates the hassle of going through all those steps every time you wish to load a program.

I have been using this modification for quite some time and find it indispensable. It can be done to any recorder but may not be able to be done to the more recent recorders because of their compactness the room required for the switch. Before you attempt this modification be sure that you have a place to mount the switch. The old CTR-

80A recorders are the best for this because of their size.

THEORY

All the jacks in the recorder are actually a type of switch. When a plug is placed into them this turns the 'switch' off. If you were to (refer to figure 1) connect a piece of wire over the two jack points the circuit would be on, and not recognize the plug.

Now if you were to install a switch into the middle of the wire you could manually switch the jack on or off.

The two jacks you want to have bypassed are the remote, which is controlled by the MOTOR ON/OFF function and the ear phone, which controls the speaker or the AUDIO ON/OFF command.

DIRECTIONS

Read over carefully all the directions before you begin and refer to diagram 1 for help.

1. Cut four pieces of wire 6 inches long and trim all ends of the wires to a 1/4 inch.

2. Disconnect the cable from the computer and the recorder.

3. Flip the recorder over and remove the three screws holding it together. Two are near the front and the third is under the battery lid. Now set the bottom half beside it.

4. With the power cord connected and plugged in, press the play button down. You should now here a soft humming noise coming from the speaker.

5. Reconnect the ear plug and you should notice the sound has stopped.

6. With one of the wires locate two separate points by touching the ends of the wire to the soldering connections directly above the ear phone jack. You will have the correct points when you hear the noise resume in the speaker. Remember these two points or mark them lightly with a marker.

7. Now connect the remote plug; the motor should now stop. Locate two more points above the remote jack using the same method as in step 6. The motor will start when you find the correct points.

8. Solder one of the ends from all the wires to the switch on the same side (refer to diagram 1).

9. Solder two of the wires from one half to the first two points you found and the other two wires to the second set of points.

10. Test the circuit by flipping the switch (with the play button down). There should be sound coming from the speaker and the motor should be going. If this does not happen, then go back and retrace the steps.

11. On the same side of the recorder as the jacks find a suitable location, drill a hole, and mount the switch. Make sure before you do this that there will be enough room for the switch on the inside and it won't interfere with the bottom half of the recorder when you replace it.

12. Remove all the washers and nuts from the switch and put the switch in the hole. You will only have enough room to replace one of the nuts.

You are now finished, replace the cover being careful of the wires and the switch and replace

the screws.

PARTS LIST

Quantity	Description
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1	DPDT switch RS#275-626 3 amps.
	20 gauge wire RS #278-1304

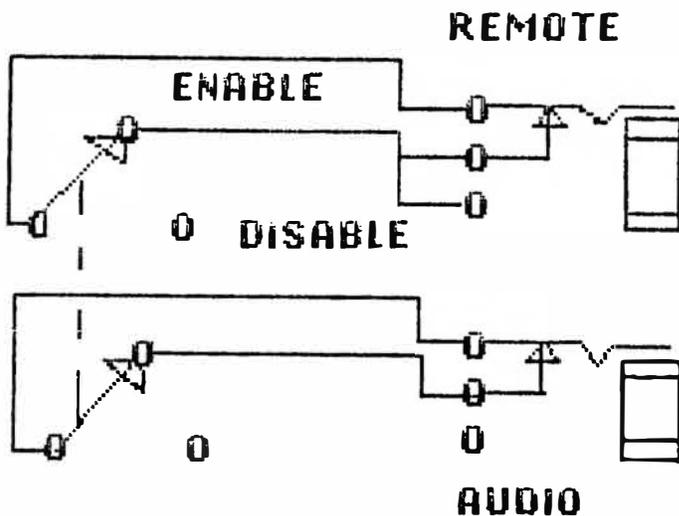


FIGURE 1



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ML PROGRAMMING

PART 9

BY

JOHN GALUS

A computer does nothing unless we supply it a program. A program is nothing but a set of organized commands which cause the computer to perform a task. The computer gets these commands from memory. While working in Basic the computer is in control of the Basic interpreter contained in ROM. This Basic interpreter is actually a "machine language" program written by a Programmer at Microsoft. For us to program this computer we must learn what is called its Instruction Set which are the operations that the 6809 CPU can perform. These instructions are known as Operation Codes or OP Codes. Machine language is the "binary words" to which a computer responds.

While a computer can only work with numbers, it is easier for humans to work with words or symbols. This is why Assembly language was developed. These machine language numbers are translated into word instructions or "Mneumonics". In turn a program called an Assembler was written to translate these mneumonics back into numbers that the computer can understand.

An Assembly language program was thus called the "Source code" while the equivalent machine language program is called the "Object code". A simple Assembly language instruction would have an "Instruction field" or Op-code and an "Address field" or Operand. While all commands must have an Op-code as we shall see not all commands need an operand. A microprocessor, like the 6809 contained in the Color Computer,

has a rather extension instruction set which makes it a powerful machine. These instructions or mneumonics are short descriptions of the commands they represent. For example LDA stands for "Load the A Register". You can see that it is much easier to simply write LDA for each time we wish to load the A register.

Although we use these Mneumonics it's good practice to sound out the command in your head when reading or writing Assembly language programs. For example whenever you see or write LDA say to yourself "Load the A register". It will usually take a few lines in Assembler to perform any useful task. So it's important to keep in mind the last few commands you wrote so you don't become lost or confused.

This is probably one of the things that gives beginners the most trouble. When writing a program in Basic you could simply write a line and forget it. This is not so in Assembler. Not only must we learn a new set of commands but we use new symbols in the Address or Operand field to specify the different ways to interpret this information.

Let's look at a few commands. The most important commands to understand are the Load and Store commands. Since we are to use the Registers in the CPU that we talked about in the last issue, there must be a way to put data into them. This is where the Load instruction comes into play. If for example we wish to put the number 1 into the A register we could do this in Assembler as follows:

LDA #1

What this statement says is "Load the A register with the number ten". The symbol # signifies that the data to load into the A register follows the command in memory. This is called the "Immediate Addressing" mode since the data is contained immediately after the instruction. If we looked at the "Object code" for this statement we would see the hex numbers 86 01. Edtasm+ also recognizes a hexadecimal number by placing the \$ symbol in front of a number. When reading this, replace the \$ symbol with the word "Hexadecimal" or "Hex". We could Load A with the number 10 (Hex A) as follows:

```
LDA # $0A
```

We can load any of the registers with a value in the same manner. Since the A and B registers are one byte or 8 bit registers we can only load a value of 0 to 255 (\$0 to \$FF Hex) into them. A two byte register (16 bits) such as D,X,Y,U or S (remember that the D register is the A and B registers combined) can contain a number from 0 to 65535 (\$0 to \$FFFF Hex). We can also load a register with the value that is contained in a memory position as follows:

```
LDA $0400
```

In this example we load the A register with the value that is in the memory address \$0400 (the start of the text screen). As you can see we drop the # immediate symbol from the command. This is called "Extended Addressing" meaning the command found the information in a specified memory position, not immediately after the command as in the last example. When we see this type of instruction we will say the word "With value in". So above we would say "Load A With value in Hex 0400". Using the "Extended" mode we could load a

register with a value in any memory address from \$0 to \$FFFF (0 to 65535 decimal).

Since a one byte register is loaded with one byte of data, a two byte register is loaded with two bytes of data. If we used a two byte register such as the X register in the above example the X register would contain the values held in the memory addresses \$0400 and \$0401. The STORE command is the inverse of the LOAD command. The Store command takes the data contained in the specified register and places it in memory. Its simple format is as follows:

```
STA $0400
```

When we see a Store instruction, read it as follows. For the above example "Store A At Hex 0400". As with the Load command a one byte register stores a one byte value in memory and a two byte register stores a two byte value in memory. You cannot store a value into a number using the # symbol it must be stored into a memory address. These two types of commands are known as "Single Operand" instructions since we have a command followed by a single operand of either a number or memory location.

SINGLE OPERAND

```
*****      *****  
* OP-CODE *  * OPERAND *  
*****      *****
```

Using these two commands we can perform simple operations. For example if we wished to place the ASCII letter A on the Text screen we could do the following:

```
LDA #'ASTA $0400
```

These two lines would load the A register with the letter "A" and store the value now in the A register into the first position of the screen. Notice that I introduced a new symbol

the ' this symbol tells the Assembler that the next character will be an ASCII symbol and can be used when we wish to load a register with a letter instead of a number. When we see the ' symbol say "letter". In the above we would read "Load A with Letter A". Let's now say that we wished to place the letter A on the entire Text screen. Using the commands that we now know we could accomplish this by simply loading the register with the ASCII value of the letter A and then storing this registers value into consecutive memory positions as follows:

```
LDA #'ASTA $0400
STA $0401
STA $0402
** etc.
*STA $05FF
```

But wait a minute there must be a simpler way to do this. We might try using a two byte register instead. This would cut our work in half but it's still too much work. There has to be another way. This is where the Index Registers come into play. We could use these Index registers as pointers to a memory Address and fill an entire area as follows:

```
PRO LDA #'A ;LOAD A "A"
LDX #$0400 ;POINT SCREEN LOOP
STA X ;STORE A AT X
CMPX #$5FF ;END OF SCREEN
BEQ LAST ;BRANCH IF=
LEAX 1X ;ADD ONE TO XBRA
LOOP ;DO ANOTHER LAST
SWI ;TO EDITOR
```

We introduced a number of new techniques and commands even with this simple program. Using what is called Indexing we can reference different memory locations easily. We use the symbol to stand for indexing. When you see the symbol say "At". In the above we would say STORE A "At" X. We also introduced the "BRANCH", "COMPARE" instructions, and the "LEAX" command

which is used to increment the X register. Don't worry about them at this time as they will be explained in a future issue.

For now try and use the Load and Store commands. These are very important and should be understood fully because they will be used in almost every program. Also find an Assembly language program in a magazine and try and read as much of it as you can using the method of reading programs I provided in this article. For an exercise see if you can turn the screen black using the above example. Try and do this using a two byte register such as the D or Y register. Next month I'll introduce the math commands such as the ADD and SUBTRACT.

OPERATING HINT

For Deleting characters using the extended basic's editor just pres the "D" key for each character. This saves having to count the characters when using the multiple character delete method.

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This program is presented as a courtesy of T & D Subscription Software (See their advertisement on page 11) and is used by permission.

```
Ø REM COPYRIGHT (C) T&D SOFTW
  ARE 1986      jungle
1 RESTORE: CLEAR5ØØ:GOSUB2Ø2:DI$=
  "MNEWS":PM=Ø:MV=3Ø:BT=Ø:BH=Ø:
  EC=Ø:GOTO74
2 Z$="BL3":RETURN
3 Z$="BU1D6BD2D3U2D1L1R3":RETURN
4 Z$="BL2D3BR4U3":RETURN
5 Z$="BL1D8BR4U8D2R2L8BD4R8":RET
  URN
6 Z$="BL1BU1D1ØBR4U1ØD1R2L8G2F2R
  8F2G2L8":RETURN
7 Z$="L3R8G1ØBR5BU2R2D2L2U2BU7BL
  5BD1L2D2R2U2":RETURN
8 Z$="D8U4L4R8":RETURN
9 Z$="R2D2L1U1L1U1":RETURN
1Ø Z$="G4D3F4":RETURN
11 Z$="F4D3G4":RETURN
```

```
12 Z$="BU1D1ØU5L5R11L6H4F8H4E4G8
  ":RETURN
13 Z$="D8U4L4R8":RETURN
14 Z$="BD8D2R2U2L2F3D2R1U4L3":RE
  TURN
15 Z$="BD4L4R8":RETURN
16 Z$="BD7D2R1U2L2D2R1U1L1R2":RE
  TURN
17 Z$="BR3G1Ø":RETURN
18 Z$="BR5BU1G11E2H1U6E2R4F2D6G2
  L4H2":RETURN
19 Z$="D9L4R9L5U9G3":RETURN
2Ø Z$="BD2BL2U2R6D2G5L1D3R6":RET
  URN
21 Z$="BD2BL3U2R7G4R3F2D2G2L4H2U
  2":RETURN
22 Z$="BR3D9U4R3L1ØE5":RETURN
23 Z$="R3L6D4R4F2D2G2L4H2":RETUR
  N
24 Z$="BD1BR4U1L4G2D6F2R3E2U2H2L
  5":RETURN
25 Z$="BD2BL3U2R9D3G7":RETURN
26 Z$="L2D3F2G2D2F2R3E2U2H2E2U2H
  2L2":RETURN
27 Z$="L3D4R6U4L5R5D1Ø":RETURN
28 Z$="L1D2R2U2L2BD6D2R2U2L2D2":
  RETURN
29 Z$="L1D2R2U2L2BD6D2R2U2L2F3D2
  U3L2":RETURN
3Ø Z$="G4F4":RETURN
31 Z$="BD2L4R8BD4L8":RETURN
32 Z$="F4G4":RETURN
33 Z$="BD1BL2U1R4D3L2D3BD3D2U1L1
  R3":RETURN
34 Z$="L3G2D6F2R5E2U6H2L4BD2G2D2
  F2R2E2U2H2L2":RETURN
35 Z$="BR1G4D5BR8U5H4F4L8":RETUR
  N
36 Z$="BL3BD1D8R4E2U1H2L4R4E2U2H
  2L4":RETURN
37 Z$="R3L3G2D6F2R3E2BU6H2":RETU
  RN
38 Z$="BL4R6F2D6G2L6R2U8":RETURN
39 Z$="BL3D9R6BU4BL2L4U5R6":RETU
  RN
4Ø Z$="BD9BL2U5R4L4U4R6":RETURN
41 Z$="BD1BR4U1L5G2D6F2R5U3L2R4"
  :RETURN
42 Z$="BD4L3U4D9BR7U9D4L6":RETUR
  N
43 Z$="BD9L4R8BU9L8R4D9":RETURN
```



JUNGLE ADVENTURE (CONTINUED)

```

44 Z$="BR2D9L6U2":RETURN
45 Z$="BL2D9U5R2E4G4L1F5":RETURN
46 Z$="BL2D9R6":RETURN
47 Z$="BR5D9BL9U9F4D1U1E4":RETURN
48 Z$="BR5D9BL8U9F8":RETURN
49 Z$="R2F2D6G2L4H2U6E2R3":RETURN
50 Z$="BD9BL3U9R4F2D1G2L4":RETURN
51 Z$="R2F3D5G1H3F5H2G1L4H2U5E3R4":RETURN
52 Z$="BD9BL4U9R4F2D1G2L4R3F5":RETURN
53 Z$="R4L6G2D1F2R6F2D2G2L6H1":RETURN
54 Z$="BD9U9L4R8":RETURN
55 Z$="BL4D8F1R5E1U8":RETURN
56 Z$="BL4D4F3R1D2U2R1E3U4":RETURN
57 Z$="BL5D9R1E4U2D2F4R1U9":RETURN
58 Z$="BL4F9H5G5E9":RETURN
59 Z$="BD9U4H5F5E5":RETURN
60 Z$="L3G2E2R7G9R8E2":RETURN
61 IF K=1 THEN X1=X1-3:RETURN
62 DRAW"BM"+STR$(X1)+"", "+STR$(Y1)";S5;BD2"+Z$
63 RETURN
64 COLOR3,1:JL=122:X1=9:Y1=125
65 FOR P=1 TO LEN(A$):Q$=MID$(A$,P,1)
66 K=ASC(Q$)-31:IF K<1 OR K>59 THEN 70
67 ON K GOSUB 2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60
68 GOSUB61:X1=X1+16
69 IF X1>242 AND Y1>163 THEN 71 ELSE IF X1>242 THEN X1=9:Y1=Y1+17
70 NEXT P:GOSUB71:RETURN
71 GOSUB194:IF RM=31 THEN RETURN ELSE LINE(0,JL)-(255,191),PSET,BF
72 X1=9:Y1=125:RETURN
73 LINE(0,0)-(255,135),PSET,B:RETURN
74 EC=0:BO=0:MAP=0:GOSUB77
75 GOSUB79:IF BH=0 AND(RO>30 AND RO<34) THEN 274
76 IF RO<>31 THEN 75 ELSE GOTO304
77 DIM A(31,4)
78 FOR Z=1 TO 31:FOR W=1 TO 4:READ A(Z,W):NEXT W:NEXT Z:RO=1:RETURN
79 GOSUB123
80 X1=37:Y1=156:JL=121:A$="DIRECTION?":GOSUB65
81 H$=INKEY$:ID=INSTR(DI$,H$):IF H$=""OR ID=0 THEN 81 ELSE IF H$="M"AND MAP=0 THEN GOSUB241:LINE(0,100)-(255,0),PSET,BF:COLOR4,1:X1=7:Y1=46:JL=2:A$="YOU MUST HAVE A MAP TO SEE ONE.":GOSUB65
82 IF H$="M"AND MAP>0 THEN CLS:GOSUB289 ELSE IF H$="N"AND A(RO,1)=0 THEN A$="NO NORTH HERE.":GOSUB64:GOTO80
83 IF H$="E"AND A(RO,2)=0 THEN A$="NO EAST":GOSUB64:GOTO80
84 IF H$="W"AND A(RO,3)=0 THEN A$="WEST BLOCKED":GOSUB64:GOTO80
85 IF H$="S"AND A(RO,4)=0 THEN A$="NO SOUTH":GOSUB64:GOTO80
86 IF H$="N"THEN RO=A(RO,1)
87 IF H$="E"THEN RO=A(RO,2)
88 IF H$="W"THEN RO=A(RO,3)
89 IF H$="S"THEN RO=A(RO,4)
90 MV=MV-1:SOUNDRND(93)+4,1:IF MV<1 THEN 269 ELSE RETURN
91 DATA 28,13,17,21
92 DATA 10,14,28,13
93 DATA 14,8,13,19
94 DATA 0,28,14,17
95 DATA 0,10,0,28
96 DATA 0,0,11,7
97 DATA 6,0,14,8
98 DATA 7,0,19,0
99 DATA 19,0,27,0
100 DATA 6,11,5,2
101 DATA 6,7,10,14
102 DATA 25,25,25,25
103 DATA 2,3,1,27
104 DATA 0,0,0,0
105 DATA 0,0,0,0
106 DATA 14,17,15,24
107 DATA 4,1,16,22
108 DATA 27,9,20,0
109 DATA 3,8,21,9
110 DATA 29,18,23,0
111 DATA 1,19,22,29
112 DATA 17,21,24,30
113 DATA 30,20,26,0
114 DATA 16,22,25,14
115 DATA 15,24,12,15
116 DATA 14,23,31,31
117 DATA 13,9,29,18
118 DATA 5,2,4,1
119 DATA 21,27,30,20
120 DATA 22,29,14,23
121 DATA 0,0,0,0
122 RETURN

```



JUNGLE ADVENTURE (CONTINUED)

```
123 ON RO GOSUB 125,126,135,136,
    136,136,136,136,136,125,140,1
    41,143,162,163,164,135,136,16
    5,136,125,181,136,183,190,136
    ,191,181,126,135,192
124 RETURN
125 GOSUB195:COLOR3,1:GOSUB317:G
    OSUB64:RETURN
126 GOSUB127:RETURN
127 GOSUB240:FOR J=0 TO 255:LINE
    (J,0)-(J,RND(18)+86),PSET:NEX
    TJ:PAINT(76,108),2,4
128 LINE(84,33)-(165,72),PRESET,
    BF:LINE(84,71)-(87,107),PRESE
    T,BF:LINE(88,35)-(161,70),PSE
    T,B:PAINT(90,37),3,4
129 DRAW"BM92,39;C5;S3;R11L5D9;B
    R11;U9D5R7U4D9BR9;U9R8L8D5R6L
    5D4R8"
130 DRAW"BM112,48;C5;S3;R9F4D5G4
    L9R4U11;BR16;BU2;BR7D12L7U12R
    7BR8;D12R7E3BU7H3L7;BR11"
131 DRAW"BM102,62;S3;C5;R66U5F7G
    7U5L66U4"
132 PAINT(105,64),2,1:LINE(162,7
    2)-(165,107),PRESET,BF
133 K=RND(3):IF K=3 THEN A$="ENT
    ER AT OWN RISK.":GOSUB64 E
    LSE IF K=2 THEN A$="A LARGE S
    IGN.":GOSUB64:A$="IN ENGLISH!
    ":GOSUB64 ELSE A$="ANYONE NEE
    D A DOCTOR?":GOSUB64
134 RETURN
135 GOSUB310:RETURN
136 GOSUB 137:RETURN
137 GOSUB242:J=RND(5):IF J=3 OR
    J=1 THEN A$="THE WATER LOOKSI
    NVITING.":GOSUB64 ELSE IF J=2
    THEN A$="WHAT A GOOD DAY FOR
    A SWIM.":GOSUB64
138 IF J=4 THEN A$="YOU SEE MILE
    S OFEMPTY OCEAN.":GOSUB64ELSE
    IF J=5 THEN A$="WHAT A PEACE
    FULSEASIDE.":GOSUB64
139 RETURN
140 IF EC=0 THEN BT=BT+2:BH=BH+1
    :GOSUB275:BT=0:EC=EC+1:RETURN
    ELSE IF EC>0 THEN BT=1:GOSUB
    275:BT=0:EC=EC+1:RETURN
141 IF PM>0 THEN MAP=MAP+1:GOSUB
    257:GOSUB142:RETURNELSEIF MAP
    =0 THENGOSUB241:LINE(0,0)-(25
    5,191),PSET,BF:COLOR4,1:X1=7:
    Y1=77:JL=2:A$="NOBODY MEETS
    MAPPER MIKE UNTIL A CHE
    CK- UP FROM THE JUNGLE D
    OCTOR'SDONE!":GOSUB65:RETURN
142 A$="MAPPER MIKE GIVES YO
    U AN ISLAND MAP.":GOSUB64:
    COLOR4,1:RETURN
143 GOSUB232:K=100:LINE(0,K)-(0,
    K),PSET:FOR J=0TO255
144 D=RND(3):IF D>2 THENK=K+1 EL
    SEIF D<2 THENK=K-2 ELSE K=K
145 IF J=147 THEN K=103
146 IF J<86 OR J>148 THEN 151
147 FOR L=114 TO 147 STEP 2:M=21
148 D=RND(3):IF D<2 THEN M=M-RND
    (3) ELSE IF D>2 THEN M=M+RND(
    3)
149 LINE-(L,M),PSET:NEXTL
150 J=163:K=100:LINE-(147,30),PS
    ET:GOTO 144
151 IF J=84 THEN LINE-(J,103),PS
    ET
152 IFK<85OR K>115THENK=RND(22)+
    84:LINE-(J,K),PSET:NEXTELSE L
    INE-(J,K),PSET:NEXT
153 PAINT(112,56),1,4:LINE(109,3
    5)-(109,35),PSET
154 M=25:FOR L=116 TO 147
155 D=RND(3):IF D<2 THEN M=M-1 E
    LSE IF D>2 THEN M=M+1 ELSE M=
    M
156 IF M<20 OR M>33 THEN 155
157 LINE-(L,M),PSET:NEXT:PAINT(1
    12,56),2,4:PAINT(2,2),3,4:LIN
    E(85,103)-(85,103),PSET:FORJ=
    85 TO167 STEP3:K=98
158 D=RND(3):IF D>2 THEN K=K+2 E
    LSEIF D<2 THEN K=K-2
159 IF K<95 OR K>105 THEN158
160 LINE-(J,K),PSET:NEXT:PAINT(4
    ,118),1,4:COLOR3,1
161 A$="AN INACTIVE VOLCANO.
    ":GOSUB64:RETURN
162 GOSUB233:RETURN
163 GOSUB241:A$="THE ISLAND'S
    DUNGEON.":GOSUB64:IF RND(0)>
    .5THEN GOTO210 ELSE GOTO220
164 BT=BT+4:GOSUB275
165 GOSUB232:PM=PM+1:LINE(0,88)-
    (255,88),PSET
166 PAINT(6,118),2,4:CIRCLE(128,
    66),20,3,1.7
167 FOR J=.7 TO 2.7 STEP .1
168 CIRCLE(128,66),14,3,J,0,.5
169 CIRCLE(128,66),20,3,J,.5,0:N
    EXT J
170 FORJ=59TO65:CIRCLE(149,J),17
    ,3,2,.65,.87:CIRCLE(108,J),17
    ,3,2,.65,.87:NEXTJ
171 PAINT(128,66),2,3:LINE(117,6
    2)-(141,69),PRESET,BF
```



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172 FOR J=117TO141 STEP6:FOR K=6
    2TO69:PSET(J,K,4):NEXTK,J
173 LINE(117,62)-(141,62),PSET:LINE
    (117,69)-(141,69),PSET:PAI
    NT(118,64),2,4
174 PAINT(124,64),3,4:PAINT(130,
    64),3,4:PAINT(136,64),2,4
175 CIRCLE(118,44),7,4,.5:CIRCLE
    (138,44),7,4,.5
176 PAINT(120,44),4,4:PAINT(136,
    44),4,4
177 BO=BO+5:A$="DOC SAY ---
    YOU HEALTHY.":GOSUB64:RETURN
178 PMODE3,1:SCREEN1,1:PCLS:LINE
    (0,0)-(255,120),PSET,B:J=45:L
    INE(0,J)-(0,J),PSET:FOR X2=0T
    O255 STEP3:K=RND(3):IF K<2THE
    N J=J-RND(10) ELSEIF K>2 THEN
    J=J+(RND(7)+7) ELSE J=J
179 IF J<19 THEN J=J+(RND(8)+7)
    ELSEIF J>113 THEN J=(RND(35)+
    43)
180 LINE-(X2,J),PSET:NEXT:PAINT(
    4,4),3,4:PAINT(4,119),2,4:COL
    OR3,1:RETURN
181 GOSUB178:J=RND(2):GOSUB182:R
    ETURN
182 IF J=1 THENA$="THE HILLS ARE
    ALIVE...":GOSUB64:RETURN E
    LSEIF J=2THENA$="MOUNTAINS TO
    WERABOVE YOU.":GOSUB64:RETURN
183 GOSUB232:LINE(0,84)-(255,84)
    ,PSET:LINE(35,14)-(211,108),P
    SET,BF
184 LINE(50,14)-(88,22),PRESET,B
    F:LINE(103,14)-(143,22),PRESE
    T,BF:LINE(158,14)-(195,22),PR
    ESET,BF
185 LINE(104,108)-(104,85),PRESE
    T:LINE-(121,68),PRESET:LINE-(
    138,85),PRESET:LINE-(138,108)
    ,PRESET:PAINT(121,77),1,1
186 LINE(44,108)-(202,108),PSET:
    PAINT(4,118),2,4:PAINT(3,4),3
    ,4
187 FOR K=67 TO 107 STEP 4:FOR J
    =104 TO 138:PSET(J,K,4):NEXT
    J,K
188 FOR J=106 TO 138 STEP 4:FOR
    K=67 TO 107:PSET(J,K,4):NEXT
    K,J:COLOR 3,1
189 A$="MIKE'S MANSION.":GOSUB 6
    4:RETURN
190 GOSUB227:A$="THE HALL OF
    CHOICE.":GOSUB64:RETURN
191 BT=BT+3:GOSUB 275:BT=0:RETUR
    N
    
```



JUNGLE ADVENTURE (CONTINUED)

```
192 GOTO 304
193 RETURN
194 FOR TH=1 TO 234*2:NEXT TH:RE
TURN
195 GOSUB 240:R1=0:R2=RND(8)+77:
LINE(0,R2)-(0,R2),PSET
196 D=RND(3):IF D>2 THEN R2=R2+R
ND(2) ELSE IF D<2 THEN R2=R2-
RND(2) ELSE R2=R2
197 IF R2<66 OR R2>114 THEN196
198 R1=R1+6:IF R1>241 THEN R1=25
5:GOTO200
199 LINE-(R1,R2),PSET:GOTO 196

200 LINE-(R1,R2),PSET
201 PAINT(4,4),3,4:PAINT(4,119),
2,4:RETURN
202 GOSUB 241:DIM V(0,60):LINE(0
,191)-(255,99),PSET,BF:Y$="L2
H1D1L2H1D1L2H1D1L2H1D1L2H1D1L
2H1D1L2H1D1L2H1D1L2H1D1"
203 FOR J=.5 TO 33 STEP 1.5:CIRC
LE(8,8),J,1:NEXT J:DRAW"BM137
,96;S10;C1;"+Y$:DRAW"BM166,96
;S10;C1;"+Y$
204 DRAW"BM34,96;C1;S10;H4R9U2BL
4R9BL5U2L1H2U1E2R2F2D1G2L1D4R
9G4R7L6H1D1"+Y$:CIRCLE(43,69)
,1,1:CIRCLE(50,69),1,1:CIRCLE
(47,72),3,1,.7,0:UP=71
205 DRAW"BM255,"+STR$(UP)+";C1;S
10;H3L1G2L2U1L1L1D1E7R8G7U6G2
U1L2G9L1G3R1U1H3U1L1D1G5L1G1L
1G1L1G1":UP=UP+2:IF UP<112 TH
EN 205
206 GET(17,58)-(76,97),V,G:FOR P
K=0 TO 90 STEP 5:PUT(17+PK,58
)-(76+PK,97),V,PSET:NEXTPK:GO
SUB318
207 GOSUB 241:JL=6:X1=8:Y1=6:A$=
"DURING A STORM AT SEA, YOU
FALLOFF YOUR YACHT INTO A LI
FE RAFTWHICH CARRIES YOU TO
THESE SHORES. OV
ERCOME BY THEHEAT, YOU PASS
OUT.":GOSUB 65
208 JL=2:X1=9:Y1=11:A$="UPON AWA
KENING, YOU FIND YOU'REON THIS
JUNGLE ISLAND. TRY TO EXIT
BEFORE THEVOLCANO ERUPTS.(MO
VE BY USING N, E, W OR S.)
GOOD LUCK!":GOSUB65
209 PMODE 3,1:PCLS:SCREEN 1,1:RE
TURN
210 GOSUB 241:J$="D1F1R2E1U1D2G1
D1R1E1F1E2U1D1F1D3G1D2U1H2G1H
1U1D3G2D3U3H2U3D1G1H1G2D1U2H1
U3E1U1D1F2E1F1R1U1H1U2;"
211 FOR S=1 TO 28:K$="S"+STR$(S)
212 DRAW"C3;BM109,26;XK$;XJ$;":P
LAY"O5;L255;BAGA"
213 IF S>27 THEN 215
214 DRAW"C0;BM109,26;XK$;XJ$;":P
LAY"O4;L255;AGBA":NEXT S
215 PLAY"O5;T11;L6;BAGFEDC;O4;T1
0;L5;BAGFEDC;O3;T9;L4;BAGFEDC
;O2;T8;L3;BAGFEDC;O1;T7;L2;BA
GFE;T1;DC"
216 A$="WHAT BAT LUCK!":GOSUB64:
A$="THE END.":GOSUB64:GOTO226

217 GOSUB 232:LINE(0,84)-(255,84
),PSET:LINE(35,14)-(211,108),
PSET,BF:LINE(50,14)-(88,22),P
RESET,BF:LINE(103,14)-(143,22
),PRESET,BF:LINE(158,14)-(195
,22),PRESET,BF
218 LINE(104,108)-(104,85),PRESE
T:LINE-(121,68),PRESET:LINE-(
138,85),PRESET:LINE-(138,108)
,PRESET:PAINT(121,77),1,1:LIN
E(44,108)-(202,108),PSET:PAIN
T(4,118),2,4:PAINT(3,4),3,4
219 FOR K=67 TO 107 STEP 4:FOR J
=104 TO 138:PSET(J,K,4):NEXT
J,K:FOR J=106 TO 138 STEP 4:F
OR K=67 TO 107:PSET(J,K,4):NE
XT K,J:RETURN
220 GOSUB232:R1=126:R2=20:LINE(9
0,120)-(162,95),PSET,B:PAINT(
92,118),2,4
221 GOSUB 224:R1=R1+16:IF R1>183
THEN R2=R2+11:GOTO 223 ELSE
GOTO 221
222 LINE(R1-10,R2)-(R1+10,R2),PS
ET:CIRCLE(R1,R2),14,4,1,0,.5:
LINE(126,0)-(R1,R2),PSET:PAIN
T(92,118),4,4:PLAY"O1;T6;L8;B
AG;T3;L7;FED;T1;L1;C":GOTO 22
5
223 GOSUB 224:R1=R1-16:IF R1<68
THEN R2=R2+11:GOTO 221 ELSE G
OTO 223
224 IF R1=126 AND R2>67 THEN GOS
UB 222 ELSE LINE(126,0)-(R1,R
2),PSET:LINE(R1-10,R2)-(R1+10
,R2),PSET:CIRCLE(R1,R2),14,4,
1,0,.5:LINE(126,0)-(R1,R2),PR
ESET:LINE(R1-10,R2)-(R1+10,R2
),PRESET:CIRCLE(R1,R2),14,1,1
,0,.5:RETURN
225 A$="YOU'RE NEXT!":GOSUB 64:C
LS
226 GOTO 226
227 GOSUB 240:N$="BL4U6R8D8L8U3"
:V$="D13L6U4BU9R9":F=100
```



JUNGLE ADVENTURE (CONTINUED)

```

228 FOR J=0 TO 252 STEP3:LINE(J,
  0)-(J,F),PSET:NEXT J:LINE(80,
  9)-(173,F),PRESET,BF:FOR S=1
  TO 54 STEP9:L$="S"+STR$(S):DR
  AW"BM127,77;XL$;XN$;":NEXT S
229 LINE(120,63)-(135,81),PRESET
  ,BF:LINE(X,F)-(81,F),PSET:LIN
  E(175,F)-(255,F),PSET:PAINT(9
  3,63),2,4:PAINT(107,71),2,4:P
  AINT(119,65),1,4:PAINT(82,68)
  ,3,4:PAINT(119,60),2,4
230 LINE(81,F)-(117,82),PSET:LIN
  E(137,82)-(175,F),PSET:LINE(8
  1,8)-(116,61),PSET:LINE(175,8
  )-(137,61),PSET:FOR J=86 TO 1
  04 STEP4:PAINT(121,J),4,4:NEX
  T J
231 LINE(193,32)-(219,61),PRESET
  ,BF:LINE(196,35)-(216,58),PSE
  T,B:DRAW"BM208,40;S5;C2;"+V$:
  RETURN
232 PMODE 3,1:PCLS:SCREEN 1,0:LI
  NE(0,0)-(255,120),PSET,B:RETU
  RN
233 GOSUB 241:X1=12:Y1=15:JL=0:A
  $="YOU JUST GOT SHAFTED!
  THAT WAS AN EMPTY
  MINE. UNTIL NOW.":GOSUB 6
  5:GOSUB 239:PMODE 0,1:PCLS:SC
  REEN 1,0:R1=128:R2=96:FOR I=1
  TO 10:R1=R1+12:R2=R2+8.5:LIN
  E(R1,R2)-(255-R1,191-R2),PSET
  ,B:NEXT
234 PSET(128,96,1):PCOPY1 TO 2:P
  COPY1 TO 3:PLAY"O3;T4;L100;AB
  CDEFGABCDEF GABABAB":PMODE 0,2
  :SCREEN 1,0:GOSUB 237:PMODE 0
  ,3:SCREEN 1,0:GOSUB238
235 FOR I=1 TO 3:PMODE 0,I:SCREE
  N 1,0:FOR TH=1 TO 88:NEXT TH:
  NEXT I:GOTO 235
236 PAINT(127,96):PAINT(89,96):P
  AINT(50,96):(9,96):RETURN
237 PAINT(111,96):PAINT(77,96):P
  AINT(38,96):PAINT(2,96):RETUR
  N
238 PAINT(100,96):PAINT(61,96):P
  AINT(22,96):RETURN
239 GOSUB241:X1=13:Y1=79:JL=2:A$
  ="YOU WILL BE FALLING FOR
  A LONG TIME.":GOSUB65:RETU
  RN
240 PMODE 3,1:PCLS:SCREEN 1,1:LI
  NE(0,0)-(255,120),PSET,B:RETU
  RN
241 PMODE 4,1:PCLS:SCREEN 1,1:RE
  TURN
242 GOSUB240:GOSUB250:RETURN

```

```

243 FOR J=1 TO 82:B1=RND(200)+15
  :B2=RND(88)+15:SOUND B1,1:D=R
  ND(3):IF D=3 THEN GOTO 246 EL
  SE IF D=2 THEN GOTO 245 ELSE
  GOTO 244
244 LINE(B1+RND(3),B2+RND(3))-(B
  1+8,B2+RND(7)),PRESET,BF:GOTO
  247
245 CIRCLE(B1,B2),RND(7),2:GOTO2
  47
246 FOR L=1 TO 10:PSET(B1+L,B2+L
  ,2):PSET(B1-RND(11),B2+RND(13
  ),2):PSET(B1,B2,2):NEXT L:GOT
  O 247
247 T$=INKEY$:IF T$=""THEN NEXTJ
  ELSE249
248 A$="A WILD SHOT HIT!":GOSUB
  64:A$="WHEN YOU GET BACK
  UP-":GOSUB 64:GOTO 220
249 A$="YOU DUCKED JUSTIN TIME!":
  :GOSUB64:RETURN
250 J=RND(13)+90:LINE(0,J)-(0,J)
  ,PSET:FOR K=0 TO 255 STEP 7..
251 D=RND(3):IF D>2 THEN J=J+1 E
  LSE IF D<2 THEN J=J-1 ELSE J=
  J
252 IF J<86 OR J>109 THEN 251
253 LINE-(K,J),PSET:NEXT K:PAINT
  (2,119),2,4:LINE(0,66)-(255,6
  6),PSET:PAINT(2,68),3,4
254 FOR J=RND(23)+20 TO RND(13)+
  223:K=RND(22)+10:IF J>98 AND
  J<151 THEN 256
255 PSET(J+1,K-1,4):PSET(J-RND(5
  ),K-RND(7),3):PSET(J,K,2)
256 NEXT J:FOR J=2 TO 253:PSET(J
  ,66,3):NEXT J:RETURN
257 GOSUB 241:LINE(0,0)-(255,120
  ),PSET,B:FOR J=.7 TO 2 STEP.3
  :CIRCLE(120,38),J,1:CIRCLE(13
  6,38),J,1:NEXT J
258 LINE(24,80)-(66,23),PSET:LIN
  E-(56,13),PSET:LINE-(14,70),P
  SET:LINE-(24,80),PSET:PAINT(6
  0,18)

```

OPERATING HINT

You can stop a basic program, do memory peeks or pokes, or list part of your program, and then continue the program by typing "CONT ENTER". You do not loose your variables with this procedure.

JUNGLE ADVENTURE (CONTINUED)

```

259 LINE(113,59)-(104,77),PSET:LINE(143,59)-(152,77),PSET39 2
60 LINE(104,77)-(128,115),PSET:LINE-(152,75),PSET:LINE-(17
3,77),PSET:LINE-(188,87),PSET:LINE-(191,120),PSET:CIRCLE(1
64,120),5,1,6,.5,0
261 LINE(70,77)-(59,107),PSET:LINE-(100,91),PSET:LINE(94,93)-
(94,119),PSET
262 FOR J=.24 TO .7 STEP.03:CIRCLE(128,75),24,1,J,0,.5:NEXT J
:FOR K=2 TO 6STEP1.5:CIRCLE(128,85),K,4,1:NEXT K
263 LINE(104,75)-(68,77),PSET:LINE-(55,43),PSET:LINE(64,95)-
(41,52),PSET
264 CIRCLE(48,43),9,1,2,.87,.38:CIRCLE(58,32),6,1:FOR J=3 TO
15 STEP4:CIRCLE(30+J,42-J),3,1:NEXT J
265 FOR J=21.6 TO 29 STEP.9:CIRCLE(128,44),J,1,1,.47,.03:NEXT
J:CIRCLE(128,44),22,1,1
266 CIRCLE(120,36),5,1,1,.63,0:CIRCLE(136,36),5,1,1,.5,.9
267 LINE(128,37)-(128,45),PSET:CIRCLE(128,50),5,1,1,.6,.92
268 CIRCLE(128,49),15,1,.47,.07,.43:CIRCLE(128,54),10,1,.7,0,
.5:PAINT(128,57):FOR J=.33 TO .5 STEP.01:CIRCLE(128,56),7,
4,J,0,.5:NEXT J:PAINT(96,118):RETURN
269 PLAY"T1;V30;03;L22;10;10;7;1
2;L14;10;7":SCREEN 0,0:FOR J=
1 TO 9:PLAY"T220;V30;L200;04;
1;2;3;4;5;6;7;8;9;10;11;12;05
;1;2;3;4;5;6;7;L100;8;L200;7;
6;5;4;3;2;1;04;12;11;10;9;8;7
;6;5;4;3;2;1"
270 CLS(RND(9)-1):NEXTJ:PMODE3,1
:SCREEN3,1:A$="YOU TOOK TOO
LONG. THE VOLCANO ER
UPTS!":GOSUB64
271 SCREEN4,1:GOSUB272:SCREEN3,0
:GOSUB272:GOTO271
272 FORL=1 TORND(22):C=RND(240)+
5:D=RND(108)+5:R=RND(4):PSET(
C,D,R):PSET(C-RND(4),D-RND(4)
,R):PSET(C+RND(4),D+RND(4),R)
:PSET(C+RND(4),D-RND(4),R):PS
ET(C-RND(4),D+RND(4),R):SOUND
C,1:NEXTL:GOSUB273:RETURN
273 IF R<4THENRETURN ELSE A$="TH
E END.":GOSUB64:RETURN

```

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JUNGLE ADVENTURE (CONTINUED)

```

274 GOSUB241:LINE(255,131)-(0,55
),PSET,BF:COLOR 4,1:X1=7:Y1=5
7:JL=0:A$="THE VERY STRONG UN
DERTOW HAS JUST PULLED YOU
UNDER.":GOSUB65:GOSUB209:X1=7
:Y1=57:JL=0:A$="THE END.":GOS
UB65:GOTO226
275 GOSUB241:LINE(190,119)-(62,3
9),PSET,BF:COLOR 4,1:U=52:G=(
RND(2)-1)
276 FOR C=62 TO 191:IF G>1 THEN
G=0
277 D=RND(3):IF D>2 THEN U=U+RND
(7) ELSE U=U-RND(8)
278 IF U>66 THEN U=U-RND(14) ELS
E IF U<51 THEN U=U+RND(11)
279 IF G>0 THEN LINE(C,120)-(C,U
),PSET
280 G=G+1:LINE(C,13)-(C,U),PSET:
NEXT C
281 IF BT=1 THEN GOTO 288 ELSE I
F BT=2 THEN GOTO 286 ELSE GOT
O 282
282 LINE(108,115)-(160,59),PRESE
T,BF:LINE(124,102)-(144,102),
PSET:LINE-(141,111),PSET:LINE
-(139,102),PSET:LINE(124,102)
-(127,111),PSET:LINE-(130,102
),PSET:LINE(134,102)-(134,97)
,PSET:LINE(139,106)-(130,106)
,PSET
283 LINE(141,91)-(134,98),PSET:L
INE-(127,91),PSET:CIRCLE(134,
91),8,4,.4,.5,0:CIRCLE(144,82
),9,4,.4,.4,0:CIRCLE(145,83),
4,4,.4:CIRCLE(124,82),9,4,.4,
.5,.1:CIRCLE(123,83),4,4,.4
284 PAINT(133,104):PAINT(133,90)
:PAINT(123,83):PAINT(145,83):
DRAW"BM140,69;C4;S10;L5H3D3G4
D4F3D3F2D2R9U2E2U3E3U4H4U3G3"
285 IF BT=4 THEN A$="YOU HAVE FIL
LED THE TIGER'S TUMMY.":GO
SUB64:GOTO226 ELSE IF BT=3 THE
N A$="A TIGER STARES HUNGRIL
Y. WHICHWAY YOU RUN?":GOSUB64
:RETURN
286 DRAW"BM153,102;C4;S8;L39F8R3
6E8L50"
287 IFBT=1 THEN288 ELSE A$="YOU JU
ST FOUND ABOAT! NOW WHAT?":GO
SUB64:RETURN
288 A$="AN EMPTY CAVE! WHICH WA
Y NOW?":GOSUB 64:RETURN
289 GOSUB 241:DRAW"BM193,26;E2R4
F2D4G2L4H2U7D18":DRAW"BM184,2
9;G3L4H2U4E2R4F2D7U9":DRAW"BM
147,32;U18R1F8R2E8R1D18"
290 DRAW"BM99,32;H2U4E2R3F2G6R6E
1U1":DRAW"BM91,14;D18R3":DRAW
"BM83,30;G2L4H2U4E2R4F2D4U6D1
8L5H1U1"
291 DRAW"BM63,32;U8D2E2R3F2D6":D
RAW"BM50,24;D6F2R3E2U6D8":DRA
W"BM34,14;R19L9D18L9H3U2":FOR
TH=1 TO 444*2:NEXT TH:FOR J=
51 TO 163 STEP 16
292 LINE(56,J)-(184,J),PSET:NEXT
J:FORJ=56TO184 STEP16:LINE(J,
51)-(J,163),PSET:NEXTJ:FOR TH
=1 TO 432*2:NEXT TH
293 DRAW"BM60,127;U9R6L2BD4L4":D
RAW"BM142,72;BD1D6U4NR5U2E1R3
F1D6":DRAW"BM126,104;BD1D6U4N
R5U2E1R3F1D6"
294 DRAW"BM142,88;ND7R4F1D1G1NL4
F1D2G1NL4BR1":DRAW"BM126,136;
ND7R4F1D1G1NL4F1D2G1NL4BR1"
295 BM$="BD1D5F1R3E1U1BU3U1H1L3G
1BD6BR5":DRAW"BM110,136;"+BM$
:DRAW"BM110,104;"+BM$:DRAW"BM
158,104;"+BM$
296 BN$="D7R4E1U5H1L4BD7BR5":DRA
W"BM110,120;"+BN$:DRAW"BM126,
88;"+BN$
297 BX$="NR5D3NR4D4R5":DRAW"BM15
8,72;"+BX$:DRAW"BM94,104;"+BX
$
298 CV$=INKEY$:IF CV$="" THEN298
299 CLS:PRINT@132,"A TRAILS":
PRINT@164,"B SIGN":PRINT@1
96,"C NATIVES":PRINT@228,"
D MOUNTAINS":PRINT@260,"E
CAVE":PRINT@292,"F MAPP
ER MIKE":PRINT:PRINT
300 PRINT"PRESS X TO RETURN TO T
RAVELS OR R TO REREAD MAP.
":PRINT"DURING PLAY, TAP M TO
SEE MAP.":PRINT
301 FX$=INKEY$:IF FX$="" THEN301
302 IF FX$="X" THENCLS:RETURN
303 IF FX$<>"R" THEN301 ELSEGOTO28
9
304 RM=31:GOSUB241:LINE(255,91)-
(0,91),PSET:DRAW"BM54,67;S6;R
30E10R34F16L20H6L38R38F6R39G1
1L66H15L17U2R22":DRAW"BM214,7
6;S6;E5R2U2L25D2R2D5R2U5R7D5R
2U5R7G5"
305 DRAW"BM119,52;S6;E8R10U16R2D
16R11D8BL3BU2L23E4R19D4":DRAW
"BM114,56;S6R10D5L14E5BR13R9D
5L9U5":DRAW"BM99,71;S3;E2F2G2
H2R1D16L2H3F3R4E3G3L2U14L1D5L
5D1R10U1L6"

```

Checking Account Information System

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- * 32K ECB with 1 disk drive
- Compatible with CoCo 3
- (In CoCo 2 mode)



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JUNGLE ADVENTURE (CONTINUED)

```

306 PAINT(211,73),1:PAINT(202,73
),1:PAINT(135,47),1:PAINT(116
,59),1:PAINT(139,61),1:PAINT(
253,2),1
307 A$="YOU MADE IT! YOUR FRI
ENDS WELCOME YOU BACK
ON BOARD. ":GOSUB64
308 PMODE 3,1:SCREEN1,0:GOSUB309
:PMODE4,1:SCREEN1,1:GOSUB309:
PMODE3,1:SCREEN1,1:GOSUB309:P
MODE4,1:SCREEN1,0:GOSUB309:GO
TO308
309 SOUNDRND(203),1:FORTH=1TO432
:NEXTTH:RETURN
310 A$="NATIVES TOSS GARBAGE
AT YOU. ":GOSUB65:GQ=0:FORGR=1
TO200:IFGQ>3THENPMODE3,1:SCRE
EN1,1 ELSEPMODE3,1:SCREEN1,0
311 K=RND(110)+9:J=RND(239)+6:D=
RND(3):IF D<2THENGOTO 312 ELS
E IFD>2 THEN GOTO313 ELSECIRC
LE(J,K),RND(24)+3,,INT(RND(2)
/RND(10)):SOUNDK+3,1:GOTO314
    
```

```

312 LINE(J,K)-(J+4,K-(RND(9)+3))
,PSET,B:SOUNDJ,1:GOTO314
313 FORRT=1TO5:PSET(J+RND(3),K-R
ND(3),2):PSET(J-RND(3),K+RND(
3),2):NEXT RT:SOUNDJ,1
314 TH$=INKEY$:IFTH$<>" "THENA$="
YOU DUCKED JUSTIN TIME!":GOSU
B64:RETURN
315 GQ=GQ+1:IF GQ>7THENGQ=0
316 NEXTGR:A$="A WILD SHOT HIT!":
GOSUB64:GOTO220
317 J=RND(3):IF J=1THENA$="AN OP
EN FIELD. ":RETURNELSE IFJ=2TH
ENA$="A QUIET PATH. ":RETURN E
LSE A$="A PLEASANT TRAIL
. ":RETURN
318 PLAY"T1;L19;O3;BAGFEDC;O2;L3
2;DEFGEFDEFFDE":A$=" JUNGLE
BY
JOHN BECK":GOSUB65:RETURN
999 REM THE AUTHOR OF JUNGLE
ACCEPTING QUESTIONS
& COMMENTS
JOHN BECK
3513 TERRACE
SUITLAND,
DRIVE #D
MARYLAND 20746
    
```

INTERFACING COMPUTERS

JOYSTICKS

INTERFACING COMPUTERS

In this section we have been looking at various methods of interfacing computers. Last month we completed the section on using the ASCII port for interfacing, and we gave a terminal program. This month we want to look at the joystick ports. Although joysticks are generally used for games or drawing figures on the screen, the ports can be used for other purposes. An analog to digital converter converts the voltage at the joystick ports to a 6 bit digital word. This can give an accuracy of 1/64 which is adequate for many purposes. For example an inexpensive voltmeter can be constructed for measuring batteries up to 12 volts and higher. In fact this month we will show how to do this. Other measuring applications include measuring temperature, line voltage, power, and light intensity. Now let's look at the operation of the joysticks.

Have you ever wondered how a dot could be moved across the screen using a joystick? There are 4 directions of movement. These are North (up), South (down), East (right), and West (left). How is the computer able to detect the position of the joystick? To understand this we need to know how an analog to digital converter works.

ANALOG TO DIGITAL (A/D) CONVERTER

In electronics there are two types of circuits. Analog or linear circuits are used in

audio amplifiers. The voltage can continuously vary between two extremes. In other words there are no abrupt changes and an infinite number of points between the maximum and minimum values.

Digital circuits can only change in increments. For example a byte consists of 8 bits. If we change the least significant bit, we can change the total value of the byte by the value 1/256. Digital changes can be thought of as steps with each step having a value of 1/256 for an 8 bit word.

To better illustrate the difference between digital and analog consider a porch going into a house. The normal way to access the porch is by using steps. Each step represents an increase of 6 to 8 inches in height. Some porches have ramps for a disabled person. To move from the ground to the porch on the ramp, you can position yourself to be at any height between the ground and the porch level. The ramp is similar to an analog circuit and the steps are similar to a digital circuit.

Let's discuss the mechanism of the joysticks. When we look at a joystick we see a lever that can be moved in any direction? If you remove the cover and look inside, you will see that the lever is connected to a gear mechanism that turns two potentiometers. A potentiometer is a variable resistor similar to the volume control for a radio or television. It is essentially a fixed resistor with a continuously variable tap. If 5 volts is applied across the potentiometer, then

any voltage from 0 to 5 volts can be obtained at the taped terminal or arm by varying the potentiometer.

This is exactly what happens with the joystick potentiometers. A voltage of 5 volts is applied across the potentiometer. As you move the lever, the potentiometer turns and the voltage on the arm varies depending upon its position. There are two potentiometers inside a joystick assembly. One is for up-down motion and the other is for right-left motion. The voltage at the arms of the two potentiometers can be used to identify the relative position of the lever.

Now how do we get the computer to recognize the joystick positions? Each potentiometer arm is switched to an analog to digital converter. These are 6 bit converters and can give 64 different values. Since we have 5 volts applied across the potentiometer, each step for the A/D converter has a value of $1/64 * 5$ or 0.078125 volts. Suppose we have a value between the first and second steps at 1.8 of the distance to the second step. An analog meter would measure about 1.8 but an analog to digital converter would only give 1 for any value between 1 and 2. This would be a very high percentage error if we had a small number of steps. However if this were the 50th step, then our error would be $1/50$ or 2%. This error is less than can be read on the scale of an analog meter.

JOYSTICK VOLTMETER

A voltmeter that would indicate the condition of batteries would be very useful. The standard AA, C, and D cells are 1.5 volts when fully charged and most can be used down to 1.2 volts or less. Also there are 6, 9, and 12 volt batteries that we would like to be able to measure.

To make things simple let's design our voltmeter to measure voltages from 0 to 15 volts and 0 to 5. Since the joystick input will only take 5 volts, we will have to reduce the input by 3 times for the 15 volt range. This we can do with two resistors.

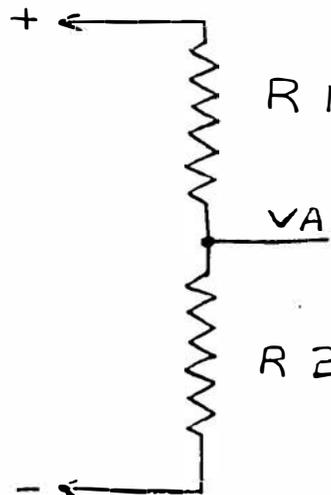


FIGURE 1

A LITTLE ELECTRONICS

You can refer to any basic electronics book to see how to design a simple voltage divider network using two resistors. To design a voltage divider we connect two resistors together as shown in Figure 1. The voltage V_A will be as follows:

$$V_A = R_2 / (R_1 + R_2) * V$$

But since we want to know V , we can rearrange the equation to give the following:

$$(1) V = V_A * (R_1 + R_2) / R_2$$

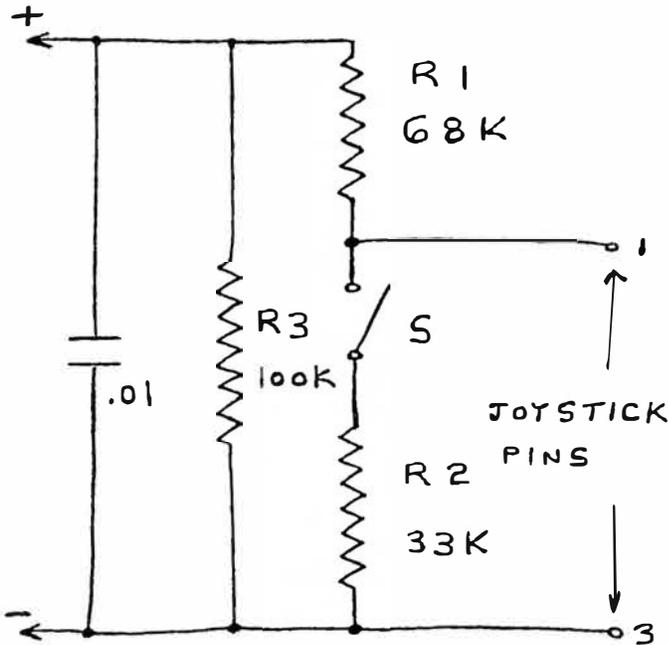
CONSTRUCTION

Since the joystick A/D converters are referenced to 5 volts, we will get a number from 0 to 63 instead of VA. The JOYSTK(X) command returns this number to basic where X is the number of the joystick from 0 to 3. To not exceed the range of the A/D converter, VA must not exceed 5 volts. Therefore we can write the following for VA:

$$(2) VA=5*JOYSTK(X)/64$$

Substituting the equation for VA from (2) into (1) gives the final formula we need:

$$(3) V=(R1+R2)/R2*5*JOYSTK(X)/64$$



JOYSTICK VOLTMETER
SCHEMATIC DIAGRAM

FIGURE 2

To give better accuracy for 1.5 volt batteries we will need to use the 0-5 volts. Two ranges can be realized by constructing the circuit shown in Figure 2. With the switch open the range is 0-5 volts and with the switch closed the range is 0-15 volts.

The parts layout is not critical and can be placed on any circuit board. The joystick plug is a standard 6 pin DIN plug and can be purchased from Radio Shack. The resistor across the input is to cause the voltage to be zero when no voltage is applied. Without this the voltage will creep through various values. The capacitor reduces noise and preferably should be connected across the terminals of the plug.

VOLTMETER PROGRAM

The program reads the joystick value and adds a multiplier to obtain the proper reading. Remember the voltmeter will always read on the low side of the true value. We tested it on 1.5 volt flashlight batteries and 6 volt batteries with satisfactory results. If linearity is a problem, a look up table could be included to give the desired reading for each of the 64 joystick values. The switch needs to be in the proper position and the proper scale must be selected when running the program.

```

5 ?"JOYSTICK VOLTMETER
7 ?"COPYRIGHT (c) 1987
8 ?"DYNAMIC ELECTRONICS INC.
10 R1=68:R2=33:R=(R1+R2)/R2
20 INPUT"ENTER 1 FOR 3X
   MULTIPLIER";X
25 CLS
30 IF X=1 THEN 40
35 R=1
40 V=5*R*JOYSTK(0)/64
50 PRINT@0,"VOLTAGE="V
55 PRINT"JOYSTICK=";JOYSTK(0)
60 GOTU 40

```

OPERATING HINT

You can print your disk directory to a printer by POKE 111,254:DIR <ENTER>

HAM RADIO & COMPUTERS

by BILL CHAPPLE

W4GQC

In this series we are showing how to interface a computer to a ham radio and how to write software for ham radio applications. The hardware and software can be used on any computer that uses Microsoft Basic and has an ASCII port.

We started this series in August of 1986 and presented a Morse code practice program. We followed this with an antenna design program and a DX station program. We also gave an interface circuit in our Interfacing Computers series which can be used for Ham Radio applications.

During the holidays I was able to do some experimenting with interfacing my old Swan 500CX with a Color Computer. It seemed like our Morse code practice program could be easily modified to give the required memory pokes to drive a keying relay. A relay is required because of the high keying voltage present across the key input to the Swan. Last month I gave a schematic showing how to connect a keying relay to the interface circuit we gave the previous month.

MORSE KEYS

This month we want to give a complete hardware diagram of the interface and software for using a color computer as a Morse keyer. I now have this keyer working properly with my Swan and Heath SB-200 kilowatt amplifier. At first I had problems with radio interference from my transmitter. I put the interface circuit in a metal box and used several radio frequency

(RF) bypass capacitors but this did not cure the problem.

Finally I decided that the problem was my computer. I had been using an old TDP version of the color computer which had been modified many times. All of the radio RF shielding had been removed. I connected a new Color Computer 2 and the RF problems went away. I can now operate at maximum power without any RF problems. I use a cassette for programs with my ham radio station.

The complete hardware interface is shown in Figure 1. This can be used for controlling any device since the relay completely isolates the load from the computer. My relay was a high speed relay that I had on hand. Any 5 volt relay should work although some may not key very fast.

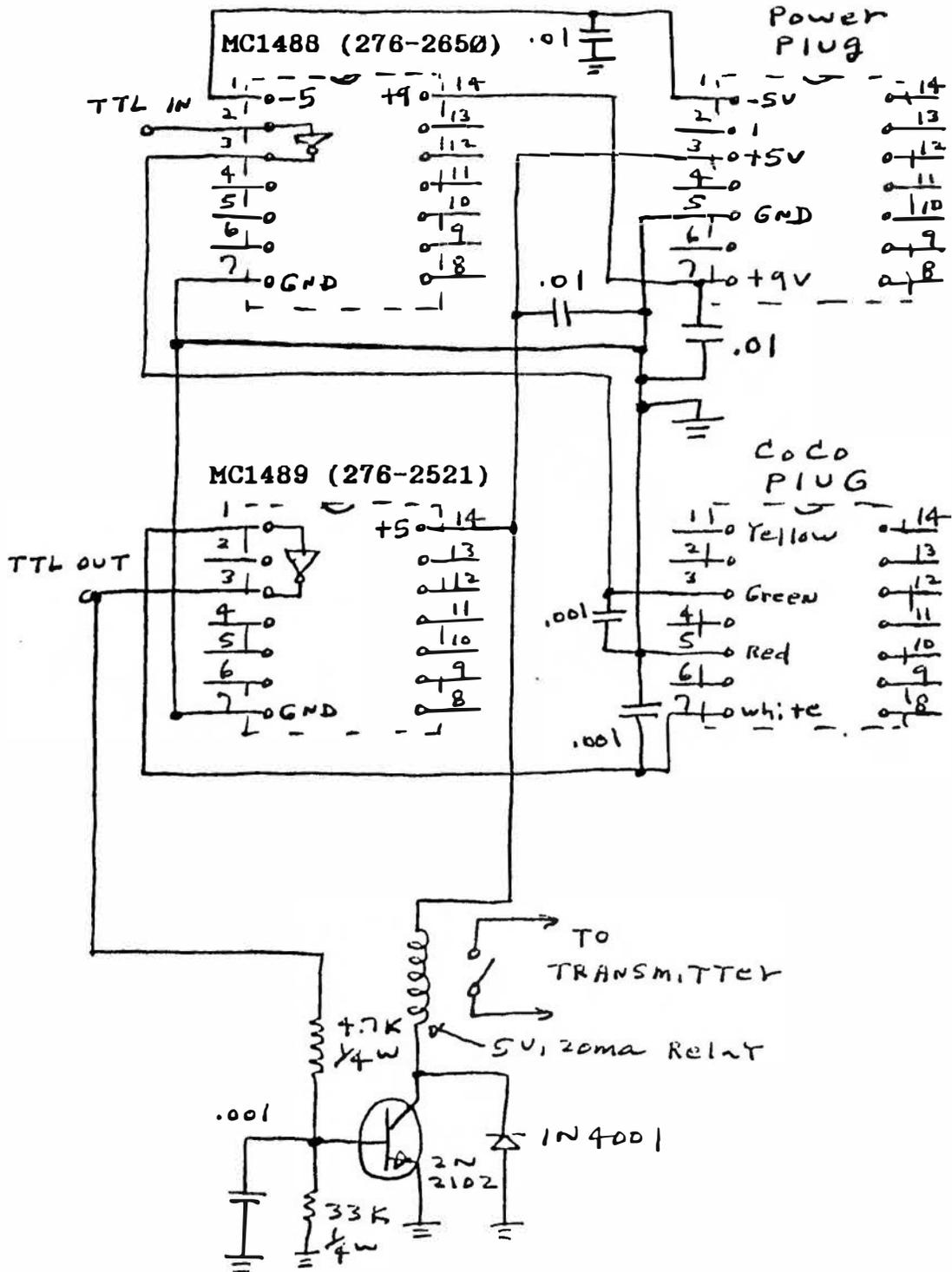
It is possible to replace the relay with a transistor. Since the relay works so good for me, I decided not to explore this possibility.

BACK ISSUES

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POWER SUPPLY (277-1022)
REWIRE PLUG AS SHOWN



MORSE CODE KEYER
SCHEMATIC DIAGRAM

FIGURE 1

MORSE CODE KEYER PROGRAM

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.

ANTENNA - An antenna design program that calculates the dimensions for a wide spaced Yagi antenna of up to 4 elements. Simply run the program and enter the desired frequency. The dimensions will be printed in feet and inches.

Order HR-1 \$11.95 tape or disk + \$3 shipping

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

OPERATING HINT

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

This requires a hardware interface similar to the one shown in Figure 1. It works on the new Color Computer 3 as well as the older versions.

```
10 CLS:PRINT"MORSE CODE KEYER
20 PRINT"COPYRITE (c) 1987
30 PRINT"DYNAMIC eLECTRONICS iNC
40 PRINT'
50 INPUT"ENTER 1 FOR COLOR COMPU
  TER 3";C3
60 IF C3=1 THEN 90
70 INPUT"ENTER 1 FOR DOUBLE SPEE
  D";DS:IF DS=1 THEN POKE 65495
  ,1 ELSE POKE 65494,0
80 GO TO 100
90 INPUT"ENTER 1 FOR DOUBLE SPEE
  D";DS:IF DS=1 THEN POKE 65497
  ,0 ELSE POKE 65496,0
100 INPUT"ENTER SPEED-LARGE VALU
  E FOR SLOW SPEEDS";Z
110 CLS
120 PRINT"PRESS RIGHT ARROW TO I
  NCREASE":PRINT"SPEED
130 PRINT"PRESS - KEY TO DECREAS
  E SPEED
140 PRINT"@ KEY SENDS THE BT CHA
  RACTER.
150 PRINT"PRESS DOWN ARROW TO WR
  ITE NOTES ON THE SCREEN.
160 PRINT"AGAIN PRESS THE DOWN A
  RROW TO":PRINT"RETURN TO TRAN
  SMIT' MODE.
170 'SET UP ARRAY FOR CHARACTERS
180 DIM N$(100)
190 'EMPTY THE ARRAY
200 FOR K=0 TO 99:N$(K)="" :NEXT
  K
210 'DEFINE THE CHARACTERS
220 N$(8)="IIIIIIII" 'ERROR BACK
  SPACE
230 N$(46)="IDIDID":N$(44)="DDII
  DD":N$(63)="IIDDII" . . , ?
240 N$(64)="DIIID":N$(47)="DIIDI
  " ' BT /
250 N$(48)="DDDDD":N$(49)="IDDDD
  " ' 0 & 1
260 N$(50)="IIDD":N$(51)="IIID
  " ' 2 & 3
270 N$(52)="IIID":N$(53)="IIII
  ":N$(54)="DIIII":N$(55)="DDII
  I" ' 4,5,6,7
280 N$(56)="DDDII":N$(57)="DDDDI
  ":N$(65)="ID":N$(66)="DIII" ' 8
  ,9,A,B
290 'N$(65)=A
```

```

300 N$(67)="DIDI":N$(68)="DII":N
$(69)="I":N$(70)="IIDI":N$(71
)="DDI":N$(72)="IIII":N$(73)=
"II" 'C,D,E,F,G,H,I
310 N$(74)="IDDD":N$(75)="DID":N
$(76)="IDII":N$(77)="DD":N$(7
8)="DI":N$(79)="DDD":N$(80)="
IDDI" 'J,K,L,M,N,O,P
320 N$(81)="DDID":N$(82)="IDI":N
$(83)="III":N$(84)="D":N$(85)
="IID":N$(86)="IIID":N$(87)="
IDD" 'Q,R,S,T,U,V,W
330 N$(88)="DIID":N$(89)="DIDD":
N$(90)="DDII" 'X,Y,Z
340 GO SUB 360
350 GO TO 340
360 'ENTER CHARACTER TO SEND
370 'WAIT FOR KEY TO BE PRESSED
380 P$=INKEY$:IF P$="" THEN 380
390 IF P$=CHR$(10) THEN 610
400 'IF KEY IS - DECREASE SPEED
410 P=ASC(P$):IF P=45 THEN Z=Z+1:
PRINT"SPEED="Z;:GO TO 380
420 'INCREASE SPEED FOR RIGHT AR
ROW P=9
430 IF P=9 THEN Z=Z-1:PRINT"SPEE
D ="Z;:GO TO 380
440 IF Z=0 THEN Z=1
450 PRINTP$;
460 P=ASC(P$):IF P=8 THEN 480
470 IF P<33 THEN 380
480 N=P
490 IF N$(N)="" THEN PRINTCHR$(8
);:RETURN
500 L=LEN(N$(N))
510 '
520 'THIS DECODES THE CHARACTER
530 FOR J=1 TO L:X$=MID$(N$(N),J
,1):IF X$="D" THEN Y=3 ELSE I
F X$="I" THEN Y=1
540 W=Y*Z
550 IF W<1 THEN W=1
560 'SEND DOT OR DASH
570 POKE65312,2:FOR PP=1 TO 4*W:
NEXT PP:POKE65312,0:FOR P=1 T
O Z:NEXT
580 NEXT J
590 RETURN
600 'THIS PRINTS COMMENTS ON SCR
EEN
610 X$=INKEY$:PRINTX$;
620 IF X$=CHR$(10) THEN 380
630 GOTO 610

```

CHECKERBOARD FILESORT

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In this series we have been looking at the Color Computer 3 and comparing it with its predecessors. Last month we looked at the memory map and discovered that it is a true 128K computer. This month we want to look at some of the commands.

CLS COMMAND

This command clears the screen to different background colors. This is a good way to set your colors if you have a composite video color monitor. We have found that CLS 5 gives a good color for use with text. You can adjust your colors by entering the following CLS commands.

CLS 1- Green
CLS 3- Blue
CLS 4 -Red

ATTR Command

This command allows the foreground and background colors to set. With this command you can have a dark background with bright characters. This is useful for basic programs because it reduces eye strain. The format is as follows:

ATTR FOREGROUND, BACKGROUND

Where FOREGROUND & BACKGROUND are the colors from 0 to 7. Try ATTR 2,4 & ATTR 6,4. Either of these give easy to read characters. An argument can be placed after the two colors. A "U" means to underline and a "B" means to blink the text.

PRINT @

The PRINT @ command is for locating a print location on the low resolution screen. This command is compatible with the earlier computers. To use this command you must be in the low

resolution mode. To access this mode type "WIDTH 32".

The low resolution-screen has 32 characters and 16 rows. If you want to start printing at the beginning of the 10th row then this would be 10*32 or 320 characters from the beginning. So you could enter PRINT @320, "HELLO" and the message would appear at the beginning of the 10th line.

LOCATE X,Y

This command is used in the high resolution screens. If you are in the 40 column mode, you will have 24 lines. X can be any value from 0 to 39 and Y can be any value from 0 to 23. For an 80 column screen, X can be any value from 0 to 79. As an example type in the following program.

```
10 CLS5
20 LOCATE 20,20: PRINT"HELLO
   THERE
```

Run the program for 40 column and 80 columns and notice where the message is printed. This command is easier to use than PRINT @ because you do not have to calculate the location. The two arguments X and Y locate the position for the cursor.

HIGHREL GRAPHICS

As stated last month a 32K memory block is reserved for the High resolution graphics. This is a great advantage over the earlier Color Computers. First of all none of the normal 32K of programming space is required since a 32K memory block is reserved for the high resolution graphics. The second advantage is that the drawing can be labelled with text by using the HPRINT command. The high resolution draw commands are similar to the Color Computer 2 commands except they are preceded with a H. Examples are HCIRCLE, HLINE, HPOINT, etc.

So if you know how to program in graphics with a CC-2 or earlier computer, then you will be able to quickly learn how to adapt to the CC-3.

HPRINT

We want to look at this command because this is not in the older computer's commands. This command allows us to write text on our graphics drawings. The format is as follows:

```
HPRINT (X,Y),P$
```

X and Y will locate the beginning of the text P\$. X and Y are the text positions and not graphics positions. This command can be mixed with graphics commands to write comments on the graphics screen. This subject is well covered in the manual, but some of our readers may not have a Color Computer 3 and are interested in its capability therefore we are mentioning it. The following is an example program for drawing a circle and writing on the screen.

```
10 INPUT "COLOR";X
20 HSCREEN2
30 HCOLORX
40 HCIRCLE (160,90), 30
50 HPRINT (10,0),"THIS WRITES
   ON THE GRAPHICS SCREEN
60 INPUT P:GOTO 10
```

When you run the program, enter a color number. We found 4 to work well. Note that a circle will be drawn and the message also written on the screen. As an exercise you might want to change line 20 to HSCREEN 3 or HSCREEN 4 to see if you can read the text on the higher resolution screens.

Next month we will continue with this series if we can think of something that is different about the Color Computer 3 that we can write about. Our Color Computer 3 failed when we were using a new multipack interface. There seems to be a problem with

BASIC PROGRAMMING

the PAL chip although this probably didn't cause the failure. We have written Radio Shack about the PAL problem and will pass along any information we receive from them.

In this series we have been showing how to write basic programs. For the past few months we have been looking at an address file. Last month we showed how to sort.

This month we are incorporating a machine language subroutine to speed up the sorting process. Basic is fairly fast for doing the logic. Since each address file consists of 100 bytes, it takes several seconds to exchange two addresses with basic.

The sort procedure involves taking the first address and comparing it with the rest. If any value of the first is larger than the corresponding value of the address we are testing, then we exchange the addresses. After we finish comparing the addresses, the smallest is in the first location.

Next we compare the second address with the rest and exchange them when we find a smaller one than the second. We continue this process until we reach the last address. The testing involves FOR-NEXT loops which we have covered in this series.

Our machine language routine is short and we used the READ-DATA method of loading the data. We reserved the memory from 500-600 for the machine language vectors and subroutine. The data is transferred from the basic program to the required memory area.

We decided to sort on (1) Names, (2) ZIP Code, and (3) Telephone numbers. For practice we entered 30 names. At first we used basic to do the sorting. This took several minutes. After entering the machine language subroutine it took about a minute. We wrote notes on the screen to show what the sorting was doing. The speed can be increased by not printing these notes and using the high speed pokes.

RENEWAL TIME?

The date beside your name on the address label indicates the last issue you will receive. Send in your renewal if you want to continue receiving technical information on Color Computers. This is the last issue for those with 1/87.

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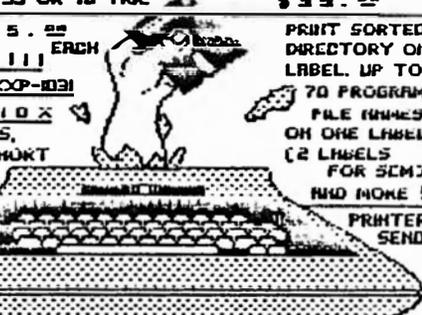
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Our files start at 10000 in memory and occupy 100 bytes each. This will allow our files to go to 19999 for 100 files or 29999 for 200 files. In order to allow maximum programming space do the following before loading the program:

```
POKE 25,14:POKE14*256,0:NEW
```

The program is user friendly. We designed it to run with our disk, but programs can be saved and loaded from a cassette. This program is available in our DCN-4 program package.

ADDRESS FILE WITH SORT

Note: Before loading the program do the following:

```
POKE 25,14:POKE14*256,0:NEW
```

```
5 CLS
10 PRINT"ADDRESS FILE PROGRAM
20 PRINT"COPYRIGHT (c) 1987
30 PRINT"DYNAMIC ELECTRONICS INC
35 PRINT"WITH ML SORT SUBROUTINE
40 FOR XA=510 TO 530:READ A:POKE
  XA,A:NEXT XA 'LOAD ML SUBROU
  TINE
50 NF=PEEK(9999)
60 PRINT"1 ADD TO FILE
70 PRINT"2 MODIFY FILE
80 PRINT"3 PRINT FILES
90 PRINT"4 CLEAR ALL FILES
100 PRINT"5 SORT FILE
102 PRINT"6 SAVE FILE
104 PRINT"7 LOAD FILE
110 INPUT"ENTER NUMBER";X
120 ON X GOTO 1000,2000,3000,400
  0,5000,6000,7000
1000 CLS:PRINT"THIS ADDS TO FILE
  S
1010 NF=PEEK(9999):POKE 9999,NF+
  1:BE=10000:BF=BE+100*NF 'SET
  UP MEMORY FOR START OF NEXT
  FILE
1015 PRINT"THIS IS FILE #NF
1017 INPUT"PRESS Y FOR A DIFFER
  FILE NO TO START";Y$:IF Y$="Y
  " THEN INPUT"ENTER NEW NUMBER
  ";NF:POKE 9999,NF:GO TO 1000
1018 PRINT"FILE NUMBER "NF
```

```
1020 M=BF:FOR J=0 TO 99:POKE M+J
  ,32:NEXT J :'CLEAR MEMORY FOR
  NEW DATA
1022 GOSUB 1030:GOSUB 1040:GOSUB
  1050:GOSUB 1060:GOSUB 1070:G
  OSUB 1080:GOSUB 1090:GOTO 110
  0
1030 PRINT"ENTER FIRST LINE":NC=
  15:GOTO 1900
1040 PRINT"ENTER SECOND LINE":M=
  BF+15:GOTO 1900
1050 PRINT"ENTER THIRD LINE":M=B
  F+30:GOTO 1900
1060 PRINT"ENTER CITY":M=BF+45:G
  OTO 1900
1070 PRINT"ENTER STATE":M=BF+60:
  GOTO 1900
1080 PRINT"ENTER ZIP":M=BF+75:NC
  =10:GOTO 1900
1090 PRINT"ENTER PHONE NUMBER":M
  =BF+85:GOTO 1900
1100 POKE 502, NF:INPUT"PRESS EN
  TER FOR MORE ADDRESSES, PRESS
  1 TO RETURN TO MENU.";V
1105 NF=NF+1:POKE 502,NF
1110 IF V=0 THEN 1000 ELSE RUN
1900 'THIS STORES CHARACTERS IN
  MEMORY
1905 C=0:X=M 'COUNT CHARACTERS B
  EING ENTERED END MARK THE BEG
  INNING OF MEMORY
1910 FOR K=0 TO NC
1915 W1=PEEK(136):W2=PEEK(137):P
  RINT@,"NO CHARACTER USED="K;
  " M="M:POKE 136,W1:POKE137,W2
1920 A$=INKEY$:IF A$="" THEN 192
  0
1925 PRINTA$;
1930 A=ASC(A$):IF A=13 THEN RETU
  RN
1935 IF A=8 THEN K=K-1:GO TO 192
  0
1940 POKE M+K,A:IF A=13 THEN RET
  URN
1942 NEXT K
1945 FOR AA=0 TO NC-1:POKE M+AA,
  32:NEXT AA
1950 PRINT"TOO MANY CHARACTERS -
  REDO"
1960 GO TO 1910
1999 '
2000 PRINT"FILES CAN BE MODIFIED
  WHILE":PRINT"BEING PRINTED.
  PRESS 'L' AND":PRINT"THE LIN
  E NUMBER WILL BE ASKED":PRINT
  "FOR. PRESS THE NUMBER OF TH
  E":PRINT"LINE TO EDIT AND MAK
  E YOUR":PRINT"CHANGE. USE SHI
  FT @ TO SLOW":PRINT"DISPLAY
```

```

2005 PRINT:INPUT"PRESS ENTER TO
CONTINUE";PP
2010 GOTO 60
2910 RETURN
2999 '
3000 PRINT"THIS PRINTS THE FILES
ON 6 LINES FOR LABELS
3002 INPUT"ENTER 1 TO PRINT TELE
PHONE NUMBERS";TN
3006 NF=PEEK(9999):IF NF=0 THEN
PRINT"THERE ARE NO FILES":INP
UT"PRESS ENTER TO CONTINUE";W
:RUN
3008 INPUT"ENTER 1 FOR PRINTER";
P
3010 BE=10000:INPUT"ENTER FILE N
UMBER OR PRESS RETURN FOR ALL
FILES";N
3012 IF N>NF THEN PRINT"LARGEST
FILE IS"NF:GOTO3010
3015 IF N>0 THEN NF=N ELSE IF N=
0 THEN NF=0
3016 CLS:PRINT:PRINT
3020 PP=0:M=BE+100*N
3025 GOSUB 3980
3030 PRINT"THIS IS FILE #"NF:X=1
5:FOR J=0 TO 4
3032 IFJ=2 THEN 3400 'CHECK FOR
EMPTY LINE
3035 W=J+1
3040 GOSUB 3900
3045 IF J=3 AND P=1 THEN PRINT#-
2," ";:GOTO3070
3047 IF J=4 AND P=1 THEN PRINT#-
2," ";:GO TO3070
3050 IF P=1 THEN PRINT#-2," "
3070 NEXT J
3080 X=10:M=M+75:J=0:W=6:GOSUB 3
900:IFP=1 THEN PRINT#-2," "
3082 J=1:W=7:AP=P:IF TF=0 THEN P
=0
3084 GOSUB 3900:P=AP
3086 IF P=1 THEN PRINT#-2,CHR$(1
3):IF KK=32 THEN PRINT#-2," "
3095 XX=PEEK(136):YY=PEEK(137)
3115 PRINT
3120 NF=NF+1:IF NF=PEEK(9999) TH
EN 3130 ELSE 3020
3130 INPUT"LAST FILE PRESS ENTER
FOR MENU OR ENTER FILE NUMBE
R TO CONTINUE";X:IF X=0 THEN
RUN ELSE NF=X:GOTO3020
3200 PRINT:PRINT:NC=15:M=BE+100*
NF:IF PP>5 THEN 3300
3210 M=M+15*(PP-1):GO SUB1900:GO
TO3020
3300 NC=10:M=M+75+10*(PP-6):GO S
UB 1900:GOTO 3020

```

```

3400 AA=BE+100*N
F+30:KK=PEEK(AA)
:IF KK=32 THEN NEXT J ELSE 30
35
3899 '
3900 PRINTW;:FOR K=0 TO X-1
3905 AX=M+X*J+K
3910 A=PEEK(AX):B=PEEK(AX+1):IF
A=32 AND B=32 THEN 3940
3915 A$=CHR$(A):PRINTA$;:IF P=1T
HEN PRINT#-2,A$;
3917 X$=INKEY$:IF X$="" THEN 392
0 ELSE 3950
3920 NEXT K
3940 PRINT:RETURN
3950 IF X$="L" THEN INPUT"LINE N
UMBER TO CHANGE";PP:GOTO3200:
RETURN
3960 IF X$="F" THEN INPUT"NEW FI
LE NUMBER";NF:RETURN
3965 NEXT K:RETURN
3980 AA=PEEK(136):AB=PEEK(137):P
RINT0,"PRESS F FOR DIFFERENT
FILE & L TO CHANGE LINE":PO
KE136,AA:POKE137,AB
3985 FOR LL=Q TO 800: NEXT LL: R
ETURN
3999 END
4000 PRINT"THIS CLEARS ALL FILES
":INPUT"PRESS ENTER TO CLEAR
FILES OR BREAK TO ABORT";CF
4010 POKE 9999,0:RUN
5000 PRINT"THIS SORTS THE FILES"
:PRINT"N NAME SORT":PRINT"T T
ELEPHONE SORT":PRINT"Z ZIP CO
DE SORT
5005 PRINT"PRESS M FOR MENU"
5010 INPUTS$:N=PEEK(9999):S=1000
0
5012 '9999 CONTAINS THE NUMBER O
F FILES 10000 IS THE START OF
THE FIRST FILE
5015 PRINT"S="S
5020 IF S$="N" THEN GO SUB5200 E
LSE IF S$="T" THEN GOSUB 5600
ELSE IF S$="Z" THEN GOSUB540
0 ELSE GOTO 5000
5030 PRINT"SORTING COMPLETED":RU
N
5199 '
5200 PRINT"THIS SORTS ON NAMES"
5201 '
5210 OS=0:GOSUB 5800:RETURN
5399 '
5400 PRINT"THIS SORTS ON ZIP COD
ES"
5401 '
5405 OS=70
5410 GOSUB 5800:RETURN

```

```

5599 '
5600 PRINT"THIS SORTS ON TELEPHO
      NE NUMBERS
5601 '
5610 OS=85:GOSUB 5800:RETURN
5799 '
5800 X=NF-1:FOR J=0 TO X 'OS=AMO
      UNT OF OFFSET FROM BEGINNING
      OF FILE
5805 FOR K=J+1 TO X
5807 PRINTJ;K
5810 P=S+100*J+OS:Q=S+100*K+OS
5820 FOR L=0 TO 8
5830 M1=P+L:M2=Q+L:A=PEEK(M1):B=
      PEEK(M2)
5840 IF A<B THEN GOTO 5870
5850 IF A=B THEN NEXT L
5860 GO SUB 5900
5870 NEXT K:NEXT J:RETURN
5900 PRINT"EX "J" AND "K
5910 P1=P-OS:Q1=Q-OS
5950 XX=P1:GOSUB 5990:POKE500,MS
      :POKE501,LS:XX=P1+99:GOSUB 59
      90:POKE 502,MS:POKE503,LS:XX=
      Q1:GOSUB 5990:POKE 504,MS:POK
      E505,LS
5960 EXEC 510:RETURN
5990 MS=INT(XX/256):LS=XX-256*MS
      :RETURN
6000 PRINT"THIS SAVES THE FILES
6010 NF=PEEK(9999):BE=9999:EN=BE
      +100*NF+1:PRINT"NUMBER OF FIL
      ES="NF
6020 PRINT"BEGINNING="BE:PRINT"E
      NDING="EN
6025 Z=FREE(0):IF Z<10 THEN PRIN
      T"NOT ENOUGH ROOM":END
6026 PRINT"THERE ARE "Z" GRANULE
      S FREE"
6030 INPUT"ENTER NAME FOR FILES"
      ;N$
6040 SAVEM N$,BE,EN,BE
6050 INPUT"PRESS ENTER FOR ANOTH
      ER SAVE OR PRESS 1 FOR MENU";
      X:IF X>0 THEN 60
7000 INPUT"ENTER 1 FOR DIRECTORY
      ";X:IF X=1 THEN DIR
7010 INPUT"ENTER FILE TO LOAD";F
      $:LOADM F$
7020 PRINT"FILE "F$" IS LOADED":
      RUN
9000 INPUT"MEMORY";M
9010 A=PEEK(M):A$=CHR$(A)
9020 PRINTM;A;CHR$(A)
9030 X$=INKEY$:IF X$="M" THEN 90
      00

```

```

9040 M=M+1:GOTO9010
9500 DATA190,1,244,16,190,1,248,
      166,132,230,164,167,160,231,1
      28
9510 DATA 188,1,246,35,243,57

```

```

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```

OPERATING HINT

If your computer hangs up while saving a program to a disk, press the reset button to stop the procedure. If you try to kill the file, you will destroy the other files on the disk. Copy the files you want to save onto another disk and reformat the disk and copy files back onto the reformatted disk.

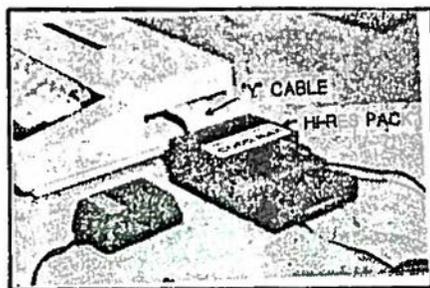
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It lets you work on an area 3.5 times the size of the window on the screen. It's so friendly that you will easily recover from mistakes: The **undo** feature lets you revert to your image prior to the mistake. As usual, it only takes a single click.

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 **rubberbanding** 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:

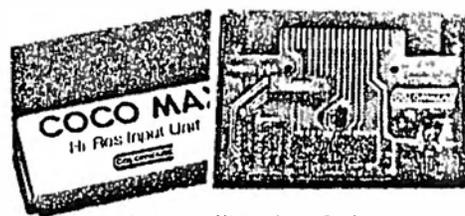
- You can move it around
- Copy it
- Shrink or enlarge it in both directions
- Save it on the electronic **Clipbook**
- Flip it vertically or horizontally
- Rotate it
- Invert it
- Clear it, etc. etc.

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 **lasso**.



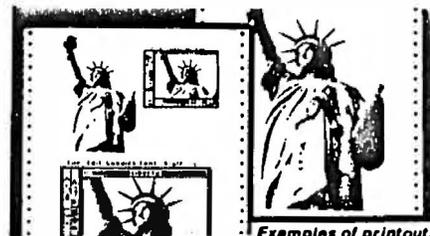
Inside the Hi-Res Input Pack

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!

QUESTIONS & ANSWERS

These are questions that we have received. If you have a question that you would like for us to answer send it to us at Box 896, Hartselle, AL 35640. We will print our answers here. Send \$10 for a quick personal reply to your question.

QUESTION: I received the sample copy (Nov. 86) of Dynamic Color News and love it! Attached is my check in the amount of \$15.00 to cover one year's subscription. I'd like to start with Dec. 86, and desire the following articles on "Ham Radio", programming, etc.

I wish to build the interface as described on page 29, but need the schematic or article on the power supply described last month. Can you provide a copy of that info?

Also do you have a list of articles, programs, etc. from previous issues? I am not experienced in computers, but do want to use my TRS-80 CCII with shortwave receivers, etc.

What is required to expand this to 64K? Have you covered a program for receiving Radioteletype (RTTY) and or Morse Code (CW) or is this coming?

ANSWER: The power supply is Radio Shack part # 277-1022. This is listed in their sales flyers. We cut off the connector and wired a header to interface with the circuit shown in our November issue.

This month we are giving software for keying a ham transmitter for on the air Morse code transmission. Programs for receiving Morse code and radioteletype will be coming soon.

There are two distinct versions of the color computer 2. The Korean version has two 18 pin 4464 chips. These can be upgraded to 256K with our upgrades. The older CC-2 had 8-16 pin chips. These were 4164 type chips and some were in sockets.

We have upgrades for these up to 512K. The memory chips are near the 6883 SAM chip and have various markings on them depending upon the manufacturer. If you have sockets under the chips then we can provide a plug in upgrade which does not require soldering.

A list of articles is printed about every other month inside the back cover.

QUESTION: I am using your remark word processor and would like for it to pause and clear the screen before displaying additional information. How can this be done?

ANSWER: The vectors in locations 136 & 137 indicate the cursor's location. You can peek these values and stop the printing anywhere on the screen. For example enter the following program:

```
1 CLS
2 FOR J=1 TO 510
3 ?"*";
4 A=PEEK(136):B=PEEK(137)
5 ?@0,A;B
6 POKE 136,A:POKE137,B
7 NEXT J
8 INPUT X:GOTO 1
```

When the program is run, a * will be printed at each print position on the screen. The values of the vector are displayed at the top of the screen. You can enter a check in any basic program to cause something to happen for any value of A and B.

```
9 IF A=5 AND B=224 THEN GOSUB
100
```

A statement like the preceding can be used to stop printing if the cursor is at the start of the 15th line.

EDITOR'S COMMENTS

We are excited about the support we are receiving. This issue marks the end of our third year of publishing "Dynamic Color News". We are now covering more material than ever, and the response from our readers is very encouraging. As I have stated many times, my biggest problem is organization. We have grown to about 40 pages and will have to start doing some things differently. We need to plan a schedule of what needs to be ready on certain dates and stick by the schedule.

Organization is very important in writing programs. Make an outline of what you want the program to do. Then write each section and concentrate on one thing at a time. It is easy to get side tracked and loose your objective.

If you will notice, we are getting more involved with hardware projects. I think many people are confused by the term "hardware". Hardware consists of electronic circuits that allow the computer to increase its capability. For instance we can add more memory chips to increase the memory, or we can build an interface circuit to allow the computer to control an external device. Once the interface is installed, then software is required to use the interface. Our emphasis has been on writing software which is required for any computer application.

In this issue we are showing how to use a joystick port for a voltmeter. With this circuit you can measure the value of batteries up to 15 volts. The hardware is fairly simple and needs to be supported with software. Also in our Ham Radio Series, we are providing software for using our interface circuit with a color computer as

a Morse Code keyer for keying a transmitter. Since we are using a relay, this provides isolation and the same circuitry can be used for controlling lights or a motor.

We had a failure with our Color Computer 3 while using a new Radio Shack expander. There is a compatibility problem with the expander and a PAL chip needs to be replaced. I have written Radio Shack for a policy statement on getting the PAL replaced and will pass along any information they give us.

I want to thank all of you who have written letters and asked questions. We will print an answer to your questions in our Questions & Answers section. There seems to be a growing interest in this section.

In our programming series, we have added a sort section to our file manager program. This has a machine language subroutine and will sort on names, zip codes, and telephone numbers. We have had many requests for this type program.

As we start our fourth year we will be adding more articles. If you have a subject you would like for us to cover we would like to hear from you.

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.

Note: We do not have any new product information for this month. Dealers send us your new product releases.

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.

DIGISECTOR DS-69 & DS/69A

Two digitizers from The Micro Works allows a video signal to be digitized and saved. The DS-69 is for a black and white camera and the DS-69A is for a color camera. After a television frame has been digitized, it can be saved to a cassette or disk, or printed to a printer.

A multipack Interface or PBJ C-C bus is required for a disk system. A Y cable can be used with the DS-69A. A camera, tape recorder, or other video source is required.

The software comes on disk and the DS-69 and DS-69A are in cartridges. Plug the cartridge into one of the slots of the expander interface. Make a backup copy of the software and put the original in a safe place. Next it is necessary to run a configuration program to configure the software for your hardware. In the CONFIG program you select the slot you are using for the cartridge plus the printer type.

There is a RCA type phono jack on the DS-69 and DS-69A. The video signal should be connected to this jack. It is a good idea to also connect a monitor so that the signal to be digitized can be viewed on the monitor. After configuring the software type 'RUN "C-SEE"'.
A menu appears allowing the following options:

- T- Take a single five level scan.
- G- Take a continuous five level scan.
- S- Set up and take a 128x128 16 level image.
- I- Set up and take a 256x256 16 level image.
- K- Display a 16 level image.
- D- Go to Disk Menu.
- A- Go to Cassette Menu.
- P- Go to Printer Menu.
- Q- Return to Basic.
- M- Toggle between the main menu and the 5 level picture.

Select "G" to continuously take 5 level scans. With this option you can see a rough image of your picture. If no video signal is present a message appears. It will probably be necessary to adjust the contrast and brightness. To do this press "C" and the image will appear along with a number indicating the contrast. Adjust this number with the arrow keys or joystick until the best picture occurs. It may be necessary to adjust the brightness. This is similar except you press the "B" key. The vertical and horizontal dithers can be adjusted in like manner. We did not find it necessary to make these adjustments.

After mastering the 5 level picture, we went to the 128 x 128 16 level image. This worked well and gave much better resolution than the 5 level picture. To use this press "S" from the menu and a scene will be presented. Adjust the "C" and "B" parameters until the best picture is on the screen. Then press the RETURN key to digitize the picture.

Next we went to the 256 x 256 16 level image. This gives 4 times the resolution of the 128 x 128 image. The procedure is the same. Adjust C and V until a recognizable image appears on the screen. Then press the RETURN key and the digitizing begins. This takes about 16 seconds to complete after which

you are returned to the main menu. A course representation of the 16 level picture can be obtained by pressing "K" from the menu. If this is not recognizable then it is necessary to perform the digitizing again before printing or saving the image.

After an image has been digitized, it can be printed on a dot matrix printer. We used an Epson FX-85 and had very good results in printing the images.

The digitized images can also be saved to a disk or cassette. Pressing "D" from the main menu brings up the disk menu. Pictures can be loaded or saved by using the disk menu. To save or load pictures from a cassette press "A" to access the cassette menu.

The 5 level pictures can be edited by using Magigraph, CoCo-Max, and Graphicom. Other graphic editors can be used if the extension is modified. The extension will have to be changed to be compatible with the editor.

Two other programs are included. "RANDAC" and "RANDACA" allow basic programs to digitize any of the 65536 points in a 256 x 256 picture. This operates by poking the X and Y coordinates two memory locations. Another location is peeked to show the brightness. This requires a total of 64K bytes to save a picture using this method.

Two programs are included. "SLOWPIC" digitizes each point as previously discussed and "BURGLAR" detects a change in the picture.

The DS-69 and DS-69A work as advertised. The DS-69 is advertised to work on a black and white camera. Since we had a color camera, the DS-69A did a better job. We were able to freeze a frame from a VCR, digitize it, and print it on our printer. We also digitized some pictures directly from our video

camera. Proper lighting and a good background help give better results.

The DS-69 sells for \$99.95 and the DS-69A sells for \$149.95 + shipping. For more information contact The Microworks, P. O. Box 110, Del Mar, CA 92014

Note: We will have more product reviews next month. We have received several but have not had time to review them. Dealers send us your products for a free review. - Editor.

OPERATING HINT

Patch around bad sectors: If you have a file in a bad sector on your disk and wish to save another copy of the file, then save it under a different name. This will force the file to be placed in a different sector. Rename the file in the bad sector and then you can use its name to rename the new file. The good file will then be loaded whenever it is called.

OPERATING HINT

Motor Control- The motor relay can be used to drive another relay for control of devices. Although the commands "MOTOR ON" and "MOTOR OFF" work, they are slow. Faster turning on and off can be accomplished by POKE 65313,4 for Motor on and POKE 65313, 52 for Motor off.

OPERATING HINT

The vector in locations 135-6 determine the screen position of the cursor. The cursor can be moved to any screen location by poking values into these locations.

WE'VE OUTDONE OURSELVES!

DS-69A DIGISECTOR™ THE VIDEO DIGITIZER NOBODY CAN BEAT!

NEW

The DS-69A is the best video digitizer available for your COCO at any price. This new, turbocharged version of our original DS-69 Digisector allows your 64K COCO to see clearly into the world of any television picture.

- SPEED!** The fastest — 8 images per second!
- PRECISION!** The highest — 64 levels of true grey scale!
- RESOLUTION!** The finest — 256 x 256 picture elements!
- Compatibility** Use with a black and white or color camera, a VCR or tuner.
- Compactness** Self contained in a plug in Rompack.
- Convenience** Use with a Y-cable, Multi-Pak, PBJ Bus or plug directly into the cartridge slot.
- Ease of Use** Software on disk will get you up and running fast!

POWERFUL C-SEE™ SOFTWARE

C-SEE is the menu driven software package included with your DS-69A. Available on disk or cassette, it provides lightning fast 5 level digitizing to the screen, high precision 16 level digitizing for superb hard copy printout and simple keyboard or joystick control of brightness and contrast. Or call our driver routines from your own Basic program for easy 64 level random access digitizing. Pictures taken by the DS-69A may be saved on disk or cassette by C-SEE and then edited with COCO MAX, MAGIGRAPH or GRAPHICOM for special effects. Any of the popular printers may be used to obtain printouts of images digitized by the DS-69A.

ONE YEAR WARRANTY

DS-69A Digisector & C-SEE III Software
OR your DS-69 &
MAGIGRAPH Graphics Editor on disk

\$149.95
\$ 59.95
\$ 39.95

COCO 3 COMPATIBLE
with
MULTIPAK EXPANDER

DS-69 DIGISECTOR™ THERE'S ONLY ONE BETTER VIDEO DIGITIZER...

And that's the DS-69A. The DS-69 is The Micro Works' original video digitizer, tried and true since 1984. It provides almost all the features of the DS-69A and is now available at a new low price. The DS-69 features;

- SLUGGISHNESS** 2 images per second. Quick enough to freeze all but the fastest moving pictures.
- INCOMPATIBILITY** Brightly colored scenes may be striped when using a color camera.
- INCONVENIENCE** Will not work with a Y cable.

Otherwise, it's a DS-69A. Precision, resolution, compactness, ease of use, software and warranty. Except one last thing.

DS-69 Digisector & C-SEE III Software \$ 99.95

Superb image quality produced by both Digisectors.



Screen



Screen

DISTRIBUTED BY

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

Checks, VISA & MC
add \$3 S/H

CLASSIFIED ADS

1. 10 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.
5. No X-Rated ads.
6. No all capital ads.

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 warranty and will be replaced should they become defective. DSK-1 SSDD for CoCo 6.95 /box, DSK-2 DSDD for MSDOS \$7.95 /box+\$1.50 S/H. Dynamic Electronics Inc., P. O. Box 896, Hartselle, AL 35640 (205) 773-2758.

APPLIANCE PARTS INVENTORY CONTROL PROGRAM. This program is designed for an Appliance Service Shop, but it can be used for almost any type of service shop with up to two trucks and a parts dept. It will keep track of over 3900 parts. It orders parts and gives printouts of all parts, sales, locations, list prices, and re-stocking of all trucks. This program is very easy to operate. It doesn't do any accounting or analysis, but it does keep an accurate account of each part. It requires a 32K color computer, one disk drive and a printer. \$49.95 Add \$2.00 shipping. Geborek Software, 915 Elru Dr., Menasha, WI 54952

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.

Artwork must be camera ready and can be enlarged or reduced at no extra cost. Rates are per page or fraction thereof. Enclose payment with ad copy. No X-Rated ads.

