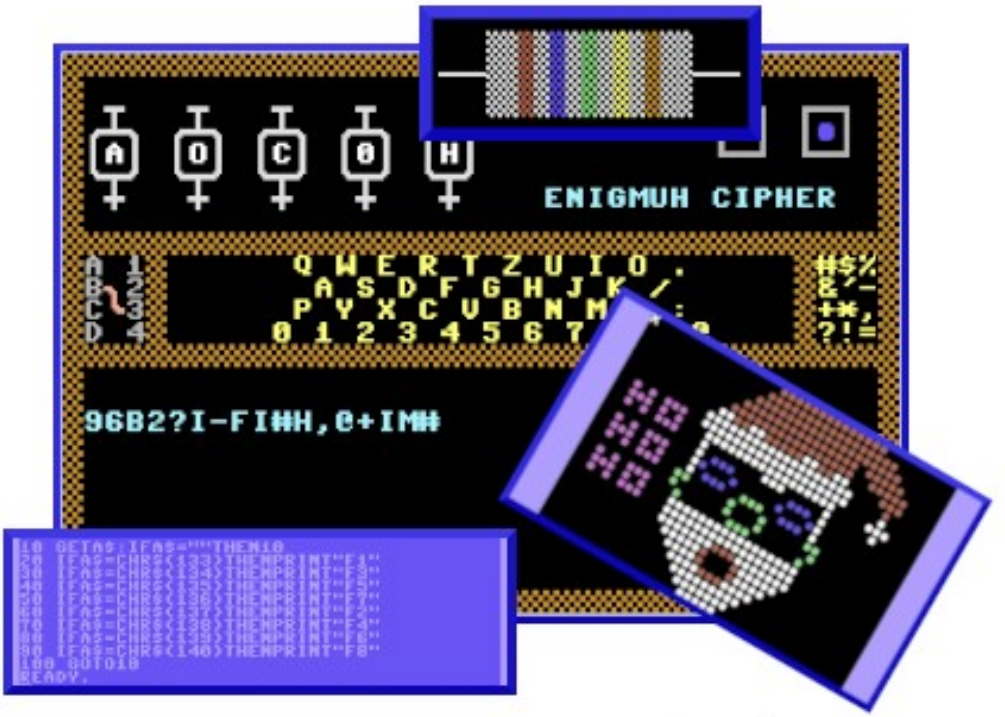
Joe's First Book For The C64



By Joseph E. Gordon

Foreword

I had a Commodore 64 as a kid and had a few books, games, magazines, disk drive, printer and a tape drive. I typed in many programs from the books and magazines and even created my own programs. When my C64 broke, I sold everything. When I heard about the C64 Maxi, I got nostalgic and starting using VICE 3.3, a Commodore 64 emulator. Even though working with my C64 taught me that I didn't want to be a programmer, I wanted to re-create some of the programs I wrote long ago and share them. This book is the result.

PS – This book was created using LibreOffice Writer and Kubuntu Linux 20.04.

For:

Chrislynn

Lucas

Anavianna

Braiden

Landon

Bryleigh

River

Maximilian

Blaine

Emerson

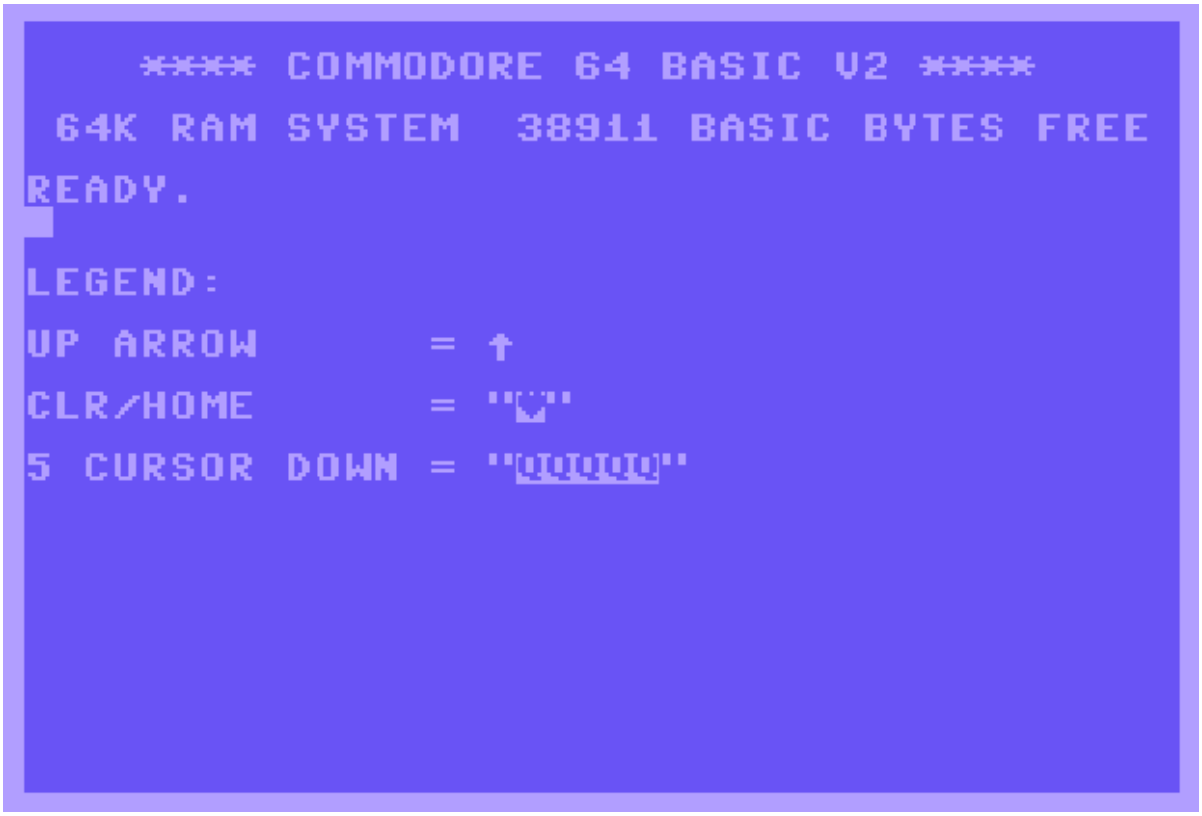
Felix

Ophelia

Table of Contents

Introduction

Here is a listing of the special characters used in some of my programs:



Notes:

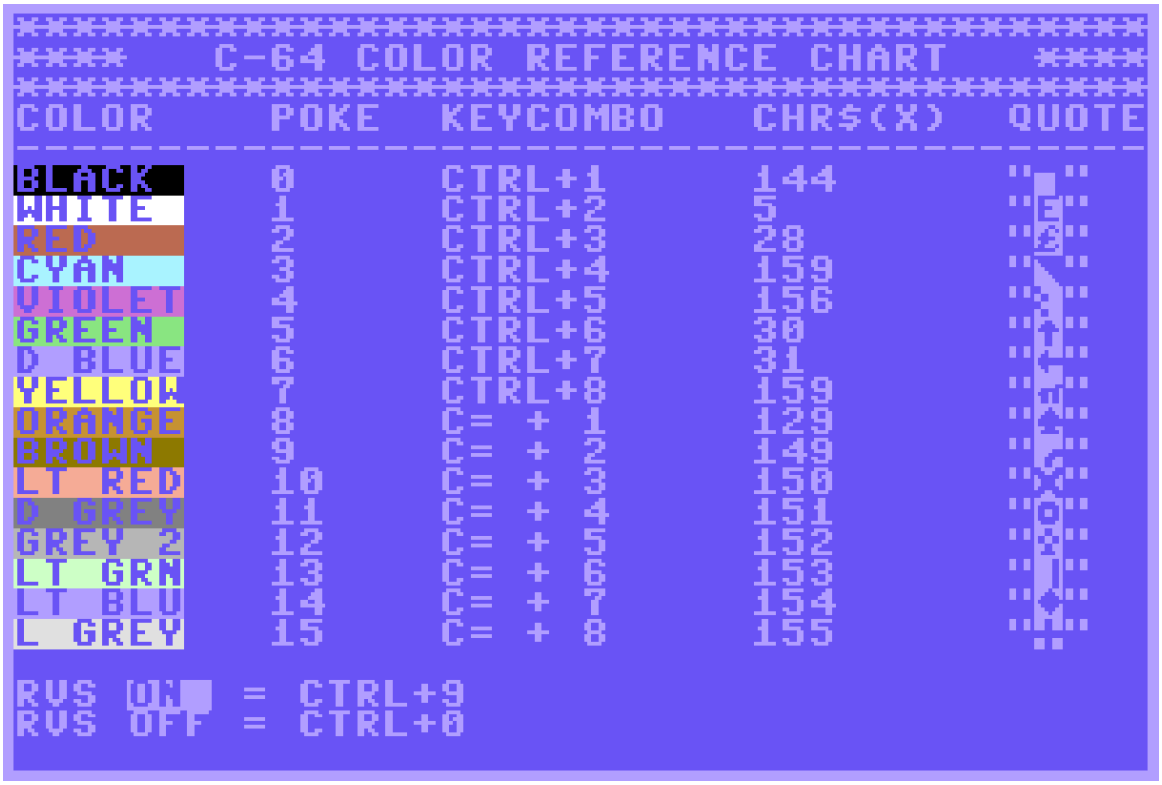
The British ‘pound’ symbol is the “\” key.
The left arrow symbol is the END key.
The up arrow symbol is the Page Down key.

All of the programs in this book are available at:
https://archive.org/details/@josephgordon

Important Information

(In no particular order)

C64 Color Codes:



CLR/HOME Button:

Pressing the CLR/HOME button will put the cursor at the top left of the screen. Pressing C= + CLR/HOME will clear the screen and put the cursor at the top left. Shift+Home will clear the screen.

Where are the Commodore and CTRL keys?

In VICE 3.3, the left Ctrl key is the Commodore (C=) key and the Tab key is the Commodore CTRL key.

Insert A Space:

The C64 screen is always in overwrite mode so to insert a space you need to hold the C= key and press the Insert key.

Function Keys:

If none of your function keys work in VICE 3.3, you can go into settings and change to the German keyboard layout and use F1, F2, F7 & F8.

F1 – Page Up
F2 – Shift+Page Up
F7 – Page Down
F8 – Shift+Page Down

Using Lower Case Letters:

`POKE 53272,21` will enter upper case mode.
`POKE 53272,23` will enter lower case mode.

Changing the Border, Background & Text Color:

Where X is a POKE value from the Color Chart:
`POKE 53280,X` will change the border color.
`POKE 53282,X` will change the background color.
`POKE 646,X` will change the text and cursor color.

Working With Sequential Files:

With the C64 you can ‘print’ information to the disk and read it back. The PRINT#8 command prints the data to the disk and the INPUT#8 command reads the data back in the order it was ‘printed’. EX:

```
10 PRINT#8,”Some data”
20 PRINT#8,D$
30 INPUT#8,A$,B$
```

To see this in action, look at the program listing for C64 LED DRAW lines 2050-2190.

Using the 1541 Disk Drive in Device #8:

The default drive in VICE 3.3 is is the CBM 1541 and uses .D64 files as the emulated disk.

1) To list the drive directory, enter the following commands:

```
LOAD "$",8
LIST
```

2) To save a program to the disk:

```
SAVE "NAME",8
```

3) To load a program from the disk:

```
LOAD "NAME",8
```

4) To delete (scratch) a file from the disk:

```
OPEN 1,8,15,"S:FILENAME":CLOSE1
```

Note: you may use the wildcard "*" symbol in the filename to delete multiple files at once.

5) To rename a file on the disk:

```
OPEN 1,8,15,"R:NEWNAME=OLDNAME":CLOSE1
```

6) To save & replace a file (overwrite):

```
SAVE"@0:NAME",8
```

7) To format and name a disk:

```
OPEN 1,8,15,"N:DISK_NAME,01":CLOSE1
```

Auto Run a Program After Load:

```
LOAD"PROGRAM_NAME",8:{SHIFT}{RUN/STOP}
```

Repeating Keys:

Repeating keys are when you press and hold a key, that key acts like you are continually pressing it.

To turn on repeating keys, enter: `POKE 650,128`
To turn off repeating keys, enter: `POKE 650,0`

Print A Program Listing To A File In VICE 3.3:

If you have a BASIC program in memory:

Click Settings > Settings > Peripheral Devices > Printer Settings

Check the ‘File System Access’, ‘Enable IEC Device’, ‘ASCII’, ‘Text’, and ‘#1’ boxes

At the C64 terminal type:

```
OPEN4,4
CMD4:LIST
PRINT#4:CLOSE4
```

Exit the VICE emulator.

Do a file search for ‘print.dump’ and open with a text editor.

Convert .d64 PRG File to .txt File In VICE 3.3:

Commands to extract a PRG from a C64 disk to a text file in Ubuntu Linux:

sudo c1541 -attach name.d64 -list
sudo c1541 -attach name.d64 -read filename_on_d64 newfilename.prg
sudo petcat -2 -o outputfile.txt – prgname_from_previous_step.prg
sudo chown linuxusername outputfile.txt

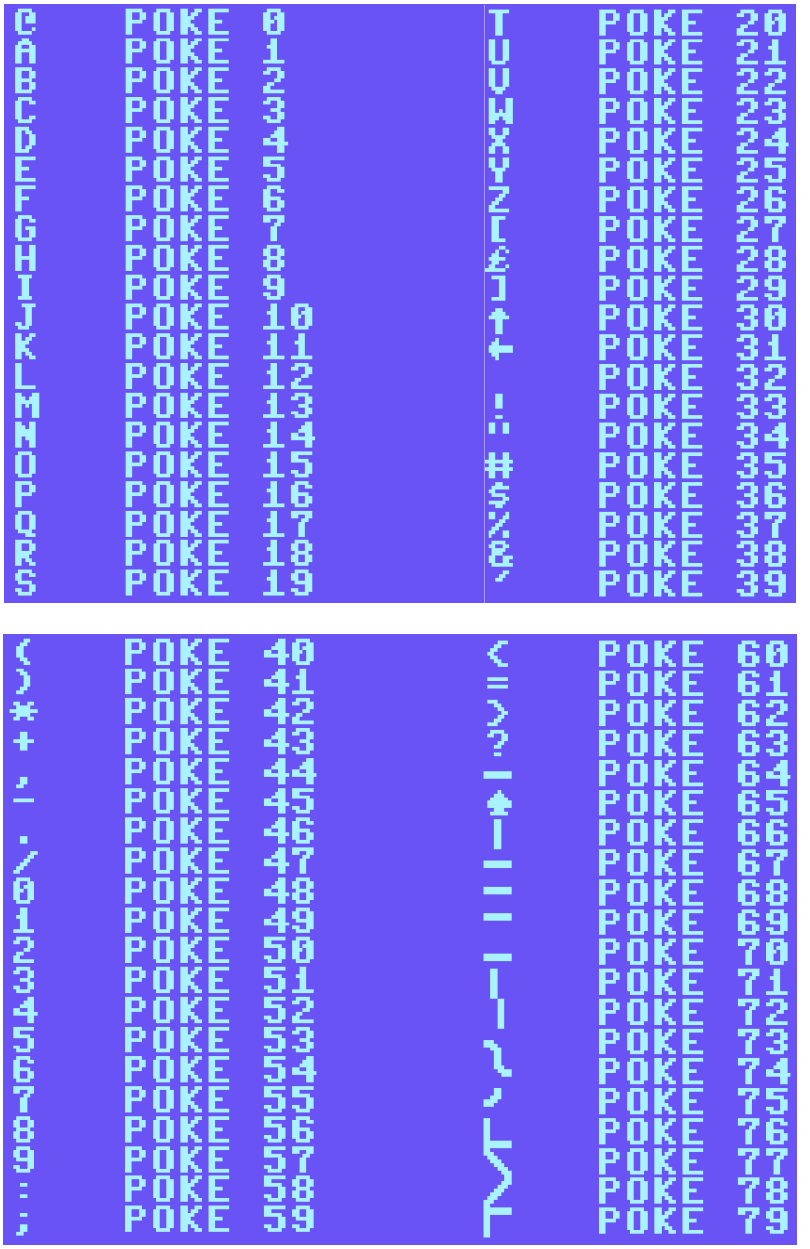
The first step gets a file listing of the d64 disk. The second step copies the PRG file from the d64 disk to the current folder you are working in. The petcat command will convert the program listing in the PRG file to a standard text file. The last step changes the file owner from root to you. Now you can view the program listing in a text program like Notepad++, Kate or LibreOffice Writer.

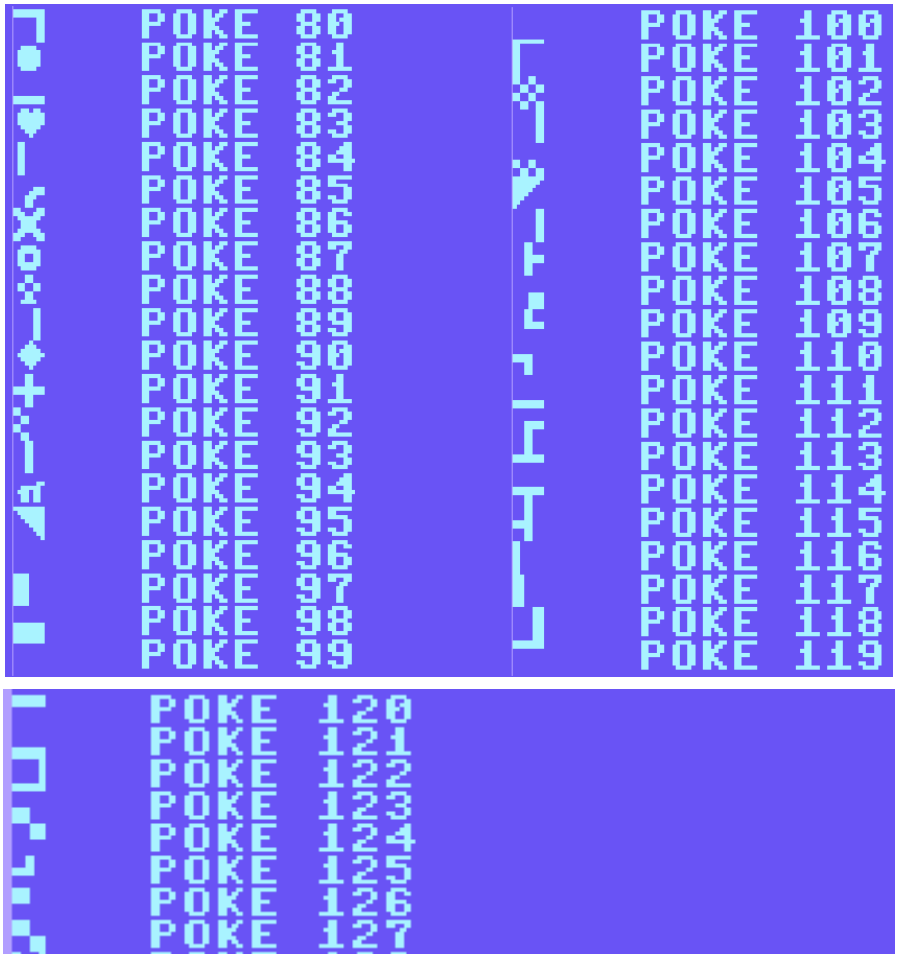
Mnemonics Used By ‘petcat’ for C64 Special Chars

{BLK}	Black
{BLU}	Blue
{BRN}	Brown
{CLR}	Clear the screen
{CYN}	Cyan
{DEL}	Delete
{DOWN}	Cursor down
{GRN}	Green
{GRY1}	Grey #1
{GRY2}	Grey #2
{GRY3}	Grey #3
{HOME}	Home
{INST}	Insert
{LBLU}	Light blue
{LEFT}	Cursor left
{LGRN}	Light green
{LRED}	Light red
{ORNG}	Orange
{PUR}	Purple
{RED}	Red
{RGHT}	Right
{RVOF}	Reverse off
{RVON}	Reverse on
{UP}	Cursor up
{WHT}	White
{YEL}	Yellow

List of Poke Codes:

Note: To get the reverse image, add 127 to the poke code.





Here is a short program to display all the characters/symbols and their poke codes:

```
10 X=0
20 P1=1064:P2=55336:C=0
30 PRINT"{CLR/HOME}{CYAN}"
40 IFX=256THEN120
50 PRINT"{4 RIGHT ARROWS}POKE";
60 POKEP1,X
70 POKEP2,3
80 P1=P1+40:P2=P2+40:C=C+1:X=X+1
90 IFC<20THEN40
100 GETA$:IFA$=""THEN100
110 GOTO20
120 END
```

CHR$ Codes:

Usage: “PRINT CHR$(35)” will display the “#” symbol.

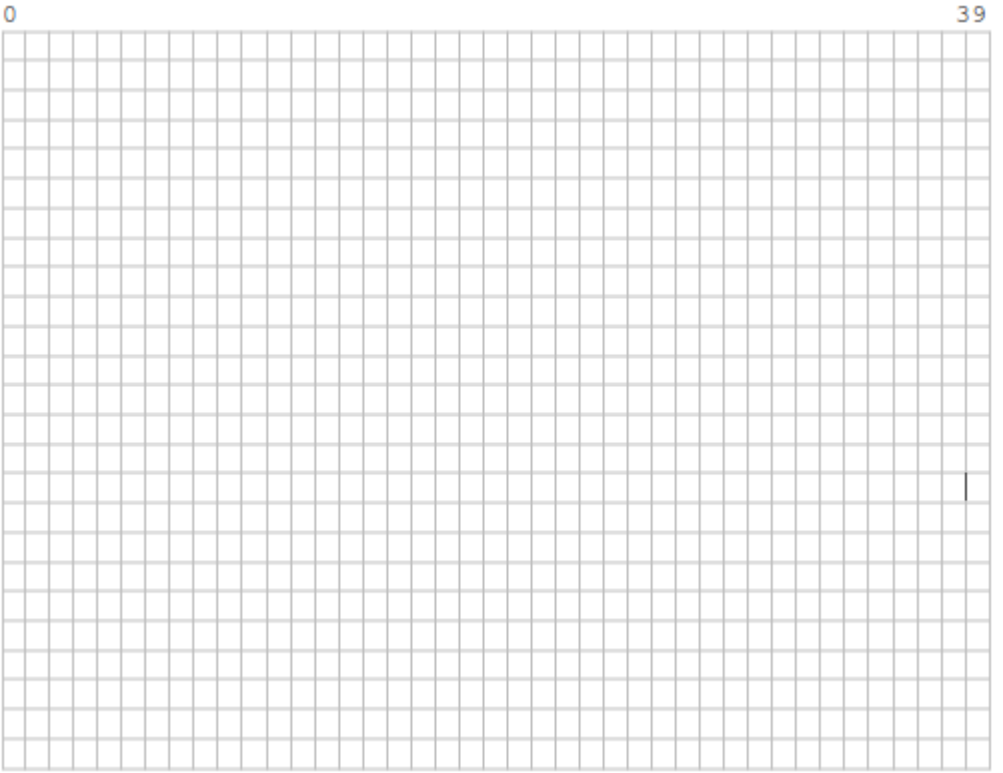
CHR$(5) = White	CHR$(101)= 
CHR$(13) = Return	CHR$(102)= 
CHR$(14) = Lower case	CHR$(103)= 
CHR$(17) = Cursor up	CHR$(104)= 
CHR$(18) = RVS ON	CHR$(105)= 
CHR$(19) = CLR/HOME	CHR$(106)= 
CHR$(20) = Ins/Del	CHR$(107)= 
CHR$(28) = Red	CHR$(108)= 
CHR$(29) = Cursor Rt	CHR$(109)= 
CHR$(30) = Green	CHR$(110)= 
CHR$(31) = Blue	CHR$(111)= 
CHR$(32) = Space	CHR$(112)= 
CHR$(33) = !	CHR$(113)= 
CHR$(34) = "	CHR$(114)= 
CHR$(35) = #	CHR$(115)= 
CHR$(36) = $	CHR$(116)= 
CHR$(37) = %	CHR$(117)= 
CHR$(38) = &	CHR$(118)= 
CHR$(39) = .	CHR$(119)= 
CHR$(40) = (	CHR$(120)= 
CHR$(41) =)	CHR$(121)= 
CHR$(42) = *	CHR$(122)= 
CHR$(43) = +	CHR$(123)= 
CHR$(44) = ,	CHR$(124)= 
CHR$(45) = -	CHR$(125)= 
CHR$(46) = .	CHR$(126)= 
CHR$(47) = /	CHR$(127)= 

CHR$(48) = 0	CHR$(142)= Upper Case
CHR$(49) = 1	CHR$(96) = 
CHR$(50) = 2	CHR$(97) = 
CHR$(51) = 3	CHR$(98) = 
CHR$(52) = 4	CHR$(99) = 
CHR$(53) = 5	CHR$(100)= 
CHR$(54) = 6	CHR$(144)= Black
CHR$(55) = 7	CHR$(145)= Cursor Up
CHR$(56) = 8	CHR$(146)= RVS OFF
CHR$(57) = 9	CHR$(147)= CLR/HOME
CHR$(58) = :	CHR$(148)= INST/DEL
CHR$(59) = ;	CHR$(156)= Purple
CHR$(60) = <	CHR$(157)= Cursor Left
CHR$(61) = =	CHR$(158)= Yellow
CHR$(62) = >	CHR$(159)= Cyan
CHR$(63) = ?	CHR$(160)= Space
CHR$(64) = @	CHR$(161)= 
CHR$(65) = A	CHR$(162)= 
CHR$(66) = B	CHR$(163)= 
CHR$(67) = C	CHR$(164)= 
CHR$(68) = D	CHR$(165)= 
CHR$(69) = E	CHR$(166)= 
CHR$(70) = F	CHR$(167)= 
CHR$(71) = G	CHR$(168)= 
CHR$(72) = H	CHR$(169)= 
CHR$(73) = I	CHR$(170)= 
CHR$(74) = J	CHR$(171)= 
CHR$(75) = K	CHR$(172)= 
CHR$(76) = L	CHR$(173)= 

CHR$(77) = M	CHR$(174)= 
CHR$(78) = N	CHR$(175)= 
CHR$(79) = O	CHR$(176)= 
CHR$(80) = P	CHR$(177)= 
CHR$(81) = Q	CHR$(178)= 
CHR$(82) = R	CHR$(179)= 
CHR$(83) = S	CHR$(180)= 
CHR$(84) = T	CHR$(181)= 
CHR$(85) = U	CHR$(182)= 
CHR$(86) = V	CHR$(183)= 
CHR$(87) = W	CHR$(184)= 
CHR$(88) = X	CHR$(185)= 
CHR$(89) = Y	CHR$(186)= 
CHR$(90) = Z	CHR$(187)= 
CHR$(91) = [	CHR$(188)= 
CHR$(92) = 	CHR$(189)= 
CHR$(93) =]	CHR$(190)= 
CHR$(94) = 	CHR$(191)= 
CHR$(95) = 	

The Screen Maps:

The screen map is 40 columns x 25 rows. Column 0, Row 0 is the upper left corner and its poke number is 1024. To display a character in that position type, “POKE 1024,X” where ‘X’ is the code for the character you want to display at that location. The next block is 1025, then 1026, etc. until you reach the last block in the lower right corner which is 2023. The color map has the same grid except the number for the upper left block starts at 55296 and determines the color of the character displayed there. For example, ‘`POKE 1024, 26`’ and ‘`POKE 55296, 1`’ will display a white ‘Z’ in the upper left corner.



Intro To Sprites

Sprites use 63 bytes of data with one byte unused. The VIC-II memory registers start at 53248.

Turning Sprites On:

To turn a sprite on, add the bit values (x) of all the sprites you want to use and poke it to 53269,X. For example, to enable sprites 0 and 1, type `POKE 53269,3`.

Sprite #	7	6	5	4	3	2	1	0
Bit Value	128	64	32	16	8	4	2	1

Sprite Pointers:

Sprite	Pointer
0	2040
1	2041
2	2042
3	2043
4	2044
5	2045
6	2046
7	2047

Use the sprite pointers to tell the VIC-II chip where the data for the sprite is located. The corresponding address must be divisible by 64. For example, 640 / 10 = 64. Type POKE2041,10 to tell sprite #1 to use the data stored at location 10.

To load the sprite data to that location, you can use a FOR/NEXT loop.

```
10 FOR X=0TO62:READ
Z:POKE640+X,Z:NEXT
20 DATA  128,64,132,4,0,etc.
```

Sprite Coordinates:

These tell the VIC-II chip where to place the sprite on the screen.

Sprite	X Axis - Horizontal	Y Axis - Vertical
0	53248	53249
1	53250	53251
2	53252	53253
3	53254	53255
4	53256	53257
5	53258	53259
6	53260	53261
7	53262	53263

Most Significant Bit:

The highest value that can be assigned for the X Axis is 255; however, the screen is 320 pixels wide. In order to place the sprite in pixels 256-320, the most significant bit must be set for the sprite. To do this, refer to the bit chart under “Turning Sprites On” and add all the bit values for the sprites you wish to enable the MSB for. If you want to place sprites 0, 1 and 2 past the 255th pixel, you would type the following command: `POKE 53264,7`. Now, X Axis bits 0-64 correspond to pixels 256-320.

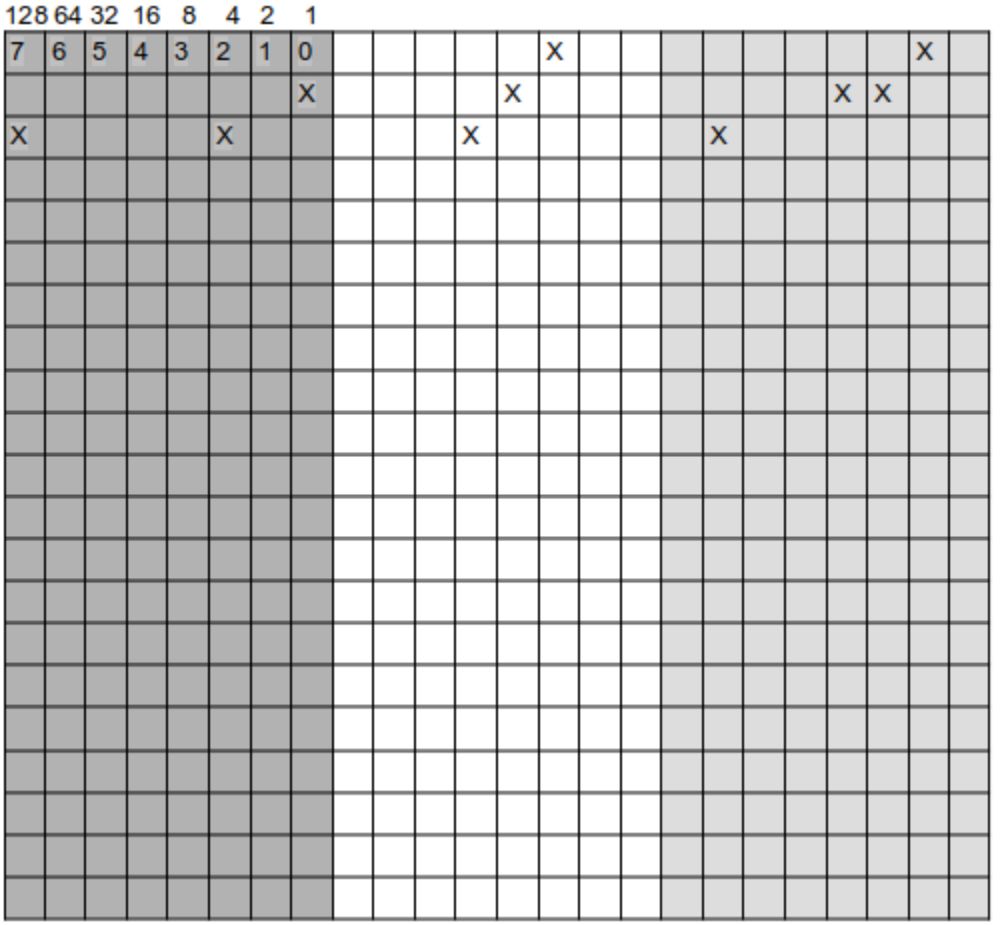
Sprite Colors:

To set the sprite color for high resolution (normal) sprites, poke the color number 0-15 into the sprite's corresponding color register. To make sprite 2 red, type `POKE 53289,2`.

Sprite	Register
0	53287
1	53288
2	53289
3	53290
4	53291
5	53292
6	53293
7	53294

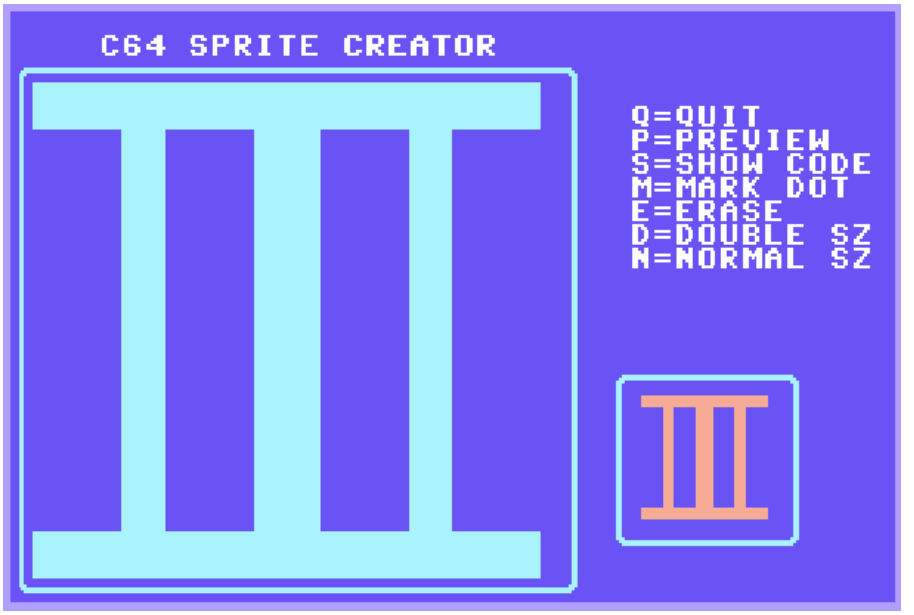
Sprite Map:

The sprite map is 24 columns by 21 rows. Each row contains 3 bytes (8 bits) representing dots for the sprite. You will calculate the value for the byte in the same way as in the “Turning Sprites On” section. As an example, the first rows three bytes would equal 0,4,2, the second row would equal 1,8,12, and the third row would equal 132, 16, 64 and so on. These would be “READ” in through “DATA” statements like the example in the “Sprite Pointers” section.



Sprite Example:

This is a sprite I created with C64 Sprite Creator:



And here is the code:

```
HERE IS THE SPRITE CODE:
DATA 255, 255, 254, 255, 255, 254, 12
DATA 56, 96, 12, 56, 96, 12, 56
DATA 96, 12, 56, 96, 12, 56, 96
DATA 12, 56, 96, 12, 56, 96, 12
DATA 56, 96, 12, 56, 96, 12, 56
DATA 96, 12, 56, 96, 12, 56, 96
DATA 12, 56, 96, 12, 56, 96, 12
DATA 56, 96, 12, 56, 96, 12, 56
DATA 96, 255, 255, 254, 255, 255, 254
HIT ANY KEY TO QUIT
```

Putting It All Together:

Here is a sample program to display the Roman Numeral III sprite:

```
10 V=53248:     REM START OF VIC CHIP
20 POKE2040,13: REM SPRITE 0 BLOCK 13
30 POKE53269,1: REM ENABLE SPRITE 0
40 FOR K=0TO62: REM LOAD DATA BLOCK 13
50 READ DT:POKE 832+K,(DT):NEXT K
60 POKEV+39,10: REM SPRITE 0 COLOR
70 POKEV+0,252: REM X POSITION
80 POKEV+1,180: REM Y POSITION
90 GETA$:IFA$=""THEN90
100 END
110 DATA 255,255,254,255,255,254,12
120 DATA 56,96,12,56,96,12,56
130 DATA 96,12,56,96,12,56,96
140 DATA 12,56,96,12,56,96,12
150 DATA 56,96,12,56,96,12,56
160 DATA 96,12,56,96,12,56,96
170 DATA 12,56,96,12,56,96,12
180 DATA 56,96,12,56,96,12,56
190 DATA 96,255,255,254,255,255,254
```

LED Draw 64

LED Draw 64 is a drawing program similar to the old Lite Brite toys. The 'M' key is used to light the led under the white 'X' cursor. The cursor is moved around the screen using the arrow keys. To change the color of the LEDs, use the number key 1 through 8 and Q,W,E,R,T,Y,U,I. This will cycle through all 16 colors. Use the 'B' key to change the border color and A,S,D,F,G,H,J,K to change the background color. LED Draw 64 can be downloaded at https://archive.org/details/LEDDraw64.c64 and you may view the demonstration video at https://youtu.be/suoMScCngQA.

Saving and Loading:

A new disk is needed for each picture, otherwise saving a new picture will overwrite the old one. Hit the 'Z' key to save your picture to the disk drive. When the drive LED goes off, the save is complete. Use the 'X' key to load the saved picture.

Note: To save multiple files to disk, you can change line 2055 to reflect the new file name (before you run the program). Also, to read the new file name, change line 2140.
Program Listing:

```
  1 GOSUB 3000
 10 PRINT"{CLR}"
 20 C=1:P1=32:P2=1:POKE56295,1
 30 M$="":BC=0:BR=0
 90 X=1024:Y=55296:REM X POSITION COLOR
100 POKE X,86:REM 'X' CHARACTER BALL 81
110 POKE Y,C:REM MAKE X WHITE
120 GET M$:IF M$="" THEN 120
121 IFM$=CHR$(77)THENP1=81
122 IFM$=CHR$(29) THEN GOTO 1000
123 IFM$=CHR$(157)THEN GOTO 1030
124 IFM$=CHR$(77) THEN POKE X,P1
125 IFM$=CHR$(77) THEN POKE Y,C
126 IFM$=CHR$(77)THENP1=PEEK(X)
127 IFM$=CHR$(77)THENP2=PEEK(Y)
130 IFM$=CHR$(77)THEN120
135 IFM$=CHR$(49)THENC=0
136 IFM$=CHR$(50)THENC=1
137 IFM$=CHR$(51)THENC=2
138 IFM$=CHR$(52)THENC=3
139 IFM$=CHR$(53)THENC=4
140 IFM$=CHR$(54)THENC=5
141 IFM$=CHR$(55)THENC=6
142 IFM$=CHR$(56)THENC=7
143 IFM$=CHR$(81)THENC=8:REM Q
144 IFM$=CHR$(87)THENC=9:REM W
145 IFM$=CHR$(69)THENC=10:REM E
146 IFM$=CHR$(82)THENC=11:REM R
147 IFM$=CHR$(84)THENC=12:REM T
148 IFM$=CHR$(89)THENC=13:REM Y
149 IFM$=CHR$(85)THENC=14:REM U
150 IFM$=CHR$(73)THENC=15:REM I
151 IFM$=CHR$(17)THEN1060
152 IFM$=CHR$(65)THEN POKE53281,0
153 IFM$=CHR$(83)THEN POKE53281,1
154 IFM$=CHR$(68)THEN POKE53281,2
155 IFM$=CHR$(70)THEN POKE53281,3
```

```
 156 IFM$=CHR$(71)THEN POKE53281,4
 157 IFM$=CHR$(72)THEN POKE53281,5
 158 IFM$=CHR$(74)THEN POKE53281,6
 159 IFM$=CHR$(75)THEN POKE53281,7
 160 IFM$=CHR$(90)THEN2050
 161 IFM$=CHR$(145)THEN1090
 162 IFM$=CHR$(88)THEN2130
 163 IFM$=CHR$(66)THENBR=BR+1
 164 IFBR=16THENBR=0
 165 IFM$=CHR$(66)THENPOKE53280,BR
 998 M$=CHR$(160)
 999 GOTO100
1000 REM RIGHT ARROW KEY ACTION
1005 POKEX,P1:POKEY,P2
1010 X=X+1:IF X>2023 THEN X=X-1
1011 Y=Y+1:IF Y>56295 THEN Y=Y-1
1015 P1=PEEK(X):P2=PEEK(Y)
1020 GOTO100
1030 REM LEFT ARROW KEY ACTION
1035 POKEX,P1:POKEY,P2
1040 X=X-1:IF X<1024 THEN X=X+1
1041 Y=Y-1:IF Y<55296 THEN Y=Y+1
1045 P1=PEEK(X):P2=PEEK(Y)
1050 GOTO100
1060 REM DOWN ARROW KEY ACTION
1065 POKEX,P1:POKEY,P2
1070 X=X+40:IF X>2023 THEN X=X-40
1071 Y=Y+40:IF Y>56295 THEN Y=Y-40
1075 P1=PEEK(X):P2=PEEK(Y)
1080 GOTO100
1090 REM UP ARROW KEY ACTION
1095 POKEX,P1:POKEY,P2
2000 X=X-40:IF X<1024 THEN X=X+40
2001 Y=Y-40:IF Y<55296 THEN Y=Y+40
2005 P1=PEEK(X):P2=PEEK(Y)
2010 GOTO100
2050 REM ***** SAVE PICTURE
2051 BC=PEEK(53281)
2055 OPEN 8,8,8,"@0:MYLEDPICTURE,W,S"
2060 A=1024:B=55296
2065 PRINT#8,BC
2070 A1=PEEK(A):B1=PEEK(B)
```

```
2080 PRINT#8,A1:PRINT#8,B1
2090 A=A+1:B=B+1
2100 IF A=2024 THEN CLOSE8
2110 IF A=2024 THEN 100
2120 GOTO 2070
2130 REM ***** LOAD PICTURE
2131 PRINT"{CLR}"
2135 A=1024:B=55296:A1=0:B1=0
2140 OPEN 8,8,8,"MYLEDPICTURE,R,S"
2141 INPUT#8,BC:POKE53281,BC
2145 INPUT#8,A1,B1
2150 POKEA,A1:POKEB,B1
2160 A=A+1:B=B+1
2170 IFA=2024THENCLOSE8
2180 IFA=2024THEN100
2190 GOTO2145
3000 PRINT"{CLR}"
3010 PRINT"WELCOME TO LED DRAW 64"
3020 PRINT"BY JOSEPH GORDON 13DEC2020"
3030 PRINT""
3040 PRINT"USE ARROW KEYS TO MOVE"
3050 PRINT"HIT 'M' TO LIGHT LED"
3060 PRINT"USE 1-8 TO CHANGE LED COLOR"
3070 PRINT"USE Q-O TO CHANGE LED COLOR"
3080 PRINT"USE A-K TO CHANGE BACKGROUND"
3090 PRINT"USE 'B' TO CHANGE BORDER"
3100 PRINT"HIT 'Z' TO SAVE PICTURE"
3110 PRINT"HIT 'X' TO LOAD PICTURE"
3120 PRINT""
3130 PRINT"USE NEW DISK FOR EACH PIC"
3140 PRINT""
3150 PRINT"HIT A KEY TO CONTINUE"
3160 GET C$:IF C$="" THEN 3160
3170 RETURN
```

Basic Electronics Formulas

This program has a resistor chart and an option to find the value of a resistor by reading it's color code. The other options on the menu are for finding the power (watts), resistance (ohms), the current (amps) and the voltage of a circuit, as long as you know two of the other values.

Program Listing:

```
10 REM BASIC ELECTRONICS FORMULAS
20 PRINT"{CLR}"
30 POKE53280,0:POKE53281,0
40 REM *** MAIN MENU
41 OP$=""
42 PRINT"POWER IS MEASURED IN WATTS"
44 PRINT"CURRENT IS MEASURED IN AMPS"
46 PRINT"RESISTANCE IS MEASURED IN OHMS"
48 PRINT"ENERGY IS MEASURED IN VOLTS"
49 PRINT""
50 PRINT"CHOOSE YOUR OPTION:"
```

```
 60 PRINT""
 70 PRINT"A) LOOK UP A RESISTOR'S VALUE"
 80 PRINT"B) FIND VOLTS IF AMPS  & OHMS ARE KNOWN"
 90 PRINT"C) FIND VOLTS IF WATTS & AMPS ARE KNOWN"
100 PRINT"D) FIND VOLTS IF WATTS & OHMS ARE KNOWN"
110 PRINT"E) FIND AMPS  IF VOLTS & OHMS ARE KNOWN"
120 PRINT"F) FIND AMPS  IF WATTS & VOLT ARE KNOWN"
130 PRINT"G) FIND AMPS  IF WATTS & OHMS ARE KNOWN"
140 PRINT"H) FIND OHMS  IF VOLTS & AMPS ARE KNOWN"
150 PRINT"I) FIND OHMS  IF WATTS & VOLT ARE KNOWN"
160 PRINT"J) FIND OHMS  IF WATTS & AMPS ARE KNOWN"
170 PRINT"K) FIND WATTS IF VOLTS & AMPS ARE KNOWN"
180 PRINT"L) FIND WATTS IF AMPS  & OHMS ARE KNOWN"
190 PRINT"M) FIND WATTS IF VOLTS & OHMS ARE KNOWN"
200 GETOP$:IF OP$=""THEN200
210 IFOP$="A"THEN500
215 IFOP$="B"THEN2000
220 IFOP$="C"THEN2050
225 IFOP$="D"THEN2100
230 IFOP$="E"THEN2150
235 IFOP$="F"THEN2200
240 IFOP$="G"THEN2250
245 IFOP$="H"THEN2300
250 IFOP$="I"THEN2350
255 IFOP$="J"THEN2400
260 IFOP$="K"THEN2450
265 IFOP$="L"THEN2500
270 IFOP$="M"THEN2550
275 GOTO200
500 REM *** RESISTOR MENU
501 B1=0:B2=0:B3=0:B4$="":B5$=""
502 T1$="":RL$=""
503 GOSUB3000
505 PRINT"{CLR}"
510 PRINT"0) BLACK"
511 PRINT"1) BROWN"
512 PRINT"2) RED"
513 PRINT"3) ORANGE"
514 PRINT"4) YELLOW"
515 PRINT"5) GREEN"
516 PRINT"6) BLUE"
517 PRINT"7) VIOLET"
```

```
518 PRINT"8) GRAY"
519 PRINT"9) WHITE"
520 PRINT""
521 PRINT"NOTE: BANDS 1 & 2 CAN'T BOTH BE ZERO!"
522 PRINT""
525 PRINT"SELECT COLOR OF FIRST BAND"
530 GETB1$:IFB1$="0"THENB1=0:GOTO545
531 IFB1$="1"THENB1=1:GOTO545
532 IFB1$="2"THENB1=2:GOTO545
533 IFB1$="3"THENB1=3:GOTO545
534 IFB1$="4"THENB1=4:GOTO545
535 IFB1$="5"THENB1=5:GOTO545
536 IFB1$="6"THENB1=6:GOTO545
537 IFB1$="7"THENB1=7:GOTO545
538 IFB1$="8"THENB1=8:GOTO545
539 IFB1$="9"THENB1=9:GOTO545
540 IFB1$=""THEN530
545 PRINT"SELECT COLOR OF SECOND BAND"
550 GETB2$:IFB2$="0"THENB2=0:GOTO565
551 IFB2$="1"THENB2=1:GOTO570
552 IFB2$="2"THENB2=2:GOTO570
553 IFB2$="3"THENB2=3:GOTO570
554 IFB2$="4"THENB2=4:GOTO570
555 IFB2$="5"THENB2=5:GOTO570
556 IFB2$="6"THENB2=6:GOTO570
557 IFB2$="7"THENB2=7:GOTO570
558 IFB2$="8"THENB2=8:GOTO570
559 IFB2$="9"THENB2=9:GOTO570
560 GOTO550
565 IFB1=0ANDB2=0THEN500
570 PRINT"{CLR}"
580 PRINT"0) BLACK"
581 PRINT"1) BROWN"
582 PRINT"2) RED"
583 PRINT"3) ORANGE"
584 PRINT"4) YELLOW"
585 PRINT"5) GREEN"
586 PRINT"6) BLUE"
587 PRINT"7) SILVER"
588 PRINT"8) GOLD"
590 PRINT""
600 PRINT"SELECT COLOR OF THIRD BAND"
```

```
601 GETB3$:IFB3$="0"THENB3=0:GOTO630
611 IFB3$="1"THENB3=1:GOTO630
612 IFB3$="2"THENB3=2:GOTO630
613 IFB3$="3"THENB3=3:GOTO630
614 IFB3$="4"THENB3=4:GOTO630
615 IFB3$="5"THENB3=5:GOTO630
616 IFB3$="6"THENB3=6:GOTO630
617 IFB3$="7"THENB3=7:GOTO630
618 IFB3$="8"THENB3=8:GOTO630
619 IFB3$="9"THENB3=9:GOTO630
620 GOTO601
630 PRINT"{CLR}"
635 PRINT"SELECT COLOR OF FOURTH BAND"
637 PRINT""
640 PRINT"0) SILVER"
650 PRINT"1) GOLD"
660 PRINT"2) NONE"
670 PRINT""
690 GETT1$:IFT1$=""THEN690
700 IFT1$="0"THENB4$="+/- 10%":GOTO740
710 IFT1$="1"THENB4$="+/- 5%":GOTO740
720 IFT1$="2"THENB4$="+/- 20%":GOTO740
730 GOTO690
740 PRINT"0) BROWN"
750 PRINT"1) RED"
760 PRINT"2) ORANGE"
770 PRINT"3) YELLOW"
780 PRINT"4) NONE"
785 PRINT""
786 PRINT"SELECT COLOR OF FIFTH BAND"
787 PRINT"(IF ONE EXISTS)"
790 GETRL$:IFRL$=""THEN790
800 IFRL$="0"THENB5$="1%":GOTO860
810 IFRL$="1"THENB5$="0.1%":GOTO860
820 IFRL$="2"THENB5$="0.01%":GOTO860
830 IFRL$="3"THENB5$="0.001%":GOTO860
840 IFRL$="4"THENB5$="":GOTO860
850 GOTO790
860 PRINT"{CLR}"
870 PRINT""
880 PRINT"YOUR RESISTOR IS ";
890 IFB3=7THENPRINT"0.";B1$;B2$;
```

```
  895 IFB3=7THEN1070
  910 IFB3=8THENPRINTB1$;".";B2$;
  925 IFB3=7ORB3=8THEN1070
  930 IFB1=0ANDB3=0THENPRINT"";
  940 IFB1=0ANDB3=1THENPRINT"0";
  950 IFB1=0ANDB3=2THENPRINT"00";
  960 IFB1=0ANDB3=3THENPRINT",000";
  970 IFB1=0ANDB3=4THENPRINT"0,000";
  980 IFB1=0ANDB3=5THENPRINT"00,000";
  990 IFB1=0ANDB3=6THENPRINT",000,000";
 1000 IFB1<>0ANDB3=0THENPRINTB1$;B2$;
 1005 IFB1<>0ANDB3=1THENPRINTB1$;B2$;
 1010 IFB1<>0ANDB3=1THENPRINT"0";
 1020 IFB1<>0ANDB3=2THENPRINTB1$;",";
 1025 IFB1<>0ANDB3=2THENPRINTB2$;"00";
 1030 IFB1<>0ANDB3=3THENPRINTB1$;B2$;
 1035 IFB1<>0ANDB3=3THENPRINT",000";
 1040 IFB1<>0ANDB3=4THENPRINTB1$;B2$;
 1045 IFB1<>0ANDB3=4THENPRINT"0,000";
 1050 IFB1<>0ANDB3=5THENPRINTB1$;",";
 1055 IFB1<>0ANDB3=5THENPRINTB2$;
 1056 IFB1<>0ANDB3=5THENPRINT"00,000";
 1060 IFB1<>0ANDB3=6THENPRINTB1$;B2$;
 1065 IFB1<>0ANDB3=6THENPRINT",000,000";
 1070 PRINT" OHMS":PRINT""
 1075 PRINT"THE TOLERANCE LEVEL IS: ";B4$
 1080 IFRL$<>"4"THENPRINT"THE RELIABILITY LEVEL IS:
";B5$
 1083 OP$=""
 1085 PRINT"":PRINT"(A)NOTHER OR (H)OME?"
 1090 GETOP$:IFOP$=""THEN1090
 1095 IFOP$="A"THEN500
 1096 IFOP$<>"H"THEN1090
 1097 PRINT"{CLR}"
 1098 GOTO40
 2000 REM * FIND VOLTS - CURRENT OHMS
 2005 AM=0:OM=0:V=0:OP$=""
 2010 PRINT"{CLR}"
 2015 PRINT"ENTER AMPS"
 2020 INPUTAM:IFAM=0THEN2020
 2025 PRINT"ENTER OHMS"
 2030 INPUTOM:IFOM=0THEN2030
```

```
2040 V=AM*OM:PRINT""
2042 PRINT"THERE ARE ";V;" VOLTS"
2044 PRINT"IN THIS CIRCUIT"
2045 PRINT""
2046 PRINT"(A)NOTHER OR (H)OME?"
2047 GETOP$:IFOP$="A"THEN2000
2048 IFOP$<>"H"THEN2047
2049 PRINT"{CLR}":GOTO40
2050 REM * FIND VOLTS - POWER CURRENT
2051 AM=0:WT=0:V=0:OP$=""
2055 PRINT"{CLR}":PRINT"ENTER AMPS"
2060 INPUTAM:IFAM=0THEN2060
2065 PRINT"ENTER WATTS"
2070 INPUTWT:IFWT=0THEN2070
2080 V=WT/AM:PRINT""
2090 PRINT"THERE ARE ";V;" VOLTS"
2091 PRINT"IN THIS CIRCUIT"
2092 PRINT"":PRINT"(A)NOTHER OR (H)OME?"
2094 GETOP$:IFOP$=""THEN2094
2095 IFOP$="A"THEN2050
2096 IFOP$<>"H"THEN2094
2098 PRINT"{CLR}":GOTO40
2100 REM * FIND VOLTS - WATTS OHMS
2105 V=0:WT=0:OM=0:OP$=""
2110 PRINT"{CLR}":PRINT"ENTER WATTS"
2115 INPUTWT:IFWT=0THEN2115
2120 PRINT"ENTER OHMS"
2125 INPUTOM:IFOM=0THEN2125
2130 V=SQR(WT*OM)
2135 PRINT"THERE ARE ";V;" VOLTS"
2136 PRINT"IN THIS CIRCUIT"
2140 PRINT"":PRINT"(A)NOTHER OR (H)OME?"
2142 GETOP$:IFOP$=""THEN2142
2144 IFOP$="A"THEN2100
2146 IFOP$<>"H"THEN2142
2148 PRINT"{CLR}":GOTO40
2150 REM * FIND AMPS - VOLTS OHMS
2155 V=0:AM=0:OM=0:OP$=""
2160 PRINT"{CLR}":PRINT"ENTER VOLTS"
2165 INPUTV:IFV=0THEN2165
2170 PRINT"ENTER OHMS"
2175 INPUTOM:IFOM=0THEN2175
```

```
2180 AM=V/OM
2185 PRINT"THERE ARE ";AM;" AMPS"
2186 PRINT"IN THIS CIRCUIT"
2190 PRINT"":PRINT"(A)NOTHER OR (H)OME?"
2192 GETOP$:IFOP$="A"THEN2155
2194 IFOP$<>"H"THEN2192
2196 PRINT"{CLR}":GOTO40
2200 REM * FIND CURRENT - WATTS VOLTS
2205 V=0:AM=0:WT=0:OP$=""
2210 PRINT"{CLR}":PRINT"ENTER VOLTS"
2215 INPUTV:IFV=0THEN2215
2220 PRINT"ENTER WATTS"
2225 INPUTWT:IFWT=0THEN2225
2230 AM=WT/V
2235 PRINT"THERE ARE ";AM;" AMPS"
2236 PRINT"IN THIS CIRCUIT"
2240 PRINT"":PRINT"(A)NOTHER OR (H)OME?"
2242 GETOP$:IFOP$="A"THEN2200
2244 IFOP$<>"H"THEN2242
2246 PRINT"{CLR}":GOTO 40
2250 REM * FIND CURRENT - WATTS OHMS
2255 OM=0:AM=0:WT=0:OP$=""
2260 PRINT"{CLR}":PRINT"ENTER WATTS"
2265 INPUTWT:IFWT=0THEN2265
2270 PRINT"ENTER OHMS"
2275 INPUTOM:IFOM=0THEN2275
2280 AM=SQR(WT/OM)
2285 PRINT"THERE ARE ";AM;" AMPS"
2286 PRINT"IN THIS CIRCUIT"
2290 PRINT"":PRINT"(A)NOTHER OR (H)OME?"
2292 GETOP$:IFOP$="A"THEN2250
2294 IFOP$<>"H"THEN2292
2296 PRINT"{CLR}":GOTO40
2300 REM * FIND OHMS - VOLTS AMPS
2305 OM=0:AM=0:V=0:OP$=""
2310 PRINT"{CLR}":PRINT"ENTER VOLTS"
2315 INPUTV:IFV=0THEN2315
2320 PRINT"ENTER AMPS"
2325 INPUTAM:IFAM=0THEN2325
2330 OM=V/AM
2335 PRINT"RESISTANCE OF THIS CIRCUIT:"
2336 PRINTOM;" OHMS"
```

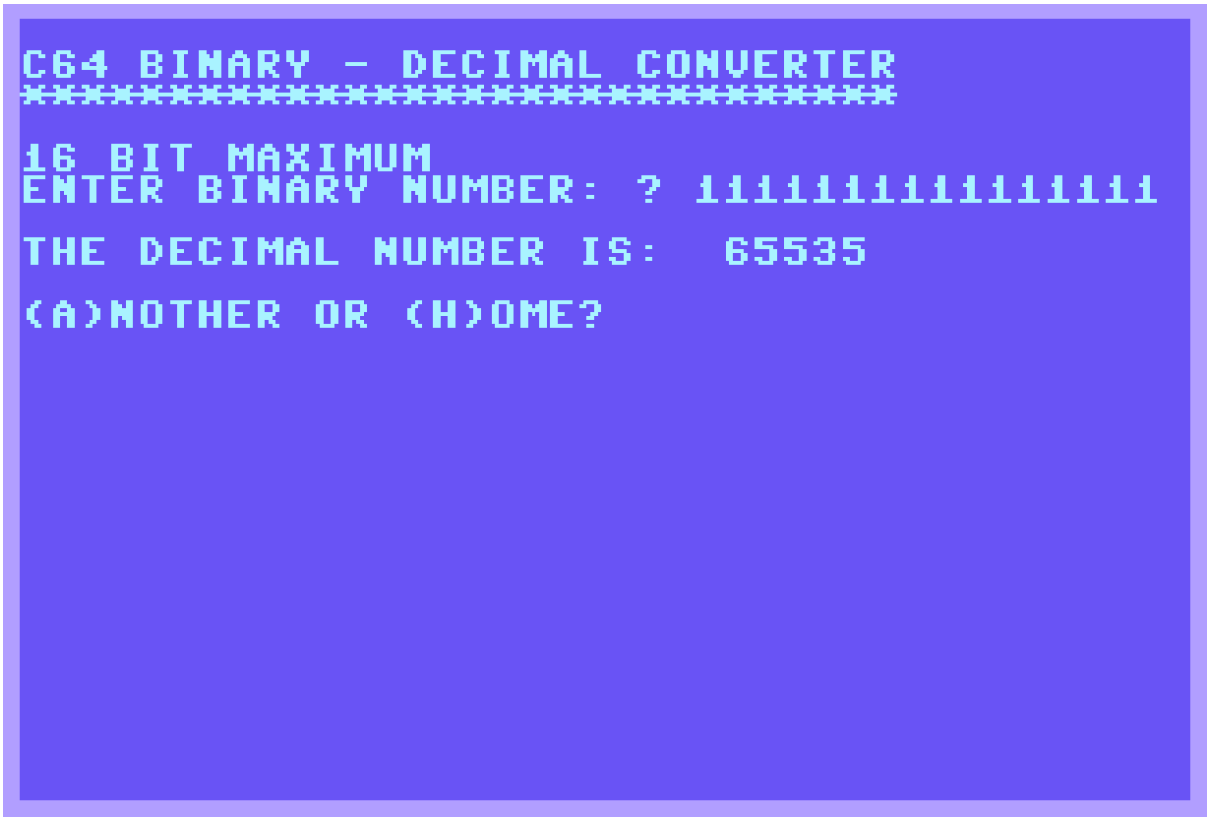
```
2340 PRINT"":PRINT"(A)NOTHER OR (H)OME?"
2342 GETOP$:IFOP$="A"THEN2300
2344 IFOP$<>"H"THEN2342
2346 PRINT"{CLR}":GOTO40
2350 REM * FIND OHMS - VOLTS WATTS
2355 OM=0:WT=0:V=0:OP$=""
2360 PRINT"{CLR}":PRINT"ENTER VOLTS"
2365 INPUTV:IFV=0THEN2365
2370 PRINT"ENTER WATTS"
2375 INPUTWT:IFWT=0THEN2375
2380 OM=V^2/WT
2385 PRINT"RESISTANCE OF THIS CIRCUIT:"
2386 PRINTOM;" OHMS"
2390 PRINT"":PRINT"(A)NOTHER OR (H)OME?"
2392 GETOP$:IFOP$="A"THEN2350
2394 IFOP$<>"H"THEN2392
2396 PRINT"{CLR}":GOTO40
2400 REM * FIND OHMS - WATTS AMPS
2405 OM=0:WT=0:AM=0:OP$=""
2410 PRINT"{CLR}":PRINT"ENTER AMPS"
2415 INPUTAM:IFAM=0THEN2415
2420 PRINT"ENTER WATTS"
2425 INPUTWT:IFWT=0THEN2425
2430 OM=WT/AM^2
2435 PRINT"RESISTANCE OF THIS CIRCUIT:"
2436 PRINTOM;" OHMS"
2440 PRINT"":PRINT"(A)NOTHER OR (H)OME?"
2442 GETOP$:IFOP$="A"THEN2400
2444 IFOP$<>"H"THEN2442
2446 PRINT"{CLR}":GOTO40
2450 REM * FIND POWER - AMPS VOLTS
2455 V=0:WT=0:AM=0:OP$=""
2460 PRINT"{CLR}":PRINT"ENTER AMPS"
2465 INPUTAM:IFAM=0THEN2465
2470 PRINT"ENTER VOLTS"
2475 INPUTV:IFV=0THEN2475
2480 WT=AM*V
2485 PRINT"THE POWER OF THIS CIRCUIT IS"
2486 PRINTWT;" WATTS"
2490 PRINT"":PRINT"(A)NOTHER OR (H)OME?"
2492 GETOP$:IFOP$="A"THEN2450
2494 IFOP$<>"H"THEN2492
```

```
2496 PRINT"{CLR}":GOTO40
2500 REM * FIND POWER - AMPS OHMS
2505 OM=0:WT=0:AM=0:OP$=""
2510 PRINT"{CLR}":PRINT"ENTER AMPS"
2515 INPUTAM:IFAM=0THEN2515
2520 PRINT"ENTER OHMS"
2525 INPUTOM:IFOM=0THEN2525
2530 WT=AM^2*OM
2535 PRINT"THE POWER OF THIS CIRCUIT IS"
2536 PRINTWT;" WATTS"
2540 PRINT"":PRINT"(A)NOTHER OR (H)OME?"
2542 GETOP$:IFOP$="A"THEN2500
2544 IFOP$<>"H"THEN2542
2546 PRINT"{CLR}":GOTO40
2550 REM * FIND POWER - VOLTS OHMS
2555 OM=0:WT=0:V=0:OP$=""
2560 PRINT"{CLR}":PRINT"ENTER VOLTS"
2565 INPUTV:IFV=0THEN2565
2570 PRINT"ENTER OHMS"
2575 INPUTOM:IFOM=0THEN2575
2580 WT=V^2/OM
2585 PRINT"THE POWER OF THIS CIRCUIT IS"
2586 PRINTWT;" WATTS"
2590 PRINT"":PRINT"(A)NOTHER OR (H)OME?"
2592 GETOP$:IFOP$="A"THEN2550
2594 IFOP$<>"H"THEN2592
2596 PRINT"{CLR}":GOTO40
3000 PRINT"{CLR}"
3010 Y=55339:FOR X=1067TO1079
3020 POKEX,102:POKEY,15
3030 Y=Y+1:NEXTX
3040 Y=55379:FORX=1107TO1119
3050 POKEX,102:POKEY,15
3060 Y=Y+1:NEXTX
3070 Y=55419:FORX=1147TO1159
3080 POKEX,102:POKEY,15
3090 Y=Y+1:NEXTX
3100 Y=55459:FORX=1187TO1199
3110 POKEX,102:POKEY,15
3120 Y=Y+1:NEXTX
3130 Y=55499:FORX=1227TO1239
3140 POKEX,102:POKEY,15
```

```
3150 Y=Y+1:NEXTX
3160 Y=55416:FORX=1144TO1146
3170 POKEX,64:POKEY,15
3180 Y=Y+1:NEXTX
3190 Y=55432:FORX=1160TO1162
3200 POKEX,64:POKEY,15
3210 Y=Y+1:NEXTX
3220 Y=55341:FORX=1068TO1228STEP40
3230 POKEX,102:POKEY,2
3240 Y=Y+40:NEXTX
3250 Y=55343:FORX=1070TO1230STEP40
3260 POKEX,102:POKEY,6
3270 Y=Y+40:NEXTX
3280 Y=55345:FORX=1072TO1232STEP40
3290 POKEX,102:POKEY,5
3300 Y=Y+40:NEXTX
3310 Y=55347:FORX=1074TO1234STEP40
3320 POKEX,102:POKEY,7
3330 Y=Y+40:NEXTX
3340 Y=55349:FORX=1076TO1236STEP40
3350 POKEX,102:POKEY,8
3360 Y=Y+40:NEXTX
3370 PRINT"{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}"
3380 PRINT"RESISTOR STANDARD COLOR CODE"
3390 PRINT"**************************"
3400 PRINT""
3410 PRINT"THE NUMBERS FOR THE FIRST 2 BANDS ARE:"
3420 PRINT"BLK=0, BRN=1, RED=2, ORN=3, YEL=4"
3430 PRINT"GRE=5, BLU=6, VLT=7, GRA=8, WHT=9"
3440 PRINT"EX: BROWN AND VIOLET = 17
3450 PRINT""
3460 PRINT"THE 3RD BAND IS THE MULTIPLIER:"
3470 PRINT"BLK=1, BRN=10, RED=100, ORN=1K, YEL=10K"
3480 PRINT"GRE=100K, BLU=1M, SLVR=0.01, GOLD=0.1"
3490 PRINT"EX: 17*10 (BROWN) = 170 OHMS"
3500 PRINT""
3510 PRINT"THE 4TH BAND IS THE TOLERANCE:"
3520 PRINT"SILVER=10%, GOLD=5%, NO COLOR=20%"
3530 PRINT""
3570 PRINT"PRESS ANY KEY TO CONTINUE"
3580 GETC$:IFC$=""THEN3580
3590 RETURN
```

Binary – Decimal Converter

With Binary/Decimal Converter, you can convert a 1 to 16 bit binary number to it's decimal value, or convert a decimal number between 0 and 65535 to it's binary value. You can download this program at: https://archive.org/details/c-64-binary-to-decimal-converter



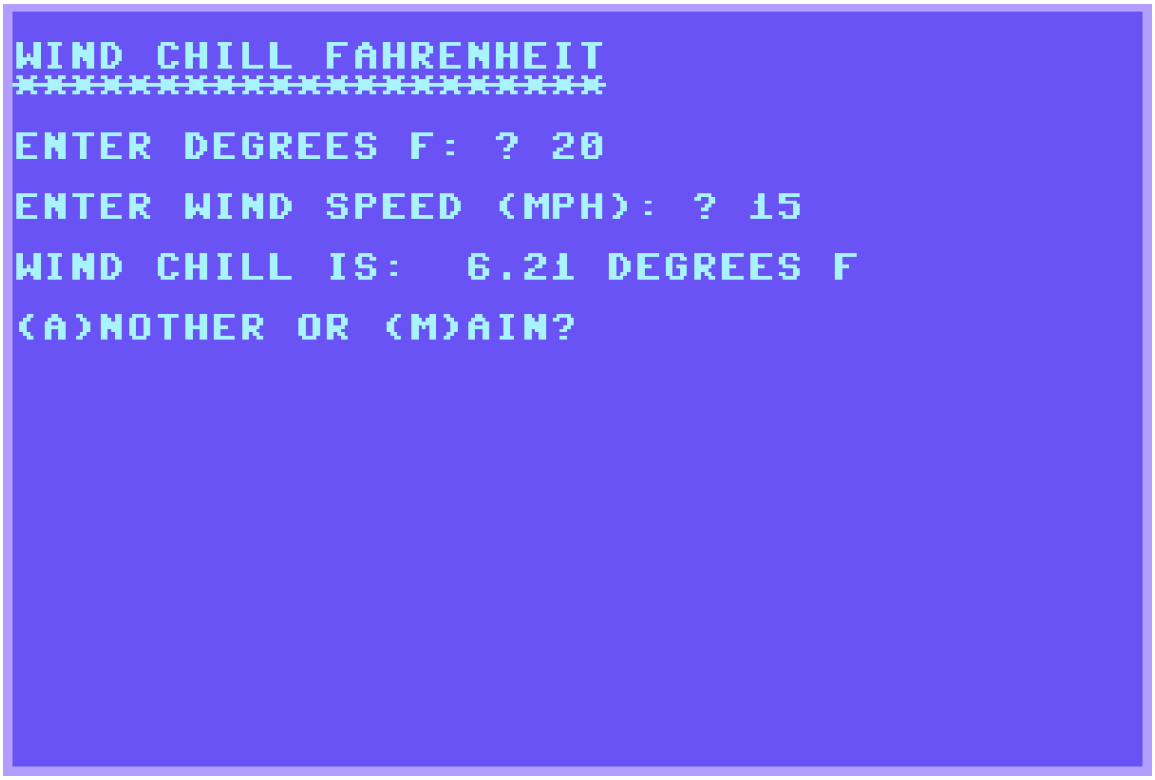
Program Listing:

```
 0 DIMDI$(16)
 1 PRINT"{CLR}{CYN}"
 2 PRINT"A) BINARY TO DECIMAL OR"
 3 PRINT"B) DECIMAL TO BINARY?"
 4 GETQ$:IFQ$="B"THEN250
 5 IFQ$<>"A"THEN4
10 REM BINARY TO DECIMAL CONVERTER
20 A$="":A=0:DI=0:C=0:CO=0:X=0:Q$=""
30 PRINT"{CLR}{CYN}"
```

```
 40 PRINT"C64 BINARY - DECIMAL CONVERTER"
 45 PRINT"******************************"
 70 PRINT"":PRINT"16 BIT MAXIMUM"
 80 INPUT"ENTER BINARY NUMBER: ";BI$
 90 A=LEN(BI$):IFA>16THEN80
100 FORC=1TOA
110 IFVAL(MID$(BI$,C,1))=0THEN140
120 IFVAL(MID$(BI$,C,1))=1THEN140
130 GOTO80
140 NEXTC
145 A=A-1
150 FORX=ATO0STEP-1:CO=CO+1
160 DI=DI+VAL(MID$(BI$,CO,1))*2^(X)
165 NEXTX
170 PRINT""
180 PRINT"THE DECIMAL NUMBER IS: ";DI
190 PRINT""
200 PRINT"(A)NOTHER OR (H)OME?"
210 GETQ$:IFQ$=""THEN210
220 IFQ$="A"THEN10
230 GOTO1
250 A=0:A$="":Z=0:Q$=""
330 PRINT"{CLR}"
335 PRINT"C64 DECIMAL-BINARY CONVERTER"
336 PRINT"****************************"
337 PRINT""
340 INPUT"ENTER NUMBER (0-65535) ";A$
350 A=VAL(A$)
360 IFA<0ORA>65535THEN340
361 FORX=15TO0STEP-1
362 IFA-2^X>=0THENDI$(X)="1":A=A-2^X:GOTO364
363 IFA-2^X<0THENDI$(X)="0"
364 NEXTX
370 PRINT""
380 PRINT"YOUR BINARY NUMBER IS: ";
400 FORX=15TO0STEP-1
410 IFDI$(X)="0"ANDZ=0THEN430
415 IFDI$(X)="1"THENZ=1
420 PRINTDI$(X);
430 NEXTX
440 PRINT""
450 PRINT"":PRINT"(A)NOTHER OR (H)OME?"
460 GETQ$:IFQ$="A"THEN250
470 IFQ$<>"H"THEN460
480 GOTO1
```

Temperature Conversion & Wind Chill

This utility will convert Fahrenheit to Celsius, Celsius to Fahrenheit, and calculate the wind chill for both.



Program Listing:

```
10 TF=0:TC=0:WM=0:WK=0:A$="":W$=""
20 PRINT"{CLR/HOME}{CYAN}"
30 PRINT"MAIN MENU"
40 PRINT"*********"
50 PRINT""
60 PRINT"A) CONVERT FAHRENHEIT TO CELSIUS"
70 PRINT"B) CONVERT CELSIUS TO FAHRENHEIT"
80 PRINT"C) FIND WIND CHILL - FAHRENHEIT"
90 PRINT"D) FIND WIND CHILL - CELSIUS"
100 PRINT""
110 GETA$:IFA$=""THEN110
120 IFA$="A"THEN200
```

```
130 IFA$=”B”THEN400
140 IFA$=”C”THEN600
150 IFA$=”D”THEN800
160 GOTO110
200 PRINT”{CLR/HOME}”
210 PRINT”FAHRENHEIT TO CELSIUS”
220 PRINT”**********”
230 PRINT””
240 INPUT”ENTER DEGREES F: “;TF
250 TC=(5/9)*(TF-32)
260 PRINT””
270 PRINT”DEGREES CELSIUS =”;TC
280 PRINT””
290 PRINT”(A)NOTHER OR (M)AIN?”
300 GETA$:IFA$=”A”THEN200
310 IFA$<>”M”THEN300
320 GOTO10
400 PRINT”{CLR/HOME}”
410 PRINT”CELSIUS TO FAHRENHEIT”
420 PRINT”**********”
430 PRINT””
440 INPUT”ENTER DEGREES C: “;TC
450 TF=(9/5)*TC+32
460 PRINT””
470 PRINT”DEGREES FAHRENHEIT =”;TF
480 PRINT””
490 PRINT”(A)NOTHER OR MAIN?”
500 GETA$:IFA$=”A”THEN400
510 IFA$<>”M”THEN500
520 GOTO10
600 PRINT”{CLR/HOME}”
610 PRINT”WIND CHILL FAHRENHEIT”
620 PRINT”**********”
630 PRINT””
640 INPUT”ENTER DEGREES F: “;TF
650 PRINT””
660 INPUT”ENTER WIND SPEED (MPH): “;WM
670 PRINT””
671 WC=35.74+(.6215*TF)-(35.75*WM{UP ARROW}.16)+
(.4275*TF*WM{UP ARROW}.16)
672 W$=STR(WC)
674 FORX=1TOLEN(W$)
```

```
675 IFMID$(,X,1)=”.”THEN677
676 NEXTX
677 WC=VAL(LEFT$(W$,X+2))
680 PRINT”WIND CHILL IS: ”;WC;”DEGREES F”
690 PRINT””
700 PRINT”(A)NOTHER OR (M)AIN?”
710 GETA$:IFA$=”A”THEN600
720 IFA$<>”M”THEN710
730 GOTO10
800 PRINT”{CLR/HOME}”
810 PRINT”WIND CHILL CELSIUS”
820 PRINT”******************”
830 PRINT””
840 INPUT”ENTER DEGREES C: “;TC
850 PRINT””
860 INPUT”ENTER WIND SPEED (KPH): “;WK
870 PRINT””
871 WC=13.12+(.6215*TC)-11.37*WK{UP
ARROW}.16+.3965*TC*WK{UP ARROW}.16
872 W$=STR$(WC)
874 FORX=1TOLEN(W$)
875 IFMID$(W$,X,1)=”.”THEN877
876 NEXTX
877 WC=VAL(LEFT$(W$,X+2))
880 PRINT”WIND CHILL IS: “;WC;”DEGREES C”
890 PRINT””
900 PRINT”(A)NOTHER OR (M)AIN?”
910 GETA$:IFA$=”A”THEN800
920 IFA$<>”M”THEN910
930 GOTO10
```

Enigmuh Code Generator

The Enigmuh Cipher Code Generator is a way to transmit secret messages to friends or to get around social media censorship. Although modeled after the German Enigma machines, it is just a simple coding method. When starting the program, you will be asked for three wheel codes ranging from A-Z and 0-9. Next, you will be asked if you want to encrypt or decrypt a message. After answering the questions, the C64 will draw the machine and you can begin typing when the blue light in the upper right comes on. You may hear a buzzer and see a red light in the upper right corner when encrypting a message if you try to type a character not shown on the Enigmuh machine's screen. The characters on the screen will briefly illuminate and the wheels in the upper left corner will advance when a key is pressed just like on the real Enigma. The Enigmuh has a 240 character limit and you can take a screenshot of the encrypted text and send it to your friends or post it to social media. Available at:
https://archive.org/details/c-64-enigmuh-code-generator

Number Of Days

This program will calculate how many days you have been alive. It will also calculate the number of days between any two dates between 01 Jan 1901 and 31 Dec 2099. Just substitute the starting date for the date of birth and the ending date for the current date. If you want to include the end date, just add one to the total. Note:1582 was the start of the Gregorian calendar.

Program Listing:

```
    5 REM 10FEB2010-04JAN2021=3981DAYS
    6 REM HTTPS://TIMEANDDATE.COM/DATE/DURATION.HTML?
TI=ON
    7 REM USED ABOVE WEBSITE TO VERIFY
   10 DIMJA(31):DIMFE(28):DIMMA(31)
   20 DIMAP(30):DIMMY(31):DIMJN(30)
   30 DIMJL(31):DIMAU(31):DIMSE(30)
   40 DIMOC(31):DIMNV(30):DIMDE(31)
   45 DIMDA$(9)
   70 FORX=1TO31:READJA(X):NEXT:REM JAN
   80 FORX=1TO28:READFE(X):NEXT:REM FEB
   90 FORX=1TO31:READMA(X):NEXT:REM MAR
  100 FORX=1TO30:READAP(X):NEXT:REM APR
  110 FORX=1TO31:READMY(X):NEXT:REM MAY
  120 FORX=1TO30:READJN(X):NEXT:REM JUN
  130 FORX=1TO31:READJL(X):NEXT:REM JUL
  140 FORX=1TO31:READAU(X):NEXT:REM AUG
  150 FORX=1TO30:READSE(X):NEXT:REM SEP
  160 FORX=1TO31:READOC(X):NEXT:REM OCT
  170 FORX=1TO30:READNV(X):NEXT:REM NOV
  180 FORX=1TO31:READDE(X):NEXT:REM DEC
  190 REM *** GET START DATE
  194 M1=0:M2=0:D1=0:D2=0
  195 Y1=0:Y2=0:Y3=0:Y4=0
  196 FORX=1TO9:DA$(X)=" ":NEXTX
  200 PRINT"{CLR}"
  202 PRINT"** ENTER YEARS BETWEEN 1901 AND 2099 **"
  204 FORX=1TO5000:NEXTX
  206 PRINT"{CLR}"
  210 PRINT"HOW MANY DAYS HAVE YOU ";
```

```
220 PRINT"BEEN ALIVE?":PRINT""
230 INPUT"ENTER BIRTH MONTH #";M1
240 IFM1<1ORM1>12THEN230
250 INPUT"ENTER BIRTH DAY #";D1
260 IFD1<1ORD1>31THEN250
270 INPUT"ENTER BIRTH YEAR (YYYY)";Y1
280 IFY1<1901ORY1>2099THEN270
285 PRINT""
290 REM *** GET CURRENT DATE
300 INPUT"ENTER CURRENT MONTH #";M2
310 IFM2<1ORM2>12THEN300
320 INPUT"ENTER CURRENT DAY #";D2
330 IFD2<1ORD2>31THEN320
335 IFM2=2ANDD2=29THEND2=28
340 INPUT"ENTER CURRENT YEAR (YYYY)";Y2
350 IFY2<1901ORY2>2099THEN340
360 IFY2<Y1THEN340
400 REM *** CALCULATE DAYS
410 REM K0=JULIAN DATE FOR M1/D1
420 REM K1=365-DT0
430 REM K2=JULIAN DATE FOR M2/D2
440 REM K3=Y1-Y2-1
450 REM K4=NUMBER OF LEAP YEARS
460 REM K5=NUMBER OF DAYS TOTAL
470 K0=0:K1=0:K2=0:K3=0:K4=0
500 IFM1=1THENK0=JA(D1)
510 IFM1=2THENK0=FE(D1)
520 IFM1=3THENK0=MA(D1)
530 IFM1=4THENK0=AP(D1)
540 IFM1=5THENK0=MY(D1)
550 IFM1=6THENK0=JN(D1)
560 IFM1=7THENK0=JL(D1)
570 IFM1=8THENK0=AU(D1)
580 IFM1=9THENK0=SE(D1)
590 IFM1=10THENK0=OC(D1)
600 IFM1=11THENK0=NV(D1)
610 IFM1=12THENK0=DE(D1)
615 REM # DAYS FIRST YEAR
620 K1=INT(365-K0)
625 REM # DAYS LAST YEAR
630 IFM2=1THENK2=JA(D2)
640 IFM2=2THENK2=FE(D2)
```

```
  650 IFM2=3THENK2=MA(D2)
  660 IFM2=4THENK2=AP(D2)
  670 IFM2=5THENK2=MY(D2)
  680 IFM2=6THENK2=JN(D2)
  690 IFM2=7THENK2=JL(D2)
  700 IFM2=8THENK2=AU(D2)
  710 IFM2=9THENK2=SE(D2)
  720 IFM2=10THENK2=OC(D2)
  730 IFM2=11THENK2=NV(D2)
  740 IFM2=12THENK2=DE(D2)
  745 REM # DAYS MIDDLE YEARS
  750 Y3=INT(Y2-Y1):Y3=Y3-1
  760 K3=Y3*365
  765 REM # LEAP YEARS
  766 PK=123:PRINT"{DOWN}{DOWN}{DOWN}{DOWN}
{DOWN}CALCULATING"
  770 K4=0:FORZ=Y1TOY2
  780 P=0
  790 Y4=Z/4
  800 X$=STR$(Y4)
  810 XL=LEN(X$)
  820 FORC=1TOXL
  830 IFMID$(X$,C,1)="."THENP=1
  832 POKE1636,PK:POKE55908,1
  835 PK=PK+1:IFPK=125THENPK=123
  840 NEXTC
  850 IFP=1THENK4=K4+0
  860 IFP=0THENK4=K4+1
  870 IFZ=Y1ANDP=0ANDM1>2THENK4=K4-1
  880 IFZ=Y2ANDP=0ANDM2<3ANDD2<29THENK4=K4-1
  890 P=0:NEXTZ
  895 REM *** ADD ALL THE DAYS
  900 K5=K1+K2+K3+K4
  910 K$=STR$(K5)
  920 KL=LEN(K$)
  930 DB=3:DC=0
  940 FORX=KLTO1STEP-1
  945 IFMID$(K$,X,1)=" "THEN980
  950 DA$(DC)=MID$(K$,X,1):DB=DB-1:DC=DC+1
  960 IFDB=0THENDA$(DC)=",":DC=DC+1:DB=3
  970 NEXTX
  980 PRINT"":PRINT"TOTAL DAYS = ";
```

```
 990 FORX=DCTO0STEP-1
1000 PRINTDA$(X);:NEXTX
1010 PRINT" DAYS!"
1020 PRINT"":PRINT"TRY AGAIN? (Y/N)"
1030 GETA$:IFA$="Y"THEN190
1035 IFA$=""THEN1030
1040 END
5000 REM * (JA) JANUARY
5010 DATA1,2,3,4,5,6,7,8,9,10,11,12
5020 DATA13,14,15,16,17,18,19,20,21
5030 DATA22,23,24,25,26,27,28,29,30,31
5040 REM * (FE) FEBRUARY
5050 DATA32,33,34,35,36,37,38,39,40,41
5060 DATA42,43,44,45,46,47,48,49,50,51
5070 DATA52,53,54,55,56,57,58,59
5080 REM * (MA) MARCH
5090 DATA60,61,62,63,64,65,66,67,68,69
5100 DATA70,71,72,73,74,75,76,77,78,79
5110 DATA80,81,82,83,84,85,86,87,88,89
5120 DATA90
5130 REM * (AP) APRIL
5140 DATA91,92,93,94,95,96,97,98,99
5150 DATA100,101,102,103,104,105,106
5160 DATA107,108,109,110,111,112,113
5170 DATA114,115,116,117,118,119,120
5180 REM * (MY) MAY
5190 DATA121,122,123,124,125,126,127
5200 DATA128,129,130,131,132,133,134
5210 DATA135,136,137,138,139,140,141
5220 DATA142,143,144,145,146,147,148
5230 DATA149,150,151
5240 REM * (JN) JUNE
5250 DATA152,153,154,155,156,157,158
5260 DATA159,160,161,162,163,164,165
5270 DATA166,167,168,169,170,171,172
5280 DATA173,174,175,176,177,178,179
5290 DATA180,181
5300 REM * (JL) JULY
5310 DATA182,183,184,185,186,187,188
5320 DATA189,190,192,192,193,194,195
5330 DATA196,197,198,199,200,201,202
5340 DATA203,204,205,206,207,208,209
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```
5350 DATA210,211,212
5360 REM * (AU) AUGUST
5370 DATA213,214,215,216,217,218,219
5380 DATA220,221,222,223,224,225,226
5390 DATA227,228,229,230,231,232,233
5400 DATA234,235,236,237,238,239,240
5410 DATA241,242,243
5420 REM * (SE) SEPTEMBER
5430 DATA244,245,246,247,248,249,250
5440 DATA251,252,253,254,255,256,257
5450 DATA258,259,260,261,262,263,264
5460 DATA265,266,267,268,269,270,271
5470 DATA272,273
5480 REM * (OC) OCTOBER
5490 DATA274,275,276,277,278,279,280
5500 DATA281,282,283,284,285,286,287
5510 DATA288,289,290,291,292,293,294
5520 DATA295,296,297,298,299,300,301
5530 DATA302,303,304
5540 REM * (NV) NOVEMBER
5550 DATA305,306,307,308,309,310,311
5560 DATA312,313,314,315,316,317,318
5570 DATA319,320,321,322,323,324,325
5580 DATA326,327,328,329,330,331,332
5590 DATA333,334
5600 REM * (DE) DECEMBER
5610 DATA335,336,337,338,339,340,341
5620 DATA342,343,344,345,346,347,348
5630 DATA349,350,351,352,353,354,355
5640 DATA356,357,358,359,360,361,362
5650 DATA363,364,365
```

Enigmuh V2.0 Code Generator

This updated version of the Enigmuh Cipher Code Generator adds 12 new characters and a plug board that enhances the encryption. When you start the program, you will be asked to enter the three wheel codes that can be letters A-Z or numbers 0-9. Next, you will be asked if you want to encrypt or decrypt a message. Finally you will be asked to choose the plug board configuration. Choose a letter A-D for the first connection and a number 1-4 for the second. You can see a visual of this in the image below at center left. When the blue light in the upper right corner comes on, you may begin typing. https://archive.org/details/c-64-enigmuh-cipher-v-2

The program can be further strengthened by adding additional functions between lines 8210 and 8220 that will further alter the value of the variable PB. Just be sure that your recipient has a copy of the updated program:

```
8211 PB=PB+(P1*3)
8212 PB=PB-(P1*2)
8213 IF P1=4 THEN PB=PB*4
```

You could also change the values of PB in lines 8010 – 8210.

Program Listing:

```
  10 DIMCC$(64):DIMCP(64)
  11 REM ENCRYPT UP TO 240 CHARACTERS
  20 REM INCLUDES : / . @ AND SPACE
  30 REM BLUE LIGHT - CAN BEGIN TYPING
  40 REM LIGHT UP TYPED LETTER
  50 REM ENCODER WHEELS ADVANCE
  60 REM BUZZER 4 UNSUPPORTED CHARACTER
  70 REM CLICK FOR ACCEPTED CHARACTER
  80 REM TAKE SCREENSHOT OF ENCRYPTED -
  90 REM TEXT & POST TO SOCIAL MEDIA
  99 REM *** SET VARIABLES
 100 CN=0:DIMCH$(64):W1$="":W2$=""
 101 W3$="":W1=65:W2=65:W3=65:W4=48
 102 W5=48:Y=0:WC=0:GC=0
 105 P1$="":P1=0:P2=0:PB=0
 799 REM *** READ CHARACTERS
 800 FORX=0TO63:READCH$(CN)
 810 CN=CN+1:NEXTX
 900 REM *** GET WHEEL SETTINGS
 910 PRINT"{CLR}"
 920 PRINT"USE 0-9 & A-Z FOR WHEEL CODE"
 925 PRINT"ENTER CODE FOR WHEEL 1"
 930 GETA$:IFA$=""THEN930
 932 GOSUB9000
 935 IFA1<1THEN930
 936 IFA1>26ANDA1<48THEN930
 937 IFA1>57THEN930
 940 W1=A1
 960 PRINT"ENTER CODE FOR WHEEL 2"
```

```
  970 GETA$:IFA$=""THEN970
  972 GOSUB9000
  975 IFA1<1THEN970
  976 IFA1>26ANDA1<48THEN970
  977 IFA1>57THEN970
  980 W2=A1
 1000 PRINT"ENTER CODE FOR WHEEL 3"
 1010 GETA$:IFA$=""THEN1010
 1011 GOSUB9000:PRINT""
 1012 PRINT"(E)NCRYPT OR (D)ECRYPT"
 1013 PRINT""
 1014 GETD$:IFD$=""THEN1014
 1015 IFA1<1THEN1010
 1016 IFA1>26ANDA1<48THEN1010
 1017 IFA1>57THEN1010
 1020 W3=A1
 1021 PRINT"":PRINT"1ST PLUG BOARD CONNECTION
(A,B,C,D)"
 1022 GETP1$:IFP1$=""THEN1022
 1023 IFP1$="A"ORP1$="B"ORP1$="C"ORP1$="D"THEN1025
 1024 GOTO1022
 1025 PRINT"":PRINT"2ND PLUG BOARD CONNECTION
(1,2,3,4)"
 1026 GETP2:IFP2<1ORP2>4THEN1026
 1027 IFP2<1ORP2>4THEN1026
 1050 WC=INT(W1+W2-W3):IFWC<=0THENWC=1
 1051 PRINT"{CLR}"
 1055 REM *** POKE W1,W2,W3,W4,W5
 1060 POKE1186,W1:POKE55458,1
 1065 POKE1190,W2:POKE55462,1
 1070 POKE1194,W3:POKE55466,1
 1075 POKE1198,W4:POKE55470,1
 1080 POKE1202,W5:POKE55474,1
 1100 REM *** DRAW SCREENS
 1101 REM *** DRAW LINES
 1105 POKE53281,0:REM BLACK BACKGROUND
 1106 POKE53280,12:REM GREY2 BORDER
 1110 Y=55296:FORX=1024TO1063:REM LINE1
 1120 POKEX,102:POKEY,8:Y=Y+1:NEXTX
 1125 Y=55616:FORX=1344TO1383:REM LINE2
 1130 POKEX,102:POKEY,8:Y=Y+1:NEXTX
 1131 Y=55660:FORX=1388TO1508STEP40
```

```
 1132 POKEX,102:POKEY,8:Y=Y+40:NEXTX
 1133 Y=55691:FORX=1419TO1539STEP40
 1134 POKEX,102:POKEY,8:Y=Y+40:NEXTX
 1135 Y=55816:FORX=1544TO1584:REM LINE3
 1140 POKEX,102:POKEY,8:Y=Y+1:NEXTX
 1141 Y=55296:FORX=1024TO1984STEP40
 1142 POKEX,102:POKEY,8:Y=Y+40:NEXTX
 1143 Y=55335:FORX=1063TO2023STEP40
 1144 POKEX,102:POKEY,8:Y=Y+40:NEXTX
 1145 Y=56256:FORX=1984TO2023
 1146 POKEX,102:POKEY,8:Y=Y+1:NEXTX
 1149 REM *** DRAW WHEELS
 1150 Y=55378:FORX=1106TO1122STEP4
 1160 POKEX,114:POKEY,15:Y=Y+4:NEXTX
 1170 Y=55417:FORX=1145TO1163STEP4
 1180 POKEX,85:POKEY,15:Y=Y+4:NEXTX
 1190 Y=55418:FORX=1146TO1162STEP4
 2000 POKEX,113:POKEY,15:Y=Y+4:NEXTX
 2010 Y=55419:FORX=1147TO1163STEP4
 2020 POKEX,73:POKEY,15:Y=Y+4:NEXTX
 2030 Y=55457:FORX=1185TO1203STEP2
 2040 POKEX,66:POKEY,15:Y=Y+2:NEXTX
 2050 Y=55497:FORX=1225TO1241STEP4
 2060 POKEX,74:POKEY,15:Y=Y+4:NEXTX
 2070 Y=55498:FORX=1226TO1242STEP4
 2080 POKEX,114:POKEY,15:Y=Y+4:NEXTX
 2090 Y=55499:FORX=1227TO1243STEP4
 2100 POKEX,75:POKEY,15:Y=Y+4:NEXTX
 2110 Y=55538:FORX=1266TO1282STEP4
 2120 POKEX,91:POKEY,15:Y=Y+4:NEXTX
 2130 REM *** POKE CHARACTERS
 2134 PRINT"{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}ENIGMUH CIPHER"
 2140 POKE1395,17:POKE55667,7:REM Q
 2141 POKE1397,23:POKE55669,7:REM W
 2142 POKE1399,5 :POKE55671,7:REM E
 2143 POKE1401,18:POKE55673,7:REM R
 2144 POKE1403,20:POKE55675,7:REM T
 2145 POKE1405,26:POKE55677,7:REM Z
 2146 POKE1407,21:POKE55679,7:REM U
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```
2147 POKE1409,9 :POKE55681,7:REM I
2148 POKE1411,15:POKE55683,7:REM O
2149 POKE1413,46:POKE55685,7:REM .
2150 POKE1436,1 :POKE55708,7:REM A
2151 POKE1438,19:POKE55710,7:REM S
2152 POKE1440,4 :POKE55712,7:REM D
2153 POKE1442,6 :POKE55714,7:REM F
2154 POKE1444,7 :POKE55716,7:REM G
2155 POKE1446,8 :POKE55718,7:REM H
2156 POKE1448,10:POKE55720,7:REM J
2157 POKE1450,11:POKE55722,7:REM K
2158 POKE1452,47:POKE55724,7:REM /
2159 POKE1475,16:POKE55747,7:REM P
2160 POKE1477,25:POKE55749,7:REM Y
2161 POKE1479,24:POKE55751,7:REM X
2162 POKE1481,3 :POKE55753,7:REM C
2163 POKE1483,22:POKE55755,7:REM V
2164 POKE1484,32:POKE55756,7:REM SPACE
2165 POKE1485,2 :POKE55757,7:REM B
2166 POKE1487,14:POKE55759,7:REM N
2167 POKE1489,13:POKE55761,7:REM M
2168 POKE1491,12:POKE55763,7:REM L
2169 POKE1493,58:POKE55765,7:REM :
2170 POKE1514,48:POKE55786,7:REM 0
2171 POKE1516,49:POKE55788,7:REM 1
2172 POKE1518,50:POKE55790,7:REM 2
2173 POKE1520,51:POKE55792,7:REM 3
2174 POKE1522,52:POKE55794,7:REM 4
2175 POKE1524,53:POKE55796,7:REM 5
2176 POKE1526,54:POKE55798,7:REM 6
2177 POKE1528,55:POKE55800,7:REM 7
2188 POKE1530,56:POKE55802,7:REM 8
2189 POKE1532,57:POKE55804,7:REM 9
2190 POKE1534,0 :POKE55806,7:REM @
2200 POKE1140,64:POKE55412,12
2210 POKE1139,112:POKE55411,12
2220 POKE1141,110:POKE55413,12
2230 POKE1179,66:POKE55451,12
2240 POKE1181,66:POKE55453,12
2250 POKE1180,81:POKE55452,12:REM G DOT
2260 POKE1219,109:POKE55491,12
2270 POKE1221,125:POKE55493,12
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```
2280 POKE1220,64:POKE55492,12
2300 POKE1136,64:POKE55408,12
2310 POKE1135,112:POKE55407,12
2320 POKE1137,110:POKE55409,12
2330 POKE1175,66:POKE55447,12
2340 POKE1177,66:POKE55449,12
2350 POKE1176,81:POKE55448,12:REM R DOT
2360 POKE1215,109:POKE55487,12
2370 POKE1217,125:POKE55489,12
2380 POKE1216,64:POKE55488,12
2381 POKE1385,1:POKE55657,12:REM PB-A
2382 POKE1425,2:POKE55697,12:REM PB-B
2383 POKE1465,3:POKE55737,12:REM PB-C
2384 POKE1505,4:POKE55777,12:REM PB-D
2385 POKE1387,49:POKE55659,12:REM PB-1
2386 POKE1427,50:POKE55699,12:REM PB-2
2387 POKE1467,51:POKE55739,12:REM PB-3
2388 POKE1507,52:POKE55779,12:REM PB-4
2389 FORX=55658TO55778STEP40
2390 POKEX,10:NEXTX
2395 IFP1$="A"ANDP2=1THENPOKE1386,64
2400 IFP1$="A"ANDP2=2THENPOKE1386,73
2405 IFP1$="A"ANDP2=2THENPOKE1426,74
2410 IFP1$="A"ANDP2=3THENPOKE1386,73
2415 IFP1$="A"ANDP2=3THENPOKE1426,66
2420 IFP1$="A"ANDP2=3THENPOKE1466,74
2425 IFP1$="A"ANDP2=4THENPOKE1386,73
2430 IFP1$="A"ANDP2=4THENPOKE1426,66
2435 IFP1$="A"ANDP2=4THENPOKE1466,66
2440 IFP1$="A"ANDP2=4THENPOKE1506,74
2445 IFP1$="B"ANDP2=1THENPOKE1386,85
2450 IFP1$="B"ANDP2=1THENPOKE1426,75
2455 IFP1$="B"ANDP2=2THENPOKE1426,64
2460 IFP1$="B"ANDP2=3THENPOKE1426,73
2465 IFP1$="B"ANDP2=3THENPOKE1466,74
2470 IFP1$="B"ANDP2=4THENPOKE1426,73
2475 IFP1$="B"ANDP2=4THENPOKE1466,66
2480 IFP1$="B"ANDP2=4THENPOKE1506,74
2485 IFP1$="C"ANDP2=1THENPOKE1386,85
2490 IFP1$="C"ANDP2=1THENPOKE1426,66
2495 IFP1$="C"ANDP2=1THENPOKE1466,75
2500 IFP1$="C"ANDP2=2THENPOKE1426,85
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 2505 IFP1$="C"ANDP2=2THENPOKE1466,75
 2510 IFP1$="C"ANDP2=3THENPOKE1466,64
 2515 IFP1$="C"ANDP2=4THENPOKE1466,73
 2520 IFP1$="C"ANDP2=4THENPOKE1506,74
 2525 IFP1$="D"ANDP2=1THENPOKE1386,85
 2530 IFP1$="D"ANDP2=1THENPOKE1426,66
 2535 IFP1$="D"ANDP2=1THENPOKE1466,66
 2540 IFP1$="D"ANDP2=1THENPOKE1506,75
 2545 IFP1$="D"ANDP2=2THENPOKE1426,85
 2550 IFP1$="D"ANDP2=2THENPOKE1466,66
 2555 IFP1$="D"ANDP2=2THENPOKE1506,75
 2560 IFP1$="D"ANDP2=3THENPOKE1466,85
 2565 IFP1$="D"ANDP2=3THENPOKE1506,75
 2570 IFP1$="D"ANDP2=4THENPOKE1506,64
 2575 POKE1420,35:POKE55692,7:REM #
 2580 POKE1421,36:POKE55693,7:REM $
 2585 POKE1422,37:POKE55694,7:REM %
 2590 POKE1460,38:POKE55732,7:REM &
 2595 POKE1461,39:POKE55733,7:REM '
 2600 POKE1462,45:POKE55734,7:REM -
 2605 POKE1500,43:POKE55772,7:REM +
 2610 POKE1501,42:POKE55773,7:REM *
 2615 POKE1502,44:POKE55774,7:REM ,
 2620 POKE1540,63:POKE55812,7:REM ?
 2625 POKE1541,33:POKE55813,7:REM !
 2630 POKE1542,61:POKE55814,7:REM =
 3000 REM *** INPUT LETTER AND ENCRYPT
 3001 REM *** MAKE CLICK FOR LETTER
 3002 REM *** BUZZER FOR BAD LETTER
 3005 PRINT"{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}
{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}{DOWN}"
 3006 CC=0:WW=0:XL=1665:TW=1
 3007 W4=48:W5=49
 3010 FORX=0TO52
 3014 READCC$(X):NEXTX:REM CHARACTERS
 3016 FORX=0TO52
 3017 READCP(X):NEXTX:REM POKE NUMBERS
 3018 IFD$="D"THEN3105
 3019 POKE1180,81:POKE55452,6
 3020 GETIN$:IFIN$=""THEN3020
 3024 FORX=0TO52
 3025 IFIN$=CC$(X)THENCC=X:GOTO3040
```

```
 3030 NEXTX
 3031 IFIN$="<"ORIN$=">"THENGOSUB7100
 3032 IFIN$=CHR$(92)ORIN$=CHR$(94)THENGOSUB7100:REM
POUND UP ARROW
 3033 IFIN$=CHR$(59)ORIN$=CHR$(95)THENGOSUB7100:REM ;
LEFT ARROW
 3034 IFIN$=CHR$(34)ORIN$=CHR$(126)THENGOSUB7100:REM "
AND PI
 3035 IFIN$=CHR$(157)ORIN$=CHR$(29)THENGOSUB7100:REM
LR CURSOR
 3036 IFIN$=CHR$(145)ORIN$=CHR$(17)THENGOSUB7100:REM
UD CURSOR
 3037 IFIN$="("ORIN$=")"THENGOSUB7100
 3038 IFIN$="["ORIN$="]"THENGOSUB7100
 3039 GOTO3020
 3040 WC=WC+1
 3045 GOSUB8000:REM GET PB
 3050 WW=PB+WC
 3060 FORX=0TOWW
 3061 CC=CC+1:IFCC>52THENCC=0
 3070 NEXTX
 3074 IFXL=1703THENXL=1705
 3075 IFXL=1743THENXL=1745
 3076 IFXL=1783THENXL=1785
 3077 IFXL=1823THENXL=1825
 3078 IFXL=1863THENXL=1865
 3079 IFXL=1903THENXL=1905
 3080 IFXL=1943THENXL=1945
 3085 POKEXL,CP(CC)
 3086 GOSUB6000:REM WHEELS & SOUND
 3090 XL=XL+1:TW=TW+1
 3092 IFTW=241THENPOKE1979,19
 3093 IFTW=241THENPOKE1980,20
 3094 IFTW=241THENPOKE1981,15
 3095 IFTW=241THENPOKE1982,16
 3096 IFTW=241THEN4999
 3100 GOTO3020
 3105 REM *** TEST DECRYPT
 3107 CC=0:WW=0:XL=1665:TW=1:X=0
 3108 POKE1180,81:POKE55452,6
 3110 GETIN$:IFIN$=""THEN3110
 3120 FORX=0TO52
```

```
3130 IFIN$=CC$(X)THENCC=X:GOTO3160
3140 NEXTX
3150 GOTO3110
3160 WC=WC+1
3165 GOSUB8000:REM GET PB
3170 WW=PB+WC
3180 FORX=0TOWW
3190 CC=CC-1:IFCC<0THENCC=52
3200 NEXTX
3210 IFXL=1703THENXL=1705
3220 IFXL=1743THENXL=1745
3230 IFXL=1783THENXL=1785
3240 IFXL=1823THENXL=1825
3250 IFXL=1863THENXL=1865
3260 IFXL=1903THENXL=1905
3270 IFXL=1943THENXL=1945
3280 POKEXL,CP(CC)
3290 GOSUB6000:REM WHEELS & SOUND
3300 XL=XL+1:TW=TW+1
3310 IFTW=241THENPOKE1979,19
3320 IFTW=241THENPOKE1980,20
3330 IFTW=241THENPOKE1981,15
3340 IFTW=241THENPOKE1982,16
3350 IFTW=241THEN4999
3360 GOTO3110
4000 REM *** INPUT LETTER AND DECRYPT
4001 REM *** MAKE CLICK FOR LETTER
4002 REM *** BUZZER FOR BAD LETTER
4998 END
4999 GOTO4999
5000 DATA@,A,B,C,D,E,F,G,H,I,J,K,L,M
5001 DATAN,O,P,Q,R,S,T,U,V,W,X,Y,Z,"["
5002 DATA"#","]","^","_"," "
5003 DATA"!"," ","#","$","%","&","'"
5004 DATA"(",")","*","+",",","-","."
5005 DATA"/",0,1,2,3,4,5,6,7,8,9,":"
5006 DATA";","<","=",">","?"
5010 DATA@,A,B,C,D,E,F,G,H,I,J,K,L,M
5011 DATAN,O,P,Q,R,S,T,U,V,W,X,Y,Z
5012 DATA" ",".","/",0,1,2,3,4,5,6,7
5013 DATA8,9,":"
5014 DATA"#","$","%","&","'","-","+","*",",","?","!",
```

```
     "="
5015 DATA0,1,2,3,4,5,6,7,8,9,10,11,12
5016 DATA13,14,15,16,17,18,19,20,21
5017 DATA22,23,24,25,26,32,46,47,48
5018 DATA49,50,51,52,53,54,55,56,57,58
5019 DATA35,36,37,38,39,45,43,42,44,63,33,61
6000 REM WHEELS&SOUND
6010 POKE1198,W4:POKE1202,W5
6020 W5=W5+1:IFW5=58THENW5=1
6025 IFW5=27THENW4=W4+1
6030 IFW5=27THENW5=48
6050 FORR=54272TO54296:POKER,0:NEXTR
6060 POKE54296,15:POKE54275,8
6070 POKE54277,0:POKE54278,240
6080 POKE54272,47:POKE54273,65
6090 POKE54276,65:POKE54276,64
6100 POKE54296,0
6110 REM *** NEED TO LIGHT UP LETTER
6120 IFCC=0THENPOKE1534,128:GOSUB7000
6130 IFCC=0THENPOKE1534,0:RETURN
6140 IFCC=1THENPOKE1436,129:GOSUB7000
6150 IFCC=1THENPOKE1436,1:RETURN
6160 IFCC=2THENPOKE1485,130:GOSUB7000
6170 IFCC=2THENPOKE1485,2:RETURN
6180 IFCC=3THENPOKE1481,131:GOSUB7000
6190 IFCC=3THENPOKE1481,3:RETURN
6200 IFCC=4THENPOKE1440,132:GOSUB7000
6210 IFCC=4THENPOKE1440,4:RETURN
6220 IFCC=5THENPOKE1399,133:GOSUB7000
6230 IFCC=5THENPOKE1399,5:RETURN
6240 IFCC=6THENPOKE1442,134:GOSUB7000
6250 IFCC=6THENPOKE1442,6:RETURN
6260 IFCC=7THENPOKE1444,135:GOSUB7000
6270 IFCC=7THENPOKE1444,7:RETURN
6280 IFCC=8THENPOKE1446,136:GOSUB7000
6290 IFCC=8THENPOKE1446,8:RETURN
6300 IFCC=9THENPOKE1409,137:GOSUB7000
6310 IFCC=9THENPOKE1409,9:RETURN
6320 IFCC=10THENPOKE1448,138:GOSUB7000
6330 IFCC=10THENPOKE1448,10:RETURN
6340 IFCC=11THENPOKE1450,139:GOSUB7000
6350 IFCC=11THENPOKE1450,11:RETURN
```

```
6360 IFCC=12THENPOKE1491,140:GOSUB7000
6370 IFCC=12THENPOKE1491,12:RETURN
6380 IFCC=13THENPOKE1489,141:GOSUB7000
6390 IFCC=13THENPOKE1489,13:RETURN
6400 IFCC=14THENPOKE1487,142:GOSUB7000
6410 IFCC=14THENPOKE1487,14:RETURN
6420 IFCC=15THENPOKE1411,143:GOSUB7000
6430 IFCC=15THENPOKE1411,15:RETURN
6440 IFCC=16THENPOKE1475,144:GOSUB7000
6450 IFCC=16THENPOKE1475,16:RETURN
6460 IFCC=17THENPOKE1395,145:GOSUB7000
6470 IFCC=17THENPOKE1395,17:RETURN
6480 IFCC=18THENPOKE1401,146:GOSUB7000
6490 IFCC=18THENPOKE1401,18:RETURN
6500 IFCC=19THENPOKE1438,147:GOSUB7000
6510 IFCC=19THENPOKE1438,19:RETURN
6520 IFCC=20THENPOKE1403,148:GOSUB7000
6530 IFCC=20THENPOKE1403,20:RETURN
6540 IFCC=21THENPOKE1407,149:GOSUB7000
6550 IFCC=21THENPOKE1407,21:RETURN
6560 IFCC=22THENPOKE1483,150:GOSUB7000
6570 IFCC=22THENPOKE1483,22:RETURN
6580 IFCC=23THENPOKE1397,151:GOSUB7000
6590 IFCC=23THENPOKE1397,23:RETURN
6600 IFCC=24THENPOKE1479,152:GOSUB7000
6610 IFCC=24THENPOKE1479,24:RETURN
6620 IFCC=25THENPOKE1477,153:GOSUB7000
6630 IFCC=25THENPOKE1477,25:RETURN
6640 IFCC=26THENPOKE1405,154:GOSUB7000
6650 IFCC=26THENPOKE1405,26:RETURN
6660 IFCC=27THENPOKE1484,160:GOSUB7000
6670 IFCC=27THENPOKE1484,32:RETURN
6680 IFCC=28THENPOKE1413,174:GOSUB7000
6690 IFCC=28THENPOKE1413,46:RETURN
6700 IFCC=29THENPOKE1452,175:GOSUB7000
6710 IFCC=29THENPOKE1452,47:RETURN
6720 IFCC=30THENPOKE1514,176:GOSUB7000
6730 IFCC=30THENPOKE1514,48:RETURN
6740 IFCC=31THENPOKE1516,177:GOSUB7000
6750 IFCC=31THENPOKE1516,49:RETURN
6760 IFCC=32THENPOKE1518,178:GOSUB7000
6770 IFCC=32THENPOKE1518,50:RETURN
```

```
6780 IFCC=33THENPOKE1520,179:GOSUB7000
6790 IFCC=33THENPOKE1520,51:RETURN
6800 IFCC=34THENPOKE1522,180:GOSUB7000
6810 IFCC=34THENPOKE1522,52:RETURN
6820 IFCC=35THENPOKE1524,181:GOSUB7000
6830 IFCC=35THENPOKE1524,53:RETURN
6840 IFCC=36THENPOKE1526,182:GOSUB7000
6850 IFCC=36THENPOKE1526,54:RETURN
6860 IFCC=37THENPOKE1528,183:GOSUB7000
6870 IFCC=37THENPOKE1528,55:RETURN
6880 IFCC=38THENPOKE1530,184:GOSUB7000
6890 IFCC=38THENPOKE1530,56:RETURN
6900 IFCC=39THENPOKE1532,185:GOSUB7000
6910 IFCC=39THENPOKE1532,57:RETURN
6920 IFCC=40THENPOKE1493,186:GOSUB7000
6930 IFCC=40THENPOKE1493,58:RETURN
6940 IFCC=41THENPOKE1420,163:GOSUB7000
6941 IFCC=41THENPOKE1420,35:RETURN
6942 IFCC=42THENPOKE1421,164:GOSUB7000
6943 IFCC=42THENPOKE1421,36:RETURN
6944 IFCC=43THENPOKE1422,165:GOSUB7000
6945 IFCC=43THENPOKE1422,37:RETURN
6946 IFCC=44THENPOKE1460,166:GOSUB7000
6947 IFCC=44THENPOKE1460,38:RETURN
6948 IFCC=45THENPOKE1461,167:GOSUB7000
6949 IFCC=45THENPOKE1461,39:RETURN
6950 IFCC=46THENPOKE1462,173:GOSUB7000
6951 IFCC=46THENPOKE1462,45:RETURN
6952 IFCC=47THENPOKE1500,171:GOSUB7000
6953 IFCC=47THENPOKE1500,43:RETURN
6954 IFCC=48THENPOKE1501,170:GOSUB7000
6955 IFCC=48THENPOKE1501,42:RETURN
6956 IFCC=49THENPOKE1502,172:GOSUB7000
6957 IFCC=49THENPOKE1502,44:RETURN
6958 IFCC=50THENPOKE1540,189:GOSUB7000
6959 IFCC=50THENPOKE1540,63:RETURN
6960 IFCC=51THENPOKE1541,161:GOSUB7000
6961 IFCC=51THENPOKE1541,33:RETURN
6962 IFCC=52THENPOKE1542,187:GOSUB7000
6963 IFCC=52THENPOKE1542,61:RETURN
6990 RETURN
7000 FORZ=1TO100:NEXTZ
```

```
7001 RETURN
7100 REM BUZZER SOUND
7105 POKE1176,81:POKE55448,2
7110 FORS1=1TO12
7120 POKE54296,15
7130 FORS2=1TO5:NEXT
7140 POKE54296,0
7150 FORS3=1TO5:NEXT
7160 NEXT
7170 POKE1176,81:POKE55448,12
7200 RETURN
8000 REM PB CODE
8010 P1=P1+1:IFP1>4THENP1=1
8020 IFP1$="A"ANDP1=1THENPB=1
8030 IFP1$="A"ANDP1=2THENPB=4
8040 IFP1$="A"ANDP1=3THENPB=8
8050 IFP1$="A"ANDP1=4THENPB=12
8060 IFP1$="B"ANDP1=1THENPB=3
8070 IFP1$="B"ANDP1=2THENPB=6
8080 IFP1$="B"ANDP1=3THENPB=9
8090 IFP1$="B"ANDP1=4THENPB=13
8100 IFP1$="C"ANDP1=1THENPB=5
8110 IFP1$="C"ANDP1=2THENPB=10
8120 IFP1$="C"ANDP1=3THENPB=15
8130 IFP1$="C"ANDP1=4THENPB=20
8140 IFP1$="D"ANDP1=1THENPB=6
8150 IFP1$="D"ANDP1=2THENPB=11
8160 IFP1$="D"ANDP1=3THENPB=18
8170 IFP1$="D"ANDP1=4THENPB=24
8180 IFP2=1THENPB=PB+3
8190 IFP2=2THENPB=PB+7
8200 IFP2=3THENPB=PB+9
8210 IFP2=4THENPB=PB+11
8220 RETURN
9000 REM * NUMBER TO POKE CODE
9005 A1=0
9010 IFA$="A"THEN A1=1
9020 IFA$="B"THEN A1=2
9030 IFA$="C"THEN A1=3
9040 IFA$="D"THEN A1=4
9050 IFA$="E"THEN A1=5
9060 IFA$="F"THEN A1=6
```

```
9070 IFA$="G"THEN A1=7
9080 IFA$="H"THEN A1=8
9090 IFA$="I"THEN A1=9
9100 IFA$="J"THEN A1=10
9110 IFA$="K"THEN A1=11
9120 IFA$="L"THEN A1=12
9130 IFA$="M"THEN A1=13
9140 IFA$="N"THEN A1=14
9150 IFA$="O"THEN A1=15
9160 IFA$="P"THEN A1=16
9170 IFA$="Q"THEN A1=17
9180 IFA$="R"THEN A1=18
9190 IFA$="S"THEN A1=19
9200 IFA$="T"THEN A1=20
9210 IFA$="U"THEN A1=21
9220 IFA$="V"THEN A1=22
9230 IFA$="W"THEN A1=23
9240 IFA$="X"THEN A1=24
9250 IFA$="Y"THEN A1=25
9260 IFA$="Z"THEN A1=26
9270 IFA$="0"THEN A1=48
9280 IFA$="1"THEN A1=49
9290 IFA$="2"THEN A1=50
9300 IFA$="3"THEN A1=51
9310 IFA$="4"THEN A1=52
9320 IFA$="5"THEN A1=53
9330 IFA$="6"THEN A1=54
9340 IFA$="7"THEN A1=55
9350 IFA$="8"THEN A1=56
9360 IFA$="9"THEN A1=57
9370 IFA$="@"THEN A1=0
9380 IFA$="."THEN A1=46
9390 IFA$="/"THEN A1=47
9400 IFA$=":"THEN A1=58
9410 IFA$="#"THEN A1=35
9420 IFA$="$"THEN A1=36
9430 IFA$="%"THEN A1=37
9440 IFA$="&"THEN A1=38
9450 IFA$="'"THEN A1=39
9460 IFA$="-"THEN A1=45
9470 IFA$="+"THEN A1=43
9480 IFA$="*"THEN A1=42
```

```
9490 IFA$=","THEN A1=44
9500 IFA$="?"THEN A1=63
9510 IFA$="!"THEN A1=33
9520 IFA$="="THEN A1=61
9530 RETURN
```

Function Key Checker

I was able to find function keys F1, F2, F7 and F8 using this function key checker and the German keyboard, although the function keys are completely working in VICE 3.3 as I write this.

```
10 GETA$:IFA$=""THEN10
20 IFA$=CHR$(133)THENPRINT"F1"
30 IFA$=CHR$(134)THENPRINT"F3"
40 IFA$=CHR$(135)THENPRINT"F5"
50 IFA$=CHR$(136)THENPRINT"F7"
60 IFA$=CHR$(137)THENPRINT"F2"
70 IFA$=CHR$(138)THENPRINT"F4"
80 IFA$=CHR$(139)THENPRINT"F6"
90 IFA$=CHR$(140)THENPRINT"F8"
100 GOTO10
READY.
```

C64 Sprite Creator

C64 Sprite Creator allows you to draw a sprite on the screen, see a normal or expanded size preview and calculate the data codes and display them.

Program Listing:

```
   10 DIMA(63):M$=""
   20 P1=32:REM SPACE
   30 PRINT"{CLR}{RGHT}{RGHT}{RGHT}{RGHT}{DOWN}
{WHT}C64 SPRITE CREATOR"
   40 PRINT"{DOWN}{DOWN}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}Q=QUIT"
```

```
   45 PRINT"{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}P=PREVIEW"
   50 PRINT"{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}S=SHOW CODE"
   52 PRINT"{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}M=MARK DOT"
   54 PRINT"{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}E=ERASE"
   55 PRINT"{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}D=DOUBLE SZ"
   56 PRINT"{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}{RGHT}
{RGHT}{RGHT}{RGHT}N=NORMAL SZ"
   60 REM * POKE DRAWING AREA BOXES
   70 POKE1104,85:POKE55376,3
   80 POKE1129,73:POKE55401,3
   90 POKE1984,74:POKE56256,3
  100 POKE2009,75:POKE56281,3
  110 Y=55377:FORX=1105TO1128
  120 POKEX,67:POKEY,3:REM CYAN
  130 Y=Y+1:NEXTX
  140 Y=56257:FORX=1985TO2008
  150 POKEX,67:POKEY,3
  160 Y=Y+1:NEXTX
  170 Y=55416:FORX=1144TO1944STEP40
  180 POKEX,66:POKEY,3
  190 Y=Y+40:NEXTX
  200 Y=55441:FORX=1169TO1969STEP40
  210 POKEX,66:POKEY,3
  220 Y=Y+40:NEXTX
  230 REM * BOARDER FOR PREVIEW AREA
```

```
240 POKE1651,85:POKE55923,3
250 POKE1659,73:POKE55931,3
260 POKE1931,74:POKE56203,3
270 POKE1939,75:POKE56211,3
280 Y=55924:FORX=1652TO1658
290 POKEX,67:POKEY,3
300 Y=Y+1:NEXTX
310 Y=56204:FORX=1932TO1938
320 POKEX,67:POKEY,3
330 Y=Y+1:NEXTX
340 Y=55963:FORX=1691TO1891STEP40
350 POKEX,66:POKEY,3
360 Y=Y+40:NEXTX
370 Y=55971:FORX=1699TO1899STEP40
380 POKEX,66:POKEY,3
390 Y=Y+40:NEXTX
400 REM * GET INPUT - MARK ERASE
410 X=1145:Y=55417
420 POKEX,86:POKEY,3:REM 'X' CHARACTER
430 GETM$:IFM$=""THEN430
440 IFM$=CHR$(77)THENPOKEX,224:REM RSPC
445 IFM$=CHR$(77)THENPOKEY,3:REM CYAN
446 IFM$=CHR$(77)THENP1=PEEK(X)
450 IFM$=CHR$(69)THENPOKEX,32:REM ERASE
451 IFM$=CHR$(69)THENP1=PEEK(X)
460 IFM$=CHR$(80)THEN810:REM PREVIEW
470 IFM$=CHR$(83)THEN810:REM SHOWCODE
480 IFM$=CHR$(145)THEN690:REM UP ARROW
490 IFM$=CHR$(17)THEN750:REM DN ARROW
500 IFM$=CHR$(157)THEN610: REM L ARROW
510 IFM$=CHR$(29)THEN530:REM R ARROW
515 IFM$=CHR$(68)THENGOSUB7000:REM BIG
516 IFM$=CHR$(78)THENGOSUB7100:REM SML
517 IFM$=CHR$(81)THENGOTO7200:REM QUIT
520 GOTO430
530 REM * RIGHT ARROW KEY ACTION
540 POKEX,P1:POKEY,3
550 X=X+1:Y=Y+1
560 FORZ=1169TO1969STEP40
570 IFX=ZTHENX=X-1:Y=Y-1
580 NEXTZ
590 P1=PEEK(X)
```

```
 600 GOTO420
 610 REM * LEFT ARROW KEY ACTION
 620 POKEX,P1:POKEY,3
 630 X=X-1:Y=Y-1
 640 FORZ=1144TO1944STEP40
 650 IFX=ZTHENX=X+1:Y=Y+1
 660 NEXTZ
 670 P1=PEEK(X)
 680 GOTO420
 690 REM * UP ARROW KEY ACTION
 700 POKEX,P1:POKEY,3
 710 X=X-40:Y=Y-40
 720 IFX<1145THENX=X+40:Y=Y+40
 730 P1=PEEK(X)
 740 GOTO420
 750 REM * DOWN ARROW KEY ACTION
 760 POKEX,P1:POKEY,3
 770 X=X+40:Y=Y+40
 780 IFX>1968THENX=X-40:Y=Y-40
 790 P1=PEEK(X)
 800 GOTO420
 810 REM * READ CODE CONVERT TO BINARY
 820 B=1:C=0:REM B FOR DIMA - C=VALUE
 830 IFPEEK(1145)=224THENC=C+128
 840 IFPEEK(1146)=224THENC=C+64
 850 IFPEEK(1147)=224THENC=C+32
 860 IFPEEK(1148)=224THENC=C+16
 870 IFPEEK(1149)=224THENC=C+8
 880 IFPEEK(1150)=224THENC=C+4
 890 IFPEEK(1151)=224THENC=C+2
 900 IFPEEK(1152)=224THENC=C+1
 910 A(B)=C:B=B+1:C=0
 920 IFPEEK(1153)=224THENC=C+128
 930 IFPEEK(1154)=224THENC=C+64
 940 IFPEEK(1155)=224THENC=C+32
 950 IFPEEK(1156)=224THENC=C+16
 960 IFPEEK(1157)=224THENC=C+8
 970 IFPEEK(1158)=224THENC=C+4
 980 IFPEEK(1159)=224THENC=C+2
 990 IFPEEK(1160)=224THENC=C+1
1000 A(B)=C:B=B+1:C=0
1010 IFPEEK(1161)=224THENC=C+128
```

```
1020 IFPEEK(1162)=224THENC=C+64
1030 IFPEEK(1163)=224THENC=C+32
1040 IFPEEK(1164)=224THENC=C+16
1050 IFPEEK(1165)=224THENC=C+8
1060 IFPEEK(1166)=224THENC=C+4
1070 IFPEEK(1167)=224THENC=C+2
1080 IFPEEK(1168)=224THENC=C+1
1090 A(B)=C:B=B+1:C=0
1100 REM * LINE 2
1110 IFPEEK(1185)=224THENC=C+128
1120 IFPEEK(1186)=224THENC=C+64
1130 IFPEEK(1187)=224THENC=C+32
1140 IFPEEK(1188)=224THENC=C+16
1150 IFPEEK(1189)=224THENC=C+8
1160 IFPEEK(1190)=224THENC=C+4
1170 IFPEEK(1191)=224THENC=C+2
1180 IFPEEK(1192)=224THENC=C+1
1190 A(B)=C:B=B+1:C=0
1200 IFPEEK(1193)=224THENC=C+128
1210 IFPEEK(1194)=224THENC=C+64
1220 IFPEEK(1195)=224THENC=C+32
1230 IFPEEK(1196)=224THENC=C+16
1240 IFPEEK(1197)=224THENC=C+8
1250 IFPEEK(1198)=224THENC=C+4
1260 IFPEEK(1199)=224THENC=C+2
1270 IFPEEK(1200)=224THENC=C+1
1280 A(B)=C:B=B+1:C=0
1290 IFPEEK(1201)=224THENC=C+128
1300 IFPEEK(1202)=224THENC=C+64
1310 IFPEEK(1203)=224THENC=C+32
1320 IFPEEK(1204)=224THENC=C+16
1330 IFPEEK(1205)=224THENC=C+8
1340 IFPEEK(1206)=224THENC=C+4
1350 IFPEEK(1207)=224THENC=C+2
1360 IFPEEK(1208)=224THENC=C+1
1370 A(B)=C:B=B+1:C=0
1380 REM * LINE 3
1390 IFPEEK(1225)=224THENC=C+128
1400 IFPEEK(1226)=224THENC=C+64
1410 IFPEEK(1227)=224THENC=C+32
1420 IFPEEK(1228)=224THENC=C+16
1430 IFPEEK(1229)=224THENC=C+8
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1440 IFPEEK(1230)=224THENC=C+4
1450 IFPEEK(1231)=224THENC=C+2
1460 IFPEEK(1232)=224THENC=C+1
1470 A(B)=C:B=B+1:C=0
1480 IFPEEK(1233)=224THENC=C+128
1490 IFPEEK(1234)=224THENC=C+64
1500 IFPEEK(1235)=224THENC=C+32
1510 IFPEEK(1236)=224THENC=C+16
1520 IFPEEK(1237)=224THENC=C+8
1530 IFPEEK(1238)=224THENC=C+4
1540 IFPEEK(1239)=224THENC=C+2
1550 IFPEEK(1240)=224THENC=C+1
1560 A(B)=C:B=B+1:C=0
1570 IFPEEK(1241)=224THENC=C+128
1580 IFPEEK(1242)=224THENC=C+64
1590 IFPEEK(1243)=224THENC=C+32
1600 IFPEEK(1244)=224THENC=C+16
1610 IFPEEK(1245)=224THENC=C+8
1620 IFPEEK(1246)=224THENC=C+4
1630 IFPEEK(1247)=224THENC=C+2
1640 IFPEEK(1248)=224THENC=C+1
1650 A(B)=C:B=B+1:C=0
1660 REM * LINE 4
1670 IFPEEK(1265)=224THENC=C+128
1680 IFPEEK(1266)=224THENC=C+64
1690 IFPEEK(1267)=224THENC=C+32
1700 IFPEEK(1268)=224THENC=C+16
1710 IFPEEK(1269)=224THENC=C+8
1720 IFPEEK(1270)=224THENC=C+4
1730 IFPEEK(1271)=224THENC=C+2
1740 IFPEEK(1272)=224THENC=C+1
1750 A(B)=C:B=B+1:C=0
1760 IFPEEK(1273)=224THENC=C+128
1770 IFPEEK(1274)=224THENC=C+64
1780 IFPEEK(1275)=224THENC=C+32
1790 IFPEEK(1276)=224THENC=C+16
1800 IFPEEK(1277)=224THENC=C+8
1810 IFPEEK(1278)=224THENC=C+4
1820 IFPEEK(1279)=224THENC=C+2
1830 IFPEEK(1280)=224THENC=C+1
1850 A(B)=C:B=B+1:C=0
1860 IFPEEK(1281)=224THENC=C+128
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1870 IFPEEK(1282)=224THENC=C+64
1880 IFPEEK(1283)=224THENC=C+32
1890 IFPEEK(1284)=224THENC=C+16
1900 IFPEEK(1285)=224THENC=C+8
1910 IFPEEK(1286)=224THENC=C+4
1920 IFPEEK(1287)=224THENC=C+2
1930 IFPEEK(1288)=224THENC=C+1
1940 A(B)=C:B=B+1:C=0
1950 REM * LINE 5
1960 IFPEEK(1305)=224THENC=C+128
1970 IFPEEK(1306)=224THENC=C+64
1980 IFPEEK(1307)=224THENC=C+32
1990 IFPEEK(1308)=224THENC=C+16
2000 IFPEEK(1309)=224THENC=C+8
2010 IFPEEK(1310)=224THENC=C+4
2020 IFPEEK(1311)=224THENC=C+2
2030 IFPEEK(1312)=224THENC=C+1
2040 A(B)=C:B=B+1:C=0
2050 IFPEEK(1313)=224THENC=C+128
2060 IFPEEK(1314)=224THENC=C+64
2070 IFPEEK(1315)=224THENC=C+32
2080 IFPEEK(1316)=224THENC=C+16
2090 IFPEEK(1317)=224THENC=C+8
2100 IFPEEK(1318)=224THENC=C+4
2110 IFPEEK(1319)=224THENC=C+2
2120 IFPEEK(1320)=224THENC=C+1
2130 A(B)=C:B=B+1:C=0
2140 IFPEEK(1321)=224THENC=C+128
2150 IFPEEK(1322)=224THENC=C+64
2160 IFPEEK(1323)=224THENC=C+32
2170 IFPEEK(1324)=224THENC=C+16
2180 IFPEEK(1325)=224THENC=C+8
2190 IFPEEK(1326)=224THENC=C+4
2200 IFPEEK(1327)=224THENC=C+2
2210 IFPEEK(1328)=224THENC=C+1
2220 A(B)=C:B=B+1:C=0
2230 REM * LINE 6
2240 IFPEEK(1345)=224THENC=C+128
2250 IFPEEK(1346)=224THENC=C+64
2260 IFPEEK(1347)=224THENC=C+32
2270 IFPEEK(1348)=224THENC=C+16
2280 IFPEEK(1349)=224THENC=C+8
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2290 IFPEEK(1350)=224THENC=C+4
2300 IFPEEK(1351)=224THENC=C+2
2310 IFPEEK(1352)=224THENC=C+1
2320 A(B)=C:B=B+1:C=0
2330 IFPEEK(1353)=224THENC=C+128
2340 IFPEEK(1354)=224THENC=C+64
2350 IFPEEK(1355)=224THENC=C+32
2360 IFPEEK(1356)=224THENC=C+16
2370 IFPEEK(1357)=224THENC=C+8
2380 IFPEEK(1358)=224THENC=C+4
2390 IFPEEK(1359)=224THENC=C+2
2400 IFPEEK(1360)=224THENC=C+1
2410 A(B)=C:B=B+1:C=0
2420 IFPEEK(1361)=224THENC=C+128
2430 IFPEEK(1362)=224THENC=C+64
2440 IFPEEK(1363)=224THENC=C+32
2450 IFPEEK(1364)=224THENC=C+16
2460 IFPEEK(1365)=224THENC=C+8
2470 IFPEEK(1366)=224THENC=C+4
2480 IFPEEK(1367)=224THENC=C+2
2490 IFPEEK(1368)=224THENC=C+1
2500 A(B)=C:B=B+1:C=0
2510 REM * LINE 7
2520 IFPEEK(1385)=224THENC=C+128
2530 IFPEEK(1386)=224THENC=C+64
2540 IFPEEK(1387)=224THENC=C+32
2550 IFPEEK(1388)=224THENC=C+16
2560 IFPEEK(1389)=224THENC=C+8
2570 IFPEEK(1390)=224THENC=C+4
2580 IFPEEK(1391)=224THENC=C+2
2590 IFPEEK(1392)=224THENC=C+1
2600 A(B)=C:B=B+1:C=0
2610 IFPEEK(1393)=224THENC=C+128
2620 IFPEEK(1394)=224THENC=C+64
2630 IFPEEK(1395)=224THENC=C+32
2640 IFPEEK(1396)=224THENC=C+16
2650 IFPEEK(1397)=224THENC=C+8
2660 IFPEEK(1398)=224THENC=C+4
2670 IFPEEK(1399)=224THENC=C+2
2680 IFPEEK(1400)=224THENC=C+1
2690 A(B)=C:B=B+1:C=0
2700 IFPEEK(1401)=224THENC=C+128
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2710 IFPEEK(1402)=224THENC=C+64
2720 IFPEEK(1403)=224THENC=C+32
2730 IFPEEK(1404)=224THENC=C+16
2740 IFPEEK(1405)=224THENC=C+8
2750 IFPEEK(1406)=224THENC=C+4
2760 IFPEEK(1407)=224THENC=C+2
2770 IFPEEK(1408)=224THENC=C+1
2780 A(B)=C:B=B+1:C=0
2790 REM * LINE 8
2800 IFPEEK(1425)=224THENC=C+128
2810 IFPEEK(1426)=224THENC=C+64
2820 IFPEEK(1427)=224THENC=C+32
2830 IFPEEK(1428)=224THENC=C+16
2840 IFPEEK(1429)=224THENC=C+8
2850 IFPEEK(1430)=224THENC=C+4
2860 IFPEEK(1431)=224THENC=C+2
2870 IFPEEK(1432)=224THENC=C+1
2880 A(B)=C:B=B+1:C=0
2890 IFPEEK(1433)=224THENC=C+128
2900 IFPEEK(1434)=224THENC=C+64
2910 IFPEEK(1435)=224THENC=C+32
2920 IFPEEK(1436)=224THENC=C+16
2930 IFPEEK(1437)=224THENC=C+8
2940 IFPEEK(1438)=224THENC=C+4
2950 IFPEEK(1439)=224THENC=C+2
2960 IFPEEK(1440)=224THENC=C+1
2970 A(B)=C:B=B+1:C=0
2980 IFPEEK(1441)=224THENC=C+128
2990 IFPEEK(1442)=224THENC=C+64
3000 IFPEEK(1443)=224THENC=C+32
3010 IFPEEK(1444)=224THENC=C+16
3020 IFPEEK(1445)=224THENC=C+8
3030 IFPEEK(1446)=224THENC=C+4
3040 IFPEEK(1447)=224THENC=C+2
3050 IFPEEK(1448)=224THENC=C+1
3060 A(B)=C:B=B+1:C=0
3070 REM * LINE 9
3080 IFPEEK(1465)=224THENC=C+128
3090 IFPEEK(1466)=224THENC=C+64
3100 IFPEEK(1467)=224THENC=C+32
3110 IFPEEK(1468)=224THENC=C+16
3120 IFPEEK(1469)=224THENC=C+8
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3130 IFPEEK(1470)=224THENC=C+4
3140 IFPEEK(1471)=224THENC=C+2
3150 IFPEEK(1472)=224THENC=C+1
3160 A(B)=C:B=B+1:C=0
3170 IFPEEK(1473)=224THENC=C+128
3180 IFPEEK(1474)=224THENC=C+64
3190 IFPEEK(1475)=224THENC=C+32
3200 IFPEEK(1476)=224THENC=C+16
3210 IFPEEK(1477)=224THENC=C+8
3220 IFPEEK(1478)=224THENC=C+4
3230 IFPEEK(1479)=224THENC=C+2
3240 IFPEEK(1480)=224THENC=C+1
3250 A(B)=C:B=B+1:C=0
3260 IFPEEK(1481)=224THENC=C+128
3270 IFPEEK(1482)=224THENC=C+64
3280 IFPEEK(1483)=224THENC=C+32
3290 IFPEEK(1484)=224THENC=C+16
3300 IFPEEK(1485)=224THENC=C+8
3310 IFPEEK(1486)=224THENC=C+4
3320 IFPEEK(1487)=224THENC=C+2
3330 IFPEEK(1488)=224THENC=C+1
3340 A(B)=C:B=B+1:C=0
3350 REM * LINE 10
3360 IFPEEK(1505)=224THENC=C+128
3370 IFPEEK(1506)=224THENC=C+64
3380 IFPEEK(1507)=224THENC=C+32
3390 IFPEEK(1508)=224THENC=C+16
3400 IFPEEK(1509)=224THENC=C+8
3410 IFPEEK(1510)=224THENC=C+4
3420 IFPEEK(1511)=224THENC=C+2
3430 IFPEEK(1512)=224THENC=C+1
3440 A(B)=C:B=B+1:C=0
3450 IFPEEK(1513)=224THENC=C+128
3460 IFPEEK(1514)=224THENC=C+64
3470 IFPEEK(1515)=224THENC=C+32
3480 IFPEEK(1516)=224THENC=C+16
3490 IFPEEK(1517)=224THENC=C+8
3500 IFPEEK(1518)=224THENC=C+4
3510 IFPEEK(1519)=224THENC=C+2
3520 IFPEEK(1520)=224THENC=C+1
3530 A(B)=C:B=B+1:C=0
3540 IFPEEK(1521)=224THENC=C+128
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3550 IFPEEK(1522)=224THENC=C+64
3560 IFPEEK(1523)=224THENC=C+32
3570 IFPEEK(1524)=224THENC=C+16
3580 IFPEEK(1525)=224THENC=C+8
3590 IFPEEK(1526)=224THENC=C+4
3600 IFPEEK(1527)=224THENC=C+2
3610 IFPEEK(1528)=224THENC=C+1
3620 A(B)=C:B=B+1:C=0
3630 REM * LINE 11
3640 IFPEEK(1545)=224THENC=C+128
3650 IFPEEK(1546)=224THENC=C+64
3660 IFPEEK(1547)=224THENC=C+32
3670 IFPEEK(1548)=224THENC=C+16
3680 IFPEEK(1549)=224THENC=C+8
3690 IFPEEK(1550)=224THENC=C+4
3700 IFPEEK(1551)=224THENC=C+2
3710 IFPEEK(1552)=224THENC=C+1
3720 A(B)=C:B=B+1:C=0
3730 IFPEEK(1553)=224THENC=C+128
3740 IFPEEK(1554)=224THENC=C+64
3750 IFPEEK(1555)=224THENC=C+32
3760 IFPEEK(1556)=224THENC=C+16
3770 IFPEEK(1557)=224THENC=C+8
3780 IFPEEK(1558)=224THENC=C+4
3790 IFPEEK(1559)=224THENC=C+2
3800 IFPEEK(1560)=224THENC=C+1
3810 A(B)=C:B=B+1:C=0
3820 IFPEEK(1561)=224THENC=C+128
3830 IFPEEK(1562)=224THENC=C+64
3840 IFPEEK(1563)=224THENC=C+32
3850 IFPEEK(1564)=224THENC=C+16
3860 IFPEEK(1565)=224THENC=C+8
3870 IFPEEK(1566)=224THENC=C+4
3880 IFPEEK(1567)=224THENC=C+2
3890 IFPEEK(1568)=224THENC=C+1
3900 A(B)=C:B=B+1:C=0
3910 REM * LINE 12
3920 IFPEEK(1585)=224THENC=C+128
3930 IFPEEK(1586)=224THENC=C+64
3940 IFPEEK(1587)=224THENC=C+32
3950 IFPEEK(1588)=224THENC=C+16
3960 IFPEEK(1589)=224THENC=C+8
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3970 IFPEEK(1590)=224THENC=C+4
3980 IFPEEK(1591)=224THENC=C+2
3990 IFPEEK(1592)=224THENC=C+1
4000 A(B)=C:B=B+1:C=0
4010 IFPEEK(1593)=224THENC=C+128
4020 IFPEEK(1594)=224THENC=C+64
4030 IFPEEK(1595)=224THENC=C+32
4040 IFPEEK(1596)=224THENC=C+16
4050 IFPEEK(1597)=224THENC=C+8
4060 IFPEEK(1598)=224THENC=C+4
4070 IFPEEK(1599)=224THENC=C+2
4080 IFPEEK(1600)=224THENC=C+1
4090 A(B)=C:B=B+1:C=0
4100 IFPEEK(1601)=224THENC=C+128
4110 IFPEEK(1602)=224THENC=C+64
4120 IFPEEK(1603)=224THENC=C+32
4130 IFPEEK(1604)=224THENC=C+16
4140 IFPEEK(1605)=224THENC=C+8
4150 IFPEEK(1606)=224THENC=C+4
4160 IFPEEK(1607)=224THENC=C+2
4170 IFPEEK(1608)=224THENC=C+1
4180 A(B)=C:B=B+1:C=0
4190 REM * LINE 13
4200 IFPEEK(1625)=224THENC=C+128
4210 IFPEEK(1626)=224THENC=C+64
4220 IFPEEK(1627)=224THENC=C+32
4230 IFPEEK(1628)=224THENC=C+16
4240 IFPEEK(1629)=224THENC=C+8
4250 IFPEEK(1630)=224THENC=C+4
4260 IFPEEK(1631)=224THENC=C+2
4270 IFPEEK(1632)=224THENC=C+1
4280 A(B)=C:B=B+1:C=0
4290 IFPEEK(1633)=224THENC=C+128
4300 IFPEEK(1634)=224THENC=C+64
4310 IFPEEK(1635)=224THENC=C+32
4320 IFPEEK(1636)=224THENC=C+16
4330 IFPEEK(1637)=224THENC=C+8
4340 IFPEEK(1638)=224THENC=C+4
4350 IFPEEK(1639)=224THENC=C+2
4360 IFPEEK(1640)=224THENC=C+1
4370 A(B)=C:B=B+1:C=0
4380 IFPEEK(1641)=224THENC=C+128
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4390 IFPEEK(1642)=224THENC=C+64
4400 IFPEEK(1643)=224THENC=C+32
4410 IFPEEK(1644)=224THENC=C+16
4420 IFPEEK(1645)=224THENC=C+8
4430 IFPEEK(1646)=224THENC=C+4
4440 IFPEEK(1647)=224THENC=C+2
4450 IFPEEK(1648)=224THENC=C+1
4460 A(B)=C:B=B+1:C=0
4470 REM *CLOSELINE 14
4480 IFPEEK(1665)=224THENC=C+128
4490 IFPEEK(1666)=224THENC=C+64
4500 IFPEEK(1667)=224THENC=C+32
4510 IFPEEK(1668)=224THENC=C+16
4520 IFPEEK(1669)=224THENC=C+8
4530 IFPEEK(1670)=224THENC=C+4
4540 IFPEEK(1671)=224THENC=C+2
4550 IFPEEK(1672)=224THENC=C+1
4560 A(B)=C:B=B+1:C=0
4570 IFPEEK(1673)=224THENC=C+128
4580 IFPEEK(1674)=224THENC=C+64
4590 IFPEEK(1675)=224THENC=C+32
4600 IFPEEK(1676)=224THENC=C+16
4610 IFPEEK(1677)=224THENC=C+8
4620 IFPEEK(1678)=224THENC=C+4
4630 IFPEEK(1679)=224THENC=C+2
4640 IFPEEK(1680)=224THENC=C+1
4650 A(B)=C:B=B+1:C=0
4660 IFPEEK(1681)=224THENC=C+128
4670 IFPEEK(1682)=224THENC=C+64
4680 IFPEEK(1683)=224THENC=C+32
4690 IFPEEK(1684)=224THENC=C+16
4700 IFPEEK(1685)=224THENC=C+8
4710 IFPEEK(1686)=224THENC=C+4
4720 IFPEEK(1687)=224THENC=C+2
4730 IFPEEK(1688)=224THENC=C+1
4740 A(B)=C:B=B+1:C=0
4750 REM * LINE 15
4760 IFPEEK(1705)=224THENC=C+128
4770 IFPEEK(1706)=224THENC=C+64
4780 IFPEEK(1707)=224THENC=C+32
4790 IFPEEK(1708)=224THENC=C+16
4800 IFPEEK(1709)=224THENC=C+8
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4810 IFPEEK(1710)=224THENC=C+4
4820 IFPEEK(1711)=224THENC=C+2
4830 IFPEEK(1712)=224THENC=C+1
4840 A(B)=C:B=B+1:C=0
4850 IFPEEK(1713)=224THENC=C+128
4860 IFPEEK(1714)=224THENC=C+64
4870 IFPEEK(1715)=224THENC=C+32
4880 IFPEEK(1716)=224THENC=C+16
4890 IFPEEK(1717)=224THENC=C+8
4900 IFPEEK(1718)=224THENC=C+4
4910 IFPEEK(1719)=224THENC=C+2
4920 IFPEEK(1720)=224THENC=C+1
4930 A(B)=C:B=B+1:C=0
4940 IFPEEK(1721)=224THENC=C+128
4950 IFPEEK(1722)=224THENC=C+64
4960 IFPEEK(1723)=224THENC=C+32
4970 IFPEEK(1724)=224THENC=C+16
4980 IFPEEK(1725)=224THENC=C+8
4990 IFPEEK(1726)=224THENC=C+4
5000 IFPEEK(1727)=224THENC=C+2
5010 IFPEEK(1728)=224THENC=C+1
5020 A(B)=C:B=B+1:C=0
5030 REM * LINE 16
5040 IFPEEK(1745)=224THENC=C+128
5050 IFPEEK(1746)=224THENC=C+64
5060 IFPEEK(1747)=224THENC=C+32
5070 IFPEEK(1748)=224THENC=C+16
5080 IFPEEK(1749)=224THENC=C+8
5090 IFPEEK(1750)=224THENC=C+4
5100 IFPEEK(1751)=224THENC=C+2
5110 IFPEEK(1752)=224THENC=C+1
5120 A(B)=C:B=B+1:C=0
5130 IFPEEK(1753)=224THENC=C+128
5140 IFPEEK(1754)=224THENC=C+64
5150 IFPEEK(1755)=224THENC=C+32
5160 IFPEEK(1756)=224THENC=C+16
5170 IFPEEK(1757)=224THENC=C+8
5180 IFPEEK(1758)=224THENC=C+4
5190 IFPEEK(1759)=224THENC=C+2
5200 IFPEEK(1760)=224THENC=C+1
5210 A(B)=C:B=B+1:C=0
5220 IFPEEK(1761)=224THENC=C+128
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5230 IFPEEK(1762)=224THENC=C+64
5240 IFPEEK(1763)=224THENC=C+32
5250 IFPEEK(1764)=224THENC=C+16
5260 IFPEEK(1765)=224THENC=C+8
5270 IFPEEK(1766)=224THENC=C+4
5280 IFPEEK(1767)=224THENC=C+2
5290 IFPEEK(1768)=224THENC=C+1
5300 A(B)=C:B=B+1:C=0
5310 REM * LINE 17
5320 IFPEEK(1785)=224THENC=C+128
5330 IFPEEK(1786)=224THENC=C+64
5340 IFPEEK(1787)=224THENC=C+32
5350 IFPEEK(1788)=224THENC=C+16
5360 IFPEEK(1789)=224THENC=C+8
5370 IFPEEK(1790)=224THENC=C+4
5380 IFPEEK(1791)=224THENC=C+2
5390 IFPEEK(1792)=224THENC=C+1
5400 A(B)=C:B=B+1:C=0
5410 IFPEEK(1793)=224THENC=C+128
5420 IFPEEK(1794)=224THENC=C+64
5430 IFPEEK(1795)=224THENC=C+32
5440 IFPEEK(1796)=224THENC=C+16
5450 IFPEEK(1797)=224THENC=C+8
5460 IFPEEK(1798)=224THENC=C+4
5470 IFPEEK(1799)=224THENC=C+2
5480 IFPEEK(1800)=224THENC=C+1
5490 A(B)=C:B=B+1:C=0
5500 IFPEEK(1801)=224THENC=C+128
5510 IFPEEK(1802)=224THENC=C+64
5520 IFPEEK(1803)=224THENC=C+32
5530 IFPEEK(1804)=224THENC=C+16
5540 IFPEEK(1805)=224THENC=C+8
5550 IFPEEK(1806)=224THENC=C+4
5560 IFPEEK(1807)=224THENC=C+2
5570 IFPEEK(1808)=224THENC=C+1
5580 A(B)=C:B=B+1:C=0
5590 REM * LINE 18
5600 IFPEEK(1825)=224THENC=C+128
5610 IFPEEK(1826)=224THENC=C+64
5620 IFPEEK(1827)=224THENC=C+32
5630 IFPEEK(1828)=224THENC=C+16
5640 IFPEEK(1829)=224THENC=C+8
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5650 IFPEEK(1830)=224THENC=C+4
5660 IFPEEK(1831)=224THENC=C+2
5670 IFPEEK(1832)=224THENC=C+1
5680 A(B)=C:B=B+1:C=0
5690 IFPEEK(1833)=224THENC=C+128
5700 IFPEEK(1834)=224THENC=C+64
5710 IFPEEK(1835)=224THENC=C+32
5720 IFPEEK(1836)=224THENC=C+16
5730 IFPEEK(1837)=224THENC=C+8
5740 IFPEEK(1838)=224THENC=C+4
5750 IFPEEK(1839)=224THENC=C+2
5760 IFPEEK(1840)=224THENC=C+1
5770 A(B)=C:B=B+1:C=0
5780 IFPEEK(1841)=224THENC=C+128
5790 IFPEEK(1842)=224THENC=C+64
5800 IFPEEK(1843)=224THENC=C+32
5810 IFPEEK(1844)=224THENC=C+16
5820 IFPEEK(1845)=224THENC=C+8
5830 IFPEEK(1846)=224THENC=C+4
5840 IFPEEK(1847)=224THENC=C+2
5850 IFPEEK(1848)=224THENC=C+1
5860 A(B)=C:B=B+1:C=0
5870 REM * LINE 19
5880 IFPEEK(1865)=224THENC=C+128
5890 IFPEEK(1866)=224THENC=C+64
5900 IFPEEK(1867)=224THENC=C+32
5910 IFPEEK(1868)=224THENC=C+16
5920 IFPEEK(1869)=224THENC=C+8
5930 IFPEEK(1870)=224THENC=C+4
5940 IFPEEK(1871)=224THENC=C+2
5950 IFPEEK(1872)=224THENC=C+1
5960 A(B)=C:B=B+1:C=0
5970 IFPEEK(1873)=224THENC=C+128
5980 IFPEEK(1874)=224THENC=C+64
5990 IFPEEK(1875)=224THENC=C+32
6000 IFPEEK(1876)=224THENC=C+16
6010 IFPEEK(1877)=224THENC=C+8
6020 IFPEEK(1878)=224THENC=C+4
6030 IFPEEK(1879)=224THENC=C+2
6040 IFPEEK(1880)=224THENC=C+1
6050 A(B)=C:B=B+1:C=0
6060 IFPEEK(1881)=224THENC=C+128
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6070 IFPEEK(1882)=224THENC=C+64
6080 IFPEEK(1883)=224THENC=C+32
6090 IFPEEK(1884)=224THENC=C+16
6100 IFPEEK(1885)=224THENC=C+8
6110 IFPEEK(1886)=224THENC=C+4
6120 IFPEEK(1887)=224THENC=C+2
6130 IFPEEK(1888)=224THENC=C+1
6140 A(B)=C:B=B+1:C=0
6150 REM * LINE 20
6160 IFPEEK(1905)=224THENC=C+128
6170 IFPEEK(1906)=224THENC=C+64
6180 IFPEEK(1907)=224THENC=C+32
6190 IFPEEK(1908)=224THENC=C+16
6200 IFPEEK(1909)=224THENC=C+8
6210 IFPEEK(1910)=224THENC=C+4
6220 IFPEEK(1911)=224THENC=C+2
6230 IFPEEK(1912)=224THENC=C+1
6240 A(B)=C:B=B+1:C=0
6250 IFPEEK(1913)=224THENC=C+128
6260 IFPEEK(1914)=224THENC=C+64
6270 IFPEEK(1915)=224THENC=C+32
6280 IFPEEK(1916)=224THENC=C+16
6290 IFPEEK(1917)=224THENC=C+8
6300 IFPEEK(1918)=224THENC=C+4
6310 IFPEEK(1919)=224THENC=C+2
6320 IFPEEK(1920)=224THENC=C+1
6330 A(B)=C:B=B+1:C=0
6340 IFPEEK(1921)=224THENC=C+128
6350 IFPEEK(1922)=224THENC=C+64
6360 IFPEEK(1923)=224THENC=C+32
6370 IFPEEK(1924)=224THENC=C+16
6380 IFPEEK(1925)=224THENC=C+8
6390 IFPEEK(1926)=224THENC=C+4
6400 IFPEEK(1927)=224THENC=C+2
6410 IFPEEK(1928)=224THENC=C+1
6420 A(B)=C:B=B+1:C=0
6430 REM * LINE 21
6440 IFPEEK(1945)=224THENC=C+128
6450 IFPEEK(1946)=224THENC=C+64
6460 IFPEEK(1947)=224THENC=C+32
6470 IFPEEK(1948)=224THENC=C+16
6480 IFPEEK(1949)=224THENC=C+8
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6490 IFPEEK(1950)=224THENC=C+4
6500 IFPEEK(1951)=224THENC=C+2
6510 IFPEEK(1952)=224THENC=C+1
6520 A(B)=C:B=B+1:C=0
6530 IFPEEK(1953)=224THENC=C+128
6540 IFPEEK(1954)=224THENC=C+64
6550 IFPEEK(1955)=224THENC=C+32
6560 IFPEEK(1956)=224THENC=C+16
6570 IFPEEK(1957)=224THENC=C+8
6580 IFPEEK(1958)=224THENC=C+4
6590 IFPEEK(1959)=224THENC=C+2
6600 IFPEEK(1960)=224THENC=C+1
6610 A(B)=C:B=B+1:C=0
6620 IFPEEK(1961)=224THENC=C+128
6630 IFPEEK(1962)=224THENC=C+64
6640 IFPEEK(1963)=224THENC=C+32
6650 IFPEEK(1964)=224THENC=C+16
6660 IFPEEK(1965)=224THENC=C+8
6670 IFPEEK(1966)=224THENC=C+4
6680 IFPEEK(1967)=224THENC=C+2
6690 IFPEEK(1968)=224THENC=C+1
6700 A(B)=C:B=0:C=0
6710 IFM$="P"THEN6800
6720 REM * PRINT SPRITE CODE
6730 PRINT"{CLR}HERE IS THE SPRITE CODE:"
6740 PRINT"":B=1
6745 POKE53269,0
6750 FORX=1TO9
6760 PRINT"DATA";A(B);"{LEFT},";:B=B+1
6770 PRINTA(B);"{LEFT},";:B=B+1
6771 PRINTA(B);"{LEFT},";:B=B+1
6772 PRINTA(B);"{LEFT},";:B=B+1
6773 PRINTA(B);"{LEFT},";:B=B+1
6774 PRINTA(B);"{LEFT},";:B=B+1
6780 PRINTA(B):B=B+1:PRINT""
6790 NEXTX
6791 PRINT"HIT ANY KEY TO QUIT"
6792 GETM$:IFM$=""THEN6792
6793 GOTO7200
6800 REM * PREVIEW SECTION
6810 V=53248:B=1
6811 POKE2040,13:REM SPRITE 0 BLOCK 13
```

```
6820 POKEV+21,1:REM ENABLE SPRITE 0
6840 FORK=0TO62
6850 POKE832+K,A(B):REM LOAD SPRITE
6855 B=B+1:NEXTK
6860 POKEV+39,10:REM SPRITE 0 COLOR
6870 POKEV+0,252:REM X POSITION
6880 POKEV+1,180:REM Y POSITION
6890 GOTO420
6900 REM * EXPAND SPRITE
7000 POKE53277,1
7010 POKE53271,1
7020 REM POSITION
7050 RETURN
7100 REM * NORMAL SIZE
7110 POKE53277,0
7120 POKE53271,0
7150 RETURN
7200 REM * QUIT
7210 POKE53277,0:POKE53271,0
7220 POKE53269,0
7230 END
```

Notes:

All of my C64 videos can be found on YouTube at:
https://youtube.com/playlist?list=PLsyxqko2fbqENSDTGgHni1Pu3vNMypVFP