

SLOW-SCAN

A computer program that should make slow-scan television a little less of a mystery for the average amateur.

This computer package is capable of receiving a range of different speeds. There is a screen dump program in it, a transmit program, and an enhancement program to filter out noise from the screen.

It occurred to me when I first bought a computer that it would be capable of decoding a wide range of signals from the air. There were some programs available overseas but I had not seen any locally. This has taken at least two years to write and I am pleased to be able to share it with others.

The program is written for the Tandy Colour Computer. It was written for a 64k machine, but it should work on a 16k machine with changes. If anyone is interested, would they please write to the address above and I could alter the program to suit their machine, if there is enough interest.

I use the program with disc drives but it works equally well with a cassette. The program works by putting in an audio signal from the receiver to the cassette input lead, which is a standard connector. Each audio cycle is timed by a zero crossing detector, and recognised as a synchronous pulse, or something between black and white. Synchronous pulses are 1200 Hz, black is 1500 Hz and white is 2300 Hz. After decoding, four pixels are placed on the screen, giving five levels of gray from white to black. This is limited by the 256 x 192 pixel screen on the COCO, but by using an extra portion of the next screen, the whole 128 element by 120 line picture is received.

The resulting picture is then manipulated by BASIC, and can be saved to disc, cassette, sent to a printer, enhanced, borders added, etc. Simple commands can be added to add borders, captions, etc. The picture can be re-sent, or a screen built-up and sent as a written message such as CQ SSTV. The possibilities are numerous. A digitiser could be used to put a photograph on the screen to send.

Type the program in, and save it to disc or cassette before running, as just one mistake in typing can cause the Machine Language portion to run rampant over the program in memory, and lock-up the computer.

When the program is running, tune an SSB receiver to 14.230 MHz or 21.340 MHz Upper Sideband. Push any key to enter the menu. Most of the commands are listed in there, however a little more explanation may help.

C enters change mode. The parameters are originally set for eight second video. This can be changed by entering 7 or 12 for 7.2 or 12 second video.

```
10 PCLEARB
20 AUDI00N
25 PC=1
30 CLEAR200,29999:CLS
35 DEFFNP(X)=PEEK(X)*256+PEEK(X+1)
36 DEFFNPD(X)=(I(X/256)-INT(X/256))*256)
40 FORA=30000TO31082:READP:POKEA,P:NEXT
50 'LOADM'DSPLY'
60 L1=#H7536:L2=#H7537:L3=#H7538:L4=#H7539:L5=#H753A:SP=#H7531:LL=#H77C1:LH=#H77
C3:SL=#H77C7:SH=#H77C5:WT=#H77C9:FL=#H7625:PT=#H774165:POKESL,0:POKESL+1,38:POKE
SH,0:POKESH+1,45:POKELL,1:POKELL+1,244:POKELH,7:POKELH+1,208
70 AUDI00N:CLS
80 PRINT096,STRING$(32,150)
90 PRINT"***** SSTV *****"
100 PRINT"***** BY *****"
110 PRINT"**** GORDON THURSTON ****"
120 PRINT0288,STRING$(32,150)
130 IFINKE(7)="*THEN130
131 GOSUB135:GOTO250
135 S#=#CFLMPSRV#*CHR$(94)+CHR$(10)+*AT*
140 CLS:PRINT*R - RECEIVE PIC
150 PRINT*C - CHANGE CONSTANTS
160 PRINT*F - FILTER PICTURE
170 PRINT*L - LOAD PICTURE
180 PRINT*M - MENU
190 PRINT*P - PRINT PICTURE
200 PRINT*R - RECEIVE PICTURE
210 PRINT*S - SAVE PICTURE
220 PRINT*V - VIEW PICTURE
230 PRINT*W - WAIT FOR SYNC
231 PRINT*^ - VIEW TOP OF PIC
233 PRINT*A - AUTO TAPE MAKE CONNECTIONS
234 PRINT*T - TRANSMIT PICTURE*
235 PRINT<CLEAR> - EXIT TO M/L*
239 RETURN
250 A#=#INKEY$:IFA#="*THEN250
260 ONINSTR(1,S#,A#)GOSUB300,400,500,600,700,800,810,820,830,840,850,860,870
270 GOTO250
300 CLS:CHANGE
310 PRINT*L1 - SYNC",PEEK(L1):PRINT*L2 - BLACK",PEEK(L2):PRINT*L3 - DK GREY",PEE
K(L3):PRINT*L4 - MD GREY",PEEK(L4):PRINT*L5 - LT GREY",PEEK(L5):PRINT*SP - SPACI
NG",PEEK(SP)
330 PRINT*SYNC DET PARAMETERS*:PRINT*LL - LNLNGTH LO",FNP(LL):PRINT*LH - LNLNGTH
HI",FNP(LH):PRINT*SL - SYNCLN LO",FNP(SL):PRINT*SH - SYNCLN HI",FNP(SH)
335 PRINT*BRIGHTNESS - BL - BH
336 PRINT*CONTRAST - CH - CL
340 INPUT*PARAMETER*:N#:#INPUT*CHANGE TO*:N
351 IFN#="*THEN CLS:PRINT*CHANGED*:RETURN
360 IFN#="L1"THENPOKEL1,N
361 IFN#="L2" THENPOKEL2,N
362 IFN#="L3"THENPOKEL3,N
363 IFN#="L4"THENPOKEL4,N
364 IFN#="L5"THENPOKEL5,N
365 IFN#="CL"THEN M=LL:GOSUB390
366 IFN#="LH"THEN M=LH:GOSUB390
367 IFN#="SL"THEN M=SL:GOSUB390
368 IFN#="SH"THEN M=SH:GOSUB390
369 IFN#="SP"THENPOKESP,N
370 IFN#="CH"THENPOKEL2,31:POKEL3,30:POKEL4,29:POKEL5,28
371 IFN#="CL"THENPOKEL1,37:POKEL2,31:POKEL3,29:POKEL4,27:POKEL5,24
372 IFN#="7"THENPOKESP,21
373 IFN#="8"THENPOKESP,23
374 IFN#="12"THENPOKESP,37
375 IFN#="BL"THENFORA=#H7536 TO#H753A:POKEA,PEEK(A)-N:NEXT
376 IFN#="BH"THENFOR A=#H7536 TO#H753A:POKEA,PEEK(A)+N:NEXT
379 GOTO300
390 POKEM,N/256:POKEM+1,FNPD(N):RETURN
400 'FILTER
410 SCREEN1,1:EXEC#H7625:SOUND50,1:RETURN
500 'LOADPIC
510 CLS:INPUT*LOAD PIC*:L#:#IFL#="*THENRETURNELSE SCREEN1,1:LOADML#+"/PIC":RETURN
600 'MENU
605 GOSUB140:RETURN
700 SCREEN1,1:EXEC#H7741:POKE#H6F,0:SOUND100,1:RETURN
800 'RECEIVE
810 CLS:INPUT*SAVE PIC*:N#:#IFN#="*THENRETURNELSE SCREEN1,1:P=PEEK(#HBC)*256:SAVE
MN#+"/PIC",P,P+#H1E00,0:RETURN
820 SCREEN1,1:RETURN
830 CLS:PRINT*WAITING FOR SYNC*
831 POKE#HFF21,PEEK(#HFF21)ORB:EXEC#H77C9
832 IFINKEY#="*THENIGOSUB890:GOTO831
833 MOTOROFF:RETURN
840 PMODE4,2:SCREEN1,1:RETURN
850 PMODE4,1:SCREEN1,1:RETURN
860 VERIFYOFF:CLS:PRINT*AUTO TO DISK*
861 EXEC#H77C9:IFINKEY#<>*THENRETURNELSEGOSUB890:MOTOROFF
862 IFINKEY#="*THENP=PEEK(#HBC)*256:N#=#RIGHT$(STR$(P),(LEN$(STR$(P))-1)):SAVEMN
#+"/PIC",P,P+#H1E00,0:POKE#HFF40,0:PC=PC+1:GOTO861ELSEMOTOROFF:RETURN
870 EXEC#H784F:EXEC#H784F:RETURN
890 POKE#HFF21,PEEK(#HFF21)ORB:PMODE4,1:SCREEN1,1:PCLS:PMODE4,5:PCLS:PMODE4,1:EX
EC#H7559:MOTOROFF:RETURN
1000 DATA 75,23,0,53,17,160,37,31
1010 DATA 29,27,24,43,224,29,224,92
1020 DATA 39,17,33,15,116,255,32,37
1030 DATA 246,92,39,7,39,5,116,255
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1040 DATA 32,36,246,57,198,2,126,117
 1050 DATA 164,150,188,95,31,1,252,117
 1060 DATA 61,51,139,255,117,59,26,80
 1070 DATA 134,253,183,255,2,48,136,224
 1080 DATA 48,136,32,51,136,32,255,117
 1090 DATA 52,182,255,0,132,64,16,39
 1100 DATA 0,146,134,1,167,132,127,117
 1110 DATA 51,198,1,141,178,241,117,54
 1120 DATA 35,247,198,1,141,169,241,117
 1130 DATA 54,34,247,95,16,142,0,220
 1140 DATA 49,63,38,252,141,153,247,117
 1150 DATA 48,251,117,51,247,117,51,43
 1160 DATA 163,127,117,50,246,117,48,241
 1170 DATA 117,55,105,136,32,241,117,57
 1180 DATA 105,132,241,117,56,105,136,32
 1190 DATA 241,117,58,105,132,36,29,48
 1200 DATA 1,188,117,59,39,62,134,1
 1210 DATA 167,132,188,117,52,39,145,182
 1220 DATA 117,51,176,117,49,183,117,51
 1230 DATA 42,16,32,26,198,0,251,117
 1240 DATA 50,247,117,50,30,136,30,136
 1250 DATA 32,229,198,7,251,117,50,247
 1260 DATA 117,50,30,136,32,174,198,9
 1270 DATA 251,117,50,140,170,170,16,140
 1280 DATA 170,170,32,144,57,255,255,255
 1290 DATA 255,255,255,20,192,14,0,255
 1300 DATA 0,43,224,44,0,150,188,95
 1310 DATA 31,1,51,137,29,224,255,118
 1320 DATA 33,51,132,255,118,29,51,201
 1330 DATA 30,0,255,118,35,51,136,32
 1340 DATA 255,118,27,134,128,95,141,54
 1350 DATA 141,67,23,0,91,141,62,141
 1360 DATA 45,141,43,23,0,140,141,46
 1370 DATA 141,44,141,42,141,40,188,118
 1380 DATA 27,38,226,188,118,33,38,5
 1390 DATA 190,118,29,134,64,188,118,35
 1400 DATA 38,1,57,48,136,32,51,136
 1410 DATA 32,255,118,27,32,199,73,36
 1420 DATA 3,48,31,73,73,57,70,36
 1430 DATA 3,48,1,70,57,16,142,0
 1440 DATA 6,48,136,192,141,63,141,238
 1450 DATA 16,142,0,6,48,137,255,64
 1460 DATA 141,51,141,226,48,136,128,57
 1470 DATA 16,142,0,2,48,136,192,141
 1480 DATA 36,48,136,64,16,142,0,2
 1490 DATA 141,27,141,202,48,137,255,64
 1500 DATA 16,142,0,2,141,15,48,136
 1510 DATA 64,16,142,0,2,141,6,141
 1520 DATA 181,48,136,128,57,165,132,39
 1530 DATA 1,92,48,136,32,49,63,38
 1540 DATA 244,57,203,4,84,84,84,48
 1550 DATA 136,32,52,2,68,170,132,167
 1560 DATA 132,166,228,90,42,7,68,168
 1570 DATA 132,167,132,166,228,48,136,224
 1580 DATA 170,132,167,132,166,228,90,42
 1590 DATA 6,168,132,167,132,166,228,48
 1600 DATA 136,32,170,132,167,132,166,228
 1610 DATA 90,42,6,168,132,167,132,166
 1620 DATA 228,48,136,224,68,170,132,167
 1630 DATA 132,166,228,90,42,7,68,168
 1640 DATA 132,167,132,166,228,53,2,57
 1650 DATA 2,255,255,255,255,43,225,43
 1660 DATA 225,134,254,151,111,134,41,151
 1670 DATA 150,150,188,95,31,1,195,29
 1680 DATA 225,253,119,63,48,136,31,51
 1690 DATA 137,29,224,255,119,61,134,27
 1700 DATA 173,159,160,2,134,71,173,159
 1710 DATA 160,2,134,28,173,159,160,2
 1720 DATA 134,27,173,159,160,2,134,73
 1730 DATA 173,159,160,2,134,0,173,159
 1740 DATA 160,2,134,239,173,159,160,2
 1750 DATA 166,132,67,173,159,160,2,166
 1760 DATA 31,67,173,159,160,2,48,136
 1770 DATA 32,188,119,61,38,234,182,255
 1780 DATA 0,132,64,39,11,188,119,63
 1790 DATA 39,6,48,137,226,30,32,167
 1800 DATA 134,27,173,159,160,2,134,30
 1810 DATA 173,159,160,2,57,255,255,255
 1820 DATA 0,1,244,7,208,0,45,0
 1830 DATA 38,206,0,0,255,119,191,255
 1840 DATA 119,191,134,253,183,255,2,23
 1850 DATA 253,101,18,198,1,23,253,95
 1860 DATA 182,255,0,132,64,39,81,241
 1870 DATA 119,200,43,77,241,119,198,36
 1880 DATA 75,79,253,119,191,247,119,189
 1890 DATA 198,3,33,45,23,253,64,182
 1900 DATA 255,0,132,64,39,50,84,116
 1910 DATA 119,189,251,119,189,247,119,189
 1920 DATA 241,119,200,43,20,241,119,198
 1930 DATA 42,15,79,243,119,191,253,119
 1940 DATA 191,198,5,33,4,31,136,32
 1950 DATA 211,252,119,191,16,179,119,193
 1960 DATA 43,151,16,179,119,195,42,145
 1970 DATA 57,188,170,170,33,250,33,248
 1980 DATA 33,246,198,3,32,151,255,0

CH changes to high contrast.

CL goes back to normal.

L1 sets the level below which the synchronous levels are detected.

L2 to L5 set the levels of gray.

BH <enter> and a number (try 2) changes the level of brightness the computer sees.

BL just the opposite.

SH and **SL** set the levels between which the synchronous detect portion works. Spacing sets the time of each line.

LL and **LH** set the length of synchronous pulse detected.

These parameters have been included for experimenting, and the program works well without changing them in most cases.

The voice portion of the transmission is used for tuning, and the slow-scan should then be right. If it is saved to tape, it can be used again and again and the parameters changed to see their effects.

F Filter runs a Machine Language program to average the pixels around it. It does not work well, but its effect is interesting.

L Load picture from disc.

M return to Menu.

P send Picture to Printer. This works with DMP 110 printer and probably others.

R Receive picture does not wait for synchronous pulse.

S Saves the picture.

The voice portion of the transmission is used for tuning, and the slow-scan should then be right. If it is saved to tape it can be used again and again, and the parameters changed to see their effects.

V View picture on screen.

W Wait for synchronous pulse so that picture starts at top of the screen.

▲ (UP ARROW) view lower portion of screen out of view (usually not needed).

CLEAR causes an exit from any Machine Language that might be running. It may not exit if there is not any audio applied.

T Transmit sends two frames to the cassette output lead. This should be filtered before applying it to the microphone input on the transmitter. The remote control lead can be used to key the transmitter. Transmitting is probably the hardest part, as there are a few leads, and some audio switching needed for the microphone. (I have only tried this once and did not have a microphone connector, so I recorded the sound on tape and put the microphone to the tape recorder. It worked, but does leave a lot to be desired).

The machine code is poked to memory from data statements, and could be saved as a Machine Language program to speed loading, but this is the easiest way to publish it. It takes a few seconds to poke to memory.

Sometimes, the program locks on printing, and re-setting, and a *goto50* gets back into the program. The printer works on the second try. (I have not figured that one out yet!).

There is a lot of typing involved, but I feel it is well worth it. If anyone is interested in the program on tape, send a blank tape and sufficient return postage, and I would be pleased to copy the program to it. (This also applies for a disc as well).

The source code is available for the cost of return postage upon request.

1990 DATA 3, 24, 43, 224, 43, 224, 33, 127
 2000 DATA 120, 72, 150, 188, 95, 31, 1, 51
 2010 DATA 137, 31, 224, 255, 120, 76, 51, 136
 2020 DATA 32, 255, 120, 74, 198, 128, 134, 253
 2030 DATA 183, 255, 2, 134, 82, 183, 120, 71
 2040 DATA 26, 80, 206, 0, 36, 127, 255, 32
 2050 DATA 125, 120, 71, 16, 38, 0, 190, 125
 2060 DATA 120, 72, 42, 18, 182, 120, 72, 187
 2070 DATA 129, 73, 183, 120, 72, 84, 84, 36
 2080 DATA 16, 86, 48, 1, 32, 14, 18, 33
 2090 DATA 220, 16, 140, 170, 170, 18, 18, 30
 2100 DATA 136, 18, 30, 136, 79, 229, 132, 39
 2110 DATA 3, 76, 32, 3, 18, 33, 245, 229
 2120 DATA 136, 32, 39, 3, 76, 32, 3, 18
 2130 DATA 33, 234, 84, 229, 132, 39, 3, 76
 2140 DATA 32, 3, 18, 33, 223, 229, 136, 32
 2150 DATA 39, 3, 76, 32, 3, 18, 39, 212
 2160 DATA 16, 142, 121, 85, 166, 166, 183, 120
 2170 DATA 78, 68, 128, 9, 23, 0, 123, 30
 2180 DATA 136, 30, 136, 33, 144, 134, 128, 183
 2190 DATA 255, 32, 125, 120, 71, 38, 90, 84
 2200 DATA 36, 5, 48, 1, 86, 32, 3, 18
 2210 DATA 30, 136, 182, 120, 72, 176, 120, 78
 2220 DATA 187, 120, 73, 183, 120, 72, 182, 120
 2230 DATA 78, 68, 64, 187, 120, 78, 128, 5
 2240 DATA 23, 0, 71, 18, 188, 120, 74, 16
 2250 DATA 38, 255, 90, 127, 255, 32, 188, 120
 2260 DATA 76, 39, 70, 48, 136, 32, 51, 136
 2270 DATA 32, 255, 120, 74, 33, 59, 134, 11
 2280 DATA 183, 120, 71, 198, 128, 127, 120, 72
 2290 DATA 134, 17, 32, 160, 18, 134, 18, 18
 2300 DATA 122, 120, 71, 16, 140, 0, 0, 32
 2310 DATA 147, 134, 18, 18, 122, 120, 71, 16
 2320 DATA 140, 0, 0, 32, 187, 33, 30, 28
 2330 DATA 26, 23, 74, 30, 136, 16, 131, 170
 2340 DATA 170, 74, 38, 247, 30, 136, 57, 53
 2350 DATA 144, 57, 0, 0, 0, 2, 16, 252

