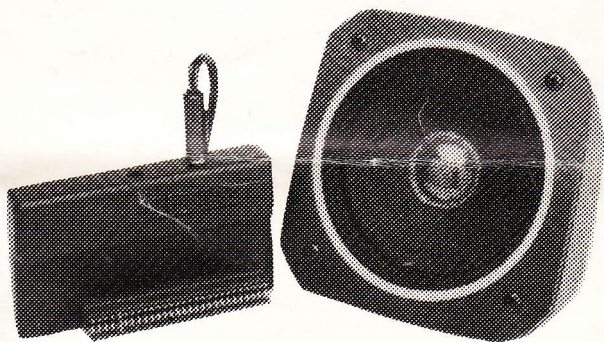


3 - CHANNEL SOUND UNIT



dk'tronics

DK'TRONICS 3-CHANNEL SOUND UNIT

INSTRUCTIONS FOR OPERATION

WARNING: PLEASE DISCONNECT THE SPECTRUM POWER SUPPLY BEFORE PLUGGING THE SOUND UNIT ONTO THE EXPANSION PORT.

INTRODUCTION

The sound unit is based on the AY-3-8912 PROGRAMMABLE SOUND GENERATOR chip.

The unit can be used as a programmable sound generator or as a BEEP amplifier. The unit also has an extension of the edge connector to allow you to plug other peripherals on. E.G. Centronics Printer Interface, Joysticks, etc.

Futhermore, all future DK'TRONICS software releases will contain exciting sounds to exploit the full potential of your PROGRAMMABLE SOUND GENERATOR.

USING WITH BEEP

To use the Amplifier with Beep only requires that the volume be set up to the desired level. For most applicates this will only need to be set the once. On the top of the interface there is a small hole to the left of the jack socket. This can be adjusted with a small screwdriver.

PROGRAMMING THE SOUND UNIT

The chip has 14 internal registers, each dealing with a specific part of the sound output.

To create sound effects/music you first select the desired register, then send the data to the chip.

The chip's registers are accessed by using the BASIC 'OUT' command.

To select the register — OUT 63, Reg. No.

To send the data — OUT 95, data.

STEP 1: A SINGLE TONE (MIDDLE C) ON CHANNEL A

TYPE THIS INTO YOUR SPECTRUM

```
10 BORDER 0:PAPER 0:INK 7:CLS
20 LET reg=63:LET data=95
30 LET ca=1:LET cb=2:LET cc=3
40 OUT reg, 7:OUT data,63-ca
50 OUT reg, 8:OUT data,10
60 OUT reg,0:OUT data,222
62 OUT reg,1:OUT data,1
90 PAUSE 50
92 OUT reg,8:OUT data,0
[ RUN ]
```

(ca=CHANNEL A etc)
(ENABLE CHANNEL A)
(VOLUME CHANNEL A)
(TONE VALUE CHANNEL A)
0=FINE, 1=COARSE)
(PLAY FOR 1 sec.)
(TURN VOLUME OFF)

You should hear a tone play for about 1 second. If you don't then examine your program carefully. The words in upper case are Spectrum Keywords. Refer to your manual if in doubt.

Now try altering some of the values in the program, especially the VOLUME (Line 50) and the TONE (Lines 60-70). Refer to the Tables for the data.

STEP 2: A CHORD USING ALL 3 CHANNELS

ADD THESE LINES TO THE ABOVE PROGRAM.

```
40 OUT reg,7:OUT data,63-ca-cb-cc
52 OUT reg,9:OUT data,10
54 OUT reg,10:OUT data,10
70 OUT reg,2:OUT data,123
72 OUT reg,3:OUT data,1
80 OUT reg,4:OUT data,63
82 OUT reg,5:OUT data,1
92 OUT reg,7:OUT data,63
```

(ENABLE ALL CHANNELS)
(VOLUME CHANNEL B)
(VOLUME CHANNEL C)
(TONE VALUES CHANNEL B)
2=FINE 3=COARSE)
(TONE VALUES CHANNEL C)
4=FINE 5=COARSE)
(DISABLE ALL CHANNELS)

Now you should have heard the chord of C major.

STEP 3: SOUND EFFECTS

BASIC INPUT LOOP

```
10 INPUT "REG (0-13) ";r:"DATA ";d
20 IF r=255 THEN GOTO 60
30 OUT 63,r:OUT 95,d
40 PRINT "REG ";r,"DATA ";d
50 GOTO 10
60 FOR a=0 TO 13
70 OUT 63,a:OUT 95,0
80 NEXT a
90 OUT 63,7:OUT 95,63
95 STOP
```


TYPE IN THE ABOVE AND [RUN] THEN ENTER THE FOLLOWING DATA TO THE PROMPTS TO CREATE THE EFFECT YOU WANT.

1. WAVES 6,15,7,0,8,16,12,50,13,10	255,0
2. SHOTS 1,1,6,30,7,0,8,16,12,20,13,0,13,0	255,0
3. DRUMS 1,2,6,30,7,0,8,16,12,10,13,8	255,0

USING THE DEMONSTRATION SOFTWARE

NOTE: There are 16K and 48K versions of the software. When using the 16K version there will only be about 2K free for your programs.

Type LOAD " " [ENTER] then start the tape.

The program will auto-RUN once loaded, presenting you with a front-panel display. It has been designed so that any of the functions available can be accessed by using only 5 keys.

Keys : 8 = UP : 9 = DOWN : 6 = LEFT : 7 = RIGHT : 0 = FIRE

Or use a joystick (PORT 31 TYPE IE DK'TRONICS, KEMPSTON) or (INTERFACE 2 TYPE)

To access any part of the program, use LEFT/RIGHT to move the cursor over the required function, then press FIRE. There will be visual indication that it has been accessed.

Upon loading if you turn ON all VOICES and VOLume then select PLAY for TUNE 1 then you will hear a pre-recorded tune.

FUNCTIONS

RET : This will return you to Sinclair BASIC.

PLAY : This will play back the current TUNE. The notes will scroll by on the lower part of the screen. If you cannot hear anything then check that the VOICE(s) have been turned ON, and/or the VOLume is above 0. Any key exits PLAYing mode.

TUNE : There is space for three TUNEs, each capable of holding 768 notes (256 on each VOICE). Use UP/DOWN to alter the current TUNE number. Any other key will exit.

TEMPO : This controls the PLAY back speed. Use UP/DOWN to alter the value (0 = fastest 255 = slowest). Any other keys to exit.

VOL : There is a VOLume control for each VOICE. Use UP/DOWN to increase/decrease the VOLume, (0 = off 15 = loud). Any other key exits.

ON/OFF SWITCHES:

VOICE : Pressing FIRE over these will turn the selected VOICE ON and OFF.

WAVE : As for VOICE but changes between TONE and NOISE.

ENVELOPE CONTROLS:

ON/OFF : As for VOICE but enables/disables the ENVELOPE generator.

PERIOD : The number on the left is the COARSE value, the other controls the FINE value. These combined determine the attack/decay times for the SHAPE selected.

SHAPE : Use UP/DOWN to change the SHAPE value. See diagram for ENVELOPE SHAPE outputs.

RECORDING TUNES:

REC : This is the most complex function available. Follow the steps below carefully before recording long tunes to avoid accidental erasure etc.

1. Turn OFF all VOICES
2. Select TUNE number to RECOard on.
3. Turn all VOLumes on>0
4. Turn OFF envelope generator
5. Turn all WAVE functions to TONE
6. Move cursor over REC and press FIRE. It should flash red/white for about 10-15 sec. This is to clear the tune table. This should be done each time a new tune is recorded. Should you accidentally select REC and don't want to erase TUNE, then press any key before the 15 secs are up.
7. Turn VOICE 1 ON
8. Select REC again. This time it should not flash. Also a blue REC will appear in the VOICE column and the selected VOICE no. will turn red on the lower part of the display.
9. The cursor control has now been passed to the yellow arrow at the bottom of screen under END. Using LEFT/RIGHT the arrow will move along the keyboard. Press FIRE to record the selected note. Pressing DOWN will select a pause (-). Press FIRE to record this. If you record a wrong note then move the arrow to BS and press FIRE, this will backspace to the last note entered.
10. Move the arrow to END and FIRE to stop recording.
11. Select PLAY to hear your TUNE.
12. To record on another VOICE turn OFF all other VOICES and turn On the required VOICE. Goto 7.

NB: Always start with VOICE 1. This has the start and END controls included in the tune. Also ensure that only one VOICE is ON when recording.

SAVING YOUR TUNES

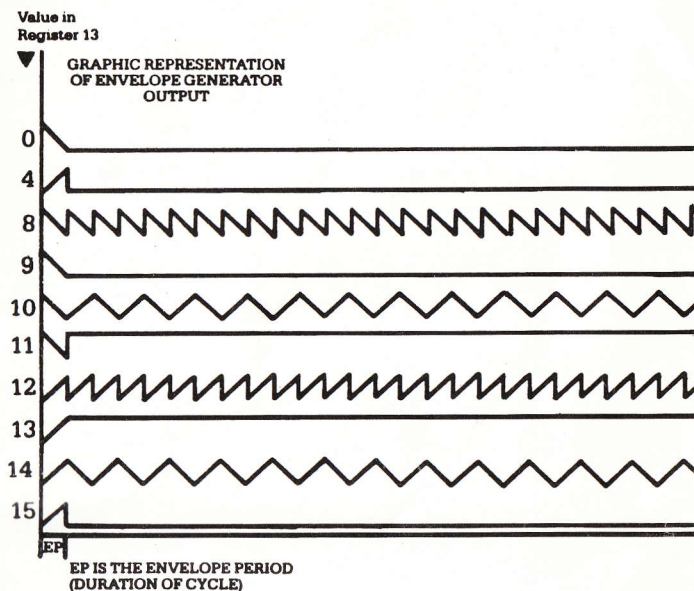
48K Spectrum : SAVE "TUNES" CODE 58000,6910

16K Spectrum : SAVE "TUNES" CODE 25850,6910

SUMMARY OF REGISTER FUNCTIONS

Register	Function	Values
0	Fine tune, Channel A	0-255
1	Coarse tune, Channel A	0-15
2	Fine tune, Channel B	0-255
3	Coarse tune, Channel B	0-15
4	Fine tune, Channel C	0-255
5	Coarse tune, Channel C	0-15
6	Noise frequency	0-31
7	Enable Channels (Subtract from 63 to enable) Tone A=1 B=2 C=3 Noise A=8 B=16 C=32	0-63
8	Volume Channel A	0-15
9	Volume Channel B	0-15
10	Volume Channel C (Values 16 enables Envelope)	0-15
11	Fine tune Envelope period	0-255
12	Coarse tune Envelope period	0-255
13	Envelope shape Disable 0 Hold 1 Alternate 2 Attack 4 Continue 8	0-15

ENVELOPE SHAPE DIAGRAM:



MUSICAL NOTE DATA

Note	Coarse	Fine	Note	Coarse	Fine
C	14	238	C	7	119
C#	14	24	C#	7	12
D	13	77	D	6	167
D#	12	142	D#	6	71
E	11	218	E	5	237
F	11	47	F	5	152
F#	10	143	F#	5	71
G	9	247	G	4	252
G#	9	104	G#	4	180
A	8	225	A	4	112
A#	8	97	A#	4	49
B	7	233	B	3	244

OCTAVE 0

OCTAVE 1

MUSICAL NOTE DATA

Note Coarse Fine

C	3	188
C#	3	134
D	3	83
D#	3	36
E	2	246
F	2	204
F#	2	164
G	2	126
G#	2	92
A	2	56
A#	2	24
B	1	250

OCTAVE 2

Note Coarse Fine

C	0	119
C#	0	113
D	0	106
D#	0	100
E	0	95
F	0	89
F#	0	84
G	0	80
G#	0	75
A	0	71
A#	0	67
B	0	63

OCTAVE 5

C	1	222
C#	1	195
D	1	170
D#	1	146
E	1	123
F	1	102
F#	1	82
G	1	63
G#	1	45
A	1	28
A#	1	12
B	0	253

MIDDLE C

OCTAVE 3

C	0	60
C#	0	56
D	0	53
D#	0	50
E	0	47
F	0	45
F#	0	42
G	0	40
G#	0	38
A	0	36
A#	0	34
B	0	32

OCTAVE 6

C	0	239
C#	0	225
D	0	213
D#	0	201
E	0	190
F	0	179
F#	0	169
G	0	159
G#	0	150
A	0	142
A#	0	134
B	0	127

OCTAVE 4

C	0	30
C#	0	28
D	0	27
D#	0	25
E	0	24
F	0	22
F#	0	21
G	0	20
G#	0	19
A	0	18
A#	0	17
B	0	16

OCTAVE 7