SIRENS

Sound effects are always popular. One of the most popular effects for 'livening up' disco-shows, films, etc., is the (police) siren.
The crime series on TV have taught practically everybody the difference between the European two-tone siren and the banshee wail of the American version. The circuit described here can produce either sound.

The basic principle of the siren is shown in the block diagram (figure 1).
The first section is an oscillator (Astable MultiVibrator, or AMV). For the European siren, the square-wave output from this oscillator is fed direct to the control input of a Voltage Controlled Oscillator (VCO). This causes the VCO to switch to and fro between two frequencies.

For the American siren, the output from the AMV is first passed through an integrating low-pass filter. The output from this stage is something mid-way between a sinewave and a triangular wave. When the VCO is driven by this signal, the result is a close approximation to the noise made by the American cops.
The complete circuit is shown in figure 2. Transistors T1 and T2 are the active elements in the AMV. With S1 in position 'E' (for European) the time-determining elements are P1, R2, R3 and C2; P1 sets the 'switching frequency'. The time-determining elements for the American siren are P2, R3 and C2; P2 sets the 'wailing speed'. Any number of additional preset potentiometers can be added if further siren effects are required.
The main components of the integrator are P3, R10, C5 and T3. P3 sets the amplitude of the output signal from this stage, so it is used to set the difference between the highest and lowest frequency of the American siren.

Transistors T4 . . . T7 are the active elements in the VCO. The voltage at the control input (base of T6) determines the output frequency. For the American siren, the control voltage is the output from the integrator. Since this voltage swings up and down in the rhythm of the AMV, the output from the VCO will swing up and down in the same rhythm.

The centre frequency of this wailing siren is set with P6.
For the European siren, the square-wave output from the AMV is fed direct to the VCO, causing the latter to produce two frequencies alternately. P5 sets the lower of the two, and P4 sets the difference between them – so it can be used to set the higher frequency.
The adjustment procedures for the two sirens are quite simple.
For the European siren, first set the desired switching frequency with P1. Then set the lower frequency with P5; finally, set the upper frequency with P4.
The American siren is slightly more difficult to adjust. First set the 'wail speed' with P2. Then adjust P5 and P6 to get the desired effect. Note that P3 will need readjustment if the setting of P2 is altered.
If more than one American siren is to be preset, an extra switch will be required between C3 and P3, so that it becomes possible to switch in several different presets for P3.
Alternatively, normal potentiometers can be used with a calibrated scale. An almost infinite number of different sirens can then be 'dialed in'.

Figure 1. Block diagram of the siren.

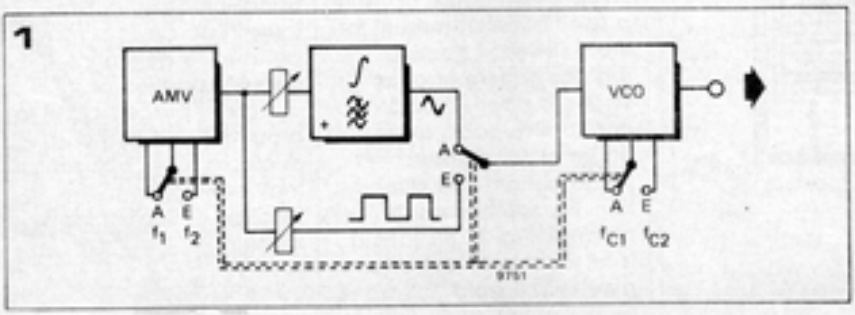

Figure 2. Circuit diagram of the complete unit. The three switches can be coupled for ease of switching between the American and European type of siren.

Figure 3. Printed circuit board and component layout.

Resistors:
R1,R16,R17 = 2k2
R2,R3,R5,R20 = 100 k
R4,R7,R10 = 10 k
R6,R8,R9,R11,R12,R13,R14 = 1 k
R15 = 3k3
R18 = 22 k
R19 = 12 k
P1,P2 = 470 k (preset)
P3 = 100 k (preset)
P4 = 22 k (preset)
P5,P6 = 4k7 (preset)

Capacitors:
C1 = 22 µ/6 V
C2 = 1µ5/63 V
C3,C6 = 47 µ/16 V
C4 = 470 µ/6 V
C5,C8 = 4µ7/16 V
C7 = 680 n

Semiconductors:
T1,T3,T8 = TUN
T2 = TUP
T4 ... T7 = BC547B, BC107B or equ.
D1 ... D4 = 1N4148
Z1 = 4.7 V/250 mW zener

Sundries:
S1 ... S3 = 3-pole, 2-way (see text)

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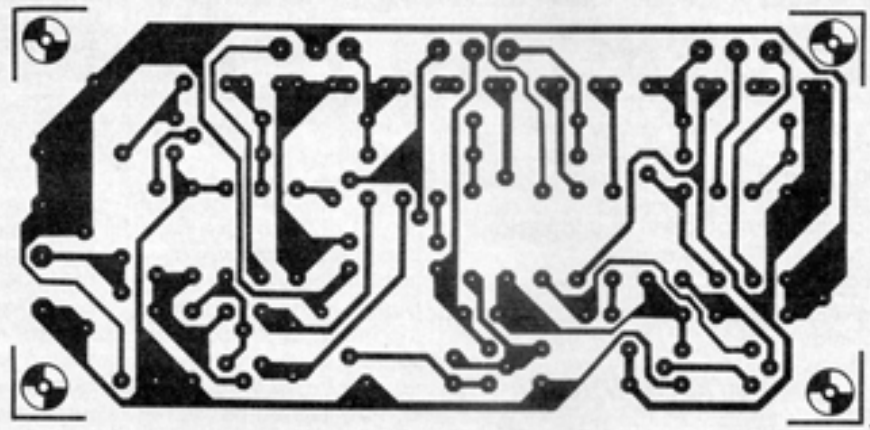
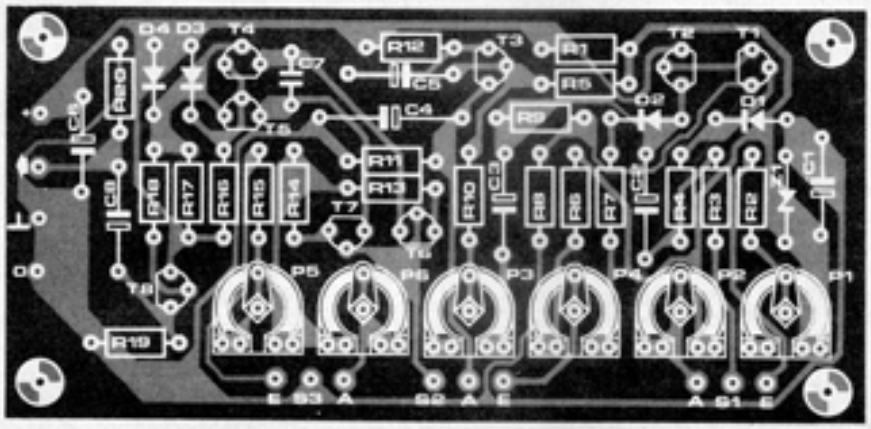
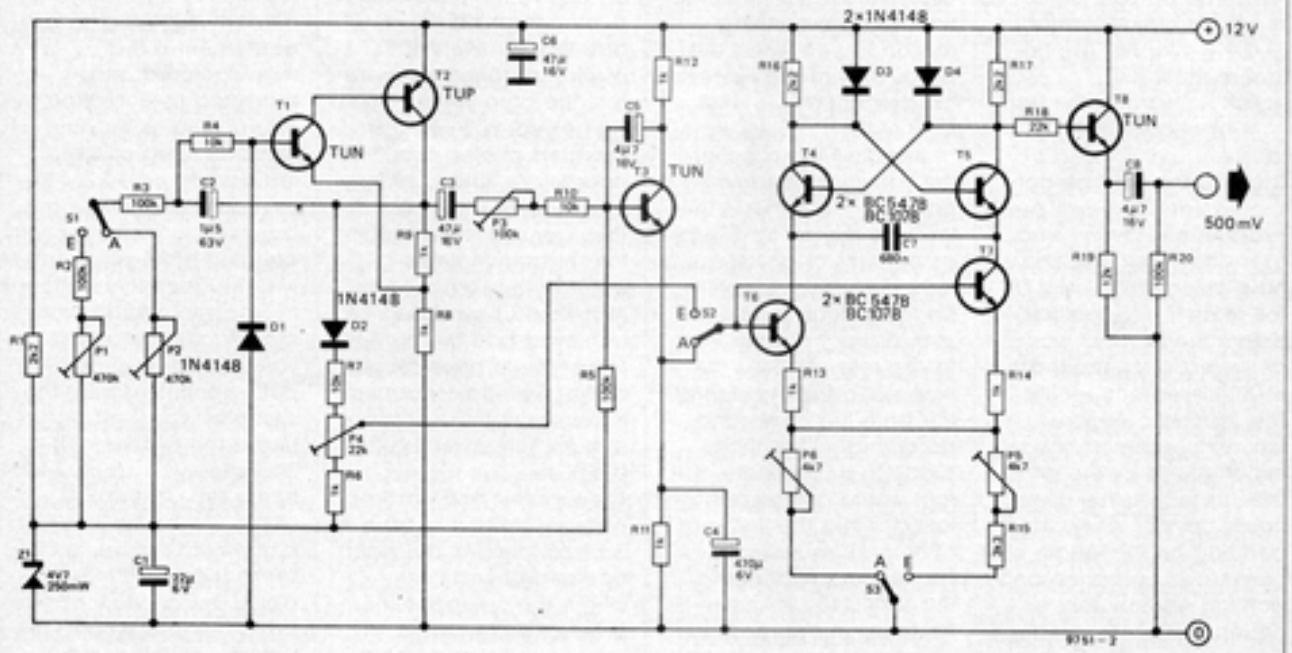



D4 D3
T4
C7
R12
T3
C5
R1
R15
T2
T1
C6
R10
C4
R9
D2
D1
C8
R18
R17
R16
R15
R14
T5
R11
R13
T7
R10
C3
R8
R6
R7
C2
R4
R3
R2
C1
T8
R19
P5
P6
P3
P4
P2
P1
E B3 A
B2 A E
A B1 E

2


2×1N4148
12V
T2 TUP
T1 TUN
C6 47µ 16V
R12
R16
D3
D4
R17
T8 TUN
R4 10k
C5 4µ7 16V
T3 TUN
T4
T5
2× BC 548B BC 107B
C8 4µ7 16V
500 mV
R3 100k
C2 1µ5 63V
C3 47µ 16V
P3 100k
R10 10k
S1
E
A
R2 100k
R9
C7 680n
R19 22k
R20 100k
1N4148
D1
D2
R8
T6
2× BC 548B BC 107B
E B2
A
R7 10k
P4 22k
R6
R5 100k
R13
R14
P6 4k7
P5 4k7
R11
C4 470µ 6V
R15
A E
S3
Z1 4V7 250mW
C1 33µ 6V
9751 - 2