

## COMPONENTS . . .

### Resistors

R1	220k $\Omega$	R7	2.2k $\Omega$
R2	10k $\Omega$	R8	1k $\Omega$
R3	10k $\Omega$	R9	3.3k $\Omega$
R4	10k $\Omega$	R10	10k $\Omega$
R5	10k $\Omega$	R11	1k $\Omega$
R6	39k $\Omega$	R12	220 $\Omega$

All  $\pm 10\%$ ,  $\frac{1}{4}$  watt carbon

### Capacitors

C1	30 $\mu$ F elect. 6V
C2	0.1 $\mu$ F polyester
C3	4,700pF polystyrene
C4	100 $\mu$ F elect. 25V
C5	0.033 $\mu$ F polyester
C6	25 $\mu$ F elect. 12V
C7	50 $\mu$ F elect. 12V
C8	0.22 $\mu$ F polyester
C9	0.01 $\mu$ F polyester
C10	100 $\mu$ F elect. 12V
C11	50 $\mu$ F elect. 12V
C12	8 $\mu$ F elect. 12V
C13	100 $\mu$ F elect. 12V

### Inductor

L1 660 turns of 38 s.w.g. enamelled copper wire wound on bobbin of Ferroxcube pot core type LA1

### Potentiometer

VR1 10k $\Omega$  linear wirewound preset

### Transistors

TR1, TR4, TR5, TR6 OC71 (4 off)  
TR2, TR3 OC200 (2 off)

### Switches

S1, S2 Single pole, changeover press switches (Bulgin S.M.357) (2 off)  
S3 On/off toggle switch

### Sockets

SK1, SK2 Coaxial sockets (2 off)

### Battery

BY1 9V, type PP3 or similar

### Miscellaneous

8in  $\times$  6in  $\times$  2 $\frac{1}{2}$ in aluminium chassis, Veroboard, battery clips, 6B.A. nuts, bolts and spacers

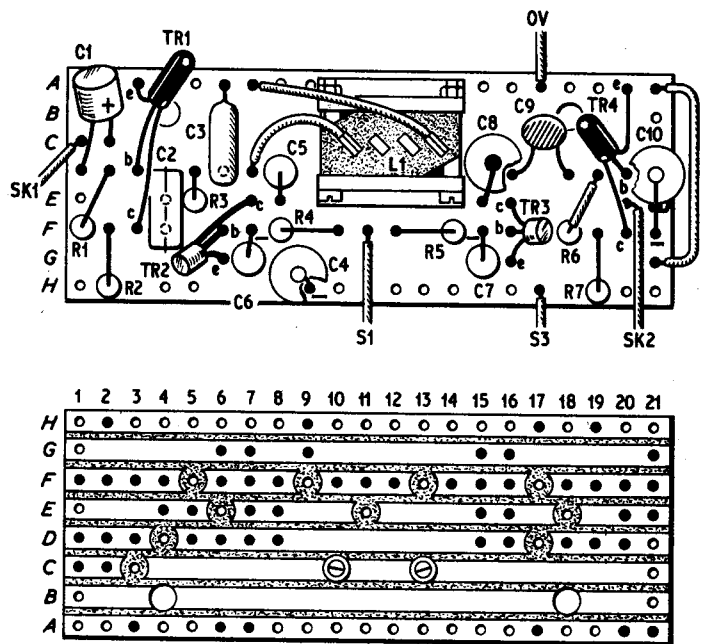


Fig. 2. Waa-waa module layout and wiring

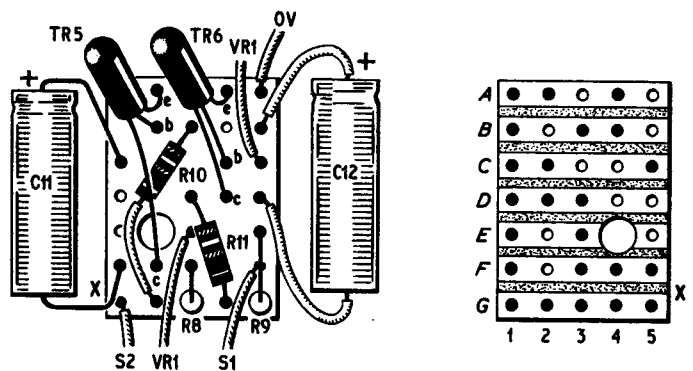


Fig. 3. Multivibrator module layout and wiring

## CONSTRUCTION

In the prototype unit two circuit modules are constructed. These consist of the basic Waa-Waa module and the multivibrator module, details of which are given in Fig. 2 and Fig. 3.

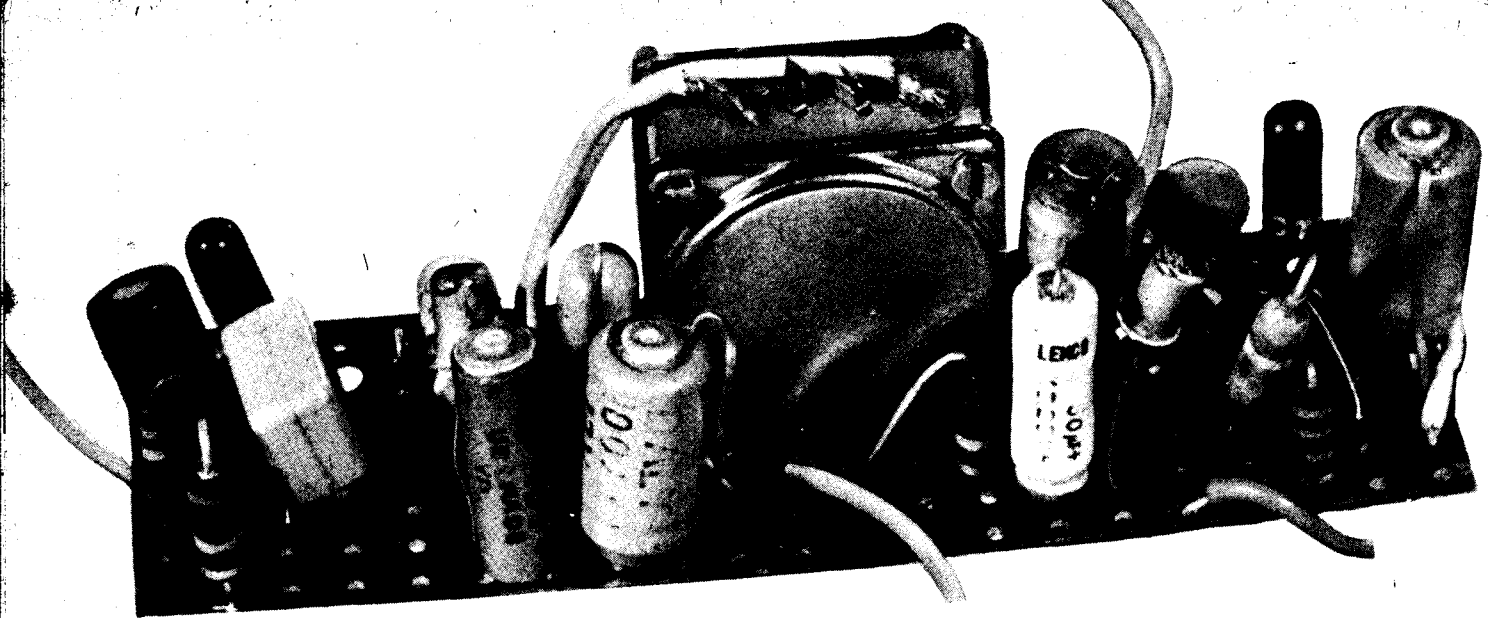
If only the single Waa-Waa function is required, both the multivibrator and S1 can be omitted in the construction.

The inductor L1 is made up by pile winding 660 turns of 38 s.w.g. enamelled copper wire on a Ferroxcube pot core bobbin. When assembled the pot core is mounted on the Veroboard by two  $\frac{1}{4}$ in 6B.A. screws. In tightening these up, be careful not to crack the ferrite core.

With the modules completed they should be wired and mounted with their associated components in an 18 s.w.g. aluminium chassis, as shown in Fig. 4. The boards should be spaced away from the chassis to prevent short circuits.

## USING THE WAA-WAA

The unit may be used with any guitar amplifier as the output impedance is about 600 ohms. When switched on with no footswitches depressed, the unit acts as a treble booster, accentuating the harmonics of the guitar.



Waa-Waa unit circuit board

Depressing the SINGLE footswitch (S2) produces a single "Waa". With a little practice it is easy to add this effect to single notes or chords, then quickly releasing the switch to produce a second "Waa".

If the AUTO switch (S1) is used, the effect can be produced continuously at a frequency determined by the setting of the potentiometer VR1. This is very effective on rhythm guitars as the Waa-Waa will not always coincide with the beat of the music.

**MODIFICATIONS**

If the Waa-Waa is used with an electronic organ, where the pitch is generally higher and harmonics more prominent, it would be better to reduce the values of C5 and C8.

If the effect is still too heavy, a resistor can be wired in parallel with L1 to reduce its Q-factor. The actual value would depend on experiment and personal requirement.

Again, with other instruments it is necessary to ensure that the first stage is not overloaded. In the prototype, a 16mV signal proved the maximum for the least distortion. If this figure is in fact exceeded a 1 kilohm potentiometer should be interposed between SK1 and C1 to provide signal attenuation. ★

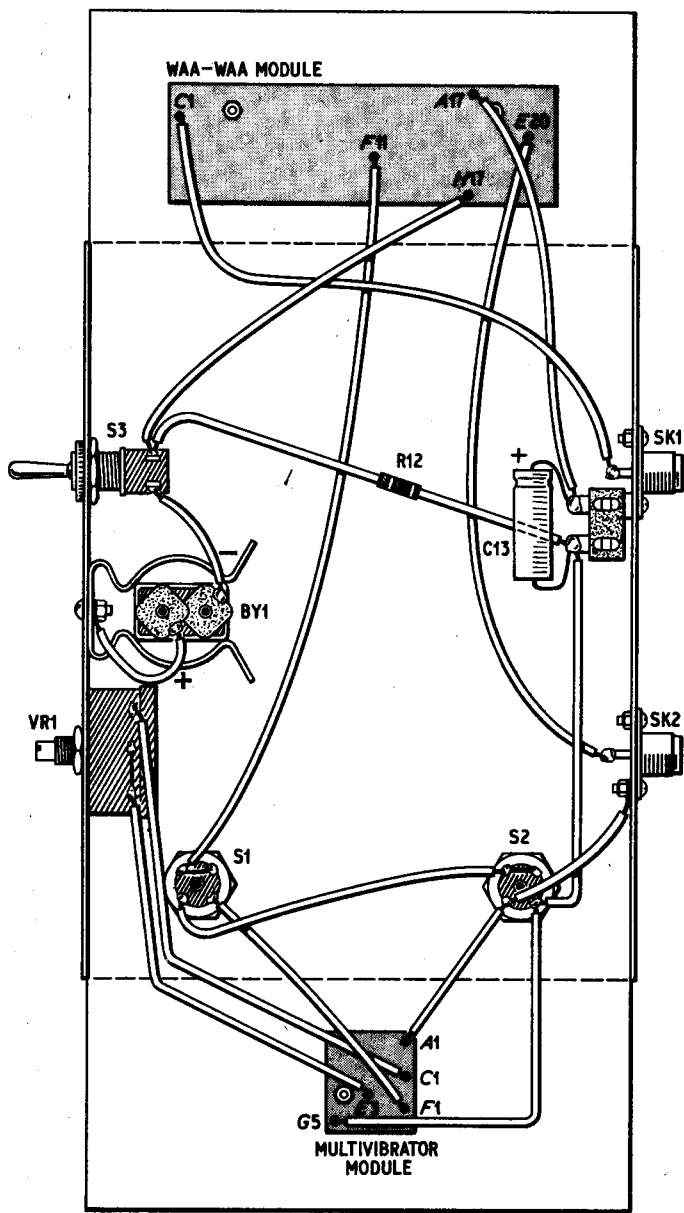
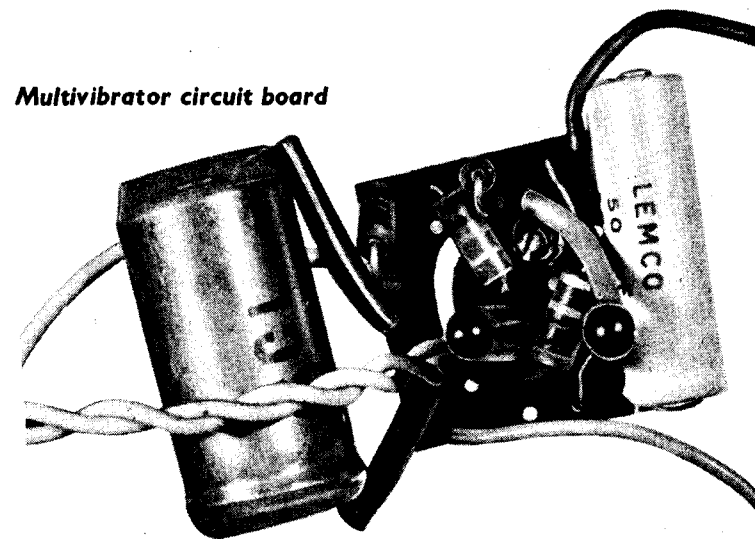


Fig. 4. Layout and wiring of the complete waa-waa unit in an aluminium chassis. The end flanges are shown folded flat for clarity



Multivibrator circuit board