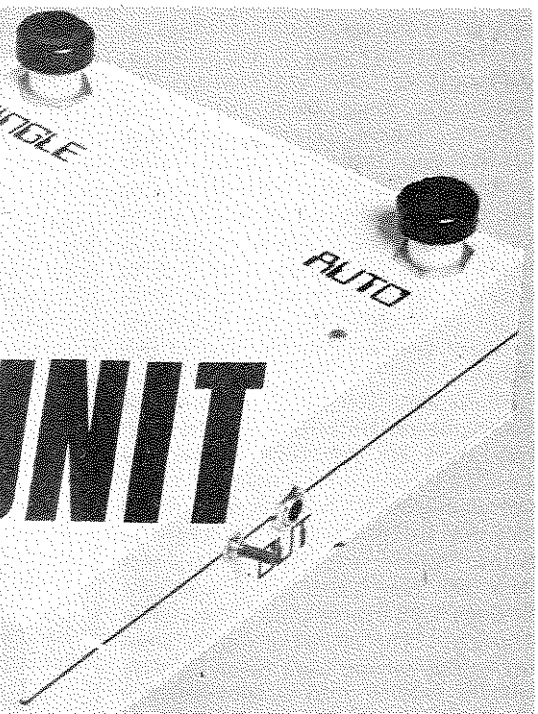
PLAY EFFECTIVE GUITAR WITH OUR WAA WAA UNIT



project 455

PERHAPS THE MOST used of all the various guitar effects is that of the 'Waa-Waa' unit. The sound of this circuit has been screaming from speaker stacks for many a decibel-ridden year now, and no doubt will continue to do so for a while yet.

Our unit described here will, we hope, contribute to this longevity!

Basically the chracteristic sound of a Waa-Waa unit is produced by sweeping a band-pass filter across the audio spectrum of a guitar. A frequency range of approx 70Hz–6kHz. This can be done in various ways, but is usually tailored to he operated by a foot pedal. However, these pieces of hardware are both expensive and hard to obtain other than full of electronics.

BACK PEDALLING

Since our design was to be for the home constructor, we decided against the use of a pedal; and instead we have substituted two foot switches. These are much cheaper and should be easy to get hold of. Ours came from the surplus bins at HL Smiths.

By avoiding the pedal, we created a problems for ourselves, in that we could no longer operate the filter with a variable resistor. Instead it is made to sweep across tile range by the switching into circuit of three capacitors, which alters the resonant frequency of the filter.

GETTING WOUND UP

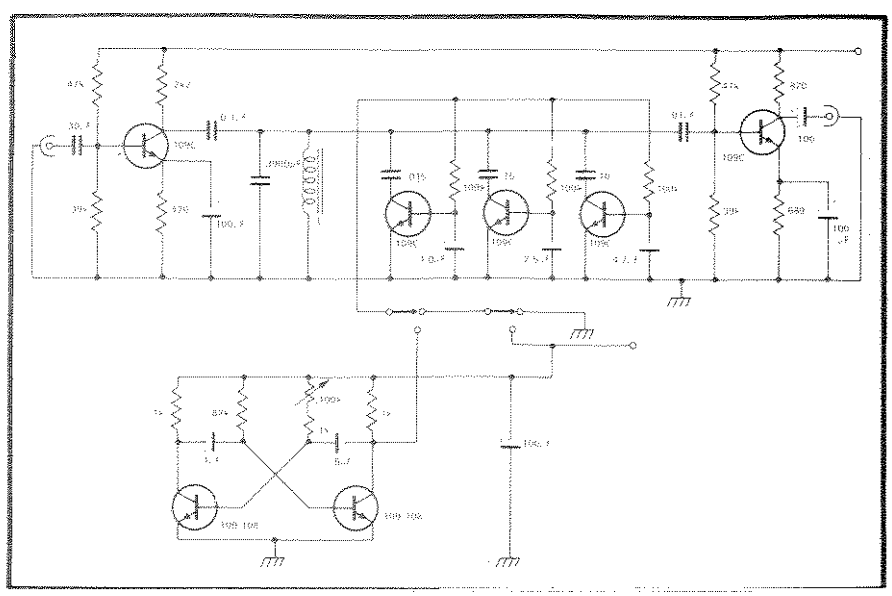
Coils are generally to be avoided, if for no other reason than that they arc so much trouble to wind, but in this case there really wasn't any other way! At least we used a ready wound coil from one of our earlier projects (Graphic Equaliser) so that problems were sidestepped as much as possible. Should you he one of these strange people who derive pleasure from enmeshing yourself in yards and yards of wire, we have repeated details in the parts list. Good luck.

ON THE LEVELS

The input impedance of the unit is about 2k and the first stage gain such that the device operates best with an input of around 10–20mV. Signals much higher will cause the stage to distort the incoming signal. If you wish to cause distortion of course, then go ahead (did someone mutter 'Fuzz to you too'?) If not then a volume control of at least 2k is a good idea if the input exceeds 50mV. Output impedance is low and will match any amplifier.

USE AND ABUSE

Using the unit should pose no real problems, and there is no setting up to be done. Operating the single switch will result in a 'waa' on the next note played through the circuit. It is best not to hold the siwitch closed, but to release it quickly. After a short while it becomes easy (relatively!) to add the effect to any required note or chord. Depressing the auto switch couples the filter to the oscillator, and thus produces a 'waa-Waa' sound



independent of the input, at a rate set by VR1, for as long as the switch is held down.

With no controls operated, the section of the filter which remains in circuit means that a 'teble boost' occurs on the signal. If you don't want this effect, then a third switch wired to take the signal away from the waa-waa is needed, and should not be difficult to add.

BUILDING UP

Construction of the unit is made easier by using the PCBs, but layout is no: that important, and something like veroboard would serve the purpose. We split up the circuit onto two hoards to facilitate the fitting of the small multivibrator auto control into the guitar itself. This system has the advantage that the rate control for the auto-waa is then easy to alter while playing. The lead between the two parts of the circuit need not be screened, as it carries no audio signal just the supply to the oscillator, and the square wave switching signal to the filter,

The sound of the effect in use is set by the capacitors in the filter section, and these can be experimented with to change the nature of the resulting sound.

HOW IT WORKS

L and C4 form a band-pass filter with resonant frequency equal to

$$f = \frac{1}{2\Pi\sqrt{L.C4}}$$

With the values shown here this value is about 6kHz. The R-C networks R5 –C6 R6–C8 R7 --C10 act as time delays to switch on Q2,3,4 respectively in sequence following the depression of SW2

This switches C5, C7. C9 across the filter in turn, pulling the resonance point across the audio band. The time constants are such that the order of switch on is Q2, Q3 and Q4.

This resonance changes from 6kHz 2k7Hz 950Hz to 400Hz when Q4 switches on. Upon releasing the switch the electrolytics discharge through the 100k resistors to earth, switching off the transistors.

Automatic switching is provided by the multivibrator, the frequency of which is set by VR1. When the 'auto' switch. S1, is depressed a slow square wave of about 8V is applied to the charging resistors. Thus the transistors are pulsed on and off. C13 is to decouple the supply to the oscillator to prevent problems with variations as the oscillator switches state.

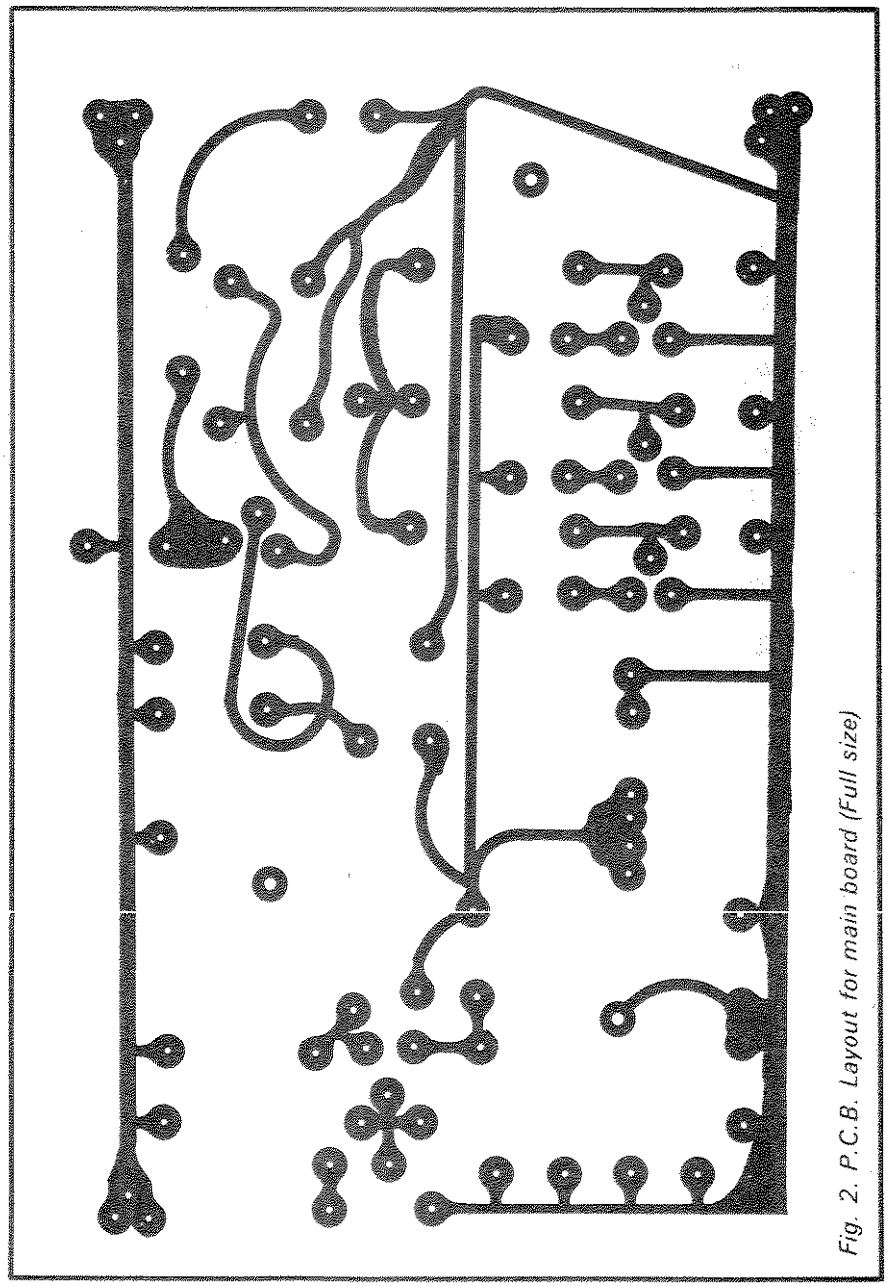


Fig. 2. P.C.B. Layout for main board (Full size)

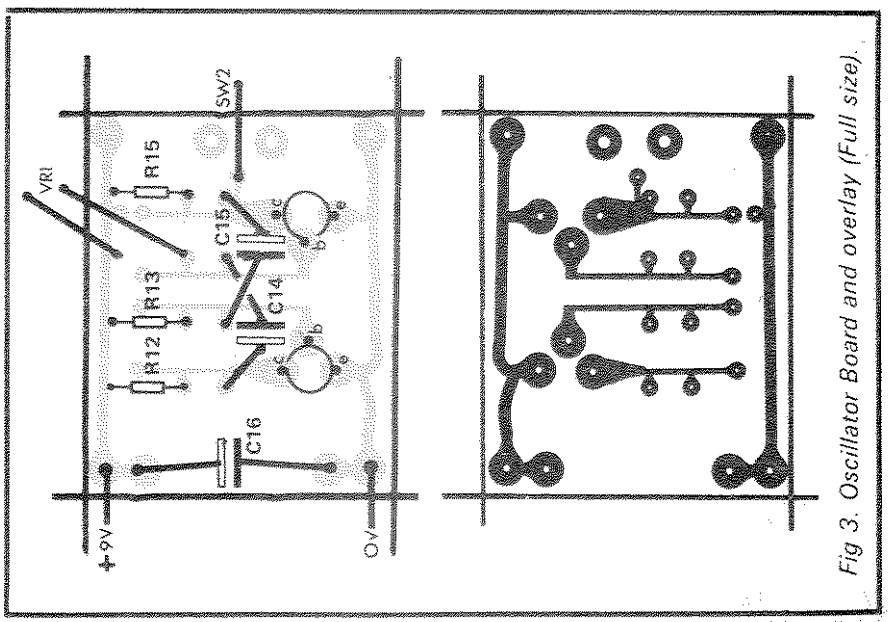


Fig 3. Oscillator Board and overlay (Full size).

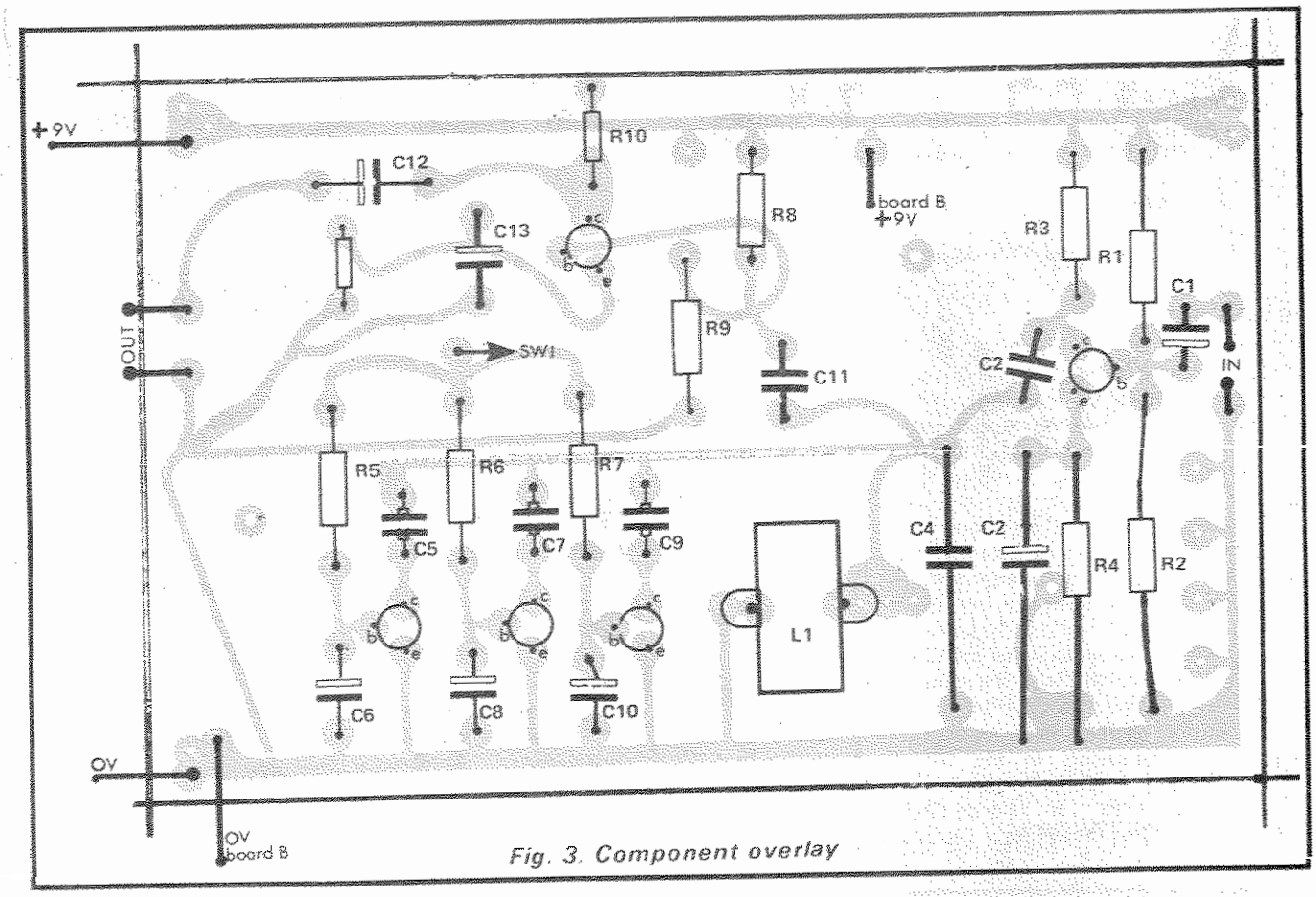


Fig. 3. Component overlay

PARTS LIST

R1,8	–	47k
R2,9	–	39k
R3	–	2k2
R4	–	470R
R,5,6,7	–	100k
R10	–	820R
R11	–	680R
R12,14,15	–	1k
R13	–	82k
	–	
C1	–	30μF
C2	–	0.1μF
C3,12,13,14	–	100μF
C4	–	3900pF
C5	–	.015μF
C6,15	–	1.0μF
C7	–	.15μF
C8	–	2.5μF
C9	–	1.0uF
C10	–	4.7μF
C11	–	.01μF
C16	–	5μF
Q1,5	–	BC109C
Q2,3,4,6,7	–	BC109 or similar

L – 180mH – available from Maplin Electronics as 'L5' for the ETI Graphic Equaliser at £1.26 ready wound. Add 20p 20p p and p. Can be wound as 424t of 38swg on Mullard LA 4543 core and DT2534 bobbin.

SW1, SW2 – Single pole changeover foot switches

Aluminium case to suit, On/Off switch, 9V battery. ¼" jack sockets (2 off).

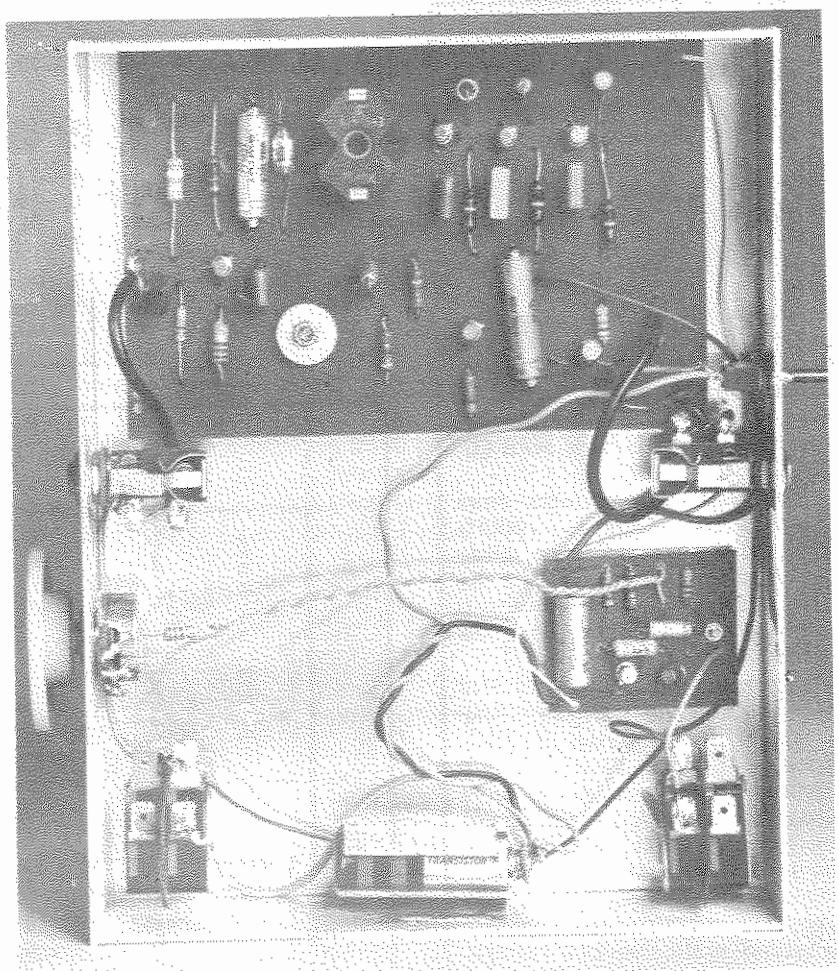


Fig. 4. Internal view of the unit.