

A TRANSISTORISED TREMOLO UNIT

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A TRANSISTORISED TREMOLO UNIT FOR ELECTRIC GUITARS

THE function of the tremolo unit when used in conjunction with an electronic musical instrument is to modulate the signal from the instrument with a low frequency of approximately 5-15c/s. This produces a plaintive effect reminiscent of the human voice which adds expression to the tone of the music.

The normal valve operated type of tremolo unit consists of a low frequency oscillator, the output of which is mixed with the signal from the instrument in a "gating" circuit. The unit is usually introduced between the instrument and power amplifier and operates at a low level of signal.

This type of unit has the disadvantages of relatively large size and of needing an isolated and very well smoothed power supply. The unit to be described measures 5½ in. x 2½ in. x 2 in. (conveniently pocket sized) is driven from a 9V PP4 battery and uses three transistors.

The Circuit

Tr1 and Tr2 are coupled in a multivibrator circuit using 2μF capacitors, C1 and C2 to supply the low frequency signal. VR1 is the frequency control and VR2 controls the amplitude of signal fed to Tr3 and hence the depth of modulation.

The output of the multivibrator is a square wave having harmonics which extend into audio frequencies, and if the output were mixed directly with the signal, the harmonics of the square wave would come through the amplifier as an unpleasant train of clicks.

To remove these high frequencies the low pass filter R7, C3, R8, C4 is introduced to integrate the square wave and provide a smoothly varying voltage across C4.

This voltage provides the power supply for Tr3,

a single transistor amplifier operated at very low collector current. Since the gain of the amplifier varies with the h.t. voltage, the low frequency ripple appearing on the h.t. supply to Tr3 will cause the amplitude of the output signal to fluctuate in the desired manner.

Since the collector current in Tr3 is low the noise introduced by the circuit is negligible, and the gain of the circuit is approximately unity,

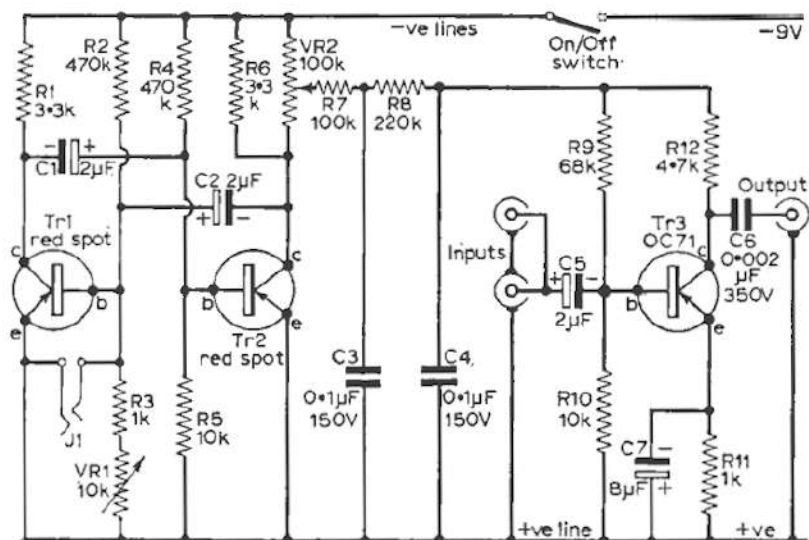


Fig. 1: The circuit of the unit.

allowing the unit to be inserted between instrument and amplifier without alteration of gain controls.

Construction

The unit is constructed in a small plastic case using normal sized potentiometers. The construction is uncritical and the circuit would lend itself to miniaturisation techniques.

The components are assembled on a small strip of tag-board as in the wiring diagram. The usual precautions should be observed when wiring tran-

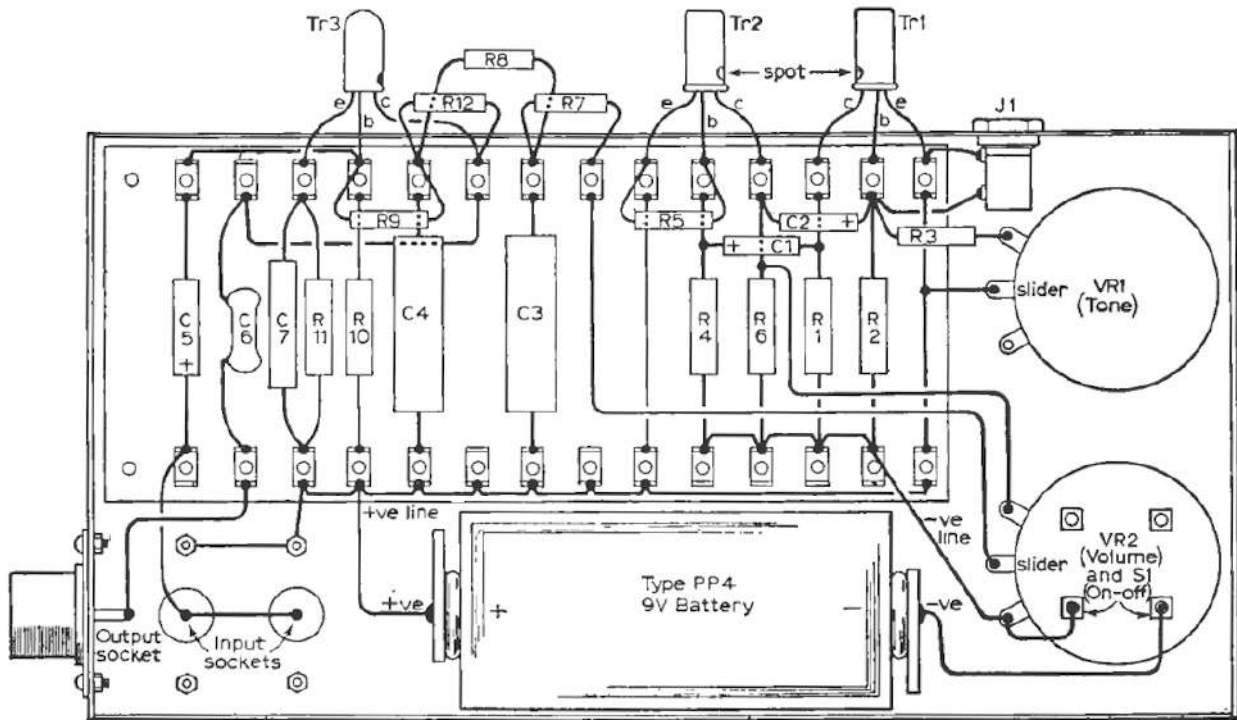


Fig. 2: The wiring diagram.

sistors and small electrolytics to avoid overheating the components.

Two coaxial sockets are provided for inputs. The sockets are not isolated from each other since electric guitar volume controls are usually connected "wrong way round" enabling direct mixing of the two circuits without interaction.

The inside of the plastic case should be covered with aluminium foil which is earthed to prevent pick-up. A layer of polythene sheet is used to insulate the underside of the tag-board from the screening.

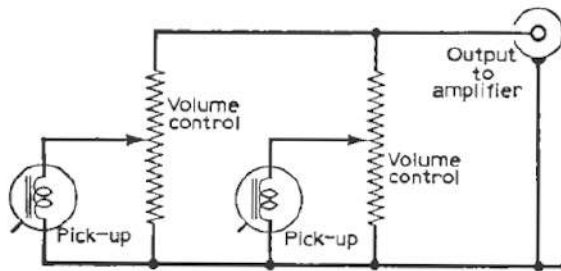
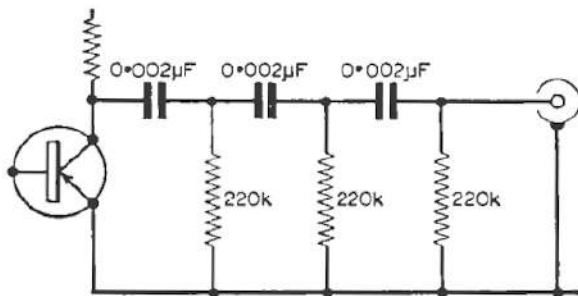


Fig. 3 (above): Electric guitar volume controls connected to permit direct mixing of signals from two pick-ups.

Fig. 4 (below): A high pass filter for use after the tremolo unit.



COMPONENTS LIST

Resistors:

- | | |
|----------|----------|
| R1 3.3kΩ | R7 100kΩ |
| R2 470kΩ | R8 220kΩ |
| R3 1kΩ | R9 68kΩ |
| R4 470kΩ | R10 10kΩ |
| R5 10kΩ | R11 1kΩ |
| R6 3.3kΩ | |
- (All resistors ¼W., 10%)

Capacitors:

- | | |
|----------------|------------------|
| C1 2µF, 12V | C5 2µF, 12V |
| C2 2µF, 12V | C6 0.002µF, 350V |
| C3 0.1µF, 150V | C7 8µF, 12V |
| C4 0.1µF, 150V | |

Transistors:

- Tr1 Red spot surplus type
 Tr2 Red spot surplus type
 Tr3 OC71

Potentiometers:

- VR1 10kΩ VR2 100kΩ

Components C5, C6 and C7 are deliberately made small in order to introduce a measure of bass cut, but if the unit is to be used with an amplifier with strong bass response some trouble may be experienced with the low frequency signal coming through the amplifier as a "thumping" sound. This may be improved by the use of a high pass filter after the unit (Fig. 4).

If necessary the unit may be used with a foot switch plugged into the miniature jack, which is connected between the base of Tr1 and earth. This prevents the multivibrator from oscillating until the switch is opened. Thus the vibrato effect can be added at any time without using the hands.

The unit has given good service when used in conjunction with the author's electric guitar, and results obtained will justify the effort involved in its building.