

TREMOLO ADAPTER

ADD TREMOLO TO YOUR ELECTRIC GUITAR
OR OTHER ELECTRONIC INSTRUMENT

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TREMOLO devices are quite popular for adding interesting effects to different types of electronic musical instruments. In fact, they are often built into expensive systems. For systems that lack the tremolo feature, an inexpensive tremolo adapter is easily added.

The ideal tremolo would be a low-frequency (6 to 10 Hz) sine-wave oscillator driving a non-distorting, voltage-controlled amplifier (vca). Some circuits employ triangle-wave modulation or a nonlinear vca, which can cause undesirable clicks or distortion. The tremolo adapter described avoids these problems by using a sine-wave modulation signal to control the channel resistance of a field effect transistor. The FET vca has much less distortion than bipolar transistor or diode techniques.

As shown in the schematic diagram, *IC1* and its associated components form a phase-shift oscillator. The output of this oscillator is attenuated by *R4* and *R5* and is then

fed to *Q1* via *S1*. You can change the value of *R5*, which affects the modulation depth, to suit the gain of the FET used. A lower resistance increases the depth, but avoid going below 30,000 ohms or the FET will become reverse biased.

The oscillator output adds or subtracts from the bias level set by *R6* and *R7*. The voltage on the inverting input of *IC2* will always be very close to ground level. Therefore, the gate-source voltage of *Q1* is dependent only upon gate voltage relative to ground, resulting in a low-distortion modulation of the signal on the drain terminal. The output of *IC2* is attenuated by *R9*.

With a 1-volt peak-to-peak drive, the frequency range of the tremolo adapter is 40 to 50,000 Hz. Extended low-frequency response can be obtained by increasing the capacitance of *C4* and *C5*. Higher gain can be obtained by increasing the value of *R8*.

Use of a printed circuit board or perforated phenolic board and solder clips for assembling the adapter is strongly recommended. Also, use only a low-wattage soldering iron to solder into place the components. (Switch *S1* can be a footswitch if desired, but it must be sturdily mounted. A commercial footswitch, selling for as little as \$3, is ideal for this application.)

When assembly is complete, plug the instrument to be used with the adapter into *J1* and a power amplifier into *J2*. If any clipping circuits, such as a fuzzbox, are to be used, they must be placed between the instrument and the tremolo adapter. Flip *S2* to power the adapter. (Note: It may take a few seconds before the tremolo oscillator reaches full output.) Place *S1* in the OUT position and adjust level control *R9* as desired. Set *S1* to IN and adjust *R4* for the desired depth of tremolo. That is all there is to it. ♦

