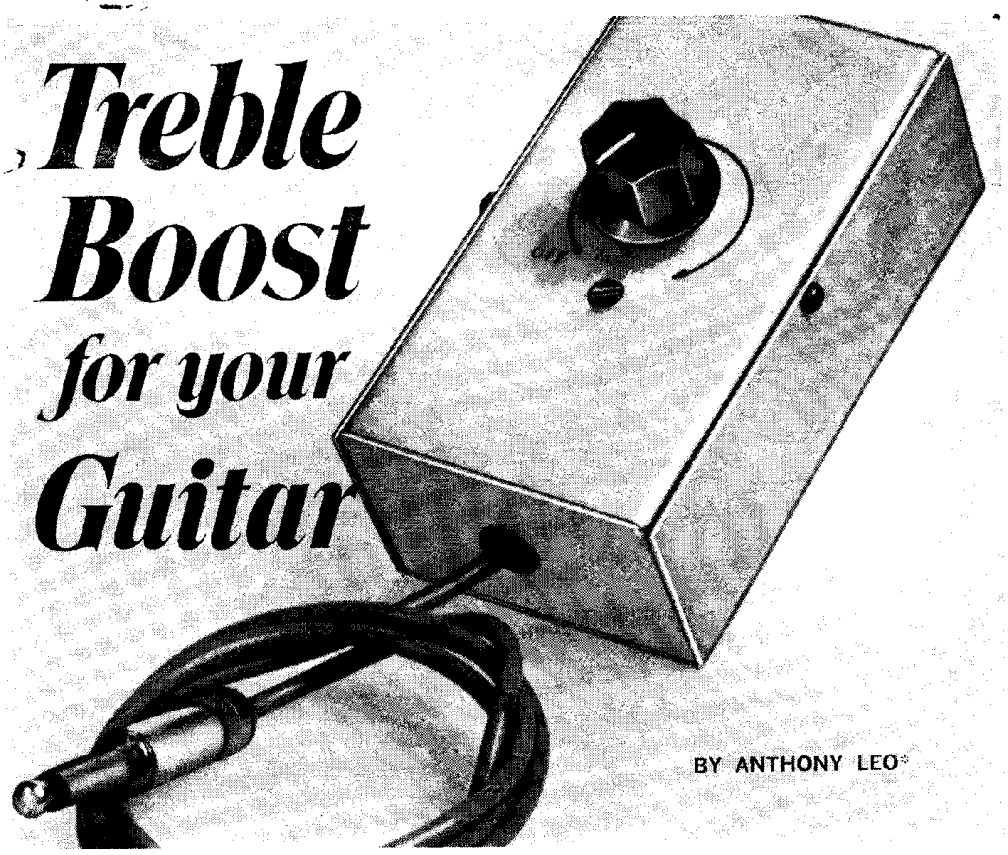
Treble Boost for your Guitar



BY ANTHONY LEO*

Blast 'em with another 20 dB

IN POP MUSIC groups, the predominant instrument is usually the electric guitar—either a bass or a rhythm guitar, with the latter played as a simple accompaniment or as the lead instrument. When it is the lead instrument, a great deal of treble boost is required of the rhythm guitar either to highlight the melody section or for special effects.

Often, the necessary boost is within the range of the amplifier and the guitar tone controls. However, there are occasions when a large amount of additional treble boost is desired. At times like these, you need a special treble boost preamplifier.

The independent treble boost preamplifier described in this article is just the thing for the pop music guitarist. It provides 20 dB of boost at 3000 Hz with reference to 300 Hz. With a minor alteration, an extra 6 dB can be obtained.

The circuit of the booster preamp is simply a one-transistor amplifier stage (*Q1* in the schematic diagram) whose response to incoming signals is continuously adjustable in the treble range. Control of treble boost is provided by potentiometer *R4*.

At bass frequencies, *R4* in the emitter circuit of *Q1* introduces sufficient degenerative feedback to maintain stage gain at slightly more than unity. As the incoming signal from the guitar through

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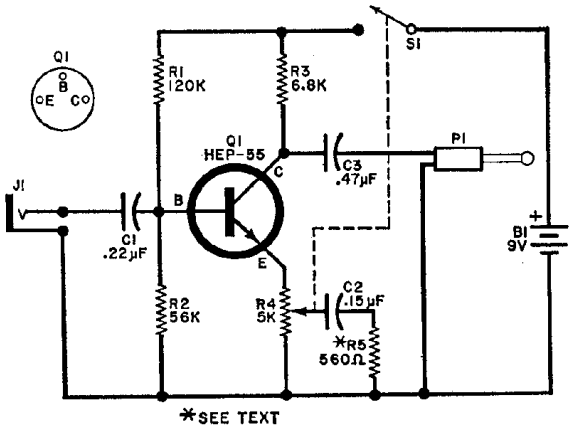

Basic circuit includes R5 which limits maximum gain to 20 dB. Up to 6 dB extra gain can be had by eliminating R5 and connecting C2 directly to negative bus.

PARTS LIST

B1—9-volt transistor battery
C1 0.22-μF, low-voltage capacitor
C2—0.15-μF, low-voltage capacitor
C3—0.47-μF, low-voltage capacitor
J1—Jack (see text)
P1—Plug (see text)
Q1—Transistor Motorola HEP55
R1—120,000-ohm, ½-watt resistor
R2—56,000-ohm, ½-watt resistor
R3—6800-ohm, ½-watt resistor
R4—5000-ohm switched linear potentiometer
R5—560-ohm, ½-watt resistor (see text)
S1—S.p.s.t. switch (part of R4)
1—4¼" x 2⅜" x 1½" aluminum utility box
1—Dual five-terminal tag strip or terminal board
Misc.—Shielded microphone cable; battery clip; hardware; metal spacers; control knob; solder; etc.

jack *J1* increases in frequency, the resistance of the emitter circuit is progressively shunted by the impedance network made up of capacitor *C2* and resistor *R5*. Assuming the frequency of the incoming signal continues to rise and that *R4* is set for maximum resistance, the gain of the stage continues to increase until at about 3000 Hz it levels off at 20 dB. At this point, the gain of the stage is limited only by the value of resistor *R5*.

As the resistance of *R4* is decreased, stage gain drops proportionally from a maximum to some intermediate level. Hence, if treble is too "bright" at one setting of *R4*, it can be compensated for by changing the setting.

Constructing the treble boost preamplifier should present no problems. The circuit is simple, and since all components are relatively small in size, it can be housed in a very small aluminum chassis box. A convenient size for the box is 4¼" × 2⅜" × 1½".

For convenience, mount *J1* at one end of the box, and bring out the shielded microphone cable to which output plug *P1* is connected through a rubber-grommet-lined hole in the other end of the box. (Select the jack and plug to conform with the requirements of your particular guitar and amplifier.) The potentiometer can then be mounted on the top of the box.

When assembling the project, first mount the battery holder at one end of the underside of the top half section of the utility box. Slip the battery into the holder. Then mount a tag strip or terminal board over the battery, using long enough spacers to provide clearance between the board and battery.

Now wire the components to the tag strip or terminal board, following carefully the schematic diagram. Be sure to wire the transistor and battery leads to the proper points in the circuit, and exercise caution when soldering the transistor into place. Apply just enough heat for the solder to flow; as soon as the solder flows, remove the heat.

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When the circuit is completed, assemble the utility box. Turn the box over and fasten a suitable knob to the shaft of the potentiometer.

To use the booster preamp, plug into *J1* the cable from your guitar and the plug on the booster/preamp's cable into the input of your amplifier. Switch on power (turn the potentiometer knob clockwise until you hear a click) and start playing your guitar.

By experimenting with the setting of the potentiometer control, you can determine the best positions of the control for different occasions and effects. (The maximum stage gain of the treble boost preamp is at this point restricted to 20 dB at 3000 Hz to prevent overloading and consequent distortion of the amplifier input stages. However, if your guitar/amplifier combination will handle it without degrading the sound quality, you can add another 6 dB of gain. To do this, remove *R5* from the circuit, and connect *C2* directly to the negative buss of the circuit.)

Once you familiarize yourself with the use of the guitar treble boost preamplifier, you will wonder how you got along without it at "rock" sessions. And because the booster preamp is an accessory item, when the time comes that you do not need it for special effects, you can disconnect it from the circuit and play your guitar straight through. -30-