



BUILD A

GUITAR SOUND INTENSIFIER

IMPROVES FREQUENCY RESPONSE, GIVES COMPLETE TONE CONTROL

BY KEN LANG

THERE are few families with youngsters (or young-at-heart oldsters) that don't have guitars these days. The instrument may be the familiar acoustic type, whose shape and size have not changed much during its long history, or it may be a solid-body electric type. With a smaller body, the electric guitar relies entirely on electronic amplification for its sound—and it is probably today's largest selling electronic instrument.

The solid-body electric guitar has a thick wooden section instead of a resonant box. Magnetic pickups are mounted inside the body under the metal strings. Without the nuances of body size and shape to provide differences in tone, most solid-body guitars sound pretty much alike. The combination of pickup, strings and electronic resonance provides a pure inductance, which contributes little to sound character and causes peak emphasis at one particular frequency (with attendant ringing and hangover). The subtle string overtones get lost because they can't compete with the sound output at circuit resonance.

Of course, special effects can be added to electric guitars, but a means of really changing the coloration of the sound is

more desirable. Such a change can be achieved by adding this Guitar Intensifier. It has its own volume, bass, and treble controls and can be mounted in the cavity of many solid-body electric guitars. Having independent tone-control arrangements, this approach gives the user a variety of tonal colorations and produces a wide frequency response. There is no loss of high-frequency overtones at low volume settings, but the GI provides the instrument with more "punch."

Circuit Operation. The signal induced in the guitar pickup (Fig. 1) is coupled through *S1* and *C1* to the base of *Q1*, a preamplifier. Potentiometer *R12* is a volume control, while *R13* and *R14* provide bass and treble control.

The complete bass cut-and-boost circuit is composed of *R5*, *R13*, *R6*, *C3*, and *C4*. The treble cut-and-boost consists of *C5*, *R14*, and *C7*. The contoured signal is then applied to output amplifier *Q2*, which is coupled to *J1* through *C8*.

When *S2* is placed in the bypass position, the transistor amplifier is turned off and the input signal goes through only the volume, bass, and treble controls.

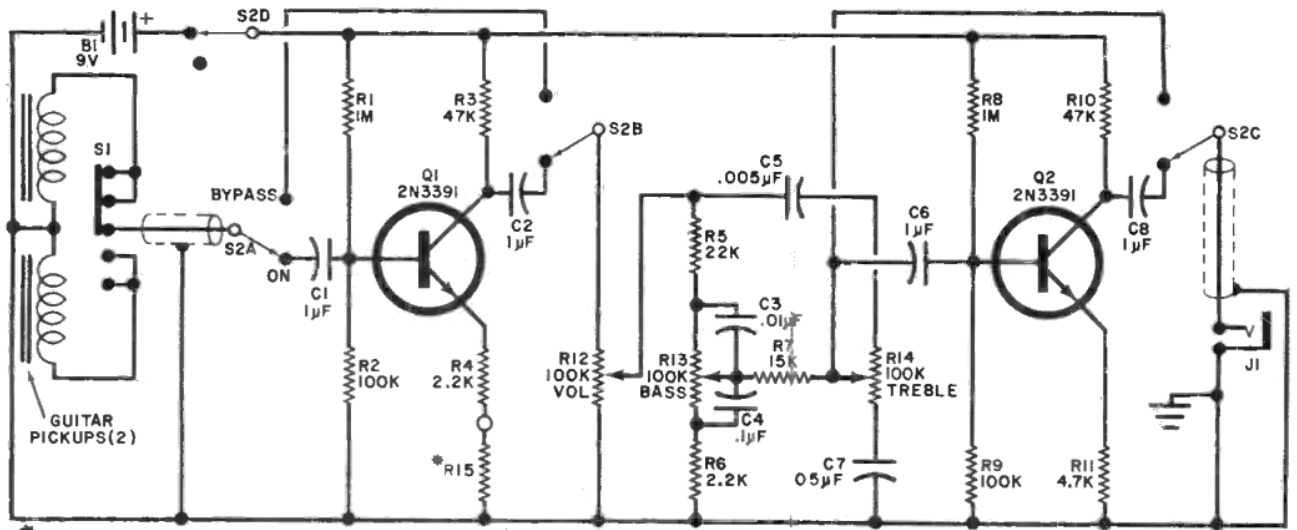


Fig. 1. Spectracom IGI™ circuit (patent applied for) is similar to discrete model.

Construction. The complete circuit can be assembled on a small pc board as shown in Fig. 2. If the unit is to be mounted in the cavity of a solid-body guitar, be sure all components are mounted so that they take up a minimum of height.

The value of R_{15} must be selected so that it prevents distortion due to overloading of the first stage. Because of variations among guitar pickups, this resistor can be any value from zero to 10,000 ohms.

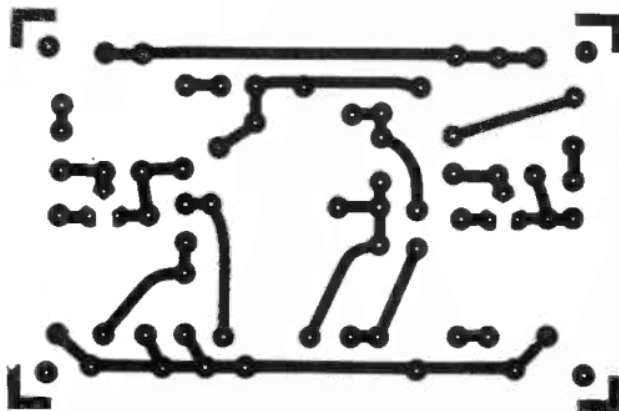
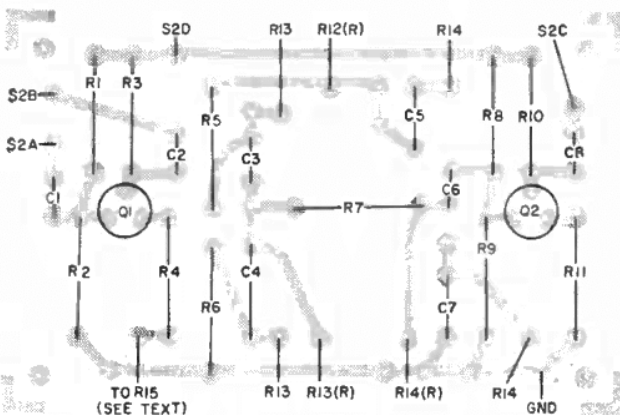


Fig. 2. Actual-size foil pattern for intensifier is above; component layout below.



PARTS LIST

- B1*—9-volt battery
- C1, C2, C6, C8*—1- μ F tantalum capacitor
- C3*—0.01- μ F, 20-volt, ceramic disc capacitor
- C4*—0.1- μ F, 20-volt, ceramic disc capacitor
- C5*—0.005- μ F, 20-volt, ceramic disc capacitor
- C7*—0.05- μ F, 20-volt, ceramic disc capacitor
- J1*—Phone jack
- Q1, Q2*—2N3391A transistor
- R1, R8*—1-megohm, $\frac{1}{4}$ -watt resistor
- R2, R9*—100,000-ohm, $\frac{1}{4}$ -watt resistor
- R3, R10*—47,000-ohm, $\frac{1}{4}$ -watt resistor
- R4, R6*—2200-ohm, $\frac{1}{4}$ -watt resistor
- R5*—22,000-ohm, $\frac{1}{4}$ -watt resistor
- R7*—15,000-ohm, $\frac{1}{4}$ -watt resistor
- R11*—4700-ohm, $\frac{1}{4}$ -watt resistor
- R12-R14*—100,000-ohm potentiometer
- R15*—See text
- S1*—On guitar
- S2*—4-pole, 2-position rotary switch
- Misc.—Suitable chassis (if not put in guitar), knobs (3), battery holder, battery connector, mounting hardware.
- Note—A kit (in hybrid IC form rather than discrete components) of the circuit described here is available from Spectracom Corp., Box 307, 1101 State Rd., Princeton, NJ 08540, for \$49.50, including installation instructions and switch.

After determining that the amplifier operates with S_2 in the bypass position, connect the loose end of R_4 to ground and place S_2 in the on position. If you get distortion, start by using 2200 ohms for R_{15} . If the distortion continues, try 4700 ohms. Continue to increase the resistance if necessary.

Set the amplifier volume and tone controls as you normally do. Then play the guitar and test the operation of volume control R_{12} , bass control R_{13} , and treble control R_{14} . The results should be very noticeable. Tone response is tailored by adjusting the bass and treble controls for a broad range of coloration. The wider frequency response gives both slashing chords and softly picked solo notes. The attack is fast and the sound is clean. Chord sustain is excellent. ♦