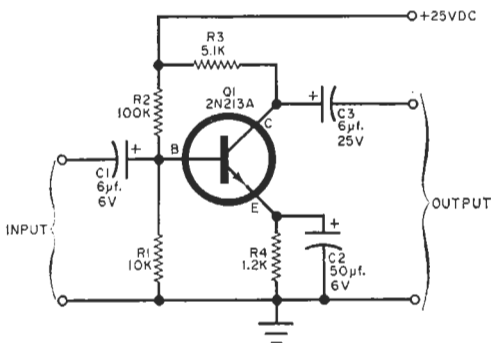
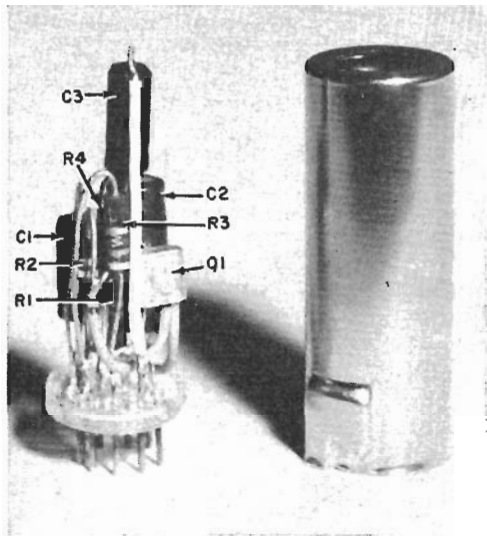


# HIGH-GAIN LOW-HUM MODULE

By HAROLD REED



Plug-in module (far left) utilizes a mere handful of components connected to the pins of a defunct miniature tube. Schematic diagram (above) calls for 25 volts of B+, which can be tapped from most power supplies.

**I**F IT'S high gain you want at low \$\$, here's one way to get it. The circuit is not very startling—it's an ordinary, everyday transistor preamplifier, plain and simple. But it does use a high-gain, driver-type transistor instead of the type made specifically for low-level preamplifier service. Also, to obtain maximum gain with minimum distortion, the d.c. bias potentials have to be carefully adjusted.

In using this transistor, it was expected that the signal-to-noise ratio would be "horrible." Actually, the ratio turned out to be quite low. With a 5-millivolt signal to the input and 3.5 volts at the output, noise measured only 1 millivolt: 70 db below the 3.5-volt output signal.

Other characteristics were equally impressive, despite the fact that the 2N213A transistor employed was not hand-picked. Distortion was 0.5% at 50 cycles, 0.55% at 1000 cycles, and 1.5% at 20,000 cycles. Frequency response was flat within  $\pm 0.9$  db from 50 to 20,000 cycles, down just 2 db at 40,000 cycles.

The photo shows how the amplifier can be built on a 9-pin tube base and enclosed within a shield for 7-pin tubes. The glass envelope of a defunct 9-pin tube (such as a 12AX7) is removed, leaving only the base (it's fairly easy to cut around the top of the thick glass base with a bench grinding wheel). And all the tube elements have to be removed, although the wires connected between them and the tube pins naturally remain. These wires are used for tie points for the component parts of the amplifier, and for external connections through the tube base pins.

The 9-pin glass base fits snugly into a "7-pin" tube shield and can be cemented in place after all the parts are assembled. This results in a module that can be plugged into any 9-pin socket.

The input and output capacitors are placed end-to-end—not side-by-side—to reduce any chance of coupling. Since there is no need for concern about hum pickup within the circuit, layout is non-critical and the amplifier may be used in any convenient arrangement. —30—