glue between the inductor and the side of the enclosure.

Because both variable capacitors must be insulated from ground, including their shafts, I mounted both on a piece of perforated board that was cut to fit the aluminum case. The assembly is mounted in the case with stand-off screws, as shown in Figure 3. I made my own capacitor shaft couplings from a 1/8-NPT brass nipple, available in the plumbing section of most hardware stores. These nipples have a ¼-inch inside diameter. Cut a 1-inch long nipple in half to make two couplers. Drill and tap holes for two #6 set screws in each coupling. The completed shaft coupling is shown in Figure 3. For the insulated shafts, I used ¼ inch diameter nylon rods, which are also available from most hardware stores.

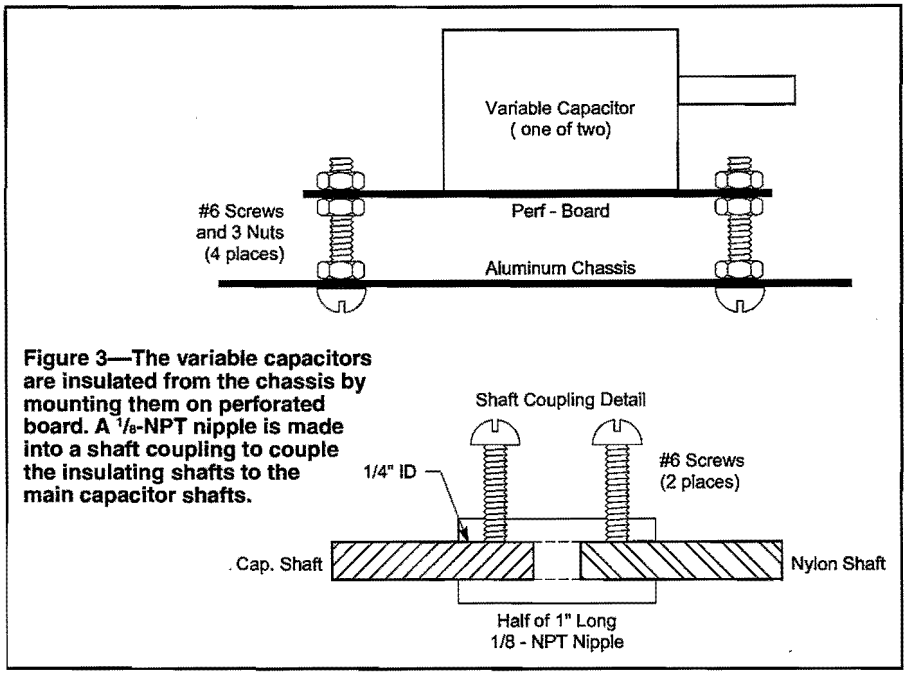


Figure 3—The variable capacitors are insulated from the chassis by mounting them on perforated board. A 1/8-NPT nipple is made into a shaft coupling to couple the insulating shafts to the main capacitor shafts.

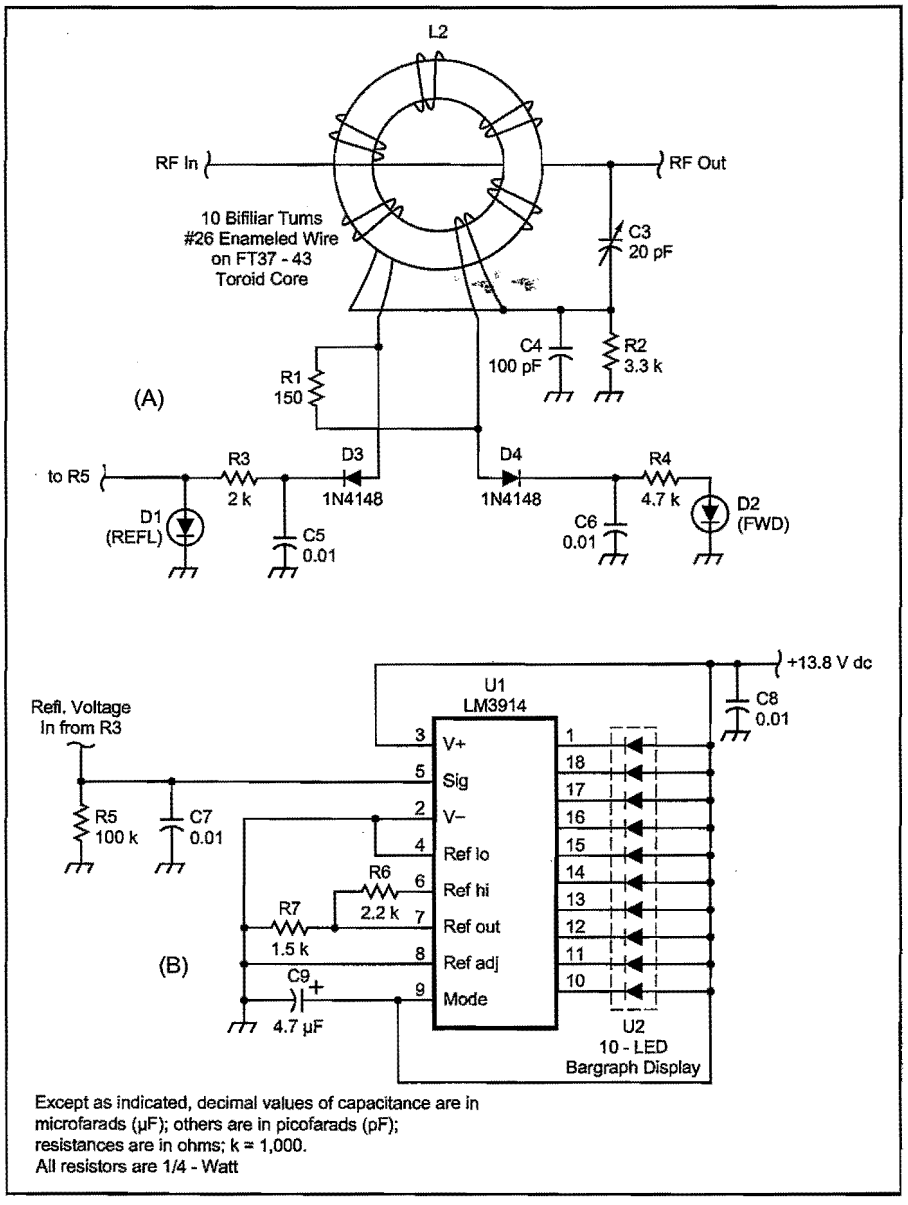
Operation

Tuning the Z-Match tuner is very easy. First, adjust the resonating capacitor C2 for maximum receiver noise. Then apply some RF power and adjust C1 and C2 for minimum SWR. If you need more capacitance for matching, use S1 to switch in extra sections for C1. Balanced feed lines, which are terminated in banana plugs, plug into the center pin of the output SO-239 and the adjacent banana jack. To feed coax, ground one end of the output link with switch S2.

Optical HF SWR Meter

You can use an external SWR meter with the Z-Match tuner, but I built a convenient optical (LED) SWR meter into the same case. It works well with the newer high intensity LEDs that are currently available. The schematic is shown in Figure 4A. I built the circuit on a small piece of perforated board and mounted it into the Z-Match tuner enclosure. This can be seen in Figure 5. I also added a bit of hot glue between the perforated board assembly and the back of the chassis.

This broadband circuit works well at the 100 W level through at least the 10 meter amateur band. With short leads, it should work well through 6 meters. The transformer is an FT37-43 ferrite core wound with 10 bifilar turns of #26 enameled wire. The primary is just the single wire passing through the center of the toroid. To calibrate the SWR bridge, connect the output to a resistive 50 Ω load. Apply RF power on any HF band and adjust the 20 pF variable capacitor until the REFL LED goes out.



Except as indicated, decimal values of capacitance are in microfarads (µF); others are in picofarads (pF); resistances are in ohms; k = 1,000.
All resistors are 1/4 - Watt

Figure 4—Optical SWR meter schematic with the bar graph display modification (see text). The basic LED version is shown in A and the bar graph addition in B.