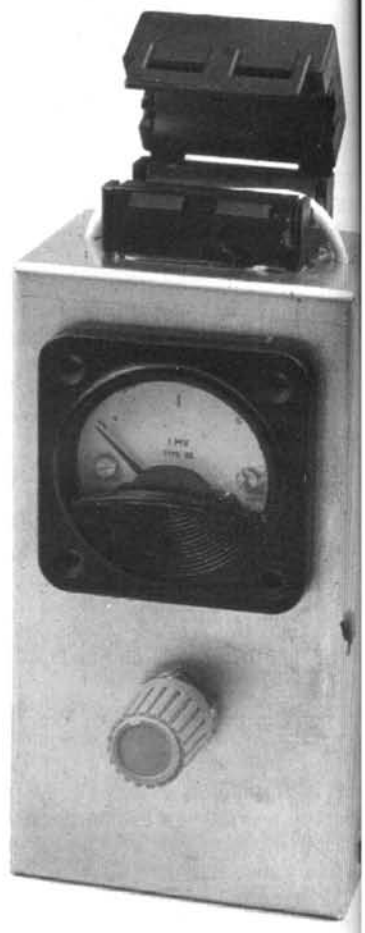
By Steve L. Sparks, N5SV

An RF Current Probe for Amateur Use

You can build this simple, inexpensive gadget in a few hours!



Recently I had a need to make some relative RF current measurements. Not having anything immediately available, I quickly assembled this simple, yet capable instrument. It's not only easy to build, but inexpensive, too.

The probe schematic is shown in Figure 1. With the component values shown, my unit has a half-scale-reading sensitivity of 0.2 mA (10 mW) into 50 Ω at frequencies from 1.8 to 30 MHz. By using a more-sensitive meter—such as a 50 µA unit—you can improve the probe's sensitivity.

Construction

The size of the enclosure you use is primarily dependent on the size of the meter. For ease of use, I suggest keeping the box size no larger than something you can comfortably hold in one hand. The enclosure I use measures 4.25×2.5×1.5 inches (HWD).

Secure the snap-open core to the top of the enclosure using epoxy or another strong adhesive. Before applying the adhesive to the box and core, rough up the attachment area to provide better bonding. Drill a hole through the enclosure on each side of the core to pass the ends of L1. To create the single turn required for L1, run a length of #14 wire through the core (in one end and out the other) and connect its ends to the full-wave diode bridge; see the accompanying photographs. Note that the entire circuit is floating and is not attached (grounded) to the enclosure.

The value of the **SENSITIVITY** pot, R1, isn't critical and can range from 100 to 500 Ω. I used a 10-turn, 100 Ω wire-wound unit.

Uses

There's not much to using the current probe: You simply snap the core around the conductor you're checking and adjust the **SENSITIVITY** control for a usable reading. You can use the probe to check RF current distribution in antenna elements, open-wire feed lines, guy wires and other conductors.

If you're bitten by RF in the shack, you can use the current probe to help you resonate the station's ground wire. Snap the probe around the ground wire, connect a variable capacitor—a broadcast-band type can be used—between the ground wire and your equipment connection and transmit using just enough power to obtain an indication on the probe's meter. Then, tune the variable capacitor for maximum meter deflection. It will likely take some experimentation to find the correct value of capacitance to series-resonate the ground wire. As your operating frequency changes, you'll need to readjust the capacitor accordingly. I used the resonant-ground procedure at a friend's house in Iowa. It cured the problem of RF getting into his computer while on the air.

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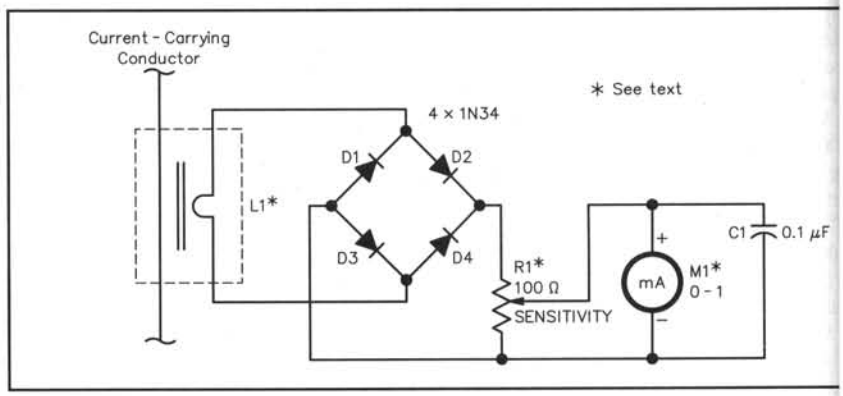

Figure 1—Schematic of the RF current probe. Unless otherwise specified, resistors ¼ W, 5% tolerance carbon-composition or film units. Part numbers in parentheses RadioShack. Equivalent parts can be substituted.

C1—0.1 µF disc ceramic (RS 272-135).
D1-D4, incl—1N34 germanium diode (RS 276-1123); do *not* use silicon diodes.
L1—Single turn of #14 wire through a snap-on ferrite choke (RS 273-105); see text.
M1—0-1 mA or greater sensitivity; (a RS 22-410 can be used without th series multiplying resistor supplied it's a 0-1 mA movement meter.)
R1—Panel-mount pot, 100 to 500 Ω; 10-turn pot used here.
Misc: Enclosure, knob, hardware, adhesive.