

A simple RF clamp meter

By Mike, G8CKT

Most of us have a means of measuring RF voltage but if you've never experienced the joys of owning a meter that can reliably indicate RF current then you are definitely missing out. The problem, of course, is that you can't simply break into your antenna feeder in order to insert a conventional ammeter. Instead, a quicker and more effective method of sampling the current is required. Fortunately, this can be easily achieved using a simple clamp-on device comprising a ferrite cored current transformer and diode detector. This little gadget makes an excellent constructional project for a winter evening and the finished instrument will repay your efforts many times over!

The RF clamp meter comes in handy in a number of situations including:

- Tuning a wire antenna for maximum feeder current and radiated power
- Checking to see whether common-mode currents are present in coaxial cables
- Checking to see if equipment leads are carrying RF current
- Checking to see whether any RF current is present in household mains wiring
- Ensuring that a counterpoise is cut to the right length
- Tuning an artificial ground for maximum earth current
- Checking that the current in a balanced feeder really is balanced!

The complete circuit of the RF clamp meter is shown in Figure 1. The current transformer consists of a primary, L1, and secondary, L2. The primary is simply the RF-carrying conductor over which the two semi-circular ferrite cores are clamped. The secondary load, R1 and R2, is essential. This will reflect a low impedance into the primary and hence ensure that the instrument introduces negligible impedance into the conductor in which the RF current is being sampled. R1 and R2 need to be suitably rated non-inductive carbon or metal film types. The values quoted are good for continuous RF carrier powers of up to 50 W.

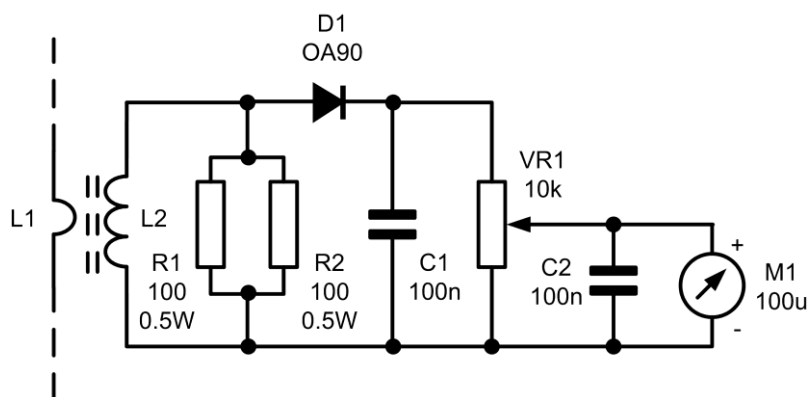


Figure 1 *Circuit of the clamp RF meter*

Construction is extremely straightforward and the instrument can be easily built into a small ABS enclosure to which the clamp assembly is bolted, as shown in Figure 2. I used two spring-loaded horticultural clips to make the clamp assembly, securing the two opposing halves of the ferrite core using epoxy resin adhesive but many other clamping arrangements are possible. However, whatever method is chosen, it is essential to ensure that the two faces of the ferrite cores are correctly aligned and tightly held together.

The ferrite cores are available from several suppliers, including RS Components (where they are manufactured by Fair-Rite and known as 'snap-it' cores). Note that, when selecting a core, it's important that you use the larger diameter cores as this will permit the use of larger diameter cables and wires. You will need to remove the plastic snap-fit outer casing before fixing the cores to the jaws of the spring clamp assembly (see Figure 2). This is easy to do but make sure that you avoid damaging the ferrite cores as the material used is extremely brittle!



Figure 2 *The RF clip meter clamped over one of the conductors of a 10m length of 450 ohm balanced twin feeder*



Figure 3 *The RF clip meter and MFJ Travel Tuner indicating a maximum RF output of 10W during final tune-up prior to one of the 2010 RSGB 80m CC contests*