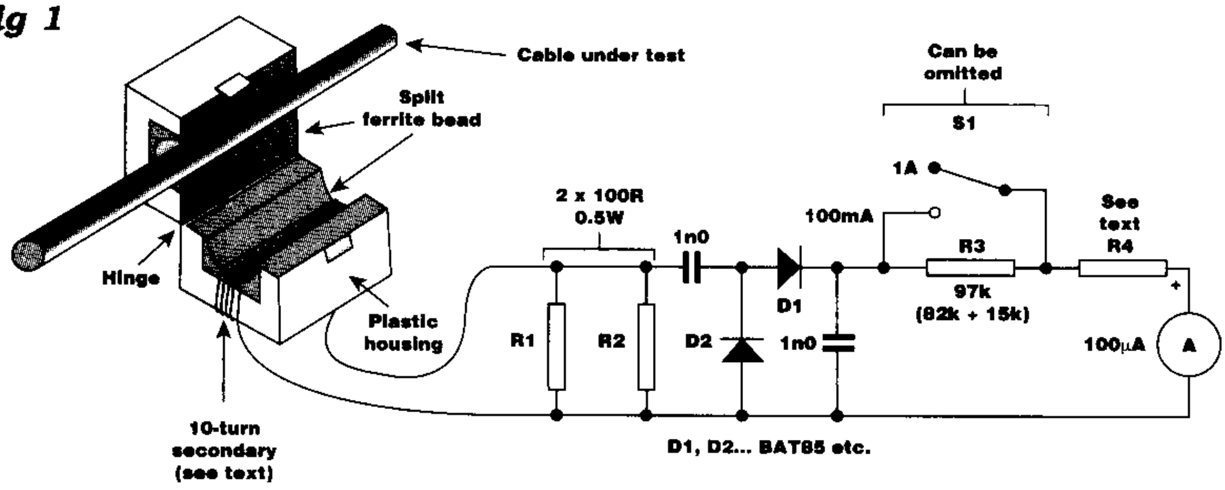
Clamp Meter

Fig 1



The basic version of this handy device takes about 10 minutes to tack-solder together (Fig 1). When you're convinced how useful it is, you can then go on to build a more permanent version. The clip-on RF current meter has a long history in RadCom [5, 6], but early versions involved breaking a ferrite ring into two equal pieces - which takes some doing. The constructional breakthrough was GOSNO's idea to use a large split ferrite bead intended for RF interference suppression [7]. This clamps around the conductor under test, to form the one- turn primary of a wideband current transformer. The secondary winding is about 10 turns, and is connected to a load resistor, R1-R2, and the diode detector.

The load resistor, R1-R2, is important because it creates a low series impedance when the current transformer is effectively inserted into the conductor under test. For the values shown in Fig 1 (10-turn secondary, 2xlOOQ) this is 50/102 = 0.5S2. Some circuits omit this resistor, but that creates a high insertion impedance - exactly the opposite of what is needed. Also, more secondary turns create a lower insertion impedance, but at the expense of HF bandwidth.

The other components in Fig 1 are discussed in GOSNO's article [7] which is reproduced on the 'In Practice* website. Component types and values are critical only if you want to make a fully calibrated meter with switchable current ranges. However, for a first try, and for most general RFI investigations, the meter is almost as useful with- out any need for calibration.

Simply make R4 about 4.7-lOkQ, and omit R3 and Sl. If the meter is either too sensitive or not sensitive enough, either change R4 or change the RF power level. Just about any split ferrite core intended for RFI suppression will do the job, but there are a few practical points. Choose a large core, typical- ly with a 13mm diameter hole. This allows you to clip the core onto large coax, mains and other multi- core cables while still leaving enough space for the secondary winding (which should be made using very thin enamelled or other insulated wire). It is important that the core closes with no air gap... and that can be a problem. A major disadvantage of the basic split fer- rite core in its plastic housing (Fig 1) is that the housing is not meant to be repeatedly opened and closed, so the hinge will soon break. By all means try out this gadget in the basic form shown in Fig 1, but I guarantee you'll soon be thinking about something more permanent. The classic way to do this is using a clothes-peg [5, 6] but there are now several better alternatives.

The only requirement about the clip is that it must be basically non- metallic, and that it can hold the two halves of the core accurately together while the whole weight of the meter is dangling from the cable. Another option worth investigating would be the pliers-style plastic work clamps that are sold in a range of sizes by hobby shops. Whatever you use, it's vital that you glue the two halves of the core to the clip in such a way that they always close tightly together with no air gap. Hint: glue one half of the core to one side of the clip first, and let that side set; don't try to glue the second half until the first is good and solid.

A clip-on RF current meter could hardly be simpler to build. It's an ideal project for beginners and clubs. Once upon a time, every amateur station was required to have an absorption wavemeter, which achieved almost nothing; but believe me, if every amateur station today had a clip-on RF current meter, we'd see a lot less RFI, and a lot more confidence about going on the air!

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