An Absorbing Project ...
Building A Wavemeter

Carmel Fenech 9H1AQ, from Malta GC, describes how she tackles building one of the simplest - and most useful items of test equipment ... an absorption wavemeter

The simple absorption wavemeter project described by Carmel 9H1AQ.

As every licensed Radio Amateur knows, an absorption wavemeter is essential. This simple instrument, which doesn't in itself generate harmonics, is always used during the first tests on home-made transmitters ... **or perhaps should be!**

In **Fig. 1** is a circuit of the wave meter in its simplest form. And I hope if you've not got one in your shack ... the situation will soon be remedied!

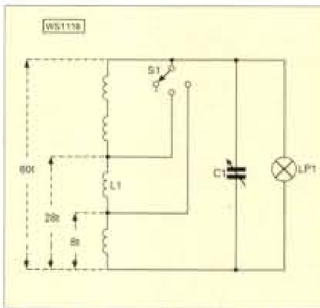

Fig. 1: The basic wavemeter circuit (see text).

The principle of operation of a wave meter is as follows. If a coil (L1) is coupled to the power amplifier or transmitter and C1 adjusted until the circuit is resonated to the same frequency as the transmitter, then power will be absorbed by the wavemeter tuned circuit (L1, C1). This will cause a current to flow in the circuit so that Lamp LP1 will glow and the maximum brightness will be obtained when the wave meter is tuned to the same frequency as the transmitter.

There is, however, one disadvantage with the circuit in Fig. 1, this is because it's not very sensitive. Therefore it can only be used for checking the output of the power amplifier and the higher power stages in the exciter. (The power absorbed from the low power stages may not be sufficient to make the lamp glow).

The wavemeter could be made much more sensitive by modifying the circuit to the one shown in **Fig. 2**. In this circuit, if switch S2 is in the 'off' position, the damping effect the lamp has on the whole circuit is removed and the wave meter becomes a sensitive diode detector or demodulator. The output of which is fed to the meter which will act as a sensitive indicator, allowing a comparative reading to be taken.

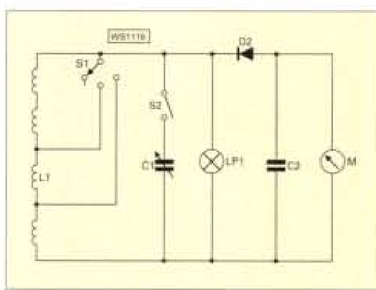

Fig. 2: A more 'sensitive' wavemeter circuit. Diode polarity is not important (some diodes 'cathode' markings can be very difficult to identify) but is the meter pointer moves in the wrong direction you can easily reverse connections on the meter or the diode itself (see text).

The circuit can be used in other ways too. This is achieved by removing the meter and inserting a pair of high impedance headphones instead, enabling amplitude modulation (a.m.) signals to be monitored.

Simple Techniques

I build my wavemeters using the following simple techniques: Coil L1 is wound on a 60mm long and 250mm diameter Paxolin (or other phenolic resin-impregnated cloth or paper tubing), or any stout cardboard tube of these dimensions.

The wire used is 30s.w.g. enamelled copper and the coil is secured to the chassis by means of 'L' brackets. These can be made from pieces of brass or aluminium, or by means of a bolt and nut as shown in **Fig. 3 a&b**.

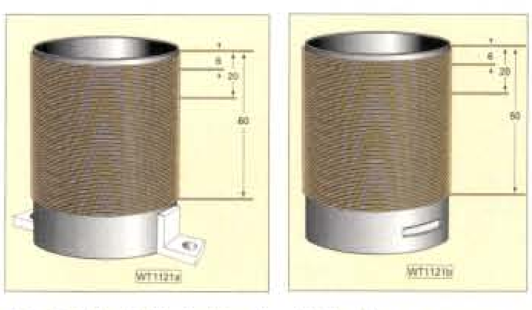

Fig. 3a & b: Coil winding details for the wavemeter project (see text).

It's important that the coil is mounted with the smallest windings (the 6 turn tap) furthest from the chassis. The wavemeter is then housed in a box, the dimensions of the prototype are shown in **Fig. 4**.

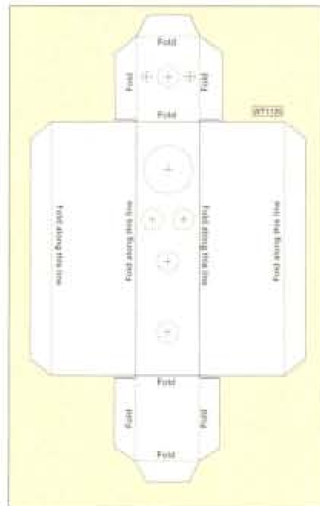

Fig. 4: Dimension for the bracket - which can be formed from aluminium sheet (see text).

Although dimensions are given in the diagram, these depend very much on the size of the components used. (i.e. the size of the variable capacitor, the wafer switch and the diameter of the meter used).

The calibration may be carried out with a calibrated oscillator, a dip meter, or a calibrated receiver. As most amateur stations these days have an accurately calibrated receiver, I'll describe the latter method.

With the receiver switched on and the antenna connected, a signal is tuned in at the low frequency end of the band to be calibrated. A coupling coil consisting of a few turns of sufficient diameter to slide over the wave meter tuning coil is then connected in series with the antenna.

The receiver's S-meter should be observed, while the wavemeter is slowly tuned. At one point, the reading of the S-meter will decrease ('dip') significantly indicating that energy is being absorbed from the signal frequency. This point can be marked on the prepared dial of the wavemeter.

The receiver is tuned to the next higher frequency and the process repeated until the whole dial is calibrated. It's as simple as that!

I hope you enjoy making your own absorption wavemeter. It's a useful 'tool' in the shack and there's something very satisfying when you build something that's so simple but which at the same time is very effective! *PW*