

Making your own FM Trap

In some FM reception areas, it can be hard to get good clear reception of a not-too-powerful local community station because of interference from a much stronger station close to it in frequency. This is the kind of situation where you need a 'trap' — a gizmo which can attenuate signals from the strong interfering station while leaving those from weaker local station alone. It's quite easy to build your own FM Trap, at very low cost. Here's how it's done.

THIS SIMPLE FM TRAP connects in series with the 75Ω cable between your antenna and your FM tuner, and can be quite easily tuned to attenuate or 'reject' any desired frequency in the 88 – 108MHz FM broadcasting band. This makes it ideal for throttling back a very strong signal that may be interfering with your reception of a relatively weak local station.

As you can see from the circuit diagram in Fig.1 below, there's very little involved in the trap: just a parallel tuned circuit made from a very small coil of enamelled copper wire, with a small trimmer capacitor which is adjusted with a screwdriver for tuning. When the tuned circuit is adjusted to resonate at the frequency of the station you want to reject, it becomes a relatively high impedance in series with signals at that frequency — while remaining a relatively low impedance at all other frequencies. So the interfering signal is attenuated, allowing you to get clear reception of the wanted signal.

Does this mean that once the trap is tuned to reject a strong interfering signal, that signal can no longer be received itself? No, because this kind of trap circuit doesn't give complete rejection of the signals at its tuning frequency. It just 'throttles them back' by a reasonable amount, so they can still be received when you really want to do so.

This type of trap gives the best performance when it's fitted inside an earthed metal box, to provide screening. We suggest the use of one of the small low cost diecast aluminium boxes sold by Jaycar with the catalog number HB-5060 (see below). This box measures 51 x 51 x 32mm and has just enough space for the job.

Fitting a 75Ω coaxial socket at each end of the box allows the trap to be easily connected in series with the cable from your FM antenna to the input of your FM tuner. The coil and trimmer capacitor are mounted inside the box on a 35 x 35mm square of stripboard, cut from a standard piece of this material sold by Jaycar as Cat. No. HP-9540. The square of stripboard itself is

List of Parts You'll Need:

- 1 Aluminium diecast box, 51 x 51 x 32mm (Jaycar HB-5060)
- 2 75Ω chassis mount 'PAL' sockets (PS-0628) or F61 sockets (PS-0645)
- 1 35 x 35mm square of stripboard (HP-9540)
- 2 15mm long M3 tapped spacers (HP-0904)
- 2 6mm long M3 machine screws, round head
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- 1 6-30pF trimmer capacitor (green: RV-5716)
- 1 230mm length of 0.8mm enamelled copper wire (WW-4020)

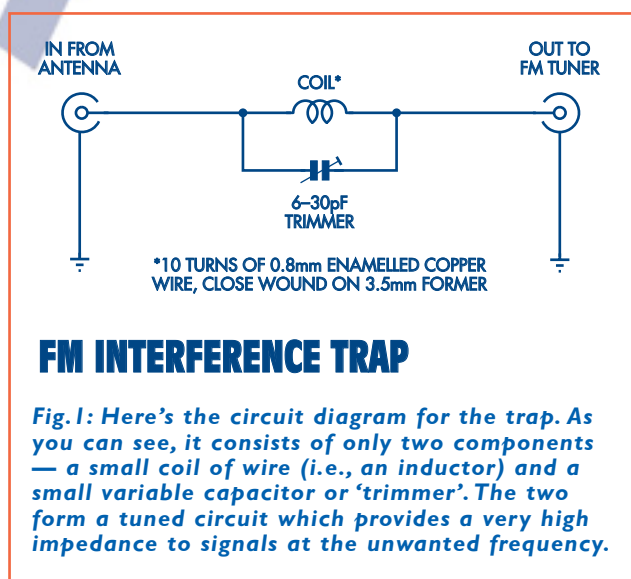
mounted inside the box using two 15mm long M3 tapped spacers, with M3 machine screws top and bottom. The construction details should be quite clear from the assembly diagrams in Fig.3.

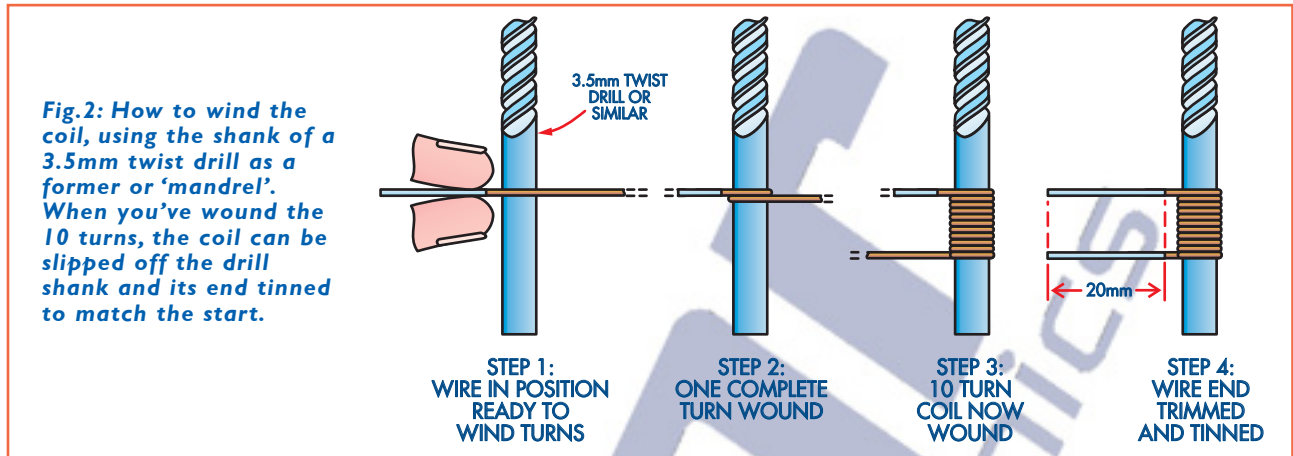
The trimmer capacitor and coil are mounted on the stripboard before it's fitted into the case. As you can see, the trimmer is mounted on the top (i.e., the side without the copper strips) and in the very centre. Its two connection lugs pass down through holes in the board, and each is soldered to a copper strip on one side of the centre strip. A pair of very short U-shaped wire links are then used to connect each of these 'trimmer' strips to the strips alongside them, on the sides further from the centre strip.

The coil is wound using 0.8mm enamelled copper wire (ECW), available from Jaycar stores and dealers as WW-4020. You only need a length of about 230mm, as the coil consists of just 10 turns of the wire tightly wound on a 3.5mm diameter former.

The easiest approach in winding the coil is to carefully scrape off the enamel coating for 20mm from one end of the wire, and then tin this section carefully with your soldering iron. Don't apply a lot of solder, because the tinned section will need to be able to pass through one of the holes in the stripboard. Then carefully wind the next 270mm or so of the still-enamelled wire around a mandrel such as the smooth shank of a 3.5mm twist drill or some other object of the same diameter (see Fig.2). Wind the turns closely together, so that when you have wound a total of 10 turns, the coil will be only 10-11mm long. Then the mandrel can be slipped out, to leave your almost finished 'air cored' coil.

Now cut off all but about 20mm from the end of the





wire at the far end of the coil, and scrape off the enamel from this end as well. You can tin this end in the same way as the start end, before pushing both ends through holes in the stripboard from below (i.e., the copper strip side). Each end is pushed through a hole in the copper strips two-removed from the centre strip, as you can see from the diagram above.

Push the ends through their holes until the coil axis is about 6-7mm away from the stripboard, and then solder each wire to its copper strip. These joints will support the coil below the stripboard, as well as making the connections to the trimmer capacitor (via the U-shaped

links you fitted earlier).

The stripboard assembly can then be fitted into the box and screwed onto the mounting spacers. After this is done the tinned ends of the coil can be bent over and soldered to the centre lug of each 75Ω socket.

It's also a good idea to connect the two earth/shield lugs of the 75Ω sockets together using a short length of hookup wire or tinned copper wire, to make sure the connection between them is reliable (and not purely dependent on the contact between the sockets and the aluminium box).

This will complete the 'wiring' of the trap, so all that remains is to drill a 5mm hole in the centre of the box lid (i.e., directly above the trimmer capacitor), and then screw the lid onto the box to finish the assembly.

Tuning the trap

The easiest way to tune the trap for rejection of your interfering station is by connecting it into the FM tuner's antenna cable, and then setting the tuner for reception of the interfering station itself.

Now take a screwdriver with a 3mm wide blade, or better still a plastic alignment tool or an old plastic knitting needle with its end filed into a flat screwdriver shape. Insert this 'tuning tool' carefully through the hole in the trap box lid, and lower it down until you feel its blade engage with the slot in the trimmer capacitor. Then start rotating the tuning tool *very slowly*, while listening to the interfering station's signal – and also watching your FM tuner's signal strength meter or indicator LEDs, if it has them.

If you do this very carefully, you'll find that at one particular setting of the trimmer, the signal from the interfering station will become a little more noisy – i.e., it will have a little more background hiss. If your tuner does have a signal meter or indicator, you'll see the signal strength 'dip' at the same time.

Once you've found this correct tuning position, carefully remove the tuning tool without disturbing the trimmer setting. Then re-tune your FM tuner to the weak local station you really want to receive. You should now find it's coming in clearly and without interference from the stronger one – thanks to the trap.

That's all there is to it. Your trap is now finished, tuned up and already contributing to your FM listening enjoyment.

