An Inverted L for small gardens

Len Paget GM0ONX describes his five-band inverted-L for small gardens. It may be just the job for your garden too!

Fig. 1: The overall layout of the Five-band inverted-L antenna, it's mounted in a far corner of GM0ONX's garden.

Very few of us these days have gardens that will allow the 'traditional' 40m long dipole (for the 3.5MHz band) to be erected. Fewer still have space for the doubled sized dipole for 'Top Band'. So, essentially, this means for many of us that 3.5MHz is totally out of the question. Or such a full-sized antenna has to be bent into various contortions to get it to fit in the available space.

The antenna I'm describing here was intended to allow operation on both 3.5 and 7MHz in less than half the space of a traditional dipole. However, it will, in most instances, give a performance equal to, or greater than, its full size cousin.

I'd describe myself as a lazy DXer, and by that I mean 'I'll take it if it's there'. With this antenna, I've had a lot of fun working stations in North and South America, North Africa and the Middle East on 3.5 and or 7MHz, something I could never achieve with a G5RV antenna contorted to fit into my garden.

Kilowatt Scrum

In general I find that if I can hear a station - I can work it, provided it's not part of a 'kilowatt scrum'. The antenna will also give good account of itself on 14, 21 and 28MHz being electrically similar to the W3DZZ trap dipole.

The standing wave ratio (s.w.r.) of the antenna system on the upper h.f. bands, is higher than the reading on either 3.5 or 7MHz, but it's no worse than the

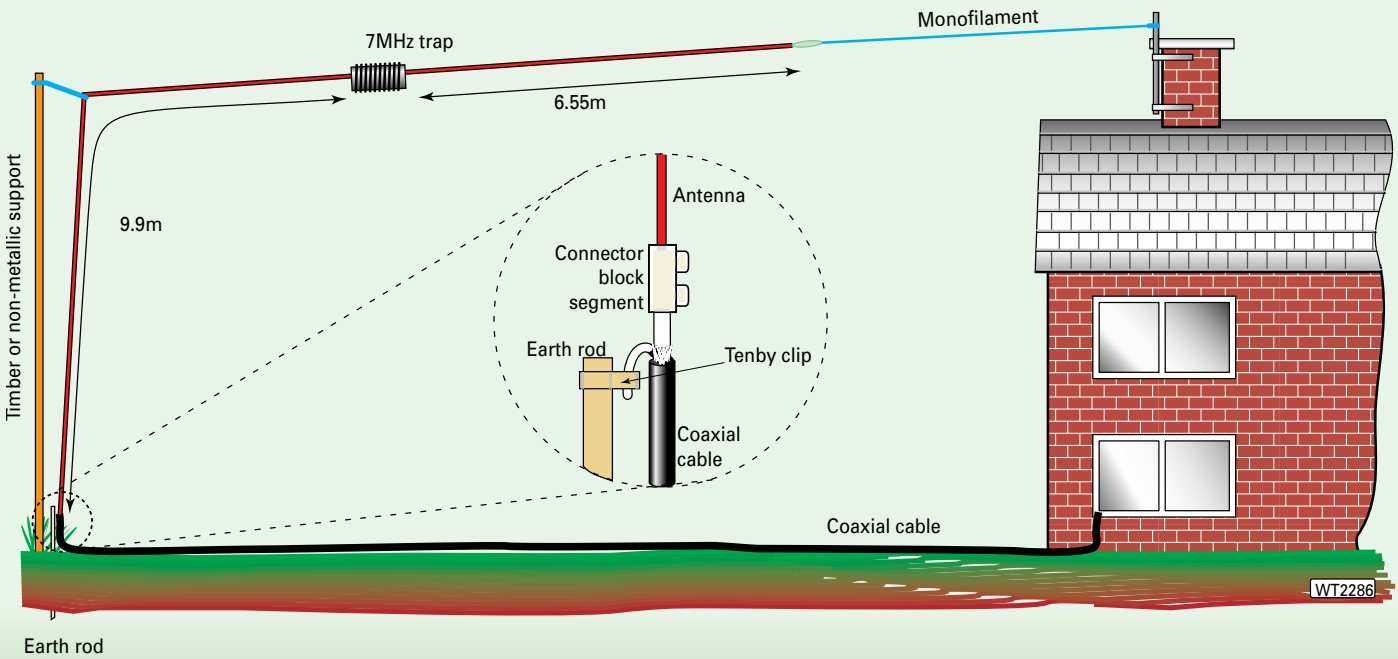
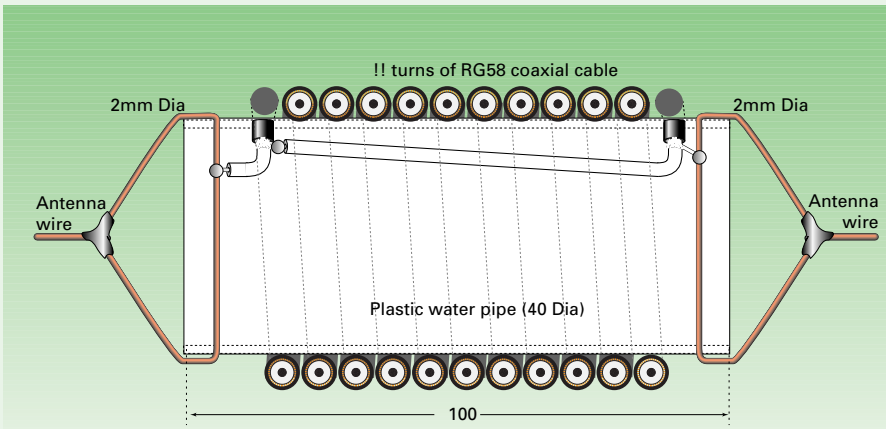


Fig. 2: After the trimming adjustments, the bottom of the antenna is covered in a thick covering to waterproof the join. The join itself and the 'Tenby' clip are seen in the inset photograph.



traditional W3DZZ trap dipole. The antenna system will almost certainly require some impedance matching to suit rigs with solid state power amplifiers - again, this is just like the W3DZZ antenna.

Antenna purists will often tell you that an antenna of this type requires radials, or a sophisticated earth system for optimum performance. But in practice the antenna works very well with a modest earth system, although this is dependent on soil conditions. Fortunately, for me in the south western area of Scotland we're 'blessed' with more than our fair share of rain, together with a very clay-rich soil, usually just below the surface.

Because of the rain and clay soil blessing, a good r.f. earth is assured with only a single one metre long earth rod. But should you have a rather more sandy soil in your area, you may require to install longer earth rods or an earth mat to achieve an acceptable r.f. earth. It's very much cases of 'suck it and see' - though not literally of course!

The prototype antenna was constructed from a heavy enamelled copper wire (2mm diameter or 14s.w.g.) obtained free as an end-of-roll gift from a local armature winder. There's a single 7MHz resonant trap to make it more efficient on that band.

General Layout

The general layout of the antenna and the theoretical lengths of the antenna are shown in the illustration **Fig. 1**. The antenna is fed with 50Ω coaxial cable, with the coaxial screen connected to the earth rod. This connection is secured using a 'Tenby' earth clamp intended for earthing water pipes and available from most d.i.y. centres.

The centre core of the coaxial cable is connected to the antenna wire via a single 15A 'chocolate block' connector. After double checking these connections and continuity, the whole area is covered with Denso tape, **Fig. 2**, to waterproof it. No balun or other matching network is needed for 3.5 and 7MHz as the antenna's feed-point impedance is close to 50Ω.

The 7MHz trap is constructed from 11 turns of RG58 coaxial cable wound on a 100mm piece of 40mm diameter plastic drainage piping as shown in the illustration **Fig. 3** and the photograph **Fig. 4**. In this type of trap the coaxial cable acts as both capacitor and inductor and is capable of working at power levels in excess of a kilowatt.

It's imperative that screen and centre cores of the coaxial cable are parted as close to the point the cable passes through the hole in the pipe as possible. This is to ensure the correct value of capacitance and inductance. The centre core of one end of the coaxial cable is soldered to the screen at the other end.

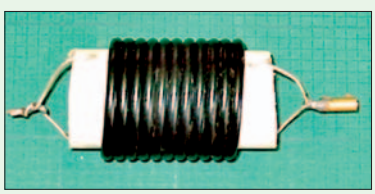


Fig. 4: A photograph of the finished trap, before sealing against moisture ingress (See text for more detail).

As with the antenna feed-point, the ends of the coaxial trap and other joints must be weather proofed. The capillary effects of coaxial cable are legendary and water ingress will totally ruin your trap. Any sealant must be of the non acetic acid type, (i.e. it doesn't smell like vinegar) to prevent cable corrosion.

The height at which the antenna folds over from vertical to horizontal is not critical but generally the higher it is the better. Extra height, not only aids the DX performance of the antenna but also significantly reduces the amount horizontal space required.

Tuning the antenna is quite simple but it is imperative that it is done in the correct order. Firstly cut both sections of the antenna about a half a metre longer than dimensions shown in Fig. 1.

Tuning Operation

To start the tuning operation, begin on 7MHz and trim the wire length at the end nearest the earth connection 50mm at a time until the lowest s.w.r. is achieved. I managed an indicated s.w.r. of less than 1.2:1 over the whole of 40m.

Then move to 3.5MHz and repeat the process, but this time **trimming the side of the antenna furthest away from the earth** i.e. the side nearest the house in Fig. 1. The s.w.r. on the 3.5MHz band should be less than 2 to 1 over the whole of the band falling to about 1.2 to 1 at the point of resonance. So. it's worth setting the lowest s.w.r. at the section of the band you normally use, if you have a preference.

The antenna can be made in a weekend with plenty of time left over to work that elusive DX. Having a very low visual impact most Local Authorities Planning Departments can be convinced that it is a 'minimalist' installation not requiring planning permission, **however this should be confirmed with your local planning office**.

I've had a lot of fun using the antenna and thoroughly recommend it to anybody not having enough garden room to erect a full size dipole in the optimum direction. So, why not chat up your local electrical motor rewinding company for the wire to make your next antennas?

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Fig. 3: A cross-section of the 7MHz trap made from a length of 40mm diameter, plastic pipe and some RG58 coaxial cable. (See text for more detail).