

Delta loop Antenna 40m

Shown below is the design for the 40m delta loop used at G4YTD. This type of antenna has been used extensively for the last 4 years and has shown good performance when coupled with 100w from a Kenwood TS2000 radio. The radio internal tuner will also tune the loop on 10, 12, 15, 17, and 20m. My latest example is constructed from 1.5mm *aluminium* welding wire as used in Mig welders in the automotive industry. This material was chosen as it is extremely light weight, and is nearly invisible when mounted at 8m above ground. There is a compromise in conductivity by using aluminium but otherwise no discernable lack of performance. The other benefits to using this type of antenna are the zero TVI and a total project cost of less than £10.00! Caution – I only use 100w, higher power may need better insulation at the feed point.

You will need to decide what type of polarisation you require. A sloping loop fed at either side will give vertical polarisation, and a loop fed at the bottom or top will give horizontal polarisation. I have used both and cannot tell the difference. I have also fed in a corner and again cannot measure any difference in performance. I tend to feed the loop in the place where it is easiest or fits in with the surroundings. Its your choice. Let me know if you find a measured difference one way or another, I am always interested in enhancements.

One other point worth noting is the loop performs best (this can be measured) when the wire covers the greatest surface area (delta, quad or circle). Try to avoid too many kinks or changes of direction, as this does have an effect. Most of the ones I have built (including the current example) are square (quad) in shape and slope E-W, the high end is 8m and the low end 6m. Log entries and “smiles per watt” speak for themselves.

To start building this antenna cut a single length of wire measuring 44.8m. This is an average length taken from various sources, and the calculation $(299.8/\text{operating base frequency}) \times 1.05$. In practical terms this may be slightly long for the type of wire used, but is totally usable with the internal ATU on the TS2000. Purists with more time than I had could easily prune the loop to give the desired SWR dip. Caution is needed here because as soon as you cut the free end from the roll, the wire will try its hardest to roll back into a coil (read birds nest!). I strung the wire across the apex of my house between two upright poles, and insulated it by forming loops in zip ties on the poles. The wire then passes through the loops and is offset from the poles by 100mm or so. The two free ends were taken down into the garden, and again strung between zip ties, and finally anchored to the support trees. The two free ends of the wire were taken into opposite ends of a small plastic box measuring 40 x 30 x 15 mm. Inside the box standard “choc block” electrical connectors were used to anchor the ends. I used a 3 connector wide section to provide insulation between the ends of the loop. (fine at 100w, make a better job for higher power).

This forms the wire loop and keeps it out of harms way whilst you cut the matching stub. No technical explanation here other than the stub used is made from a $\frac{1}{4}$ wave length of very ordinary 75 ohm TV coax. The length of the coax is 8.97m (Derived from $75/\text{operating frequency} \times \text{velocity of coax}$. In our case $(75/7.020) \times 0.84 = 8.97\text{m}$. The coax is inserted into the box from the opposite side to the antenna wires

and terminated in the connector block, inner to one side, outer to the other. In the G4YTD example the nylon rope used to hoist the loop into the tree is the tie wrapped to the coax for strain relief. The box is then filled with silicone sealant to keep the moisture out and the lid screwed on. On the opposite end of the 75 ohm matching stub, another “choc block” is used to connect directly on to the shack 50 ohm coax running to the back of the transceiver, then well covered in “self amalgamating” tape (you can use another box and silicone if you would rather). Hoist the whole assembly to around 8m and it becomes practically invisible.

You should find that it tunes (with a TS2000 internal ATU at least!) on 10, 12, 15, 17, 20 and 40m.

I am planning to add a 30m version to the array shortly and an 80m dipole if I can find another roll of nylon rope. Don't expect to work VK first time out (unless you live in VK of course), but as a compromise, no nonsense, very cheap antenna it takes some beating. I have worked many stations both QRO, and QRP using this type of construction. Let me know if you build one, how you get on, and any modifications you make to the lengths etc. As this is such a cheap antenna to build, change the aluminium wire very couple of years, or make the installation more permanent by using better quality wire. I guess the power handling could be improved by using better insulation at the feed point and connecting high quality 75 ohm coax for the stub. My aim here is to present a very easy to build antenna that will fit into a compact UK garden. The design can be scaled up and down at will by using the formulas shown above.

Give it a try. 73's

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