

Stafford & Districts Amateur Radio Society

2m/70cm POG Stick

An Aerial for all occasions by Graeme Boull G4NVH Feb 2009



For many Radio Amateurs, including me, one of the more interesting aspects of the hobby is operating a radio station outside of the normal comfort zone of warm shacks and fixed aerial systems.

Having taken part in a number of SOTA expeditions with others members of the local radio club and spending lots of summer evenings operating portable from 'Cannock Chase', the local expanse of heath land, I always felt that the aerials I used contained too many compromises, even for a single band like 2m.

For portable pedestrian operation such as for SOTA or perhaps disaster coverage (e.g. RAYNET), walking around with the ubiquitous 'rubber duck' clamped to one's ear is not an ideal solution for prolonged periods and carrying several aerials to cover fixed and 'mobile' portable use bought with it additional weight and complexity.

Necessity, as they say, is the mother of invention and I decided that the only way forward was to build something myself which would hopefully tick as many of my wish list boxes as possible.

My wish list or 'design brief' if you like looked like this:

- Lightweight
- Robust
- Cheap to Build
- No complex setting up (Radials, Matching networks etc)
- Performance at least as good as 1/2 wave dipole

- Easily fed with coax
- Could be used for prolonged periods of pedestrian mobile
- Easy to deploy as a fixed portable co-linear type of aerial
- Compact size to fit in the average sized day sack

A Christmas present in the form of the “Practical Antenna Handbook” by Joseph J Carr, provided the inspiration for the final design.

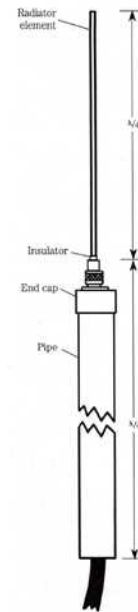
Off-Centre Fed, Coaxial Shielded Dipole (CSD for short)

Firstly I should point out that no originality is claimed by me for the basic design. Searches on the internet will reveal a whole body of knowledge on this Aerial and it has been used extensively. What I am presenting is my experience of making such an aerial using easily available DIY materials and how it performs against my list of requirements.

Three virtues of the CSD immediately attracted me.

1. Effectively a Dipole
2. No radials or ground plane required
3. Easy to end mount

The basic layout of the Coax Shielded Dipole is shown opposite. Note that the design presented here is an Off-Centre fed aerial, so the elements are not $\frac{1}{4}$ wave as shown in the diagram. This aids with obtaining a good impedance match due to the effect of the coaxial cable passing up through the lower radiating section.



General Construction

On the grounds of reducing weight to a minimum, I quickly abandoned the idea of using copper pipe for the lower section of the aerial. Instead a length of 21.5mm diameter white waste pipe covered in aluminium kitchen foil of the correct length was used.

The end cap was made out of a 21.5mm diameter copper blanking end suitably drilled to take a chassis mounting style BNC socket.



The latter requires the matching solder ring terminal and shake proof washer. Four strips of copper braid (outer braid of RG58) are radially soldered to the outside of the blanking end provide mechanical contact with the Aluminium foil.

A balun consisting of 9 turns of the RG58 coax is wound on the bottom of the waste pipe. This helps to isolate the radiating portion from the feeder and also helps maintain the Aerials polar diagram



A BNC mounted telescopic whip of the appropriate length completes the radiator.

It is important to note that there is no connector at the bottom of the aerial. The feeder is a continuous length and needs to be long enough to make the balun and connection to the BNC socket with an additional length to reach the TX from the chosen mounting position. In my case I used a length of 6m.

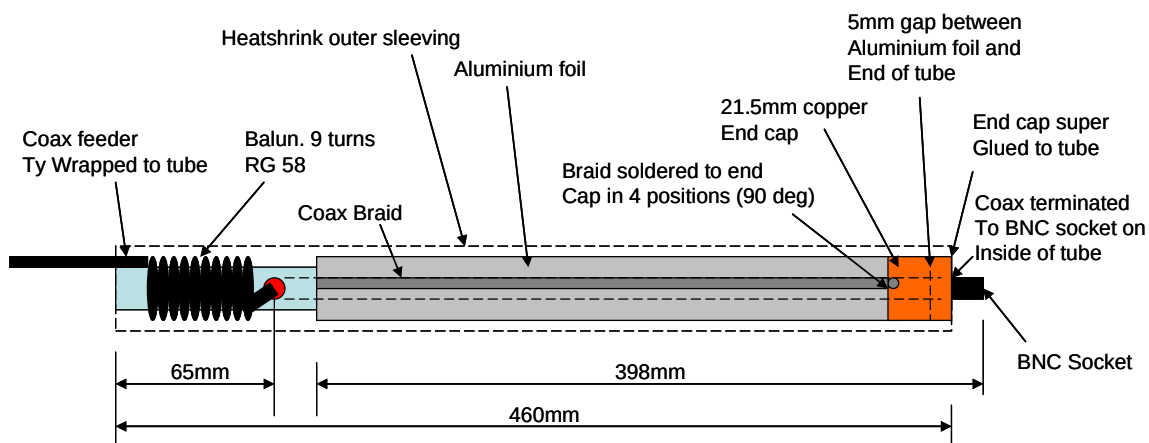
Construction details

Waste Pipe length 460mm

Length from end of BNC socket to end of Braid/Aluminium foil, 398mm.
5mm hole for coax exit to form balun, 65mm from lower pipe end. Drill two further small holes to allow tie wrap fixing of coax.

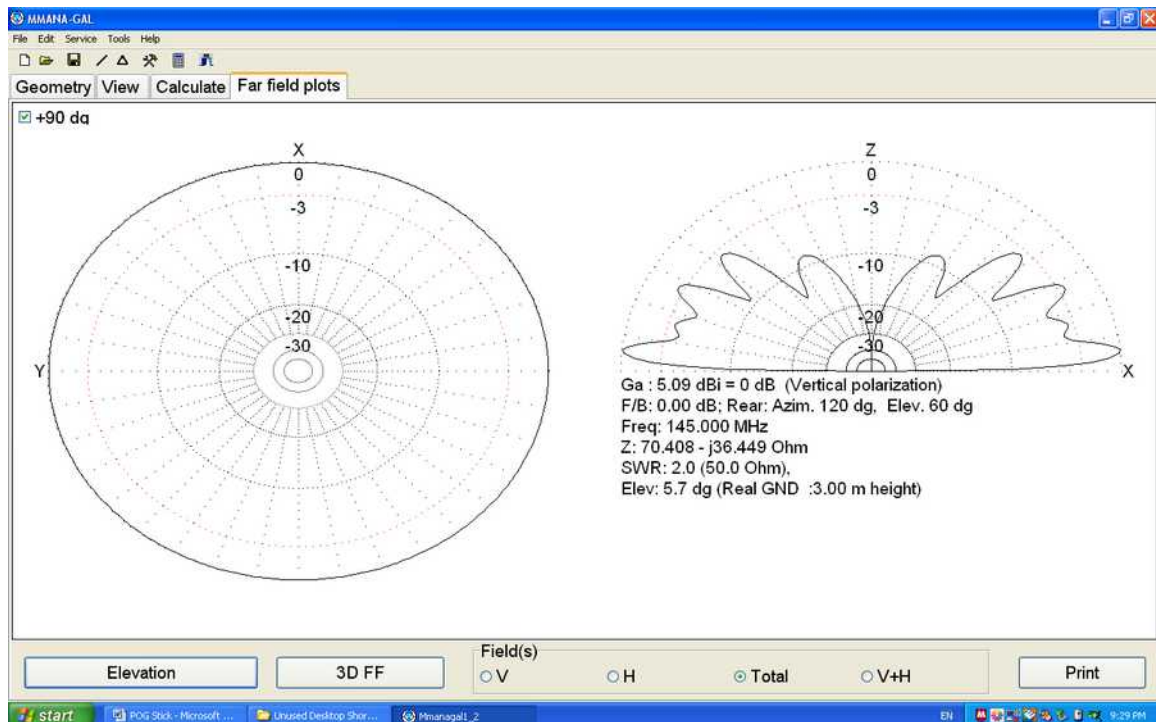
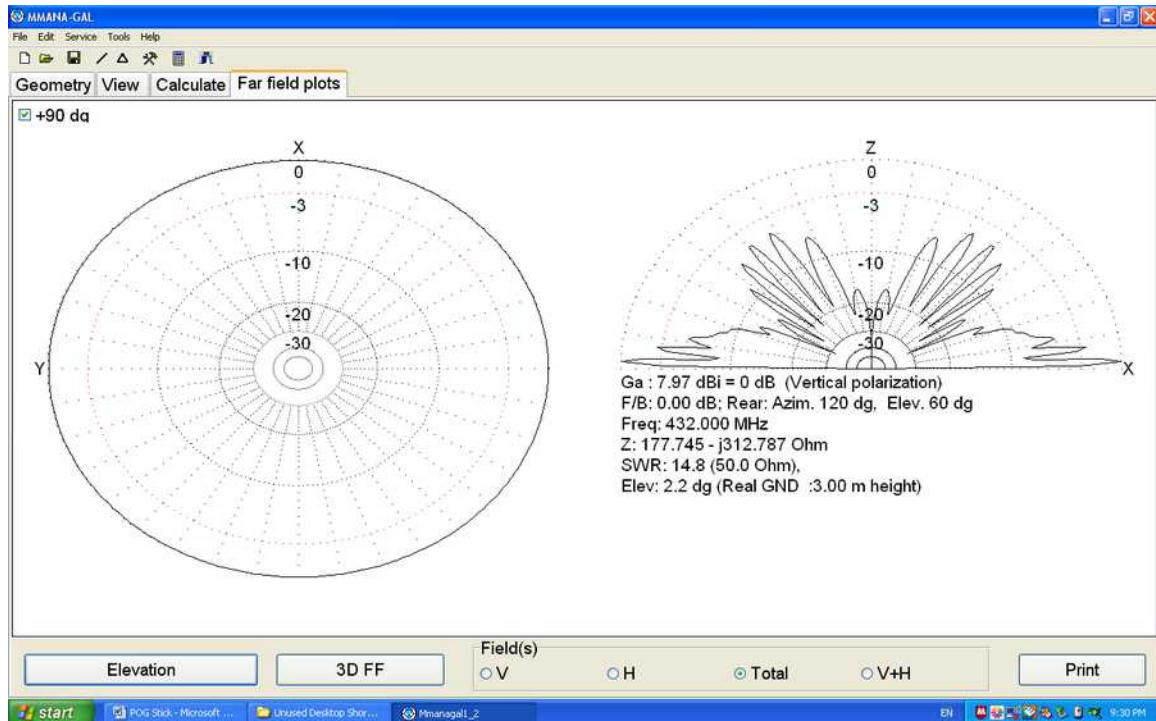
Note leave a 5mm gap between top end of pipe & start of Aluminium foil.
(Trap the aluminium foil under the copper end cap and fix end cap to pipe with super glue.)

Length of telescopic whip required > 580mm



Calculated Performance

Note: Aerial mounted 4m above ground. The SWR values are not correct and are in fact below 2:1 across both bands. This is a limitation of the model used. Gain/Pattern correct.



Adjustment

With the dimensions given and the aerial mounted 3m above ground and in the clear, the prototype 2:1 SWR points on 2m were 138MHz and 158Mhz.

The only adjustment possible is via the telescopic whip section. This should be initially set at 565mm. Small variations either side of this value should enable a good match on both 2m & 70cm.

Summary

The final design has met or exceeded my initial design requirements. It is lightweight, robust, easy to use and cheap to make. It also performs well, whether mounted on a rucksack or used in a portable collinear fashion.

Subjectively, received stations are several 'S' points stronger on the POG stick compared to the standard 'rubber duck' aerial mounted on my FT60 hand held transceiver.

Oh...and 'POG'? It stands for 'Portable Operating Group' a sub section of the Stafford & Districts Amateur Radio Society.

73 de Graeme G4NVH