

# Dan (MODFI) Andersson's 2Meter EH Antenna

(Compiled by Tony Wells from a number of emails between himself and Dan MODFI)

## Introduction

This paper describes the dimensions and construction details of Dan MODFI's 2 Meter EH Antenna.

For more info on the EH antenna visit <http://www.eh-antenna.com/>

## Danger!

The EH antenna when properly aligned - especially this VHF version - develops high RF energy in close proximity to its cylinders. Please be aware of this when experimenting with powers above 10 watts. Also bear in mind the plastic tubing may melt at sustained high powers.

## Construction Materials

- Approx 500mm 20mm OD PVC tubing with 17mm ID. Check the PVC for RF absorption using a microwave.
- 16mm OD Alu pipe for cylinders. Two cylinders 16mm OD and 90mm length each.
- 2 Solder tags and self threading 2mm screws for connection to the cylinders.
- A length of 1.2 mm lacquered copper wire for making the coils. NO HOUSEWIRE!!!
- High-voltage insulated wire for internal connections – RG58 coax inner, or PTFE-type insulation
- 1 meter "Tail" of suitable VHF coax

## Construction and Wiring

Please refer to the diagram below.

- Screw the solder tags to the inside of the cylinders and solder the cylinder wires to the tags. Leave plenty of length to help feed the wires thru the cylinders.
- Fix the cylinders inside the tubing by wedging something non-conductive. Space the cylinders apart by 16mm – which is the diameter of the cylinders.
- The main tuning coil is wound around the outside of the PVC tube. The coil is 19 turns of 1.2mm lacquered copper wire. Initially set the length to 30mm. The top of the coil should be placed 20mm below the bottom cylinder.
- Drill holes in the PVC for the cylinder wires to join to the Tuning Coil. Feed the wires thru the tubing and solder the cylinder wires to the Tuning Coil. This is fiddly!!
- Construct the Source Coil using the 1.2mm lacquered copper wire. Wind the coil on a suitable former to make 4 turns of 8mm diameter and 10mm length.
- The top wire on the Source Coil is tapped to the Tuning Coil at 2 turns from the bottom.
- Wire up your coax tail and put a plug on the end.

If you want to use the antenna outside, you will need to do something to protect the materials from the weather. You could use a coating like "ScotchKote" or mount the whole assembly in another PVC tube of suitable diameter.

## Alignment and Testing

The bandwidth of this antenna is huge, and it is possible that your initial construction will result in a reasonable VSWR and power output first time. Please note that the frequency of max power radiated may not correspond to the frequency of 1:1 SWR. This is a characteristic of the EH antenna.

If you want to get the best out of the antenna, follow these steps:

### 1. Set the frequency of Max Power output

If you have an antenna analyser and field strength meter, locate the frequency of max radiation and adjust the frequency by compressing and decompressing the Tuning Coil. In extremes you may need to add or remove a turn.

### 2. Set the VSWR ad Max Power Output

Once you are close (+/- several Mhz is acceptable because of the large bandwidth) to the desired frequency, check the VSWR. To alter the VSWR, change the tap point. Note that doing this will result in a change of operating frequency. You might need to repeat steps 1 and 2 several times. However bear in mind the bandwidth of this antenna is large, and you may be able to get close enough to the desired centre frequency and get a 1:2 or 1:3 VSWR with only one iteration round steps 1 and 2.

### 3. Changing Coax Length

If you connect up longer coax you may have to repeat 1 & 2 above again.

### 4. Taming RF at the operating position

If you experience high RF when operating, this might be caused by close proximity to the antenna. If the antenna is several wavelengths away this might be caused by feedline common mode radiation. This can be helped by mounting a few "clip-on" ferrites on the down lead. Experimenting with the position of the ferrites will probably result in eliminating this radiation.

## Experimenting

You will probably find that the antenna has a very high angle of radiation. You may find that tilting the antenna towards your favorite stations or your repeater will greatly increase signal strength reports.

Max power tested with FM on 2m is 170 Watts during "normal" repeater traffic. Do not transmit on powers like this for long periods. You'll get a white banana shaped EH that way...

It is also worth experimenting with mounting height.

## Changing the Cylinder Ratio

The EH Antenna has a different take-off angle depending on the cylinder ratio of diameter vs length. The instructions describe a 1:6 cylinder ratio EH but as this results in a pattern of radiation that is probably too high to VHF working.

Once you have got the thing working, you might want to experiment with changing the cylinder ratio to 1:3.. If you try this you will need to add a couple of turns to the Tuning Coil to compensate for the reduction in cylinder-cylinder capacitance.

You may find it difficult to reduce the ratio lower than 1:3, but you might find it difficult to get the best out of the antenna due to stray capacitance. We want the capacitance to be between the cylinders. Not anywhere else!

## Alternative materials

Copper plumbing tubing could be used instead of the aluminium tubing. However the Tuning Coil may need adjusting in length to compensate.

## EH Wiring Diagram

