

EH antenna for 7 MHz

Source <http://f5swn.2.free.fr/pages/eh4/eh4.php?lng=en>
Contact f5swn.2@free.fr

Introduction

An 50 cm (19.68 in.) 7MHz antenna suitable for indoor or a small outdoor cleared area ?

The effectiveness and efficiency of such an antenna is obviously lower when compared to a correctly deployed outdoor dipole.

It nevertheless provides a means of making QSO's on the HF band where there are building restrictions or lack of space.

The theory of EH antennas is discussed on several web sites, but these provide contradictory conclusions on the effectiveness of the EH antenna.

Here is a simple practical design developed for experimentation to allow you to draw your own conclusions.

Supplies

- 1 Grey PVC Tube (drain pipe) do not use Black PVC as this is doped with carbon particles. Diameter : 100mm (3.94 in). Height : about 500mm (19.68 in.)
- 1 SO239 (or 50 ohm BNC) chassis mounted connector.
- a 0.5mm (0.02 in.) Aluminium sheet (or decorative trim from DIY Shop) 2 rectangles required each measuring 32.9 x 10 cm (12.95 x 3.94 in.)
- 12 3mm (0.12 in.) short pop rivets
- 2 solder tags or crimp tags to take 2.5 mm² wire (0.004 sq in.)
- 1 tube of contact adhesive (to immobilise the coils after tuning).
- 8 metres (26.24 ft.) insulated solid copper wire 2.5 mm² (0.004 sq in)
- Short length of insulated stranded copper wire 2.5 mm² (0.004 sq in) used to interconnect the source coil and SO239 or BNC.

Dimensions and preparation of the tube

Mark out the various elements onto the PVC tube, and drill the various holes.

Fix the SO 239 or BNC connector to the tube.

During the tuning of the main coil, a turn may have to be shortened or removed, and require a new hole to be drilled.

It is useful to elongate the holes into slots, so that source coil can slide up and down the tube. This will assist in locating the best position for the source coil to obtain a minimum SWR.

Cylinders

The cylinders have a height of 100mm (3.94 in.)

Circumference : $3.14 \times 100\text{mm} = 314\text{ mm}$ ($3.14 \times 3.94 = 12.37\text{ in.}$) An extra 15mm (0.59 in.) for an overlap, then $314 + 15 = 329\text{mm}$ ($12.37 + 0.59 = 12.96\text{ in.}$)

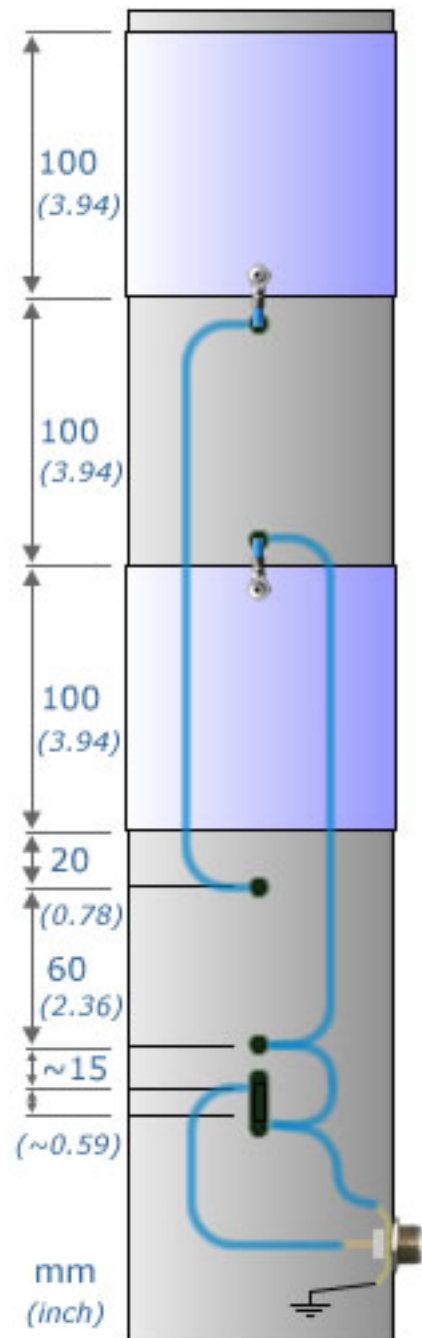
Therefore the antenna requires two rectangles of 100x329 mm (3.94 x 12.96 in.)

The aluminium is fairly easy to cut with heavy duty scissors, or you can score each side and break the sheet over a straight edge.

The two cylinders can be formed using a tube of slightly smaller diameter. The preformed tube can then be sprung over the grey plastic tube.

Alternatively you can try forming the sheet on the tube with the aid of some plastic tie-wraps.

With the tube temporarily fixed on the grey tube, mark where to drill two holes in the overlapped aluminium. Secure the solder tag or crimp eyelet by a rivet that goes through the aligned holes. Pass the wire links through the other holes. Repeat this process for the other preformed tube.



Links

Link up as indicated in the drawing. The wires are on the inside of the tube.

A flexible link is used to connect to the SO239 (or BNC connector).

The wire links on the cylinders are riveted to the eyelets (or solder tags) to the grey plastic tube. The wire from upper cylinder pass through to the middle of the tube and the wire from lower cylinder is plated to the inside of the tube.



Coils and adjust

The coils are both wound in the same sense, and their ends soldered to the wire links.

Tuning coil : 19 close wound turns (18.5 after tuning but start with 19)

Source coil : 2 close wound turns.

The tuning is achieved by shortening a turn on the tuning coil. It may be necessary to make an extra hole(s) to move the link position and secure the end of the coil.

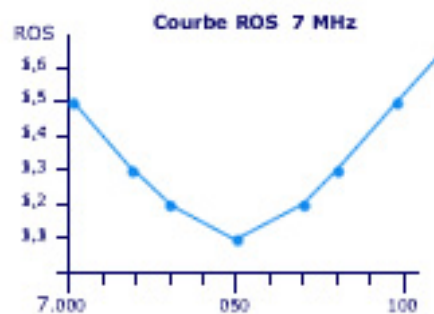
After every adjustment the SWR will need to be rechecked, and the relative position of the source coil to the tuning coil repositioned using the slot cut on the grey tube.

An antenna analyser or noise bridge can be used to determine the actual frequency and impedance of the antenna in a single measurement.

Final adjustments of the antenna will be necessary once the coaxial cable is connected back to the transmitter.

The antenna tuning will be affected by the close proximity of objects and the length of coax.

Radiation may be returned along the coaxial cable, and this may be minimised by attaching an earth to the body of the SO239 connector (or BNC connector).



Although the tuning of the antenna is sometimes difficult, the swr could be minimum as shown in the diagram.

The bandwidth is about 150KHz.

Good entertainment.

