

EMDRC 80 metre Antenna Club Project



Materials required:

Wire cutters,& RG-58 Coax cable + what you need to get to your shack
40 metres of wire (remember the thicker the wire the wider the band will be)
3 X 250mm PVC cable ties, 1 Coax cable plug to suit RG-58
125mm of 100mm PVC pipe
2 x insulators (an old PVC cutting board is suitable, test material in microwave oven, if material gets hot it is unsuitable, place a glass of water in the oven while conducting test)
Strong cord or rope, UV stabilized.
Soldering Iron
Tape measure
Old PVC cutting board (to be cut into 2 pieces
Saw

The purpose of this project is to construct and tune a wire dipole for use on the 80 metre amateur band. For those who require it we will be making a “Ugly Balun” to match the antenna to the feed wire. (Those who wish to use a commercial Balun are welcome to do so, or omit the Balun altogether.)

Once this project has been completed we will start another project to include a 40 metre dipole to the existing antenna, or, to add traps to the existing 80 metre antenna.

Following each construction we will demonstrate the various methods used to tune the antenna:-

- 1/ with a SWR meter (standing wave meter,)
- 2/) with a GDO (Grid dip Oscillator)
- 3/ with an Analyser (MJF 259B HF/VHF SWR Analyzer)

Method:

1. Calculate the length of wire for each side of the half wave dipole using

Example:

Frequency required 3.60 MHz

$$150 \times 0.95 = 142.5$$

$$142.5 / 3.6 = 39.58$$

$$39.58 / 2 =$$

Length of each side – 19.79 metres

$$\text{Length in Metres} = \frac{150 \times 0.95}{\text{Frequency (MHz)}}$$

Measure and cut 2 pieces of wire to 19.75 metres. (Allow an extra 100mm each end to secure wire to insulator.)

Remove insulation 20mm at one end of both wires



Cut 125mm of 100mm pvc pipe
 Wind 14 turns of coax around the PVC pipe
 Mark and drill holes, as described in Balun design document, to secure cable ties
 Secure Coax using cable ties

Fit 50Ω coax to secure to antenna wire, soldering one side of the wire to the coax core and the other to the outer shield.

Loop free end of each wire through insulator, tie back onto the wire using cable ties, once tuned twist wire and secure with cable ties



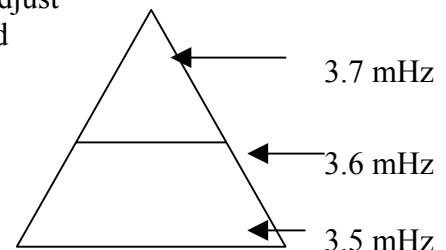
Install Antenna

For best performance locate antenna a minimum of a $\frac{1}{4}$ wave from nearest object. Tie antenna insulator to a tree or building using the non-conductive cord or rope. Pay particular attention to locate the antenna well away from any metallic object.

1 Tune (Match)

With a SWR meter (standing wave meter)

2. Install SWR meter in series with the radio and antenna using a short patch lead
3. Tune radio to resonant frequency, 3.6 mHz.
4. Set radio to low power output, RTTY, FM or AM, this results in constant carrier
5. Adjust SWR meter to Forward position, Press PTT and adjust meter to peak position. (When PTT released meter should return to zero)
6. Set SWR meter to Reflect, press PTT and read value on meter..
7. If value is higher than 1:1 retune radio to 3.7mHz and repeat step 5
8. If SWR reading is higher than previous antenna is too short, if SWR is lower antenna is too long. (Refer to the triangle)
9. Securing the antenna wire with cable ties allows the wire to be slide back onto itself, do not cut wire.
10. Make sure that both sides of the antenna wire are adjusted the same.



Length of antenna



2 Tune (Check for Resonance)

With a GDO (Grid Dip oscillator)

1. Select coil for the required band and plug into GDO
2. Tune the sensitivity control until a reading of about 75% of full scale is obtained (do not over drive the GDO)
3. Make a coil of wire, similar diameter to GDO coil, Connect one end of wire to free end of coax, make 6 turns and connect the other end to shield of coax
4. Bring the GDO coil near the coupling loop. Both loops should be inline with each other
5. Lightly couple the GDO to the antenna and rotate the dial until a slight dip is obtained moving the coils closer should increase the dip The lighter the coupling the more accurate the reading.
6. Rotate the dial until the dip is observed continue and you will see it lets go. Do this a couple of times. The point where it is about to let go is the resonant frequency when lightly coupled.

Note: An advantage of using a GDO is enables the user to find the resonate harmonic frequencies.

3 Tune

With a Analyser (MJF 259B HF/VHF SWR Analyzer)

Note: Never transmit when analyser is in operation

1. Connect antenna to analyser
2. Set analyser to frequency
3. Set analyser to read SWR and impedance
4. Tune analyser until a SWR of 1:1 is found
5. Read displayed frequency and adjust as described in SWR point 8

Note: Using the analyser enables the user to identify the impedance of the feed point, it should be approx. 50 Ω .

For the next project we will be adding either a 40 metre dipole to the balun, or, instering traps into the 80 metre dipole to enable tuning to the 40 metre band.

The inclusion of the 40 metre dipole, or the 40 metre traps, to the 80 metre dipole will require re-tuning both frequencies