

2 meter EH-Antenna

A 2 meters EH-Antenna is probably the highest frequency we can go with simple means and as a homebrew EH-Antenna. The MFJ259 have 170 Mhz as limit but are not really to be trusted above 166 Mhz anyway. (To close to the band limit)

My first attempt to build a 2m EH, was by using 2 aluminium tubes, leftovers from an old dipol and 16mm in diameter. Ted suggested a form factor of 1:6 for the cylinders, which gave a length of 96mm.

As I want my 2m EH to be "safe" whilst handling it, I decided to use a 20mm PVC pipe as a base for the antenna. This means that I also use the 20mm PVC as coilform for the tuning coil.

As the cylinders are intended to be placed INSIDE the PVC pipe, I cut a 16mm spacer from a smaller PVC pipe, to be placed between the cylinders to achieve a correct 1xDiameter spacing.

At the edge of each cylinder, I drilled a 2mm hole, to be used later for soldering tags, fastened with self threading screws from the outside of the PVC pipe.

As the pvc pipe is a bit narrow to work with, I drilled all holes except the screw holes, with a 4mm drill. I ran spun fishing line throug all holes, one piece of line for each hole where any cable is planned to go in/out through the PVC pipe. (Guess why...)

Insert the lower cylinder, spacing and upper cylinder, secure soldering ears with a screw to each cylinder. Get a piece of teflon coax, the thin one, and connect the inner coax core to the upper cylinder tag and the coax screen to the lower cylinder soldering tag.

Approx 4 inches down from the lower end of the lower cylinder, I hope you drilled a hole for coax inner core to pop out and 2 inches furter down, a hole for the coax screen.

Now you should understand why I use fishing lines to run cables in narrow locations...

How much power do you intend to push onto the EH? If you only intending to push 10 Watts or so, you can use 1.2mm lacquered copper wire. If you push 170 Watts through that later, your PVC pipe will bend at the coil due to some heat. Not much heat, but the PVC pipes are made by cheap PVC!

The 96mm cylinders show about 1pF capacitance so the tuning coil need to be around 1.2uH. On a 20mm PVC coilform, that gives about 12 with a 1.2mm wire and a coil length of 25.4mm

I know Ted's formula says that the capacitance should be about 4pF but that seems to be wrong. Also, I made 15 turns on the tuning coil instead of 12. I rather cut some turns instead of adding wire later whilst tuning!

Anyway, secure the lower end of the tuning coil with hot glue. Take a small coax with a coax connector on and connect the cylinders and the tuning coil as a SERIAL circuit, together with two parallel connected 100 Ohms resistors in serie with the coax.

This is the connected, either to your antenna analyzer, signal generator and voltmeter or even an old grip dip meter. Get yourself an AEA or a MFJ259B, they are both worth every cent!

The expected bandwidth of this contraption should be well over 50 MHz according to Ted, so don't get too fuzzy with the process. (According to Ted, about 73 Mhz for 3dB bandwidth)

Make the tuning coil to tune up at 145 MHz .

When you are happy with the tuning, seal the coil with hot glue.

After the tuning, rewire the antenna as a parallel circuit and connect the feed coax screen to the lower end of the tuning coil and the lower cylinder.

The upper cylinder should connect to the tuning coil hot end as the tuning process specified.

My contraption tuned at 145,500 Mhz and with 4 turns on the tap on the tuning coil, that produced an impedance of 25' ish ohms. Noticed that it was possible to get the impedance lower by fiddling around with the location of the tap, but with more than 50MHz bandwidth... Nahh!

I needed to add 25' ish Ohms with a source coil. The inductance should be about 27nH to produce 25' ish Ohms at 145 Mhz.

I used a 8mm drill as coilform for 3 turns of 1,2mm copper wire.

Connect the sourcecoil to the tap and check the result with the antenna analyzer. Expand or compress the source coil until you get 50 Ohms at your desired frequency.

I tried to tune the antenna by feeding it with my 2m rig.... **Just forget it!** The field in the shack was so strong with 15 Watts that all instruments including my computers went mad and became unusable. Even the VSWR meter, a rather simple-stupid Sanwa, went mad.

So, my 2m EH is working good. Far better that the 1/8 whip on a magnet foot I been using before.

The only problem so far, seems to be the strong field, which pisses of my xyl while she' srying to play cd's on her stereo. I cannot trace any TV RFI, but all audio/video devices in the house are all cheapo made in guess where... And they need to be be switched off.

Also, I cannot detect any rf from the coax at all. However, the field was so strong that it made my FT1000MP to reset all frequency settings(?) which have never happened before.

The radiation pattern are a bit to high. I need to tilt the antenna TOWARDS our local repeater, located about 15 miles away. My next 2m EH will only have a cylinder ratio of 1:2 instead. The difference in signal strength between vertical and tilted 10 degrees was from a S3-4 to a S9++

This was a bit unpredicted but this kind of experimenting shows the need for even more experiments.

Aluminium cylinders, 16mm diameter and 96mm length

20mm PVC pipe, (An electricians pvc pipe)

For antenna up to 15-20 Watts, 1,2mm magnet copper wire will do nicely.

For more power, use 8mm copper hydraulic brake pipes, you can find these at your local aftermarket car part dealer. You must recalculate the coil dimensions of course.

Tuning coil, about 12 turns and a tap 4 turns up from the cold side.

Source coil, 3 turns of 1,2mm copper magnet wire on a 8mm diameter form.

Use a thin Teflon Coax for the connection of the cylinders.

Some building notes.

The tuning process can be found in Ted' s demo #4 and demo #5, read them both!

This is a bit fiddly. You need babyfingers to go smaller so whilst tuning, a small modification makes big changes in frequency.

I' d make the cylinders 32mm long instead of 96mm, so use more wire on the tuning coil.

Don' t try tuning with power on! Just forget it. You **NEED** at least(!) an AEA or MFJ antenna analyzer. Also I say it again – **DO NOT TUNE THIS THING INSIDE YOUR HOUSE WITH HIGH RF POWER TO THE ANTENNA!**

Don' t even try to use anything less than a piece of teflon coax inside the pipe! **You WILL have arcs in there if you do!**

The 2m EH generates a significantly stronger response from my electronic gadgets in the house with only 10 Watts than my 40m and 80m EH with 100 Watts!

(I wonder how an EH would do at 23 cm...)

All "fixed" and "set" values for coils and the value of the cylinder capacitance are extremely prone to variance. It is very much a test and trial methodology while tuning the antenna. I believe that we must design an 2m EH with the coils on PCB and precisely specified cylinder size and materials to get a good repeatability for homebrewers without any antenna analyzers.

I'll look further into the PCB coil design and will post the info on the group site.

And good luck with your EH...

Dan / MODFI