

Designing & Building Your Own EH Antenna

WB5CXC



20M EH built with 2" PVC pipe

Information and data for this page is from documentation obtained from the EH Antenna web site and from my own experience with building these antennas.

EH Antenna Web Site www.eh-antenna.com

EH Tools & Tips www.eh-antenna.com/EH_Antenna_Tools_Tips.htm

You should probably download and read Demonstrations # 4 & #5. These Demos documents the principles on how to build and tune an 'STAR' EH antenna.

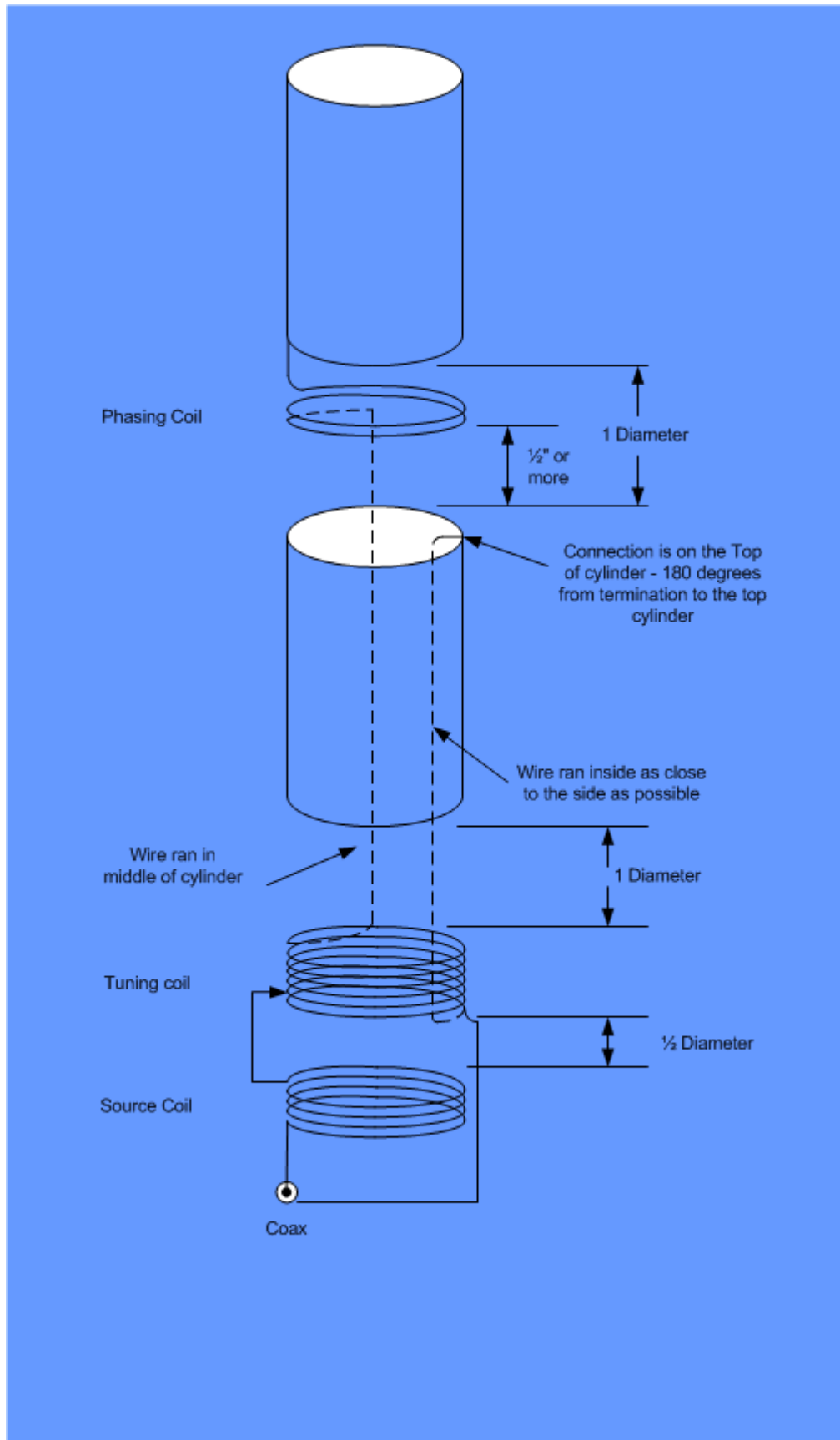
[Demonstration 4.pdf](#)

[Demonstration 5.pdf](#)

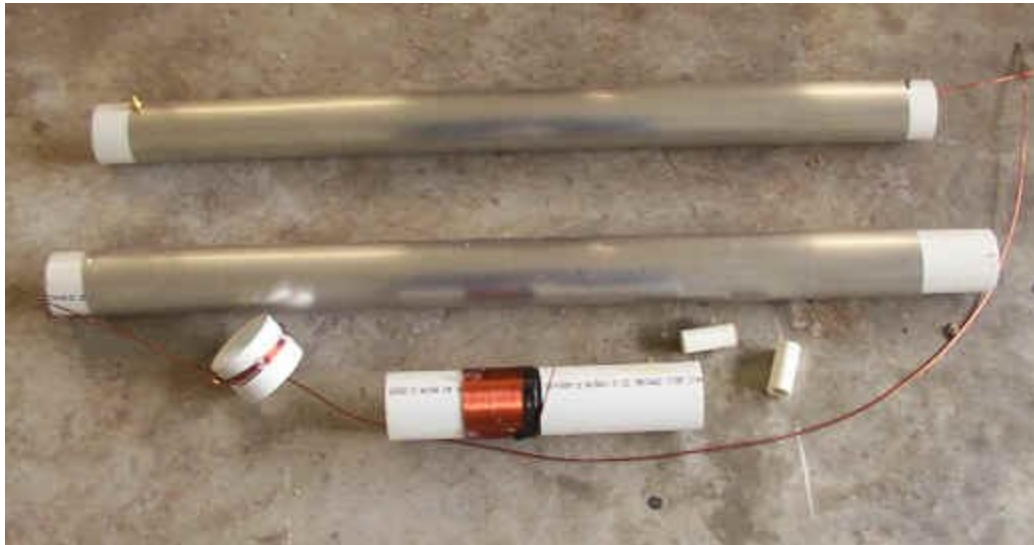
For my antennas I use PVC pipe and aluminum flashing obtained at most lumber/hardware stores. These materials are inexpensive and readily available.

The basic STAR configuration of an EH antenna is shown below. It consists of two cylinders and three

coils.



Depending on the size of the antenna I usually build each of the sections separately and then glue them together to form a complete antenna. In this manner I have smaller pieces to work with and it is easier to run wire down the inside of the cylinders. For smaller antennas just build the antenna in one piece. Below is a picture of the separate pieces for an 80M antenna.



PVC Pipe Dimensions

Size of PVC Pipe	OD	ID sch. 40
1/2"	.84"	.622"
3/4"	1.05"	.824"
1"	1.31"	1.044"
1 1/4"	1.66"	1.380
1 1/2"	1.90"	1.610"
2"	2.375"	2.062"
3"	3.5"	
METRIC PVC		
40 mm	43 mm	
50 mm	56 mm	
60 mm	68 mm	

Design Considerations

What band is the Antenna designed for The frequency band will determine the ratio of the cylinder length to diameter. For 80M and 40M you will probably want high angle radiation, so select a ratio of 10 - 14. On the other bands you will most likely be looking for DX so the ratio should be 3.

What diameter of pipe are you going to use? The bigger the pipe, the larger the bandwidth. For 20M antennas you can go with 1" pipe or larger. For 40M and 80M you will probably want to use 2" or larger.

What materials are you going to use to construct your cylinders? Copper foil from the craft supply store is a favorite but, is not too weather resistant. One inch copper pipe can also be used but it is more expensive than other materials. The one inch copper pipe can fit over 3/4" PVC pipe if the PVC pipe is sanded down a slight bit. Aluminum flashing can also be used. I use the flashing and secure the end with sheet metal screws every 2 - 3 inches. I overlap the the end by about 1 inch, this makes the width of the flashing 8 1/2 inches for 2" PVC.

What kind of wire are you going to use? I usually use # 14 enamel wire. Some of the guys use # 12 insulated house wiring. Both of these are adequate for 100 watts. Some of the guys are using the center conductor of RG-8 for the wire between the top cylinder and the coil (reduce the chance of an arcing).

Example:

We will design and build a 20M antenna using 2" PVC pipe with aluminum flashing and # 14 enamel wire.

Using the PVC pipe dimensions chart above you have a diameter of 2.375". So the cylinders would be $3 \times 2.375 = 7.125"$. So let's go with 7 1/4" (makes it easy to measure, and it is not that critical).

You will require a piece of 2" X 2' PVC pipe. I always leave myself a little room for mistakes so I would get a piece 3 foot long. ($2 * 7 \frac{1}{2} " = 15 + 3"$ (spacing for the cylinders) + 6" space for the coils = 24") Some of the lumber yards carry 5 foot pieces of pipe. Check the price. If you intend to build more antennas it is cheaper to buy a 10 foot length. The 5' piece will probably be about 80% of the cost of a 10' piece.

Flashing comes in 10" width - you will need a piece ~ 15" long.

Go to the EH Design Page - Enter in the Cylinder length, Diameter, Frequency and Wire size.



It calculates that you will need ~ 10.00 turns. I would figure on 12 or 13 turns to start. This will be adjusted when you tune the antenna.



