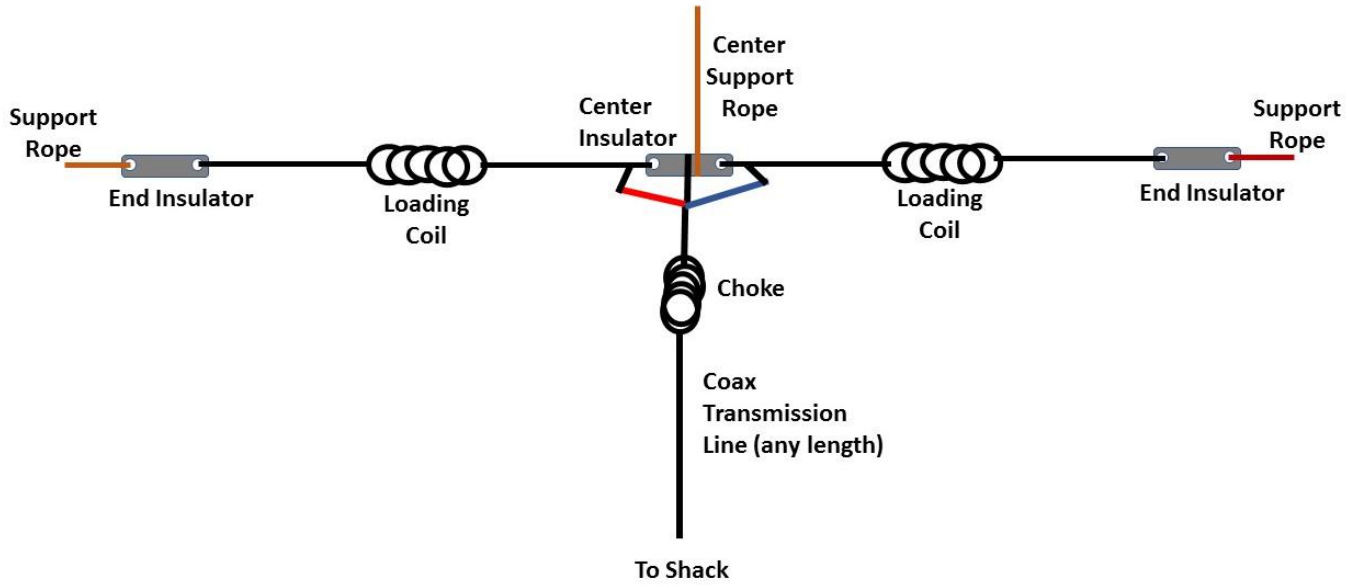
The Radio Hotel by Rick Hiller --W5RH

Building the Coil-Loaded, 60 Foot Long, K2MPP Dipole

Reference the 2 applicable <u>The Radio Hotel</u> columns in the 2019 August and September BVARC Beacons

Schematic Diagram



Parts Listing and suppliers

PVC -- Loews -- 10 foot of PVC drain pipe ($10) ----------
Wire – Loews or Home Depot or enameled wire from Amazon. 72 feet depending
Coil Wire -- #16 Enameled solid
Antenna wire – Insulated Stranded #14 or #12 Solid #10 Aluminum – DX Eng.
Wire Nuts
Liquid Electrical tape
Silicon Sealer
Heat Shrink tubing
Coax Tar wrap or electrical conduit sealer
Insulators -- Coil support insulators – MFJ-16H02 End Insulator for Dipole (Pair), 7 inch **$7.95**
Insulators – center insulator and end insulators (2) ceramic dog bone

Tools Required

Hack Saw
Soldering gun and solder
Drill and bits
Heat Gun
Various dikes, pliers, electrical tools

Building the coils

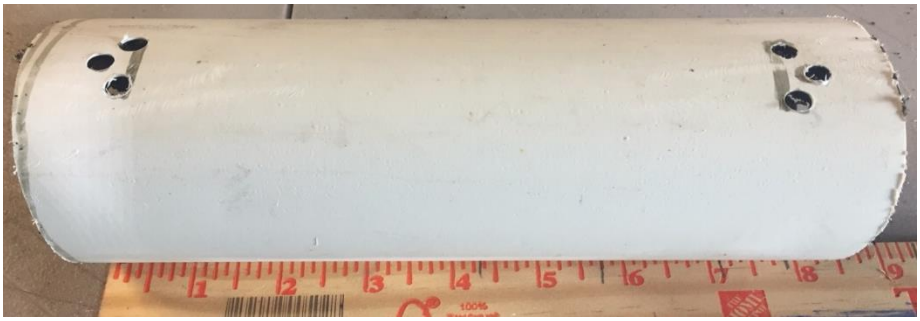
Use Parts 1 and 2 of the July/August Beacon Radio Hotel to design your antenna's custom length, coil position and coil value required to create this configuration. Then using one of the online calculators for coil inductance (or using the inductor mechanicals equation and your mathematical skills) figure out the number of turns required for the wire size and the diameter of the coil form.

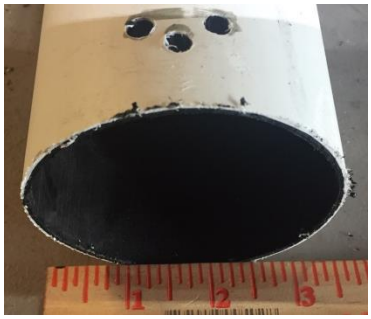
I found that if you calculate uH for #20 enameled/magnet/transformer wire, that you get an increase of 2 uH for each wire size step up in size – keeping # of turns constant.

16 turns on the PVC drain pipe: (values are nominal and will vary up to +/- 10%)

- #20 – 32 uH
- #18 – 34 uH
- #16 – 36 uH
- Be aware -- Increasing wire size slightly increases the width of the coil

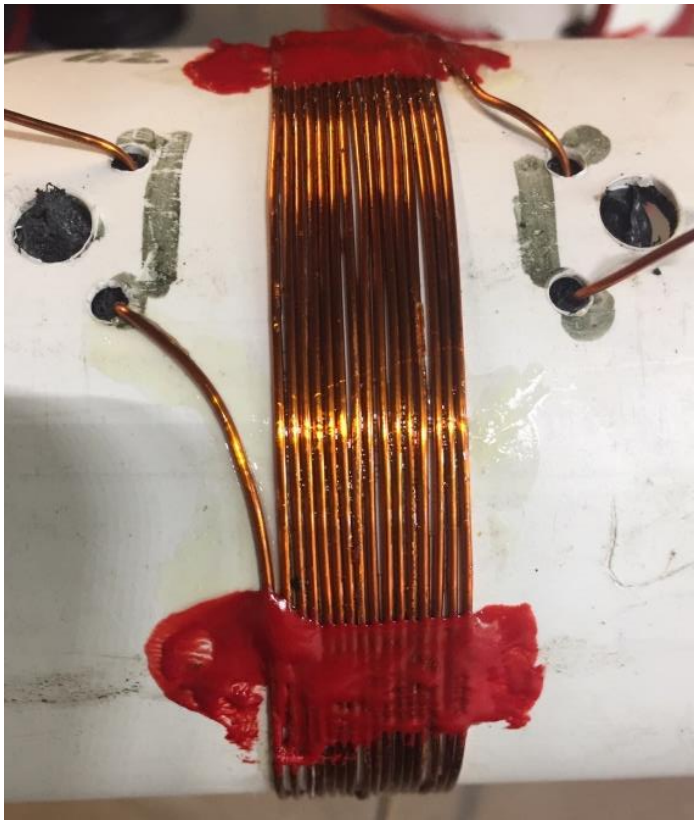
The pictures show the various coils that I built and their construction. You do not have to do it this way. It can be done a number of other ways, but the coil values, # of turns, etc. I came up with will have to be re-figured for your method.



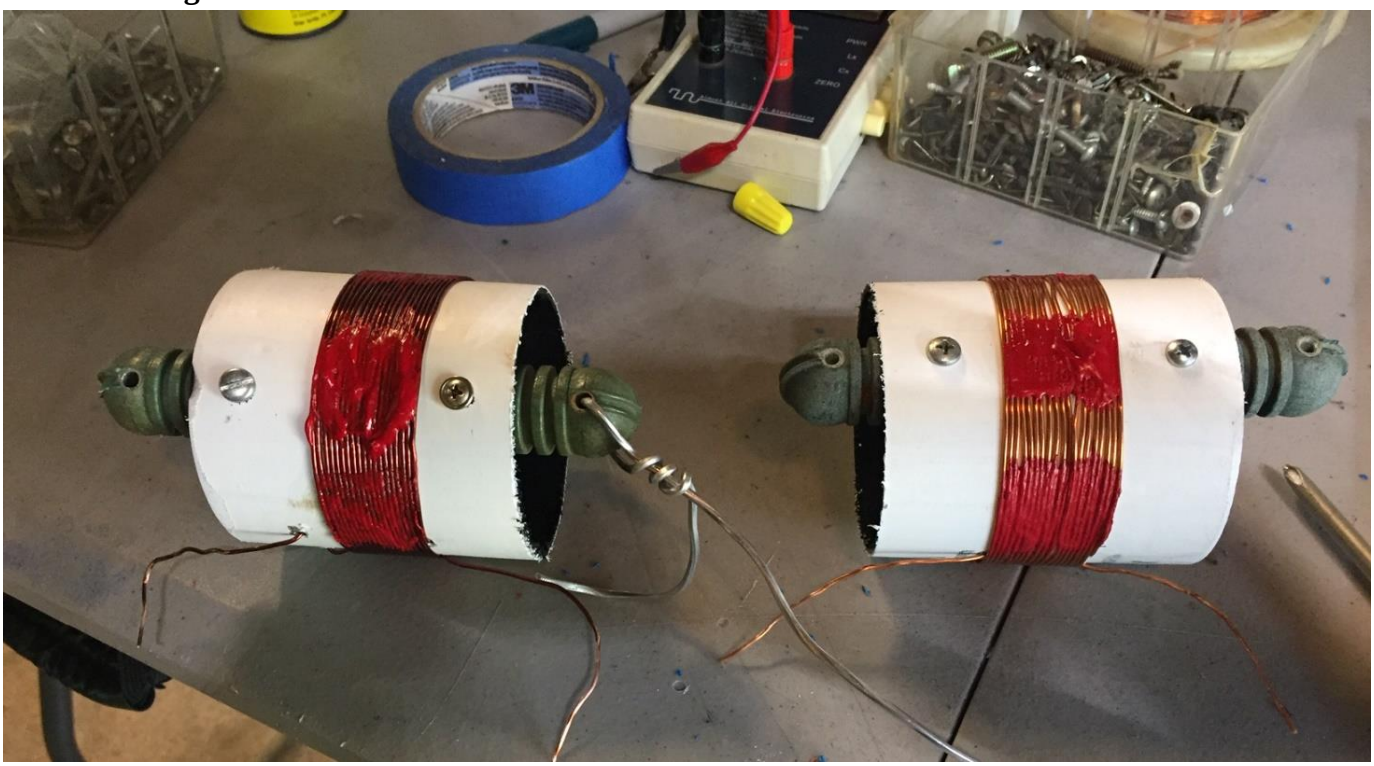


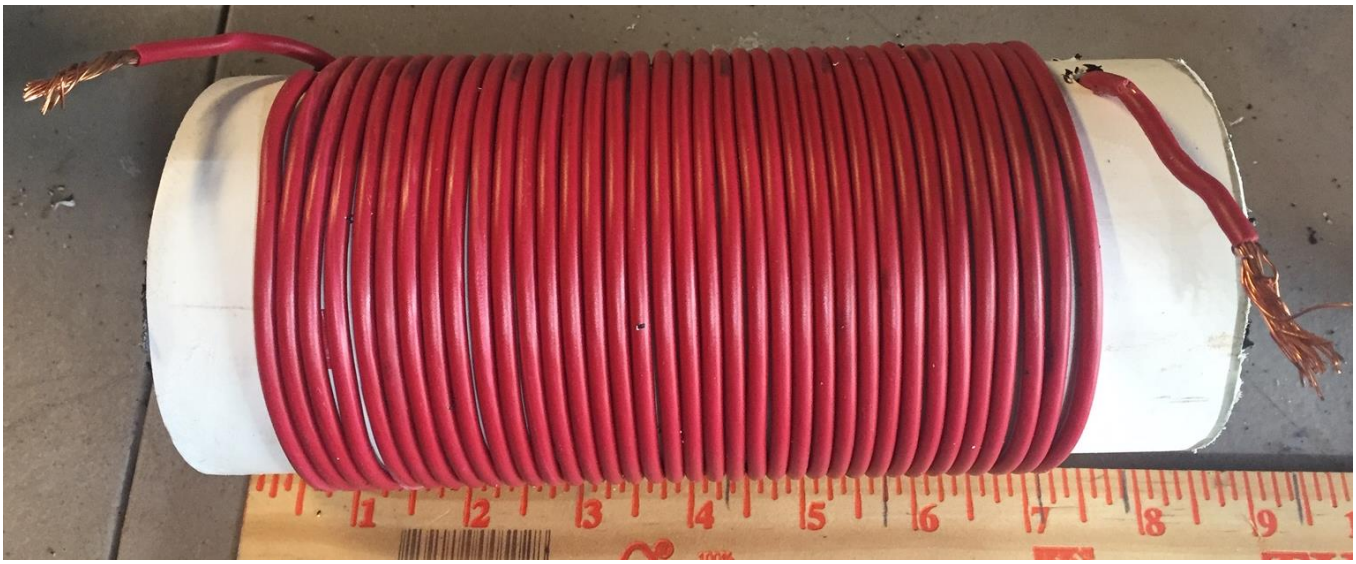
The 3.3" PVC is cut to a needed length which is, typically, coil width plus 1 inch on either side for support insulator fastening. The above was my long form for the #10 insulated wire coil.

Above -- One using #20 enameled and the other using #10 insulated. Both produced a 35 uH coil, but the red coil was significantly heavier and would cause MAJOR antenna drooping.

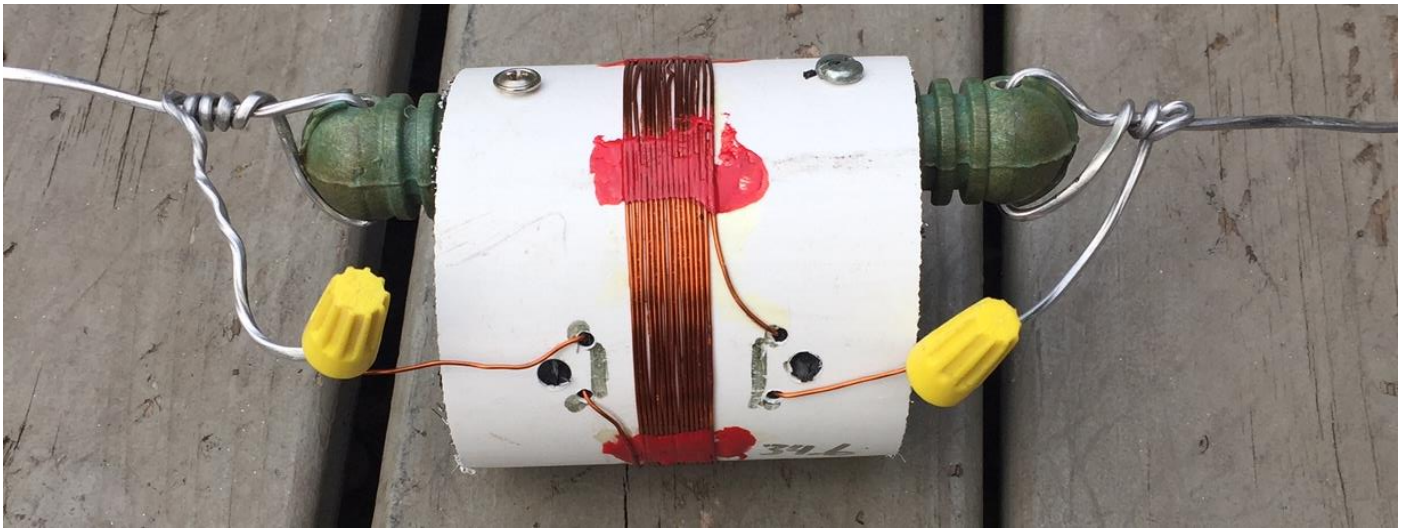


Once wound and measured, the coil is coated in 5 places with liquid electrical tape to hold it in place. It causes no change in L.





Left shows the measurement of the #20 coil with the AADE L meter.



Above prototype -- shows the attachment of the long insulators to the pvc coil form with self tapping machine screws. I did drill pilot holes for ease of installation. The wire nuts were used during testing in order to make the coil removal possible. I used #10 aluminum wire for the antenna wire because I had a lot of it, it was easy to bend and shape, it easily folds back on itself and shorts out.

Building the antenna

The antenna is 62 feet long or 31 feet on each side. The coils are 15 feet from the center feed point, made from #12 insulated copper wire. This is a fixed length so it can be built into the final form. From the coils out to the end is 15 feet, but once the antenna is deployed the end will have to be adjusted for the particular placement and influence from local buildings, fences, power lines, etc. We'll deploy the antenna as described and adjust the end sections to get the resonant frequency to be right near 3910 KHz. Once the antenna is adjusted, the end aluminum sections will be replaced with insulated wire and adjusted again, as insulated wire will cause the wire to be a bit shorter than the uninsulated tune-up wire.

Center Insulator shown below. The coax RG-58 is wrapped around the center insulator and ty-wrapped to the up going coax and stripped out about 6 inches into 2 conductors center and shield. The individual lines are heat shrinked and the ends stripped and tinned for connection to the main antenna wire.

The final center insulator connected to the antenna and coax

Below, I used some of the aluminum wire to make a hanger for the center insulator. The weight of the coax and choke make the center feed point quite heavy. The hanger is used to hang the center and support the weight of the coax etc.

Added weight from the choke coil (above) hung from the feedpoint and made from the coaxial transmission line. This choke prevents L3 antenna currents from flowing on the outside of the coax shield. This erroneous current can cause RFI and noise problems. It can also distort the radiation pattern of the antenna, but a low antenna at 3.9 MHz does not have a major radiation pattern distortion issue, as an HF Yagi would have, as it is already distorted into a ball shaped omni-direction pattern.

The choke is 20 feet of the RG-58 coax wound into a 1 ft diameter coil, so about 7 turns. It is best to make a couple more choke coils in the transmission line at points such as when the coax gets to ground level and also where the coax enters into the shack. This will help with eliminating RFI, etc., especially if you are running power – 400 watts or more.

Hanging the antenna for testing

I hung the antenna from my tower at about 20 feet and stretched it out across the roof and the back yard.

Using my MFJ 269B Antenna Analyzer, I found that it had to be adjusted as it was too low in frequency (too long) as built. Using the uninsulated aluminum end sections, which made it easy to just fold back on itself, I shortened one side a few feet and found a sweet spot at 3910. SWR was about 1.7:1 at the end of the 70 feet of RG58. Not going to get any better than that at 20 feet. SWR will get lower as the antenna is moved higher and the feed Z increases toward 50 ohms.

I connected it up to my XCVR and got on the Rag Chew Net. All went well, although the signal strength reports were about 10 to 15 dB below normal, but then I was not using an amplifier, the antenna was half size and the antenna was not up at 50' as my full size dipole. Not bad performance, actually. So success was in hand. I hope it works well for Mike, K2MPP

Should you have any questions, e-mail me, text or call. Be happy to help you with advice or parts or anything else.

Enjoy your hobby……73…..Rick – W5RH The Radio Hotel

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