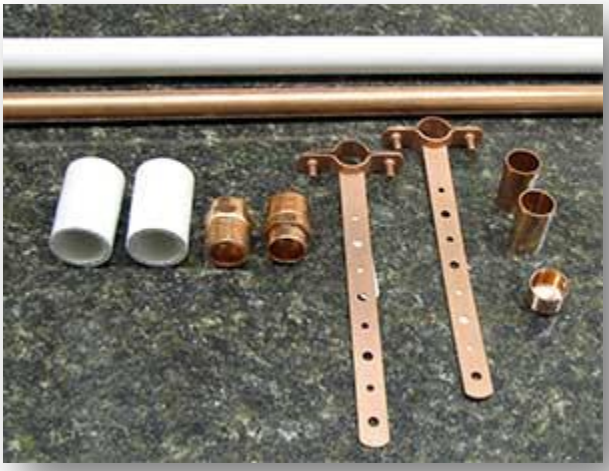
15M and 10M Vertical Half Wave Dipole

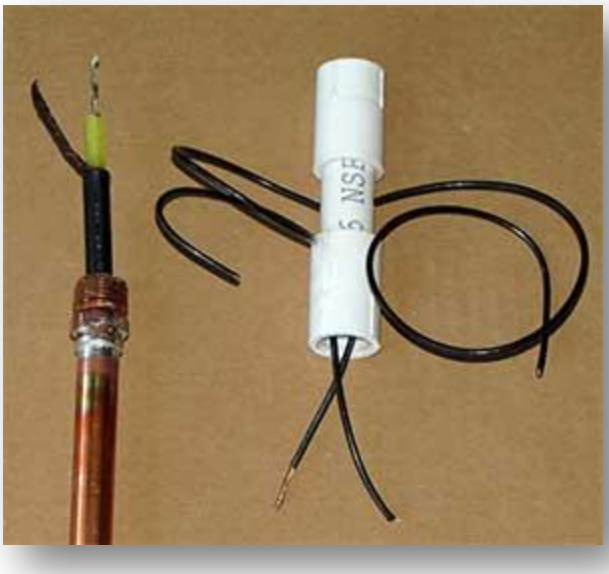
By: Al Senechal – K0CN

The vertical dipoles was made from parts available at a hardware store or home improvement center. My cost was about $35 for each antenna without the coax or line isolator. The parts list include:

1. One half inch copper tubing
2. Copper pipe solder couplers
3. Threaded copper pipe couplers
4. Threaded PVC tubing couplers
5. Copper plated pipe hangers
6. Copper tubing end cap



The design uses a PVC tube as the center insulator with the copper tubing elements attached by the threaded tube to pipe connectors. Drill two holes on the sides of the PVC center insulator. Thread one piece of number 14 copper insulated wire through each hole in the PVC tube. These wires will connect the coax feed line and the two elements of the dipole. For the 15M dipole project, I used RG-11U (75Ω) which I had available from an old antenna 15 years ago. For the 10M project I used RG-8U, both projects worked fine with the coax used. The Coax is threaded through the lower copper tube element of the dipole and terminates at the center insulator. See image 2.



Solder the end of one center insulator wire to the coax center conductor and the other to the shield. Use shrink wrap and/or tape to insulate the bare wires in the center assembly. Note: I also used cable ties around the coax jacket inside the center assembly at the head of the bottom copper tube fitting to help support the weight of the coax as it hangs in the tube when suspended. When the wires are connected and insulated, assemble the elements to the center insulator by screwing the threaded tube connector to the threaded PVC center insulator.

The copper tube elements were cut to length using a calculator that I found on the internet at http://www.kb3kai.com/ Use the Dipole Calculator listed under the projects section of the site. This site uses a velocity factor of 0.958 for ½ inch copper pipe. So, for a ½ wave antenna, the total length calculates to 278.6 inches for the 15M antenna and 199.8 inches for the 10M antenna. I would recommend cutting the tubing longer and then trimming to the desired resonant frequency when the antenna is assembled.

The copper plated pipe hangers were used to make a connection between the copper tubing and the wire leads from the coax. Remove the hanger strap from the hanger by cutting the strap with a metal saw leaving you with the screw together clamp. Attach the hanger clamp to the copper tube close to the center insulator. I soldered the bottom half of the clamp to the copper tube and then using the two bolts from the clamp, assembled the full clamp. One of the clamp screws is used to make a connection with the coax lead. An eyelet was used on the coax lead and the clamp screw. Coax seal was used to seal the wires leading from the center assembly. See the complete assembly in the photo below.

The end of the antenna was fitted with a copper cap and eyelet, however do not solder the cap to the antenna until the overall length of the antenna has been adjusted to resonance. The tuning process is described later in the text. The antenna will later be supported with a line attached to the eyelet.

IMPORTANT: The antenna is suspended with Dacron line from a tall tree. The coax is allowed to run from the bottom of the antenna to the shack. I found, during the tuning process, that a line isolator is necessary to prevent coupling between the antenna and the feedline that runs from the bottom of the antenna. The isolator I used was a ferrite type isolator* but other types such as the ugly balun (http://www.k8dns.com/balun.html) could be used. Before using the isolator, the minimum SWR produced by the antenna was greater than 2:1. With the after decoupling, an SWR of 1.15:1 were reached.

*Radio Works Line Isolator Model # T4

The antenna was installed by using a slingshot to place a fishing line over a branch of a basswood tree. The fish line was then used to pull a light weight nylon line over the tree and then in turn a Dacron support line. The support line was then tied to the eyelet at the top end of the dipole and the antenna was pulled up into a tree. I was able to use a 65 foot high basswood tree that was conveniently growing in my back yard. I chose to spray paint the antenna to give it a level of insulation during the summer when the leaves are on the tree and during rainy times. So far, I have not noticed any problems with the antenna being mounted directly in the tree.

Antenna performance: After drawing the 15M antenna into position at 60 feet high and the 10M antenna 45feet high, I ran a scan using an MFJ-259B antenna analyzer. The antenna resonated just below the 15 meter band. I adjusted by removing an inch at a time of copper tubing from the bottom and the top of the dipole using a tubing cutter. I chose to cut the antenna to the center of the 15 meter band. The SWR curve for the antenna provided a minimum SWR of 1.15 : 1 at 21.225 MHz. The SWR was 1.35 : 1 at 21.000 MHz. and 1.30 : 1 at 21.450 MHz. The 10 meter antenna was trimmed to length using the same process and the center frequency was adjusted to 28.350MHz. The minimum SWR was 1.2:1 at 28.000 MHz, 1.15:1 at 28.350 MHz and less than 2:1 at 28.600 MHz.

For a comparative test, I only have a multiband Super Loop, which is a full wavelength delta loop on 80 meters fed with a 4:1 balun. This antenna has provided very good DX results for me in past years on 80 through 10 meters. I was able to compare these two antennas by using a coax switch at the receiver. I used an ICOM IC-756 Pro III as the transceiver for all testing. When

I first switched from the loop antenna to the 15 or 10 meter dipoles, I immediately noted approximately a 2 S-unit increase on nearly all signals coming from Europe and Asia. Signals from the US were on the average of 1 to 1.5 S units better than the loop. In every case, the vertical dipoles outperformed the loop. The first contact I made with the antenna was with South Africa in a pile up. I did not work the station on the first call, but there were a fair number of other stations calling when I made the contact. I received a 59+10 report from the South African station. My next test of interest was to use the antenna in the 2010 CQWW DX contest. Running 100 watts, I was able to contact 244 stations in 76 countries and 25 zones. During the ARRL 2010 SSB Sweepstakes I made 235 contacts in 25 sections again using 100 watts. I am very impressed with the dipole's performance and it seems to perform competitively for both US and DX contacts.
During the 2011 CQWW SSB DX contest, I made 308 contacts with 91 countries in 34 zones on 15 meters and 360 contacts with 96 countries in 31 zones on 10 meters, both using 100 watts. These antenna are very functional and very cost effective.

73, Al – K0CN