6 / 10 Meter Dipole
For Vertical or Horizontal Polarization

By
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This antenna can be used either horizontally or vertically polarized. For SSB/CW/AM operation at the lower end of the 6-meter band horizontal polarization is normally used. For FM operation above 52 MHz vertical polarization is normally used. Provision is made so that the length of the elements can be adjusted for either band segment.

The photos accompanying this article show the various steps in making the antenna. The actual parts used in making the antenna shown in this article were salvaged from various other antennas that the author has made over the years. The PVC parts were, in part, salvaged from other antennas as well. The "T" and the "end caps" were exposed to various paint projects and thus are discolored by the over-spray. New parts purchased from a home improvement center (i.e. Home Depot or Lowe's) will be entirely white. The 6-meter "prototype" of this antenna is in use at amateur radio station K9STH, Richardson, Texas, and is mounted for vertical polarization on the "main" tower with the top of the antenna at approximately 46 feet above ground. The 10-meter version is mounted on the opposite side of the tower and the top of the antenna is approximately 50 feet above ground. There is a photograph showing both antennas in the link for antenna photographs at http://k9sth.com when you select the K9STH link from the home page.

Building of this antenna requires only "normal" hand tools including an electric drill, hacksaw, ¾ inch hole saw (or large drill bit), screw driver, pliers, and so on. The list of materials is as follows:

Description

10-foot length of 1-inch diameter PVC schedule 40 minimum, schedule 80 even better

Two or three 1-inch PVC "end caps"

One 1-inch PVC "T" connector

Two 0.750-inch outside diameter aluminum tubing each 50-inches long for 6-meters and 92-inches long for 10-meters

Two 0.635-inch outside diameter aluminum tubing each 12-inches long

Two stainless steel "hose clamps" 1-inch maximum diameter

Two #6 machine screws 1.5 inches long

Four #6 nuts

Twelve or fourteen #6 or #8 sheet metal screws (if putting cap on end of "mast" need fourteen)

Approximately 10 feet of either RG58/U or RG8/X coaxial cable

Appropriate r.f. connector

One roll "cheap" black plastic tape (do NOT use anything made by 3M – that marked only with a "UL" inside the paper roll)

The "steps" required in the construction of this antenna are "outlined" under the various photographs that accompany this article. Total time required from start to finish is between two to three hours average. If you are experienced in antenna building it may take less time.

Start by cutting two sections from the 10-foot length of 1-inch PVC schedule 40 (or schedule 80, do NOT use anything with a thinner wall) approximately 6-inches long. Also cut two lengths of the 0.75 outside diameter aluminum tubing 50-inches long and two lengths of the 0.625-inch outside diameter aluminum tubing 12-inches long. The 0.625-inch tubing will just fit inside of the 0.75-inch tubing.

Notch one end of both of the 0.75-inch tubing using a hacksaw. The "cut" should be about 1-inch long.

Drill the following holes in the various items:

From the "other" end (the "other" end is the one with the slots) drill a 3/32-inch diameter hole through one side of the 0.75-inch aluminum tubing 3/16 of an inch from the end. Drill both pieces. Drill a 5/32-inch diameter hole through both sides of the 0.75-inch tubing aligning it with the 3/32-inch hole. Drill this hole 2.375-inches from the end.

Drill a 5/32-inch hole all the way through each of the 6-inch long pieces of PVC pipe 2-inches from one end.

Drill a hole in two of the "end caps" (centered) that is 0.75-inches in diameter (3/4-inch)

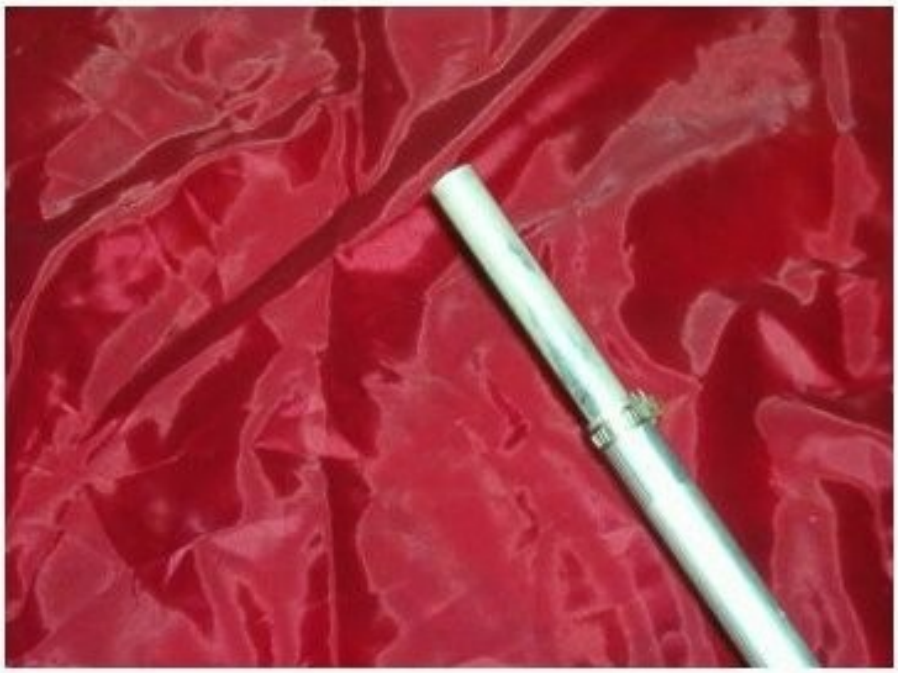
Using the black plastic tape wrap between the two holes that have been drilled in the 0.75-inch diameter aluminum tubing until the wrapped tubing will "just" slide inside of the 6-inch PVC pipe. Do this for both lengths of tubing.

of tubing.

Slide the 0.75-inch diameter tubing inside of the 6-inch PVC. Secure each piece of tubing with the 1.5-inch #6 machine screw putting two "nuts" on the outside. Next slide the "end cap" (with the 0.75-inch hole) over the "long" end of the tubing. Make sure that the cap is securely on the PVC pipe. The small single hole that was drilled on one side of the tubing will extend from the end of the pipe.

Strip one end of the coaxial cable about 1.5 inches. Make a "hole" in the braid and pull the center conductor through. Remove the insulation from about 0.25-inches of the center conductor. Put a connector on both the center conductor and braid. SOLDER the connections! Insulate the braid using black tape including around the coaxial cable as well as along the braid.

Insert both 6-inch pieces of PVC into the "T" connector. Make sure that the "holes" that have been drilled in the end are visible through the "opening". Using either the #6 or #8 sheet metal screws connect the coaxial cable to the ends of the tubing (put one screw in each hole). Turn the connectors so that they are at "right angles" to the tubing to insure that the cable is not "shorted out". Mark which piece of tubing the shield of the coaxial cable is connected to (wrap black plastic tape around that piece of tubing).



Insert a 12-inch section of the 0.625-inch diameter tubing into the end of the 0.75-inch diameter tubing where the "slots" have been sawed. Put a hose clamp around the "slots" and tighten until the smaller tubing can "just" be moved in and out. As a "starting" point for later adjustment, for tuning the antenna for horizontal operation for SSB / CW / AM, allow about 5-inches outside of the 0.75-inch tubing (about 7-inches inside the tubing). For FM operation (vertically polarized) allow about 3-inches outside of the 0.75-inch diameter tubing.

Drill 3/32-inch holes on each side of the end caps and where the 6-inch sections of PVC come into the "T". Use either #6 or #8 sheet metal screws to secure these in place. Cut off the remaining section of 1-inch PVC pipe to about 6 or 7 feet long if the antenna is to be used with vertical polarization. If the antenna is to be used for horizontal polarization you can leave it the full 9-feet long. Run the coaxial cable through the pipe and insert the pipe into the "T". Secure with two sheet metal screws. If desired, a 5/16-inch hole can be drilled near the end of this pipe, the coaxial cable brought out through this hole, and the third "end cap" can be secured to the open end of the pipe with sheet metal screws.

Using the black plastic tape cover the ends of the 0.625-inch tubing. Put two, or three, pieces over the end then secure by wrapping tape around the tubing. This is to prevent "whistling" when the wind blows across the ends of the antenna.

Attach whatever r.f. connector that you desire to use.

To tune the antenna to resonance you first need to decide on whether or not it is going to be used on the “low end” of the band (for SSB/CW) or on the high end (for FM). If you are going to use the antenna for CW/SSB then it is suggested to use the frequency of 50.150 MHz for the 6-meter band and 28.300 MHz for the 10-meter band as the “target” frequency for lowest SWR or reflected power (depending on whether or not you are using an SWR bridge or a wattmeter).

Put the antenna in the horizontal plane in an open area, preferably outside. You don’t need to get the antenna “that high” off the ground for tuning (6 feet is usually sufficient).

Again, the smaller tubing should be about 5-inches outside of the larger tubing for CW/SSB and about 3-inches outside of the larger tubing for FM. Check the “starting” SWR/reflected power at the desired “target” frequency. Then tune to a frequency 100 kHz above the “target” frequency and see if the SWR reading increases or decreases. Next tune to a frequency 100 kHz below the “target” frequency and see if the SWR reading increases or decreases. If the SWR decreases when you tune to the higher frequency then the antenna is too short and you will have to slide the smaller tubing out about 1/2 inch on both sides of the antenna. If the SWR decreases when you tune to the lower frequency then the antenna is too long and you will have to slide the smaller tubing in about 1/2 inch on both sides of the antenna. Then check the SWR at the “target” frequency, 100 kHz below the “target” frequency, and 100 kHz above the “target” frequency. See how the SWR differs on both sides of the “target” frequency and repeat the above.

If the SWR increases on both sides of the “target” frequency then you are very close to resonance. Check the SWR 50 kHz on each side and adjust the length of the smaller tubing according to the above procedure. However, only change the length no more than 1/4th inch and check the SWR. At this point it should be very close to optimum. When the minimum SWR point has been reached tighten the hose clamps to secure the smaller tubing.

You can use hose clamps to secure the mounting pipe when mounting either vertically or horizontally. Just make sure that when the antenna is mounted vertically the element to which the shield of the coaxial cable (the one that you marked with tape) is placed DOWNWARD. When mounted horizontally it doesn’t matter what element goes in which direction.

Of course you are going to have to connect feedline into the shack. For runs up to around 50 feet RG8/X will work fine on both 6-meters and 10-meters. For runs up to around 100 feet RG213/U can be used. For anything longer than 100 feet then you seriously should consider a better quality (lower loss) feedline such as LMR-400 or Heliax.

The following photographs are of the “prototype” 6-meter version of this antenna as installed at K9STH. The top of the antenna is 46 feet above ground (the tower itself is 54 feet tall and the top antenna is 67 feet above ground).

The antenna works very well and is relatively inexpensive to build. There are, of course, all sorts of antennas that can be used on 6-meters. But, this one is rugged and performs very well.

Special Notation

After the antenna is completely assembled, tuned for resonance, etc., every joint should be sealed with clear silicon to prevent water from entering the assembly. This includes the holes where the tubing comes through the “end caps”, when the “end caps” join the 6-inch pieces of pipe, where all of the pipes join the “T” connector, where the coaxial cable comes through the mounting pipe, and the #6 machine screws (both ends, head and nut). If desired, instead of “taping” the ends of the elements they can be “filled” with silicon sealant.