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BUILDING THE 2-METER COPPER J-POLE ANTENNA

by

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MATERIALS REQUIRED:

10 foot section of 3/4" Copper water pipe
3/4" copper "T"
3/4" copper elbow
3/4" copper end caps (2)
Electrical solder
RG-8U or RG-8X or equivalent coax about two feet
PL-259 connector
PL-258 coupler
UG-176 reducer for RG-8X (not required if using RG-8U)
Electrical tape

TOOLS REQUIRED:

Butane torch
Pipe cutter or hack saw
File
Pliers
Plumber's sand paper
Soldering Iron
Ohm Meter
Measuring tape

ASSEMBLY:

1) PREPARATION OF COPPER PIPE:

Using the pipe cutter or hack saw, cut the 10' copper pipe in the following lengths:

- 3/4 wave radial = 58 1/2 inches
- 1/4 wave radial = 19 1/2 inches
- J connector = 1 1/2 inches.

The remainder of the copper pipe will be used as a mast mount. Sand the ends of all pipes to ensure a clean surface for soldering.

2) RADIAL ASSEMBLY:

- Using the copper "T" connector fitting, connect the 3/4 wave pipe to the mast mount pipe so that both pipes are joined vertically.
- Insert the J connector pipe horizontally into the remaining T opening.
- Using the elbow, connect the 1/4 wave pipe to the J connector pipe thereby forming the J of the antenna. (see diagram below)
- Lay the antenna flat on a bench with the connectors to be soldered hanging over the end of the bench so they can be heated without burning the bench.
- This will also ensure that 1/4 wave matching stub will be perfectly horizontal with the 3/4 wave pipe once the solder cools.

- Using the torch, heat the copper T fitting and when sufficiently hot, apply the electrical solder to the pipe where it joins the T.
- Do not apply heat directly to the pipe, just the connector.
- Repeat this on all connector joints.
- The end caps can be soldered on the tops of each radial after all other connections are cool.

3) PL-259 AND PL-258 COUPLER ASSEMBLY:

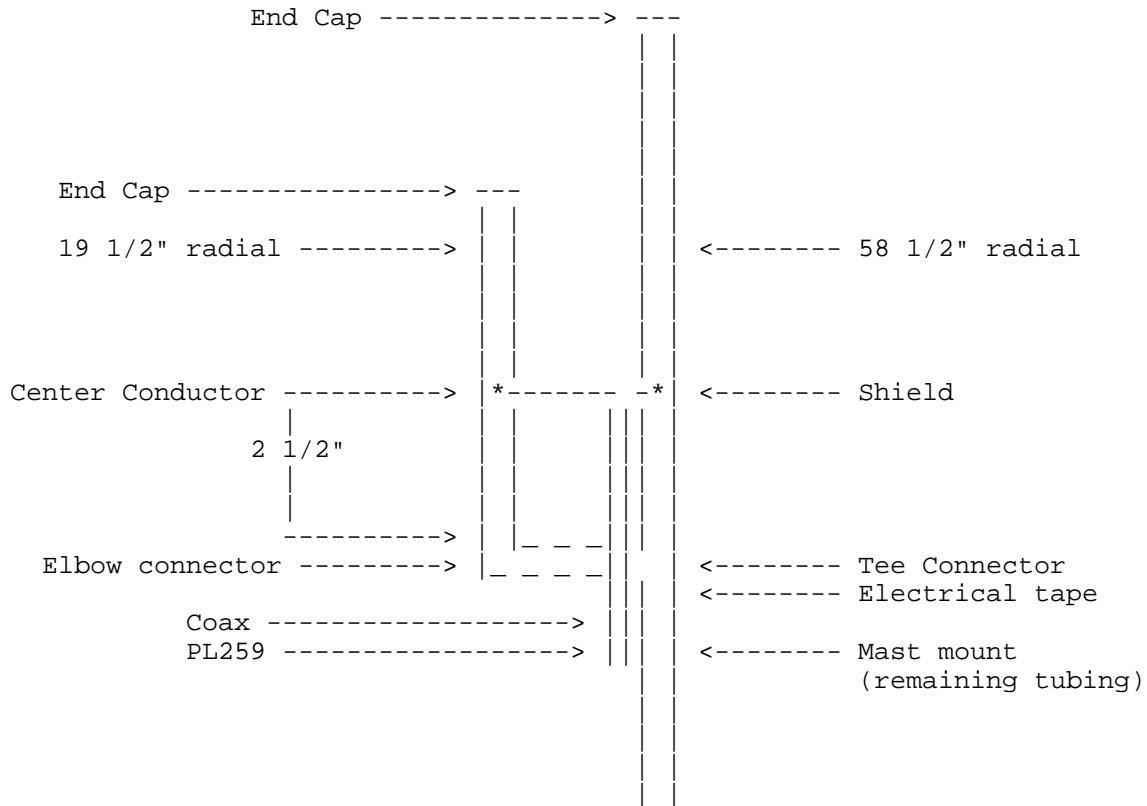
- If you are using the RG-8X coax, install the reducer on the coax first.
- If using RG-8U or similar, the reducer is not required.
- Also, slide the outer portion of the PL-259 over the coax.
- Strip the coax end about 1 1/2 inches and peel back the shield of the coax to the insulating jacket.
- Strip the insulation off the center conductor about 1 inch.
- Tin the center conductor and wrap the shield around the remaining center conductor insulation. PLEASE be certain not to short the center conductor to the shield.
- Connect the PL-259 using a twisting motion to the coax ensuring that the center conductor does not short to the shield.
- Apply solder to the tip of the PL-259 (coax center conductor) and the 4 holes (coax shield) in the body of the PL-259.
- The PL-258 coupler can then be connected to the PL-259.
- Using an Ohm meter, ensure that no short exists between the center pin and the outside of the PL-259 connector.

4) COAX CONNECTIONS:

- Strip the black insulating jacket of the coax about 3 inches exposing the shield of the coax.
- Peel back the shield of the coax to the insulating jacket and twist the shield to form a tightly woven wire.
- Using a soldering iron, tin the twisted shield.
- Scribe a mark on the 3/4 wave and the 1/4 wave pipes exactly 2 1/2 inches up from the inside portion of the J connector. (see diagram)
- Using the torch, apply heat to the under side of the pipe where you made the scribe. (that's the opposite side of the pipe).
- Apply a small bead of solder on the scribe points and ensure that the solder is adhering to the pipe.
- After the beads of solder are somewhat cooled
- Grasp the coax with a pair of pliers and while heating the pipe, (again from the bottom) wait till the solder bead begins to liquify and apply the tinned shield portion of the coax to the 3/4 wave element.
- Be sure to connect the shield of the coax to the 3/4 radial as close as you can to the insulating jacket.
- In other words, after the connection is cooled, you will be cutting off about 2 1/2 inches of unused shield.)
- The tinned shield will also start to liquify and the solder will join the shield to the radial.
- Remove the heat IMMEDIATELY after you see the solder on the shield liquify with the solder on the radial.
- Allow the shield connection to cool to room temperature.

- Using an Ohm meter, check for any shorts between the center conductor and the shield and also check for continuity between the outside portion of the PL-259 and the antenna.
- The center conductor must be soldered to the 1/4 wave radial.
- After the shield side has cooled
- Bend the center conductor over to the 1/4 wave radial
- Cut the center conductor insulation to allow the center conductor to be soldered to the antenna.
- Solder the center conductor using the same method as you did on the shield connection.
- Allow to cool to room temperature.
- Cut the excess shield and center conductor from the antenna.
- Using electrical tape, fasten the coax to the mast portion of the antenna just below the "J". (see diagram)
- Your 1/2 wave copper J-Pole is now complete
- Just add whatever length of coax you need and a 2-meter rig and your on the air!

DIAGRAM

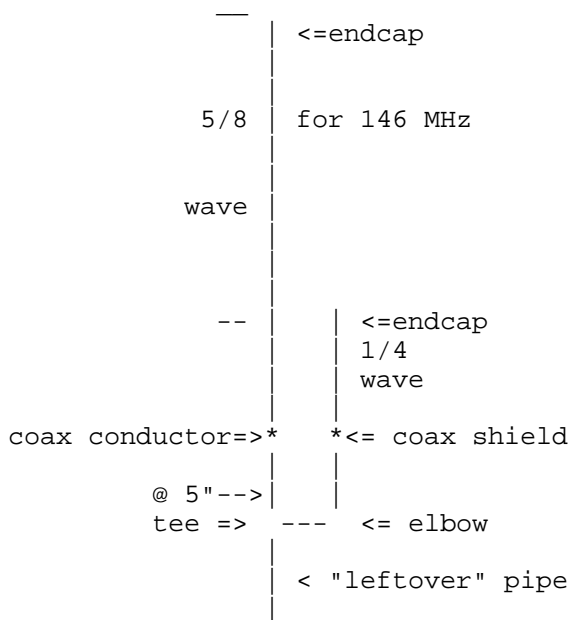


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A Copper Tube J-pole
 by
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- The following is a description of a J-Pole antenna made from copper pipe.
- You can use 1/2 inch to 1 inch pipe (wall thickness will affect stiffness/stability AND price, but not performance).
- Larger diameter pipe increases bandwidth, but 1/2 inch is fine for amateur frequencies.
- Start with a 10 foot (standard) length of pipe
- 1 90 degree (right angle) fitting
- 1 "tee" fitting
- 2 end-caps
- 2 hose clamps (worm-gear adjustable of the appropriate diameter)
- Your coax (end stripped, braid separated, center conductor stripped)
- Coax sealant to close opening in coax to keep water out)
- Cut the 10 foot pipe according, use a tube cutter (for best/easiest results, to the dimensions needed following the diagram below:



- For best general purpose use, the 5/8th wave version should be used.
- The dimensions to cut are:
- 66 1/2 inches (5/8 + 1/4 matching section)
- 19 inches (other half of 1/4 matching section)
- 3/4 inch (joins the tee and the elbow)
- and the "leftover" 33 3/4 inches that forms the base.
- Use standard plumbing solder methods to join main section to base using the tee.
- Use the 3/4 inch piece and the elbow to attach the 19 inch piece.
- Be careful to keep pieces parallel.
- This will give you a center frequency of 146 Mhz.

- Attach the coax as shown using the hose clamps.
- Adjust the swr at 146 MHz by sliding the connections up or down as needed you should be able to reach very close to 1:1 (best to do this in approximately where you intend to use the antenna the base can be attached directly to a mast by two hose clamps).

Try not to be standing right by the antenna!

It has been noted that this design can lead to RF coupling onto the feedline. To avoid this, put a ferrite on the coax at the feed point, or use 3 turns (@1") of the coax taped together at the feed point.