

Construction Plans for a modified version of the Arrow Model J146/440

Dual Band (2 Meter/70 cm) Solid Aluminum J-Pole

Adapted from:

http://www.rberger.com/radio/Dual_band_J-Pole/J-Pole_construction_plans_for_the_model.htm

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Parts Needed

- 3/8"-24/SO239 Mount - available from Burnaby Radio on Hastings St in Burnaby.
- About 85 inches of 3/8" diameter hard drawn solid aluminum rod. (Note: aluminum rod can also come in soft drawn rod which is not a good choice for this application, you don't want it to be bending easily)
- 5 1/2 inch piece of strut angle Aluminum 1 1/2" X 1 1/2" X 3/16"
- 4 inch long X 1" aluminum square tube, 1/8 inch wall thickness
- 4 Stainless Steel Jam Nuts 3/8-24 (NF)thread
- 2 each 5/16 inch diameter X 3 1/2 inch carriage bolts c/w hex nuts or wing nuts

Tools Needed

- Drill Press with 11/32", 3/8", and 1/2" drill bits
- Tap & Die for 3/8-24 thread.
- Sander or file to de-burr the cut edges.
- Saw (I used a metal chop saw to cut pieces to length and a band saw to "V" out the 1" sq X 4"long piece of square tube, a hack saw would be fine for a one off project).
- Safety Goggles
- Metal mechanic's bench vice (bigger the better)
- Hammer

Procedure

Make sure the piece of angle Aluminum is exactly 5 1/2 inches long. On one of the two faces rill three each 11/32" holes, one each 1/2" from each end and one more 1 7/8" from either end. On the other face drill 2 more 11/32" holes spaced 3" apart (1 1/2" from each end).

One of the two outside holes is closer to the inside hole and it needs to be drilled out to 1/2" diameter/. Tap the other two holes with a 3/8-24 tap. Note: the reason for using the 3/8" X 24 thread per inch tap and die is because the finer thread does not cut as deeply into the aluminum rods as a 16 thread per inch die would and so does not weaken the metal as much. The cross section of the rod stays thicker and, therefore, stronger.

The clamps are made from 1" square tube with 1/8" wall thickness and is cut 4" in length. I chose to cut it with a metal cutting chop saw with a particle blade. When cutting out the "V" I used a wood cutting band saw. It's one with a skip took pattern and seems to work well so far but I make sure to wear goggles or face mask because I expect it will blow up in my face one day soon.

Jig

I used a piece of 1" steel square tube as a jig in laying out the holes in the aluminum angle and square tube because I have had to make several of these antennas for friends and students. I use it to help line up the aluminum parts for drilling. Once the first hole is drilled I drop a bolt through the hole and into a backing piece of 2 X 4. Then I drill the rest of the holes through the holes in the jig. Before I made up this simple jig it was tricky getting the drill bit to go exactly where I wanted it to go.

Once the square tube is drilled and the notch has been cut I re-drill the holes to 3/8" diameter so that there is lots of clearance for the 5/16" diameter carriage bolts.

See the sketch for details about cutting lengths and layout.

Testing

Mount the antenna on a pole about 6 feet long and fasten to a step ladder or some support with some rope or electrical tape. SWR should be < 1.2-1 at 146 MHz and <1.4-1 at 144 & 148 MHz. SWR should be < 1.2-1 from 440 - 450 MHz.

I used a dual band hand held radio as a signal source and a Kenwood VHF/UHF power and SWR meter as a tuning indicator. Make sure that the antenna is located away from any metal surfaces beside it which would interfere with its tuning.

Note that the exposed rod lengths above the mounting base are quite critical, especially the length of the short rod. You will likely find that you need to adjust it up or down on 440 MHz to get the best possible VSWR. Then check on 430 and 450 MHz. If the adjustments are correct they should be about equal, somewhere around 1:1.3 or less if things work out well.

Alternative Method

If all this sounds like too much work, this antenna can be bought for a very reasonable price from Allen at **Arrow Antenna** or you can order one from Radio World in Toronto for approximately \$40. Quite a reasonable price.

73 Allen Lowe NØIMW Arrow146@aol.com

Arrow Antenna

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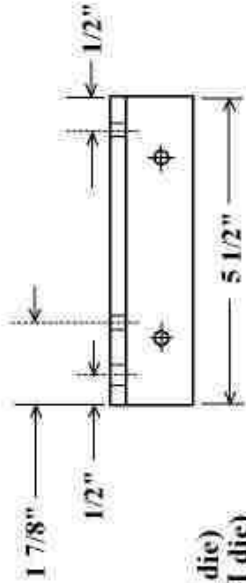
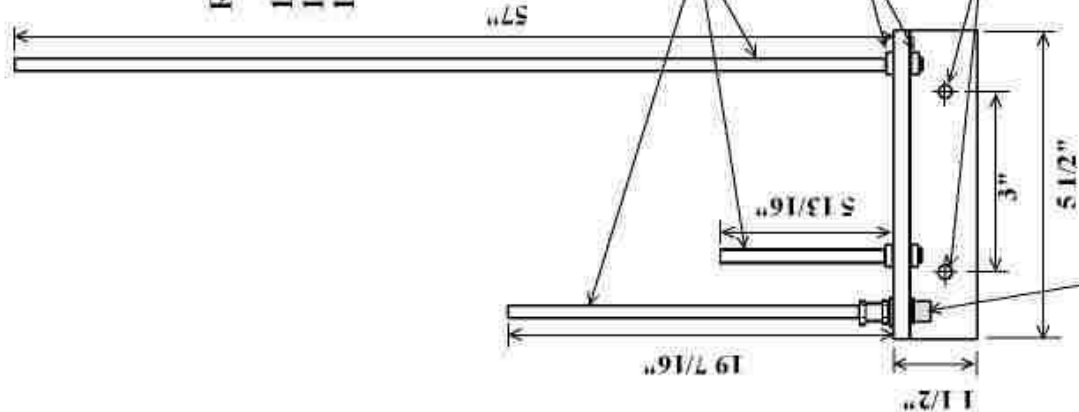
Voice (307) 638-2369

Fax (307) 638-3521

Aluminum J-Pole Antenna
Similar to the Arrow J 146/440
<http://www.arrowantennas.com/j-pole.html>

Rod cutting lengths overall:

- 1 ea. - 6 3/8" (thread 7/8" on end of rod - 3/8" X 24 TPI die)
- 1 ea. - 18 3/4" (thread 1/2" on end of rod - 3/8" X 24 TPI die)
- 1 ea. - 57 5/8" (thread 7/8" on end of rod - 3/8" X 24 TPI die)



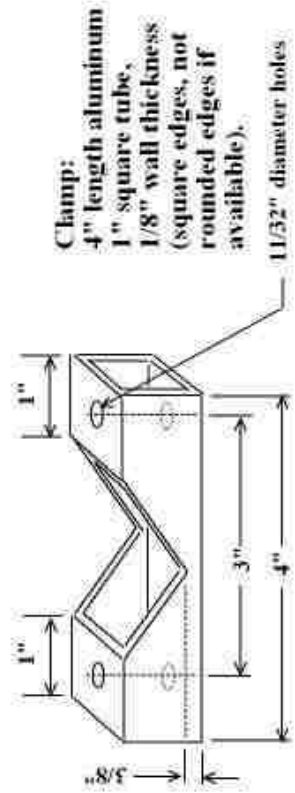
11/32 holes tapped with 3/8" X 24 thread

1/2" D hole



3/8" D hard drawn aluminum rod
 SS jam nuts 3/8" X 24 threads per inch
 11/32" D

Note: 5/16" X 3 1/2" carriage bolts to be inserted into these holes from the inside. Rest the aluminum angle on top of a metal bench vice with the threaded bolt shanks down between the vice jaws. Adjust the vice so that the jaws just touch but don't bite into the threads. Hammer the carriage bolt heads down into the aluminum until the flat side of the heads are flattened against the aluminum angle. See the pictures. The part of the bolt you are hammering in is the square section of the carriage bolt. Once that is driven in it will prevent the bolt from turning when you are tightening nuts onto the bolts.



Clamp:
 4" length aluminum
 1" square tube,
 1/8" wall thickness
 (square edges, not rounded edges if available).
 11/32" diameter holes

SO-239 / UHF antenna mount with 3/8" X 24 TPI for a whip antenna. Mounts in 1/2" D hole.

SO-239 / UHF style of connector.



If you look carefully you will note that this clamping arrangement is a bit larger than on the original Arrow. This gives a bigger range of vertical posts or pipe that this antenna can be attached to. It easily attaches to most vent stacks on roofs and due to the small footprint it's not very noticeable. A paint job of black or white to match surroundings can make it almost disappear. It even can hide in an attic providing it's not covered over by a metal clad roof.

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