6m J-pole build

SPARC (South Pasadena Amateur Radio Club)
Club build, March 4, 2026
Prepared by Tom Bruegge, KE6SRO

Overview

SPARC holds a twice monthly 2m Simplex net. Many of us also have 6m capability which we wish to explore. To this end we will use two club meetings to build 6m antennas, then test them following a future 2m Simplex net.

In this build we will aim for low SWR in the 50.3 to 50.6 MHz region of the band. This region is designated as "All modes" in the 6-meter band plan. If you'd like to target a different area of the band, you will need to make adjustments. This is accomplished during the tuning process by lengthening or shortening the radiating element. (It will be cut on the long side, and we will trim – so "lengthening" really means not trimming as much.) The J-Pole design does not have a broad resonant region, so targeting your desired operating region will be necessary.

There is a nice online calculator for J-Poles made strictly from ladder line at https://m0ukd.com/calculators/slim-jim-and-j-pole-calculator/ The build that we will be doing uses ladder line only for the matching section, so the calculator is somewhat off. The ladder line has a velocity factor of 0.91, while the 14-gauge silicone wire that we use for the radiating section has a velocity factor of 0.97. This means that our radiating section should be about 1.066 (0.97/0.91) times longer than the ladder line design.

A nice YouTube video on a similar build can be found here:

6 Meter Ladder line J-Pole build (YouTube video)

Tools

The information below includes information for building from scratch. For our meeting the PVC and radiating lines will be precut and put into a kit. Bring these items if you have them available:

Wire cutter, Wire stripper, Razor-knife
Solder and Solder iron

I have also used (but you don't need to bring)"
PVC pipe cutter, Drill with 7/32" bit
Heat shrink gun, 0.25" heat shrink tubing, painter's tape, electrical tape
Multi-meter
Crimp tool
Helping-hands assembly bench

Antenna materials

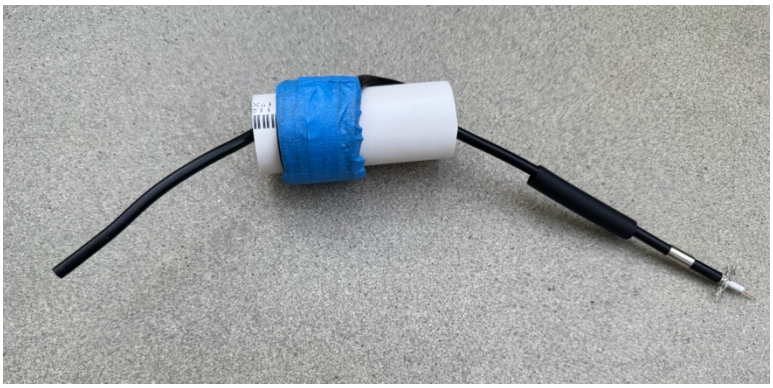
1” PVC: cut length 3.25”
RG58 coax: cut length 44”
Ladder-line: cut length 53.25”
14 AWG silicon-coated wire: cut length 130”
SO-239 coax connector

Choke

Drill two holes in the PVC using a 7/32” drill bit. The holes are ~0.25” from the top and bottom of the PVC

Wrap 5 turns of the RG58 around the PVC with ~3.5” sticking out the top and 6” sticking out the bottom

Wrap the coils with blue masking tape. Overwrap with electrical tape.



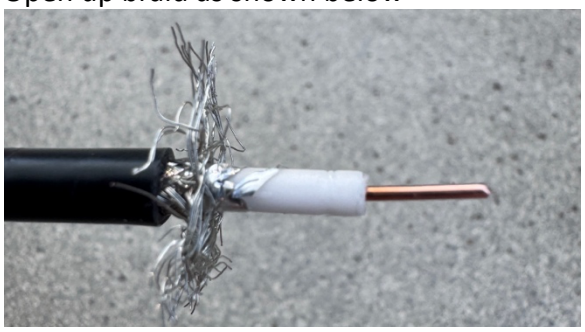
Bottom coax – right side (to be connected to SO-239)

On bottom coax insert shrink wrap, crimp connector sleeve

Strip ~7/16” off of the tip of the bottom coax. Remove black jacket, braid, and white insulator so only the center conductor is exposed

Now, below the first cut, cut 3/8” through outer jacket, being very careful not to cut through the braid

Open up braid as shown below

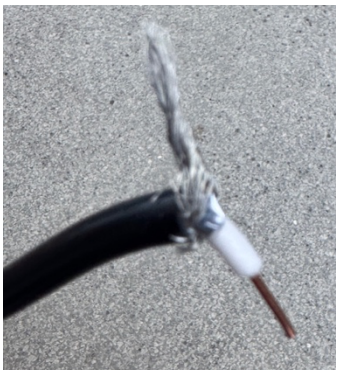


With a soldering iron, heat solder tip to prime. Then heat the center conductor and apply solder. Insert small brass-colored pin (that comes with the SO-239 connector) onto the center conductor. Push the coax with the pin on the end into the back side of the SO-239. It should

snap in and be nice and tight. Verify conductivity along the center conductor to the pin. Do this by taking a resistance measurement and confirm zero resistance.

Now, fold the braid back over the SO-239 and crimp it using a crimp opening of 0.213". Cover with shrink wrap sleeve and heat.

Top end of RG58 (to be connected to the ladder line)



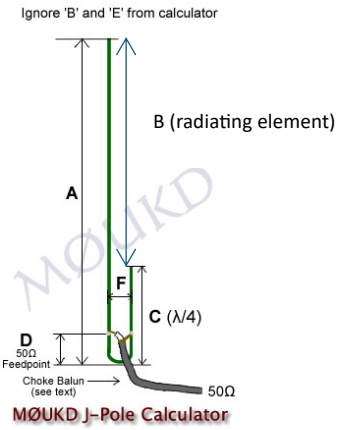
Now work the top end of the RG58.

Strip ½" of black jacket away from the wire. Pull back the braid and twist together. Then strip away the second layer of (silver) shielding using a razor-knife blade. Now strip away the (white) inner jacket, leaving about half of the white inner jacket left.

Ladder-line

SLIM JIM AND J POLE CALCULATOR

Slim Jim / J Pole antenna calculator.	
Frequency	50.45 MHz
Velocity Factor (see text*)	0.91 vf
Calculate my Slim Jim / J Pole!	
Actual wavelength	5.95 metres
Wavelength considering velocity factor	5.41 metres
A. Overall length (λ*0.75)*vf (plus gap for Slim Jim)	405.8 cm (J Pole)
	411.8 cm (Slim Jim)
B. Half wave radiator section (λ/2)*vf	270.6 cm
C. Quarter wave matching section (λ/4)*vf	135.3 cm
D. 50Ω feed point. Adjust for 1:1 SWR. (λ/40)*vf	13.5 cm
E. Gap (λ/100)	5.9 cm
F. Spacing - not critical	12.9 cm
Clear Form	



Dimensions

B. A-C=117". This is the half-wave radiating portion of the antenna

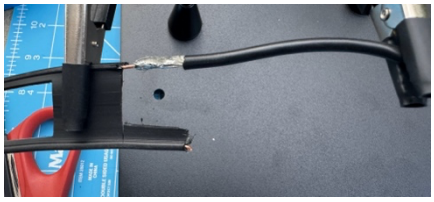
C. 135.3 cm = 53.25". This is the ladder-line length.

D. 13.5 cm = 5.3" will be feed line attachment point

Bottom of ladder line

Trim away 0.25" + of insulation on both legs, bend together and solder

Top of ladder line



Take out the 130” of 14 AWG silicon-coated wire

On top of ladder-line. Strip away ~0.5” of insulation on one ladder-line wire and the 14 AWG wire. Slide ¼” shrink wrap onto wire, then solder ends together.

Heat the shrink wrap to secure

Attach Choke

Strip both sides of the ladder-line top at about 5” from the end. Open up the choke to make contact – the braid on one side of the ladder-line and the center pin to the other side of the ladder line. The center conductor should make contact with the side of the ladder line that has the radiating section soldered to it. Secure using painter’s tape. This is a temporary connection, as the location of the feed point (the point at which the coax attaches to the ladder line) will be adjusted during the first part of the tuning process.

Tuning

Hang the antenna and check SWR. There are two phases to the tuning process. During the first part, we are just concerned with minimizing the SWR by adjusting the position of the feed point. Once we have a feed point location that yields a good, low SWR (1.2 or lower), we solder the connections to secure it. We can then adjust the length of the radiating element to move the frequency at which our minimum SWR occurs. We would like ~1.1 at around 50.4 MHz. So, the 2 tuning phases are: 1) change the SWR by adjusting the position of the feed point and 2) change resonant frequency by shortening the 14 AWG wire.