

Building Your J-Pole Correctly

The Copper J-Pole Antenna has long been a favorite home brew antenna for Hams new and old. It is inexpensive, mechanically rugged, and when built properly, performs very well. The antenna is simple with a $\frac{1}{2}$ wave radiating section and matched to a $\frac{1}{4}$ wave shorted stub, which creates the “J” in the J-Pole. It is fed direct with 50 Ohm Coax and requires no special matching, as the matching section is part of the design. It is also a popular construction project for people who do portable and emergency communications.

One thing that has been discovered is many of the published J-Pole construction articles in print, and on the Internet, show the connections for the coax center conductor and shield backwards! Many of the articles depict the coax center conductor connecting to the shorter 19” leg of the “J” and the coax shield going to the longer leg of the J. This is backwards. There are even people selling J-Poles on the Internet that are fabricated incorrectly!

Even if the antenna is constructed this way, it will show a nice low SWR, but the antenna will radiate far less energy than it is capable of. The long leg of the J-Pole needs to be connected to the coax center conductor to get optimum current flow allowing the antenna to radiate efficiently, and receive as much signal as possible. This is a perfect example of how low SWR can trick you into thinking the antenna is performing well.

When the short 19” element of the J is fed with the coax center conductor, the entire length of that element is paralleled by the grounded half of the J which carries equal and opposite RF current, thus canceling out the radiated energy in the 19” element. When the center conductor is connected to the longer element, the RF waves will still cancel along the J portion of the antenna, but in this case will mostly continue past the J into the $\frac{1}{2}$ wave radiating section and RF energy radiates into free space.

The J portion of the antenna is a shorted matching stub. At the bottom the impedance is very low, near zero. At the top of the 19” shorted stub the impedance is high, more than 1,000 Ohms. At the point the coax connects is where the impedance happens to be 50 Ohms which will properly match your 50 Ohm coax impedance for maximum energy transfer to the antenna.

So, on a J-Pole antenna, always remember the coax center conductor connects to the long element of the antenna, no matter what the article tells you. If you have one that was built backwards, try swapping the coax conductors and you’ll be pleasantly surprised at how much better the antenna performs!



This J-Pole design is backwards. Notice the Shield is connected to the long element, and the center conductor goes to the shorter element.