

# VHF - Slim Jim Antenna for 2 Meter Band

By D. Prabakaran

**H**ere is a 2 meter (144-146 MHz) antenna that is inexpensive and easy to build for amateur radio operators compared to other types like the ground plane vertical antenna, Yagi antenna, etc. In India, the frequency band allotted in VHF for amateur radio operation is 144-146 MHz; in the U.S. it's 144-148 MHz.

Generally, antennas work well only when placed over a good ground system. The success or failure of an antenna system often depends on whether or not it has a good RF ground. Poor grounds cause antennas to operate at less than best efficiency. In fact, it is possible to lose between 50 and 90 percent of the RF power by heating the space under the radiation lobe, instead of transmitting into the air.

This is a vertically polarized omnidirectional free space antenna which offers approximately 1.8 dB of gain. It has a radiation efficiency 50% better than a ground-plane antenna due to its low radiation angle, it is unobtrusive, and has no ground-plane radials – therefore low wind resistance and easy to erect.

This antenna is a back feed folded vertical dipole antenna for the 2 m band. The name Slim Jim comes from the slender construction. The Slim Jim vertical angle of radiation is almost parallel to ground so maximum radiation is where it is needed: straight out and all round. With all ground planes, including those with radials an entire wavelength long, the vertical angle radiation is tilted upwards at an angle of 30 degrees or more. This gives the Slim Jim a gain over a 5/8th wave of 6dB when measured parallel to the ground!

The feed is on the base, which causes no problem with the connection between the feeder and the antenna. The feeder impedance is 50 ohm. Slim Jim can be made of aluminum tubing with a diameter of 10mm or 12mm, or a 300 ohm cable. The distance between the two parallel elements is not critical and neither is the length if it is made of 10mm tubes.

The isolation between the two divided halves (halfwave and quarter wave), should be made of pertinax or teflon or a similar isolation material, which fits between the two parts. The use of a 'J' type matching stub (J integrated matching = JIM) facilitates feeding the antenna at the base, thus overcoming problems of interaction between feeder and antenna. The feed impedance is 50 ohms.

Basically, it is an end-fed folded dipole

operated vertically. The matching stub provides a low impedance feed point (50 ohms) at the base and couples to the antenna section at high impedance at one end. As with all folded dipoles, the currents in each leg are in phase, whereas in the matching stub they are in phase opposition, so little or no radiation occurs from this. Correctly matched, the VSWR (Voltage Standing Wave Ratio) will be much less than 1.5:1, and remains so across the band.

A slip sleeve made from copper can be added to the element above the gap for tuning purposes, although the average length of the gap and spacing between the elements is 3" at 72 MHz and 1" at 220 MHz. No part of the antenna should be grounded to the tower or mast. The recommended mount is the use of PVC pipe and PVC pipe "T's." Make sure the space between the tower or mast and the antenna is one "freespace" 1/4 wavelength.

Stand upright (on a railing, etc. but clear of metal water tanks, drainpipes, etc.) and fit the coaxial cable to the antenna with some alligator clips. Attach about 2 inches up from the bottom and check the VSWR. Adjust the clips up or down to get the best match (mine managed 1.2:1), mark where they are to go, remove the clips, and solder the coax directly. Use the copper sleeve, if added, for any necessary tuning.

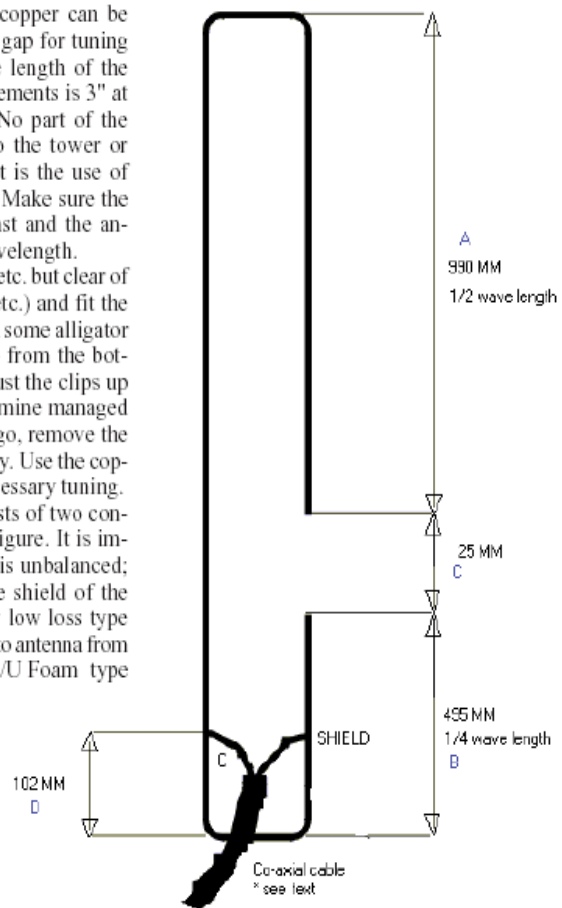
Feed line coax cable consists of two concentric wires, as shown in the figure. It is important to note that coax cable is unbalanced; no current flows on the outside shield of the cable. Always use good quality low loss type coaxial cables to feed RF energy to antenna from transmitter. RG-8/U and RG-11/U Foam type cables are good choices and preferable.

Bad connections cause loss. If you are going to solder connectors on the ends of your coax, be sure to do it right. You must have the right tools. Most CBers and Ham radio operators think they can solder connectors on to coax with their 25 Watt pencil tip soldering iron. You can't. You should use a high wattage iron, preferably over 100 watts. You must heat the connector up quick, so you don't damage the coax and connector, and the only way to do this is with a high wattage soldering iron.

For antennas mounted outside, don't forget lightning-induced damage protection. The

minimum is to never use them in weather likely to produce lightning, and disconnect and ground them when they are not in use.

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