

Sleeveless Sleeve Dipole Antenna – VA3TPV



Every now and again during research for background material for RSARS e-Library articles, a new source of really well written articles is discovered. The Mississauga Amateur Radio Club Ontario Canada produces a well written newsletter with interesting material from its club members, Ed Spingola's (VA3TPV) three articles describing Multi-band HF Antennas appear in the February, March, April 2010 editions of "The Communicator".

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"It is the exchange of ideas and information that makes Ham Radio what it is"
Ed Spingola

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The Communicator

Newsletter of the Mississauga Amateur Radio Club

A Sleeveless Sleeve Dipole Antenna

By Ed Spingola, VA3TPV

As many of you have probably realized by now, antennas are one of my favourite topics to write about. Each month, when the publications that I subscribe to arrive in the post, I eagerly scan the issues for new or novel antenna ideas which I may be able to use in my own designs. Once such antenna design, the sleeve dipole, was recently published. Although the sleeve dipole is not a new design, the implementation by Robert Zimmerman¹, VE3RKZ, which I describe below is certainly new in the ham radio literature. But first I will give some background antenna information.

A common type of radio antenna is the dipole. The dipole antenna can be made of simple wire and fed at the centre by splitting the wire in half and placing an insulator at this point. The wire is then fed at this centre point with either a balanced line i.e. ladder or open wire or through a balun to coaxial cable. The typical wire dipole is $\frac{1}{2}$ wavelength long and in this instance is hung horizontally to receive and transmit horizontally polarized radio waves.

Although the horizontal configuration is quite useful if you should have the necessary vertical supports i.e. tress, poles, etc. wouldn't it be great to hang this dipole vertically requiring only one support? The only problem being that for proper operation the feed line must come away perpendicular to the dipole i.e. at 90 degrees.

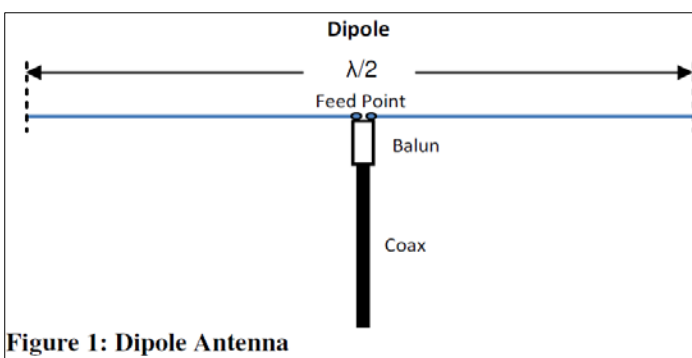


Figure 1: Dipole Antenna

The solution to the vertical mounting dilemma is a type of antenna called the sleeve dipole as shown in Figure 2. The sleeve dipole is fed from one end of the antenna and therefore may be conveniently mounted either horizontally or vertically.

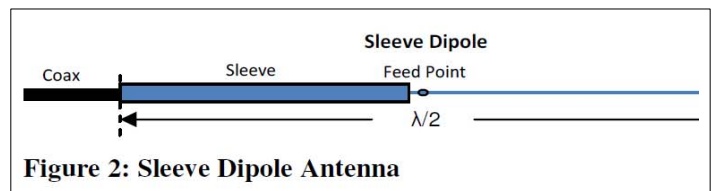


Figure 2: Sleeve Dipole Antenna

As the name implies, part of the antenna is made up of a metallic sleeve, as shown in figure 2. The sleeve forms one half of a $\frac{1}{2}$ wavelength dipole and extends over the coax but is insulated from the coax except at the feed point where the braid of the coax is connected to the sleeve.

The sleeve antenna has found use at both HF and VHF frequencies and there are many construction articles on such antennas in the various ARRL and other publications as well as on the internet. Just search for sleeve dipole. I will leave it up to the reader to determine the $\lambda/2$ length for their particular frequency of interest and also the method of constructing the sleeve. But as always the standard formulas for a $\lambda/2$ dipole length are $l = 143/f$ (meters) and $l = 468/f$ (feet) where f is the frequency in MHz serve as a starting point. I note that these formulas do not take into account the thickness of the antenna elements. Therefore some trimming and tuning will be required. Just remember to trim each side of the dipole equally.

A variation of the sleeve dipole i.e. without the sleeve has been proposed by Robert Zimmerman¹, VE3RKZ, in the July/August, 2010, QEX magazine. Zimmerman described a 20M antenna which used a feed line choke along the coax as shown in figure 3.

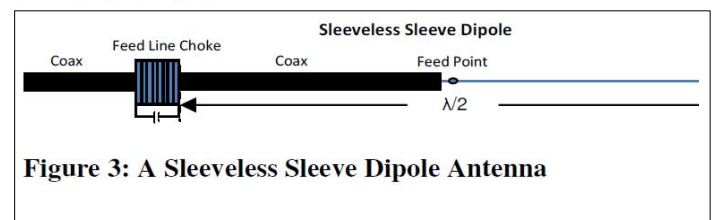


Figure 3: A Sleeveless Sleeve Dipole Antenna

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coax at the desired operating frequency. Possibly multiple BA-8 or BA-58 kits would be required to provide sufficient choking action. Other mixes of ferrite core with a suitable frequency range could also be used.

Construction

As with most antennas, the theory is well known, and the challenge is in the mechanical construction of the antenna. These details will depend upon your particular circumstances of how you will be using the antenna. No construction details are therefore given in this article, other than the usual formulae for a $\frac{1}{2}$ wavelength as given above. A good rule of thumb is to measure lengths slightly longer than calculated and then trim to the frequency desired using an antenna analyzer.

To implement Zimmerman's method you will need to correct the length of the coax from the feed point to the choke point by the velocity factor of the specific coax that you are using. If you build the sleeve dipole with a sleeve of aluminium tubing, then no correction factor for the length of the sleeve will be required. Remember to use a high voltage capacitor. For the 20 meter band, resonating at 14.200 MHz, Zimmerman has used a 24 pF capacitor and a 7 μ H inductor as his starting point. You can use the ARRL Single-Layer Coil Winding Calculator or other convenient handbook formula to determine the number of turns required. A variable capacitor could be used to tune the antenna to resonance with your constructed coaxial coil. Then measure the capacitor value and substitute a high voltage fixed capacitor. Or alternatively choose a fixed capacitor value and adjust the coils number of turns and turn spacing to achieve the desired resonant frequency. To use this antenna design at other frequencies, scale the inductor and capacitor values by the factor $14.200/(\text{desired frequency in MHz})$.

Applications

One possible application of a sleeve dipole antenna is for apartment dwellers who do not have access to two supporting structures from which a centre fed dipole can be strung. An HF sleeve dipole can simply be extended vertically downward from a balcony or open window providing, of course, that the balcony is of sufficient height.

Another application would be as a stealth antenna mounted inside a fiberglass flag pole.

A third application might be as a field day antenna with the sleeve dipole mounted vertically from a tall tree or a light weight fiberglass supporting mast. Being vertically mounted, the angle of maximum radiation of the antenna would be low on the horizon providing the possibility of long range contacts. Maybe this antenna could be a secondary field day antenna.

Give it a try. You might be surprised at the results. I would be interested in hearing from anyone who has tried this sleeve dipole antenna.

References:

- 1) Robert Zimmerman, VE3RKZ, "A 20 Meter Sleeve Dipole without the Sleeve", ARRL QEX, July/August 2010, pages 35 – 38.
- 2) Robert Zimmerman, VE3RKZ, "An easily Erected 20 Meter Antenna for Emergency Use", QEX, September/October 2009, pages 17 -20.
- 3) Palomar Engineers, <http://www.palomar-engineers.com/>