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The Broadband Sloping-V Antenna

Have you been wishing for an effective gain type of wire antenna that is broadly directional? If so, perhaps cost is a factor that has kept you from constructing or purchasing an antenna that fits this general description. The sloping-V antenna may be just the low-cost system you need for effective short-wave listening in the high frequency part of the spectrum. Let's learn what's involved in the mechanics of this simple antenna.

The sloping V has received little attention among radio amateurs in the past few decades, even though it offers good performance and simplicity of erection. Perhaps the lack of interest can be associated with the requirement for two terminating resistors that must be capable of dissipating one half the transmitter power. Large noninductive 300-ohm resistors (a necessity) are not only hard to find, but they are very expensive. However, if this antenna is used only for reception we can use ordinary 1/2- or 1-watt carbon or carbon-film resistors for terminating the two wires seen in Figure 1.

Almost any type of wire you elect to use is satisfactory for this antenna. It need only be of sufficient strength to support itself without breaking during icing or periods of strong wind.

A Practical Sloping V

You need a mast or tower that is 40-60 feet high for the dimensions given in Figure 1. A tall tree may be used in lieu of a metal support. Terminating resistors are used to make the antenna directional off the slope of the wires. These resistors must be attached to an earth ground so that signal energy can flow through them. Although 6-foot ground stakes are specified, they will not, by themselves, provide an adequate ground in terms of high antenna performance.

The efficiency of the V is enhanced by running a wire from each ground stake to the support structure. These two wires may be buried a few inches in the soil, or you may simply let them lie on the surface. Two more wires of the same length may be extended from the ground posts outward from the antenna to further improve performance, but they are not essential.

R1 and R2 are 300-ohm carbon resistors, as discussed earlier. They should be protected from the the sun and rain by enclosing them in 1-1/2 inch pieces of 1/2-inch OD PVC pipe or an equivalent insulating cover. PVC pipe caps are cemented in place on the tubing after they have been equipped with terminals to which the antenna and ground wires can be attached. I use no. 8-32 screws and nuts for this purpose. See Figure 2 for details.

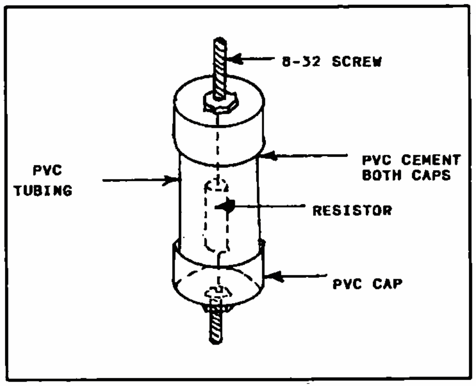

Figure 2: Construction method for protective covers that house the antenna terminating resistors of Figure 1. See text for further information.

Antenna Characteristics

In the favored direction (see arrow in Figure 1) you can expect several dB of antenna gain, especially at the upper end of the design frequency (30 MHz). The effective gain declines somewhat as we approach the lower frequency range of the system.

The antenna has a relatively broad lobe that favors the chosen part of the world to be monitored. If you are interested in listening to European DX you should slope the two wires NE if you live in the USA. The wires need to slope in a southerly direction for monitoring signals in Central and South America, and so on. But, just because the antenna is erected to favor a given direction it does not restrict reception of signals from other parts of the globe. The tradeoff is that incoming signals will be somewhat weaker off the sides and back of the system.

The characteristic impedance of the sloping V is roughly 600 ohms, owing to the value of R1 and R2. This suggests that R1 and R2 could be

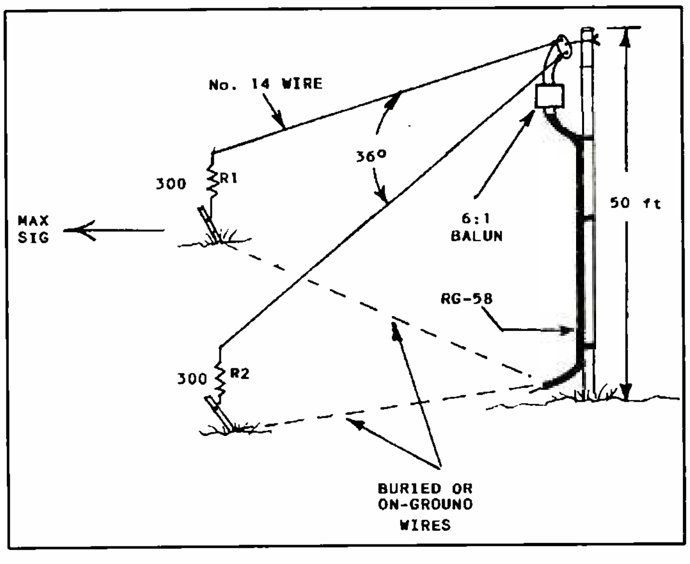

Figure 1: Details of the broadband sloping V antenna for DX reception. The apex angle is 36 degrees for the wire length given here. The optimum apex angle for longer wires can be calculated from data provided for V-beam antennas (see *The ARRL Antenna Book*, chapter 13).

changed to 100 ohms each to obtain a 200-ohm feed impedance. This would permit the use of a small 4:1 balun transformer at the feed point so that 50-ohm coax could be used for the feed line. If you maintain the 300-ohm resistors (600-ohm feed impedance) you will need to use a balanced antenna tuner at your receiver to accommodate the balanced feed line. You may use 450-ohm ladder line or 300-ohm TV ribbon line for the feeder if you retain the balanced feeders. Alternatively, the home-made broadband transformer in Figure 3 can be used at the feed point to allow 50-ohm coax to be used for the feeder.

Each of the antenna wires should be at least 1 wavelength long at the lowest receiving frequency for best results, although good reception is possible somewhat below that frequency with a loss of gain and directivity resulting. Thus, for reception from 7 to 30 MHz we would make each wire 135 feet long. They would be shortened to 94 feet each for use from 10 to 30 MHz [L(feet) = 936/f(MHz)]. The greater the number of wavelengths per wire the higher the antenna gain.

In a like manner, the greater the antenna height the better the performance. The rule of thumb for height is that the support should be 1/2 to 3/4 the length of the wires. The sloping V responds to both horizontal and vertical signal energy. This can be beneficial in minimizing signal fading (QSB).

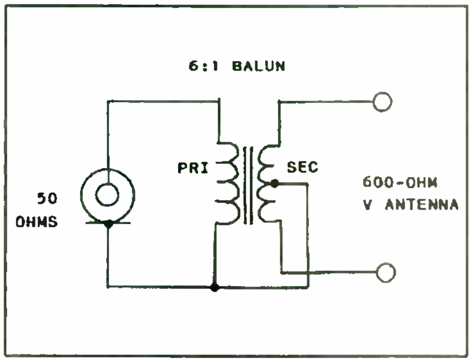

Figure 3: Data for building a 12:1 balun transformer. It is used at the antenna feed point to allow the use of 50-ohm coaxial feed line. See text for information about using a standard 4:1 balun.

The toroid core for this balun is available from Amidon Assoc., 2216 E. Gladwick St., Dominguez Hills, CA 90220. The core is an FT-82-43. The primary uses 6 turns of no. 26 enamel wire. The secondary winding has 36 turns (center tapped) of no. 26 enamel wire. Enclose the transformer in a weatherproof plastic enclosure and install it at the antenna feed point.

Tag Ends

SWLs sometimes avoid the effort of erecting a quality receiving antenna. They try to make do with a short piece of wire that s only a few feet above ground or strung up in an attic. Others rely on the short whip antennas that come with some receivers. None of the foregoing antennas are effective for pulling in those weak, distant signals. An antenna of the type described in this article can open the door to reception you have never experienced, and only a few hours of work are needed to construct this DX-getter! I hope you will give it a try.