A Reduced-Size Half Sloper For 160 Meters

Here’s a limited-space antenna that will put you on the Top Band!

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Have you ever thought of trying 160 meters? Wintertime is the perfect time for exploring the "Top Band." The atmosphere is relatively quiet, so you can mine 160 meters for all it’s worth—lots of stateside contacts and plenty of DX!

If you live on a small lot, you’re probably muttering, "This guy must be kidding!" Yes, most 160-meter antennas are *big*. A full-sized half-wavelength dipole is about 260 feet long! But with a little creative design work, it’s possible to build limited-space antennas that will get you on the band without sacrificing too much real estate. They aren’t as efficient as the full-sized variety, but they *will* get you on the air. Isn’t that what counts?

My Approach

Maybe you’ve seen designs for half-sloper antennas. As the name suggests, these antennas literally slope down to the ground from a tree or tower. Many 160-meter half-sloper designs require supports that are at least 50 feet tall. The problem is that my tower is only 40 feet tall. And what about hams (like you, perhaps) who don’t own towers at all? It was time for a different solution.

The typical half-sloper design uses the tower as one half of the antenna by connecting one side of the feed line (normally the shield of the coax) directly to the tower. The center conductor of the coax connects to a $^1/_4$-wavelength wire that slopes back down toward the ground. My idea was to design a half-size ($^1/_8$ wavelength) sloper using inductive loading. I decided to place the coil directly at the top of the wire (see Figure 1). Placing the coil at this location requires the least amount of inductance, but it’s a trade-off with efficiency.

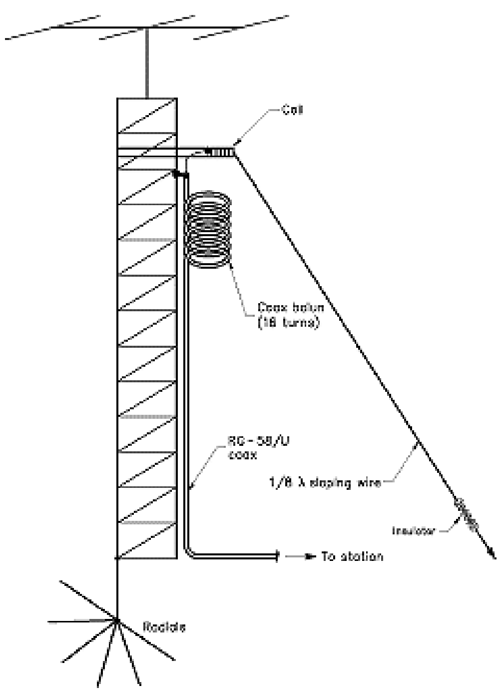

Figure 1—Even a 40-foot tower makes a convenient support for a 160-meter half-sloper antenna.

Those hams not blessed with a 40-foot tower can substitute a convenient tree or other support (see **Figure 2**). Just use a wire running vertically to ground as your substitute "tower." More about this in a moment.

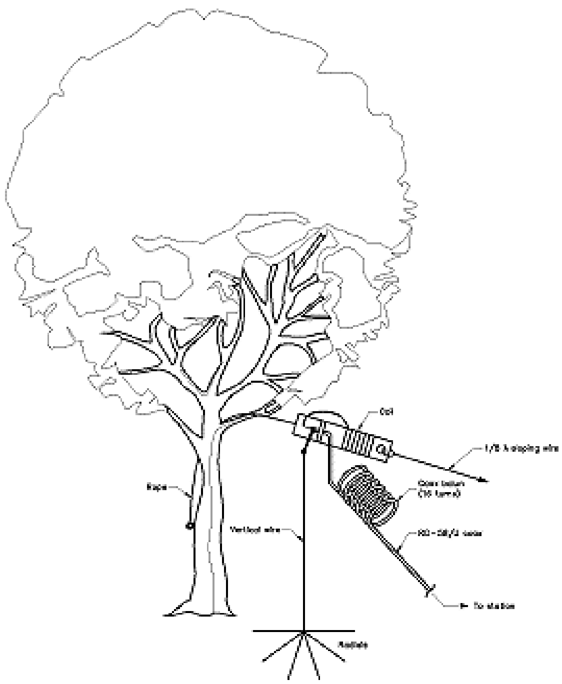

Figure 2—If you don't own a tower, use a tree! The vertical wire (and radials) act as your substitute tower. Just make sure you secure the coax to the PVC pipe for good mechanical strength.

Construction

A 26-inch length of $^{3}/_{4}$-inch PVC pipe (outside diameter of 1.05 inches) is used as the coil form. I chose a 26-inch long pipe because I wanted to wind the coil on one end and attach the opposite end to my tower. You can certainly use shorter pipes according to your particular requirements. Bear in mind that this coil is designed for use with 100-W transceivers.

Wind 90 turns of 16-gauge enamel-coated wire at one end of the pipe. Keep it tightly spaced to produce a $4^{1}/_{2}$-inch long coil (see **Figure 3**). Wrap the coil with two layers of electrical tape (**Figure 4**). Solder the center conductor of your coax to one end of the coil as shown. Apply silicone caulk to the exposed ends of the coax. Solder a 68.3-foot piece of wire to the opposite end (this is the sloping portion of the antenna).

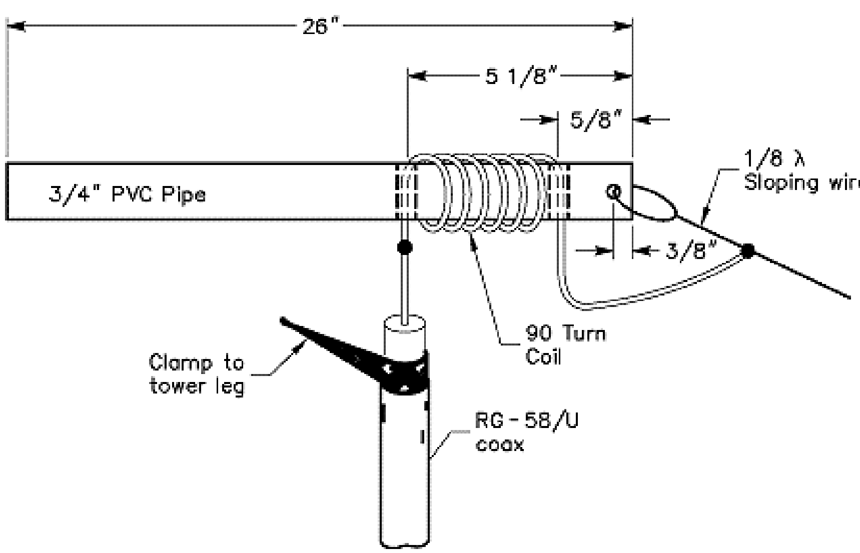

Figure 3—Construction details for the PVC mounting pipe and coil. For a tree installation, secure the coax to the PVC pipe behind the coil.

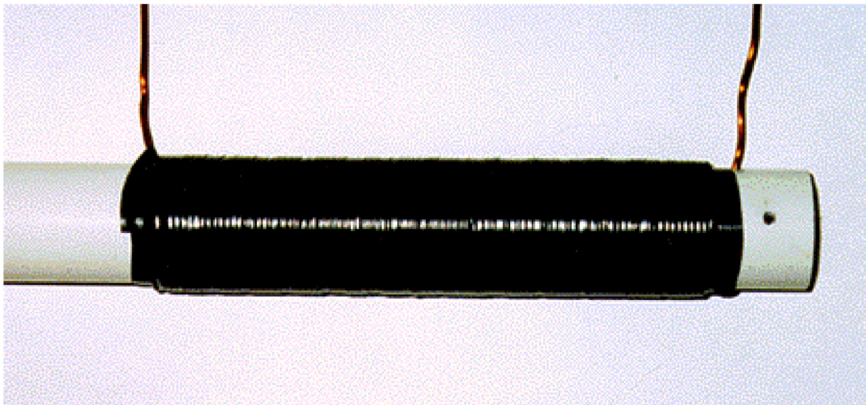

Figure 4—Wrap the coil in electrical tape.

Install the coil on your tower and clamp the coax shield to the tower leg using a stainless-steel hose clamp (**Figure 5**). Make an RF choke (balun) by coiling 16 turns of your coax into an 8-inch diameter coil. You can use electrical tape or tie wraps to hold it together. Tape the choke to the tower leg 2 feet below the feed point. Slope the $^{1}/_{8}$-wavelength wire back to terra firma and terminate it with an egg insulator about 7 feet above the ground to avoid contact with people and pets.

Figure 5—For a tower installation, attach the PVC mounting pipe horizontally and snake the coax down the leg of the tower.

If you're taking the "tree tower" approach, install the coil as high as possible (preferably 40 feet or higher). With some clever rope-and-slingshot manipulation you can haul the coil into the desired position without actually climbing into the tree. Before you take the coil skyward, use some electrical tape to secure the coax to the PVC pipe behind the coil. If you allow the coax to simply dangle from the center-conductor solder connection, it will break in short order! Make the same RF choke as described in the tower installation and attach it to a nearby branch, or just let it dangle. Finally, solder the coax shield to a 40 or 50-foot length of wire. When you have the coil assembly at the proper height, bring this wire down to the ground as vertically as possible. Make sure it doesn't come in contact with the tree trunk or branches.

I manage to get away with using an 8-foot ground instead of the radials shown in Figures **1** and **2**. But if you want maximum efficiency from the antenna, you'll need to install some radials. The radial wires attach to the base of the tower or, in the case of a tree installation, to the bottom of your vertical wire. Don't worry about the lengths of these radials. Just run as many as you can for as long as you can. You can bury the radial wires, or simply lay them on top of the soil.

Results

My antenna loaded great and worked superbly right from the start without an antenna tuner. The SWR was plotted (**Figure 6**) and the 2:1 SWR bandwidth was 120 kHz. You'll note that my antenna is resonant at the bottom of the band (near 1.8 MHz). If you want it to resonant higher in the band, just trim the sloper wire. If you opt for tree mounting, you may have to tweak and trim the antenna a bit to compensate for any detuning caused by the tree itself. You can also modify this design for use on other bands (80 meters, for example) with the inductive reactance of the coil being 500 Ω for the desired band.

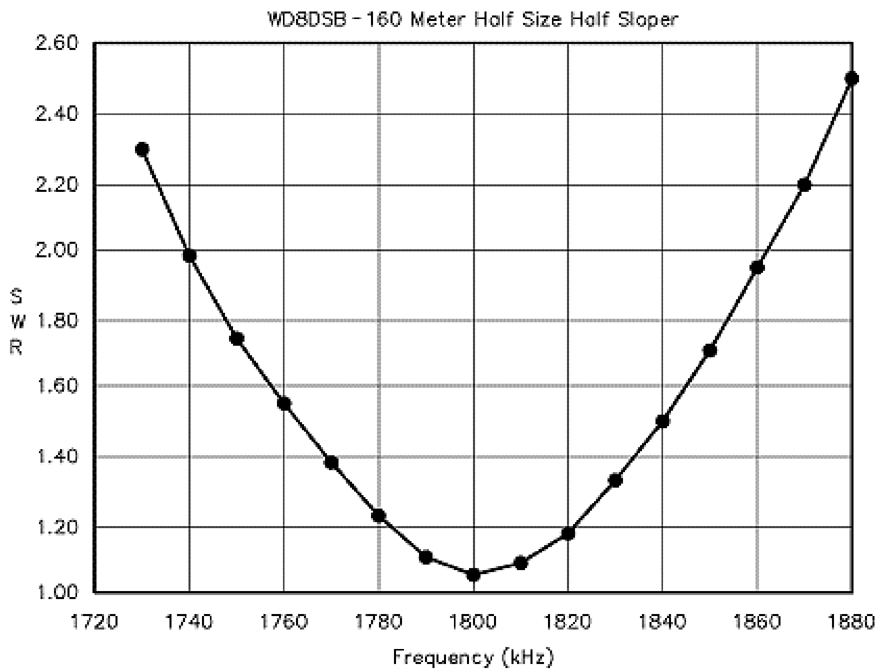

Figure 6—This is the SWR curve for my installation which uses an 8-foot ground rod and no radials. Notice that it is resonant at the bottom of the band. To make the antenna resonant higher up the band, just trim the length of the sloping wire.

If you're squeezed for space, give this antenna a try. The perfect opportunity is coming up February 27 during the CQ World Wide 160-Meter SSB contest. Of course, you can also modify the design for use on other bands (80 meters, for example). Have fun!

Learn more about 160-meter antennas and operating with these ARRL publications

DXing on the Edge—The Thrill of 160 Meters by Jeff Briggs, K1ZM

Antennas and Techniques for Low Band DXing by John Devoldere, ON4UN,

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