Newcomers And Elmers Net: Some Practical Wire Antennas
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Wire antennas represent one of the greatest values in the radio hobby world. For less than the cost of a good meal out on the town you can buy all of the necessary parts for a really good antenna, and have change left over for a fast-food meal to boot!

In addition to being efficient and inexpensive, wire antennas have the added bonus of being fun to build and to experiment with, since mistakes are hardly costly and the materials are easy to work with.

HF

- While it may seem hard to believe, HF signals only need thin lengths of wire properly matched to a radio to do their job.
- Common speaker wire that you would normally use with your home stereo is almost perfect for making a basic dipole.
- I actually like speaker wire for one very simple reason: it comes with both wires joined together through its insulating material; you only have to make one cut to get both wires to the proper length when making a center-fed dipole.
- Calculate the length needed for one arm of the dipole, measure and cut the speaker wire to that length, and now both arms of the dipole are exactly the same length!
- As you may remember from your license exam studies, RF current actually travels down the outside of the wire (called the “skin effect”), and in the HF frequency range almost any wire will do.
- I like to avoid really thin wire for permanent installations, but for portable installations thin wire is a great option just for the weight reduction it represents

Dipole

- A *dipole* antenna is made up of 2 poles or lengths of wire, often cut to equal lengths as described above.
- The antenna is considered *resonant* if the total length of the two arms equals ½ wavelength for a given frequency. (This means each arm is ¼ wavelength.)
- The outer ends of each wire are connected to insulators which are in turn tied off to some form of support, usually trees or masts.
- The inner ends of the wires are connected to a feedline in one of several ways, the most simple being ladder-line

- Coax may also be used, but this requires some form of matching since a dipole is considered a *balanced* line and coax is considered an *unbalanced* line
- These terms have to do with how the RF signal is affected by the feedline. Because the ½ wavelength dipole has two equal lengths, each side has an electrical balance, and this must be matched or transformed to travel along an unbalanced feedline.
- If using coax, one side gets connected to the inner coax conductor and the other side is connected to the outer shield of the coax
- If using ladder line connections are just as easy, and both methods require some form of support for strain relief at the feedpoint

What makes a Wire Dipole so Effective?

- The key to the effectiveness of a wire dipole antenna is that nothing is wasted, given proper construction.
- Electrically nothing is wasted and mechanically nothing is wasted, so the result is a maximum transference of energy where it is intended to go.

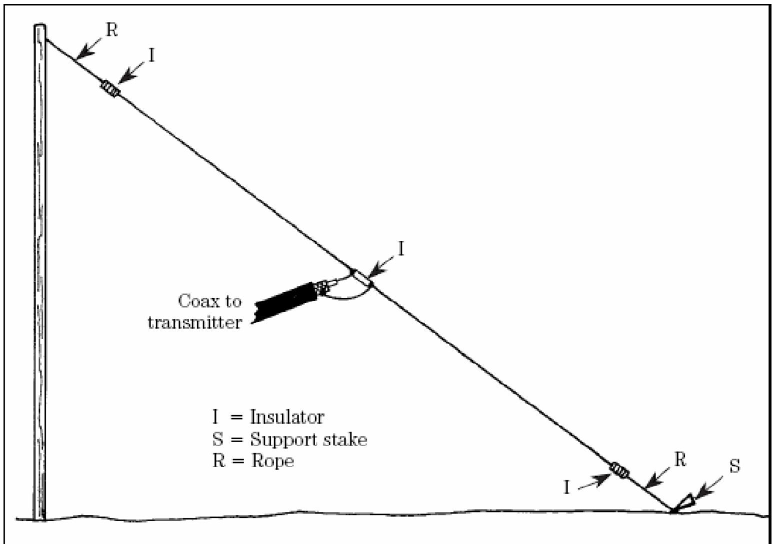
Making a Dipole: The Dipole Formula

The common formula for calculating the length of a dipole is:
468 / (f MHz) = dipole length in feet
(e.g. 468/14.275 MHz = 32.8 feet total length (approx. 16.5’ per side)

Cut each length a bit long, adding 6 inches or so to each side and then trim or fold back as needed. If you cut the wire too short you will have to add length or start over, so it is always better to leave a margin of error.

Half-Wave Sloper

Slopers (also known as *half-wave slopers*) are a variation of the dipole antenna, and they have both horizontal and vertical polarization characteristics. While a 45° angle is common, they can be anything between 0 and 90 degrees. When they are straight up and down (90°) they are sometimes referred to as a *Halfwave Vertical Dipole* (HVD).



"Slipole" or "sloper."

This configuration can be very useful when you have less than the ideal amount of horizontal space for a flat-top antenna, or when you want to use a single support, such as a tree or mast, for the antenna.

(If the antenna is going to be used where people are likely to be, make sure the lowest end of the antenna is high enough off the ground to avoid physical contact with the radiator.)
-- Assuming you are feeding the sloper in the center, you will want to make sure the feedline does not become part of the radiating element of the antenna since it is near the ground.
-- Two things can help with this: first, make sure you have the feedline at a perpendicular angle to the radiating elements, at least 30-40° or more; second, add a common mode choke at the feedpoint with either ferrite beads or a coaxial loop.
-- Some folks add a second choke about ¼ wavelength down the feedline as well, and this certainly can't hurt.

Like any antenna the half-wave sloper is a compromise antenna, with its vertical characteristics adding to the noise you are likely to hear.
-- However, its savings in size, use of one tall support, and ease of construction may outweigh its disadvantages, especially in the lower bands.
-- If you happen to live where noise is not as big of an issue as city-dwellers, this antenna can be a real benefit.

Slopers show a bit of directionality in the direction of the slope, with slight front-to-back signal ratios, and they offer decent low take-off angles for DX work.

-- While not the first choice for DX work, they can be good antennas for some situations.
-- Even if you already have another antenna you may want to try a sloper just for the experience.
-- A friend of mine has a 160 meter sloper coming off his tower running back into the woods and he uses it both for 160 work and for medium wave broadcast listening.
-- It's a great antenna for AM listening!

Half-Sloper
A popular variation of this antenna is the half-sloper, or ¼ wave sloper.
-- Like its big brother, a half-sloper will show some directionality, around 3 db difference, in the direction of the slope.
-- It will also have decent low take-off angles for distant work, and can really be useful for the lower bands.

The main advantage of the half-sloper is the reduced height required for the antenna. 160 meters requires quite a bit of height, as does 80 meters.
-- A half-sloper will reduce that amount considerably, but with some reduction in performance.
-- While you always want to put up the best antenna possible, sometimes real-world considerations, such as your neighbor's property line, can get in the way!
-- A half-sloper may be just the ticket to get you on the air on the bands you want even if the noise level is a bit higher than you might like.

The most common problem with a half-sloper is higher VSWR than other dipoles, but some of this can be controlled by careful antenna placement.
-- If you are running a sloper off an existing tower, you may have issues with other antennas on top of the tower introducing some coupling.
-- Another common problem is higher VSWR when using coax for the feedpoint.
-- This can be reduced by using ladder line where possible, or by using ladder line for a part of the feedline run and coax where it goes into the shack.
-- If you can, try to angle the antenna as close to 45° as possible if you are using a tower or other metal support to avoid interference.
-- While you may not be able to much about the type of ground conductivity you have under your sloper, be aware the VSWR can be

greatly affected by poor conductivity like any antenna, but a bit more so with a half-sloper.

The half-sloper is usually connected to a metal support, and this metal support becomes the 2nd half of the antenna.
-- The metal support must be grounded, or else you must ground the outer braid of the coax at the base of the support for it to act as a conductor.
-- For a half-sloper use the formula: length (L) = 260 / Frequency (MHz), and trim the wire as needed for a good VSWR match.
-- You may have to adjust the feedline attachment point to vary the VSWR if you can’t get it to 2:1 or below by adjusting the angle of the antenna/feedline.
-- Also a tuner may be used at the radio to adjust the impedance if the VSWR is not too high.

Both the ½ and ¼ wavelength sloper can work quite well on the “top” band (160), particularly because of the low take-off angles of the antenna design.
-- As mentioned previously, noise can be a problem, but much of that is determined by your noise surroundings.
-- What is noisy to one operator may be great to another (I am one of those guys who live near a noisy city!), so noise is a bit relative.
-- Of course, a high noise level may make it next to impossible to hear someone, but unless you are experiencing S7 or higher noise levels, a bit of work with headphones can be quite rewarding.
-- Keep in mind, sometimes noise levels on the lower bands are high regardless of the antenna due to atmospheric noise levels common to the low bands, such as storms and other electrical interference.

Loops

- Loop antennas are a great option if you have the room
- A loop is a full-wavelength antenna shaped like a square (quad loop), a rectangle, a triangle (delta), or a circle (hardest to support)
- My first homemade antenna was a vertical delta loop for 20 meters; approx. 23’ per side with the feedpoint up about 32 feet
- If you have the room you could string the antenna up horizontally between three or four trees or other supports and feed it anywhere that was convenient and you would have a good antenna with 3db gain

- Loops are forgiving in that they don’t have to be perfect squares or rectangles or triangles. Get it as close as you can and then don’t worry about it
- Formula for a loop is 1005/frequency in MHz = length as a starting point; leave a little extra length and fold back or trim as needed