Dr. Ace's 160 Meter full wave loop tips from personal experience

I have personally used a 160 meter band Horizontal Full Wave Loop antenna with very good success. I worked all 50 states and several countries with 100 Watts using the antenna on the 160 meter band. With a good antenna tuner the antenna will work 6 thru 160 meters. I currently use a 75 Meter Full Wave Delta Loop on the 6 thru 75 Meter bands with a tuner. I am very pleased with it! These Omni directional antennas offer Horizontal polarization, and about 2.1 db of gain. Loops are much quieter than a dipole or a vertical, have a broader bandwidth and usually out perform any dipole - and perhaps best of all, they offer super low noise.

To determine the approximate length in feet for a full wave loop antenna use the formula 1005/Freq in MHz = length in feet. For 160 meters a full wave loop resonant at 1.9 MHz will be about 529 feet long. For 75 meters, a full wave loop at 3.85MHz is about 261 feet long, while for 3.9 MHz it is just less than 258 feet long.

Loop antennas may require some pruning or trimming to obtain a very low SWR. However, if you measure carefully you should get below 2:1 SWR over the entire band with little tweaking. The impedance of a Full Wave Loop antenna is theoretically in the vicinity of 100 ohms. One end of the wire goes to the coax center and to the shield to the other end. Be sure and seal the end of any coax against rain water. Form the loop and then hang it horizontally from trees or whatever supports are handy. Be sure to insulate the wire from the supports as with any antenna. You may need rope extensions from the supports to the wire loop to accurately place your loop for the most convenient feed point, etc.

Orientation need not be horizontal on 20 Meters and up. A 20 meter or smaller full wave loop antenna can even be oriented as a vertical diamond or vertical square. Fed at the top or bottom corner of a diamond the antenna then has a horizontal polarization. (A vertically oriented horizontally polarized one-wavelength loop with the bottom of at 1/2 wave length above ground is a really fine antenna.) Don’t put the bottom of the vertically oriented loop more than 1/2 wave length above ground however or the pattern becomes badly distorted.

A loop of any shape will work well, whether an octagon, a pentagon, a triangle or even a rectangle. The larger the area or aperture inside the loop, the better it’s gain figure. A circle has the largest area but is often impractical. Still, a circle has almost a full db more gain than a square however. The square in turn has 1dbd gain over an equilateral triangular shape. As you might guess, the rectangular configuration has even less gain and becomes quite directional if squeezed too much from the square’s configuration. Most people favor the square layout but if you only have 3 supports you can usually make it a triangle. These triangular loops are called Delta loops. If it’s going to be a triangle, make all the legs equal length; this gives it the largest possible inside area and the best gain.

A horizontally oriented loop can be fed it at a corner, a side, or anywhere. It is really not very important in my experience. I also suggest you don't use a balun on this Antenna. I usually feed a full wavelength loop directly with either 50 or 75 ohm coax. I use the 75 ohm coax a lot, just because I have a big roll of the stuff. Sometimes I go with 450 ohm flat window line. When operating any loop, dipole or Zepp on more than one band, you should reduce the feed line loss as much as possible by using open wire (450 to 600 ohm ‘window’ or ‘ladder’ line) down to the transceiver from the antenna’s feed point. Do not connect the antenna wire in any way to a tower. This type of antenna doesn't depend on an efficient ground system for maximum performance.

Do NOT put the bottom of the vertically oriented loop more than 1/2 wave length above ground.

IMPORTANT

Any shape loop will work - octagon, pentagon, etc. The larger the area or aperture inside the loop the better, A circle has the largest area but is impractical. A circle has 1dbd gain over a square. Most people use a square but if you only have 3 supports you can shape it like a triangle. Triangle loops are called Delta loops. A square loop has 1dbd gain over an equal lateral triangle loop. If you use a triangle shape try to make each leg an equal length as this gives the largest inside aperture or area.

NOTE #1

Don't use a Balun on this Antenna! On a horizontally oriented loop you can feed a corner, center of a side or anywhere it is unimportant.

NOTE #2

If you know you will be using a Loop, Dipole, Zepp, etc. on Multiple Bands and you want the most efficient performance of the antenna system you will always get less feed line loss if you use Open wire 450 - 600 Ohm window/ladder line.

If you feed the Full wave Loop antenna direct with a single piece of coax you can only adjust add/prune the antenna till the VSWR gets down to about 1.7:1 at resonance , so you will probably want to use a tuner if you want to cover an entire HF band . And Yes the tuner in the radio will work fine as long as you are not using a linear amplifier. The impedance of a Full Wave Loop antenna is theoretically in the vicinity of 100 ohms. That is why I use a 75 ohm "Q section" to provide a perfect match to the 50 ohm coax. My Loop antenna is flat 1:1 VSWR around 3.875 MHz and rises to about 2:1 SWR at 3.75 and 4 MHz . So I cover the entire 75 meter phone band without using a tuner.

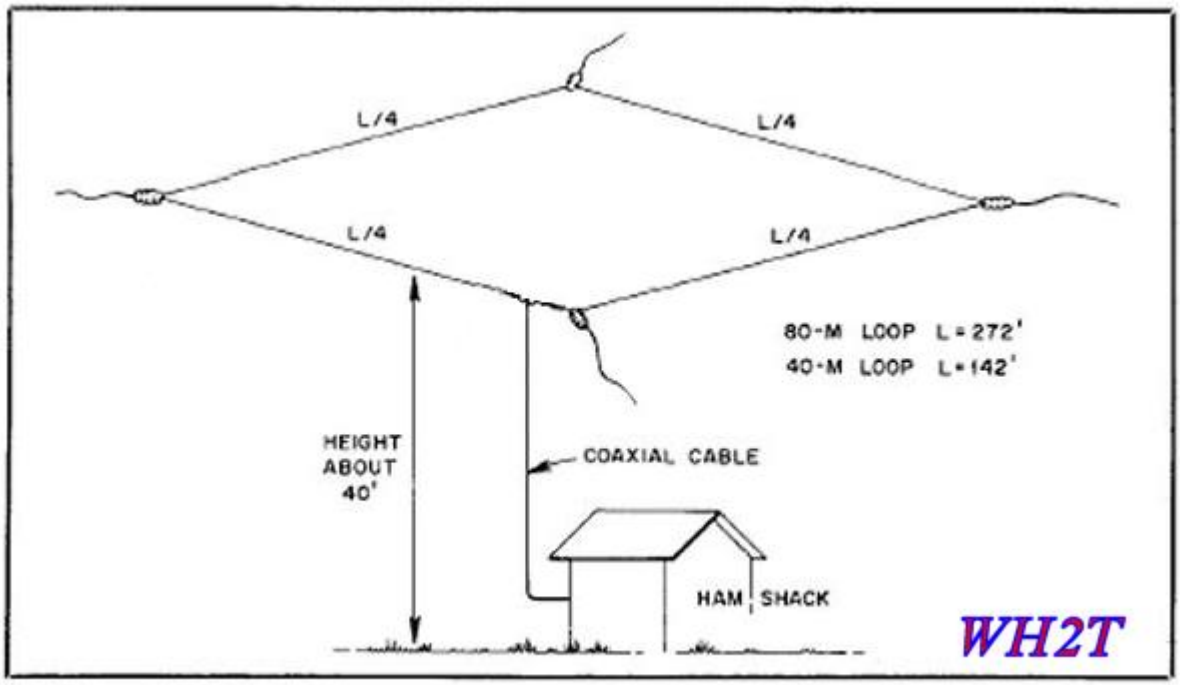
Here is How I Do It.

IMPORTANT - Connect the shield of a "Short Piece" of 75 ohm coax to one end of the loop antenna , Connect the center of the 75 ohm coax to the other end of the loop antenna. The length of the 75 ohm coax is most important. It will be used as a Q section.

To determine the length to use, Use this formula "Length in feet = 246 x VF / Freq in Mhz" VF = the Velocity Factor of the coax. So multiply 246 by the Velocity Factor of the coax , Then divide by the frequency .

If you use RG59 or RG11 with a Velocity Factor of 0.66 , For the 75 meter band the Piece of 75 ohm coax should be about 42 feet long , It doesn't need to be exact . RG59 and RG11 coax usually have a Velocity Factor of 0.66 , Foam dielectric coax such as RG6 might have a Velocity Factor of 0.81 or more.

Put a PL259 coax connector on the unused end of the 75 ohm coax, Screw a PL258 double female coax connector onto this PL259 coax connector. Then connect 50 ohm coax to the other side of the PL258 double female coax connector, Use any length 50 ohm coax needed to reach your Transceiver.
This Antenna system can be fed as a Top Loaded Vertical fed against ground for use on a lower frequency band than the loop is resonant on.



The Loop is erected horizontal to the earth.

Note:
Dr. Ace/WH2T is very fond of the Full Wave Horizontal Loop Antennas, but another Great HF antenna is the Double Extended Zepp. You may also want to consider the Zepp type antenna if you have the real estate.

73 de WH2T, Ace