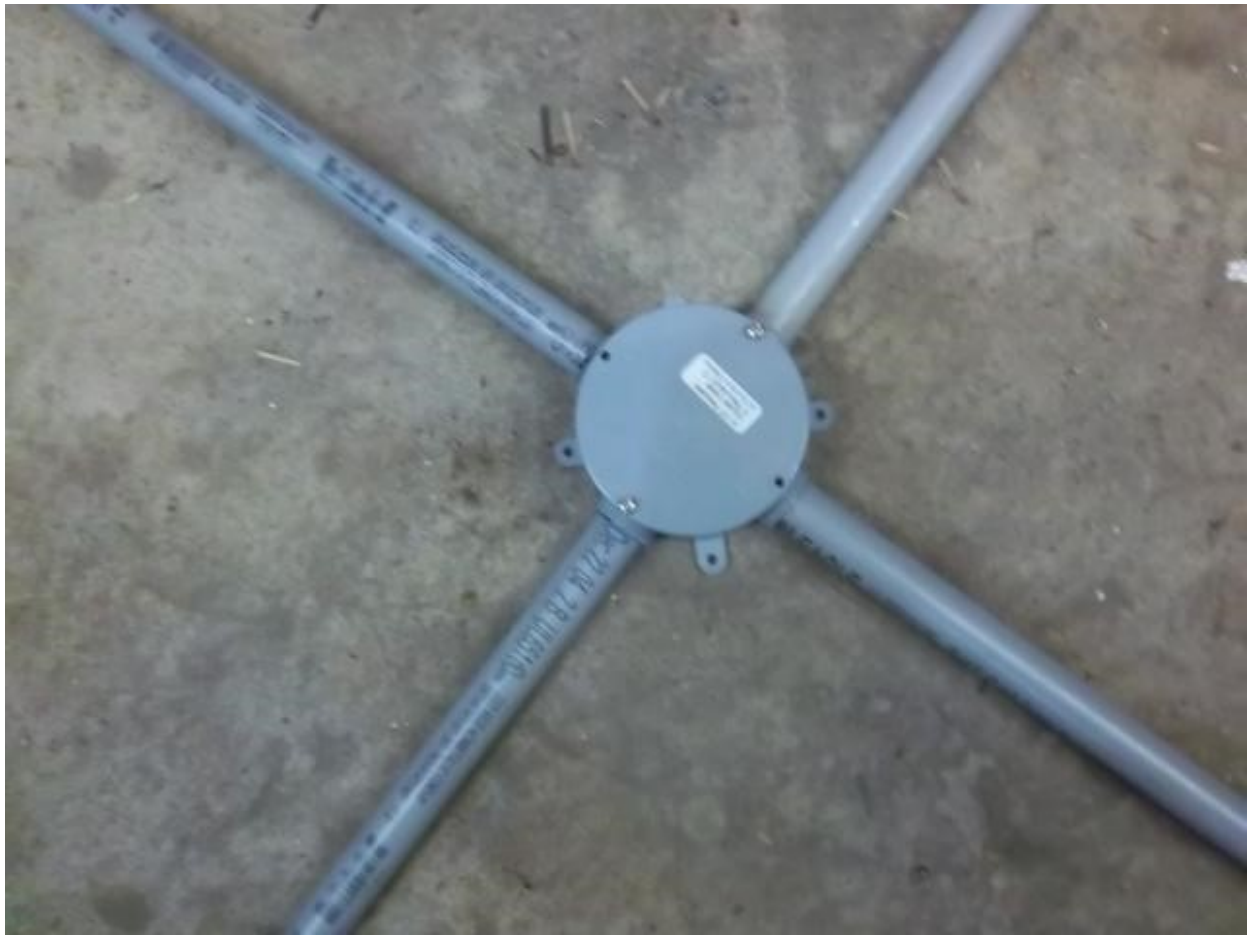

The antenna is constructed using a 4-way electrical conduit junction box and 3/4" PVC electrical conduit as shown above.

The length of a full-wave antenna is given by the formula 1005 / frequency in MHz = total length of the loop.

So in this case, we want to build an antenna for 6 meters, 50.110 MHz. 1005 / 50.110 = 20.06 feet. Since the sides of the square are equal, this means the finished antenna is approximately 5 feet square. The orientation of the loop antenna does not matter. It can be fed in the middle as shown above, and placed on the tower as a “square”. Or it can be fed on a corner and placed on the tower as a “diamond” shape. What does matter is where you feed it – bottom or side. If you feed a quad loop on the bottom it has horizontal polarization. If you feed it on the side it is vertically polarized. Since beams are commonly used on 6m SSB, we will use horizontal polarization to prevent cross-polarization loss on direct-wave communications. And we will feed the antenna on a bottom corner (shown in the photos below). I assembled with the feedpoint in the middle between two spreaders to make it easy to tension the wire, then simply slid the wire around the spreaders until the feedpoint was at one corner.

This photo shows the detail of how I made the a parallel feeder stub integral with the loop antenna. Simply tie an overhand knot in the loop ends, use a plastic tie to tension the wire on the spreaders, and place a feedline spreader close to the junction to keep it tight.

Most people new to ham radio are familiar with coaxial cable that has a center conductor and a shield. If this antenna were fed with coax the center conductor would go to one side of the loop and the shield would go to the other side. Open-wire parallel feedline has several advantages over coax for this type of antenna:

- it can operate at very high VSWR's with almost zero loss, where coaxial cable becomes quite lossy (and RF in the shack!) at high SWR's
- open-wire parallel feedline is much cheaper than decent quality coax, and can be home-built as shown. I simply use 14 AWG THHN wire with 1" wire staple clips as the spreaders. The spreaders are hot glued, then melted into the insulation of the wire with a propane torch so they never slip
- open-wire parallel feeder is impervious to water damage or intrusion into the feedline – one of the most common causes of failure of coaxial cable

- it can also handle much higher power output than coaxial cable without arcing over at high SWR's. Always remember that your antenna and feedline can have several thousand volts on it at high SWR's with a linear power amplifier!

While it may be possible to feed this loop antenna with coax by using a 1/4-wave matching section of 75-ohm as a transformer, that would make the antenna only useful on one frequency. Our goal is to be able to use this antenna on both 6 meters and 10 meters. My MFJ-259C antenna analyzer shows the input impedance of the loop to be 200 ohms at 50.110 MHz and 1,200 ohms at 28.305 MHz. Fed directly with 50 ohm coax this would yield a SWR of 4:1 on 6 meters and 24:1 on 10 meters. Using the homemade 400 ohm parallel feeder yields a 2:1 SWR on 6 meters and 3:1 on 10 meters – well within easy tuning range of your antenna tuner to be able to use the antenna on both bands with a 1:1 balun (or 4:1 balun if you end up with an odd quarter wave-length multiple of feedline from the shack).

A burned out SO-239 from a balun that arc'd over at about 2,000 volts from a linear power amplifier feeding an antenna at high SWR. Keep in mind that SWR on the feedline and antenna with parallel-feedline DOES NOT MATTER! All you have to do is make your

transmitter happy by providing it with a 50 ohm load, and that's what the antenna tuner does. With coaxial feeder you will be going to elaborate extremes to try to match an antenna that may have several hundred ohms of feedpoint impedance to the transmitter's 50 ohm output impedance, and will still probably end up with what is shown above if you try to run more than 100 watts on the antenna system.

The final two photos below show our $20 antenna being mounted on the tower and the final installation. Happy antenna building – it is one of the most rewarding parts of ham radio!!

73,

Chris Olson – AC9KH

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