A COIL LOADED DELTA LOOP
For The 60 Meter Band

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The excellent article by David Clark on delta antennas in last year's *Proceedings* thoroughly examined the benefits of this full wavelength, closed loop design. For those DXers with enough real estate, the full wavelength delta is a superb antenna. It provides lower noise levels, good performance at low heights, and good low angle DX reception.

However, at 68 ft. per side, even a full wave 60 meter version is out of the question for many. After the publication of Clark's article, Seattle DXer Craig Siegenthaler and I wondered if there was a way to incorporate the benefits of the delta loop in a physically smaller design.

Craig looked into antenna design texts and the only formulas he located for loaded (shortened) antennas were for types other than loop antennas. Craig decided it was time for Plan B: "trial and error". At a ham radio supply house he found a coil that looked promising, an air-core type (model 3022, $5.12 plus shipping) made by Barker & Williamson of 10 Canal St., Bristol, PA 19007 (215) 788-5581.

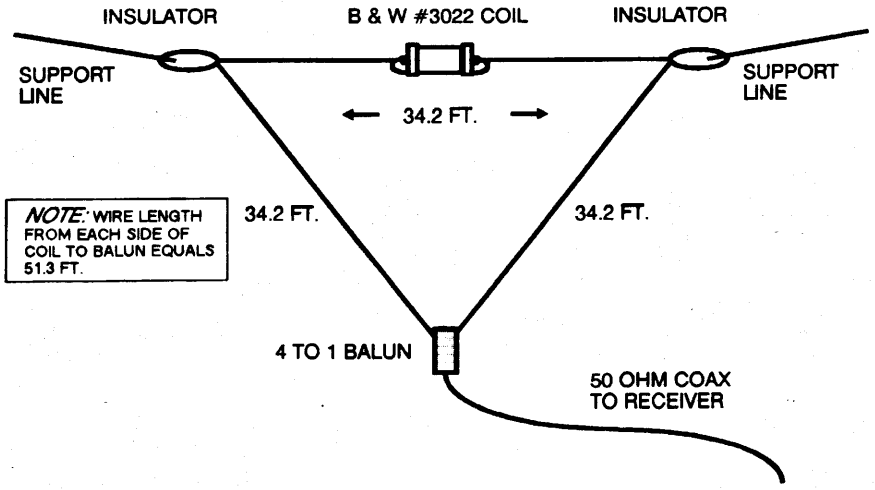
With the coil in the center of a 100 ft. loop of wire, Craig was amazed to find that the antenna was resonant at 5.15 Mhz when checked with an RF noise bridge. Success at the first try! Sometimes life is like that. He also found that the feedpoint impedance was 220 ohms so he added a 4:1 balun between the antenna and 50 ohm coaxial feedline. His antenna is mounted in an apex down, bottom feed arrangement, with the feedpoint nine feet above the ground. Listening sessions showed good reception around 5 Mhz extending down into the 60 meter band, with the low noise characteristics that loop antennas are known for. After hearing the results, and seeing how easily the shortened delta fit Craig's small city lot, I knew I had to try one. Using the same model of coil, I erected a similar shortened delta loop at my location. Due to the arrangement of antenna supports (my wife calls them trees), the delta is erected in an apex down, upper corner feedpoint arrangement. However, this happens to be one of the preferred configurations for vertical polarization, low angle DX. (See *Proceedings 1988* for further information).

The 100 ft. length of antenna wire used by Craig is commonly available ready-to-go on wire spools, and when used with the loading coil creates a resonant, half wave loop near 5 Mhz. I wanted additional wire for resonance in the center of the 60 meter band. Using the formula

$$L \text{ (feet)} = 1005/f \text{ (Mhz)}$$

indicates 205.1 ft. as the proper full wave loop dimension at 4.9 Mhz (center of 60 meters), or 102.5 ft. for a half wavelength loop. Each leg is only 34.2 ft. long, quite small overall for an antenna resonant on the 60 meter band.

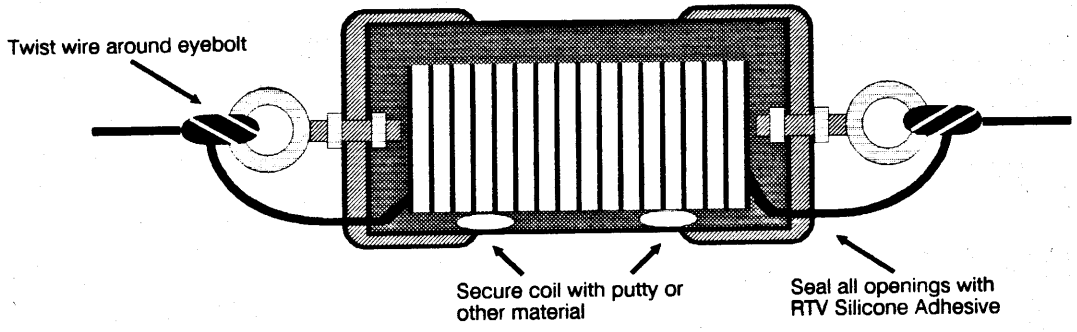
The illustration below shows this antenna fed at the point of an inverted apex, the arrangement that most DXers would use:



● CONSTRUCTION DETAILS

The key to this shortened delta loop is the loading coil. B & W's #3022 coil has just the right amount of inductance. It is a 1-3/4" dia., 4" long coil, with 8 turns per inch of 14 gauge wire, 32 turns total. The turns are spaced 1/8" apart. Measured on a calibrated LCR meter, the coil's inductance is 19 uH (even though B & W product literature states 16.5 uH). If you cannot find this coil you might contact Barker & Williamson directly. Alternatively, you could wind your own coil using a 1-3/4" dia. form. Follow the dimensions and turn-spacing exactly, and check inductance with a meter, if possible.

Make a weatherproof housing for the coil from a 5" length of ABS plastic pipe with an O.D. of 2-3/8", two eyebolts with two nuts each, and two end caps to fit the pipe. The plastic pipe, caps and eyebolts are available at hardware stores. See illustration below. Holes drilled in the center of each cap allow the mounting of the eyebolts which take the strain off the coil. A short loop of wire runs from the eyebolts through another hole in each cap, and is soldered directly to the ends of the coil. Secure the coil to the inside of the pipe with putty for a shock-absorbing effect and seal all holes and joints with silicone sealant. The end caps fit so snugly that no permanent glue is needed; this allows future access to the coil.



You may wind your own 4:1 balun following details in a guide such as *The Amateur Radio Handbook,* or purchase a ready-made unit with integral SO239 connector for mating with a PL259 plug.

You might want to vary coax feedpoints for good low angle DX reception or try an offset feedpoint for optimized vertical polarization (.08 wavelength from corner on a vertical leg). See illustration 10 in Clark's article for details.

● PERFORMANCE

Craig and I have done little comparison testing due to restricted space for antennas. However, we're pleased with the loaded delta's tropical band performance, especially considering the 35 ft. per side dimensions.

Craig uses his shortened delta as his only antenna for the 60 meter band on up. He finds it sufficient for SWLing on the major SW broadcast bands. On a DXpedition last year, Craig erected his loaded coil delta to compare it with a 60 meter dipole and found that it was a quieter antenna and gave equal signal strengths in that band.

My antenna has been used along with a 67 ft. inverted L for comparison, and the shortened delta is always the quieter antenna, often by a substantial margin. The shortened delta exhibits reasonable 60 meter band performance and outperforms the inverted L there. The inverted L usually gives a stronger S-meter reading on WWV down at 2.5 MHz, but that may be due to its higher noise level.

Obviously much more work remains to be done regarding loaded coil delta loops. Craig and I spent quite a few fruitless hours with different B & W coils trying for resonance on other tropical bands. If anyone knows of the calculations for *designing* loaded loops, please share your information with us.

Perhaps this article has inspired others to try our approach to compact delta loop antennas. Comparison of this design to a full size delta antenna is sorely needed! Hopefully the next *Proceedings* will include construction data and test results of the loaded delta loop's performance on the other tropical bands as well.