YET ANOTHER DELTA LOOP ANTENNA

(Using an *isosceles triangle*)

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Originally Published by ARRG.US December 14th, 2006
(Used with permisson from WB3AYW)

**This article is not intended to be a complete construction, or "build it" adventure,
but is intended to give you some ideas and good working lengths and spacings for use on various HF ham bands including 2 meters, and should work well when the antenna is properly supported. The antenna is high gain.**

In 1996 I had a T-L antenna on the wall for two meters, when one Saturday it fell to the floor, breaking in two pieces. I decided to try a loop antenna and I only had one mounting point on the paneling, so I used tape to make a triangle, but if I used an equilateral triangle as in all of the antenna books, I would have to put a nail in the middle of the paneling; not in the groove. So I used my MFJ 259 antenna analyzer and when I changed the top of the antenna to another groove, the VSWR and the resistance were OK. I then tried a repeater that is about 20 miles away and voila full quieting. Later I checked into the net and no problems; they said it sounded good for an indoor antenna with a handy-talkie. It stayed on the wall and is still there as my emergency two-meter antenna. Then I decided to try the design on 40 meters and it worked! After testing with a three-element beam and the delta loop I then decided that there was not enough signal difference to leave up the beam in the woods.

One Tuesday evening, I was net control for our local ten meter net at 8 PM on 28.330. After several check-ins, I was told that my signal was down, but steady and readable. I looked at the VSWR meter and it showed a one-to-one. I then looked at my antenna switch and knew what was wrong; I was on my 40-meter loop. I switched to my four-element beam and everyone in the net said I was back to normal. After several months I checked the delta loop for other bands and it had a three-to-one VSWR on the worst band from 40 meters to 10 meters that I can use.

On ten meters my beam is to the East for the net. Before net time, I would listen to the South for Florida and Georgia because some of our club members are snowbirds and if the band conditions are good, they check into our net.

After the 40 meter delta was used on 10 and the VSWR was OK I then decided to build a delta beam for 10 METERS. I decided to point it to

the South, so I only had to switch antennas instead of using net time to rotate my beam. I used the same design and it worked OK. I added a reflector and two directors to make it a four-element array. With my beam pointed to the South, signals were the same on both antennas, but the delta was picking up a wider beam width, so when I moved the one end to another tree to fine tune the direction I added two more directors and the beam width was narrowed enough for what I wanted. Now I do not have to rotate my beam all the time during the net.

The cost of my six-element delta beam was only time; since the wire (you can use any size that is on hand) that made up my three-element forty-meter beam was recycled into yet another antenna in the woods. *It is nice to have three acres of tall trees to put my antennas in next to the house.*

What I like about the delta loop is, it is fed at the top. Frequency adjustments can be made on the ground. I used two pieces of wire 1/2 wave long plus about one foot or more extra on both pieces for adjustments. After the antenna is tuned up, solder the wires where the adjustment was made. I use plastic rope to support the antenna. There is yellow and brown rope; never use yellow in the woods, unless you want it noticed from afar. Brown blends into the trees and can hardly be seen. At each element, tie the wire with a knot in the top support rope to hold the spacing in the antenna. If the rope stretches, don't worry--it will still work, since the spacing is always a compromise. The lower two corners of the triangle are held out with rope. Tie the rope around the wire so it will slide for fine adjustments for lowest VSWR. The radiation pattern seems to be both vertical and horizontal with this design.

Then I built another delta and pointed it to the east for tests. Tests with two-element delta and a four-element horizontal Yagi at my QTH, with a four-element Yagi that is on a rotator at W3TO's QTH about twenty air miles to the east of my QTH. (This test does not take into consideration any feedline losses because the main purpose is a vertical to horizontal signal report test for dual polarity in the delta antenna).

My radio is a Kenwood TS870S and Jim's (W3TO) is an ICOM 751A.

Horizontal Yagi to horizontal Yagi - S9

Horizontal Yagi to vertical Yagi - S0

Horizontal Yagi to delta - S9

Vertical Yagi to delta - S7

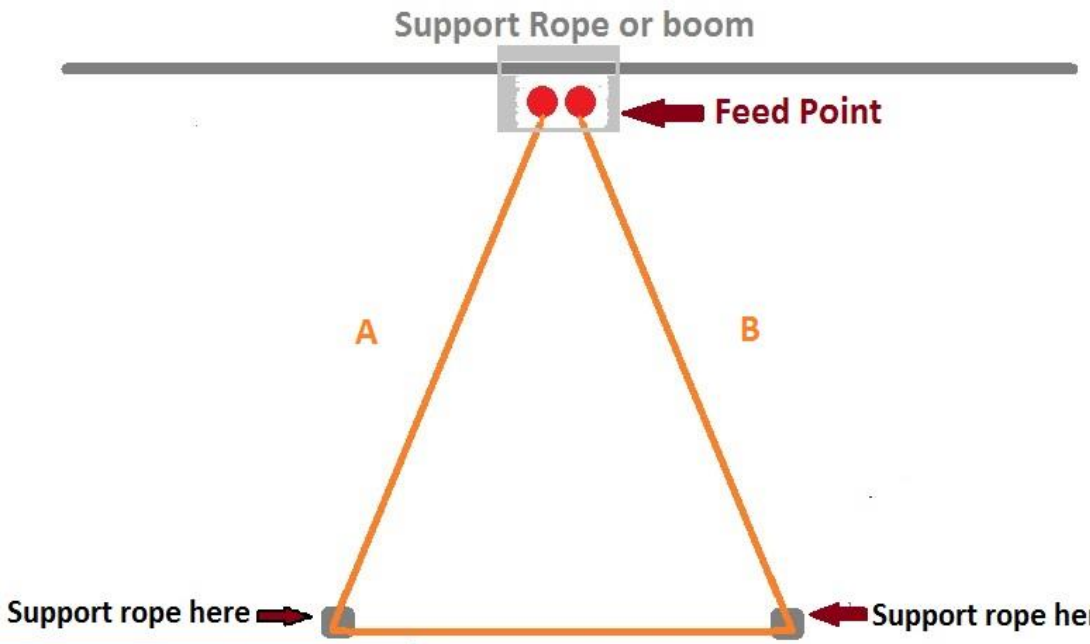
The lowest S meter reading with W3TO's four-element Yagi being rotated and the delta was S3.

This shows that the delta has an S7 gain and an S3 gain over the Yagi for DX purposes on fadeout conditions, that is caused by polarity change. The impedance is 50 OHMS and the VSWR is non-existent with the .4 - .2 - .4 isosceles triangle with no matching network.
--Leonard WB3AYW

Dimensions for Delta Loop Antenna by WB3AYW					
	Driven Element		**Total Wire**	**Reflector**	**Director**
	Lengths		Length	Spacing	Spacing
Wavelength/ Frequency	0.4 **A** and **B**	0.2 Bottom	1.0	.15	.1
2-M 144	31.5"	16"	79"	12 1/4"	8"
6-M 50.1	93 1/2"	46 1/2"	234"	35"	23 1/2"
10-M 28.2	14'	7'	35'	62 1/4"	41 1/2"
12-M 24.9	15'9"	7'10"	39'4"	71"	471/4"
15-M 21.1	18'8"	9'4"	46'6"	84"	56"
17-M 18.1	21'8"	10'10"	54'2"	99"	66"
20-M 14.15	27'8"	13'10"	69'3"	125"	83"
30-M 10.12	38'8"	19'4"	96'10"	174"	116"
40-M 7.1	55'	27'6"	138'	247"	165"
80-M 3.7	104'10"	52'4"	262'	39'8"	26'6"

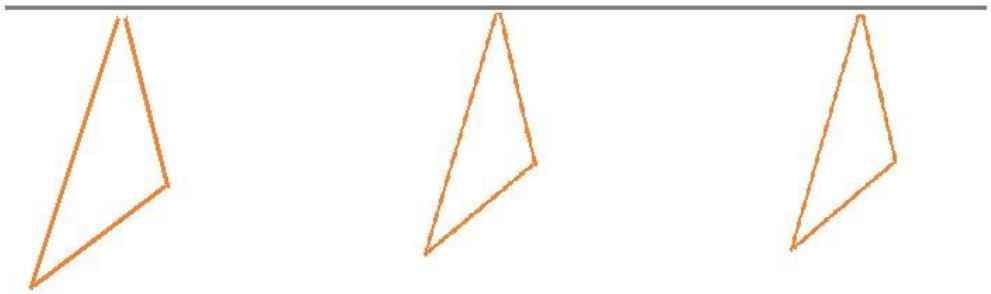
(Note: Under Driven Element column above, "**A**" and "**B**" refer to sides of loop in drawing below)

Add 5% for reflector
Subtract 4% for each director



Driven Element shown only. Refelector is 5% longer than driven element. Director is 4% shorter than driven with each additional director 4% shorter towards the end of the antenna than the one next to it towards the driven. Side A and B are same length.

Feed point area is attached to insulated block. Block attached to rope, etc Support ropes are attached to each lower corner.



Side View of typical 3 element Loop Antenna

Reflector on left, driven next and director on right toward station

Drawing not to scale

Drawing N4UJW

Tuning notes for lowest swr:

Overall length of the driven element can be longer at first than what the chart above shows, then cut in center bottom and the overall length adjusted more or less as needed. Some trial and error may be done here. Twist ends together and solder when done.
Support ropes at bottom corners may also be slid up or down equally to increase or decrease angle at bottom sides. A combination of these procedures will help tune the antenna for lowest swr.

Editor notes...Since this could be a somewhat complicated antenna to support if multiple elements are used, you may wish to aim it in the general direction of your "most desired direction" and secure it in a fixed position. If you don't have suitable supports for the top and bottom sides, then you will have to modify the supports to suit your needs and location.
If you have the suitable materials and the ability, this would make a very cool multi element beam when used with a rotor or just build the driven element and hang on an inside wall for a great 2 meter emergency antenna or even stealth mode!

References:

Definition: (*isosceles triangle*) A triangle with two equal sides. The angles opposite the equal sides are also equal.

ARRL Antenna Book

Edward M. Noll, 73 Vertical Beam and Triangle Antennas

VE3GEJ, 73 Magazine, June 1972. "Six elements on twenty meters. pp 17-20

My thanks to W3TO for testing and for the reports from N4WCK in Georgia, WA3PGL and W3AGF in Florida for signal reports, as this antenna was developed and WA3HDK for his support.