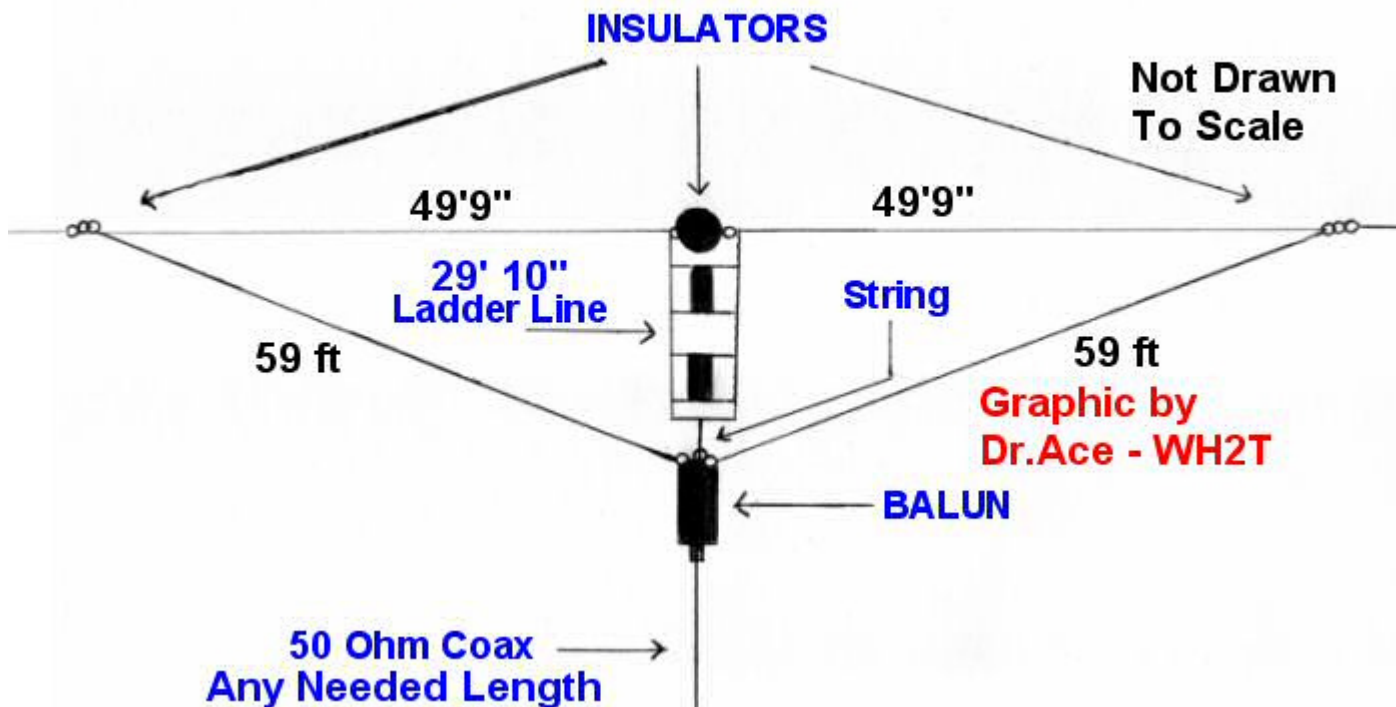


A multi-band super mini loop anten

The WH2T Mini Super Loop Antenna



Here's how to make the "Super" antenna.

To build this antenna you need a lot that is at least 100 feet across.
(This can be on a diagonal).

Antenna covers all bands 80-10 meters + 30, 17, 12 meter WARC Bands

This antenna works as a Full Wave Loop on 80 Meters and also works as a 2 wavelength open loop or Bi-Square on the 40 Meter band.

The gain is around 4 dBd on 40 mtrs, but it will seem much higher due to the very low angle, radiation pattern. Any antenna tuned for 80 Meters should also work on 20 and 10 meters as well. If an antenna works on 40 it should work on 15 as well. A tuner will probably be needed for 10, 18 and 24 MHz Band operations.

The loop is an inverted vertical triangle with the base along the top and what would be the apex hanging down. Or it could be erected horizontally if needed.

The feed point at the bottom uses a 3:1 or 4:1 balun and is then fed with any needed length of 50 ohm coax. The top center is broken with an insulator and has a 29 feet 10 inch length of 450 ohm ladder line connected across the insulator.

IMPORTANT - The 450 ohm ladder line is shorted across at the bottom end.

Here is how I calculated the loop size.

Dimensions -

One wavelength at say 7.25 MHz = $1005/7.25 = 138.62$ or 138 feet 7.5 inches. If this length is doubled and used on 80 meters as a loop Then Freq(for a loop) = $1005/(2 \times 138.62) = 3.625$ MHz.

The 1/4 wave stub = 246 multiplied by (Velocity Factor of your type of ladder line) / 7.25 = about 32 feet.

Ladder line / twin lead velocity factors vary by brand, type, insulation, etc.

The best method is to use a grid dip oscillator or antenna analyzer to measure the resonant frequency of the 1/4 wave matching stub during construction, rather than by just using the mathematical formula to determine the length.

The perimeter of the 80 meter loop for 3.625 MHz = $277.24 - (2 \times 29' 10'') [2 \times 29.86 \text{ feet} = \text{the length of both sides of the wire in the ladder line}] = 217.52 \text{ ft.}$ Let's call it 217.5 feet.

If the top horizontal span is made 99.5 feet overall and the legs 59 feet each then the balun will hang about 30.5 ft below the top center insulator.

The 29' 10" ladder line can have its bottom - shorted end - tied to the top of the balun with a short length of fishing line, weed eater line, string, or cord etc.

On 40 meters the ladder line stub automatically acts as a switch and opens the connection across the insulator so the antenna works as 2 one wave length loops fed in phase.

This antenna is a high performance, full size, full wave, 80m loop antenna.

On 40m it is a 2 wave length open loop or Bi-Square.

The stub in the top leg of the antenna opens the loop when operating on 40m and selected other bands.

This improves the antennas radiation pattern.

Its gain is around 4dB, but it will seem a lot higher due to its excellent, low angle, radiation pattern.

The 50 Ohm coax from the balun to transmatch is not critical but recommended to be 1/2 wave length. (99 Feet of RG-8X)

This antenna could also be configured as a 54' 4.5" square on a horizontal plane. The 217.5 ft loop can be pulled into almost any shape but the bigger the "aperture" enclosed area the better it will work.

I have NOT tried this experimental design yet. I believe my calculations are correct and should work.

I have heard rumors that something similar to this Multi-Band loop antenna is available commercially as a "Super Loop" from R a d i o W o r k s.

The antenna has been built and tested by Don / K8THU.

Here are excerpts from emails I got from Don in Nov, 2005

Hi Ace,

The stub needed to be longer than you quoted.

{Page info has been updated to longer stub}

The other measurements are exactly as you stated. The antenna is resonant at 7.21 so I could shorten it slightly but have not done so. I just was on 20 and worked N. Ireland and France again both with 5/8 reports. I am using just 100 watts with my Kenwood 570 and the internal tuner. Locally on ground wave on 75 meters I am getting 20 over 9 reports on distances about 300+ miles.

Don, K8THU

Hi Ace,

Ok, on Saturday we removed the 1/4 wave stub and found it was too short so we changed it and then pruned it until the stub was resonant at 7.25. I did not alter the loop size other than the stub length.

Then we reassembled the whole antenna and found with the extra stub length the overall antenna resonant frequency was 7.21 Mhz. so I left it there for now and began SWR testing. The SWR readings are after the stub lengthening. Ladder line is 14 ga. stranded and the other line is also 14 ga. stranded and insulated (thnn?).

VSWR Measurement Results follow:

3.995 Mhz / SWR 1.1 to 1
3.751 Mhz / SWR 2 to 1
7.164 Mhz / SWR 1.1 to 1
7.290 Mhz / SWR 1.2 to 1
14.151 Mhz / SWR 1.3 to 1
14.348 Mhz / SWR 1.7 to 1
21.250 Mhz / SWR 2 to 1
21.441 Mhz / SWR 2.5 to 1
24.932 Mhz / SWR 3.5 to 1
24.987 Mhz / can't load
28.331 Mhz / SWR 3 to 1
29.650 Mhz / can't load

Usually I can't load on 10 meters.
40 and 20 are really quite good. Even 15 isn't too bad.
Don, K8THU