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From: wb2vuo@juno.com (William K Hibbert)

To: grp-1@Lehigh.EDU

Subject: [645] HF Loop Antennas

Message-ID: <19960928.163230.4335.1.wb2vuo@juno.com>

The Looper,
A Delta Loop/ Diamond Loop Antenna

Basically, the Looper is a full-wave loop antenna, with the full-wave referring to the circumference. One common example of this antenna can be seen by looking at a Quad. The loop elements in the are based on a full-wave loop. The Looper is basically a quad D.E. (driven element), that is fed as an antenna, sort of the same difference you would see between a dipole and a Yagi. The Quad antenna came to be in the 1940's at the HCJB transmitter site in Quito, Ecuador. The yagi antennas they were using for the high-power Shortwave broadcasts had Corona discharge from the ends, which were destroying the elements. The Full-wave loop element, with a reflector were tried, and didn't suffer from the corona damage. The Cubical Quad became popular with the Amateur community in the 1950's, although with the high wind loading, it has lost some of the popularity it had.

So, why would we (or you, for instance), want to run a Looper? Well, with the closed loop. any DC on the loop is bled to the ground side of the antenna. This helps reduce precipitation static, and may be part of the reason the Looper doesn't respond to static as much as other antennas. Some antenna references claim that the Full-Wave Loop has gain over a dipole, but it has been argued both ways. One real advantage is bandwidth, and another is multi-band capabilities. If you are running a dipole, and try to use it on its second harmonic, the center feedpoint shows a very high impedance. This results is a large mismatch, requiring the use of open-wire feeders, or stubs at the feedpoint. The Looper has a feed impedance on its fundamental of around 110 ohms, and doesn't vary much from that on its harmonics. You can use open-wire to feed it, and it will have similar matching characteristics on the various harmonically-related bands. If you want to use a Looper as a single band Delta or Diamond Loop, just feed the antenna with a quarter-wave long section of 75 Ohm coax, such as RG-59A/U. The velocity factor needs to be multiplied in for this cable length. The velocity factor for the foam cables is 0.8, so, to calculate the length, use the formula: $L=(246 \times 0.8)/F(\text{MHz})$.

Utilizing the lower HF spectrum during Field Day puts an interesting perspective on our antenna requirements. We want to talk to EVERYBODY, so the closer-in contacts are as important as DX. A high angle of radiation will be to our advantage on 80 & 40 meters, and by mounting the Looper in a horizontal, or sloping position, we will have the high-angle radiation we want. On the higher bands (20, 15 & 10 Meters), we will want a lower angle of radiation. The Looper, on its harmonic bands, tends to be an end-fired, low angle, vertically polarized antenna, which will give us the "DX" we want. In this respect, we can cover all the bases with one antler.

Just to give you an idea of what we will have, or provide you with the data you would need to install a Looper at your station at home, here are the dimensions for Full-Wave Loops for frequencies from 1.8 MHz to 29.3 MHz:

Freq (MHz)	Delta Side	Diamond Side	Matching Line RG-59A/U (Foam)
1.8	186.1'	139.6'	109.4'
1.9	176.3'	132.2'	103.7'
2.0	167.5'	125.6'	98.5'
3.6	93.1'	69.8'	54.7'
3.9	85.9'	64.4'	50.5'
7.1	47.2'	35.4'	27.7'
10.1	33.2'	24.9'	19.5'
14.1	23.8'	17.8'	14.0'
18.1	18.5'	13.9'	10.9'
21.1	15.9'	11.9'	9.3'
24.9	13.5'	10.1'	7.9'
28.3	11.8'	8.9'	7.0'
29.3	11.4'	8.6'	6.7'

NOTE: If the Looper is mounted in a Vertical plane, and fed in the center of the bottom or top, the polarization is Horizontal. If the Looper is fed in the center of either side, the polarization is Vertical.

In the Delta configuration, with the plane of the Looper Vertical, feeding it at either bottom corner results in an Oblique polarization, partially Vertical and partially Horizontal.

Antenna season is here, so get out the wire and coax, and go to town. Let's hear about your Looper experiences.

72/73, Keith, WB2VUO, QRP-L #582
 Trustee, KB2YTW/B 10 Mtr Beacon (28.2860 MHz)
 "In the Depths of the Great Bergen Swamp...FN13ac"

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