The Hula Hoop Antenna

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Things happen when you build a Hula Hoop. This unusual circular antenna is recommended only to the stalwart experimenter willing to bear anxious looks from the XYL and suspicious stares from the neighbors. Local hams will invariably find some pretext for a nervous visit to your shack. The actual construction is quite simple, rapid, and inexpensive, however. The finished product should do much to boost both your morale and signal reports.

Characteristics

This antenna may be thought of as a folded dipole expanded to circular shape. The Hula Hoop does have some characteristics of the folded dipole. The feed point has an impedance of 300 Ohms, affording an easy match to the transmission line. A voltage node exists at the top of the loop, permitting direct attachment to a grounded mast. Please note, however, that the familiar "doughnut" radiation pattern of the half-wave dipole differs from that of the Hula Hoop. The latter gives a "figure-eight" radiation pattern in both the horizontal and *vertical* cross section. This gives an increase in gain of 1 *db* due to the concentration of radiation in the horizontal plane. Low angle noise pickup is correspondingly reduced.

The circular antenna does not function in the same manner as the loop commonly used for direction finding applications. The *df* loop, which measures much less than one wave length, gives a null for a signal source broadside to the plane of the antenna. (The incident wavefront striking the loop induces energy of equal phase in both sides of the antenna, resulting in cancellation.) The Hula Hoop is nearly a half wavelength in diameter, which causes out of phase voltages to be induced as shown in fig. 1.

The circumference of the Hula Hoop may be computed from the usual formula for a half-wave length in free space. Circumference also equals pi times diameter; by combination we have:

$$\text{Diameter (feet)} = \frac{313.2}{\text{Frequency (Megacycles)}}$$

A 10 meter antenna might be 10½ feet in diameter, for example. For the 6 meter band this value would be only 6 feet.

Variations

Endless experimentation is possible. A simple Channel 13 antenna bent from coat hangers has displayed sharp directivity and offers a convincing demonstration of the existence of space nodes, by the way. A 54 inch length of wire is adequate. Make a Super Hoop by placing two loops back to back, spaced one quarter wave length apart, and feeding them as shown in fig. 2. This gives a unidirectional pattern. Parasitic elements do not seem to work well in actual practice. The author is presently constructing an antenna dubbed—you guessed it—the Super Duper Hoop, using the collinear array for 2-meters described in the *Handbook*. Three collinear elements can be bent into circular form and joined by an additional quarter-wave phasing section. It is worthy of note that at one-third the designed frequency this antenna would operate like the simple loop, since the phasing sections would be only a small fraction of one wave length. The resonant frequency would be lowered somewhat, but the radiation pattern would be virtually unaffected.

A loop with phasing loops is interesting in itself—and new possibilities await the experimenter. The circular antenna has apparently been neglected for many years; perhaps *you* could contribute to present knowledge. Now if a circle were to be stretched into a helix . . . . ■

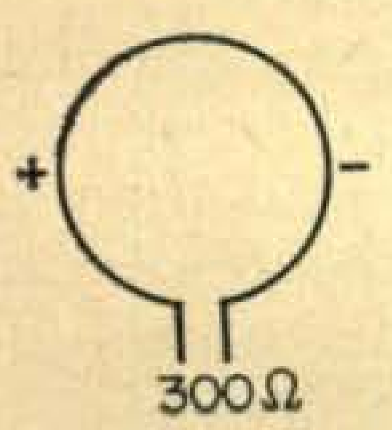

Fig. 1—Out of phase voltages exist (maximum sensitivity) with loop broadside to the signal source.

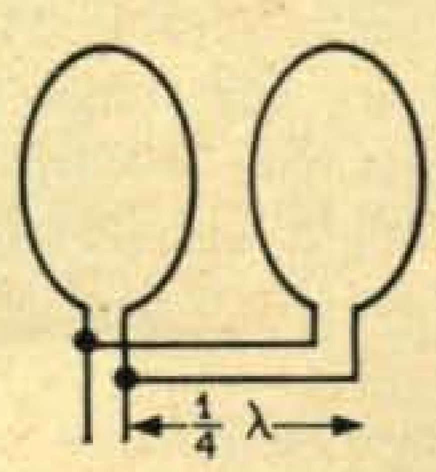

Fig. 2—Two loops back to back and 90° out of phase give undirectional pattern.