

Type TA 103 Series HF Monopole/Loop Antenna

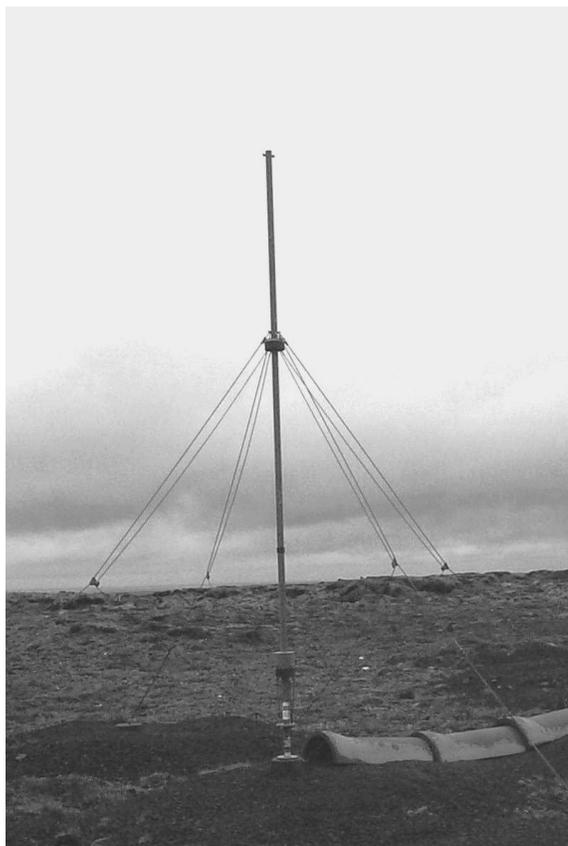
- 1.5 to 30 MHz
- Vertical and Circular Polarization
- Omnidirectional
- Receive Only
- Short-to-Long Range

General Description

The TA 103 series antennas are a family of lightweight, easily deployable, multi-polarized, omnidirectional receive antennas for short-to-long-range communications. The antenna element consists of a sleeve monopole with two orthogonal loops supported by the monopole as well as four guy ropes. A switching unit near the base of the antenna element controlled by a dc voltage fed through the RF coaxial cable allows the antenna element to be operated in one of three modes; vertically polarized, left hand circularly polarized, or right hand circularly polarized. When erected, the TA 103 stands 15.2 feet (4.6 meters) tall and has an anchor radius of 11.8 feet (3.6 meters).

Monopole Antenna

The monopole antenna is a three section mast assembly. Loop mounting rings are positioned at the base section and between the middle and top sections. These rings provide connections and support for the two orthogonal screened loops. The base section houses a quadrature hybrid PC board that processes incoming signals and provides polarization switching. A single BNC connector is mounted on the base section for the feeder cable.



Orthogonal Screened Loops

Each orthogonal screened loop is formed by two loop element cables connected to a crossfeed loop mounting ring at the top of the middle mast section and to a loop mounting ring at the base of the mast. The loop element cables are suspended from the guy lines forming a diamond within the guy lines. Each loop cable is a 13.2 foot (4 meter) length of RG-58C/U cable with a straight coax BNC connector at each end. In the exact center of each loop element cable is a white cable marker to identify the guy line suspension point.

Quadrature Hybrid PC Board

The quadrature hybrid PC board

provides the various polarizations required for reception of skywave signals from the highest elevation (90°) to the lowest elevation angles (0°). By supplying 0 Vdc to the quadrature hybrid PC board, vertical polarization is selected and the monopole element is used. The two orthogonal screened loops are fed to the quadrature hybrid PC board and phased to provide right-handed and left-handed circular polarizations. These correspond to O-ray and X-ray propagation, depending on whether the antenna is in the northern or southern hemisphere.

Characteristics

Electrical	
Frequency Range	1.5 to 30 MHz
Impedance	50 ohms nominal
Polarization	<p>0 Volts- Vertically Polarized (Monopole Antenna)</p> <p>+7 Volts – Circular Polarization -“O-Ray” polarization in northern hemisphere -“X-Ray” polarization in southern hemisphere (Crossed loop antenna)</p> <p>-7 Volts- Circular Polarization -“O-Ray” polarization in southern hemisphere -“X-Ray” polarization in northern hemisphere (Crossed loop antenna)</p> <p>Voltage tolerance of each of the three operating modes is ± 1 volt. Current requirements for the TA-103 with ± 7 volts bias is typically 30 mA.</p>
Patterns	<p>Monopole Antenna: Azimuth –Omnidirectional (± 1 dB) Elevation-Sine (2θ)</p> <p>Crossed Loop: Azimuth –Omnidirectional (± 1 dB) Elevation- Cosine (θ) where θ is the angle from zenith</p>
Phase Matching	<p>a) Monopole Phase -1.5-30 MHz - $\pm 2^\circ$ b) Loop Antenna -1.5-30 MHz - $\pm 2^\circ$ The antenna loop cables are phases stabilized and phases matched to within $\pm 0.25^\circ$</p>
Amplitude Matching	<p>a) Monopole Amplitude - ± 0.5 dB b) Loop Antenna Amplitude - ± 0.5 dB</p>
Antenna Switch Time	500 msec. Between any three bias modes
Antenna Switch Life	1,000,000 cycles
Gain, dBi	<p>Monopole- -24.9 to - 5.1 Loop - -25.6 to -1.3</p>

Mechanical

	Transportable Version	Fixed Version
Weight	22 lb (10 kg)	35 lb (16 kg)
Mast Height	15.1 ft (4.6 m)	15.1 ft (4.6 m)
Anchor Circle Diameter	23.6 ft (7.2 m)	23.6 ft (7.2 m)
Wind	65 mph (105 kph)	110 mph (180 kph)
Ice (Radial Thickness)	0.25 in (6.25 mm)	1.5 in (40 mm)
Temperature		
Operation	-40 to + 55°C	-40 to +55°C
Storage	-55 to + 65°C	-55 to 65°C
MTBF	10,000 Hours (based on a rate of 100 switches/hour)	