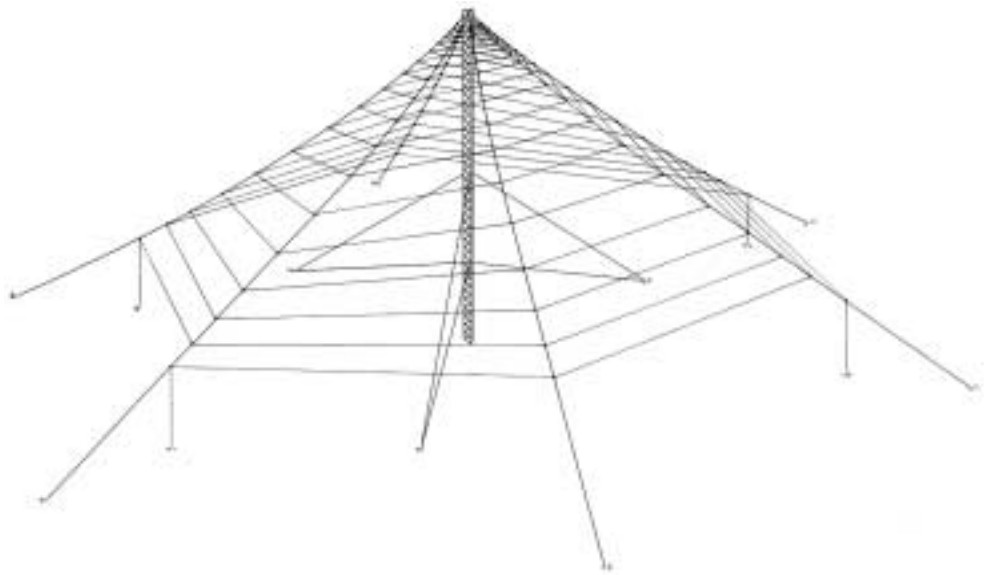
TCI
A Dielectric Company

MODEL

570

Multimode Spiral Antenna



A major problem facing communicators is a lack of sufficient land for optimal antenna systems. Antenna performance is often compromised by the use of too few antennas, inefficient antennas, antennas with degraded gain, or antennas that cannot operate at sufficiently low frequencies. The TCI Model 570 multimode spiral antenna significantly reduces the land area required for arrays of HF antennas.

The Model 570 antenna operates with up to three simultaneous transmitters, reducing the number of antennas required at communications stations. It provides both low and high take-off angles that enhance communications performance at all ranges of interest, including very low take-off angles (around 3 degrees) that are used for long-range communications. Its land area requirements are small, allowing room for the installation of more antennas and reducing attendant coupling problems.

The 570's performance results from its optimized configuration. The antenna is a four-arm spiral supported by a central mast. The antenna can be excited in three modes, two high-angle and one low-angle. Each mode is orthogonal with respect to the other two modes, virtually eliminating any coupling between them. Radiation is essentially omni-azimuthal at all elevation angles. Consequently, the 570 can operate in low-angle mode only, high-angle mode only, or simultaneously in both low- and high-angle modes.

Polarization of the radiated signal lies in the horizontal plane, minimizing ground losses. (This phenomenon is described in detail in TCI Technical Note 2.) The maximum possible gain without ground losses is provided at either high- or low-angle modes to enhance communications reliability.

The pyramid configuration enhances both electrical performance and structural advantages. Having the high-frequency active region at the top of the antenna generates very low take-off angles at higher frequencies, enhancing the gain and, therefore, the reliability for very long-range communications. Conversely, having the low-frequency active region near the ground results in high take-off angles that enhance the short-range communications supported by low-frequencies. The simple pyramid shape requires only a short mast and a small land area. Mast loads are low, which makes the system highly cost-effective and increases its long-term reliability. Concrete foundations are small, and the need for grading is minimal.

- **Simultaneous operation of two or three transmitters**
- **Dual take-off angles provide optimum gain for short-, medium-, and long-range circuits**
- **Very low take-off angles for very long-range communications**
- **2–30 MHz operation**
- **Small land area**
- **Simple rugged structure**

As with all TCI antennas, the Model 570 employs high-quality, exhaustively tested components and materials. All radiators and feedlines are of wire that is highly resistant to corrosion. Insulators are made of high-strength glazed alumina, a material which has an extremely low loss tangent (0.001) and is virtually impervious to the effects of ultraviolet radiation, dirt, and salt spray.

The antenna is supplied in a preassembled kit with all required materials including mast, guys, guy anchors, radiating curtain, feed hardware, and balun.

Specifications

Frequency ..... 2–30 MHz

Power ..... Up to 2 simultaneous transmitters each 10 kW average 20 kW PEP or 3 simultaneous transmitters each 1 kW average 2 kW PEP

VSWR ..... 2.0:1 maximum (2.5:1 Max 2–2.5 MHz) including balun/coupler

Directive Gain ..... 7 dBi nominal

Polarization ..... Circular in horizontal plane

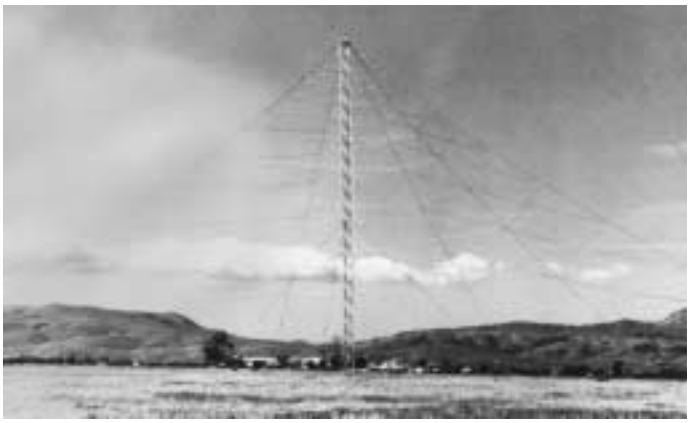
Azimuthal Pattern ... Nominally omni-azimuthal

Decoupling Between Modes ..... 25 dB typical

Operational Modes

1. Single mode, single transmitter
2. Switched mode, single transmitter, 2 modes
3. Dual mode, two transmitters operating simultaneously
4. Triple mode, three transmitters operating simultaneously

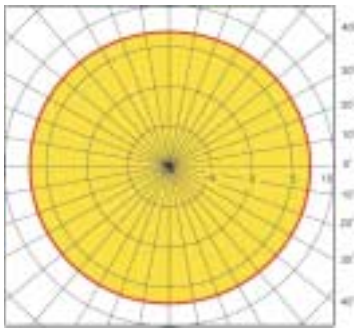
Environmental Performance ..... Designed in accordance with EIA Specification RS-222C for loading of 225 km/h (140 mi/h) wind, no ice or 96 km/h (60 mi/h) with 12mm (1/2") radial ice.



Elevation Approximate take-off angles optimized to be similar to the performance of rotatable log-periodic, as follows:

Frequency	Approximate TOA Low-Angle Mode	High-Angle Mode
2 MHz	51°	90°
4 MHz	48°	90°
30 MHz	Major lobes at 3.5°, 13°, 22° and 42°	Major radiation between 45° and 135°

Typical Azimuth Pattern
Directive gain in dBi



Dimensions

Model 570-1			
Height ft.	Height mtr.	Diameter* ft.	Diameter* mtr.
120	37	370	113

Model 570-2			
Height ft.	Height mtr.	Diameter* ft.	Diameter* mtr.
80	24	225	69

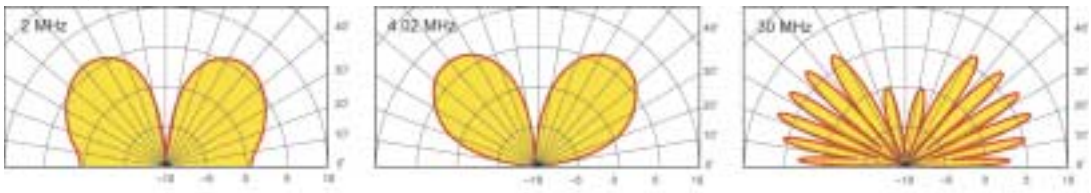
* Includes guys.
All dimensions are maximum.

Antenna Efficiency

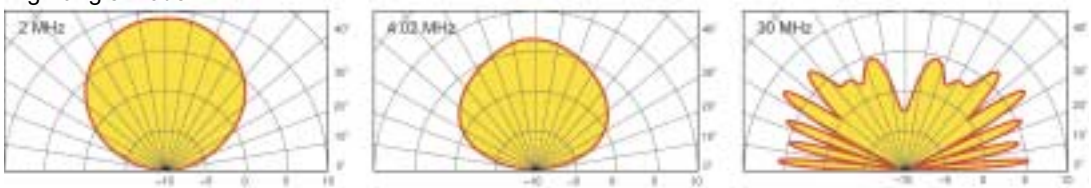
Model Number	Frequency (MHz)	Efficiency (%) Low-Angle Mode	Efficiency (%) High-Angle Mode
570-1	2	5	20
	2.5	10	40
	3	35	40
	3.5	60	50
	4	80	50
	5	95	65
	8	95	90
	30	95	90
570-2	2	5	6
	3	5	20
	4.5	35	40
	6	80	50
	7.5	95	65
	12	95	90
	30	95	90

Elevation Patterns Directive gain in dBi

Low-angle mode



High-angle mode



570-260301© TCI, 2001
Data and specifications subject to change without notice.
www.tcibr.com

TCI A Dielectric Company 47300 Kato Road, Fremont, California 94538, USA • 1 800 824-8074 (USA) • Tel 1 510 687-6100 • Fax 1 510 687-6101