

# Long-Haul, Log-Periodic HF Antennas

- Choice of Frequency Range:
  - 4.0-32 MHz
  - 4.6-32 MHz
  - 5.4-32 MHz
  - 6.5-32 MHz
- Up to 20 kW Average, 40 kW Peak Power Rating
- Vertical Polarization
- 2.0:1 Maximum VSWR
- Low Angle Radiation at All Frequencies
- Low Sensitivity to Off-Path Signals
- Minimum Space Required
- Short-Range Communications (Groundwave)
- Long-Range Communications (Skywave)

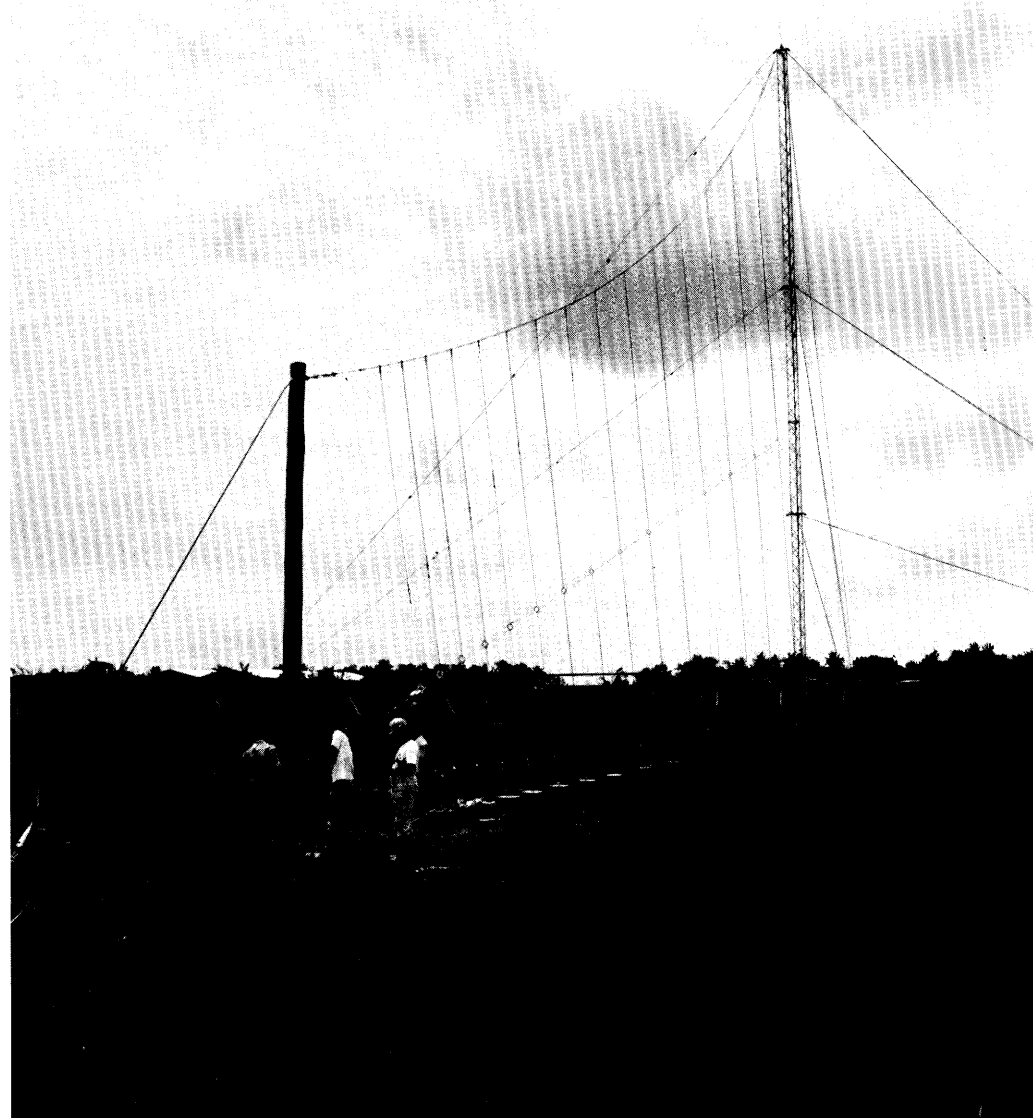
## General Description

The 1703 Series antennas are designed to provide transmitting and receiving service for HF circuits from 750 to 4,000 miles. Antenna gain is concentrated at the best elevation angles for circuits of this length, and the angle remains virtually the same regardless of the frequency.

The 4-32 MHz range of the largest antenna encompasses all frequencies required on most long-haul circuits. Smaller, more economical antennas, with low-end coverage of 4.6, 5.4 or 6.5 MHz, can be used for circuits which do not require the full 4-32 MHz range.

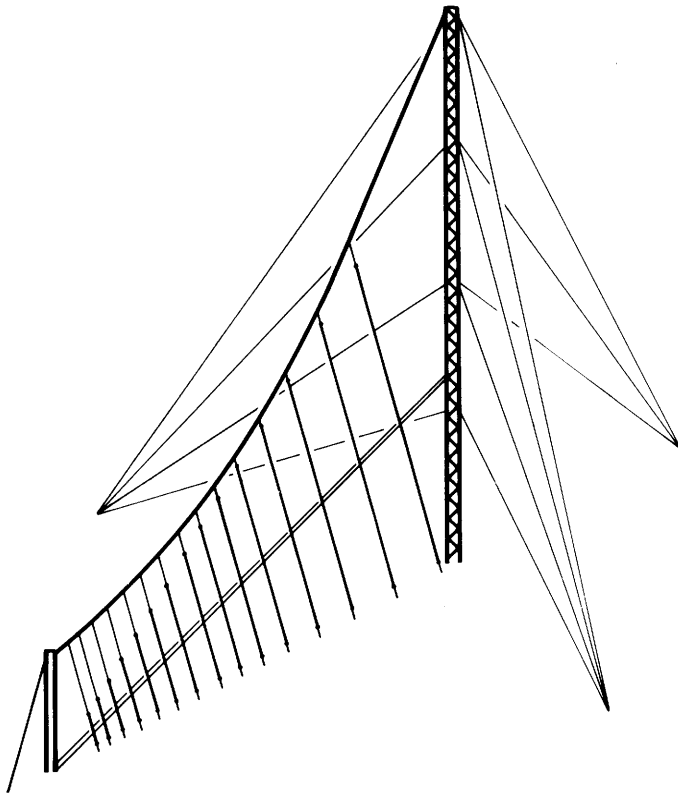
## Applications

The Type 1703 antennas are suited for point-to-point or sector coverage at long distances. The maximum distance over which satisfactory performance may be expected is a function of many variables-transmitter power, prevailing propagation conditions, local noise level at the receiver site, required sig-



nal-to-noise ratio at the receiver, etc. Under typical conditions, the effective range is approximately 1,200 miles (via the 1-hop F mode at a 12° take-off angle) when operating over average soil, and 2,000 miles (via the 1-hop F mode at a 3° take-off angle) when radiating over ocean water or equipped with a ground screen. Greater ranges are possible using the 2-hop F mode. The suitability of the antenna for a particular circuit can best be determined by a computer analysis of the variables. Andrew offers such an analysis.

The 126° azimuth coverage of these antennas makes them suitable for communication with mobile stations within a broad area. They can be used effectively at shore terminals for transmission to ships and aircraft. The small land area required, together with the extended range when radiating over water, makes them particularly advantageous in these situations. In addition, the antennas can be equipped with transmitting multi-couplers, enabling as many as four transmitters to use an antenna simultaneously. This permits simultaneous



transmission of the message at widely separated frequencies, which ensures effective communications with scattered mobile terminals.

**Features**

**Adaptability.** The 1703 Series antennas require only 1 to 3 acres of land and can be erected over rough or rocky land, since no ground screen is required. The antennas are available with a 50 ohm coaxial input, a 600 ohm balanced input or a 300 ohm balanced input to permit operation with any HF transmitter in common use today.

**Economy.** Because they are formed from components common to a family of over 100 HF antennas, the 1703 Series antennas can be produced at

low cost without sacrificing material or design quality. In addition, the use of triangular lattice towers, normally shipped disassembled in approximately one-fifth their assembled volume, greatly reduces the cost of transportation to the site.

**Strength and Durability.** The galvanized steel towers have the highest strength-to-weight ratio available. The Parafil catenaries are capable of longitudinal yielding to distribute and relieve loads without being permanently deformed. The materials for the 1703 Series have been selected for maximum corrosion resistance: galvanized steel towers, Parafil for catenaries, aluminum-clad steel radiators and alumina ceramic feed-line separators. These materials will

resist the attacks of highly corrosive agents such as salt spray.

**Ease of Shipment and Erection.**

The antennas are shipped in kit form, with all parts necessary for erection, with the exception of the concrete and reinforcing bars used in the tower base and guy anchors, and the wooden front pole. Towers may be shipped entirely disassembled to minimize shipping costs. The antenna curtain is shipped partially assembled, and the assembly is completed in the field by simple interconnection with nuts, bolts, pins and cotter keys.

Epoxy-bonded fiberglass catenaries and/or aluminum towers are available by special order.

All parts are manufactured to precise dimensions to ensure the curtain takes the correct shape and tension without cutting or adjustment. The antennas can be erected without a crane, using a simple tower erection fixture available as an accessory. Tower guys are fastened to anchors with preformed guy grips which enable the guys to be adjusted easily.

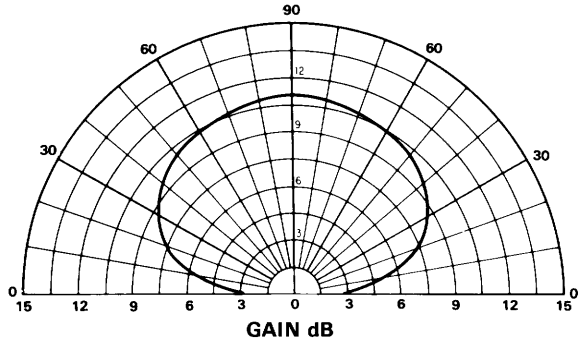
**Accessories**

The following accessories are available for ease of installation and maintenance: tower lighting kit, erection kit, paint kit, tool kit, lightning rod kit, anti-climbing kit, and spares kit.

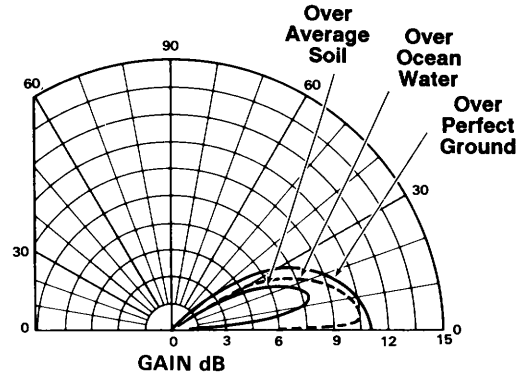
**Characteristics**

Type	HF log-periodic
Frequency Range, MHz	4 types: 1703-104 4.0-32 MHz 1703-103 4.6-32 MHz 1703-102 5.4-32 MHz 1703-101 6.5-32 MHz
Power Rating, kW	20 average, 40 peak
Polarization	Vertical
VSWR	2.0:1 maximum
Gain, dBi	11 dB nominal over perfect ground
Wind Survival Rating, mph (km/h), Without ice	100 (160)
With 0.5 in (12 mm) Radial Ice	70 (100)

**Typical Azimuth Plane Radiation Pattern**  
(Gain in dB Above Isotropic)

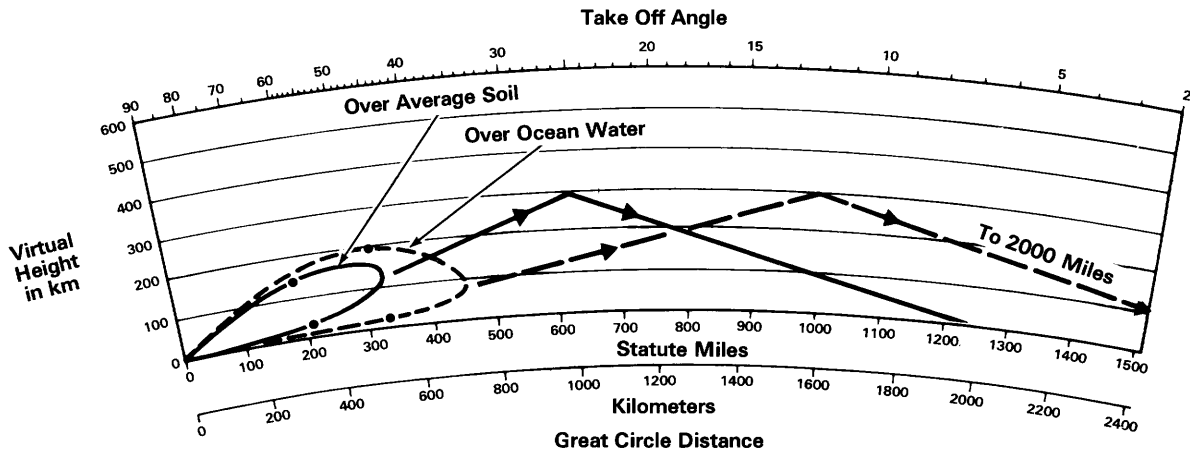


**Typical Elevation Plane Radiation Pattern**  
(Gain in dB Above Isotropic)



Series 1703 antennas operating without a ground screen. Average soil is defined to have a conductivity of 0.01 mhos/meter and a relative dielectric constant of 15.

**Elevation Plane Radiation Pattern**  
Superimposed on Skywave Transmission Chart



The dashed lines show the one-hop transmission distance assuming reflection at a virtual height of 300 km. Note that radiation emitted at the angle of maximum gain over average soil would reach 1200 miles (1930 km) in one hop. Radiation at the angle of maximum gain over ocean water reaches 2000 miles (3220 km) in one hop.

## Ordering Information

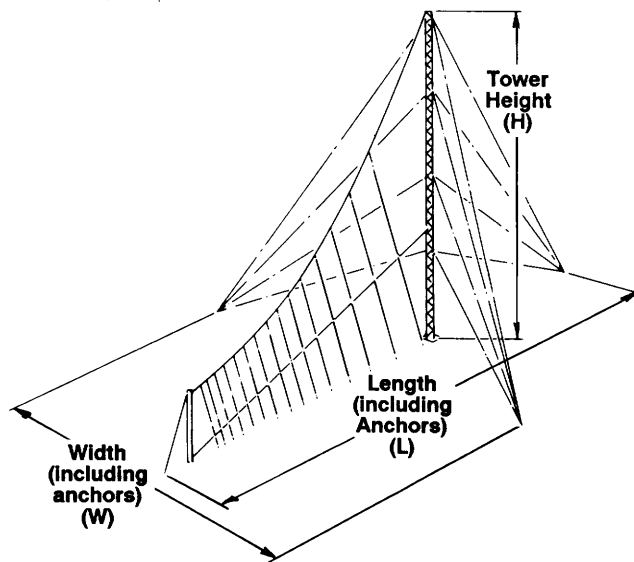
Type Number	Frequency Range, MHz	Length (L) ft (m)	Height (H) ft (m)	Width (W) ft (m)
1703-101-(* )	6.5-32	241 (73.5)	100 (30.5)	171 (52.1)
1703-102-(* )	5.4-32	284 (86.6)	125 (38.1)	190 (58)
1703-103-(* )	4.6-32	339 (103.5)	160 (48.8)	238 (72.5)
1703-104-(* )	4.0-32	410 (125)	205 (64)	307 (93.5)

\*See following table for appropriate suffix to Type Number.

Note: Class 2, 3 or 4 Douglas Fir pole required but not furnished as part of the antenna kit. Required length: 25 ft (76 m).

Type Number Suffix	Power Rating kW		Input Impedance ohms	Input Connector
	Average	Peak		
1K	20	40	300 Balanced	Open Lines
2K	20	40	600 Balanced	Open Lines
3K	20	40	50	3-1/8" EIA
4K	10	20	50	1-5/8" EIA
5K	Receive Only		50	Type N Jack
6K	Receive Only		75	Type N Jack
7K	2.5	30	50	7/8" EIA
8K	1	2	50	Type N Jack

## Antenna Dimensions



Bulletin **1417B** 4/00

Data subject to change without notice  
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**Andrew Corporation**  
10500 West 153rd St.  
Orland Park, IL 60462  
U.S.A.

**From North America:**  
1-800-255-1479  
Fax: 1-800-349-5444  
Intl.: 708-873-2307  
Fax: 708-349-5444

**Andrew Canada, Inc.**  
606 Beech Street, West  
Whitby, Ontario, Canada  
L1N 5S2  
Tel: 905-668-3348  
Fax: 905-668-8590

**Andrew Ltd.**  
Ilex Building, Mulberry  
Business Park  
Fishponds Road  
Wokingham, Berkshire  
England, United Kingdom  
RG41 2GY  
Tel: +44 118-936-6700  
Fax: +44 118-936-6777

**Fax-on-Demand**  
From North America:  
1-800-861-1700  
International:  
708-873-3614

Visit us on the Internet at:  
<http://www.andrew.com>