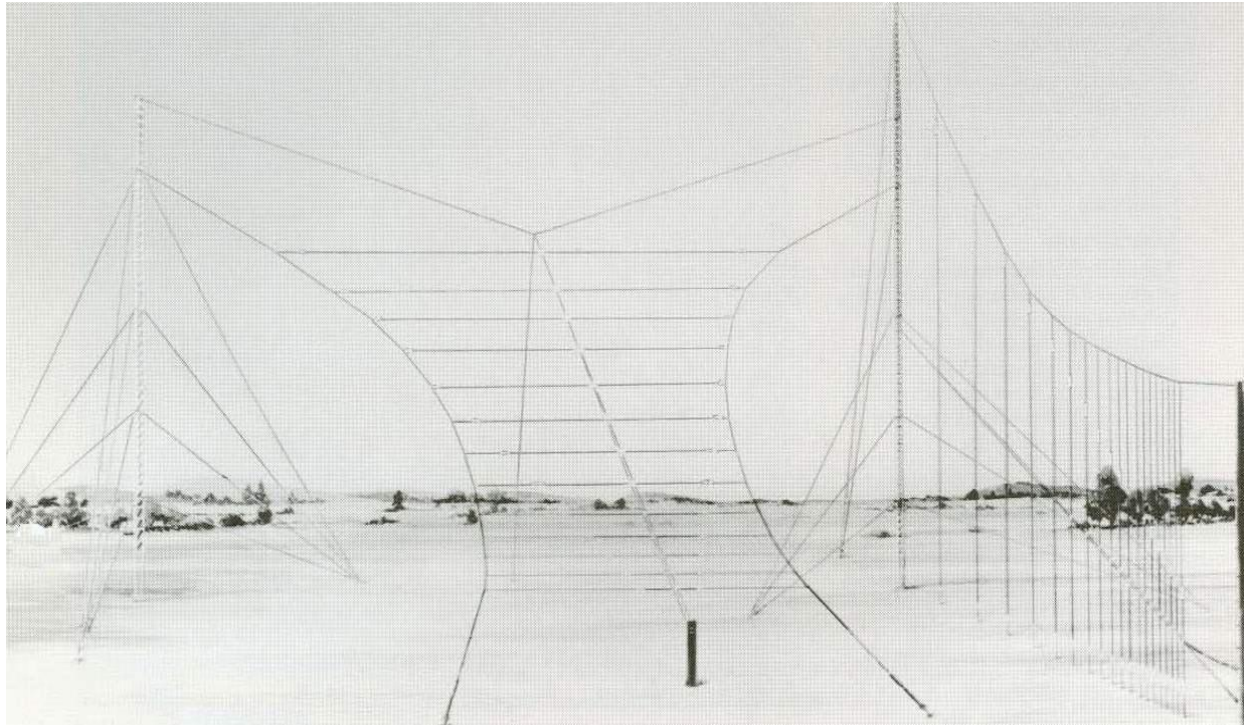# Type 1747A Series GRANGER™
Polarization Diversity HF Log-Periodic Antennas

- **4-30 MHz Frequency Range**
- **Vertical and Horizontal Polarization**
- **2.0:1 Maximum VSWR**
- **Medium-to-Long Range Communications**
- **Space-Saving Combination Reduces HF Fading**
- **Improves Reliability of HF Circuits**
- **Equal or Better Than Space Diversity**

General Description

The 1747A antenna consists of two log periodic arrays; a horizontal array which responds to the horizontally polarized component of the incoming wave and a vertical array which responds to the vertically polarized component. Since the two polarization components very rarely fade simultaneously, one of the two arrays will nearly always supply a signal of adequate strength. Selection of the stronger signal is accomplished by diversity combining techniques of the type currently employed in space diversity systems.

The antenna is recommended for use on circuits where the elevation angle of the incoming signal path lies between 5° and 25°, which usually occurs when the signal path is over 1000 miles (1610km) long. Under these conditions, the diversity gain will be within approximately 3 dB of the theoretical maximum.

Proven Effectiveness

Polarization diversity reception is a proven method of effectively reducing fading. It is widely employed in VHF, UHF and microwave communications has been successfully demonstrated. In field tests, separate receivers were connected to the vertical and horizontal arrays and the AGC voltage from each was recorded side by side. A segment of the record from a typical field test is shown in Figure 1, which indicates that the deep fades do not occur simultaneously in both signals.

An analysis of the entire record of this field test is shown in Figure 2. The chart shows the percentage of time that the received signal fell below any given level in a 13 dB range. A very large increase in transmitted power is required to reduce fading as much as diversity reception. This means that more power is required to achieve the same error rate without diversity reception than is required with diversity reception.

The diversity improvement shown was found valid for other circuits of different distance and bearing and on different occasions to rule out the possibility of peculiar propagation conditions.

Installation

The antenna is suitable for installation at almost all receiving sites. It occupies only four acres of land. It is suitable for use in very harsh environments, being able to withstand hurricane velocity winds, heavy ice loads and deterioration from highly corrosive agents such as salt spray.

The antenna is shipped in kit form, ready for erection. The arrays of radiators and their supporting catenaries are largely preassembled. The towers are shipped entirely disassembled to minimize shipping costs.

Accessories

Aircraft Obstruction Lights (required for each tower) and a kit for painting the towers orange and white.

Field Service

ASC offers field engineering services to site antennas and supervise installation. When comprehensive service is required, ASC will undertake full responsibility for providing an effective antenna system, including propagation analysis, antenna specifications, manufacturing, installation and field tests.
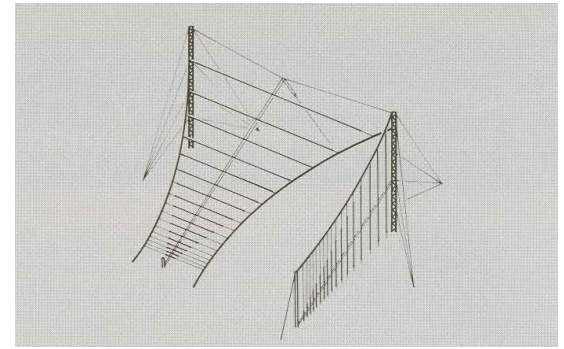
Tower Erection Fixture for erection of the tower by sections without a crane.

Characteristics

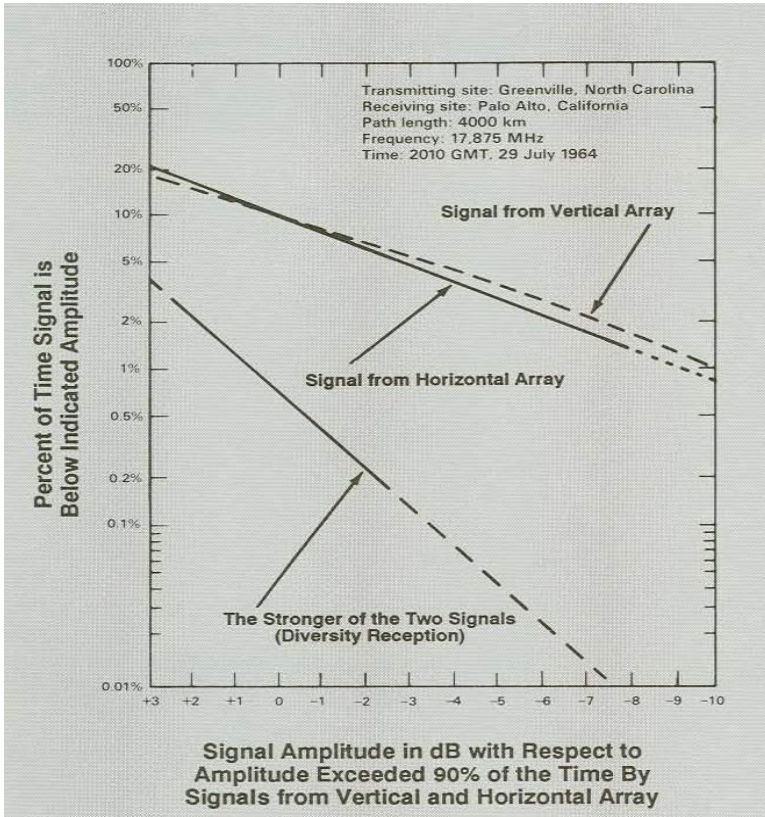|	Vertical Array (Type 2726-3K)	Horizontal Array (Type 2702-104-5K)
Frequency Range, MHz	3.5-32	4-32
Polarization	Vertical	Horizontal
Gain, dBi (over perfectly conducting ground)	10	11.5
Largest Side or Back Lobe, dBi	-14	-11
Response to Signal of Opposite Polarization (below beam max), dB	20	14
Output Impedance, ohms	50	50
VSWR	2.0:1	2.0:1
Output Connector (female)	Type N	Type N
Entire Antenna		
Azimuth Plane Coverage, degrees	60	
Elevation Plane Coverage, degrees	5-25	
Wind Survival Rating, mph (km/h)		
Without Ice	120 (190)	
With 0.5 in (12 mm) Radial Ice	100 (160)	

Section of Recording from Typical Field Test
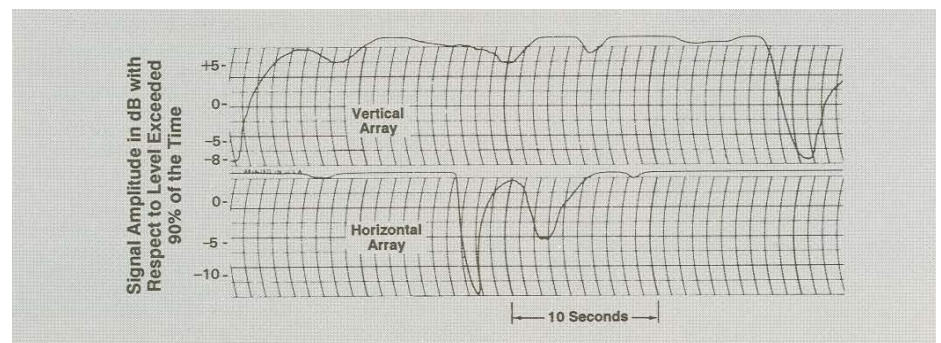
Figure 1

Diversity Improvement

Antenna Dimensions