Series 832/833 Conical Scan Antennas

Features

- High Gain, Low Cost Tracking Antenna
- Stable Electrical Operation
- Rugged Construction
- Conical Scan Tracking with No Rotary Joint
- Minimal Spillover for Low Noise Performance
- 12.4 GHz to 220 GHz Operation
- Available from 12 to 48 inches

Description

The Series 832/833 conical scan antennas are created from the Series 822 and 823 Cassegrain antennas by offsetting the subreflector and spinning it about its central axis. The beam is typically offset by one-half beamwidth, providing a nominal crossover level of -3 dB. Speeds are available from 1500 to 7200 rpm (25 Hz to 120 Hz) with input driver voltages of 3 Vdc to 35 Vdc.

The standard conical scan antenna is composed of a linearly-polarized symmetrical feed and a Cassegrain reflector assembly with a motor driven rotatable subreflector. A tach generator is incorporated in the motor drive assembly to provide position indication. The subreflector support assembly, consisting of four low profile aluminum spars, is mounted on the reflector's rim to position the subreflector accurately and creates only negligible interaction with the radiated beam.

As with the prime focus and Cassegrain antennas, the conical scan antennas are available with main reflectors of machined aluminum, Series 832, or metallized plastic, Series 833. Alpha can also supply a lightweight version of the Series 832 and 833 antennas. With precision-machined aluminum main reflectors, the Series 834 antennas are available with diameters from 12 to 24 inches. The Series 835 lightweight antennas have precision graphite main reflectors from 12 to 72 inches. Sidelobes are nominally -16 dB with the remaining performance characteristics similar to the Series 820 cassegrain antennas. Due to the increased blockage ratio caused by the subreflector and spar assembly, however, the 12-inch diameter conical scan antennas have a nominal sidelobe level of -15 dB.

Theory of Operation

Conical scan tracking is implemented by offsetting the subreflector to yield a comparable beam offset. The offset subreflector (and offset beam) are rotated about the central axis of the antenna so that over the period of one revolution, the beam locus describes a cone. The object of the track will receive or transmit signals at different levels depending on the position of the beam at any given instant in time.

Time-varying signals are received that are directly related to the beam position. This signal is commonly referred to as the conical scan modulation. The modulation amplitude is proportional to the differential signal intercepted at different points on the beam and proportional to the target position relative to the antenna axis. The modulation period is directly related to the speed of rotation.

This method of offsetting the subreflector is a very efficient method of achieving a conical scan with wideband performance. Because the feed assembly, which is the frequency-dependent part of the antenna,

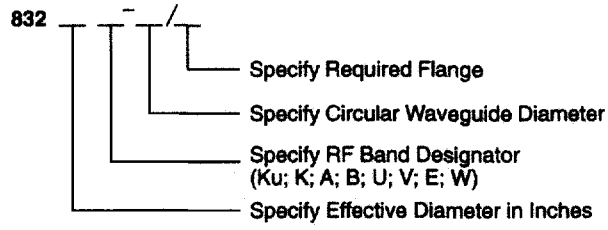
is not disturbed, the same reflector assembly can be used over the whole millimeter wave spectrum assuming that the surfaces are within appropriate tolerance limits. The greatest advantage of this technique over other types of conical scan antennas is the absence of rotary joints.

Band Letter	Series	Diameter
V through W	832,834	12
B through W	832,834	18
A through W	832,834	24
B through W	833,835	18
A through W	833,835	24
D through W	833,835	36
Ku through W	833,835	48

Ordering Information

The center frequency should be specified when ordering these antennas. Bandwidths are typically ±5%. Each antenna is tested at the customer's center frequency up to 100 GHz and optimum focal adjustments are made. Test data will include principal E and H plane radiation patterns at the designated frequency. Special test arrangements may be made for applications above 100 GHz depending on the availability of test sources.

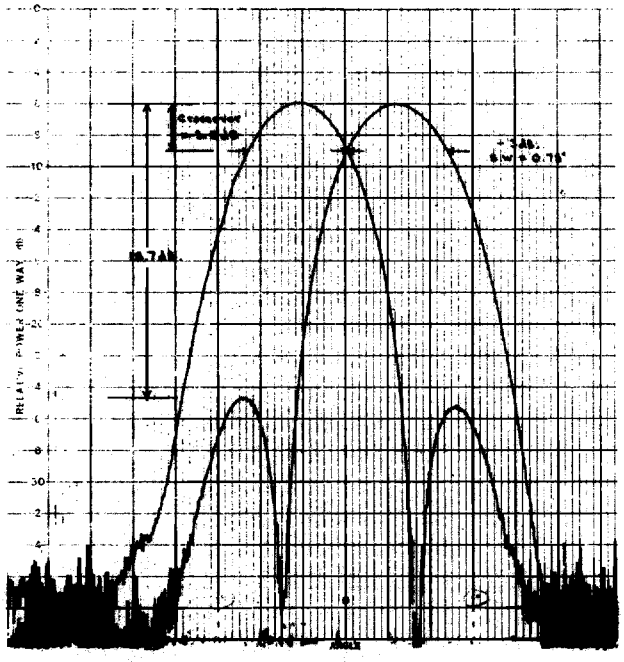
The Series 832 and 833 Cassegrain antennas are linearly polarized, although either dual or circular polarization can be achieved using the circular mode components described later in this section.



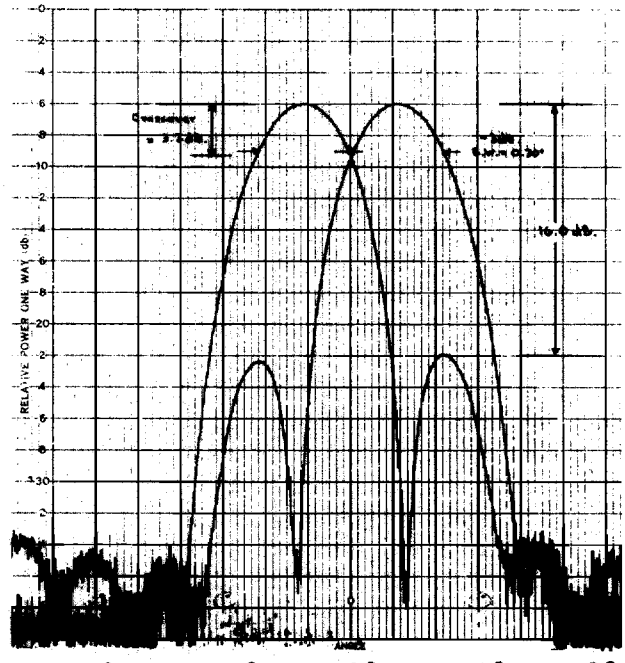
For example: Model number 832024A-250/599 is a Series 832 antenna with a 24 inch effective aperture operating in A-band at 35 GHz with linear polarization and a 599 type flange at the output.

The same antenna with circular mode components becomes model number 832024A-250/C.

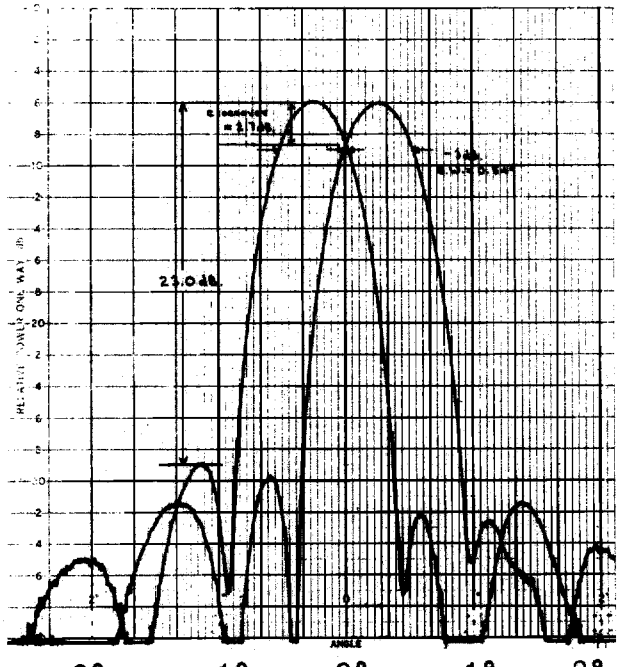
Typical Antenna Patterns for Series 832 Antenna



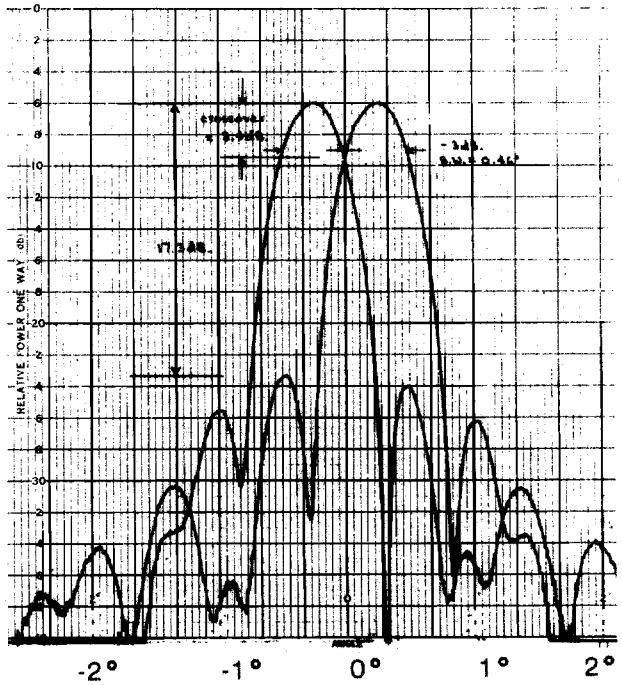
E-Plane — W-Band (12" Dia.)



H-Plane — W-Band (12" Dia.)

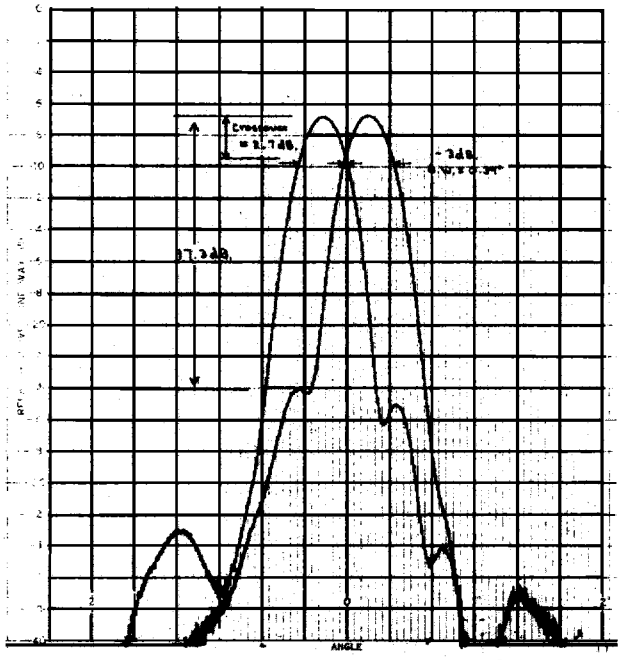


E-Plane — W-Band (18" Dia.)

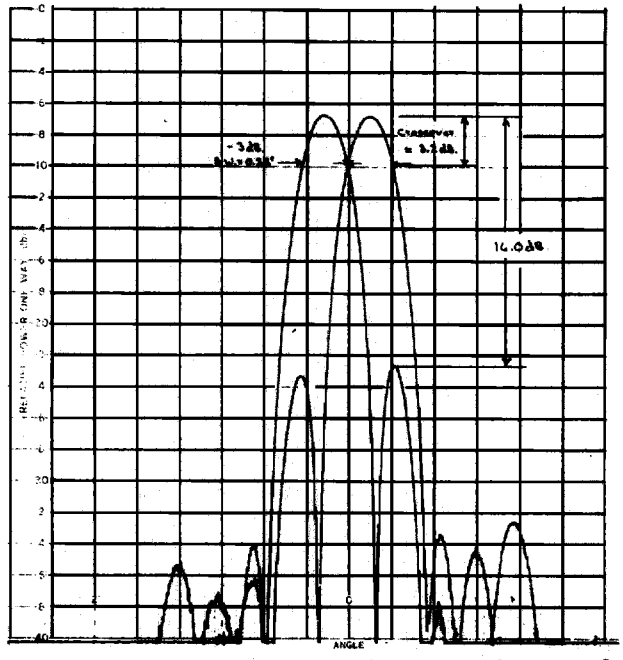


H-Plane — W-Band (18" Dia.)

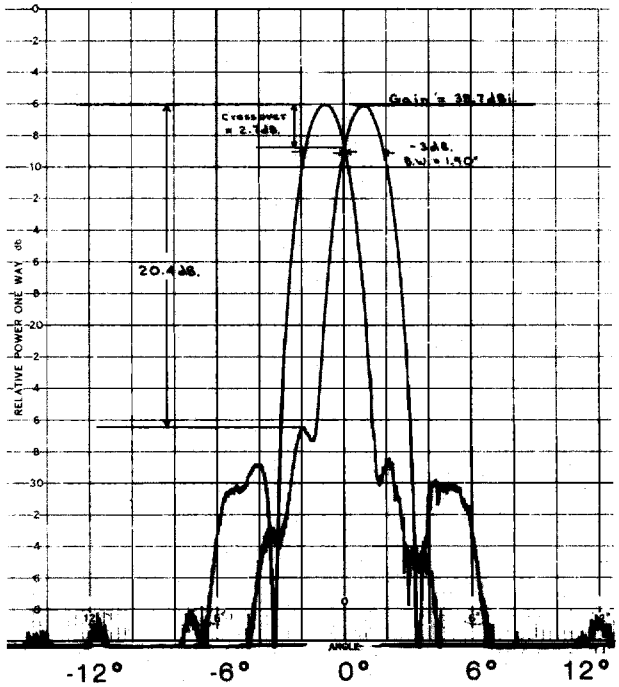
Typical Antenna Patterns for Series 833 Antenna



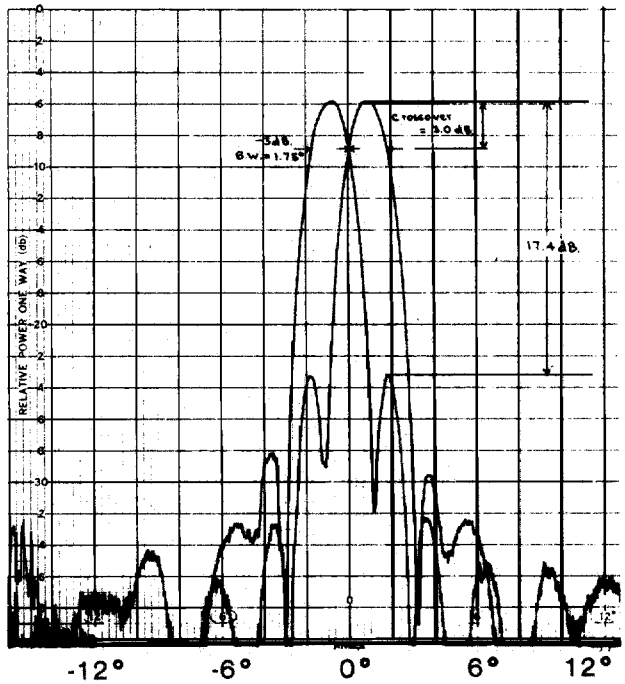
E-Plane — W-Band (24" Dia.)



H-Plane — W-Band (24" Dia.)



E-Plane — X-Band (48" Dia.)



H-Plane — X-Band (48" Dia.)