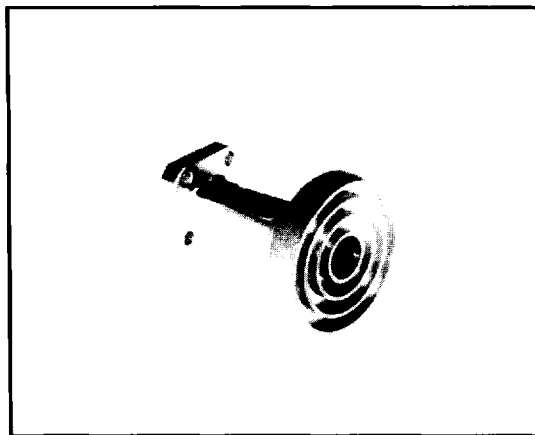


Series 863/868/869 Scalar Feed Horns

Series 863 - Series 868

- ▶ Polarization Insensitive
- ▶ Axially Symmetric Over Waveguide Band for Multimode Operation
- ▶ True Fixed Phase Center
- ▶ Nominal Sidelobes of -30 dB for Both E-Plane and H-Plane
- ▶ Secondary Aperture Efficiency of Approximately 70 percent
- ▶ Series 863 High Efficiency Feeds for Parabolic Antennas
- ▶ Series 868 High Efficiency Feeds for Lens Antennas



Series 869

- ▶ High Efficiency Feed for Radiometer Applications
- ▶ Extremely Low Sidelobes (-30 dB or better)
- ▶ Nominal Beam Efficiency of 98 Percent
- ▶ Axially Symmetric Over Waveguide Band for Multimode Operation
- ▶ Available from 8.2 to 220 GHz



Description

Scalar feeds have been developed to overcome the deficiencies of the more common horn feeds for reflector and lens antennas, such as unequal E and H-plane amplitude patterns, non-coincident phase centers in the E and H planes, and high sidelobe characteristics. Scalar feeds exhibit constant beamwidths over broad bands, extremely low sidelobes, fixed phase centers, and inherently low SWRs. In addition, the corrugated scalar feeds are polarization insensitive, mechanically symmetrical, and capable of producing almost equal radiation patterns.

The Series 863 scalar feeds have been designed to be used with parabolic reflectors that have focal length-to-diameter (F/D) ratios between 0.43 and 0.5. In this application, the scalar feed offers higher aperture efficiency, lower sidelobes, and improved noise temperature. To maximize performance of the scalar feed, the diameter of the parabolic reflector should be at least 30 wavelengths.

For low and medium gain millimeter wave antennas, the Series 868 scalar feeds can be used with a lens

antenna. In this configuration, the unobstructed aperture of a lens provides increased efficiency and significantly reduces sidelobes.

A similar scalar horn may be used to feed a Cassegrain reflector antenna. The Cassegrain geometry, however, will generally dictate a narrower illumination angle which will require a long scalar feed horn than would be required for a lens antenna illumination.

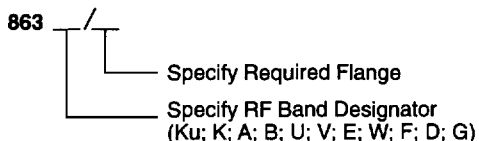
The Series 869 scalar feeds have been designed as stand-alone "farfield" horn antennas. Although the Series 869 can also be used with a Cassegrain antenna, it requires an F/D ratio of approximately 4, which results in an unusual configuration. The Series 869 feeds are most useful for radiometer applications where sidelobes as low as 30 dB can be achieved with beam efficiencies of approximately 97%.

Typical Performance Values for Feeds

Type of Feed	Scalar Feed Wide Angle	Scalar Feed Narrow Angle	Conical Feed	Circular Waveguide Feed	Standard Gain Horn
Model Number	863	868	876	875	861
Beamwidth:					
3 dB: E-Plane	56°	23°	14°	70°	9°
H-Plane	59°	27°	18°	75°	10°
10 dB: E-Plane	104°	44°	23°	140°	28°
H-Plane	112°	50°	30°	150°	22°
Sidelobes (dB)					
E-Plane	-30	-27	-15	-14	-12
H-Plane	-30	-27	-20	-18	-20
Secondary Aperture Efficiency (%)	65	70	55	60	40
Bandwidth (%)	50	40	30	40	30
Applications	Parabolic Antenna on Focus Feed	Lens Feed	Cassegrain Antenna Feed	Parabolic Antenna on Focus Feed	Lens Feed

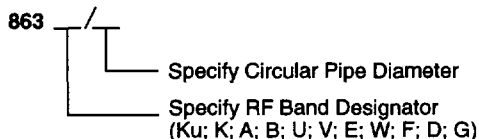
Ordering Information

Linear Mode:



For Example: Model number 863W/387 is a narrow beam scalar feed horn operating in W-band with a 387 type flange.

Circular Mode:



For Example: Model number 863A-250C is a scalar feed horn operating in A-band at 35 GHz with a circular polarization capability.

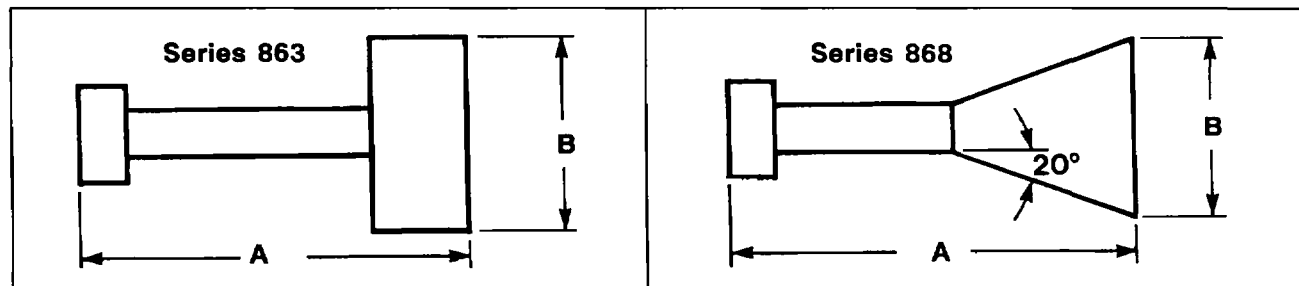
Use the same ordering sequence for Series 868 and 869 feed horns.

Test data will include principal E and H plane radiation patterns at the designated frequency. Scalar feed horns are linearly polarized, although either dual or circular polarization can be achieved using the circular mode components described later in this section.

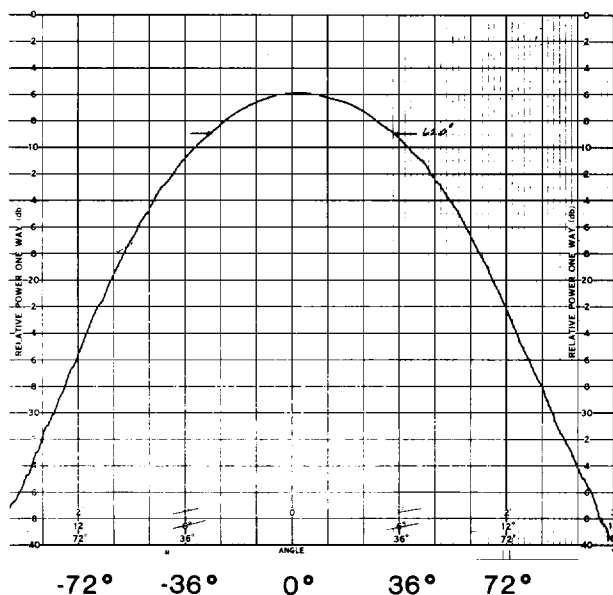
Model 863 and 868 Specification Data Table

Frequency Band (GHz)	EIA-WG Designation	863				868			
		A		B		A		B	
		in	mm	in	mm	in	mm	in	mm
12.4–18.0	WR62	1.8	45.7	2.72	69.1	5.00	127.0	3.12	79.3
18.0–26.5	WR42	1.5	38.1	1.86	47.2	3.50	88.9	2.15	54.6
26.5–40.0	WR28	1.5	38.1	1.17	29.7	2.75	69.9	1.52	38.6
33.0–50.0	WR22	1.2	30.5	1.00	25.4	2.50	63.5	1.25	31.8
40.0–60.0	WR19	1.0	25.4	0.83	21.1	2.25	57.2	1.12	28.5
50.0–75.0	WR15	0.8	20.3	0.66	16.8	1.75	44.5	0.88	22.4
60.0–90.0	WR12	0.80	20.3	0.55	14.0	1.62	41.2	0.75	19.0
75.0–110.0	WR10	0.60	15.2	0.45	11.4	1.50	38.1	0.62	15.8
90.0–140.0	WR8	0.60	15.2	0.36	9.10				
110.0–170.0	WR7	0.50	12.7	0.30	7.60				
140.0–220.0	WR5	0.50	12.7	0.23	5.80				

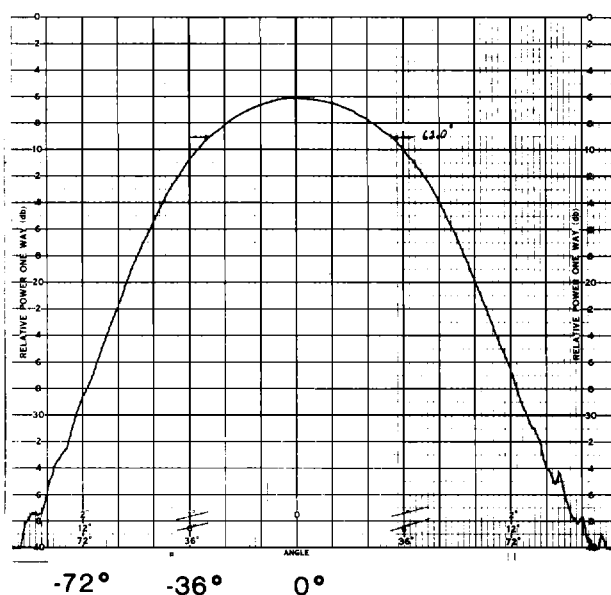
Outline Drawing



Typical Antenna Patterns for Series 863 Scalar Feed Horns

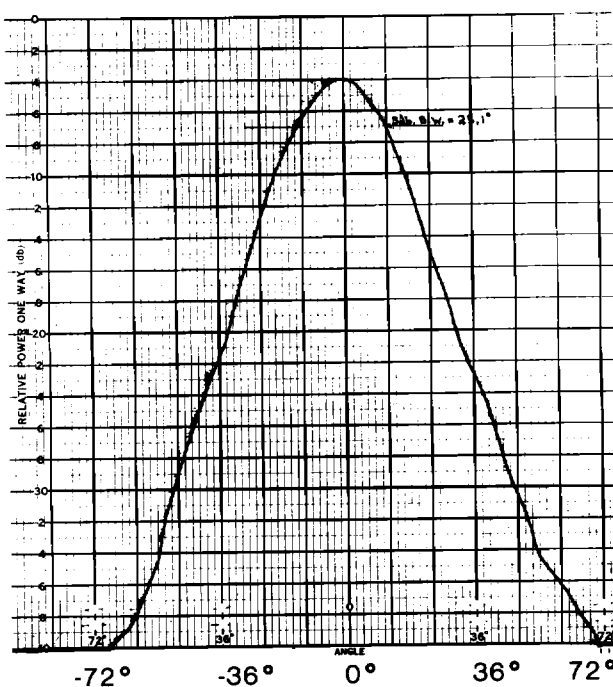


E-Plane — A-Band

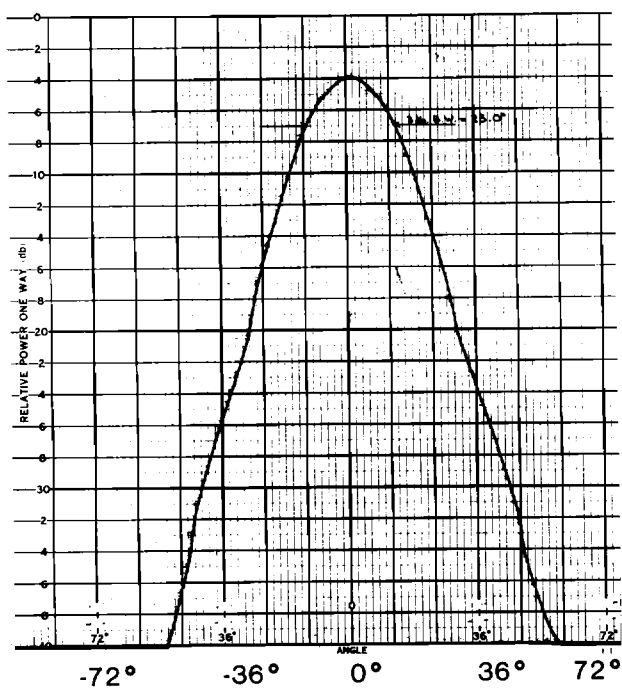


H-Plane — A-Band

Typical Antenna Patterns for Series 868 Scalar Feed Horns



E-Plane — K-Band



H-Plane — K-Band

Typical Antenna Patterns for Series 869 Scalar Feed Horns

