

## 2.4-Meter Prime Focus Ku-Band Earth Station Antenna

### Electrical Performance Meets or Exceeds:

- U.S. FCC regulation 25.209, for mandatory pattern requirements for 2° satellite spacing.\*
- INTELSAT requirements for standard E-1 (IESS208) and G (IESS601) stations.\*
- EUTELSAT requirements for pattern (CCIR 580-2) and polarization discrimination.\*

### Excellent Pattern Characteristics

Patented Prime Focus Optics and Parabolic Main Reflector Provides Excellent Pattern Characteristics and High Gain

### Wind Survival

Rugged Aluminum and Steel Construction Provides 125 mph (200 km/h) Wind Survival, in any Position of Operation

### Electrical Specifications

Operating Frequency Band	
<u>Ku-Band Receive</u>	<u>Ku-Band Transmit</u>
10.95-12.75 GHz	12.75-14.50 GHz

Gain, at rectangular waveguide flange of feed. (dBi, ±0.2 dB)			
<u>Rx Frequency</u>	<u>Rx Gain</u>	<u>Rx Frequency</u>	<u>Rx Gain</u>
10.950 GHz	47.0	12.200 GHz	47.6
11.325 GHz	47.1	12.500 GHz	47.8
11.700 GHz	47.4	12.750 GHz	48.1
11.950 GHz	47.6		

<u>Tx Frequency</u>	<u>Tx Gain</u>	<u>Tx Frequency</u>	<u>Tx Gain</u>
12.750 GHz	48.1	14.000 GHz	49.0
13.000 GHz	48.4	14.250 GHz	49.0
13.250 GHz	48.7	14.500 GHz	49.2

Polarization	Linear
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Polarization Discrimination	>35 dB across 1 dB beamwidth
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Antenna VSWR, Receive (Transmit) with W/G Option	1.5:1 (1.35:1) 1.5:1 (1.4:1)
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Isolation, Tx to Rx	>35 dB
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Beamwidth, degrees	
3 dB Receive (Transmit)	0.75 (0.65)
15 dB Receive (Transmit)	1.60 (1.40)

Antenna Noise Temperature	
<u>Elevation</u>	<u>Kelvin</u>
10°	63°
20°	48°
30°	45°

Antenna G/T @10° El, 11.0 GHz with 90 K LNA	25.5 dB/K
Maximum Input Power	200 Watts (CW)

\*To meet these performance requirements, the antenna must be ordered with the optional polarization cross-axis kit and be used with an LNA/LNB with dimensions not exceeding 16.5 cm long and 5 cm in diameter.

### Mechanical Specifications

Feed Type*	Prime Focus, Aluminum Components Chromate Converted per MIL-C-5541C Finished with highly diffusive white paint
Flange Type (OMT) Reflector Type	WR75 Cover Gasket Precision-Formed Aluminum, single-piece Chromate Converted per MIL-C-5541C Finished with highly diffusive white paint
Mount Type	Az over El, manual pipe mount Galvanized per ASTM-AI23 Customer furnished 5-inch nominal schedule 80 pipe interface

Antenna Pointing Range	
Elevation	0-90°
Azimuth	360°

Polarization Adjustment	180°
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Wind Loading, Survival	125 mph (200 km/h) in any position of operation
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Wind Loading, Operational	50 mph (80 km/h)
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Pointing Accuracy, <u>worst case</u>	
Winds Gusting to 50 mph (80 km/h)	0.084°
Gain Degrades @11 GHz	<0.25 dB

\*Feed replacement does not require electrical realignment.

### Environmental Specifications

Temperature, Operational	-50° to 125°F (-45° to 52°C)
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Rain	4 in (102 mm) per hour
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Solar Radiation	360 BTU/hr/ft <sup>2</sup> (1135 Watts/m <sup>2</sup> )
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Relative Humidity	100%
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### Available Options

Polarization Cross-Axis Kit*	0.5 dB attenuation
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Deicing Kit	Walton Snow Shield Systems
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Shield Kit	Needed for FCC 2' Compliance
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\*Allows transmit RF module mounting behind reflector.

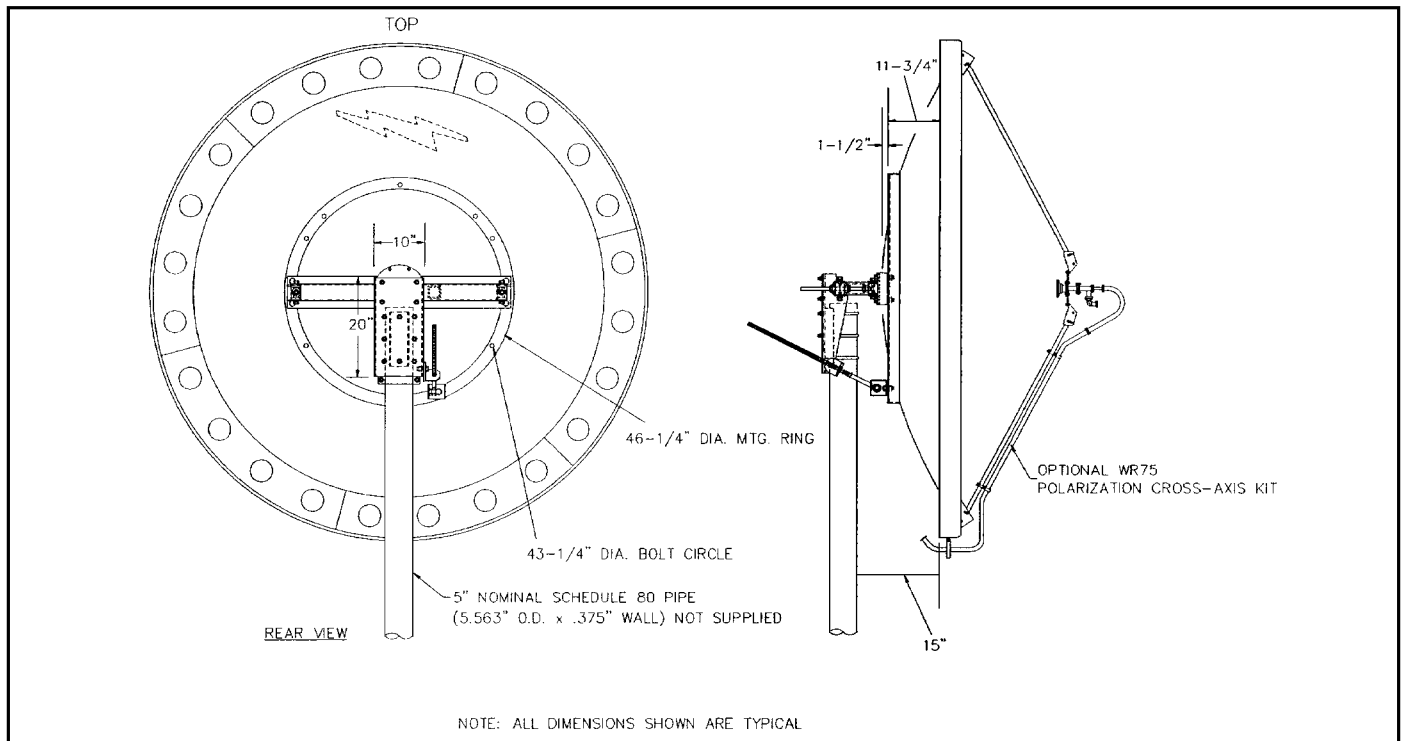
### Shipping Information

Weight, Net	
Reflector	125 lbs. (57 kg)
Mount	130 lbs. (59 kg)
Feed System	10 lbs. (4.5 kg)
Dimensions/Weight, Gross	
Unit Pack	107"L x 44"W x 100"H, 800 lbs. (363 kg)
Bulk Pack, 10 ea.	
Reflector Pack	107"L x 85"W x 108"H, 2350 lbs. (1066 kg)
Mount/Feed Pack	40"L x 60"W x 40"H, 1000 lbs. (454 kg)

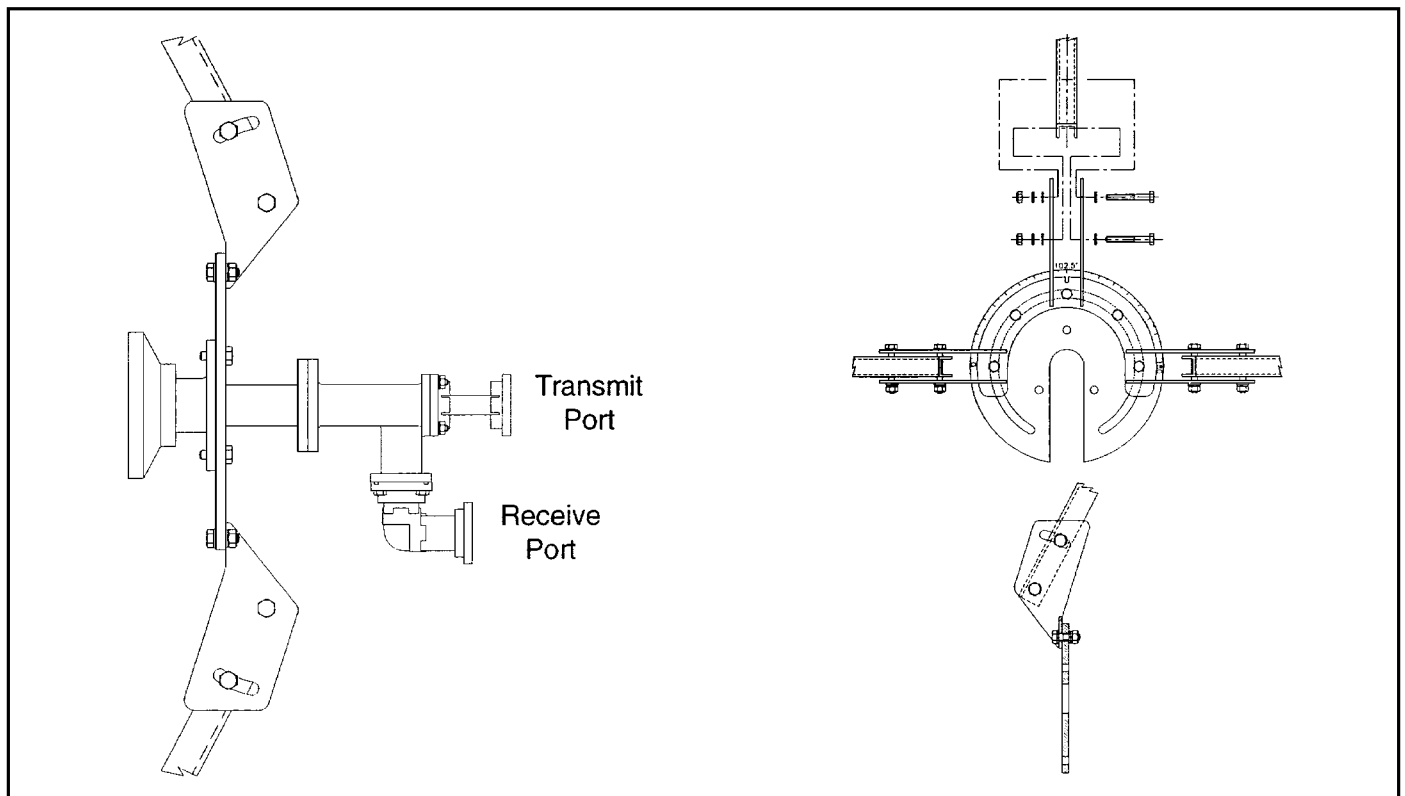
### Ordering Information

Type ESA24K-1, 2.4-Meter Ku-Band ESA  
 Type ESA24K-1 -2, 2.4-Meter Ku-Band ESA with 90 K LNA Type  
 173615 Polarization Cross-Axis Kit  
 Type 173622 Partial Shield Kit  
 Type 173623-1\* Deicing Kit - Walton 2000 Waft, 120 Vac single-phase 60 Hz with moisture/temperature sensor  
 Type 173623-2\* Deicing Kit - Walton 2000 Waft, 220 Vac single-phase 50 Hz with moisture/temperature sensor  
 Type 173623-3\* Deicing Kit - Walton Passive Snow Shield, no heater

\*Pending EUTELSAT/INTELSAT approval.

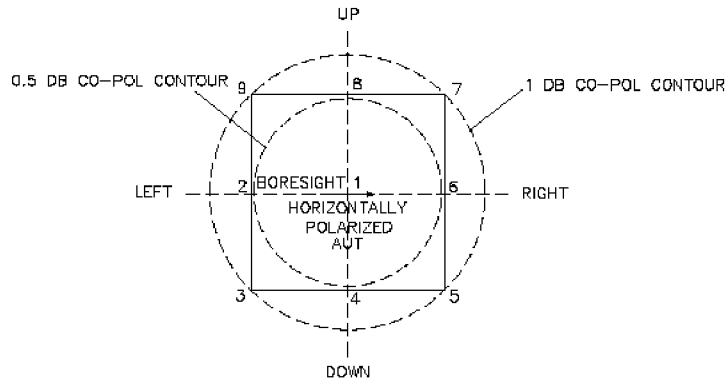


**2.4-Meter Ku-Band Antenna**



**Feed Assembly Mounting**

**Test Range XPD Measurement  
Per EUTELSAT Systems Operation Guide Module 130  
Issue 1, 2-5-1994 ESVA Para. 7.2**

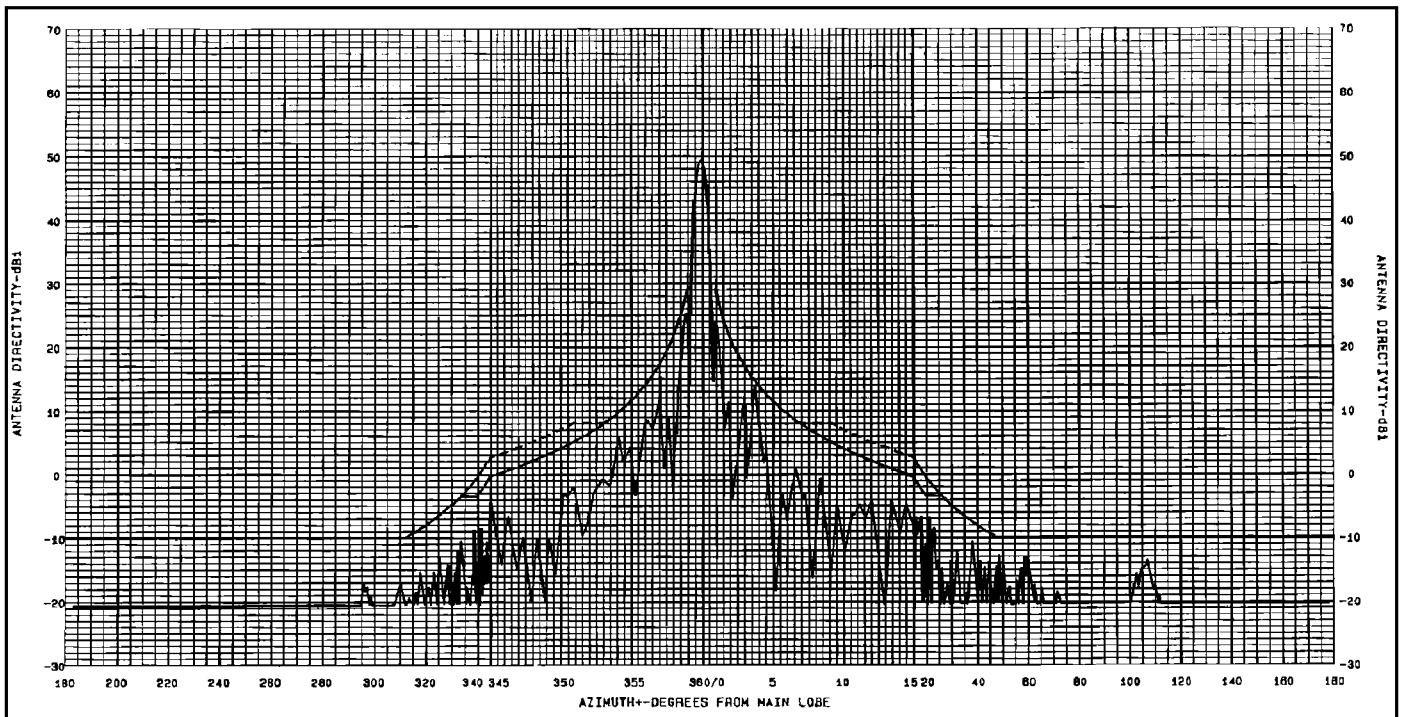


**Summary of Cross-Polar Discrimination**

Point	1	2	3	4	5	6	7	8	9
14.00 GHz	43.5	43.0	38.0	40.0	41.3	43.0	39.0	40.5	37.5
14.25 GHz	40.5	41.0	40.0	39.5	46.0	39.0	38.0	39.5	40.5
14.50 GHz	36.5	38.5	40.0	39.0	45.4	36.5	35.2	36.5	38.5

1. The numbers in the table are cross-polar discrimination in dB for a horizontally-polarized antenna.
2. For the 14.0 to 14.5 GHz transmit band, the 0.5 dB points are approximately  $\pm 0.14$  degree from the boresight and the 1 dB points are approximately  $\pm 0.2$  degree from the boresight.

**Test Range XPD Measurement per EUTELSAT Systems**



**Radiation Pattern Envelope at 14.250 GHz**

## Foundation Load Specifications

### Introduction

This document specifies the foundation loads for the Andrew ESA24K 2.4-Meter Earth Station Antenna. The antenna incorporates a 2.4-meter diameter parabolic reflector mounted on 5" nominal schedule 80 vertical steel pipe (5-1/2" O.D. x 3/8" wall).

### Foundation Loads

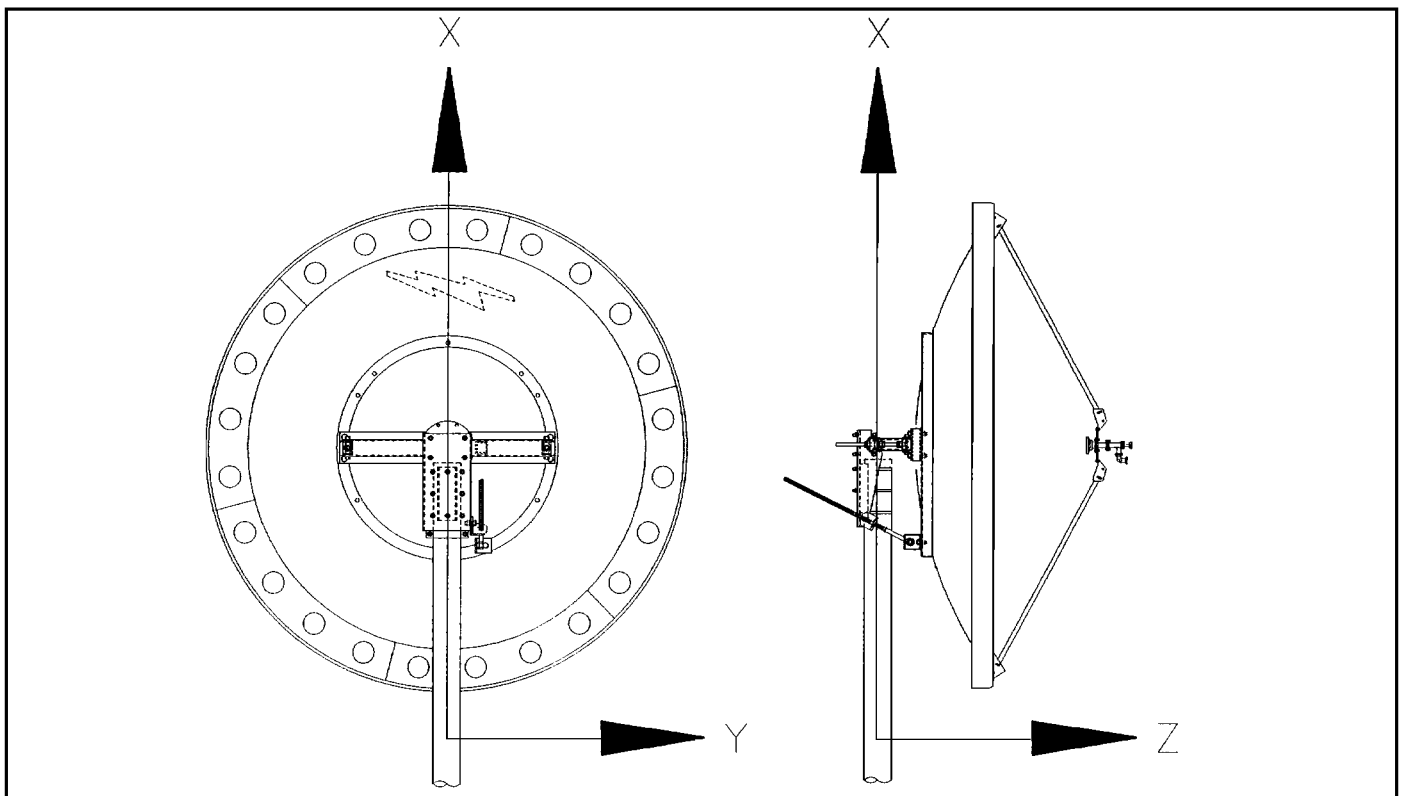
Loads are provided at the base of a 54-inch high mounting pipe using a right-hand Cartesian coordinate system as shown below. Various load conditions are provided based on the elevation angle of the antenna and the incident angle of the wind. The wind angle "A" is the angle of the wind relative to the antenna bore-sight, and the angle "WV" is the wind vector relative to the coordinate system. Loads are provided for wind directions which produce the maximum loading on the antenna for each elevation angle. Forces are given in pounds (lbs) and moments are given in inch.kips (in.kips) where 1 kip=1000 lbs. In all cases, the wind speed is 125 mph and self weight of the antenna is included.

### Foundation Design

The vertical support pipe is customer-supplied material and should be installed in such a manner to adequately resist the maximum foundation loads. If it is necessary to increase the distance from the ground to the top of the vertical mounting pipe beyond 54", the moments in the foundation load table should then be modified accordingly.

FOUNDATION LOADS FOR WIND SPEED OF 125 MPH

Antenna Elevation	Wind Direction	FX (lbs)	FY (lbs)	FZ (lbs)	MX (in.kips)	MY (in.kips)	MZ (in.kips)
0°	A=56	-308	33	-3306	-12.9	176.9	1.8
	A=130	-308	-211	831	26.1	-46.7	-11.4
20°	A=56	-1452	34	-3106	-11.8	162.9	6.2
	A=130	-89	-200	800	23.4	-53.1	-19.3
40°	A=56	-2452	29	-2519	-8.2	127.5	8.5
	A=130	109	-150	731	14.2	-59.4	-20.0
60°	A=60	-3141	0	-1593	0	71.2	0
	A=120	346	0	612	0	-59.5	0
80°	WV=0	-1779	0	-394	0	38.8	0
	WV=180	396	0	331	0	-42.2	0



Foundation Load Coordinate System