ANDREW

OPERATIONS AND MAINTENANCE MANUAL

237230
4.6M Motorizable Ante

Foreword

Purpose

The scope of this manual is intended to provide station personnel with the introduction, installation, operation and preventive maintenance information requirements necessary to operate and maintain a typical earth station system. The manual is comprised of five distinct sections to provide convenient reference for authorized operator/service personnel requiring technical information on general system or specific subsystem equipment.

Content

The manual is divided into five distinct sections, each dealing with a specific technical topic relating to either system or component subsystem information. Coverage is provided herein for optional components that may or may not be applicable to any particular system. Use discretion and apply only the appropriate procedures and corresponding illustrations. The major divisions of the manual are described and listed under the following technical headings:

1. **Introduction** – describes overall manual content and equipment purpose.

2. **Installation** – describes installation of earth station system components with reference to the cable routing and interface wiring diagrams provided in section 5.

3. **Operation** – describes general operational procedures of applicable electromechanical subsystems required for proper operation of the earth station system.

4. **Preventive Maintenance** – describes periodic preventive maintenance procedures on electromechanical subsystem components required to maintain proper functional operation of the earth station system.

5. **Drawings** – include cable routing and interface wiring diagrams between electromechanical earth station subsystem components.

Proprietary Data

Information and Assistance

For additional Andrew supplied product information or further technical assistance, contact:

Andrew Corporation
10500 W. 153rd Street
Orland Park, IL 60462
(312) 460-6316

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It is recommended that all cross axis waveguide and coaxial cable are secure such that high winds will not cause excessive flexing.

4.5 Meter Tripod ESA

For telescoping strut type mounts, verify all set screws are securely tightened (minimum 50 ft-lbs) on the azimuth and elevation struts. For threaded rod strut type mounts, fully retract threaded rod into azimuth and elevation strut pipes. The azimuth strut should be placed in the center of its travel.

3.6, 3.7, 4.5, 4.6, and 5.6 Meter Motorized Pedestal Mounted ESA

Position the antenna to an elevation angle of 90 degrees. The azimuth jack screw should be placed in the center of its travel.

5.6, 7.3, 7.6 Meter Tripod ESA

Position the antenna to an elevation angle of 35 degrees (+/- 3 degrees). The azimuth jack screw should be placed in the center of its travel.

9.3, 9.1 Meter ESA

Position the antenna to an elevation angle above 80 degrees. The azimuth jack screw should be placed in the center of its travel.

10 Meter ESA

Position the reflector in azimuth as close to the foundation center line (front to back) as possible.

12 Meter ESA

The azimuth jack screw should be placed in the center of its travel.

Section 1
3.7-/4.5-/4.6-Metre Earth Station Antenna System Manual

1.0 Introduction

1.1 This technical manual contains installation, operation, and preventive maintenance information for a typical 3.7-/4.5-/4.6-Metre Earth Station Antenna System. The basic equipment and accessories are either manufactured or design controlled by Andrew Corporation, Orland Park, Illinois.

1.2 The manual includes all essential information required for the performance of complete installation, operation and preventive maintenance by qualified station engineering personnel.

1.3 Installation and operating sections include a comprehensive assembly procedure of equipment components and detailed operating instructions. The preventive maintenance section enables qualified personnel to test and maintain the equipment using standard hand tools and test equipment. All items covered are designated to be within the operating and maintenance capabilities of all engineering staff personnel.

1.4 The drawings section contains applicable wiring and interface diagrams and specific technical reference pertaining to applicable options and accessories.

2.0 General

2.1 The 3.7-/4.5-/4.6-Metre Earth Station Antenna System is designed for use as an integral component in a satellite interconnection system. The earth station has been designed primarily for reliability, simplicity of operation, and future expandability. In addition, the system provides total operational flexibility through the following key features:

A. The antenna mount is capable of 120° continuous movement in azimuth and +90° in elevation.

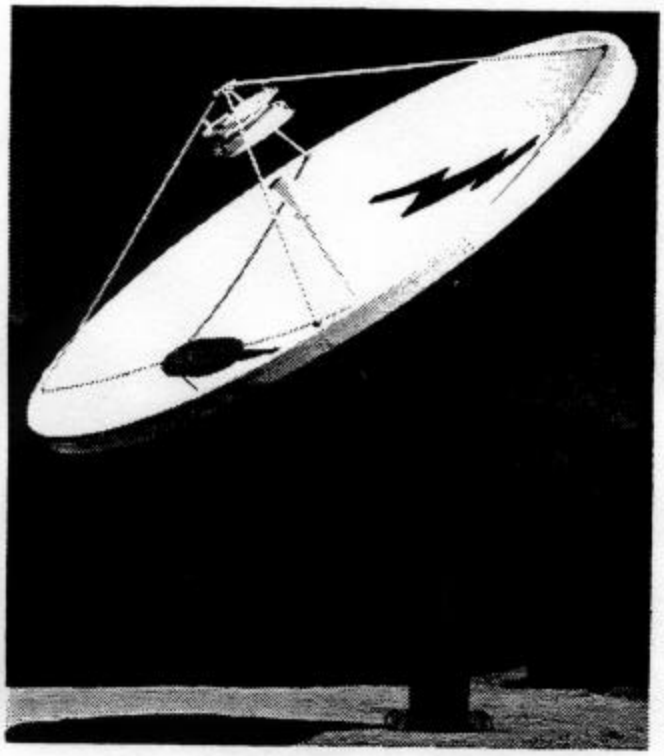
B. Optional antenna drive motor systems enable convenient repositioning of the antenna to view any of the satellites capable of being seen from your location.

3.0 Description

3.1 3.7-Metre Earth Station Antenna. The 3.7-metre earth station antenna incorporates advanced dual-reflector technology together with a single-piece precision spun aluminum reflector assembly resulting in extremely accurate surface contour, providing exceptionally high gain, superior efficiency and closely controlled pattern characteristics. The single-piece, precision reflector spinning ensures precise reflector shaping to exacting tolerances for maximized electrical performance characteristics. A large equipment enclosure capable of accommodating optional 4-port combining networks is directly attached to the rear of the reflector assembly.

3.2 4.5-Metre Earth Station Antenna. The 4.5-metre earth station antenna utilizes an exclusively designed prime focus, beam-shaping feed and ground plane configuration, together with a precision spun aluminum reflector to

produce extremely high gain, excellent efficiency and closely controlled pattern characteristics. The segmented aluminum reflector minimizes shipping costs. All required installation mounting holes are pre-drilled before the reflector spinning is segmented to ensure the assembled reflector will maintain the original surface contour.



3.3 4.6-Metre Earth Station Antenna. The 4.6-metre earth station antenna incorporates a uniquely formed dual-reflector Gregorian system, coupled with close tolerance manufacturing techniques, resulting in extremely accurate surface contours, providing superior electrical performance characteristics. The segmented aluminum reflector panels are precisely cut from a single piece, precision spun reflector to minimize shipping costs. Integrated into the aluminum back structure assembly is a large equipment enclosure capable of housing optional 4-port combining networks with corresponding support systems.

3.4 Antenna Ground Mount Assemblies. All earth station antenna ground mounts are made of hot-dipped galvanized steel fabricated with high strength friction connections using A-325 structural hardware to provide assembly stiffness. Azimuth travel of 180° in three over lapping 120° segments and continuous elevation adjustment from 0°-90° is provided.

3.5 Resolver Assemblies. A resolver is utilized as part of the optional motorized feed rotation system to convey the angular position of the feed assembly in digital format. Mechanical limit switches are provided at the end points of the polarization adjustment to prevent feed rotation component damage. Resolvers are provided on both the elevation and azimuth axes of the antenna. Each resolver conveys the angular position of the reflector in digital format. The resolvers are absolute encoders that enable extensive consistent accuracy while remaining unaffected by power failures or electrical noise. Control distances up to 700 feet maximum are permissible through direct point-to-point wiring between the antenna site and the corresponding equipment room.

3.6 Earth Station Antenna Drive Motor Systems. All earth station antennas may be equipped with optional drive motor systems on each axis controlling azimuth (120°), elevation (0° to 90°) and polarization (± 90°). Limit switches are provided at the end points of each axis to prevent overtravel with resultant structural damage. Two motor driven jackscrews are provided to drive the antenna; one for the elevation axis and one for the azimuth axis, with minimal overshoot. Each 3ø drive system contains a magnetic disc brake motor. The motor output shaft is gear coupled to a jackscrew. When the motor windings are energized, the magnetic disc brake is also energized to overcome the force of the motor brake springs thereby releasing the brake and allowing the motor to run. With the motor de-energized, the magnetic disc brake is de-energized allowing the brake springs to engage the brake discs to stop antenna movement.

3.7 Local Control/Motor Drive Controller. The optional local control/motor drive controller (Figure 3-7) is a NEMA-3R rainproof enclosure installed on the antenna ground mount. It accepts local inputs via the manually operated front panel switches to power the azimuth, elevation and polarization drive motors. The local control/motor drive controller employs manual starter protectors which provide both thermal overload and overcurrent protection for the motors and associated wiring. In the event of a motor overload or short circuit condition, the

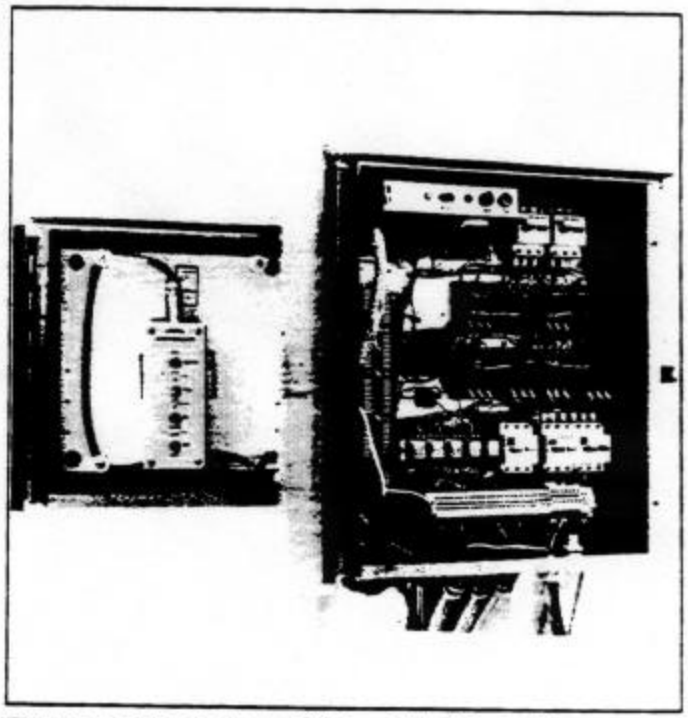


Figure 3-7. Local Control/Motor Drive Controller

manual starter protectors may trip and must be manually reset after the fault has been corrected. The controller has a control circuit breaker for internal protection. With the LOCAL/REMOTE panel switch in the LOCAL position, the antenna can be controlled entirely from the front panel. Each switch is labeled with the appropriate axis and direction, and controls a contactor which in turn operates a corresponding motor. While in this mode, any external control device will have no effect on the local control/motor drive controller, subsequently the antenna. With the LOCAL/REMOTE panel switch in the REMOTE position, the antenna can be entirely controlled from a remote control source. A signal entering the junction box from an external control device is routed via the I/O board (consisting of solid state relays) to control a contactor which in turn operates a corresponding motor. While in this mode, the front panel motor control switches will have no effect on the local control/motor drive controller, subsequently the antenna.

3.8 Optional Main Load Center. The optional main load center (Figure 3-8) is a NEMA-3R rainproof type enclosure installed on the antenna ground mount. The main load center provides primary power distribution and overload protection for the local control/motor drive controller. Expansion space is provided for additional circuit breakers to protect the various electrical options available with the antenna. Secondary surge protectors are incorporated to suppress electrical surges from lightning strikes and protect the equipment from serious overvoltage damage.

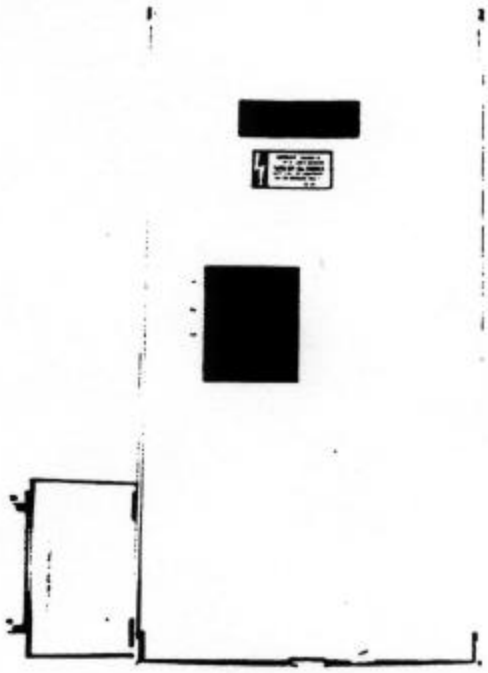


Figure 3-8. Optional Main Load Center Shown in 208V/60 Hz 3 ø U.S. Configuration

4.0 Performance Specifications

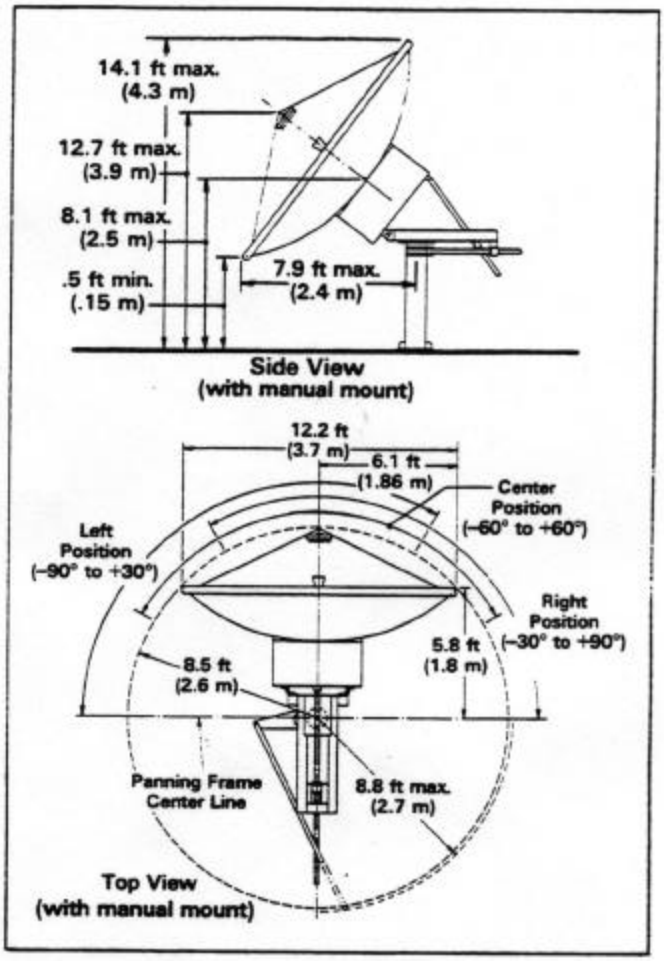
3.7-Metre Earth Station Antenna

Type Number	ESA37-114A	ESA37-124A	ESA37-134A
Electrical Specifications			
Operating Frequency, GHz			
Receive	10.95-11.70	11.70-12.20	12.25-12.75
Transmit	14.00-14.50	14.00-14.50	14.00-14.50
Gain, Steady State, Mid-band, ±0.2 dBi			
Receive	51.3	51.7	52.1
Transmit	53.2	53.2	53.2
Polarization	Linear	Linear	Linear
VSWR, Maximum: Receive (Transmit)	1.30 (1.30)	1.30 (1.30)	1.30 (1.30)
Beamwidth, Mid-band, Degrees			
–3 dB Receive (Transmit)	0.44 (0.36)	0.42 (0.36)	0.40 (0.36)
–15 dB Receive (Transmit)	0.85 (0.69)	0.83 (0.69)	0.80 (0.69)
Antenna Noise Temperature at Feed Interface, ±2K			
10° Elevation	48	48	48
30° Elevation	38	38	38
50° Elevation	35	35	35
Radiation Pattern Performance	Per FCC Regulation 25-209 and Per CCIR Recommendation 580		
Tx Power Handling Capability, kW (per port)	2	2	2
Feed Interface Flanges mate with, Receive (Transmit)	WR75 (WR75)	WR75 (WR75)	WR75 (WR75)
Isolation, Tx into Rx, dB	40	40	40
Cross-Polarization Discrimination, dB, on axis	35	35	35

Mechanical Specifications

Antenna Diameter	3.7m
Antenna Type	Gregorian, Dual-Reflector
Subreflector Type	Elipsoid
Mount Type	EL over AZ
Reflector Construction	Aluminum Homogenous Spinning
Antenna Pointing Range*: Coarse (Continuous)	
Elevation	0-90° (90°)
Azimuth	180° (120°)
Polarization	180°
Motor Drive System, Travel Rates**	
Dual-Speed Power (mount not shown)	208VAC; 3 phase; 60 Hz
Elevation, low (high)	0.10°/sec (0.40°/sec)
Azimuth, low (high)	0.10°/sec (0.40°/sec)
Polarization	2.5°/sec
Weight, Net	1200 lb (544 kg)
Shipping (Typical)	2000 lb (907 kg)
Material/Finish	
Reflector	Aluminum, chromate converted and painted with highly diffusive white paint
Back Structure	Aluminum, chromate converted and painted with high gloss white paint
Ground Mount	Hot-dipped galvanized steel
Installation Hardware	Stainless and hot-dipped galvanized steel
Enclosure	
Diameter	48 in (1219 mm)
Depth	24 in (610 mm)

*Manual mount includes hand crank for 15° continuous azimuth/elevation adjustment.
**Optional motorized version includes taller mount.

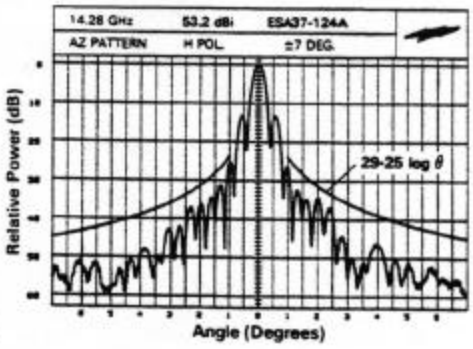


Environmental Specifications

Wind Loading	
Survival (steady state)	125 mph (200 km/h) without ice 87 mph (140 km/h) with 1 in (25 mm) of radial ice
Operational	45 mph (72 km/h) gusting to 65 mph (105 km/h)
Motor Drives	To 65 mph (105 km/h)
Temperature	
Operational	–40° to 125°F (–40° to 52°C)
Pointing Accuracy	
30 mph (48 km/h) Winds Gusting to 45 mph (72 km/h)	0.039° RMS
Seismic (earthquake)	Grade 11-Mercalli Scale
Rain	4 in (102 mm)/hour
Relative Humidity	100%
Solar Radiation	360 BTU/hr/ft² (1135 watts/m²)
Shock and Vibration	As encountered by commercial air, rail and truck shipment.
Atmospheric Conditions	As encountered in corrosive coastal and industrial areas.

Foundation Specifications (Typical, manual mount)

Type	Slab
Size	
Width	9 ft (2.7 m)
Depth	1 ft (0.3 m)
Length	9 ft (3.7 m)
Concrete	
Volume	3 yd³ (2.3 m³)
Compressive Strength	3000 lb/in² (211 kg/cm²)
Reinforcing Steel	200 lb (91 kg)
Soil Bearing Capacity	3000 lb/ft² (14646 kg/m²)
Conduit (PVC)	
Electrical	2 in (51 mm)
IFL	4 in (102 mm)



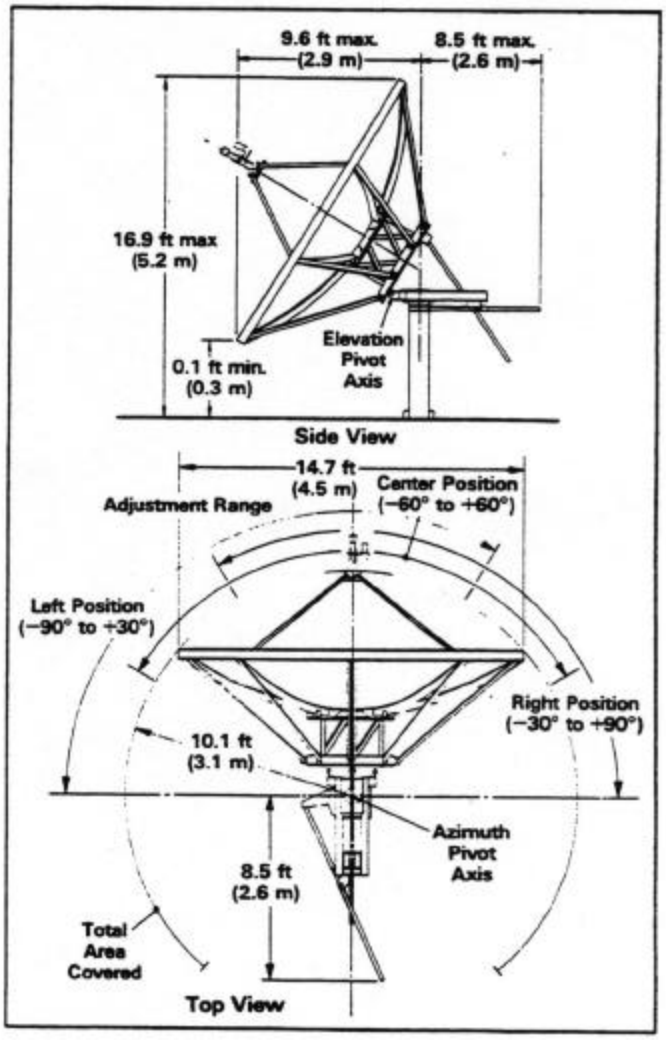
Actual satellite pattern measured upon completion of Andrew installation/alignment

4.5-Metre Earth Station Antenna

Type Number	ESA45-4A	ESA45-46B
Electrical Specifications		
Operating Frequency, GHz		
Receive	3.7-4.2	3.7-4.2
Transmit	—	5.925-6.425
Gain, Steady State, Mid-band, ±0.2 dBi		
Receive	44.2	43.9
Transmit	—	46.6
Polarization	Linear	Linear
VSWR, Maximum: Receive (Transmit)	1.30 (—)	1.30 (1.25)
Beamwidth, Mid-band, Degrees		
–3 dB Receive (Transmit)	1.20 (—)	1.20 (0.85)
–15 dB Receive (Transmit)	2.40 (—)	2.40 (1.90)
Antenna Noise Temperature at Feed Interface, ±2K		
10° Elevation	32	32
30° Elevation	20	20
50° Elevation	19	19
Radiation Pattern Performance	Per FCC Regulation 25-209 and Per CCIR Recommendation 580	
Tx Power Handling Capability, kW (per port)	—	5
Feed Interface Flanges mate with, Receive (Transmit)	CPR229G (—)	CPR229G (CPR137G)
Isolation, Tx into Rx, dB	—	40
Cross-Polarization Discrimination, dB, on axis	30	30

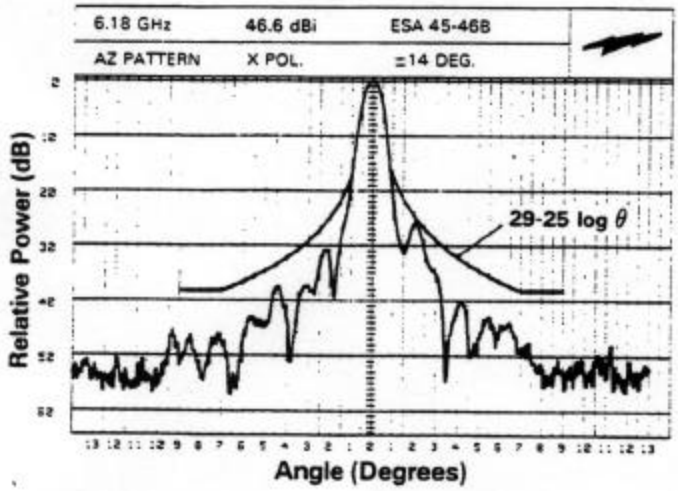
Mechanical Specifications	
Antenna Diameter	4.5m
Antenna Type	Prime Focus
Mount Type	EL over AZ
Reflector Construction	Aluminum 6 Panel Segments
Antenna Pointing Range*: Coarse (Continuous)	
Elevation	0-90° (90°)
Azimuth	180° (120°)
Polarization	360° (180°)
Motor Drive System, Travel Rates**	
Single-Speed Power	208VAC; 3 phase; 60 Hz
Elevation	0.40°/sec
Azimuth	0.40°/sec
Polarization	2.5°/sec
Weight, Net	2400 lb (1089 kg)
Shipping (Typical)	3000 lb (1361 kg)
Material/Finish	
Reflector	Aluminum, chromate converted and painted with highly diffusive white paint
Back Structure	Aluminum, chromate converted and painted with high gloss white paint
Ground Mount	Hot-dipped galvanized steel
Installation Hardware	Stainless and hot-dipped galvanized steel

*Manual mount includes hand crank for 15° continuous azimuth/elevation fine adjustment.
**Dual speed system available upon request.



Foundation Specifications (Typical)	
Type	Slab
Size	
Width	10 ft (3 m)
Depth	1.5 ft (.5 m)
Length	10 ft (3 m)
Concrete	
Volume	5.5 yd^3 (4.2 m^3)
Compressive Strength	3000 lb/in^2 (211 kg/cm^2)
Reinforcing Steel	285 lb (129 kg)
Soil Bearing Capacity	3000 lb/ft^2 (14646 kg/m^2)
Conduit (PVC)	
Electrical	2 in (51 mm)
IFL	4 in (102 mm)

Environmental Specifications	
Wind Loading	
Survival (steady state)	125 mph (200 km/h)
Operational	45 mph (72 km/h) gusting to 65 mph (105 km/h)
Motor Drives	To 65 mph (105 km/h)
Temperature	
Operational	–40° to 125°F (–40° to 52°C)
Pointing Accuracy	
30 mph (48 km/h) Winds Gusting to 45 mph (72 km/h)	0.035° RMS
Seismic (earthquake)	Grade 11-Mercalli Scale
Rain	4 in (102 mm)/hour
Relative Humidity	100%
Solar Radiation	360 BTU/hr/ft^2 (1135 watts/m^2)
Shock and Vibration	As encountered by commercial air, rail and truck shipment.
Atmospheric Conditions	As encountered in corrosive coastal and industrial areas.



Actual satellite pattern measured upon completion of Andrew installation/alignment

4.6-Metre Earth Station Antenna

Type Number	ESA46-114	ESA46-124	ESA46-134
Electrical Specifications			
Operating Frequency, GHz			
Receive	10.95-11.70	11.70-12.20	12.25-12.75
Transmit	14.00-14.50	14.00-14.50	14.00-14.50
Gain, Steady State, Mid-band, ±0.2 dBi			
Receive	53.4	53.8	54.2
Transmit	55.4	55.4	55.4
Polarization	Linear	Linear	Linear
VSWR, Maximum: Receive (Transmit)	1.30 (1.30)	1.30 (1.30)	1.30 (1.30)
Beamwidth, Mid-band, Degrees			
–3 dB Receive (Transmit)	0.36 (0.28)	0.34 (0.28)	0.32 (0.28)
–15 dB Receive (Transmit)	0.70 (0.54)	0.67 (0.54)	0.64 (0.54)
Antenna Noise Temperature at Feed Interface, ±2K			
10° Elevation	51	51	51
30° Elevation	41	41	41
50° Elevation	38	38	38
Radiation Pattern Performance	Per FCC Regulation 25-209 and Per CCIR Recommendation 580		
Tx Power Handling Capability, kW (per port)	2	2	2
Feed Interface Flanges mate with, Receive (Transmit)	WR75 (WR75)	WR75 (WR75)	WR75 (WR75)
Isolation, Tx into Rx, dB	40	40	40
Cross-Polarization Discrimination, dB, on axis	35	35	35

Mechanical Specifications

Antenna Diameter	4.6m
Antenna Type	Gregorian, Dual-Reflector
Subreflector Type	Ellipsoid
Mount Type	EL over AZ
Reflector Construction	Aluminum 16 Panel Segments
Antenna Pointing Range*: Coarse (Continuous)	
Elevation	(0-90°)
Azimuth	180° (120°)
Polarization	360° (180°)
Motor Drive System, Travel Rates	
Dual-Speed Power	208VAC; 3 phase; 60 Hz
Elevation, low (high)	0.1°/sec (0.4°/sec)**
Azimuth, low (high)	0.1°/sec (0.4°/sec)**
Polarization	2.5°/sec
Weight, Net	2400 lb (1089 kg)
Shipping (Typical)	3000 lb (1361 kg)
Material/Finish	
Main Reflector	Aluminum, chromate converted and painted with highly diffusive white paint
Back Structure	Aluminum, chromate converted and painted with high gloss white paint
Ground Mount	Hot-dipped galvanized steel
Installation Hardware	Stainless and hot-dipped galvanized steel
Enclosure	
Diameter	48 in (122 mm)
Depth	24 in (610 mm)

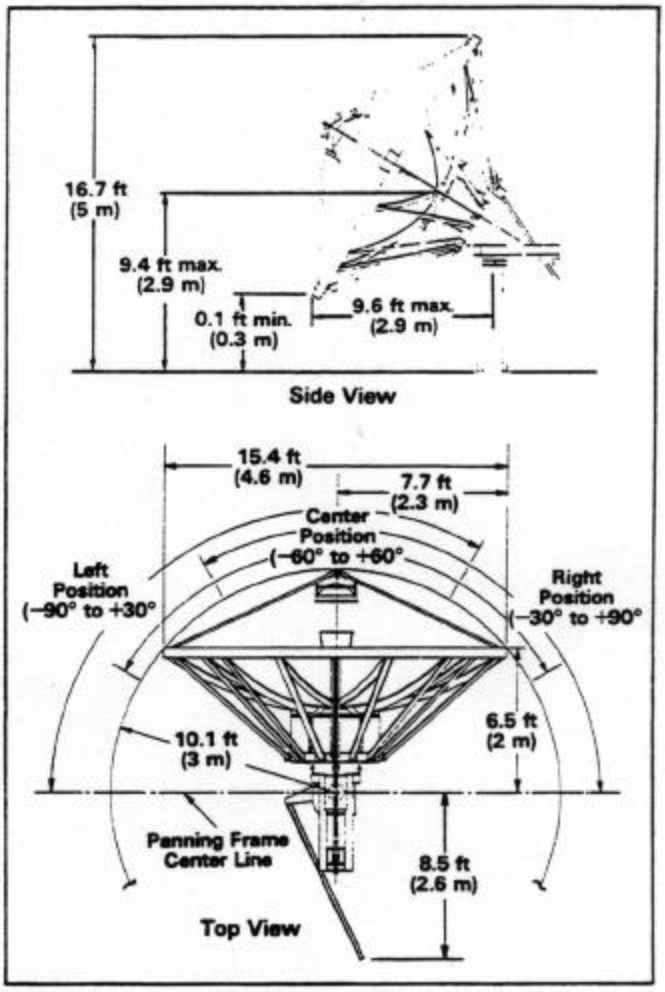
*Manual mount includes hand crank for 15° continuous azimuth/elevation adjustment.
**High speed option is available.

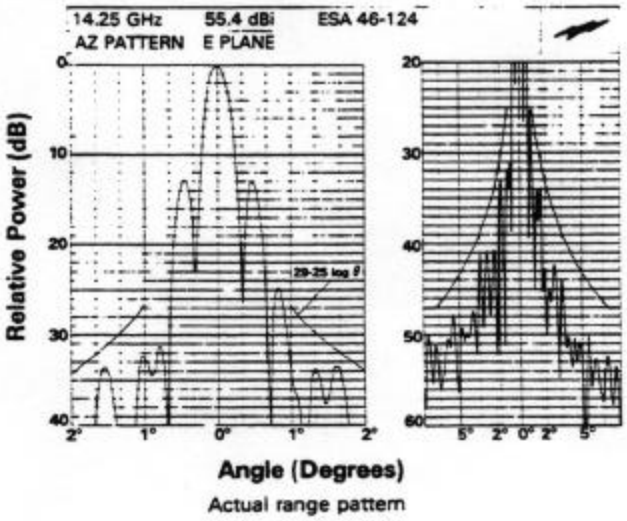
Environmental Specifications

Wind Loading	
Survival (steady state)	125 mph (200 km/h)
Operational	45 mph (72 km/h) gusting to 65 mph (105 km/h)
Motor Drives	To 65 mph (105 km/h)
Temperature	
Operational	–40° to 125°F (–40° to 52°C)
Pointing Accuracy	
30 mph (48 km/h) Winds Gusting to 45 mph (72 km/h)	0.036° RMS
Seismic (earthquake)	Grade 11-Mercalli Scale
Rain	4 in (102 mm)/hour
Relative Humidity	100%
Solar Radiation	360 BTU/hr/ft^2 (1135 watts/m^2)

Foundation Specifications (Typical)

Type	Slab
Size	
Width	10 ft (3 m)
Depth	1.5 ft (1.5 m)
Length	10 ft (3 m)
Concrete	
Volume	5.5 yd^3 (4.2 m^3)
Compressive Strength	3000 lb/in^2 (211 kg/cm^2)
Reinforcing Steel	285 lb (129 kg)
Soil Bearing Capacity	3000 lb/ft^2 (14646 kg/m^2)
Conduit (PVC)	
Electrical	2 inch (51 mm)
IFL	4 inch (102 mm)





Actual range pattern

Foundation Specifications

for 4.5-/4.6-Meter Earth Station Antennas

1.0 INTRODUCTION

1.1 This document specifies typical foundation characteristics, designs, requirements and dimensional specifications for the Andrew 4.5-/4.6-Meter Earth Station Antennas.

2.0 FOUNDATION LOADING CHARACTERISTICS

2.1 Foundation loads are applied to the foundation pad as shown in Figure 1. Positive applied forces are in the direction of the X, Y, and Z coordinate axes.

2.2 Varying load conditions are dependent upon icing, incident angle of the wind and elevation/azimuth angles of the antenna. Foundation loading for various icing, elevation/azimuth and wind conditions are listed in Table 1. Foundation loading moment for various elevation/azimuth versus wind conditions are listed in Table 2.

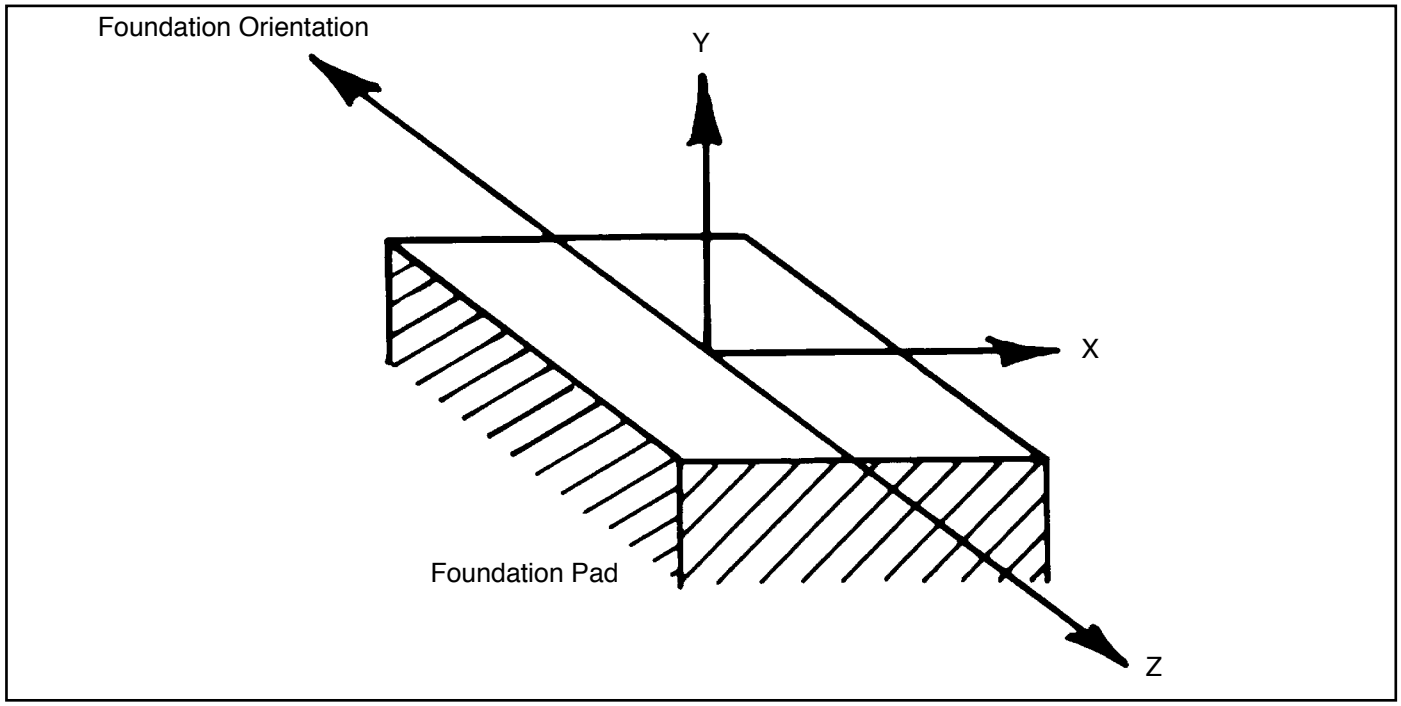


Figure 1

Andrew Corporation
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Printed in U.S.A. 4/99

EL = 0° **FOUNDATION LOADING FORCES (lbs)**

Wind Speed (mph)	Angle (α)	AZ = 0° x	AZ = 0° y	AZ = 0° z	AZ = +60° x	AZ = +60° y	AZ = +60° z	AZ = -60° x	AZ = -60° y	AZ = -60° z	AZ = 90° x	AZ = 90° y	AZ = 90° z
125	15°	354	-1841	11220	-9543	-1833	5918	9896	-1847	5305	-11220	-1841	354
125	-15°	-354	-1841	11220	-9896	-1833	5305	9543	-1847	5918	-11220	-1841	-354
125	30°	530	-1841	11210	-9444	-1833	6065	9975	-1847	5147	-11210	-1841	530
125	-30°	-530	-1841	11210	-9975	-1833	5147	9444	-1847	6065	-11210	-1841	-530
125	45°	420	-1841	10870	-9203	-1833	5799	9624	-1847	5071	-10870	-1841	420
125	-45°	-420	-1841	10870	-9624	-1833	5071	9203	-1847	5799	-10870	-1841	-420
125	60°	-707	-1841	10030	-9039	-1833	4402	8332	-1847	5627	-10030	-1841	-707
125	-60°	707	-1841	10030	-8332	-1833	5627	9039	-1847	4402	-10030	-1841	707
125	120°	-2426	-1841	-2634	1069	-1833	-3418	-3494	-1847	783	2634	-1841	-2426
125	-120°	2426	-1841	-2634	3494	-1833	784	-1068	-1847	-3418	2634	-1841	2426
125	135°	-2281	-1841	-4263	2552	-1833	-4106	-4832	-1847	-156	4263	-1841	-2281
125	-135°	2281	-1841	-4263	4832	-1833	-156	-2551	-1847	-4106	4263	-1841	2281
125	150°	-1646	-1841	-5590	4018	-1833	-4220	-5664	-1847	-1369	5590	-1841	-1646
125	-150°	1646	-1841	-5590	5664	-1833	-1369	-4018	-1847	-4220	5590	-1841	1646

EL 30° **FOUNDATION LOADING FORCES (lbs)**

Wind Speed (mph)	Angle (α)	AZ = 0° x	AZ = 0° y	AZ = 0° z	AZ = +60° x	AZ = +60° y	AZ = +60° z	AZ = -60° x	AZ = -60° y	AZ = -60° z	AZ = 90° x	AZ = 90° y	AZ = 90° z
125	60°	-667	-6646	8804	-7957	-6638	3824	7291	-6653	4979	-8804	-6646	-667
125	-60°	667	-6647	8803	-7291	-6639	4979	7957	-6653	3824	-8803	-6647	667
125	135°	-1862	-845	-4350	2836	-837	-3788	-4698	-851	-562	4350	-845	-1862
125	-135°	1862	-845	-4350	4698	-837	-562	-2836	-821	-3788	4350	-845	1862

EL = 60° **FOUNDATION LOADING FORCES (lbs)**

Wind Speed (mph)	Angle (α)	AZ = 0° x	AZ = 0° y	AZ = 0° z	AZ = +60° x	AZ = +60° y	AZ = +60° z	AZ = -60° x	AZ = -60° y	AZ = -60° z	AZ = 90° x	AZ = 90° y	AZ = 90° z
125	±60	0	-10162	5627	-4873	-10154	2814	4873	-10168	2814	-5627	-10162	0
125	120°	-69	-762	-3417	2925	-753	-1768	-2993	-767	-1649	3417	-762	-69
125	-120°	69	-761	-3417	2993	-753	-1649	-2925	-767	-1768	3417	-761	69

EL = 90° **FOUNDATION LOADING FORCES (lbs)**

Wind Speed (mph)	Angle (α)		AZ = 0° x	AZ = 0° y	AZ = 0° z	AZ = +60° x	AZ = +60° y	AZ = +60° z	AZ = -60° x	AZ = -60° y	AZ = -60° z	AZ = 90° x	AZ = 90° y	AZ = 90° z
125	90°	Side Wind	-1921	-949	0	-960	-941	-1664	-961	-956	1664	0	-949	1921
		Frontal Wind	0	-949	-1921	-1664	-941	961	1664	-956	961	-1921	-949	0
125	-90°	Side Wind	1921	-949	0	961	-941	1664	960	-956	-1664	0	-949	-1921
		Frontal Wind	0	-949	1921	-1664	-941	961	1664	-956	961	1921	-949	0

Table 1

3.0 ANCHOR BOLT REQUIREMENTS

3.1 Typical anchor bolt installation configurations and dimensions are shown in Figure 2.

3.2 Andrew type 203666 Anchor Bolt Kit includes anchor bolts, alignment plates and required mounting hardware as shown.

4.0 FOUNDATION DESIGNS

4.1 The selected foundation for a particular site is dependent upon local conditions. Soil borings and foundation analysis should be performed by a qualified civil engineer.

EL = 0° **FOUNDATION LOADING MOMENT (in-lbs)**

Wind Speed (mph)	Angle (α)	AZ = 0° x	AZ = 0° y	AZ = 0° z	AZ = +60° x	AZ = +60° y	AZ = +60° z	AZ = -60° x	AZ = -60° y	AZ = -60° z	AZ = 90° x	AZ = 90° y	AZ = 90° z
125	15°	985333	-48824	-32031	521078	-48829	837559	464633	-48838	-869208	32031	-48824	985333
125	-15°	985333	48824	33451	464299	48838	870256	521412	48829	-836512	-33451	48824	985333
125	30°	984407	-70569	-48407	534694	-70573	828390	449998	-70560	-876526	48407	-70569	984407
125	-30°	984406	70569	49834	449665	70560	877573	535028	70573	-827342	-49834	70569	984406
125	45°	952914	-94738	-38209	510056	-94753	806067	442959	-94748	-844014	38209	-94738	952914
125	-45°	952914	94738	39635	442625	94748	845062	510390	94748	-805019	-39635	94738	952914
125	60°	875109	-89366	66207	380659	-89357	790876	494458	-89367	-724343	-66207	-89366	875109
125	-60°	875109	89366	-64784	494125	89367	725391	380993	89357	-789829	64784	89366	875109
125	120°	-297894	232651	225420	-343669	232629	-145377	45783	232608	371040	-225420	232651	-297894
125	-120°	-297894	-232651	-223996	45542	-232649	-369993	-343335	-232653	146332	223996	-232651	-297894
125	135°	-448780	235374	211990	-407395	235320	-282740	-41220	235357	494973	-211990	235374	-448780
125	-135°	-448780	-235374	-210566	41554	-235357	-493925	-407061	-235344	283695	210566	-235374	-448780
125	150°	-571693	192460	153173	-417945	192441	-418528	-153546	192480	572037	-153173	192460	-571693
125	-150°	-571694	-192460	-151749	153880	-192480	-570989	-417620	-192441	419576	151749	-192460	-571694

EL = 30° **FOUNDATION LOADING MOMENT (in-lbs)**

Wind Speed (mph)	Angle (α)	AZ = 0° x	AZ = 0° y	AZ = 0° z	AZ = +60° x	AZ = +60° y	AZ = +60° z	AZ = -60° x	AZ = -60° y	AZ = -60° z	AZ = 90° x	AZ = 90° y	AZ = 90° z
125	60°	684612	-76965	13558	330988	-76958	599555	-353588	-76876	-585703	-13558	-76965	684612
125	-60°	684464	76865	-12134	353254	76976	586750	331304	76858	-598477	12134	76865	684464
125	135°	-540579	155381	250334	-487154	155399	-342996	-53892	155381	593665	-250334	155381	-540579
125	-135°	-540593	-155381	248909	-54184	-155394	-592618	-485782	-155399	343134	-248909	-155381	-540593

EL = 60° **FOUNDATION LOADING MOMENT (in-lbs)**

Wind Speed (mph)	Angle (α)	AZ = 0° x	AZ = 0° y	AZ = 0° z	AZ = +60° x	AZ = +60° y	AZ = +60° z	AZ = -60° x	AZ = -60° y	AZ = -60° z	AZ = 90° x	AZ = 90° y	AZ = 90° z
125	±60°	338700	0	712	169274	-8	293654	169607	8	-292607	-712	0	338721
125	120°	-500059	2889	11291	-259808	2889	-427418	-240624	2882	438930	-11291	2889	-500059
125	-120°	-499985	-2889	-9872	-240958	-2883	-437882	-258936	-2886	428429	9872	-2889	-499985

EL = 90° **FOUNDATION LOADING MOMENT (in-lbs)**

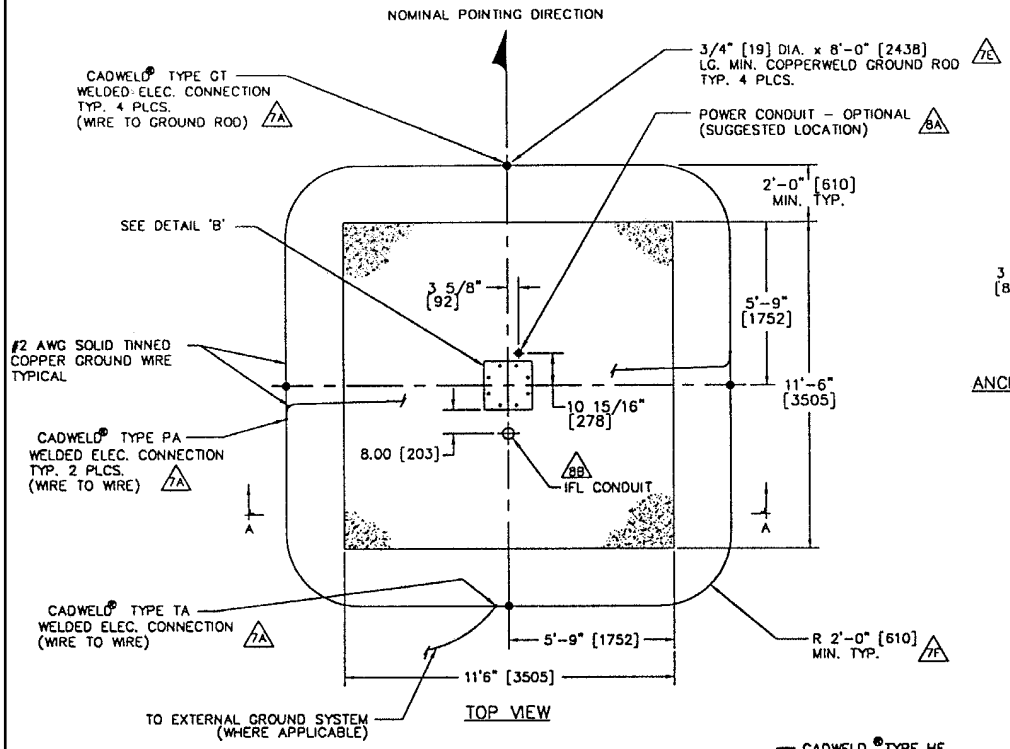
Wind Speed (mph)	Angle (α)		AZ = 0° x	AZ = 0° y	AZ = 0° z	AZ = +60° x	AZ = +60° y	AZ = +60° z	AZ = -60° x	AZ = -60° y	AZ = -60° z	AZ = 90° x	AZ = 90° y	AZ = 90° z
125	90°	Side Wind	2273	-240	317030	-272957	-226	154809	275358	-226	156939	317030	-240	-2273
		Frontal Wind	318653	0	770	159217	-9	281972	159598	9	-275292	770	0	-318653
125	-90°	Side Wind	2304	240	-315610	275024	226	-150267	-272623	226	-159393	-315610	240	-2304
		Frontal Wind	318653	0	712	159217	-9	281964	159598	9	-275292	712	0	-318653

Table 2

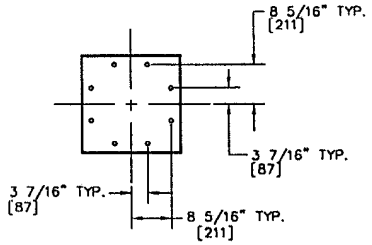
4.2 A typical slab type foundation is shown in Figure 2. A copy of this design on a D-size (22" x 33") sheet is available from Andrew on request. Refer to drawing number 240001.

5.0 FOUNDATION ORIENTATION

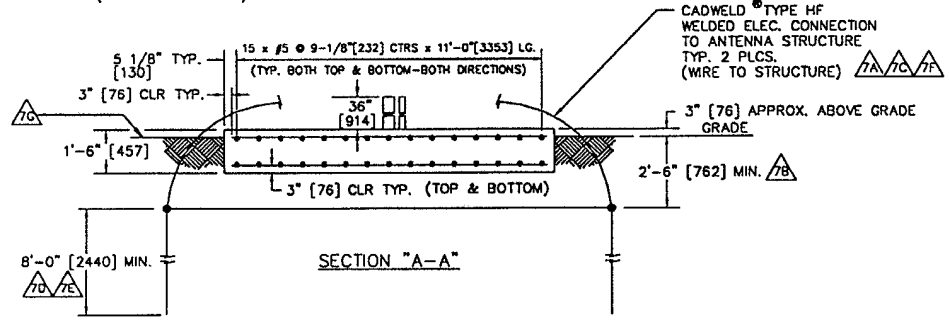
5.1 Proper foundation orientation is required to obtain the desired orbital arc coverage from a particular site location. The required azimuth and elevation angles of the antenna, relative to the mount must be determined to establish the appropriate foundation orientation. A specific foundation orientation requirement may be requested with the antenna as part of the installation package.



TOP VIEW

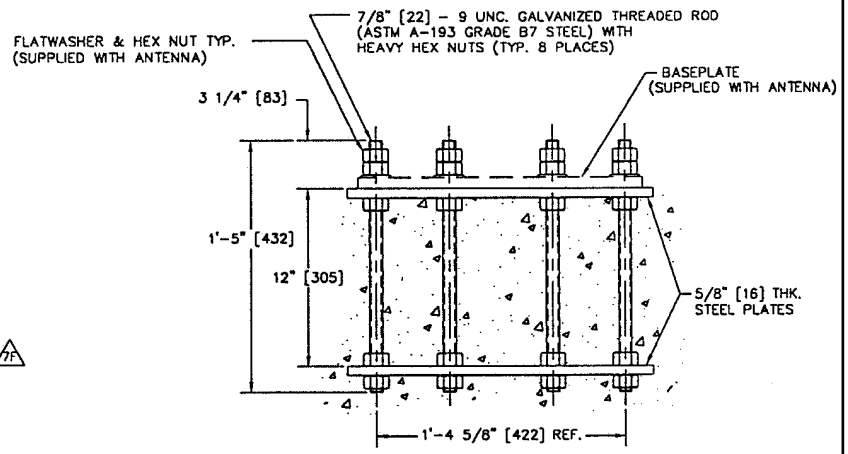


DETAIL 'B'
ANCHOR BOLT PATTERN DETAIL
NOT TO SCALE



SECTION "A-A"

VOLUME OF CONCRETE	7.35 CUBIC YARDS (5.62 CUBIC METERS)
WEIGHT OF REINFORCING	688 LBS. (312 KILOGRAMS)



ANCHOR BOLT DETAIL
SCALE: 1/4
ANDREW ANCHOR BOLT KIT
P/N: 203666

Figure 2

1. Remove all burrs and sharp edges.
2. Dimensions apply before plating.
3. Interpret drawing per ANSI Y14.5M-1982.
4. Dimensions are shown in feet and inches. Dimensions in brackets [ ] are in millimeters.
5. A tolerance of ±1/8" [3] applies to all anchor bolt layout dimensions.

6. Foundation Notes:

A) This foundation is a typical design only. Certification of it's suitability for a particular installation by a professional engineer is required prior to it's use for actual fabrication.

B) Contractor shall field verify all dimensions locating existing construction before fabrication of new construction begins.

C) Concrete and related work shall be mixed, placed and cured in accordance with "Building Code Requirements for Reinforced Concrete" ACI 318-89 (Rev. 88) and "Specifications for Structural Concrete" ACI 301-84 (Rev. 88) publication SP-15 (88).

D) Concrete for foundations shall develop a compressive strength of at least 3000 psi [211 kgf/cm^2] in 28 days with a maximum slump of 3" [76] at time of placing.

E) Reinforcing bars shall conform to ASTM A 615 [S1] grade 60 deformed type Fy = 60000 psi [4219 kgf/cm^2].

F) Unless otherwise noted, concrete cover of reinforcing bars shall conform to minimum requirements of ACI 318-89 (Rev. 88).

G) Fabrication of reinforcing steel shall be in accordance with "Manual of Standard Practice for Detailing Reinforcing ConcreteStructures" ACI 315-80 (Rev. 86).

H) Provide 3/4" x 45° [19 x 45°] chamfer on all exposed concrete edges.

J) Foundations have been designed to rest on undisturbed soil (per EIA-411-A and RS-222-D) with a minimum allowable net vertical bearing capacity of 2000 psf [9770 kgf/m^2]. If undesirable soil conditions are encountered, the engineer shall be notified.

K) Backfills shall be suitable excavated material or other suitable material compacted in 6" lifts to 90% of maximum density as determined by ASTM D1557.

L) If this foundation is to be located in an area where annual frost penetration depth exceeds 15" [381], the local building code specifying a minimum required foundation depth should be consulted.

7. Grounding Electrode System Notes:

The grounding system shown represents the minimum requirements to achieve satisfactory grounding. Actual site conditions and soil resistivity levels will determine final grounding system design to comply with the following:

A) All ground ring, ground rod and antenna structure connections to be EIRCO® products, Inc. Calweld® exothermic type welded electrical connections or equivalent.

B) Ground rods shall be driven to a depth below permanent moisture level (minimum depth shown) as dictated by geographical location.

C) The antenna structure shall be connected to a grounding electrode system consisting of a number of interconnected ground rods. The system shall meet the requirements of the Underwriters' Laboratories Publication No. ,UL96A for Lightning protection.

D) The grounding electrode system to earth resistance shall not exceed 10 Ohms, measured with a Biddle 3 terminal device or equivalent. The grounded conductor (neutral) supplied to all ac equipment on the antenna structure should be disconnected before taking measurement.

E) Actual site conditions may require longer ground rods, additional ground rods and/or land fill additives to reduce soil resistivity levels.

F) Avoid sharp bends when routing grounding wire. Grounding wires to antenna structure to be run as short and straight as possible.

G) Final grade directly above grounding electrode system to be water permeable.

8. Power/IFL Conduit Notes:

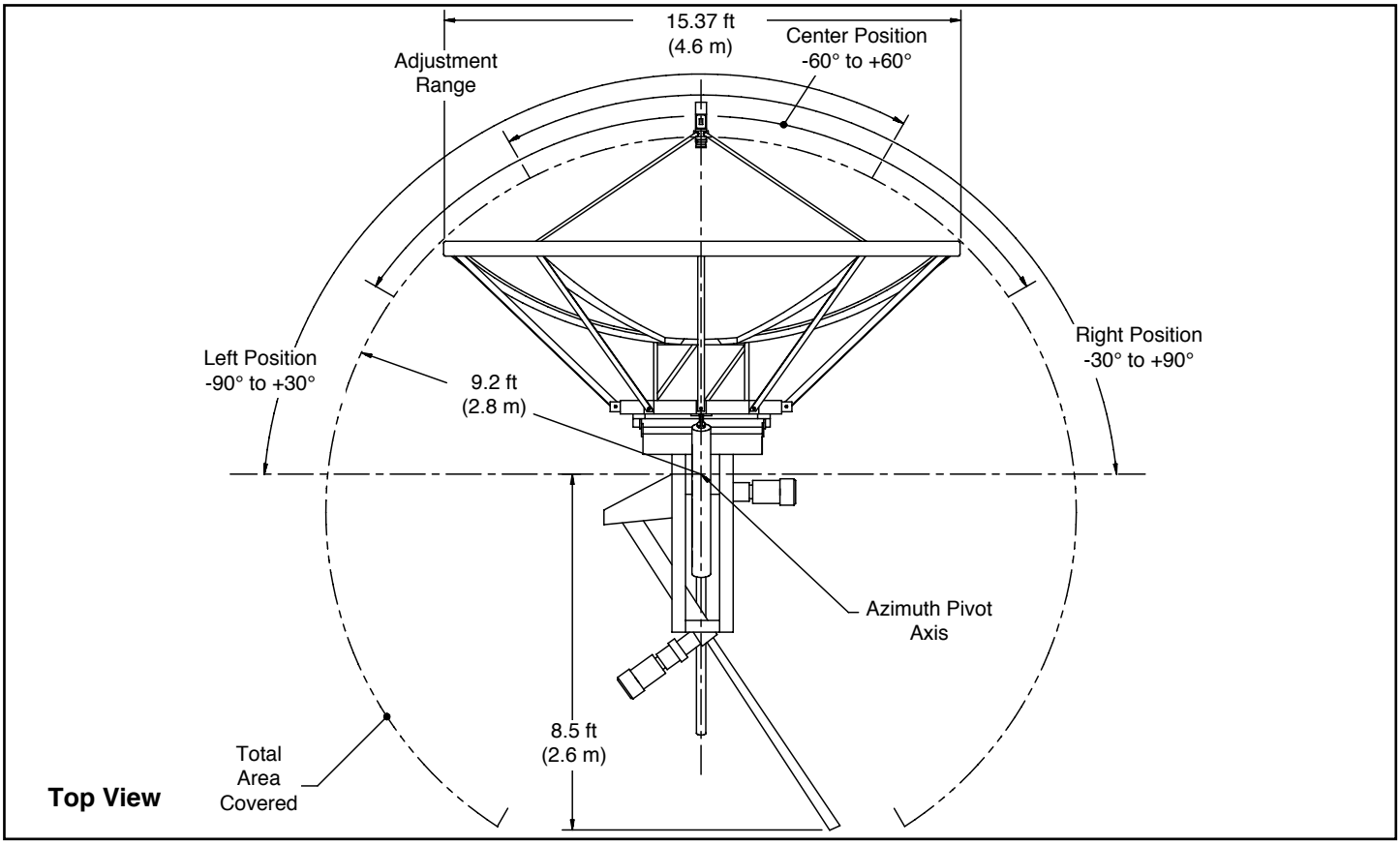
A) Electrical power - Drawing depicts suggested location for electrical power conduit to antenna. Size, type and depth to bury conduit to be determined by customer in compliance with local codes. Direction to route conduit to be determined by the relative location of communcations building/shelter. Power conduit to extend 6" (minimum) above surface of foundation slab. Open ends of conduit to be sealed to prevent moisture and foreign particle contamination.

Customer to provide main load center assembly and over-current protection devices for electrical equipment. Mounting location of load center to be determined by customer in accordance with local codes.

B) For routing IFL cables, 4” size conduit recommended. Type and depth to bury conduit to be determined by customer, in compliance with local codes. Location of conduit on foun-dation and direction to route conduit to be determined by location of communications building/shelter. Conduit to extend 36” (minimum) above surface of foundation slab. All bends to be large radius, maximum of two bends per run. Open ends of conduit to be sealed to prevent moisture and/or foreign particle contamination.

6.0 ANTENNA GEOMETRY

6.1 Figure 3 illustrates basic dimensional characteristics and azimuth adjustment range capabilities of the 4.5-meter motorizable antenna. Figure 4 illustrates the corresponding characterisitcs and capabilities of the 4.6-meter antenna.



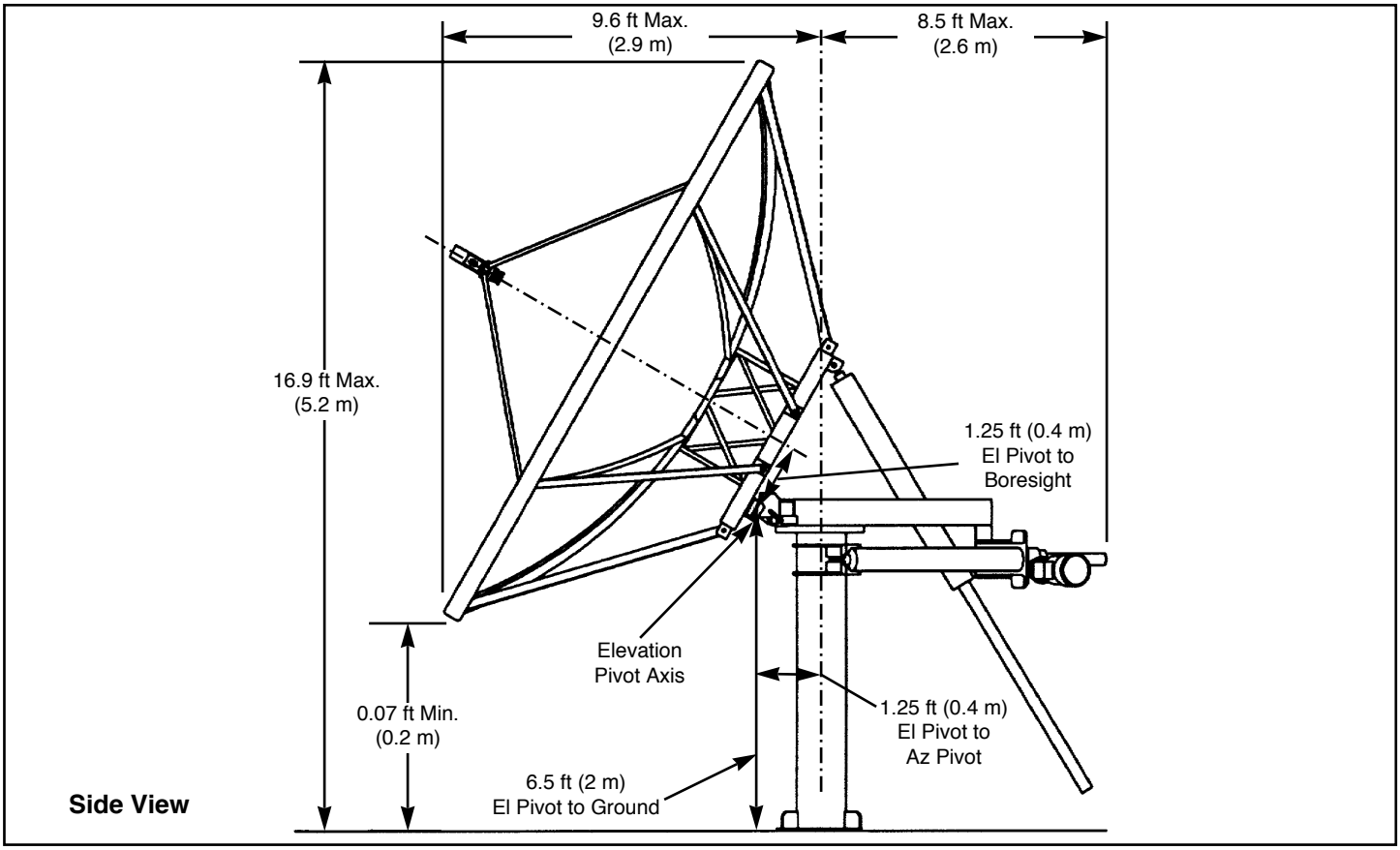
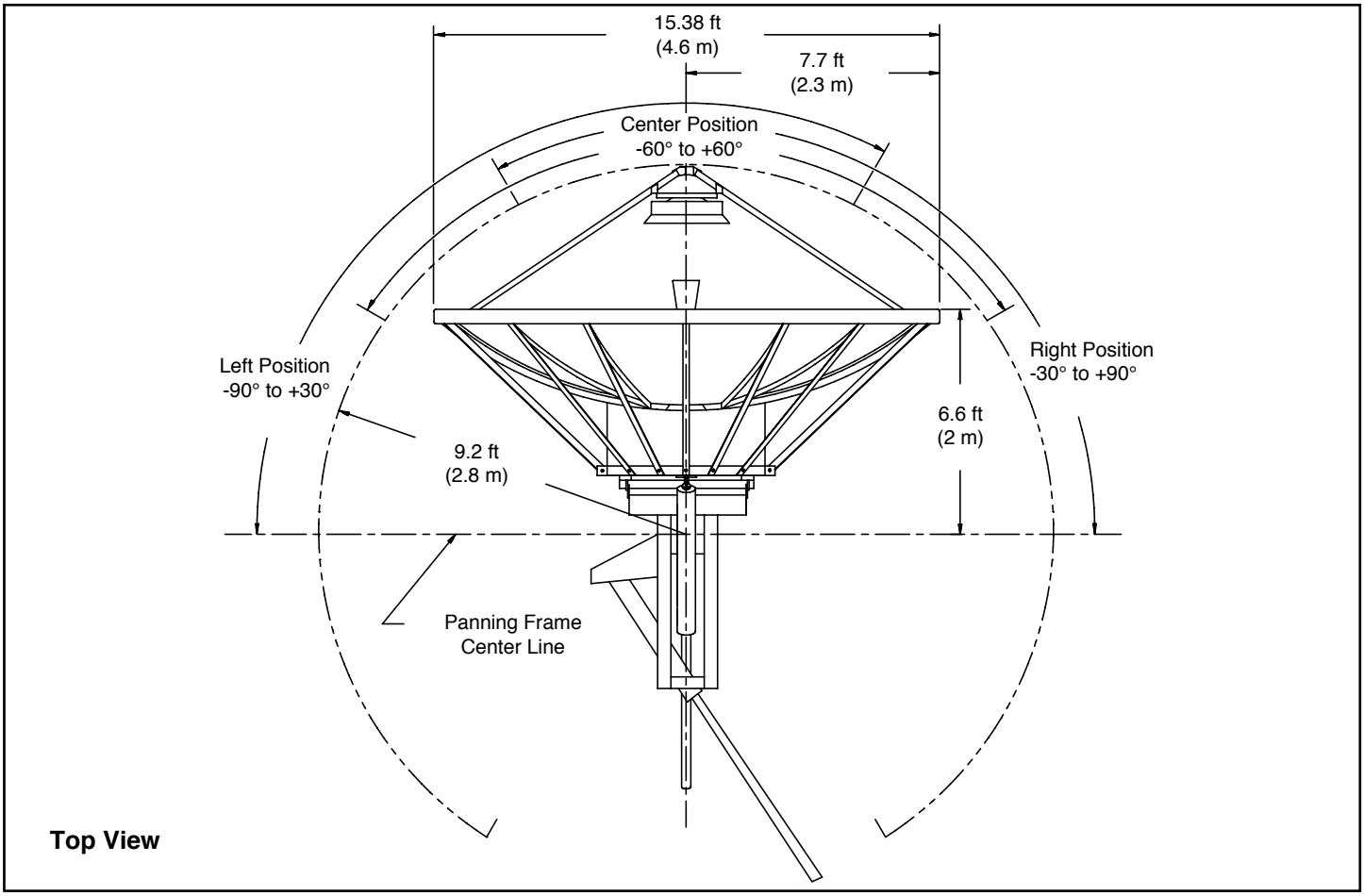


Figure 3 - 4.5-Meter Earth Station Antenna With Motorizable Mount



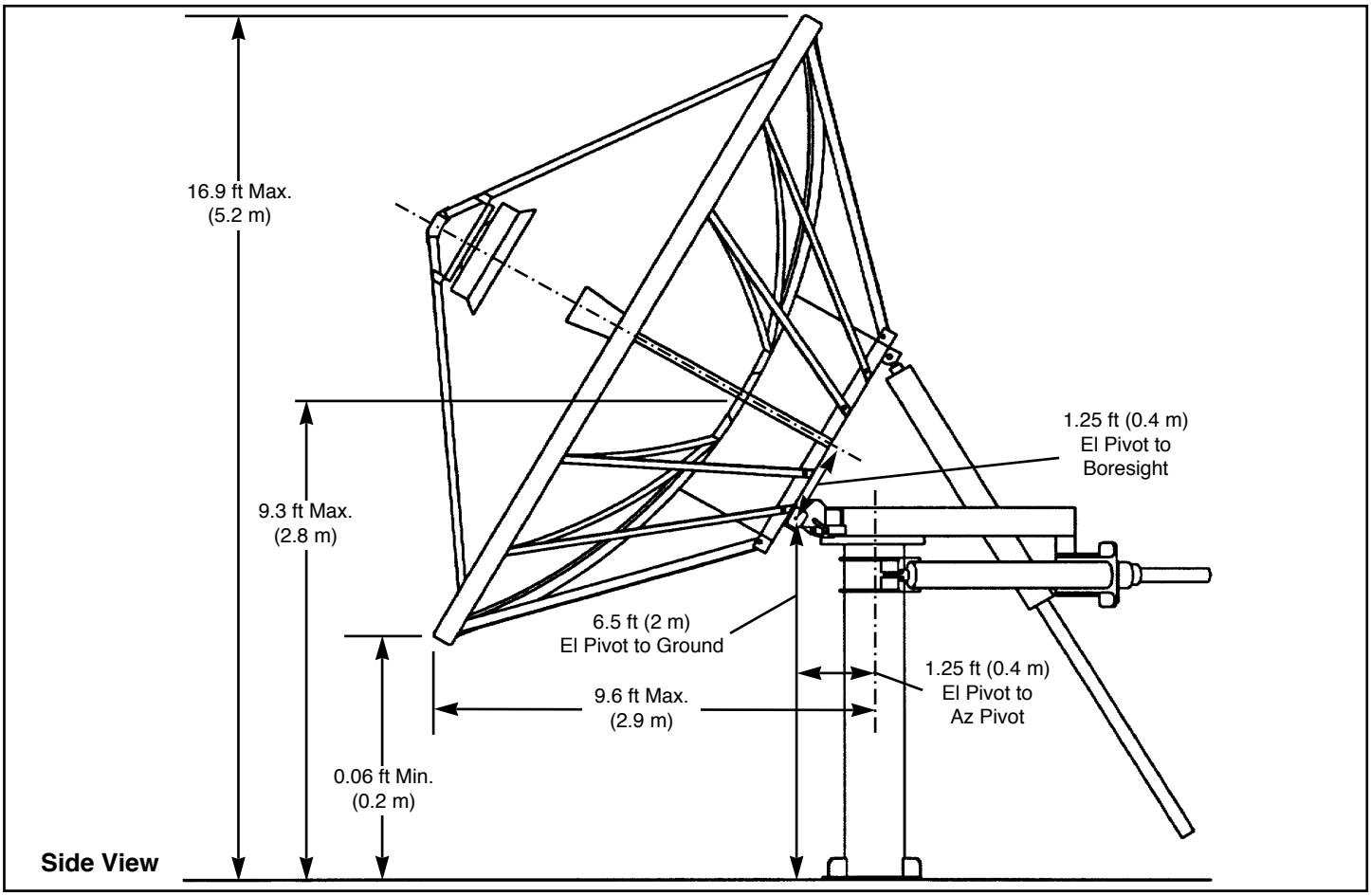
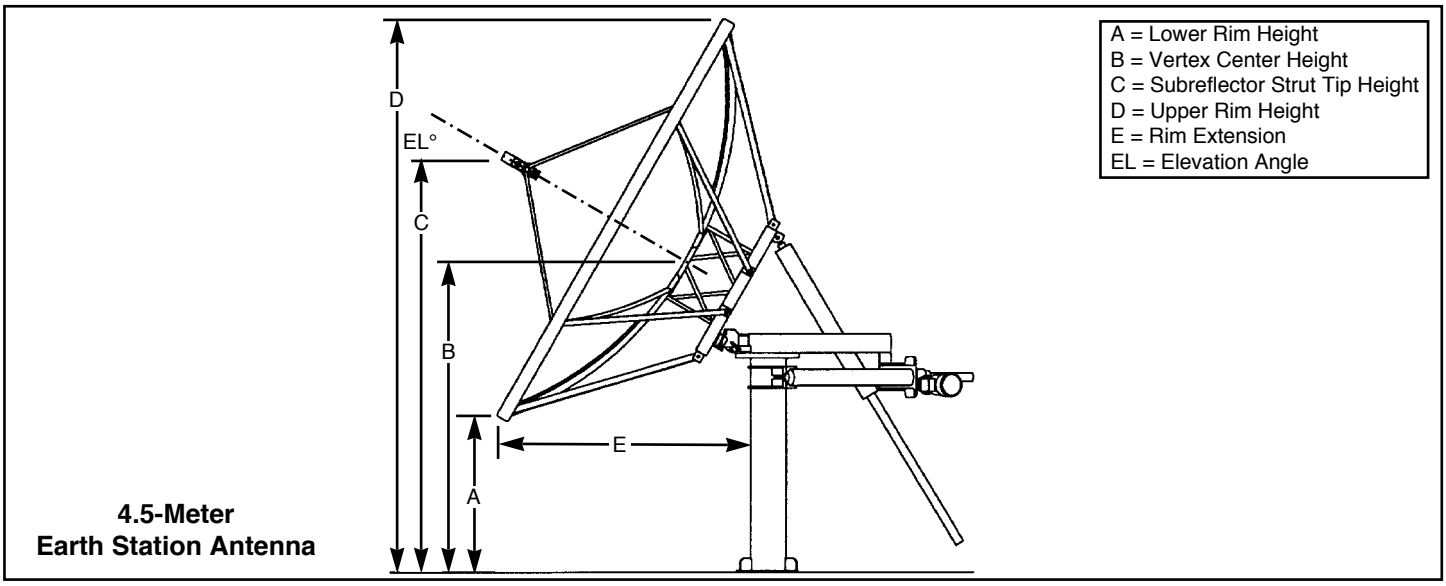
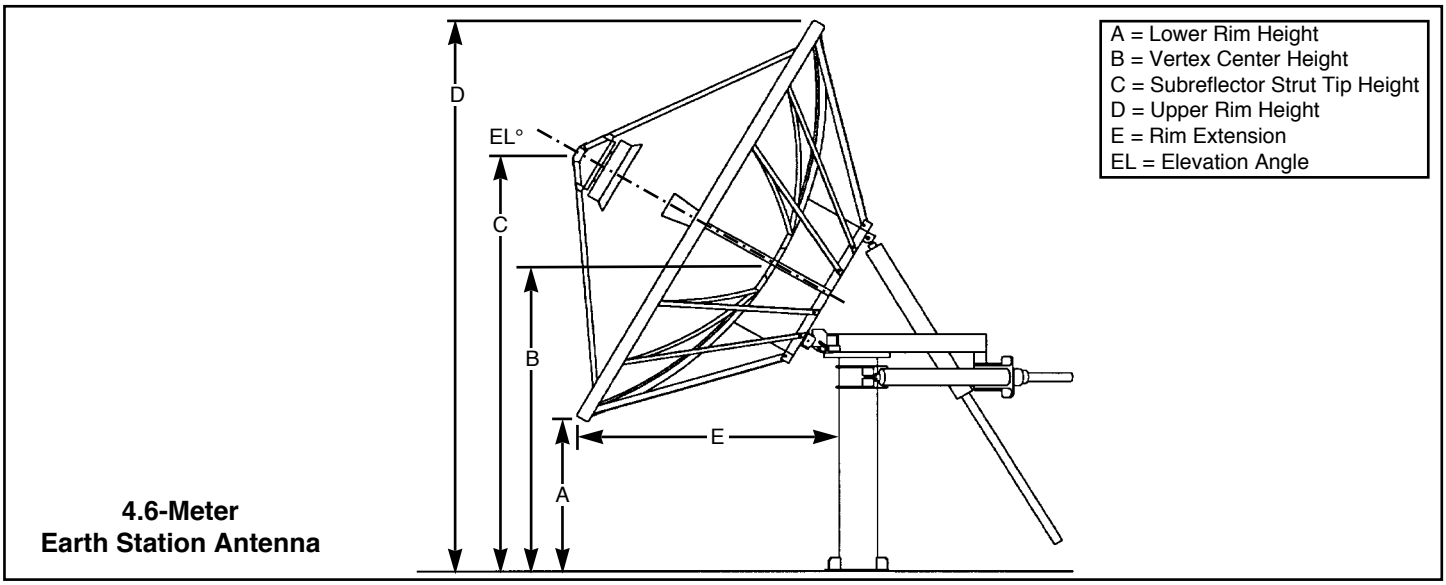


Figure 4 - 4.6-Meter Earth Station Antenna With Motorizable Mount

Figure 5 illustrates varying dimensions from ground reference of selected antenna points as the elevation angle fluctuates from 0° to 90°.





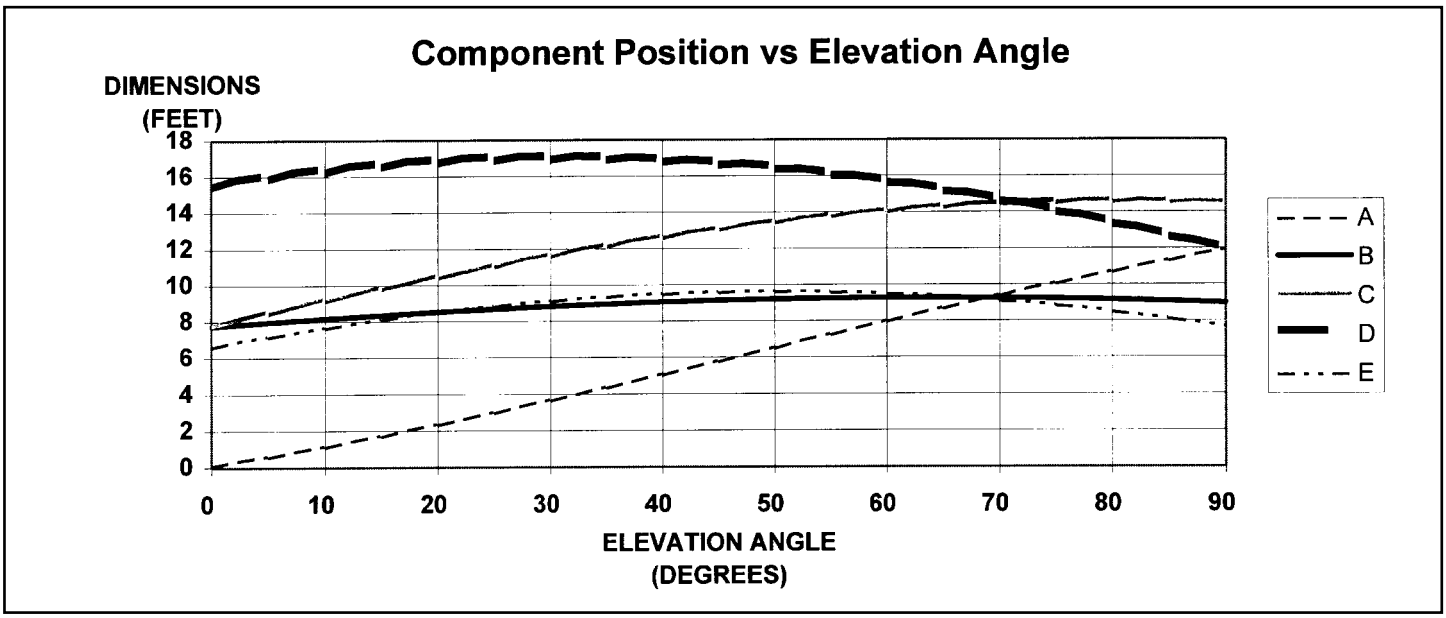


Figure 5

Type 206317-( )

Main Reflector Assembly

for 4.6-Meter Earth Station Antennas

1.0 Introduction

1.1 This bulletin provides assembly and installation instructions for the 4.6-meter earth station antenna main reflector assembly. **Be sure to adhere to all notes, cautions and warnings appearing throughout the installation text to ensure safe and accurate component assembly.**

Warning

A-325 hardware can only be used once. If the antenna is to be taken apart and reassembled, new A-325 hardware must be used.

1.2 Type A-325 hardware is utilized during the reflector backstructure assembly and during reflector attachment to the ground mount. Use of A-325 hardware eliminates slippage between mating surfaces under high loading conditions as well as the need for future retightening. Referto the A-325 hardware tensioning procedure in the following installation text.

Notice

The installation, maintenance or removal of antenna systems requires qualified, experienced personnel. Andrew installation instructions have been written for such personnel. Antenna systems should be inspected once a year by qualified personnel to verify proper installation, maintenance and condition of equipment.

Andrew disclaims any liability or responsibility for the results of improper or unsafe installation practices.

2.0 Description

2.1 The antenna main reflector assembly, illustrated in Figure 2-1, is comprised of eight (8) precision formed aluminum reflector panel segments, corresponding aluminum support ribs, backstructure support angles, an equipment enclosure assembly and a reflector hardware kit.

2.2 The segmented reflector assembly provides accurate surface contour which ensures exceptional operating characteristics in the Ku frequency band. The assembled reflector is 15.4 feet in diameter and segmented to reduce costly shipping volume.

2.3 The enclosure assembly, rib support assemblies and support angle kit comprise the reflector backstructure components while the hardware kit contains the required installation hardware for the reflector/backstructure assemblies. The equipment enclosure also provides weather protection for rf equipment and can accommodate up to a 4-port combining network.

Read the Instructions Thoroughly Before Assembly

3.0 Main Reflector Assembly Inspection

3.1 The main reflector assembly is shipped in a single crate containing the equipment enclosure assembly (206297), the reflector panel segments, the rib supports (206215), the backstructure support angles (206279), enclosed door panel assembly (206282A) and the reflector hardware kit (206285). Inspect the shipping crate for visual signs of damage denoting improper handling during shipment that may result in bending, breakage, distortion or other similar damage to the contents.

Warning

Adhere to any special instructions stenciled on the crate relative to crate opening, contents removal and/or personnel safety.

3.2 Cut and remove all strapping, if applicable. Carefully remove all crating and interior blocking/bracing materials permitting removal of all main reflector assembly components. To facilitate assembly, reflector/backstructure components are packed corresponding to the sequence each is used during the reflector/backstructure assembly. Visually inspect the main reflectorassembly components for evidence of any structural component damage. The equipment complement should correspond with the components illustrated in Figure 2-1 and the tabulation given in the corresponding parts listing. Any damage or shortages will prevent satisfactory assembly and installation of the antenna main reflector assembly.

3.3 Figure 2-1 illustrates the assembled main reflector assembly with the major assembly components identified. Refer to this figure in addition to the individually referenced illustrations as an aid in determining component relationship during assembly.

Note

Unless otherwise noted in the following procedures, hardware should initially be hand tightened only enough to hold the structural components safely in position. Final tightening of the hardware is referenced in the text as “fully tighten” to distinguish from initial tightening. Refer to appropriate tensioning procedure regarding A-325 hardware.

4.0 Main Reflector Assembly

Caution

Do not attempt to use hammers, screwdrivers or any other means of mechanical force to enable hardware attachment during any portion of the assembly procedure unless otherwise stated.

Note

The main reflector assembly should be performed in a level area in front of the foundation pad with the top of the reflector approximately 3 feet from the foundation pad. Loosely attach all hardware utilized throughout the main reflector assembly and do not tighten until the entire assembly is complete unless otherwise stated.

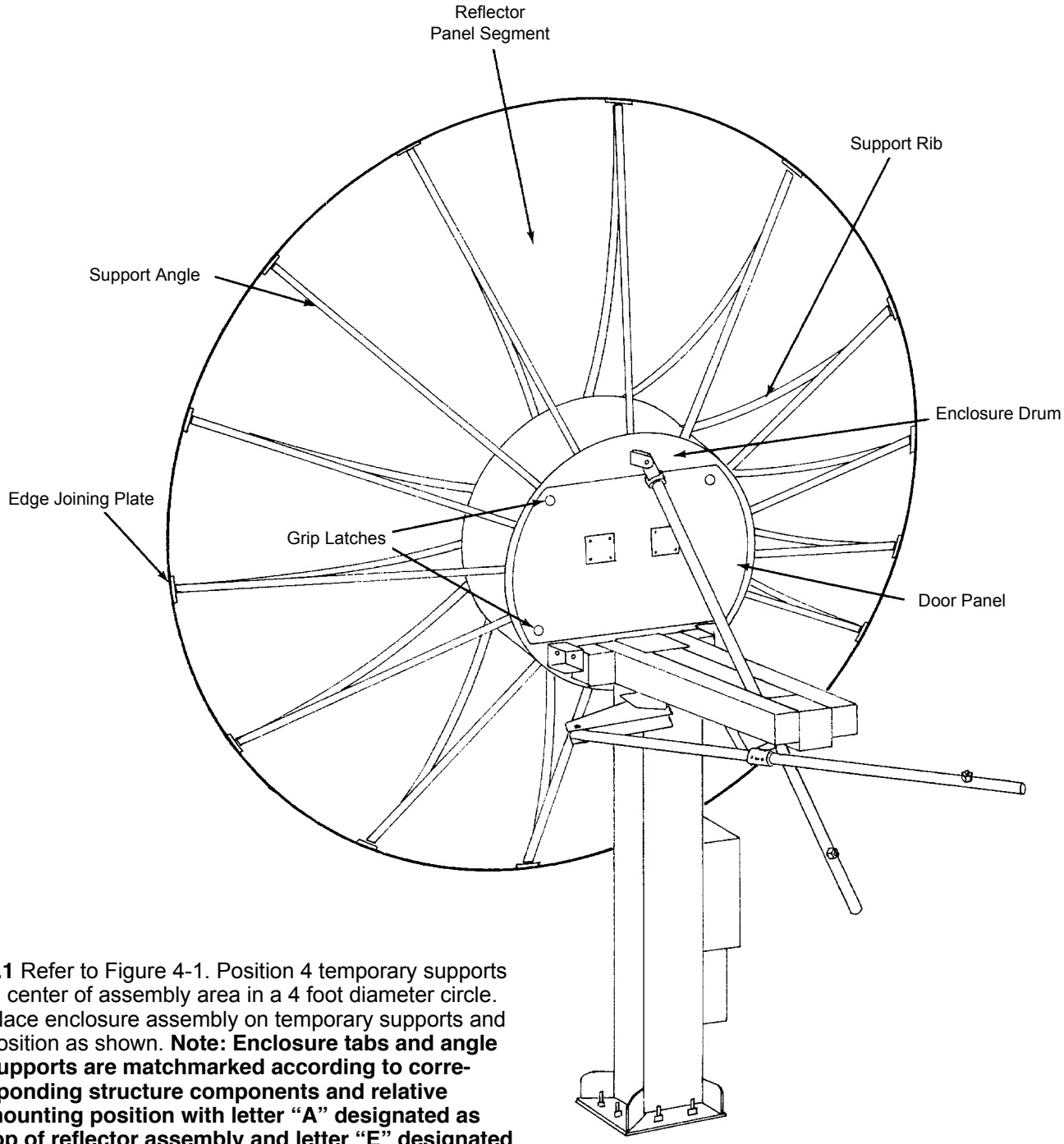


Figure 2-1

4.1 Refer to Figure 4-1. Position 4 temporary supports in center of assembly area in a 4 foot diameter circle. Place enclosure assembly on temporary supports and position as shown. **Note: Enclosure tabs and angle supports are matchmarked according to corresponding structure components and relative mounting position with letter "A" designated as top of reflector assembly and letter "E" designated as bottom of reflector assembly.**

4.2 Refer to Figure 4-2. Position matchmarked backstructure support angle and rib supports opposite corresponding matchmarked drum enclosure angles and tabs. Starting with any rib support/support angle pair, attach clipped end of backstrugture support angle to left side of lower enclosure tab using one A-325 bolt/nut assembly and flat washers as shown. **Note: A-325 hardware should be installed loosely. Ensure each A-325 bolt is lubricated with stick wax prior to installation.** Install rib support to right side of corresponding drum enclosure angle using one A-325 bolt/nut assembly and flat washers inserted in outside hole of enclosure angle/rib support connection. Ensure angled portion of rib support is toward enclosure vertex. Raise backstructure support angle and attach to support rib using one A-325 bolt/nut assembly and flat washers.

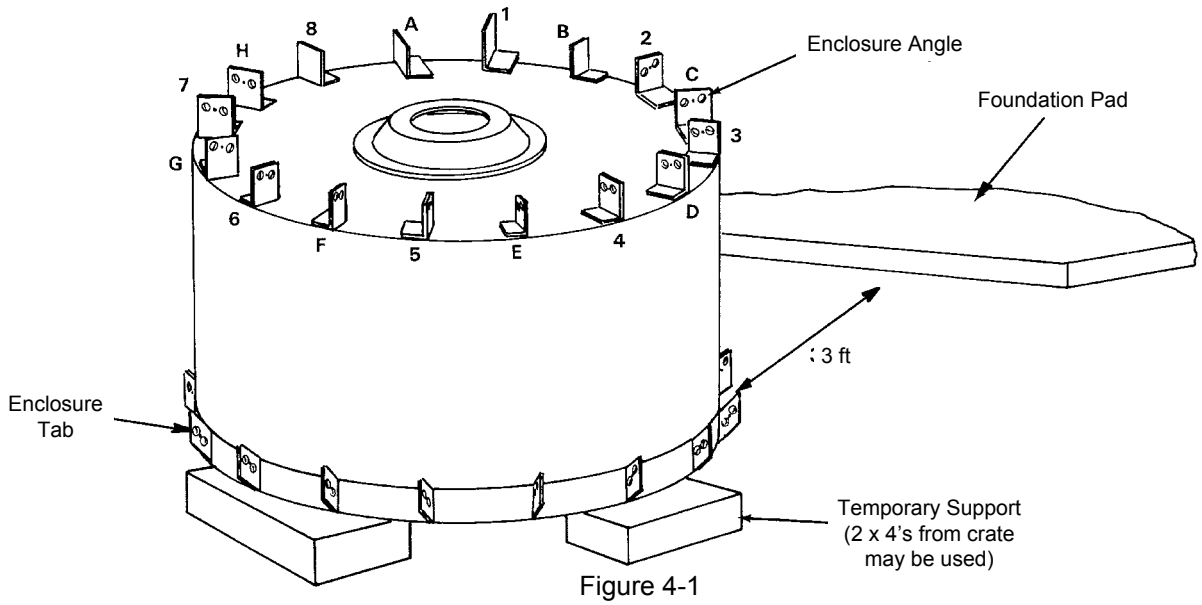


Figure 4-1

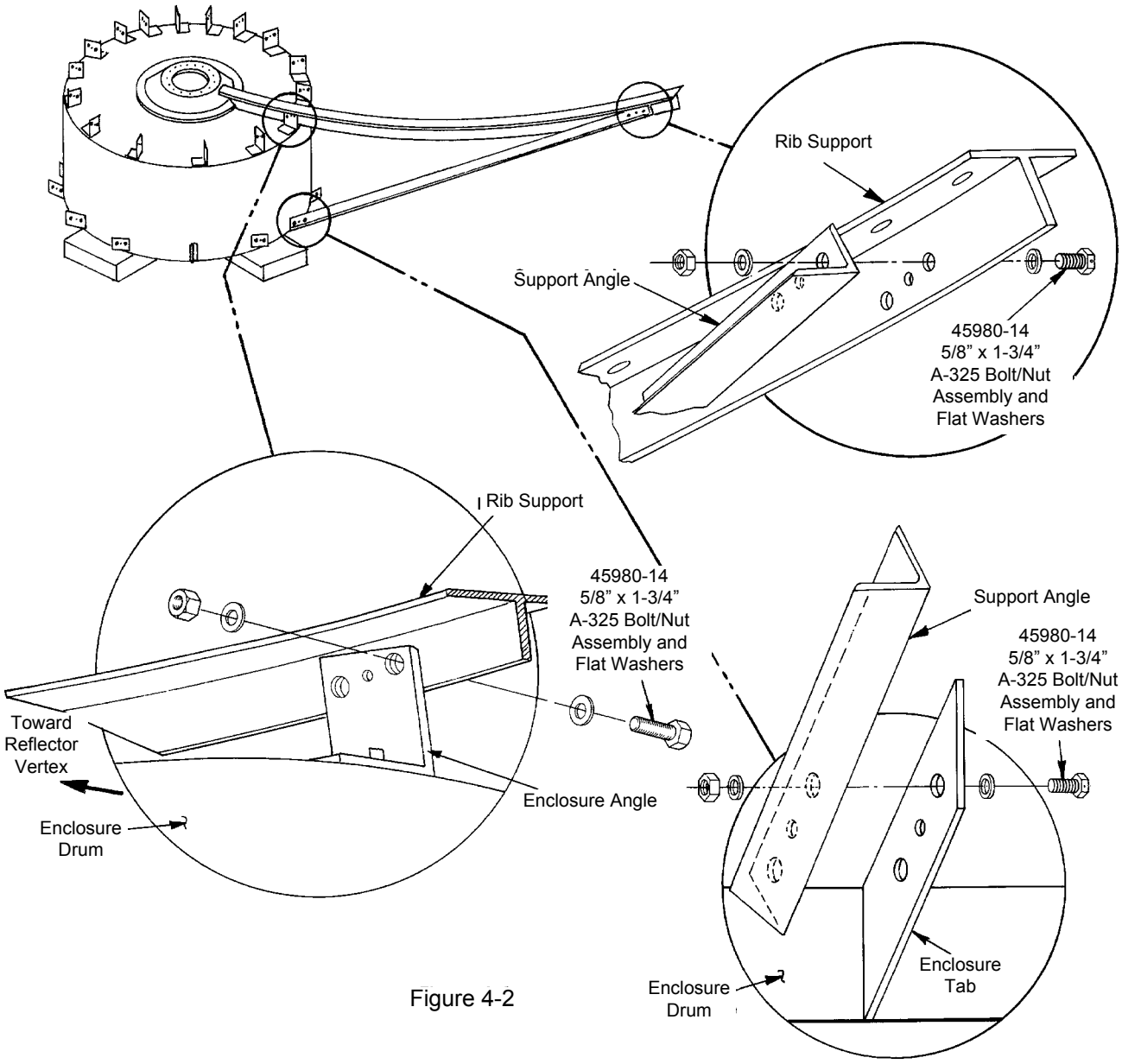


Figure 4-2

4.3 Refer to Figure 4-3. Install three tapered alignment pins by hand from strut side of connection in corresponding holes provided at indicated mounting positions using mechanical slack provided by moving corresponding rib/angle assemblies. **Note: Do not force pins.** Insert by hand until pin is firmly seated. Install second A-325 bolt/nut assembly and flat washers into each rib/angle, angle/tab and rib/support angle connection. Hand tighten each of six A-325 bolt/nut assemblies. **Note: Using hammer, tap three tapered pins until each is firmly seated.**

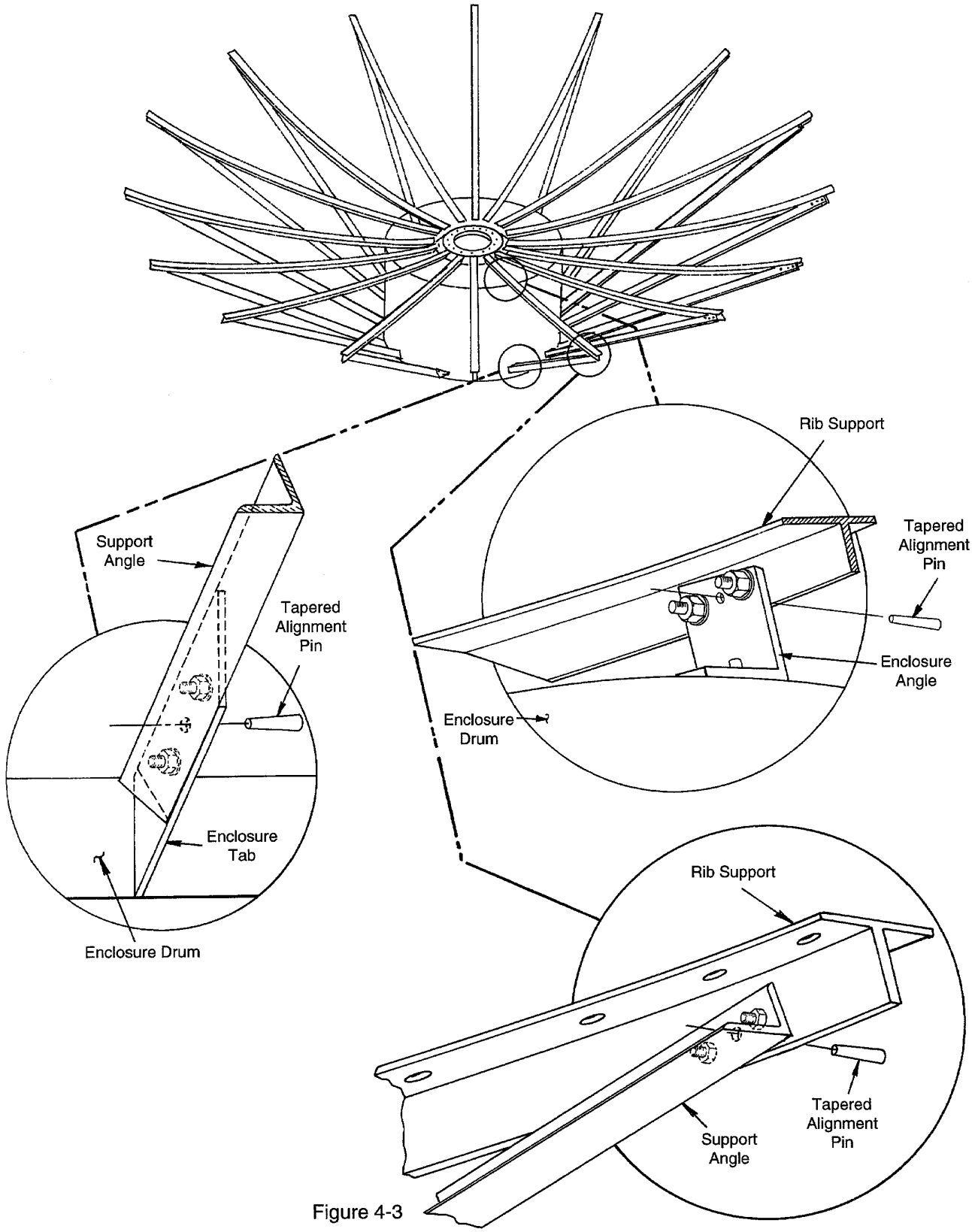
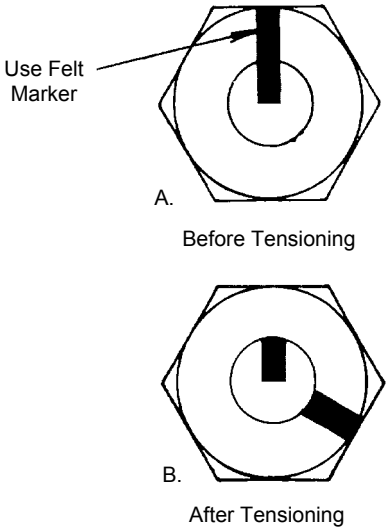


Figure 4-3

4.4 Refer to A-325 hardware tensioning procedure. Fully tighten all A-325 hardware in following sequence: Drum angle/rib support, support angle/rib support, support angle/lower drum tab. Continue installing rib supports, angle supports and tapered pins in manner described in paragraphs 4.2 through 4.4. After all A-325 hardware is fully tightened, ensure all tapered pins remain installed. Do not remove. **Note: Reassembly of reflector assembly will require new A-325 hardware and tapered pins.**



Type A-325 Hardware Tensioning Procedure

All angle bracketconnectionsuseTypeA-325 hardware. Bolts must be properly tensioned to avoid slippage between bolted surfaces under high loads. Slippage can distort reflector surface during hoisting. Make sure all bolts are tensioned and replace any that break.

Proper tensioning:

1. Lubricate bolt threads with stick wax to reduce friction.

2. Insert bolt.

3. Add nut and finger tighten.

4. After all angle braces are attached, tighten nuts until surfaces are joined tightly and nuts are snug. **Note:** Snug is defined as the tension achieved with the full effort of an installer using an ordinary spud wrench. Do not proceed with steps 5 and 6 unless the connection is to be final.

5. Mark nuts and ends of bolts with straight line. See A.

6. Tighten nuts further with extra long wrench until nuts are moved 1/3 turn (120° ±30°). See B.

4.5 Refer to Figure 4-5. Align mounting holes and position back ring over enclosure vertex opening as shown keeping flat portion of back ring against enclosure vertex surface. Beginning with any panel segment, place panel on corresponding rib supports ensuring the panel match markings correspond with those on the support ribs and struts (refer to Figure 4-4). Position panel segment to align two inner most (vertex) holes with the corresponding pair of holes in the back ring/enclosure below the panel. Place the vertex ring on top of the reflector segment aligning two holes with the corresponding vertex holes in the panel segment. Insert 1/4” shoulder bolts through the vertex ring/panel segment/back ring/enclosure. **Note: Do not force shoulder bolts in place.** Carefully joggle panel to align bolt holes if necessary. Hand tighten nuts and lock washers as shown in Figure 4-5b. Insert 5/16” seam hardware in all seam holes and finger tighten nuts and lock washers. **Note: Do not force seam hardware in place.** Joggle panel segment laterally to align panel/rib bolt holes if necessary. Continue installing adjacent reflector panel segments in corresponding matchmarked locations working either clockwise or counterclockwise by sliding vertex edge of panels under vertex ring and following above procedure ensuring finger tightening of hardware only. If reflector assembly is to be lifted onto ground mount assembly, install supplied lifting tabs on panel seams A, C, E and G at bolt hole ring locations 3 and 4 as shown using indicated hardware.

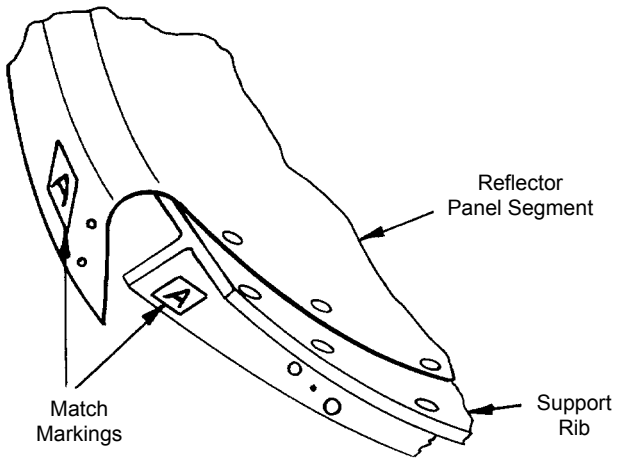
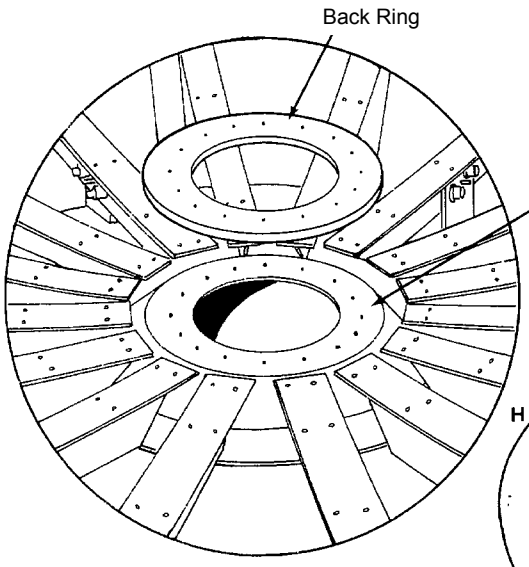
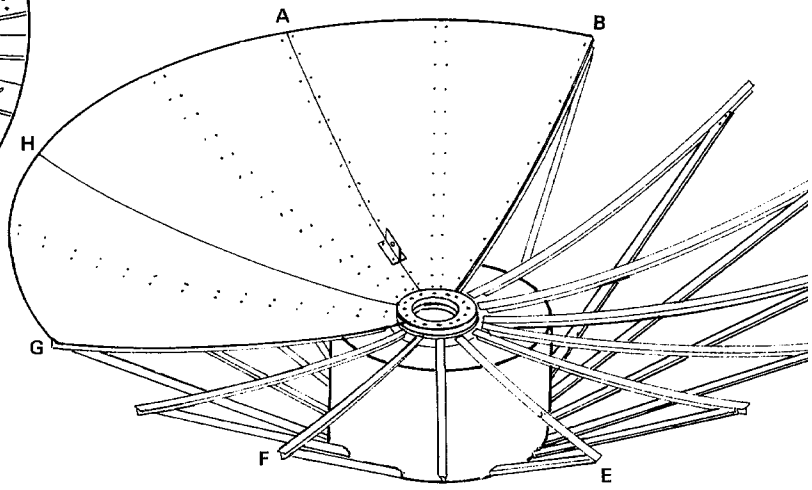


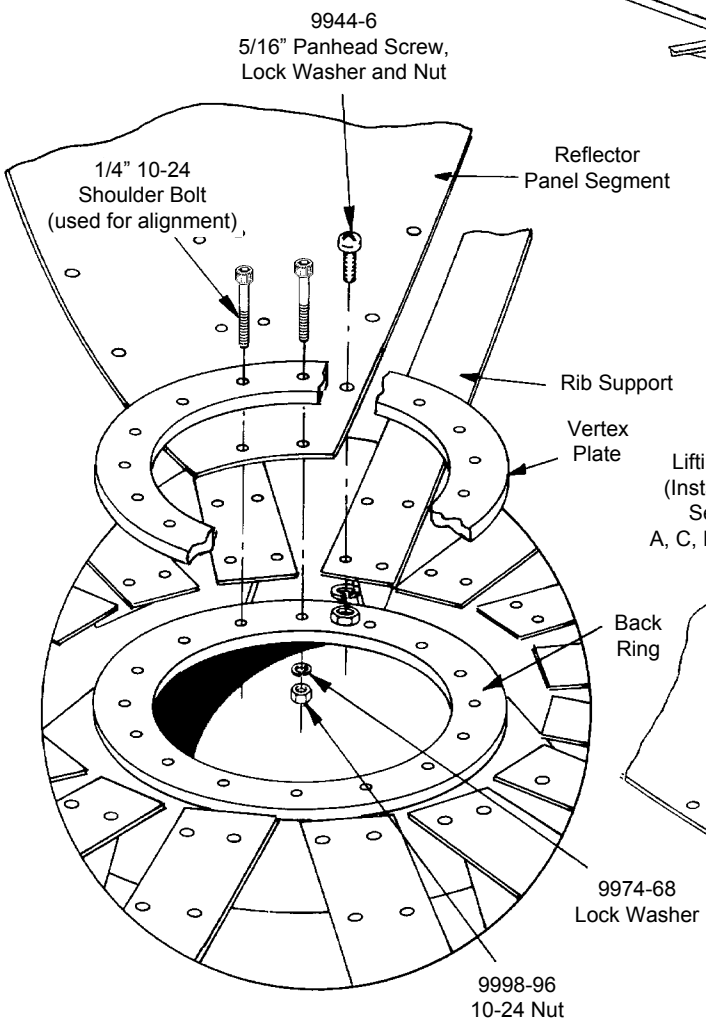
Figure 4-4



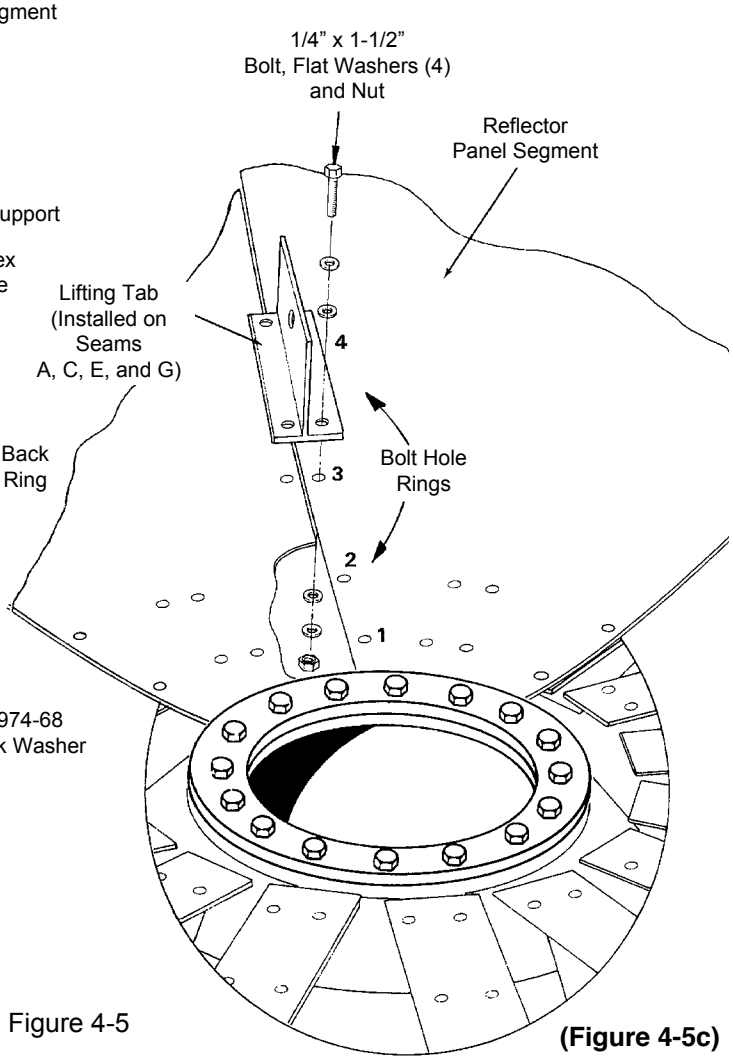
(Figure 4-5a)



(Figure 4-5d)



(Figure 4-5b)



(Figure 4-5c)

Figure 4-5

4.6 Refer to Figure 4-6. Install supplied edge joining plates across panel segment seams on inside of reflector rim at all 16 locations using indicated hardware. Finger tighten hardware only.

4.7 Begin reflector segment seam hardware tensioning by tightening all the “Number” radials and then by tightening all the “Letter” radials. The “Number” radials are down the center of the 8 panel segments, and the “Letter” radials are on the edges or seams of two adjacent panel segments. Refer to Figure 4-7A.

“Number” Radials:

Refer to Figure 4-7B. Tighten the number radials from the #1 position out to the #14 position (from inside to outside). Completely tighten all 14 pairs on each radial before proceeding to the next. The radial sequence should be as follows: 1, 5, 3, 7, 2, 6, 4, and 8. Like the tire on a car, this will ensure equal tensioning around the center line of the reflector. When tightening of the number radials are all completed, proceed to the letter radials.

“Letter” Radials:

Refer to Figure 4-7C. Begin the letter radial tightening by first tightening the vertex ring shoulder bolts. Then begin tightening the letter radials in circles starting at the #1 position, progressing outward to the #14 position. Be sure to complete one full circle before moving to the next. When all the reflector segment seam hardware is tightened per the above procedures, tighten all edge joining plate hardware.

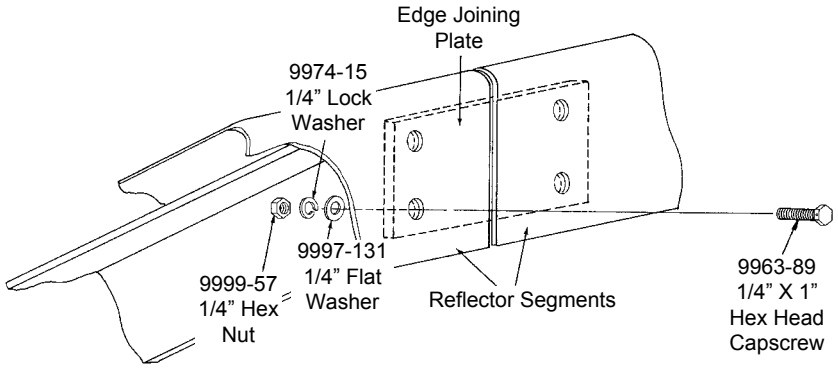


Figure 4-6

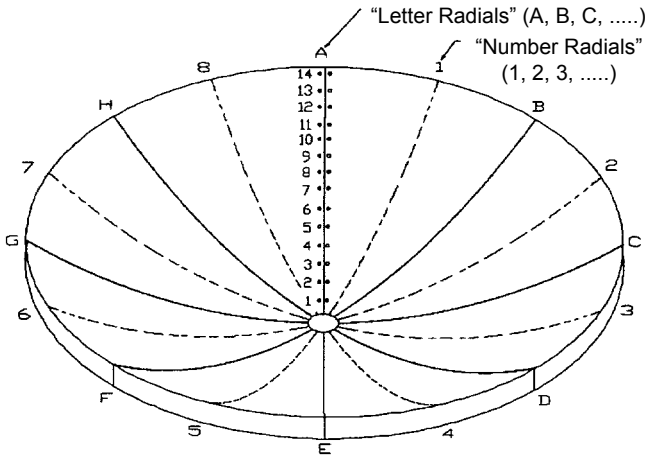


Figure 4-7A

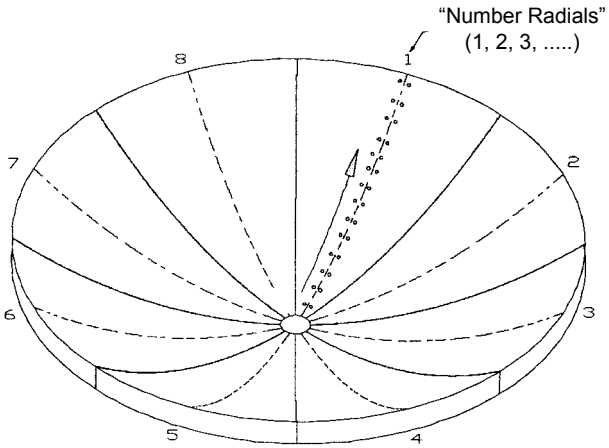


Figure 4-7B

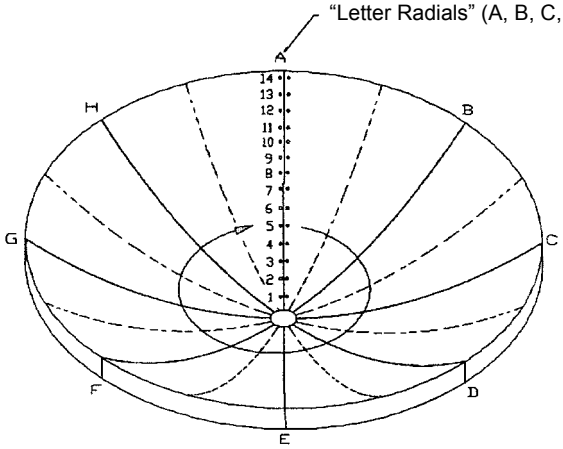


Figure 4-7C

5.0 Reflector to Mount Assembly

5.1 Refer to Figure 5-1. Attach shackles with corresponding chokers to four previously installed lifting tabs as shown. Fully retract elevation strut and raise reflector/backstructure assembly.

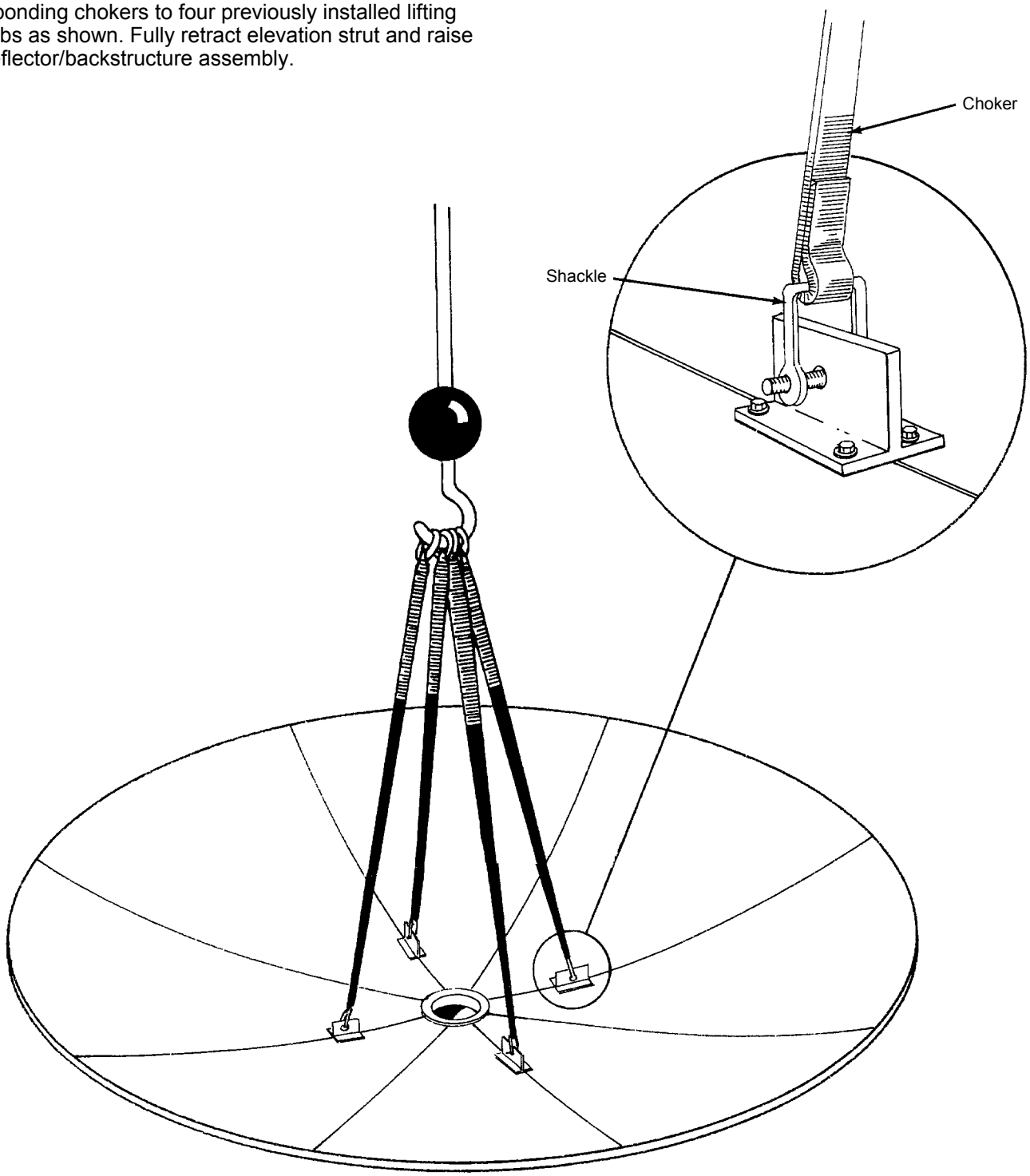


Figure 5-1

5.2 Refer to Figure 5-2. Attach rear of enclosure to corresponding ground mount angle assemblies using 7/8 in bolts, nuts and flat washers with nuts and washers on inside of enclosure.

5.3 Disassemble clevis and replace 3/4" x 2" bolt with 3/4" x 2-1/4" bolt (supplied as part of reflector hardware kit) to clevis. Use Loctite after reassembly of clevis as shown in Figure 5-2. Attach elevation strut to top rear portion of enclosure assembly as shown using 3/4 in bolt, flat washer and nut. Securely tighten all mounting hardware per A-325 hardware tensioning procedure. Attach door panel to enclosure assembly and securely tighten remaining reflector assembly mounting hardware.

5.4 Remove lifting tabs. Install and tighten hardware.

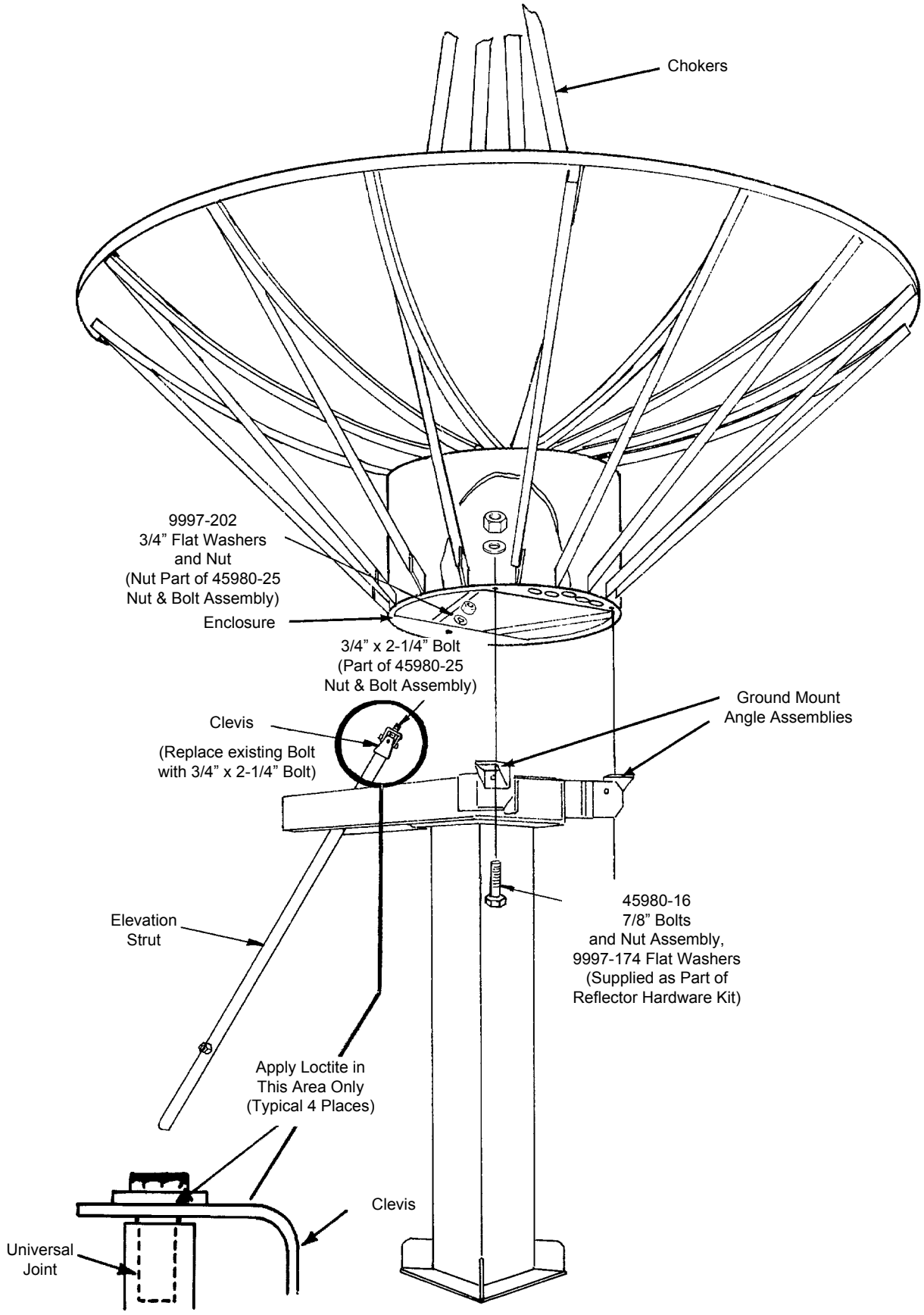

Chokers
9997-202
3/4" Flat Washers
and Nut
(Nut Part of 45980-25
Nut & Bolt Assembly)
Enclosure
3/4" x 2-1/4" Bolt
(Part of 45980-25
Nut & Bolt Assembly)
Clevis
(Replace existing Bolt
with 3/4" x 2-1/4" Bolt)
Ground Mount
Angle Assemblies
Elevation
Strut
45980-16
7/8" Bolts
and Nut Assembly,
9997-174 Flat Washers
(Supplied as Part of
Reflector Hardware Kit)
Apply Loctite in
This Area Only
(Typical 4 Places)
Clevis
Universal
Joint

Figure 5-2

Type 206317-( ) Reflector Assembly
Parts List

Type No.	Description	Qty.
206297	Enclosure Weldment	1
206215	Rib Support	16
206279	Back Structure Support Angle	16
206282A	Door Panel	1
206285	Hardware Kit, consists of:	
49693	Edge Joining Plate	16
200852	Stick Wax	1
9912-179	#6 Taper Pin	53*
45980-14	5/8-11 x 1-3/4” Nut and Bolt Assembly	106*
9974-17	5/16” Lock Washer	493*
9997-227	5/8” Flat Washer	211*
9999-59	5/16” Hex Nut	493*
9963-120	1/4-20 x 1-1/2” Hex Nut	18*
9974-15	1/4” Lock Washer	88*
9997-131	1/4” Flat Washer	140*
9999-57	1/4” Hex Nut	88*
9844-6	5/16-18 Panhead Screw	493*
203130	Vertex Plate	1
203131	Back Ring	1
206278	Lifting Tab	4
9963-89	1/4-20 x 1“ Hex Bolt	70*
9997-174	7/8” Flat Washer	2
9997-202	3/4” Flat Washer	1
45980-16	7/8” Nut and Bolt Assembly	2
45980-25	3/4” Nut and Bolt Assembly	1
9858-16	1/4” #10-24 Shoulder Bolt	18*
9974-68	#10 Lock Washer	18*
9998-96	#10-24 Nut	18*
9869-77	Plug	5
201197-4	3/4” Knockout Plug	2
36165-10	Loctite, 1/2 oz.	1

* Includes spare(s).

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Type 203330
Ground Mount
for 4.6-Meter Earth Station Antennas

ANDREW®

1.0 Introduction

1.1 Type 203330 Ground Mount Assembly is a galvanized steel elevation-over-azimuth pedestal mount optimized for geostationary satellite applications in the Ku (12 - 14 GHz) frequency band. The elevation/azimuth mount design simplifies installation and minimizes foundation requirements while enabling horizon-to-horizon coverage from any worldwide location.

1.2 The ground mount assembly enables 180° positioning for selected azimuth viewing. Azimuth range coverage is ±90° divided into three 120° continuous ranges with 30° overlap. Elevation adjustment is continuous from 0 to 90°.

READ THE INSTRUCTIONS THOROUGHLY BEFORE ASSEMBLY

2.0 Ground Mount Assembly

2.1 The following major assemblies are required to install the 4.6-meter ground mount. Check all assemblies before beginning installation. Refer to parts list for detailed description.

Type No.	Description	Qty.
203330	**Ground Mount Assembly, consists of:**	
203331A	Azimuth Strut Weldment	1
202951	Azimuth/Elevation Strut Kit	1
203341	Hardware Kit	1

2.2 Refer to Figure 1. Carefully remove 203330 ground mount assembly from packing crate. Securely attach crane/hoist as shown using nylon sling. **Note:** Use of a 1 ton minimum capacity crane or hoist will be required for proper ground mount installation.

WARNING:

Attach nylon sling below azimuth strut weldment mounting plates and ensure brake assembly hardware is securely tightened (40-45 ft-lbs) before raising ground mount assembly to prevent disengagement of panning frame weldment from square tube weldment. Do not attempt to loosen brake assembly hardware during ground mount assembly or while making azimuth/elevation adjustments.

2.3 Carefully raise entire ground mount assembly and attach to corresponding foundation anchor bolts using 7/8 in flatwashers and nuts. **Note:** Ground mount positioning on foundation is dependent upon predetermined azimuth viewing requirements.

2.4 Position and mount 203331A azimuth strut weldment to ground mount assembly as shown using 3/4 by 1-1/2 in bolts, lockwashers and nuts. **Note:** Mounting position of azimuth strut weldment is dependent upon predetermined azimuth range requirements as shown in Figure 1, top view.

2.5 Apply supplied stick lubricant to setscrew threads and A-325 bolt threads. Loosely install 1/2 by 1 in setscrews in azimuth and 1/2 by 1-1/2 in setscrews in elevation strut supports; 7/8 by 2-3/4 in A-325 bolts, flat washers and nuts in ground mount angle assemblies; and 3/4 by 3-3/4 in bolt, lockwasher and nut in azimuth strut weldment for future use.

3.0 Azimuth/Elevation Strut Assembly

3.1 Remove elevation strut mechanical stop hardware. Loosen strut support setscrews and install 202835 azimuth and 33385-4 elevation strut assemblies in corresponding strut supports as shown. Temporarily tighten all elevation strut support hardware and reinstall previously removed mechanical stop hardware.

3.2 Attach forward portion of azimuth strut assembly to corresponding hole in azimuth strut weldment using 3/4 in by 3-3/4 in bolt lockwasher and nut. Securely tighten (35 ft-lbs) all azimuth strut support hardware.

Type 203330 Ground Mount Assembly Parts List

Type No.	Description	Qty.
203331A	**Azimuth Strut Weldment**	**1**
202951	**Azimuth/Elevation Strut Kit**	**1**
203341	**Hardware Kit consists of:**	
9974-10	3/4” Lockwasher	10*
9999-121	3/4” Hex Nut	10*
9953-25	1/2” x 1“ Stainless Steel Set Screw	9*
45980-2	7/8” x 2-3/4” Bolt and Nut Assembly	3*
9963-791	3/4” x 3-3/4” Hex Head Bolt	1
9997-202	3/4” Flatwasher	9*
9963-792	3/4” x 1-1/2” Hex Head Bolt	9*
9999-174	7/8” Hex Nut	9*
9997-174	7/8” Flatwasher	11*
9953-15	1/2” x 1-1/2” Stainless Steel Set Screw	4*
200852	Stick Lubricant	1

*Includes spare(s).

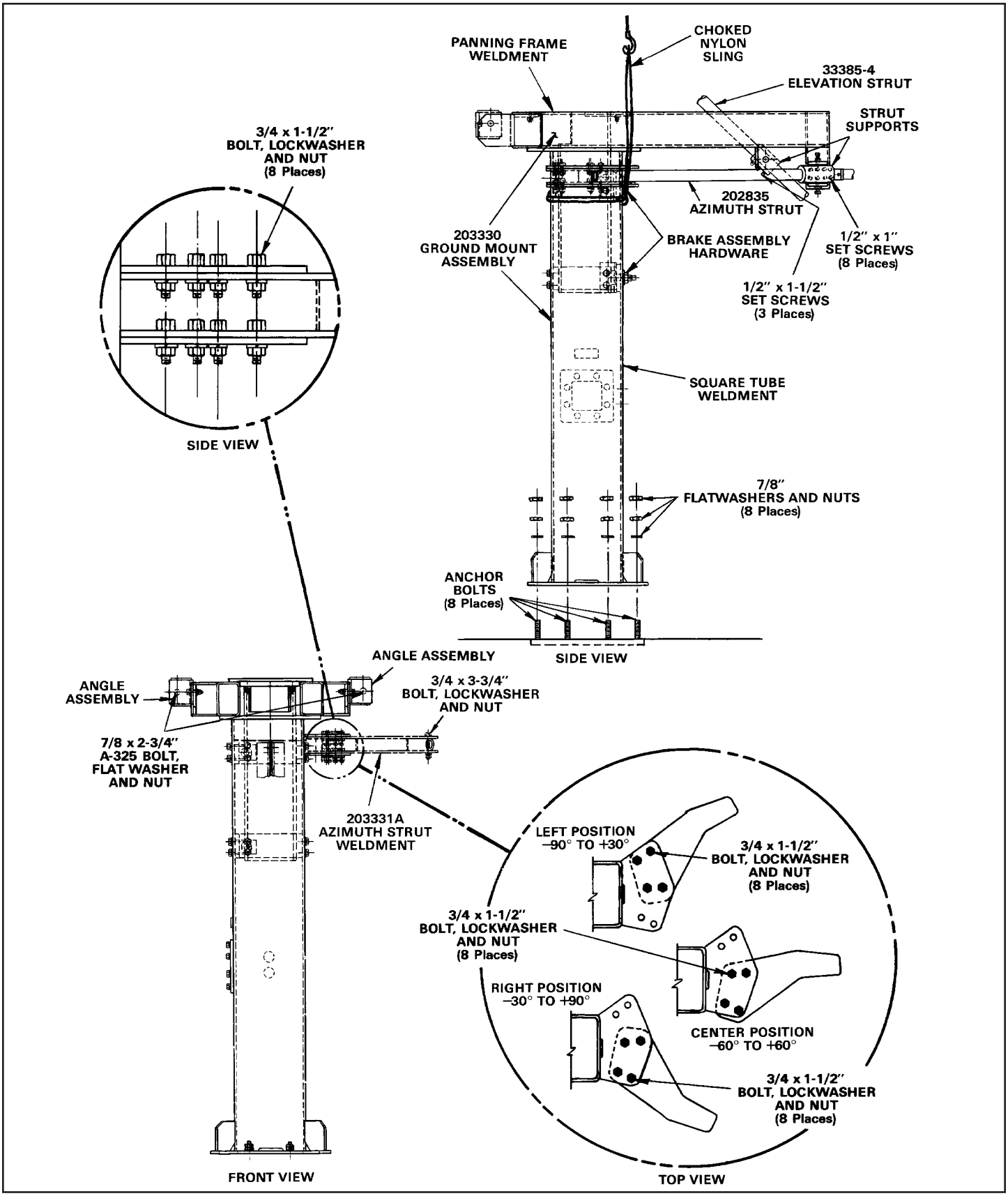

Figure 1

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Types 205947 and 206280

Subreflector and Subreflector Strut Kits

for 4.6-Meter Ku-Band Earth Station Antennas

1.0 Introduction

1.1 This bulletin provides assembly and installation instructions for the 4.6-meter Ku-band earth station antenna subreflector and subreflector strut kit assemblies. Be sure to adhere to all notes, cautions and warnings appearing throughout the installation text to ensure safe and accurate component assembly.

Notice

The installation, maintenance or removal of antenna systems requires qualified, experienced personnel. Andrew installation instructions have been written for such personnel. Antenna systems should be inspected once a year by qualified personnel to verify proper installation, maintenance and condition of equipment.

Andrew disclaims any liability or responsibility for the results of improper or unsafe installation practices.

2.0 Description

2.1 The antenna subreflector/strut kit assemblies, illustrated in Figure 2-1, comprise a significant portion of the unique dual-reflector Gregorian optic system utilized on the 4.6-meter Ku-band earth station antenna to maximize gain and ensure exceptionally high efficiency in both the receive and transmit operating frequencies.

2.2 The Type 205947 Subreflector Kit is completely preassembled to ease installation and is basically comprised of a one piece, precision cast aluminum subreflector assembly, an adjustment ring and required adjustment hardware. The cast subreflector assembly ensures an accurate surface contour which provides exceptional operating characteristics in the Ku frequency band.

2.3 The Type 206280 Subreflector Strut Kit provides mechanical support for the subreflector assembly and basically includes strut weldments, angle clips, strut angles, a subreflector sefting rod and required mounting hardware.

Read the Instructions Thoroughly Before Assembly

3.0 Subreflector/Strut Kit Inspection

3.1 The subreflector/strut kit assemblies are shipped in two crates; one containing the preassembled subreflector assembly (205947), while the other crate contains the strut weldments, angle clips, strut angles and all corresponding mounting hardware for the subreflector strut kit assembly (206280). Inspect the shipping crates for visual signs of damage denoting improper handling during shipment that may result in bending, breakage, distortion or other similar damage to the contents.

Warning

Adhere to any special instructions stenciled on the crates relative to crate opening, contents removal and/or personnel safety.

3.2 Cut and remove all strapping, if applicable. Carefully remove all crating and interior blocking/bracing materials permitting removal of all subreflector/strut kit assembly components. Visually inspect the subreflector/strut kit assembly components for evidence of any structural component damage. The equipment complement should correspond with the components illustrated in Figure 2-1 and the tabulation given in the corresponding parts listing. Any damage or shortages will prevent satisfactory assembly and installation of subreflector/strut kit assemblies.

3.3 Figure 2-1 illustrates the assembled subreflector/ strut kits with the major kit assembly components identified. Refer to this figure in addition to the individually referenced illustrations as an aid in determining component relationship during assembly.

Note

Unless otherwise noted in the following procedures, hardware should initially be hand-tightened only enough to hold the structural components safely in position. Final tightening of the hardware is referenced in the text as “securely tighten” to distinguish from initial tightening.

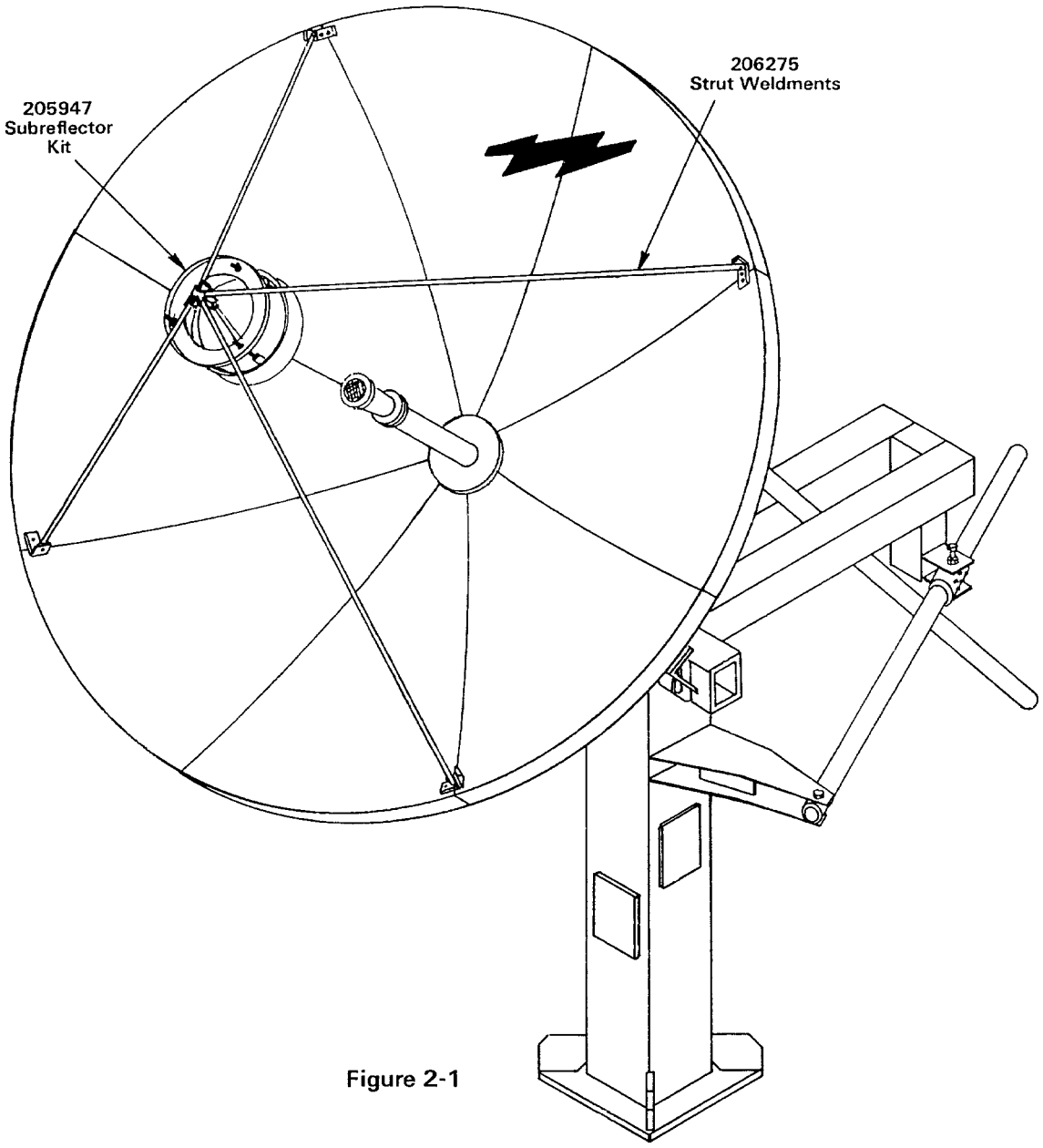


Figure 2-1

4.0 Subreflector/Strut Kit Assembly

Note

If a crane is available, paragraphs 4.1 through 4.3 may be performed on the ground with the preassembled subreflector/strut kit assembly raised into position and secured to the angle clips installed around the main reflector perimeter.

4.1 Refer to Figure 4-1. Loosely preassemble strut weldments as shown using supplied strut angles and corresponding mounting hardware.

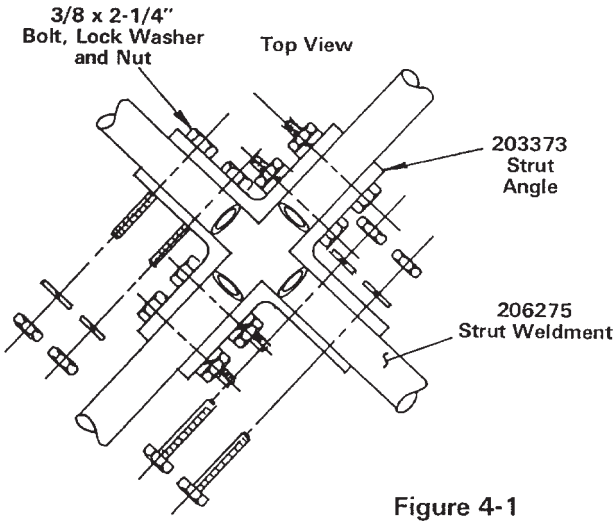
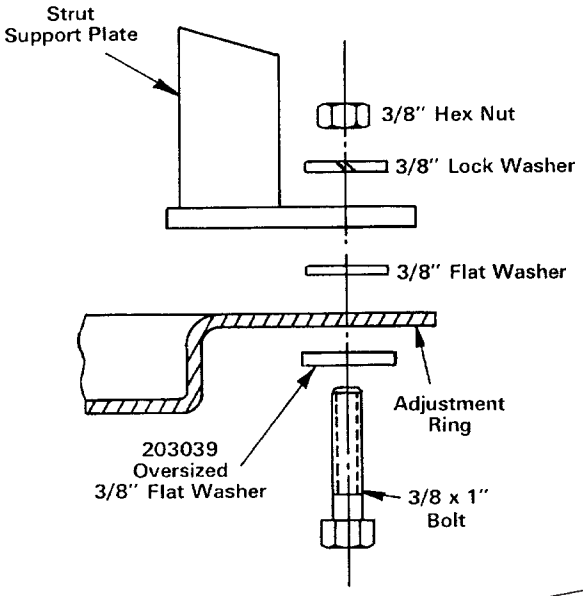


Figure 4-1



4.3 Refer to Figure 4-3. Carefully raise main reflector assembly to zenith (EL = 90°) position. Position and loosely attach preassembled subreflector/adjustment ring assembly to corresponding mounting holes in strut support plates (part of strut weldment) using supplied bolts, oversized flat washers, flat washers, lock washers and nuts. Attach temporary lifting strap as shown, being careful not to damage subreflector assembly. **Note:** Position subreflector assembly to ensure one subreflector adjustment stud will be located at 12 o'clock position when finally installed on main reflector assembly. Refer to Figure 5-1.

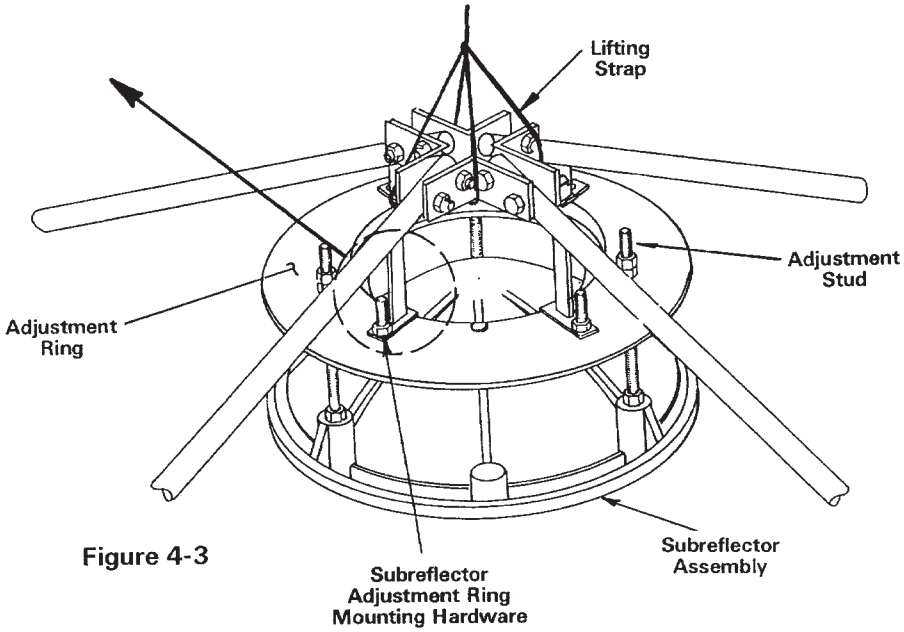


Figure 4-3

4.2 Refer to Figure 4-2. Loosely attach supplied angle clips around reflector perimeter at 2-, 4-, 8- and 10 o'clock positions using indicated bolts, lockwashers and nuts.

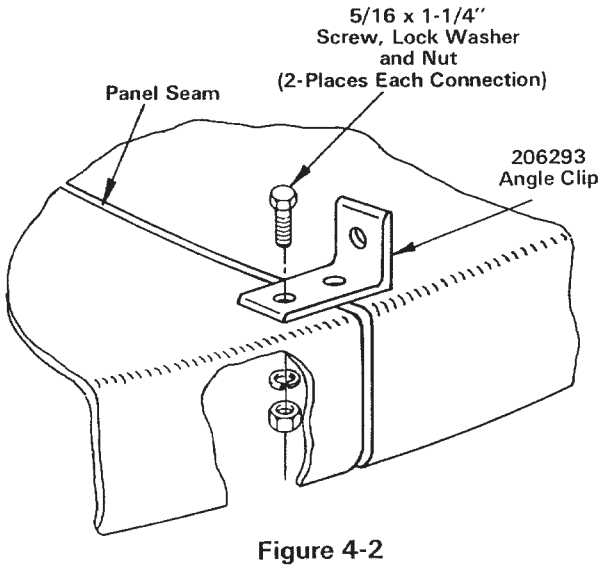


Figure 4-2

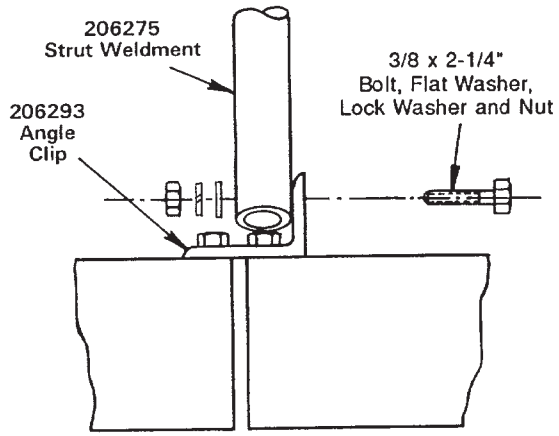


Figure 4-4

4.4 Refer to Figure 4-4. Carefully raise and attach preassembled subreflector/strut assemblies to corresponding angle clips as shown using supplied bolts, flat washers, lock washers and nuts. Securely tighten all subreflector/strut assembly mounting hardware while temporarily leaving subreflector adjustment hardware loosely attached. Remove temporary lifting strap.

5.0 Subreflector Setting

5.1 Refer to Figure 5-1. Use subreflector setting rod to set distance between inner reflector panel seam hardware and subreflector aperture at three subreflector adjustment stud positions. Use subreflector adjustment hardware (refer to Figure 4-3) to achieve equal axial dimensioning at all three locations. Securely tighten adjustment hardware.

5.2 Measure and note the distance between outermost angle clip bolt head and the subreflector rim as shown. Obtain corresponding measurements from remaining . subreflector struts and adjust subreflector adjustment ring mounting hardware (refer to Figure 4-3) at all four locations to achieve a maximum differential of 1/16 in. Securely tighten adjustment hardware.

5.3 Repeat procedure described in paragraph 5.1. If any dimensional variation is noted, repeat procedure described in paragraph 5.1 and proceed to paragraph 5.2. If no dimensional variation is noted, proceed to paragraph 5.4

5.4 Carefully lower reflector assembly to operating position.

Type 205947 Subreflector Kit
Parts List

Type No.	Description	Qty.
205339	Subreflector	1
206379	Adjustment Ring	1
9934-178	3/8 x 6" Stud	3
9999-79	3/8"Jam Nut	16*
9997-79	3/8" Flat Washer	7*

* Includes spare(s)

Type 206280 Subreflector Strut Kit
Parts List

Type No.	Description	Qty.
206275	Strut Weldment	4
206293	Angle Clip	4
203373	Strut Angle	4
9963-127	3/8 x 2-1/4" Bolt	13*
9963-115	3/8 x 1" Bolt	5*
9974-63	3/8" Lock Washer	18*
9999-60	3/8" Hex Nut	18*
203039	3/8" Flat Washer (oversized)	5*
9844-8	5/16-18 x 1-1/4" Screw	9*
9974-17	5/16" Lock Washer	9*
9999-59	5/16" Hex Nut	9*
9997-79	3/8" Flat Washer	9*
300064-2	Subreflector Setting Rod	1

*Includes spare(s).

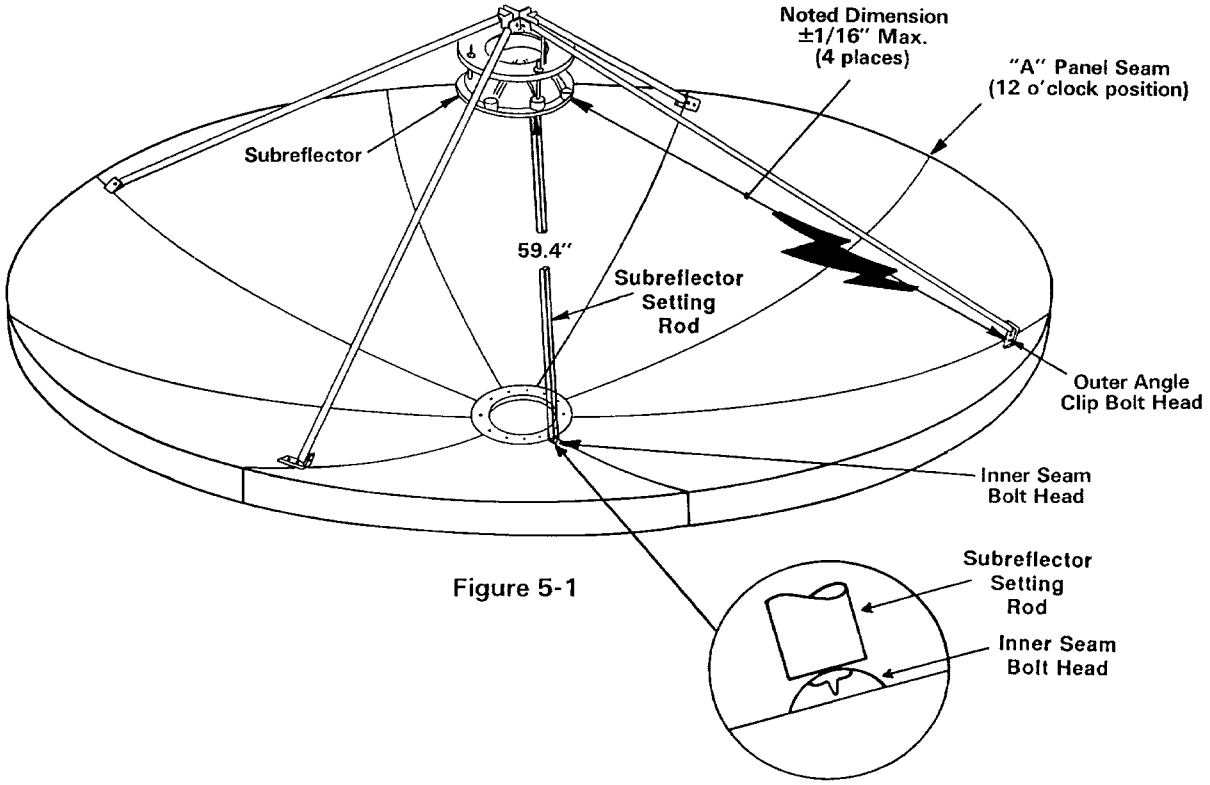


Figure 5-1

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		REL TO PRODUCTION	10NOV90	WF
	A	REVISED SHT 1.3 & 8. DCN D001.91(B)	27SEP91	TN,MK
MH	B	REVISED SHEETS 3 & 7. DCN D003.15(B)		MK

209167-2 4.6M SUBREFLECTOR KIT
AND
209169-2 4.6M SUBREFLECTOR STRUT KIT
INSTALLATION INSTRUCTIONS

REVISION STATUS OF SHEETS

REVISION	B	-	B	-	-	-	A	A
SHEET NO.	1	2	3	4	5	6	7	8

MATERIAL

FINISH

UNLESS OTHERWISE SPECIFIED	DRAWN	RWB	31OCT90
DIMENSIONS ARE IN INCHES	CHECKED		
TOLERANCES	APPD ENGRG	VS/TM	9NOV90
1 PLACE DECIMALS ± .1	APPD ENGRG	RWK	9NOV90
2 PLACE DECIMALS ± .03	APPD MFG		
3 PLACE DECIMALS ± .010	APPD Q.C.		
ANGLE ± 0.5°			
ALL SURFACES	SIMILAR TO		
COMMERCIAL TOL APPLY TO STOCK SIZES	SUPERSEDES DWG OF		

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4.6M SUBREFLECTOR AND STRUT KIT INSTALLATION INSTRUCTIONS

SIZE	FSCM NO.	DWG. NO.
A	84147	239516

SCALE NONE | CAD FILE NO: ES077F1B | SHEET 1 of 8

PROD. GR 6217 DISTR A! ! !

GENERAL

READ THE INSTRUCTIONS THOROUGHLY BEFORE ASSEMBLY. FOLLOW THE SEQUENCES FOR PROPER ASSEMBLY AND OPERATION.

CAUTION: THIS WARNING INDICATES THAT FAILURE TO FOLLOW THE PROPER PROCEDURE AT THIS POINT COULD RESULT IN DAMAGE TO THE ANTENNA AND/OR OTHER PROPERTY AND POSSIBLE INJURY TO PERSONNEL.

NOTICE

THIS INDICATES INFORMATION THAT SHOULD BE READ BEFORE PROCEEDING.

UNPACKING

CAREFULLY REMOVE ALL PARTS FROM SHIPPING BOXES. THE CONTENTS SHOULD CORRESPOND WITH THE PARTS LIST. ANY DAMAGE OR SHORTAGE WILL PREVENT SATISFACTORY ASSEMBLY, INSTALLATION, AND OPERATION OF THE ANTENNA.

NOTICE

'THE INSTALLATION, MAINTENANCE OR REMOVAL OF AN ANTENNA REQUIRES QUALIFIED, EXPERIENCED PERSONNEL. ANDREW INSTALLATION INSTRUCTIONS HAVE BEEN WRITTEN AND ILLUSTRATED FOR SUCH INSTALLATION PERSONNEL. ANTENNA SYSTEMS SHOULD BE INSPECTED ONCE A YEAR BY QUALIFIED PERSONNEL TO VERIFY PROPER INSTALLATION, MAINTENANCE AND CONDITION OF EQUIPMENT. ANDREW DISCLAIMS ANY LIABILITY OR RESPONSIBILITY FOR THE RESULTS OF IMPROPER OR UNSAFE INSTALLATION OR MAINTENANCE PRACTICES.'

SIZE	FSCM NO.	239516
A	84147	
SCALE NONE		SHEET 2

CAD FILE NO. ES077F2

TOOLS RECOMMENDED FOR PROPER INSTALLATION

1) OPEN OR COMBINATION WRENCHES: 0.5 AND 0.56 (QTY 2)
2) DRIVE SOCKETS: 0.5 AND 0.56
3) #2 PHILLIPS SCREWDRIVER
4) 12 FT. TAPE MEASURE
5) 10 FT. (EYE AND EYE TYPE) NYLON SLING (QTY 2) REQUIRED IF CRANE IS AVAILABLE

PARTS LIST

209169-2 4.6M SUBREFLECTOR STRUT KIT

QTY	ITEM	PART NO.	DESCRIPTION
4	1	209174	STRUT WELDMENT
4	2	222888	STRUT ANGLE
4	3	9963-115	0.375-16UNCx1.0LG HEX BOLT
4	4	206293	ANGLE CLIP
4	5	203039	0.375 FLATWASHER (OVERSIZED)
12	6	9963-127	0.375-16UNCx2.25LG HEX BOLT
16	7	9974-63	0.375 LOCKWASHER
16	8	9999-60	0.375-16UNC HEX NUT
8	9	9844-8	0.312-18UNCx1.25LG PHMS
8	10	9974-17	0.312 LOCKWASHER
8	11	9999-59	0.312-18UNC HEX NUT
~~4~~	~~12~~	~~9963-128~~	~~0.375-16UNCx1.75 HEX BOLT~~
8	13	9997-79	0.375 FLATWASHER
1	14	209167-2	4.6M SUBREFLECTOR KIT
1	15	300064	SUBREFLECTOR SETTING ROD

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CAD FILE NO. ES077F3B

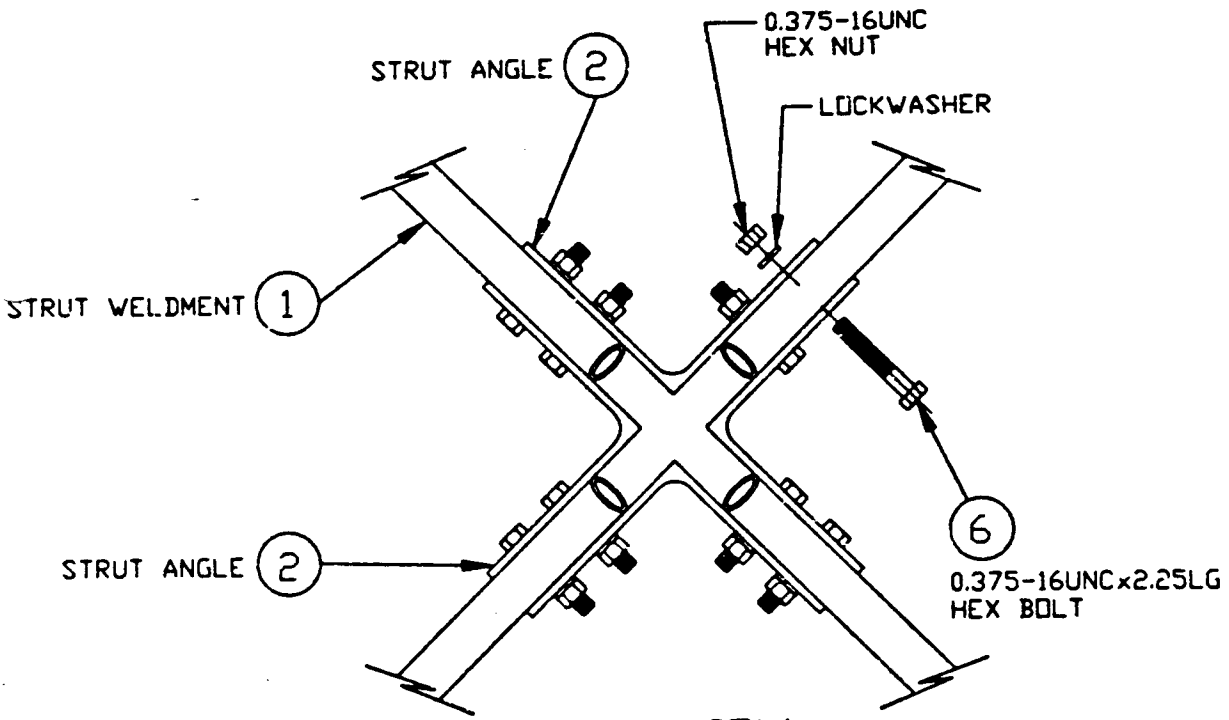
SUBREFLECTOR STRUT KIT ASSEMBLY

NOTICE

THE FOLLOWING INSTRUCTIONS HAVE BEEN WRITTEN SUCH THAT THE SUBREFLECTOR AND SUPPORT STRUTS ARE PREASSEMBLED ON THE GROUND AND LIFTED INTO REFLECTOR BY USE OF A CRANE. IF A CRANE IS NOT AVAILABLE PREASSEMBLE SUBREFLECTOR SUPPORT KIT IN REFLECTOR THEN INSTALL SUBREFLECTOR.

STEP 1:

REFER TO FIGURE 1. LOOSELY PREASSEMBLE STRUT WELDMENT AS SHOWN USING SUPPLIED STRUT ANGLES AND CORRESPONDING MOUNTING HARDWARE.



TOP VIEW

FIGURE 1

SIZE	FSCM NO.	239516
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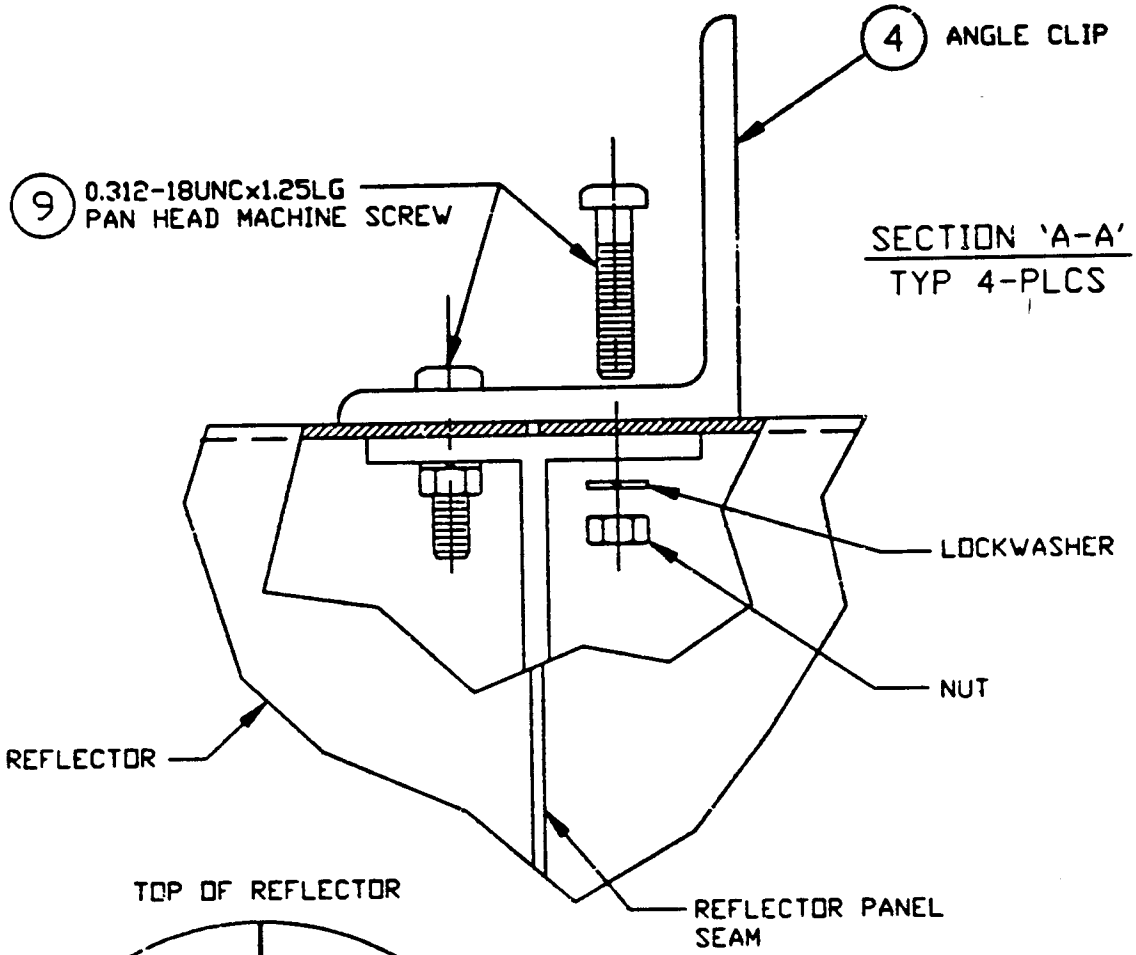
SCALE		SHEET 4

CAD FILE NO. ES077F4

STEP 2:

REFER TO FIGURE 2. LOOSELY ATTACH SUPPLIED ANGLE CLIPS AROUND REFLECTOR PERIMETER AT POSITIONS SHOWN USING INDICATED BOLTS, LOCKWASHERS AND NUTS IN THE FURTHEST SET OF PANEL SEAM HOLES FROM THE CENTER OF REFLECTOR.



SECTION 'A-A'
TYP 4-PLCS

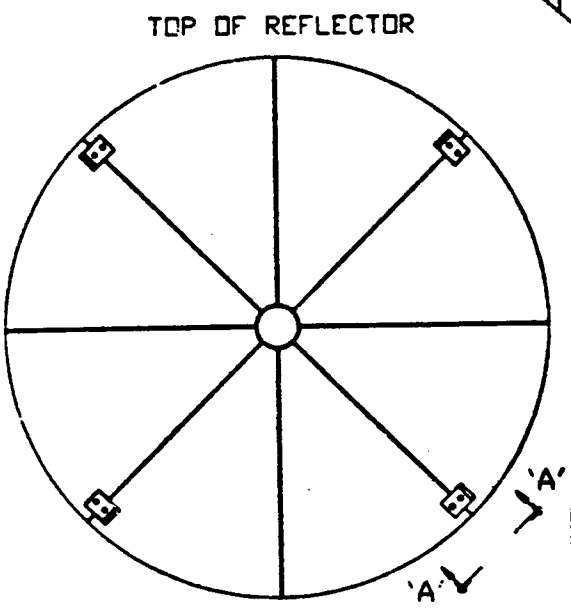


FIGURE 2
SCALE: NONE

SIZE	FSCM NO.	239516
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SCALE		SHEET 5

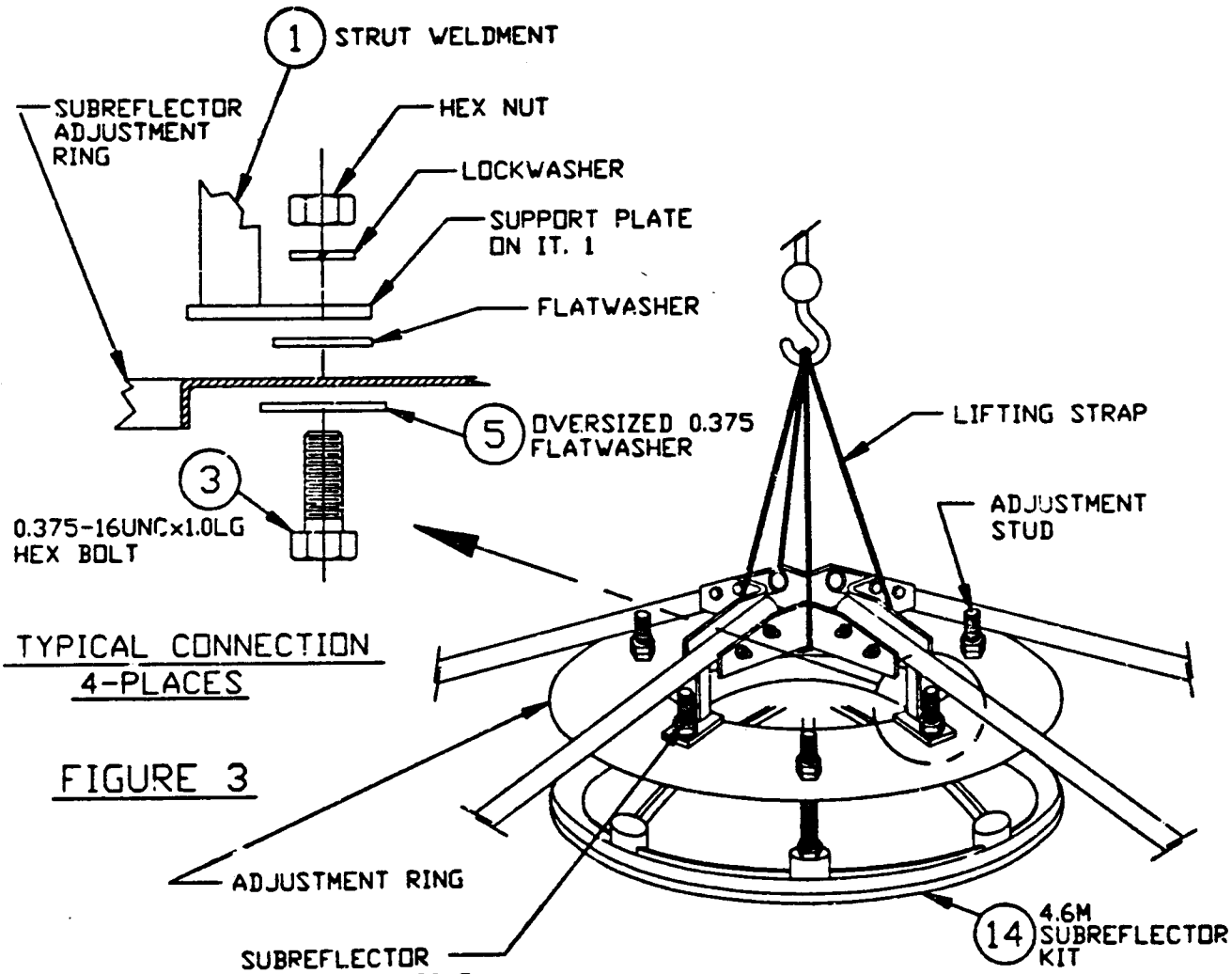
CAD FILE NO. ES077F5

STEP 3:

REFER TO FIGURE 3. PLACE MAIN REFLECTOR ASSEMBLY IN ZENITH (EL=90°) POSITION. POSITION AND LOOSELY ATTACH PREASSEMBLED SUBREFLECTOR/ADJUSTMENT RING ASSEMBLY TO CORRESPONDING MOUNTING HOLES IN STRUT SUPPORT PLATES (PART OF STRUT WELDMENT) USING SUPPLIED BOLTS, OVERSIZED FLATWASHERS, LOCKWASHERS AND NUTS. ATTACH TEMPORARY LIFTING STRAP AS SHOWN, BEING CAREFUL NOT TO DAMAGE SUBREFLECTOR ASSEMBLY.

NOTICE

POSITION SUBREFLECTOR ASSEMBLY SO THAT 'TOP' STENCILED ON THE ADJUSTMENT RING IS TOWARD TOP OF THE ANTENNA.



TYPICAL CONNECTION
4-PLACES

FIGURE 3

SIZE	FSCM NO.	239516
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SCALE		SHEET 6

FILE NO. ES077F6

STEP 4:

REFER TO FIGURE 4. CAREFULLY RAISE AND ATTACH PREASSEMBLED SUB-REFLECTOR/ STRUT ASSEMBLIES TO CORRESPONDING ANGLE CLIP AS SHOWN USING SUPPLIED BOLTS, FLATWASHERS, LOCKWASHERS AND NUTS. SECURELY TIGHTEN ALL SUBREFLECTOR/STRUT ASSEMBLY MOUNTING HARDWARE WHILE TEMPORARILY LEAVING SUBREFLECTOR ADJUSTMENT HARDWARE LOOSELY ATTACHED. REMOVE TEMPORARY LIFTING STRAP.

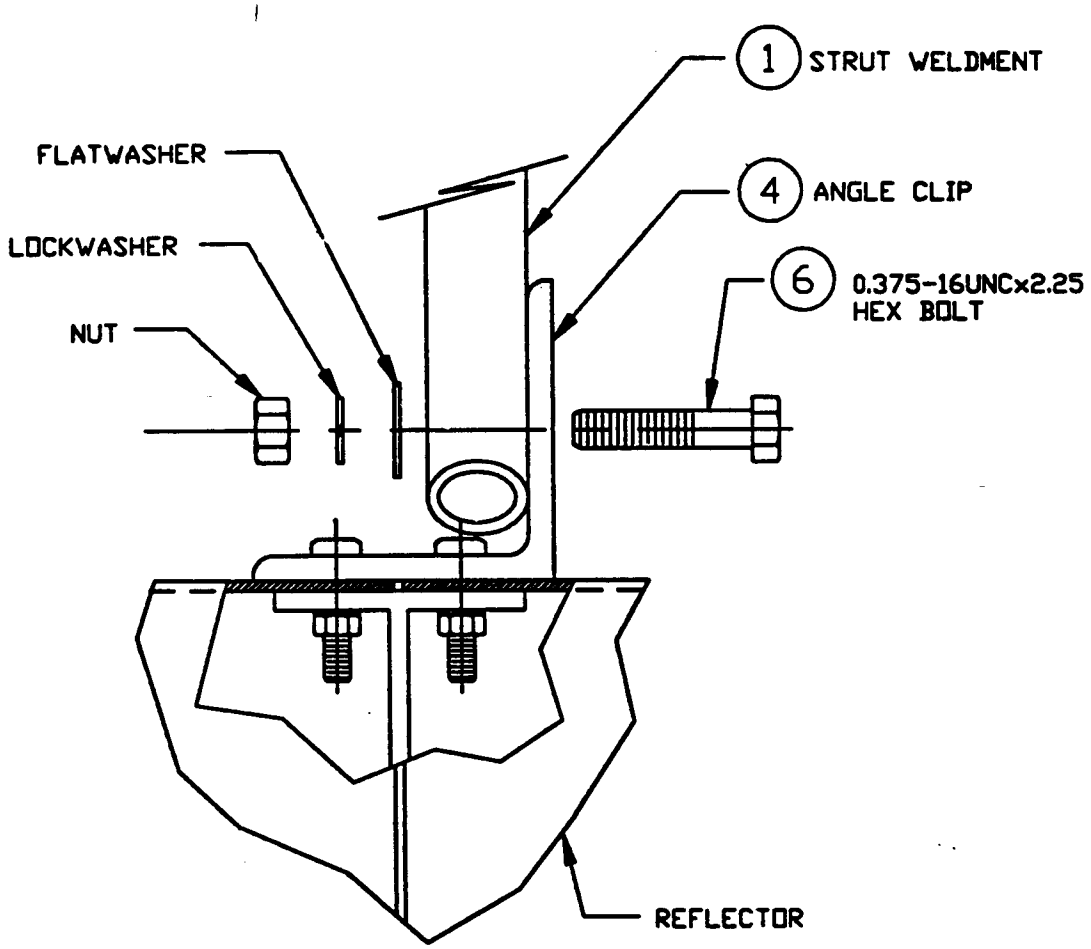

FIGURE 4

SIZE	FSCM NO.	239516
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SUBREFLECTOR SETTING

STEP 5:

REFER TO FIGURE 5. USE THE SUBREFLECTOR SETTING ROD (ITEM 15) WHICH IS A 3/8" DIAMETER x 59.8" LONG ALUMINUM ROD TO SET INDICATED DIMENSION BETWEEN INNERMOST REFLECTOR PANEL SEAM HARDWARE AND SUBREFLECTOR APERTURE RIM AT THE THREE SUBREFLECTOR ADJUSTMENT STUD POSITIONS. USE SUBREFLECTOR ADJUSTMENT HARDWARE (REFER TO FIGURE 3) TO ACHIEVE EQUAL AXIAL DIMENSIONING AT ALL THREE LOCATIONS. SECURELY TIGHTEN THE ADJUSTMENT HARDWARE.

STEP 6:

MEASURE AND NOTE THE DISTANCE BETWEEN OUTERMOST ANGLE CLIP BOLT HEAD AND THE SUBREFLECTOR RIM AS SHOWN. OBTAIN CORRESPONDING MEASUREMENTS FROM REMAINING SUBREFLECTOR STRUTS AND ADJUST SUBREFLECTOR ADJUSTMENT RING MOUNTING HARDWARE (REFER TO FIGURE 3) AT ALL FOUR LOCATIONS TO ACHIEVE A MAXIMUM DIFFERENTIAL OF 0.06 IN. SECURELY TIGHTEN ADJUSTMENT HARDWARE.

STEP 7:

REPEAT PROCEDURE DESCRIBED IN STEP 5. IF ANY DIMENSIONAL VARIATION IS NOTED, REPEAT PROCEDURE DESCRIBED IN STEP 5 AND PROCEED TO STEP 6. IF NO DIMENSIONAL VARIATION IS NOTED, PROCEED TO STEP 8.

STEP 8:

CAREFULLY LOWER REFLECTOR ASSEMBLY TO OPERATING POSITION.

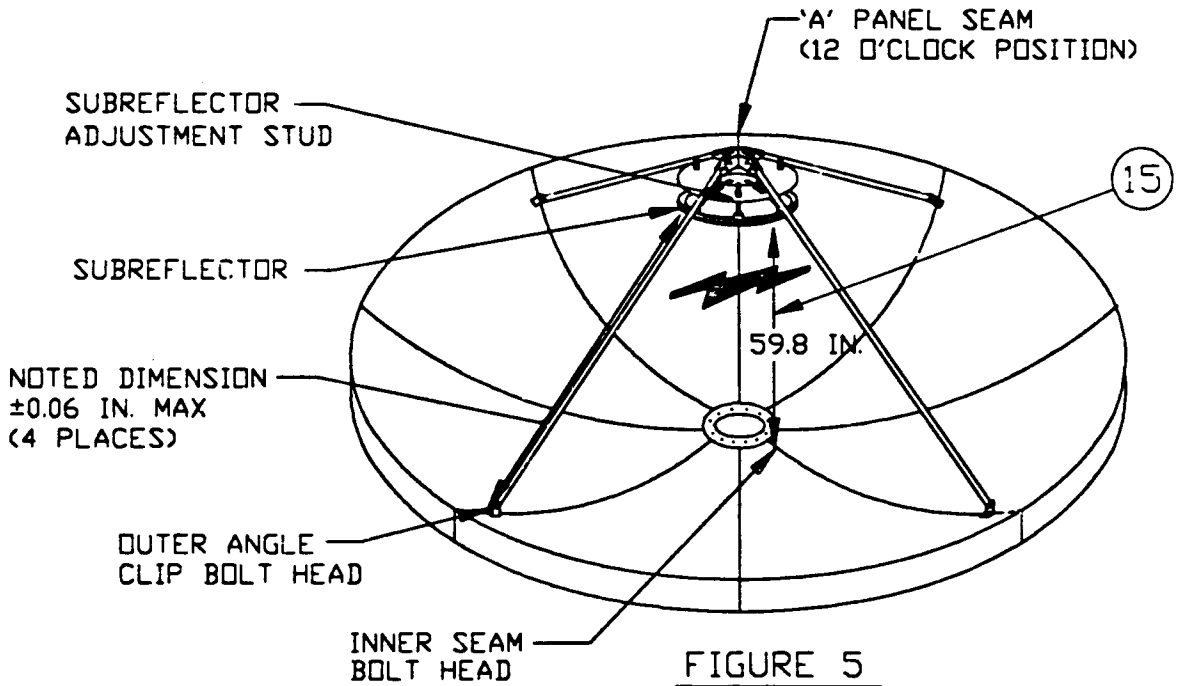

FIGURE 5

SIZE	FSCM NO.	239516
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SCALE		SHEET 8

CAD FILE NO. ES077F8A

Earth Station

Antenna Pointing

for 3.6- Thru 9.3-Meter Earth Station Antennas

1.0 INTRODUCTION

1.1 This document provides adjustment information required during installation of the Earth Station Antenna System. In addition, these same procedures are applicable as a follow-on to any corrective maintenance where readjustment and/or component replacement necessitates checking and/or reestablishing system settings and adjustments as well as antenna pointing information. Refer to applicable motor drive installation drawings for further information.

2.0 ACQUIRING A SATELLITE

2.1 While viewing the spectrum analyzer screen, a pure noise signal as shown in Figure 1 will probably be observed.

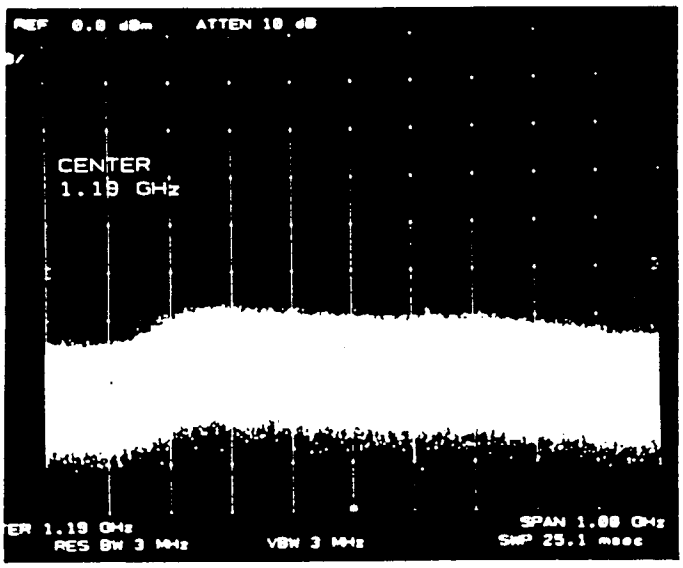

Figure 1. Pure Noise Signal on Spectrum Analyzer

2.2 Some transponder signal may be observed above the noise signal as shown in Figure 2.

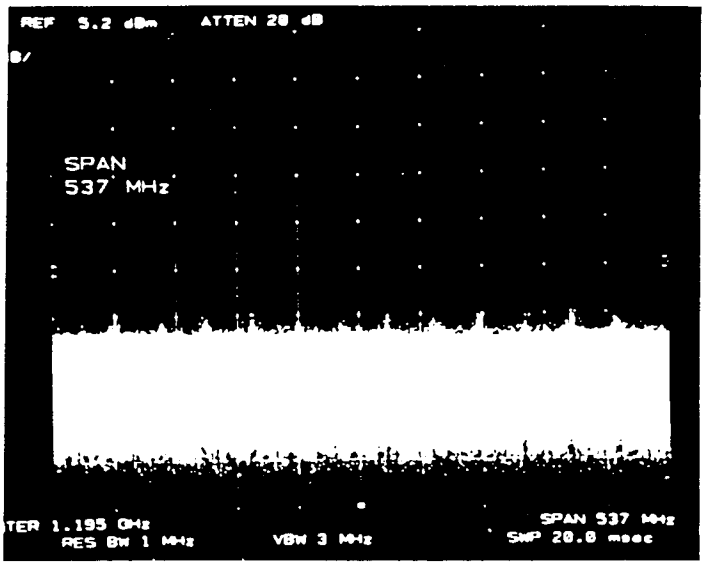

Figure 2. Minimum Transponder Signal on Spectrum Analyzer

2.3 Manually move the antenna in azimuth (scanning back-and-forth) to achieve the maximum (greatest amplitude) transponder signals. Scan in one direction until the amplitude continues to diminish and then scan in the opposite direction until the same condition occurs. Return to the position yielding the greatest amplitude. The maximum azimuth excursion from the original setting should not exceed ±1.5 degrees or the antenna may begin to access a different satellite. With the antenna positioned in azimuth such that the transponder signals are maximized, follow the same procedure manually moving the antenna in elevation (scanning up-and-down) to further maximize the transponder signals. Repeat this procedure alternating between the azimuth and elevation excursions of the antenna to peak the transponder signal amplitude. A transponder signal amplitude of 30 dB or more from peak to average noise signal indicates the antenna is receiving the signal on the main beam. A transponder signal amplitude less than 30 dB indicates the antenna is receiving the signal on a side lobe of the main beam.

2.4 With the antenna peaked on a side lobe in azimuth and/or elevation (refer to Figure 3, position A), move the antenna in azimuth while observing the spectrum analyzer screen.

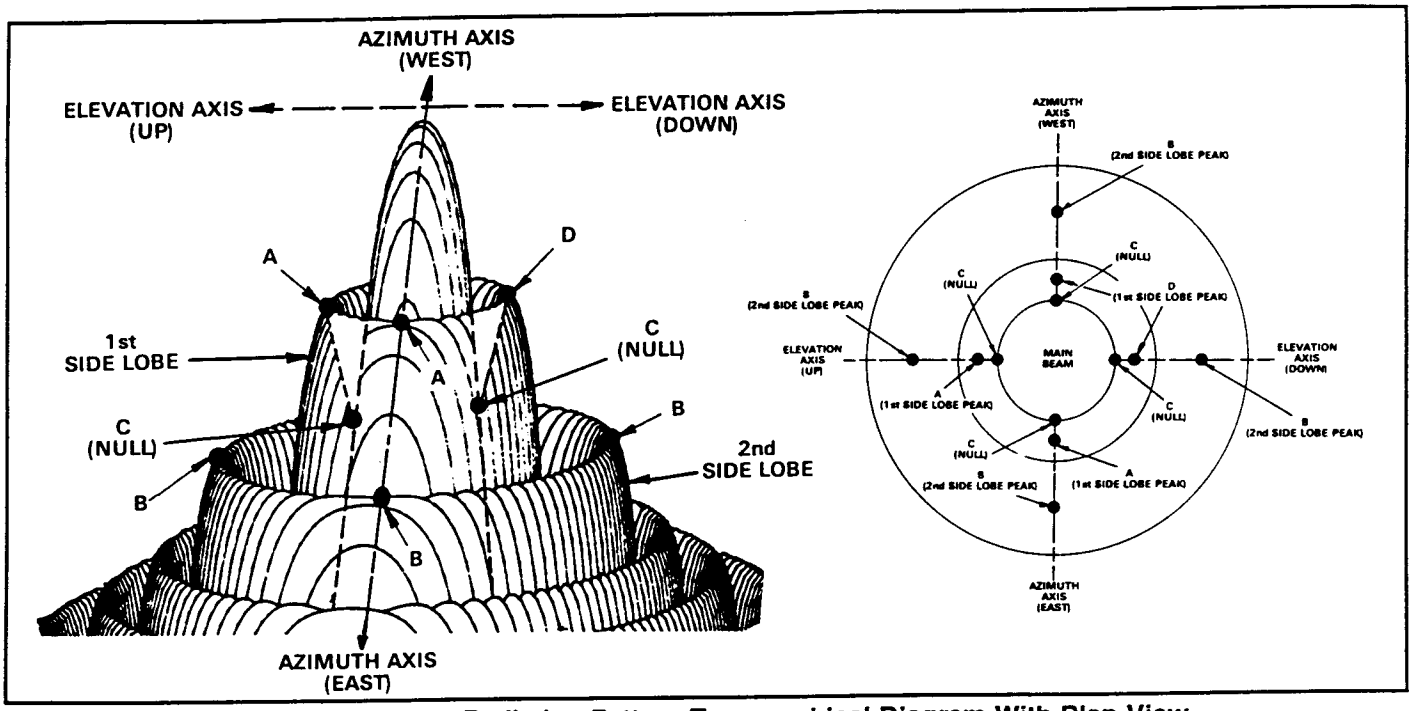

Figure 3. Antenna Radiation Pattern Topographical Diagram With Plan View

2.5 If the signal amplitude diminishes and does not increase (position B) to the level noted when the antenna was peaked on the side lobe, the antenna is moving away from the main beam; reverse the direction of antenna movement. From the original side lobe position (position A), the signal amplitude should now diminish to a null point at position C (minimum amplitude showing only signal noise) and then symmetrically increase again to the same level at position D as noted at position A. At the null point (position C), the antenna is aligned with the alternate (elevation) axis. If the antenna was peaked on a side lobe in azimuth, it was appropriately aligned with the elevation axis; proceed with paragraph 2.6. If the antenna was peaked on a side lobe in elevation, it was appropriately aligned with the azimuth axis; proceed with paragraph 2.6 moving the antenna in azimuth rather than elevation.

2.6 Move the antenna in elevation while observing the spectrum analyzer screen. If the signal amplitude increases, decreases and then increases again but to a lesser value, the antenna is moving in the wrong direction; reverse the direction of antenna movement. From the original null point (position C), the signal level should increase and decrease alternately but with increasing amplitude until the transponder signal increases to a level of at least 30 dB at which time the antenna is receiving the transponder signals on the main beam. Continue to manually peak the signal to a maximum level using the azimuth and elevation adjustments.

2.7 If the antenna is aligned in azimuth and elevation (signal maximized) and 24 transponder signals (12 horizontal and 12 vertical) are noted, the polarization adjustment is set incorrectly and must be modified. If 12 transponder signals are noted, they may or may not be the properly polarized signals. Therefore, 24 transponder signals must be visually noted in order to determine the proper polarization setting.

2.8 Rotate the feed assembly clockwise until 24 transponder signals are noted and of approximately equal amplitude as shown in Figure 4. **Note:** It is more accurate and visually easier to minimize the alternate set of transponder signals rather than maximizing the transponder set of interest.

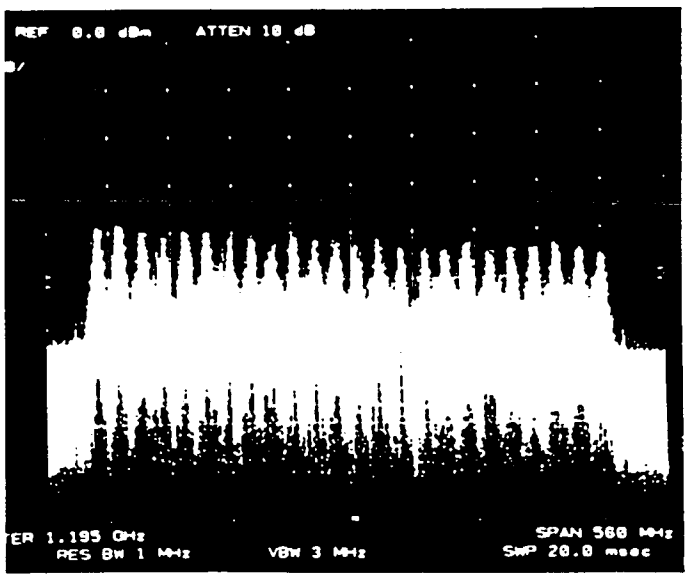

Figure 4. Polarization at 45° from Optimum Setting

2.9 With all 24 transponder signals of approximately equal amplitude appearing on the spectrum analyzer screen as shown in Figure 4 determine the specific antenna system and satellite parameters noted in paragraph 2.8. Rotate the feed assembly as required until the appropriate (odd or even) transponder signals are maximized. Figure 5 illustrates partial minimizing of the alternate transponder signals.

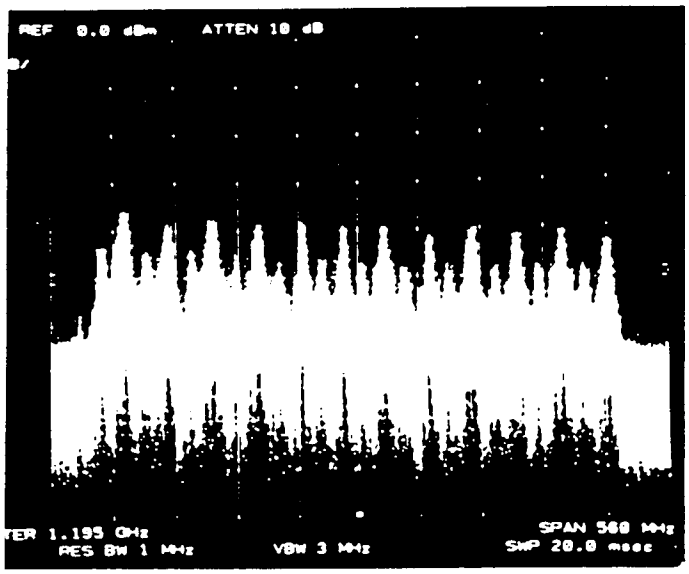

Figure 5. Maximizing Odd Transponders

2.10 Figure 6 illustrates full minimizing of the alternate signals; the desired result.

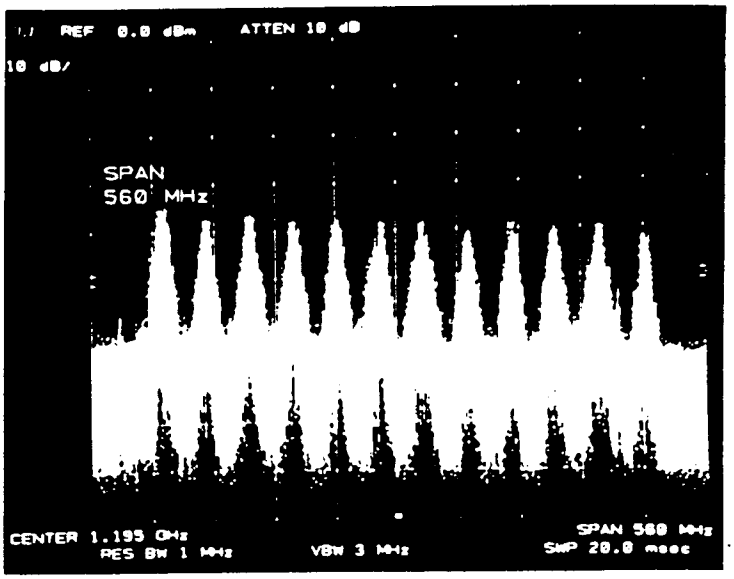

Figure 6. Optimum Polarization Setting

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Section 4
Periodic Preventive Maintenance
3.7-/4.5-/4.6-Metre
Earth Station Antenna
System Manual

1.0 General

1.1 This section contains periodic preventive maintenance instructions for the 3.7-/4.5-/4.6-Metre Earth Station Antennas. Included in this section are inspection and preventive maintenance procedures including cleaning and lubrication, painting, and an operational voltage/current checkout procedure deemed within the capabilities of the average station technician. Refer to applicable vendor manuals for any repair procedures not included in this section yet designated as capable of being performed in the "field" rather than requiring specialized facilities, tools and/or test equipment as well as technically trained personnel.

1.2 An operational checkout procedure provides an accurate indication of the overall earth station performance and should be performed at intervals of approximately three months. This procedure is essentially performed during the various modes of normal operation of the earth station. In addition, the operational checkout procedure should be performed after any repairs or adjustments have been made, or whenever the earth station is suspected of degraded operation. If any discrepancy in performance exists and the condition cannot be readily remedied to return the earth station to a proper operating condition, the appropriate troubleshooting procedures should be referenced to locate the fault. After the trouble is determined and the repairs affected, a final operational checkout procedure should be performed to verify that all discrepancies have been corrected.

Warning

Service personnel must at all times observe all safety regulations. Do not perform any maintenance task on the equipment without first turning off the main power supply and disconnecting as applicable the transmit and/or receive rack components power supplies. Under certain conditions, dangerous potentials may exist when the supply power controls are in the off position due to charges retained by capacitors. Always discharge and ground a circuit after removing power.

2.0 Inspection and Preventive Maintenance

2.1 The following paragraphs describe the inspection and preventive maintenance procedures for the earth station. These instructions include general cleaning and inspection, the preservation of metal parts and lubrication. Periodic replacement of assemblies or components as a preventive measure is not required. Malfunctions of the earth station can be traced to components, assemblies and parts through the use of applicable troubleshooting procedures.

2.2 **General Cleaning.** To prevent the excessive accumulation of dust and dirt as well as the removal of such contaminants, thoroughly clean the equipment whenever visually inspecting the earth station components. No special cleaning procedures are required. However, a thorough cleaning in accordance with the following procedures is required to assure continued trouble-free operation.

Warning

Use cleaning solvents outside or in a well ventilated room with free air circulation. Avoid breathing the fumes and excessive skin contact with the solvents. Keep solvents away from an open flame.

A. Electrical Parts. Minor cleaning, such as the removal of dust and loose foreign particles can be accomplished by vacuuming, by using a soft brush or lint-free cloth or by blowing out the dust and dirt with low pressure (5 to 25 psi), dry compressed air. When using air to blow off the contaminants, either avoid or be careful when directing the air stream on delicate parts. To remove imbedded dirt, grease or oil from electrical parts, use a 50% solution of isopropyl (rubbing) alcohol and apply with a soft bristle brush. It may be necessary to brush some parts vigorously with a stiff bristle brush to remove imbedded and hardened dirt particles. If possible, avoid excessive use of cleaning solvent on electrical insulation. After cleaning, allow the cleaned parts to dry for 10 to 15 minutes before placing the equipment into operation.

B. Mechanical Parts. Clean mechanical parts by first removing dust, dirt and other loose contaminants with a scraper, stiff brush (bristle, or wire in the case of rust or other corrosion) or cloth or compressed air at 25 to 40 psi. Any accumulated imbedded dirt, corrosion, grease or oil deposits that require further cleaning may be removed with a bristle or wire brush and a cleaning solvent such a trichlorethylene, or equal. After cleaning, allow the cleaned parts to dry for 10 to 15 minutes before placing the equipment into operation. Clean and paint aluminum and galvanized surfaces in accordance with the procedures outlined in paragraph 3.0, Preservation of Component Parts.

2.3 **Inspection.** The frequency of inspection is contingent upon the user's individual standards and the operational environment in which the earth station is located. However, a visual inspection of the earth station components should be performed at least semi-annually. Where there are no established wear limits, perform a visual inspection to locate worn or damaged parts which could cause improper functioning of the earth station. It is recommended the mechanical and electrical inspection be performed on the assembled or partially disassembled equipment to determine the extent of disassembly required prior to completely disassembling a suspected malfunctioning component or module. In the absence of any special inspection requirements, operational tests are the most effective means in isolating parts and assemblies requiring further inspection. Any condition noted during inspection that may preclude continued proper operation of the earth station prior to the next scheduled inspection should be noted. The discrepant condition should be corrected (repaired or replaced) immediately or at the conclusion of the inspection procedure.

A. Local Control/Motor Drive Controller. Inspection of the local control/motor drive controller conforms generally to standard visual inspection procedures on electromechanical equipment. In addition to these standard procedures, perform the following checks and visual inspections for the specific conditions noted:

Warning

Be certain to secure the local control/motor drive controller doors during inspection to prevent their swinging in the wind resulting in equipment damage or possible personal injury.

1. Check the front panel for illegible and indistinct panel markings.

2. Check the three position selector switches (Az-Off/Slow/Fast, El-Off/Slow/Fast and Pol-CCW/Off/CW) for smooth operation, audible clicking at each actuation (left to center and return) and spring return from right to center. For each of the two position selector switches (Az-East/West, El-Up/Down and Local/Remote) check for smooth operation and audible clicking at each actuation.

3. Inspect all wiring and cables for discoloration and burned insulation, dirt, breaks, security of connection and other signs of deterioration. Examine connections for dirt, flux, corrosion and mechanical defects. Check for loose or broken lacing and cut, brittle, abraided, frayed or cracked insulation.

4. Examine connectors for corrosion, broken inserts and stripped threads. Check connector shells for distortion and dents, and contact pins for bends, misalignment or other deformities. Check connector inserts for carbon tracking indicating arc-over.

5. Check all electrical components for dirt, cracks, chips, breaks, discoloration and other signs of deterioration and damage. A discolored, blistered or burnt condition is evidence of overload. Measure actual value of suspect electrical components and compare against specified value.

6. Check transformer for an excessive wax deposit on the surface, discoloration, or a pungent odor indicative of burning varnish denoting overheating or a total breakdown.

7. Check all terminal boards for broken or missing terminals and stripped threads. Check tightness of lead attaching hardware.

8. Check each starter for a make-after-break provision through the release of one pushbutton as the alternate pushbutton is depressed.

9. Check the relays and contactors for free operation of the armatures and contact condition. The contacts are usable even though pitted, burned, worn or discolored. The contacts or contactor or relay assembly should be replaced only when the contact material has been completely torn away or worn off.

10. Visually inspect all mechanical parts for freedom of operation without binding or interference. Check for security of all hardware and stripped or otherwise damaged threads. Check metallic parts for corrosion, dents, distortion and other deformation.

11. Check for evidence of water inside the enclosure. If any water is in evidence, check that all seals are intact and if not, use a coating of RTV-108 (silicone rubber sealant) to seal any exposed electrical fitting, bolt hole or other possible water entry to the enclosed electrical components in order to maintain a weatherproof condition.

B. Main Load Center. Inspection of the main load center conforms generally to standard visual inspection procedures on electromechanical equipment. In addition to these standard procedures, perform the following checks and visual inspections for the specific conditions noted:

1. Inspect all wiring and cables for discoloration and burned insulation, dirt, breaks, security of connection and other signs of deterioration. Examine connections for dirt, corrosion and mechanical defects. Check for loose or broken lacing and cut, abraided, frayed, brittle and cracked insulation.

2. Check the circuit breakers for latching in both the on and off positions and audibly for positive snap-action when operated to either direction. The quick-make, quick-break operating mechanism prevents contact "welding" at high fault currents to assure dependability and long life.

3. Check operation of the duplex ground fault test/reset switches by depressing the TEST pushbutton to remove power from the duplex outlet. Depress the RESET pushbutton to restore power to the duplex outlet (if so required).

C. Antenna. Inspection of the antenna conforms generally to standard visual inspection procedures performed on electromechanical equipment. In addition to these procedures, perform the following checks and visual inspections for the specific conditions noted:

1. Inspect all wiring and cables particularly the network to enclosure and enclosure to mount interfaces for discoloration and burned insulation, moisture entry, corrosion, dirt, breaks, security of connection and other signs of deterioration. Examine connections for dirt, corrosion and mechanical defects. Check for loose or broken lacing and cut, abraided, frayed, brittle and cracked insulation.

2. Examine connectors for corrosion, broken inserts and stripped threads. Check connector shells for distortion and dents, and contact pins for bends, misalignment or other deformities. Check connector inserts for cracks, and carbon tracking, burns or charring indicating arc-over.

3. Check all electrical components for dirt, cracks, chips, breaks, discoloration and other signs of deterioration and damage. A discolored, blistered or burnt condition is evidence of overload.

4. Operate the azimuth and elevation drives as well as the feed rotation in both the plus and minus direction from the local control/motor drive controller at least once every three months during antenna down time. Check that the mechanical limit switches provided at the end points stop antenna and feed movement and limit travel to prevent structural interference and damage. Check the mechanical limit switches for corrosion and water entry and the arm on each feed limit switch for free movement without binding. Be certain both feed rotation limit switch arms are not distorted and ride centrally on the actuating cam to open their corresponding limit switch.

5. Inspect the azimuth and elevation jackscrew boots for security of attachment at both ends, for abrasion, tears, cuts, brittleness and other damage that may expose the jackscrew to the environment (water, dust, etc.). Minor repairs can be made with RTV-108 silicone rubber sealant.

6. Visually inspect the feed window for dirt and the feed, feed supports, feed window and reflector for distortion, foreign object damage and environmental deterioration due to ice and snow, dust, rain, hail and high winds, etc. which may cause electrical component and/or structural deformation.

7. Check the cable attachment to the resolvers and to the LNC's and enclosure mount interface for security, the cable routing for secure hanger attachment and the cable insulation for cuts, cracking, abrasion and other deterioration. Check the LNC's and the resolvers for a secure mechanical attachment. Ensure proper torquing of polarization drive gear box set screws and appropriate tensioning of corresponding drive chain assembly, if applicable.

8. Check (if applicable) that the drain holes in the bottom of the enclosure are not obstructed and there is no evidence of water accumulation. Check the enclosure doors for proper closure and that the door seals are intact, not torn, abraided or otherwise damaged. Check that all other seals are intact and if not, use a coating of RTV-108 (silicone rubber sealant) to seal any exposed electrical fitting, bolt hole or other possible water entry to electrical components in order to maintain a weatherproof condition. If the enclosure is provided with a vent fan, check for free operation of the fan blade. The fan bearings are permanently lubricated; any binding, abnormal noise or vibration necessitates replacement of the fan assembly. Check and replace the fan filter element if it appears dirty or obstructed with dust.

9. Check for the appearance of surface lubricants that will cause the accumulation of dirt and grime. Clean off all excess surface lubricants with a cloth and if required, a cloth **dampened** not wetted with trichlorethylene, or equal.

10. Visually inspect all mechanical parts for freedom of operation with no misalignment, binding or interference. Check all cabling for sufficient slack to prevent cable strain as well as adequate restraint to prevent abrasion or chaffing during antenna and feed movement.

11. Check security of antenna mounting and interconnecting assembly hardware. Be certain all electrical grounding connections (including cross-axis grounding straps) are intact and secure, not corroded or broken. Thoroughly clean any noticeably corroded portions of grounding cables, unplated portion of universal terminals and corresponding mounting surfaces using a wire brush. Replace rather than tighten any loose A-325 structural hardware. The hardware distorts at initial installation and once loosened will not maintain the required high strength friction connection. All other assembly and installation hardware should be tightened to its original torqued condition. When installing new structural hardware, do not use a wrench with a lever arm longer than two feet.

12. Examine painted aluminum and galvanized surfaces and touch-up where required in accordance with the procedures outlined in paragraph 3.0, Preservation of Component Parts.

D. Drive System Voltage and Current Checks. At the conclusion of the installation procedure prior to turning the system over to the station facility, an installation acceptance check off sheet was prepared and duly signed off if installed by Andrew crew. Part of this check off included voltage readings taken to determine if proper voltage was available. Current readings were also taken as a reference for future comparison to serve as a troubleshooting aid in determining possible equipment degradation and shortened life. Any current reading taken during the following procedure that varies by more than 5% from the pre-established reference values necessitates troubleshooting the particular system involved to determine the cause and required corrective action.

1. Approximately every three months and during a period of down time, disconnect as applicable the RF transmitter and **all** power supplies. The main disconnect switch in the main load center box at the antenna site must be in the ON position and the LOCAL/REMOTE switch in the local control motor drive controller must be in the LOCAL position.

Warning

The following procedure necessitates gaining access to electrically powered components and wiring where dangerous potentials exist. Only qualified electrical technicians exercising extreme caution should perform these procedures. Failure to heed this warning could result in an electrical shock hazard causing serious injury or death.

2. Open the outer local control/motor drive controller door at the antenna site to gain access to the conductors supplying power to the azimuth, elevation and polarization drive motors.

Note

During the following procedures, the antenna drives (azimuth, elevation and polarization) will be powered to rotate the antenna and feed in both directions of travel. Check that this condition can be tolerated from a safety as well as an operational standpoint, and that the electrical limits are not reached before the testing is concluded. Reaching an electrical limit before concluding a test necessitates rotating the antenna or feed in the opposite direction a sufficient distance to permit retesting in the desired direction.

3. Turn the FEED CCW/OFF/CW switch to either the CW or CCW position and while the feed is rotating, **CAREFULLY** use a clamp on ammeter in accordance with the ammeter manufacturer's instructions to take current readings off each of the three conductors (phases) connected to the load side of the polarization motor circuit breaker. Record the current draw in the equipment log and compare the readings to the reference values entered in the installation/acceptance check off. If the readings differ by more than 5%, refer to appropriate troubleshooting information and perform applicable corrective action. Then take voltage readings off each of the three conductors; the readings should agree with each other within 2%. Turn the FEED CCW/OFF/CW switch to OFF.

4. Repeat preceding step (3) with the FEED CCW/OFF/CW switch in the alternate operating position.

5. Turn the AZIMUTH EAST/WEST switch to either position and while the antenna is rotating, **CAREFULLY** use a clamp on ammeter in accordance with the ammeter manufacturer's instructions to take current readings off each of the three conductors (phases) connected to the load side of the azimuth drive motor circuit breaker. Record the current draw in the equipment log and compare the readings to the reference values entered in the installation/acceptance check off. If the readings differ by more than 5%, refer to appropriate troubleshooting information and perform applicable corrective action. Then take voltage readings off each of the three conductors; the readings should agree with each other within 2%. Turn the AZIMUTH switch to OFF.

6. Repeat steps (5) with the AZIMUTH EAST/WEST switch in the alternate operating position.

7. Turn the ELEVATION DOWN/UP switch to either position and while the antenna is rotating, **CAREFULLY** use a clamp on ammeter in accordance with the ammeter manufacturer's instructions to take current readings off each of the three conductors (phases) connected to the load side of the elevation drive motor circuit breaker. Record the current draw in the equipment log and compare the readings to the reference values entered in the installation/acceptance check off. If the readings differ by more than 5%, refer to appropriate troubleshooting information and perform applicable corrective action. Then take voltage readings off each of the three conductors; the readings should agree with each other within 2%. Turn the ELEVATION switch to OFF.

8. Repeat steps (7) with the ELEVATION DOWN/UP switch in the alternate operating position.

9. If all voltage and current readings are within tolerance, close the local control/motor drive controller inner door and place the LOCAL/REMOTE switch in the REMOTE position to return antenna control to the studio. Then close and lock the outer local control/motor drive controller door.

2.4 Pedestal Mount Bearing Pad Adjustment. The bearing pad (within the pedestal mount) adjustment rods/bolts require yearly adjustment and verification of torque value in accordance with the following procedures:

A. Loosen jam nuts on all adjustment rods/bolts.

B. Torque the upper adjustment rod evenly to 40-45 foot-pounds. Then torque the lower adjustment rod evenly to 40-45 foot-pounds.

C. Torque the upper adjustment bolt evenly to 40-45 foot-pounds. Then torque the lower adjustment bolt evenly to 40-45 foot-pounds.

D. Repeat steps B and C verifying all adjustment rods/bolts are evenly torqued within the limits specified.

E. Tighten the jam nuts.

3.0 Preservation of Component Parts

3.1 Aluminum Parts

A. Remove all loose paint and corrosion by scraping, wire brushing or using steel wool. If using steel wool near the feed window, make sure that none remains on the feed horn window. Edges of existing paint can be blended with the metal surface by using a fine grit sandpaper. Wipe the surface to be painted with a soft rag dampened in trichlorethylene, lacquer thinner or equal. Be certain to remove all loose paint, corrosion, imbedded dirt, grease and oil deposits or the paint will not adhere to the surface. Lacquer thinner will dissolve paint if applied heavily and rubbed vigorously. The reflector may be washed with plain water if necessary. Do not use bleach, soap solutions or kerosene as it is difficult to remove the residue. Allow the cleaned surface to dry thoroughly before priming.

B. Prime the cleaned surface by applying zinc chromate primer. The primer can be applied with a brush, roller or pressurized spray. If necessary, thin the primer with lacquer thinner to the proper consistency. Feather primer onto adjacent painted surfaces. Allow primer to thoroughly dry before applying the finish paint coat.

C. Paint all rf surfaces, such as the inside of the main reflector and subreflector with a high-reflectance white paint. This type of paint disperses light rays, reducing the focusing effect of the sun's radiation, thereby reducing heat build-up caused by the focused sun's rays on the feed system. Rear surfaces of the reflector and subreflector may be painted with a flat white enamel paint. The paint can be applied with a brush, roller or pressurized spray. If necessary, thin the paint with the appropriate thinner to the proper consistency. Thoroughly paint over the primed surfaces and blend with the existing painted surface.

3.2 Galvanized Surfaces

A. Remove all loose paint and corrosion by scraping, wire brushing or using steel wool. Edges of existing paint can be blended with the metal surface by using a fine grit sandpaper. Wipe the surface to be painted with a soft rag dampened in trichlorethylene, lacquer thinner or equal. Be certain to remove all loose paint, corrosion, imbedded dirt, grease and oil deposits or the paint will not adhere to the surface. Lacquer thinner will dissolve paint if applied heavily and rubbed vigorously. Do not use bleach, soap solutions or kerosene as it is difficult to remove the residue. Allow the cleaned surface to dry thoroughly before painting.

B. Paint the cleaned surface with a zinc-rich paint. The paint can be applied with a brush, roller or pressurized spray. If necessary, thin the paint with the appropriate thinner to the proper consistency. Thoroughly paint over the cleaned surface and blend with the existing painted surface.

3.3 Plastic Assemblies

A. The optional feed enclosure assembly is made of high impact resistant plastic and is specially coated to resist the damaging effects of ultraviolet radiation.

Note

Improper cleaning of the enclosure assembly may cause damage to the applied protective enclosure coating causing a reduction of the ultraviolet radiation resistant properties of the feed enclosure.

B. Proper cleaning of the feed enclosure assembly may be performed in accordance with the following procedure:

1. Remove all dust and/or dirt from the enclosure surface using a soft cloth or chamois dampened with a mild detergent or similar household cleaner.

Note

Do not use any abrasive cleansers or strong chemicals to clean the enclosure assembly which may cause damage to the enclosure assembly surface.

2. Allow the cleaned enclosure surface to thoroughly dry and sparingly apply an automotive type wax to the surface of the enclosure assembly.

3. Lightly polish the enclosure surface using a clean, dry rag.

4.0 Lubrication

4.1 For long life and trouble-free operation, be certain not to extend the lubrication schedule beyond the frequency recommended in Table 4-1, Lubrication Chart. The frequency should be shortened if the antenna is subjected to an adverse environment (e.g. high temperature, extended periods of rainfall, high humidity, dust storms, etc.). Any component or part should immediately be lubricated if during inspection or operation, rough, jarring, or intermittent motion is noted, or if squeeky or other unusual noises are heard. Lubrication is required on all metal-to metal rolling or sliding parts. Use the lubricants recommended in paragraph 4.3. Do not overlubricate. Overlubrication can often be as damaging as underlubrication. Prior to the application of lubricant to any parts, use a clean cloth and/or bristle brush and remove any old lubricant to prevent an excessive build-up. Remove indicated access plugs from square tube weldment and apply lubricant to panning frame tube assembly and corresponding thrust pads. Securely replace access plugs in square tube weldment. Be certain to remove any protective caps and clean off each lubrication fitting prior to injecting fresh grease. The elevation and azimuth jack screw assemblies are equipped with a grease fitting and corresponding pipe plug on opposite sides of the jack housing. Remove the appropriate pipe plug and fill unit with grease until lubricant seeps from the pipe plug opening. Replace and securely tighten pipe plug.

4.2 Jackscrews/Motors

A. Periodically inspect lifting screws on jackscrew assemblies to insure adequate lubrication. Loosen jackscrew boot clamps to expose the lifting screw assembly. Fully extend jackscrew assembly being careful not to exceed preset mechanical limits. Brush thin coating of Mobil SHC-32 grease on exposed lifting screw. Replace boot and attach corresponding boot clamps. If lifting screw is rusty, remove existing lubricant with solvent and wire brush rusted area. Rinse with solvent and apply fresh grease.

B. Periodically inspect and remove dust or dirt deposits from the motor housings to avoid hindering the heat exchange with the ambient air. Slight dirt accumulation on the air vent screw through splash oil cannot be avoided; however, keep vent screw clean to ensure proper pressure compensation.

4.3 Lubricant Characteristics

A. Mobil Temp SHC-32 – A non-soap hydrocarbon fluid type grease. Operating temperature range is -65° to +350°F (–54° to +177°C).

B. Mobil SHC624 – A low temperature synthetic oil for worm gear reducers. Operating temperature range is –40° to +125°F (–40° to +52°C).

C. Moly Grease Lubricant - A grease lubricant containing molybdenum disulfide. Operating temperature range is -85° to +300°F (-29° to +149°C).

4.4 Gear Motor/Housing Fill and Drain Requirements

A. Lube points 2 and 4 (Table 4-1) require removal of the indicated drain plugs and collecting/measuring the amount of SHC624 drain oil using measuring cup. The specified amount of oil must be added to the gear motor/housing (after installing the drain plug) via the fill/vent plug opening using supplied funnel. Addition of the oil requires use of an appropriate filling utensil. Use of a modified level stick will **not** correctly gauge the appropriate amount of oil in the gear motor/housings.

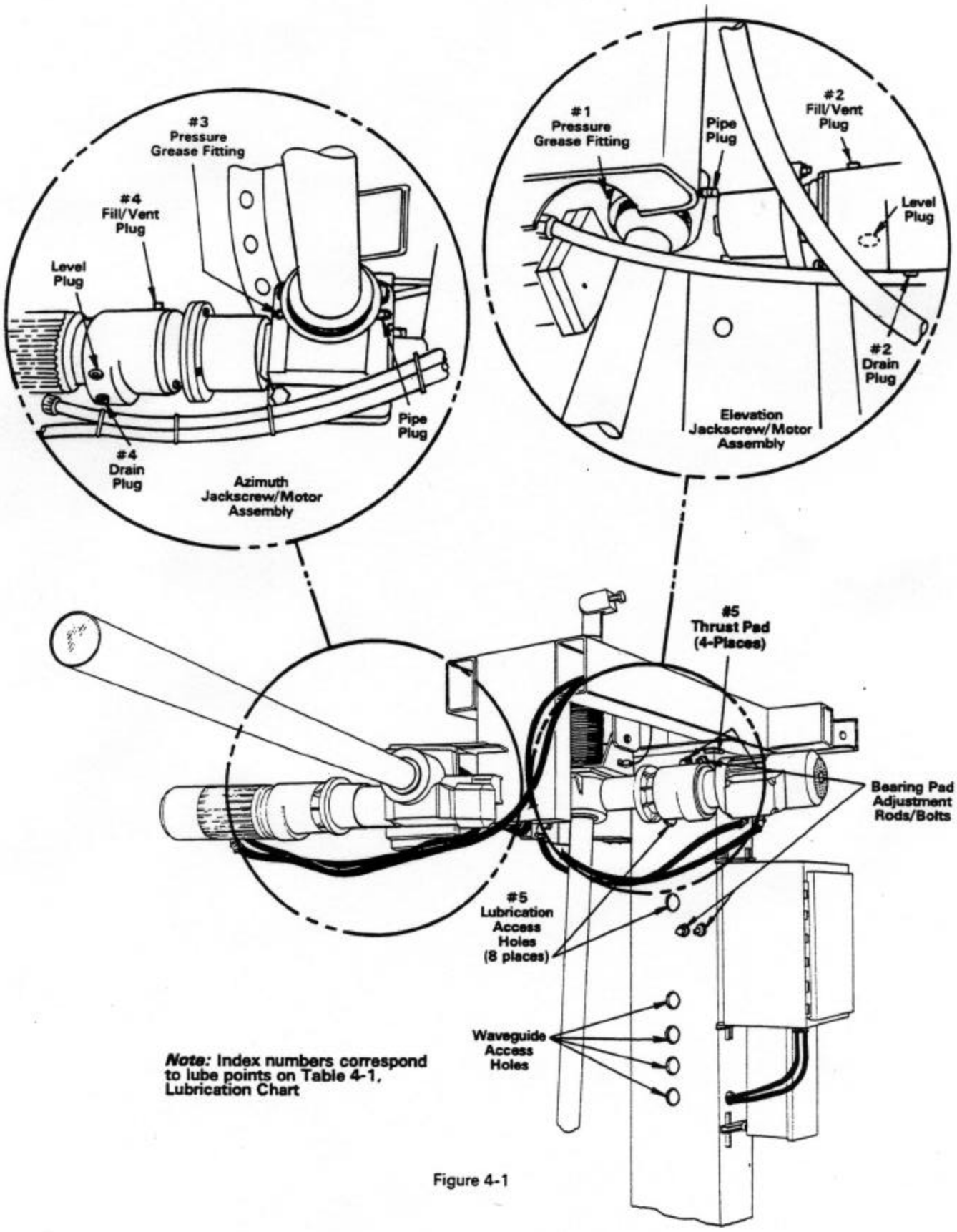
Table 4-1
Antenna Lubrication Chart

Lube Point Lube No.	Parts to be Lubricated	(Months) Frequency 1	3	6	12	Type of Service	Lube Type	No. of Lube Points or Quantity	Andrew Type Number
1.	Elevation jackscrew housing		X			Pressure fitting	SHC32	1	49208
2.	Elevation gear motor housing fill and drain	I*	C**			Pipe plugs	SHC624	10 ounces	47497
3.	Azimuth jackscrew housing		X			Pressure fitting	SHC32	2	49208
4.	Azimuth jackscrew gear housing fill and drain	I*	C**			Pipe Plugs	SHC624	10 ounces	47497
5.	Panning frame tube assembly and thrust pads		X			Aerosol Spray	Dry Moly Lubricant	Surface coverage	207911

X = LUBRICATE I = INSPECT C = CHANGE

*Inspection requires checking for visible signs of oil leakage, draining, replacing and adding oil to ensure appropriate oil level requirements. Excessively dirty oil will require fresh oil replacement. If oil leakage is found to be excessive, refer to appropriate troubleshooting information and perform applicable corrective action. Periodic inspection procedures can be less frequent after first or second scheduled inspections.

**Initial oil change requirements include flushing gear boxes with a standard cleaning agent.



Note: **Index numbers correspond to lube points on Table 4-1, Lubrication Chart**

Figure 4-1

DWG NO. 239049 SH

NOTES: (UNLESS OTHERWISE SPECIFIED)
1. REMOVE ALL BURRS AND SHARP EDGES
2. DIMENSIONS APPLY BEFORE PLATING
3. INTERPRET DRAWING PER ANSI Y14.5M-1982

INSTALLATION INSTRUCTIONS
TYPE 207885 ESA ADJUSTMENT KIT

1.0 INTRODUCTION:

1.1 TYPE 207885 ESA ADJUSTMENT KIT IS UTILIZED IN CONJUNCTION WITH 3.7/4.6-METRE EARTH STATION ANTENNAS TO ENABLE CONTINUOUS FINE ADJUSTMENT OF AT LEAST 15 DEGREES IN BOTH AZIMUTH AND ELEVATION AXES.

1.2 THE ESA ADJUSTMENT KIT INCLUDES A MANUAL ACTUATOR, BASE ANGLE AND REQUIRED MOUNTING HARDWARE FOR EACH ANTENNA AXIS.

READ THE INSTRUCTIONS THOROUGHLY BEFORE ASSEMBLY

2.0 ESA ADJUSTMENT KIT ASSEMBLY:

2.1 REFER TO VIEW 'R' AND FIGURE 1: LOOSELY ATTACH 207882 MANUAL ACTUATOR ASSEMBLY TO EITHER AZIMUTH OR ELEVATION STRUT AS SHOWN USING CLAMP SEGMENTS .25 IN. SCREWS, LOCKWASHERS AND NUTS. POSITION DRAIN HOLE ON ACTUATOR DOWNWARD FOR PROPER WATER DRAINAGE.

2.2 ATTACH 202661 BASE ANGLE TO ACTUATOR AS SHOWN USING .50 IN. BOLT, LOCKWASHER AND FLATWASHER. NOTE: AVOID EXCESSIVE TORQUE ON MOUNTING HARDWARE.

2.3 ENSURE LOCKING STRUT SUPPORT SET SCREW IS FIRMLY TIGHTENED ON STRUT ASSEMBLY. REMOVE TWO INDICATED STRUT SUPPORT SET SCREWS AND ATTACH BASE ANGLE TO CORRESPONDING STRUT SUPPORT USING SUPPLIED .50 IN. CLAMPING NUTS AND PREVIOUSLY REMOVED STRUT SUPPORT SET SCREWS AS SHOWN.

2.4 SECURELY TIGHTEN REMAINING MOUNTING HARDWARE TO ACHIEVE CLAMPING FORCE.

2.5 REPEAT ENTIRE PROCEDURE FOR REMAINING STRUT ASSEMBLY.

3.0 ANTENNA AZIMUTH/ELEVATION ADJUSTMENT PROCEDURE:

CAUTION

AZIMUTH BRAKES HAVE BEEN FACTORY SET. DO NOT READJUST BRAKES TO FACILITATE USE OF ACTUATORS.

3.1 ENSURE MANUAL ACTUATOR AND LOCKING STRUT SUPPORT SET SCREW ARE SECURELY ATTACHED TO STRUT ASSEMBLY. LOOSEN TWO INDICATED STRUT SUPPORT SET SCREWS AND TIGHTEN CORRESPONDING CLAMPING NUTS. LOOSEN LOCKING STRUT SUPPORT SET SCREW AND PERFORM AZIMUTH/ELEVATION ADJUSTMENT. NOTE: STRUT SUPPORT SET SCREWS SHOULD NOT CONTACT STRUT ASSEMBLY DURING ADJUSTMENT PROCEDURE.

3.2 UPON COMPLETION OF ANTENNA AZIMUTH/ELEVATION ADJUSTMENTS, SECURELY TIGHTEN LOCKING STRUT SUPPORT SET SCREW, TWO REMAINING STRUT SUPPORT SET SCREWS AND CORRESPONDING CLAMPING NUTS.

CAUTION

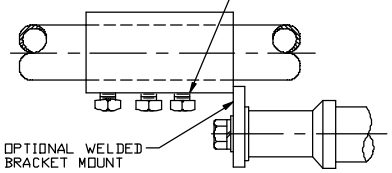
ENSURE ALL STRUT SUPPORT SET SCREWS ARE LOOSENED BEFORE ATTEMPTING TO PERFORM ANTENNA AZIMUTH/ELEVATION ADJUSTMENTS AND FIRMLY TIGHTENED ON STRUT ASSEMBLY UPON COMPLETION OF ANTENNA AZIMUTH/ELEVATION ADJUSTMENTS.

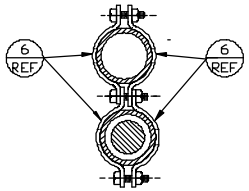
4.0 ESA ADJUSTMENT KIT REMOVAL:

4.1 REMOVE MANUAL ACTUATOR ASSEMBLY BY FIRST REMOVING HARDWARE SECURING ACTUATOR TO BASE ANGLE AND THEN REMAINING CLAMP SEGMENTS WITH CORRESPONDING HARDWARE. NOTE: BASE ANGLE REMAINS ATTACHED TO STRUT SUPPORT FOR FUTURE USE.

4.2 STORE MANUAL ACTUATOR ASSEMBLY AND CORRESPONDING HARDWARE IN DRY AREA FOR FUTURE USE.

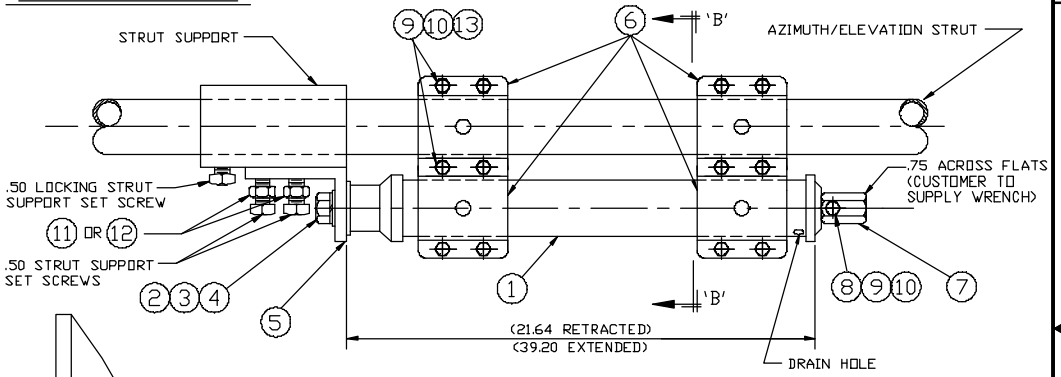
IF INTERFERENCE OCCURS WITH SET SCREW AND ACTUATOR BOLT, REMOVE SET SCREW. AFTER ANTENNA ADJUSTMENT & REMOVAL OF ACTUATOR ASSEMBLY REPLACE THE SET SCREW.





VIEW 'B'

ALTERNATE MOUNTING



VIEW 'R'

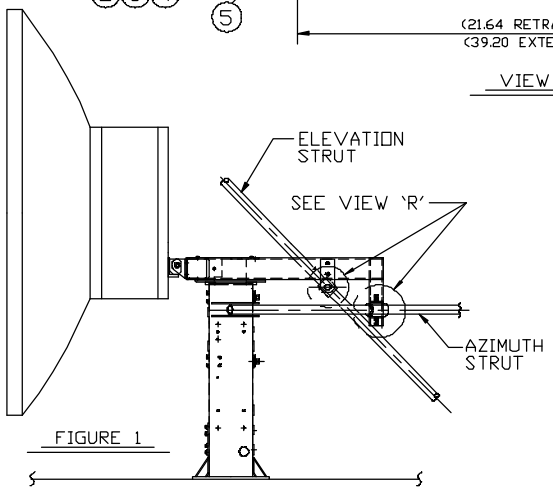


FIGURE 1

NOTE:
THERE ARE (2) SETS OF ACTUATORS AND MOUNTING HARDWARE PER EACH 207885 KIT.

QTY	ITEM NO	U OF M	ANDREW PART NO.		DESCRIPTION
12	13	EA	9963-89		.25-20UNC X 1.0 LG. HHMS
2	12	EA	9999-109		.50-13UNC HEX NUT (GALV)
2	11	EA	9999-61		.50-13UNC HEX NUT (SST)
13	10	EA	9974-15		.25 LOCKWASHER
13	9	EA	9999-57		.25-20UNC HEX NUT (SST)
1	8	EA	9963-76		.25-20UNCx1.25LG HHMS
1	7	EA	207881		.75 HEX ADAPTER
8	6	EA	207883		CLAMP SEGMENT
1	5	EA	202661		BASE ANGLE
1	4	EA	9997-65		.50 FLATWASHER (SST)
1	3	EA	9974-64		.50 LOCKWASHER (SST)
1	2	EA	9963-318		.50-20UNFx1.50LG HHMS (SST)
1	1	EA	207882		MANUAL ACTUATOR

PARTS LIST

REVISIONS					
MF	ZONE	REV	DESCRIPTION	DATE	APPROVED
			REL TO PRODUCTION	4SEP87	RCW
		A	REV'D. NOTES 2.1,4.1 & VIEW 'R'. ADDED IT.13. IT. 9&10 QTY. WAS 1, IT.6 QTY. WAS 4, P/N WAS 207883. DCN 341.27(A).	10MAY88	TRA,WF
		B	DELETE "HAND CRANK" FROM NOTES 1.1, 1.2, 2.0 AND 4.0, AND REPLACE WITH "ESA ADJUSTMENT KIT". DESCRIPTION ITEM 6 WAS PIPE CLAMP. REVISE NOTES 2.1 AND 4.1. DCN 350.33(B)	18JAN91	VR.
		C	ADDED ALTERNATE VIEW OF WELDED STRUT SUPPORT. DCN D007.87(B)	17NOV94	SLI,SJA RLP,TF
		D	CAD NO. WAS ES023F1C DCN D020.02(E)	14SEP99	SLI,SJA MF

NOTICE

"THE INSTALLATION, MAINTENANCE OR REMOVAL OF AN ANTENNA REQUIRES QUALIFIED, EXPERIENCED PERSONNEL. ANDREW INSTALLATION INSTRUCTIONS HAVE BEEN WRITTEN AND ILLUSTRATED FOR SUCH INSTALLATION PERSONNEL. ANTENNA SYSTEMS SHOULD BE INSPECTED ONCE A YEAR BY QUALIFIED PERSONNEL TO VERIFY PROPER INSTALLATION, MAINTENANCE AND CONDITION OF EQUIPMENT. ANDREW DISCLAIMS ANY LIABILITY OR RESPONSIBILITY FOR THE RESULTS OF IMPROPER OR UNSAFE INSTALLATION OR MAINTENANCE PRACTICES."

MFG PROCESSES	INSPECTION PROCEDURES	TEST PROCEDURES
AUSA SPECIFICATIONS		

CAD FILE NO: 239049.1.D

			UNLESS OTHERWISE SPECIFIED	MATERIAL
			DIMENSIONS ARE IN INCHES	
			TOLERANCES	
			1 PLACE DECIMALS ± .1	
			2 PLACE DECIMALS ± .03	
			3 PLACE DECIMALS ± .010	FINISH
			ANGLE ± 0.5°	
			ALL SURFACES	
			DON'T TOL. APPLY TO STOCK SIZES	
NEXT ASSY	USED ON		SIMILAR TO	
APPLICATION			SUPERSEDES DWG OF	

DRAWN	RWB	13JUL87
CHECKED		
APPD ENGRG	RCW	4SEP87
APPD ENGRG	TAF	3SEP87
APPD MFG		
APPD Q.C.	ACT	----

ANDREW CORPORATION
10500 W. 120th Street
Orland Park, Illinois U.S.A. 60462

MANUAL ACTUATOR INSTALLATION DWG.

SIZE D | FSCM NO. 84147 | DWG NO. 239049 | SCALE FULL | SHEET

PROD CR 6114 | DATE A | | |

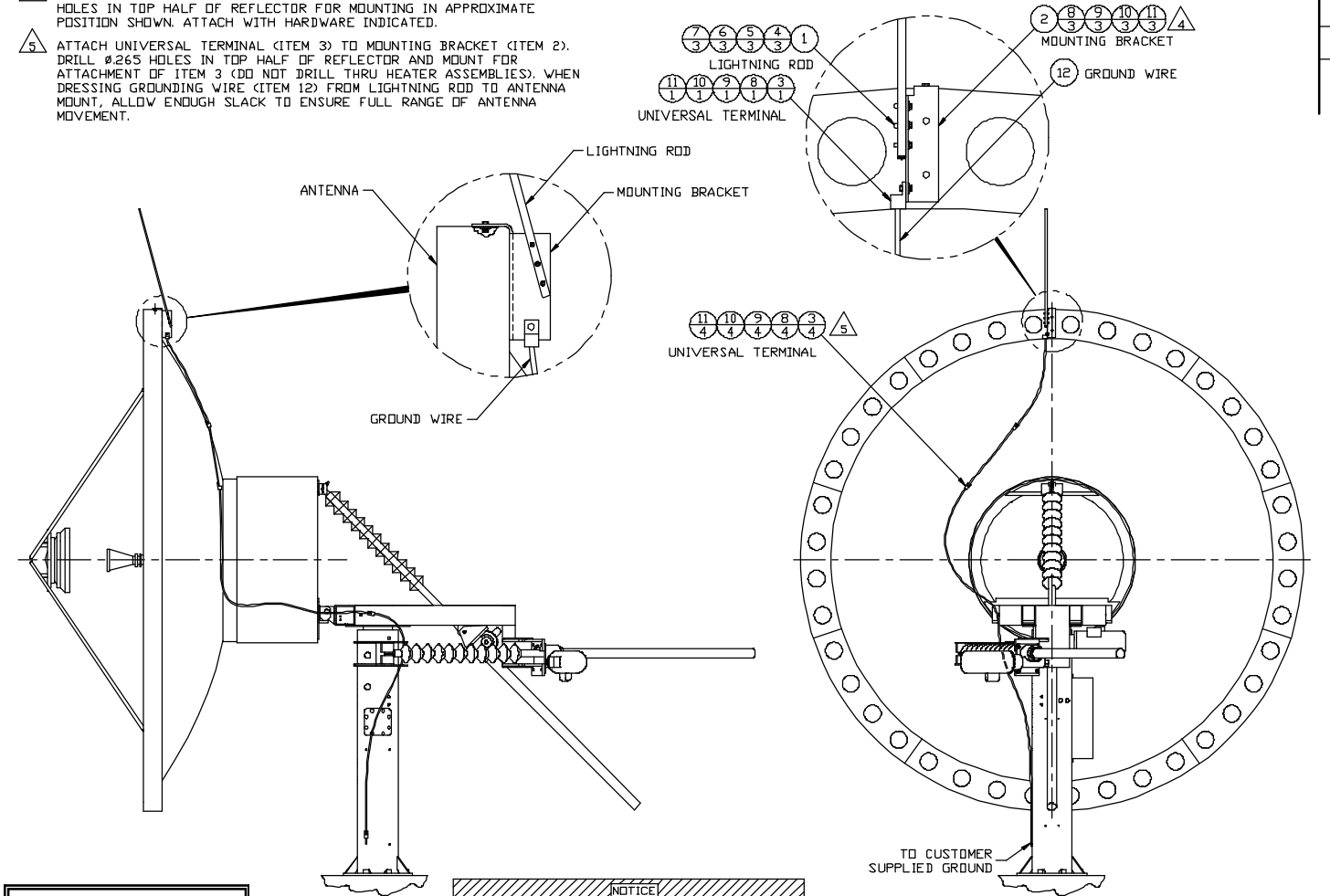
NOTES: (UNLESS OTHERWISE SPECIFIED)
1. REMOVE ALL BURRS AND SHARP EDGES
2. DIMENSIONS APPLY BEFORE PLATING
3. INTERPRET DRAWING PER ANSI Y14.5M-1982

4 USE MOUNTING BRACKET (ITEM 2) AS A TEMPLATE AND DRILL (3) Ø.265 HOLES IN TOP HALF OF REFLECTOR FOR MOUNTING IN APPROXIMATE POSITION SHOWN. ATTACH WITH HARDWARE INDICATED.

5 ATTACH UNIVERSAL TERMINAL (ITEM 3) TO MOUNTING BRACKET (ITEM 2). DRILL Ø.265 HOLES IN TOP HALF OF REFLECTOR AND MOUNT FOR ATTACHMENT OF ITEM 3 (DO NOT DRILL THRU HEATER ASSEMBLIES). WHEN DRESSING GROUNDING WIRE (ITEM 12) FROM LIGHTNING ROD TO ANTENNA MOUNT, ALLOW ENOUGH SLACK TO ENSURE FULL RANGE OF ANTENNA MOVEMENT.

PEDESTAL MOUNT CONFIGURATION

3.7M SHOWN FOR CLARITY ONLY



SHT NO.	239150	SH

REVISIONS

WF	ZONE	REV	DESCRIPTION	DATE	APPROVED
			REL TO PRODUCTION	1SEP88	WF
		A	REVISED PICTORIALLY DCN 344.08 (E)	31OCT88	JFM JJJR
		B	REVISED PICTORIALLY DCN D015.15(E)	20JAN98	SLI SJA,JTP
		C	DCN D017.81(B)	06APR99	SJA,SLI JEK

QTY	ITEM NO	U OF M	ANDREW PART NO.		DESCRIPTION
1	12	EA	209147		GROUNDING WIRE
8	11	EA	9999-57		.25-20UNC-2B HEX NUT
8	10	EA	9974-15		.25 SPLIT LOCKWASHER
8	9	EA	9997-42		.25 FLAT WASHER
8	8	EA	9963-150		.25-20UNC-2Ax.875LG HHCS
3	7	EA	9998-53		#10-32UNF-2B HEX NUT
3	6	EA	9974-68		#10 SPLIT LOCKWASHER
3	5	EA	9997-93		#10 FLAT WASHER
3	4	EA	9972-59		#10-32UNF-3Ax1.25LG SHCS
5	3	EA	46409-2		UNIVERSAL TERMINAL
1	2	EA	209138		MOUNTING BRACKET
1	1	EA	209139		LIGHTNING ROD

PARTS LIST

MOUNT CONFIGURATION & TYPICAL CABLE ROUTING

MFG PROCESSES	INSPECTION PROCEDURES	TEST PROCEDURES
AUSA SPECIFICATIONS		

NOTICE

"THE INSTALLATION, MAINTENANCE OR REMOVAL OF AN ANTENNA REQUIRES QUALIFIED, EXPERIENCED PERSONNEL. ANDREW INSTALLATION INSTRUCTION HAVE BEEN WRITTEN AND ILLUSTRATED FOR SUCH INSTALLATION PERSONNEL. ANTENNA SYSTEMS SHOULD BE INSPECTED ONCE A YEAR BY QUALIFIED PERSONNEL TO VERIFY PROPER INSTALLATION, MAINTENANCE AND CONDITION OF EQUIPMENT. ANDREW DISCLAIMS ANY LIABILITY OR RESPONSIBILITY FOR THE RESULTS OF IMPROPER OR UNSAFE INSTALLATION OR MAINTENANCE PRACTICES."

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
1 PLACE DECIMALS ± .1
2 PLACE DECIMALS ± .03
3 PLACE DECIMALS ± .010
ANGLE ± 0.5°
ALL SURFACES
CONT. TOL. APPLY TO STOCK SIZES
FINISH
MATERIAL
SIMILAR TO
SUPERSEDES DWG OF

DRAWN	JFM	21JUN88
CHECKED		
APPD ENGRG	JGJ	31AUG88
APPD ENGRG	JLH	31AUG88
APPD MFG		
APPD QAL		

ANDREW CORPORATION
2701 Maghill Road
Denton, Texas U.S.A. 76208

3.6, 3.7, 4.5, & 4.6 METER ESA
LIGHTNING ARRESTOR
INSTALLATION DRAWING

SIZE D | FSCM NO. 84147 | SHT NO. 239150
SCALE 1:16 | SHEET 1 OF 5
PROG ID 6114 | STR A1 1 1

CAD FILE NO: ES04961C

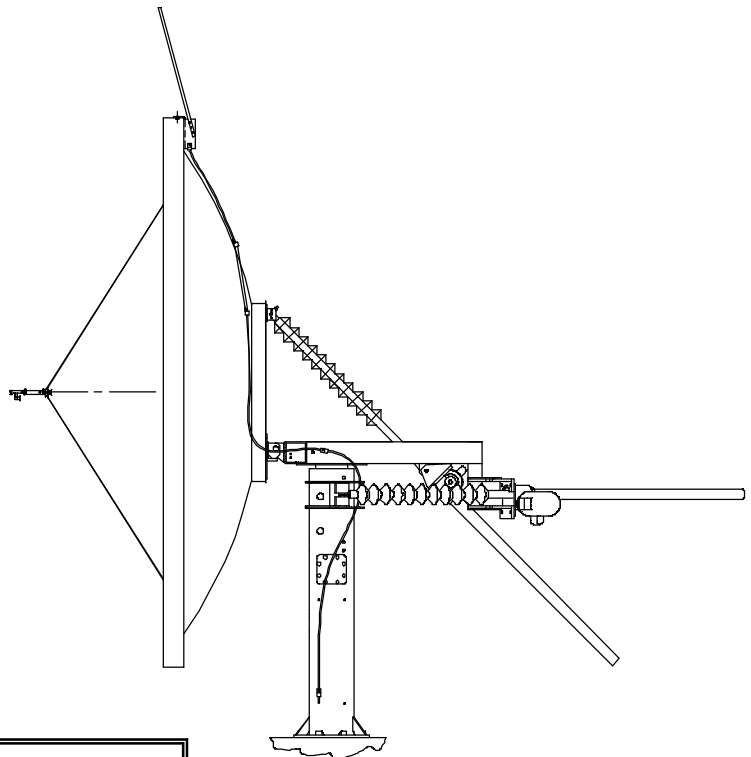
NOTES: (UNLESS OTHERWISE SPECIFIED)
1. REMOVE ALL BURRS AND SHARP EDGES
2. DIMENSIONS APPLY BEFORE PLATING
3. INTERPRET DRAWING PER ANSI Y14.5M-1982

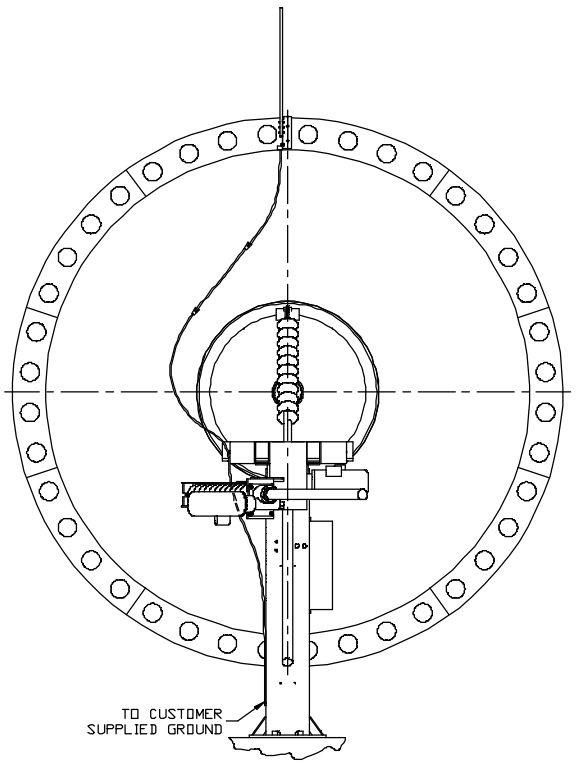
SHT NO. 239150

REVISIONS					
MF	ZONE	REV	DESCRIPTION	DATE	APPROVED
			REL TO PRODUCTION	06APR99	JEK

PEDESTAL MOUNT CONFIGURATION

3.6M SHOWN FOR CLARITY ONLY





MOUNT CONFIGURATION & TYPICAL CABLE ROUTING

MFG PROCESSES	INSPECTION PROCEDURES	TEST PROCEDURES
AUSA SPECIFICATIONS		

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
1 PLACE DECIMALS ± .1
2 PLACE DECIMALS ± .03
3 PLACE DECIMALS ± .010
ANGLE ± 0.5°
ALL SURFACES
COML TOL APPLY TO STOCK SIZES
SIMILAR TO
SUPERSEDES DWG OF

MATERIAL
FINISH

DRAWN	JEK	29MAR99
CHECKED		
APPD ENGRG	SLI	06APR99
APPD ENGRG		
APPD MFR	SJA	06APR99
APPD QC		

QTY	ITEM NO	U OF M	ANDREW PART NO.		DESCRIPTION

PARTS LIST

ANDREW CORPORATION
2701 Wayhill Road
Denton, Texas U.S.A. 76208

3.6, 3.7, 4.5, & 4.6 METER ESA
LIGHTNING ARRESTOR
INSTALLATION DRAWING

SIZE D | FSCM NO. 84147 | SHT NO. 239150
SCALE 1:16 | SHEET 2 OF 5
FINISH 61 14 | MTRL A1

CAD FILE NO: ES04962

NOTES: (UNLESS OTHERWISE SPECIFIED)
1. REMOVE ALL BURRS AND SHARP EDGES
2. DIMENSIONS APPLY BEFORE PLATING
3. INTERPRET DRAWING PER ANSI Y14.5M-1994

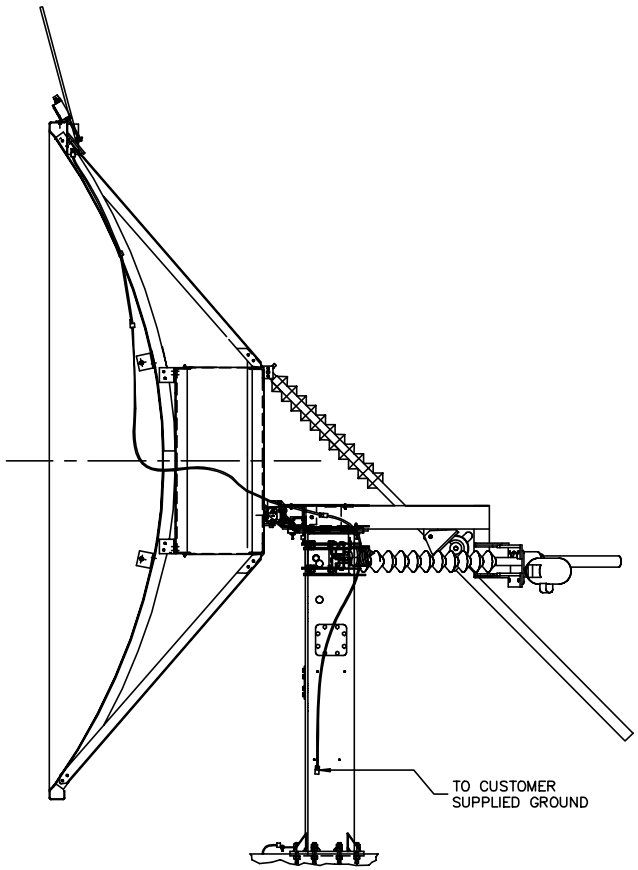
REVISIONS

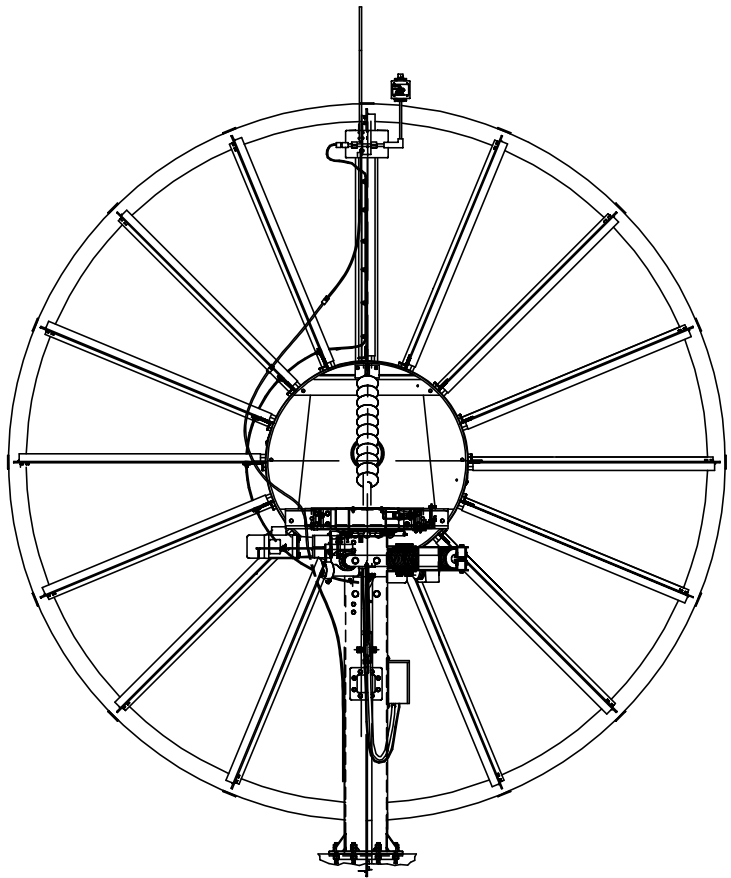
REV	DESCRIPTION	DATE	APPROVED
	REL TO PRODUCTION	06APR99	JEK

PEDESTAL MOUNT CONFIGURATION

SHOWN WITH RIBBED REFLECTOR

4.6M SHOWN FOR CLARITY ONLY





RIBBED REFLECTOR
(REAR VIEW)

QTY	ITEM NO.	U OF M	ANDREW PART NO.		DESCRIPTION

PARTS LIST

MOUNT CONFIGURATION & TYPICAL CABLE ROUTING

MATERIAL

FINISH

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES
1 PLACE DECIMALS ± 0.1
2 PLACE DECIMALS ± 0.03
3 PLACE DECIMALS ± 0.010
ANGLES ± .5

ALL SURFACES

IMPERIAL

DRAWN BY	JEK	29MAR99
APPD ENG		
APPD MFG	SLI	06APR99
APPD QA		
APPD	SJA	06APR99

SUPERSEDES

USED ON

ANDREW ORLAND PARK, IL 60462 U.S.A.

3.6, 3.7, 4.5, & 4.6 METER ESA
LIGHTNING ARRESTOR
INSTALLATION DRAWING

SIZE D | CAGE CODE 84147 | DOCUMENT NO. 239150

CAD FILE NO. ES04963 | SCALE 1/16=1 | SHEET 3 of 5

NOTES: (UNLESS OTHERWISE SPECIFIED)
1. REMOVE ALL BURRS AND SHARP EDGES
2. DIMENSIONS APPLY BEFORE PLATING
3. INTERPRET DRAWING PER ANSI Y14.5M-1994

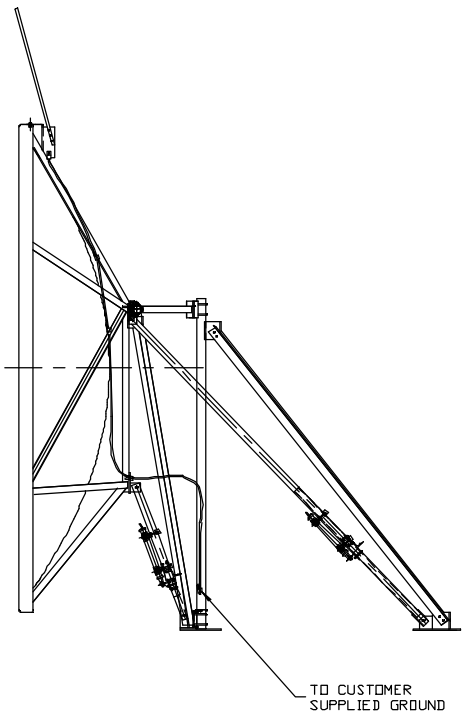
PEDESTAL MOUNT CONFIGURATION

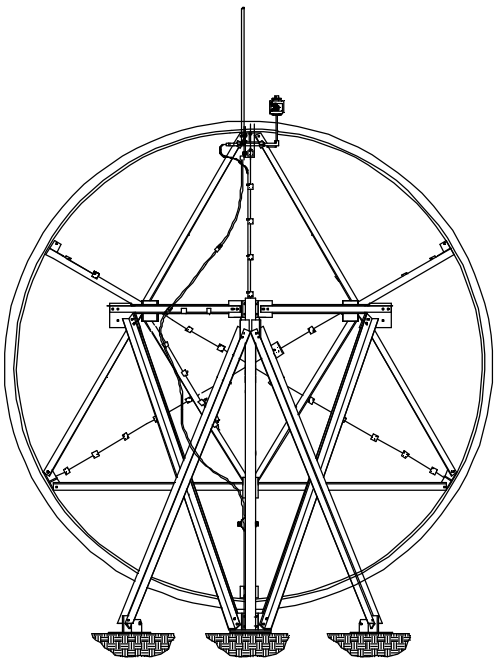
SHOWN WITH RIBBED REFLECTOR

4.5M TRIPOD SHOWN FOR CLARITY ONLY

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
	REL TO PRODUCTION	06APR99	JEK





MOUNT CONFIGURATION & TYPICAL CABLE ROUTING

PARTS LIST

QTY	ITEM NO.	U OF M	ASSEMBLY PART NO.	DESCRIPTION

MATERIAL

FINISH

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES
1 PLACE DECIMALS ± 0.1
2 PLACE DECIMALS ± 0.03
3 PLACE DECIMALS ± 0.010
ANGLES ± 5

ALL SURFACES

IMPERIAL

DRAWN BY	JEK	29MAR99
APPD ENG		
APPD MFG	SLI	06APR99
APPD QA		
APPD	SJA	06APR99

SUPERSEDES

USED ON

ANDREW®
ORLAND PARK, IL. 60462
U.S.A.

3.6, 3.7, 4.5, & 4.6 METER ESA
LIGHTNING ARRESTOR
INSTALLATION DRAWING

SIZE D | DWG NO. 84147 | DOCUMENT NO. 239150

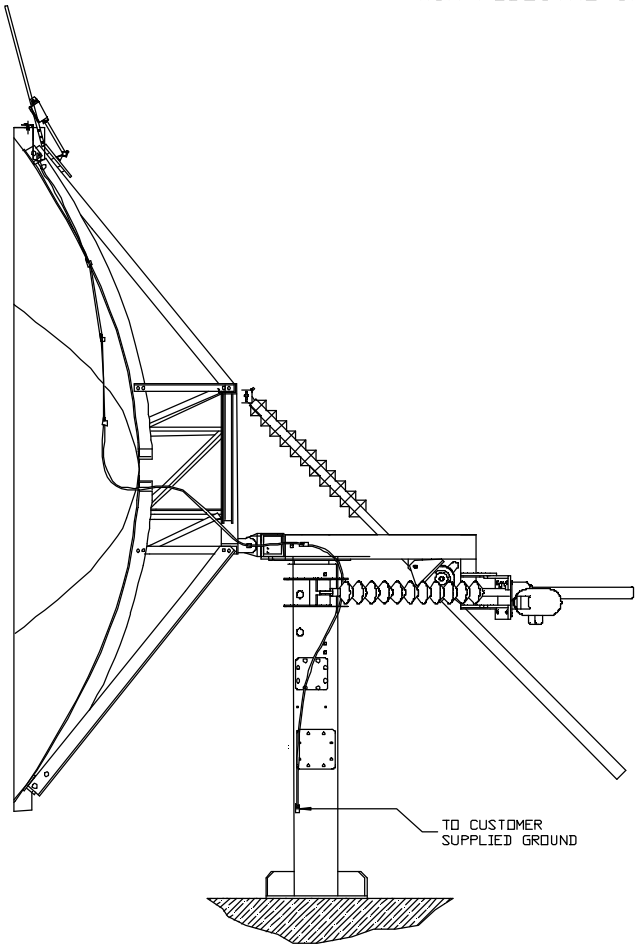
CAD FILE NO. ES04964 | SCALE 1/2=1 | SHEET 4 of 5

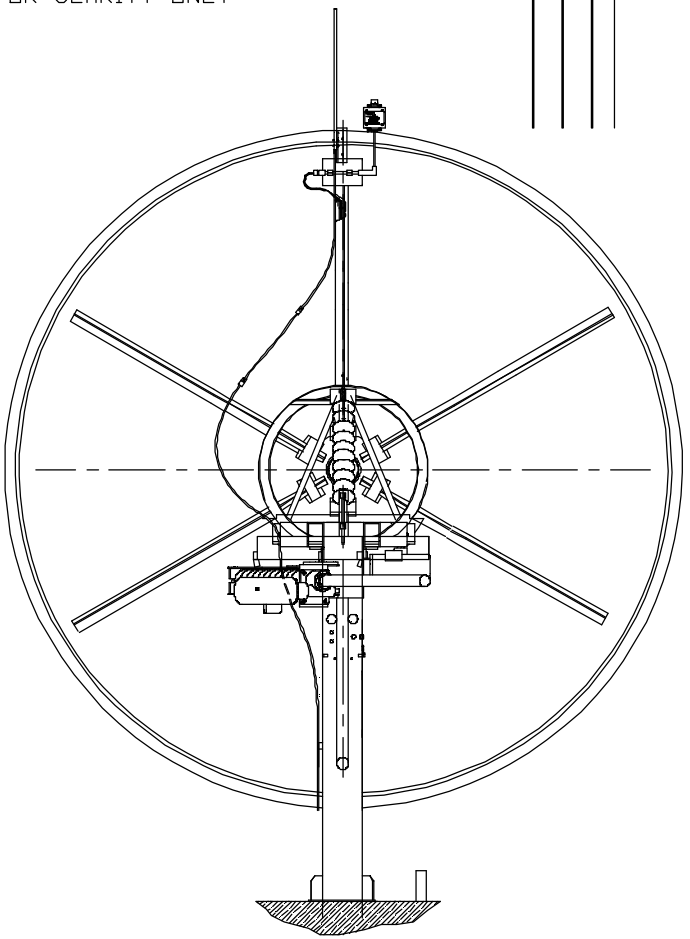
NOTES: (UNLESS OTHERWISE SPECIFIED)
1. REMOVE ALL BURRS AND SHARP EDGES
2. DIMENSIONS APPLY BEFORE PLATING
3. INTERPRET DRAWING PER ANSI Y14.5M-1982

PEDESTAL MOUNT CONFIGURATION

SHOWN WITH RIBBED REFLECTOR

4.5M PEDESTAL SHOWN FOR CLARITY ONLY





RIBBED REFLECTOR
(REAR VIEW)

DWG NO. 239150 SH 5

REVISIONS					
MF	ZONE	REV	DESCRIPTION	DATE	APPROVED
			REL TO PRODUCTION	06APR99	JEK

MOUNT CONFIGURATION & TYPICAL CABLE ROUTING

MFG PROCESSES	INSPECTION PROCEDURES	TEST PROCEDURES
AUSA SPECIFICATIONS		

NEXT ASSY	USED ON
APPLICATION	

CAD FILE NO: ES04965

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
1 PLACE DECIMALS ± .1
2 PLACE DECIMALS ± .03
3 PLACE DECIMALS ± .010
ANGLE ± 2.5°
ALL SURFACES
CONF. TOL APPLY TO STOCK SIZES
FINISH
MATERIAL
SUPERSEDES DWG OF

DRAWN	JEK	29MAR99
CHECKED		
APPD ENGRG		
APPD ENGRG	SLI	06APR99
APPD MFG		
APPD QAG	SJA	06APR99

PARTS LIST

QTY	ITEM NO	SIZE OF M	ANDREW PART NO.		DESCRIPTION

ANDREW CORPORATION
2701 Mayhill Road
Denton, Texas U.S.A. 76208

3.6, 3.7, 4.5, & 4.6 METER ESA
LIGHTNING ARRESTOR
INSTALLATION DRAWING

SIZE D | FSCM NO. 84147 | DWG NO. 239150

SCALE NONE | SHEET 5 OF 5

PROD. SH 6 | 17 | DISTR A1 | | |

DWG NO. 301212 | SH

NOTES: (UNLESS OTHERWISE SPECIFIED)
1. REMOVE ALL BURRS AND SHARP EDGES
2. DIMENSIONS APPLY BEFORE PLATING
3. INTERPRET DRAWING PER ANSI Y14.5M-1982

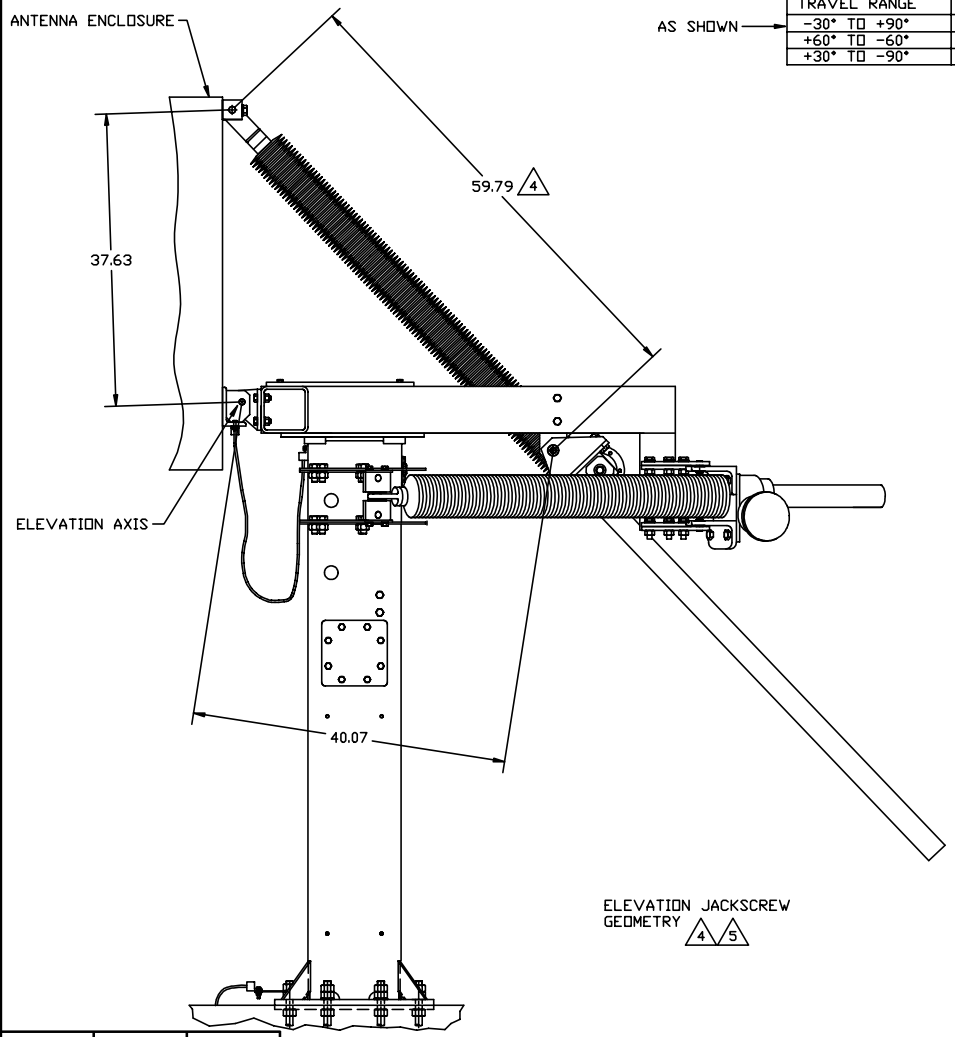
4 JACKSCREW GEOMETRY DIMENSIONS INDICATED ARE FOR AZIMUTH AND ELEVATION ANGLE OF 0°.

5 DIMENSIONS INDICATED APPLY TO MOTORIZABLE PEDESTAL MOUNT ONLY.

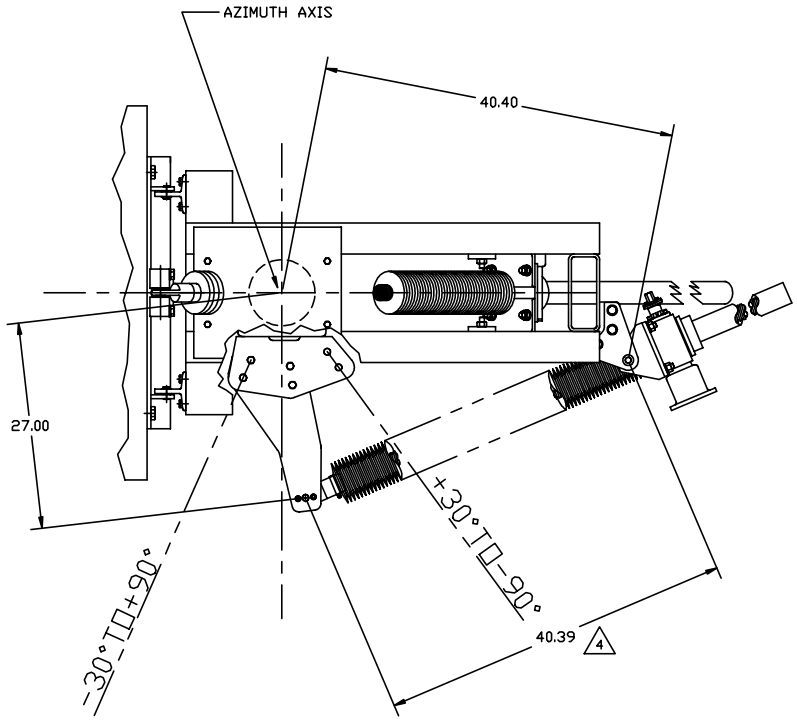
REVISIONS					
MF	ZONE	REV	DESCRIPTION	DATE	APPROVED
			REL TO PRODUCTION	18NOV96	BLA

AZIMUTH ANTENNA TRAVEL RANGE	JACKSCREW LENGTH AT AZ=0°
-30° TO +90°	52.51
+60° TO -60°	40.39
+30° TO -90°	26.48

AS SHOWN



ELEVATION JACKSCREW GEOMETRY 4 5



AZIMUTH JACKSCREW GEOMETRY 4 5

QTY	ITEM NO	U OF M	ANDREW PART NO.		DESCRIPTION

PARTS LIST

MFG PROCESSES	INSPECTION PROCEDURES	TEST PROCEDURES
AUSA SPECIFICATIONS		

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
1 PLACE DECIMALS ± .1
2 PLACE DECIMALS ± .03
3 PLACE DECIMALS ± .010
ANGLE ± 0.5°
ALL SURFACES
COML TOL APPLY TO STOCK SIZES
SIMILAR TO
SUPERSEDES DWG OF

MATERIAL
FINISH

DRAWN	CJH	10SEP96
CHECKED	BLA	NOV96
APPD ENGRG	SLI	NOV96
APPD ENGRG		
APPD MFG	SJA	NOV96
APPD Q.C.		

ANDREW CORPORATION
2701 Mayhill Road
Denton, Texas U.S.A. 76208

3.6, 3.7, 4.5, 4.6M ANTENNA JACKSCREW AZIMUTH & ELEVATION GEOMETRY

SIZE D | FSCM NO. 84147 | DWG NO. 301212 | REV
SCALE 1=8 | SHEET
PROD. CR 6140 | DISTR A 1 1

CAD FILE NO: DS015P1