

**GENERAL DYNAMICS**  
SATCOM Technologies

**INSTALLATION MANUAL**  
**FOR**  
**VERTEXRSI MODEL 4.8-METER KPK/KPC**  
**SATELLITE EARTH STATION ANTENNA**

**500-0562**

**Revision D**  
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## Use of **WARNINGS, CAUTIONS, etc.**

Warnings, Cautions and other notes are included throughout this document to provide necessary information. **IGNORING WARNINGS, CAUTIONS AND OTHER NOTES MAY RESULT IN DAMAGE TO THE PRODUCT, INJURY, OR IN EXTREME CASES, DEATH.** You should know the use of Warnings, Cautions and other markings.

Definitions are:

**WARNING!** **HIGHLIGHTS AN INSTALLATION, OPERATING OR MAINTENANCE PROCEDURE, PRACTICE, CONDITION, STATEMENT, ETC., WHICH, IF NOT STRICTLY OBSERVED, COULD RESULT IN INJURY TO OR DEATH OF PERSONNEL.**

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**Important:** **Highlights an essential installation, operating or maintenance procedure, practice, condition or statement, which, if heeded, will ensure efficiency and/or safety of said procedures.**

*Note:* *Highlights an installation, operating or maintenance procedure, practice, condition or statement, which, if heeded, could enhance efficiency and/or safety of said procedures.*

**ESD:** **The Electrostatic Sensitive Device (ESD) appears at the beginning of any procedure or procedural step that includes the handling of equipment sensitive to damage from electrostatic discharge.**

General Warnings and Cautions are also provided at the front of the document. These Warnings and Cautions should be read by anyone who is involved with installation, has access to the equipment or is assigned to perform maintenance on the equipment.

## CAUTIONARY NOTICE

Although SATCOM Technologies has attempted to detail in this document all areas of possible danger to personnel in connection with the use of this equipment, personnel should use caution when installing, operating and servicing this equipment. Care should be taken to avoid electrical shock, whether the hazard is caused by design or malfunction. SATCOM Technologies is specifically not liable for any damage or injury arising from a technician's failure to follow the instructions contained in this document or his failure to exercise due care and caution in the installation, operation and service of this equipment. SATCOM Technologies shall not be responsible for injury or damage resulting from improper procedures or from the use of improperly trained or inexperienced personnel performing such tasks.

This document is intended as a general guide for trained and qualified personnel who are aware of the dangers of handling potentially hazardous electrical and electronic circuits. This document is not intended to contain a complete statement of all safety precautions that should be observed by personnel in using this or other electronic equipment.

## ELECTRICAL HAZARDS

The antenna and feed system supplied by SATCOM Technologies is designed to be integrated with various types of electronic equipment. This system, if integrated with high power amplifiers or traveling wave tubes, will be capable of transmitting microwave energy at varying power levels. If transmitting microwave power, SATCOM Technologies cautions the end-user to review all applicable local, federal and international regulations and to comply with all such regulations in the operation and maintenance of the integrated system.

The electrical currents and voltages associated with this equipment, whether supplied by SATCOM Technologies or others, are dangerous. Personnel must at all times observe safety regulations.

- It is recommended that a lockout/tagout process be utilized while servicing the antenna system. In the United States, see OSHA 1910.147.
- Always disconnect power before opening covers, doors, enclosures, gates, panels or shields.
- Always use grounding sticks and short out high voltage points before servicing.
- Do not remove, short-circuit or tamper with interlock switches on access covers, doors, enclosures, gates, panels or shields.
- Keep away from live circuits.
- Know your equipment and do not take risks.
- Always remove all power to the system prior to working on the antenna, the reflector assembly, the reflector backup assembly or the feed assembly.
- Always tag all circuits noting that the power is OFF, the date and your name, prior to commencing any work on that system.

**In case of emergency, be sure that power is disconnected.**

### **POTENTIAL DAMAGE TO ANTENNA**

The antenna limit switches and resolvers have been pre-set to allow for maximum antenna performance. Any subsequent adjustment may jeopardize antenna performance and/or result in damage to the antenna.

### **SAFETY NOTICE**

The following safety procedures are listed to remind those performing any work on the antenna system that safety rules must be observed. Failure to observe safety rules may result in serious injury or death. Always work safely and in accordance with established procedures.

- It is recommended that a lockout/tagout process be utilized while servicing the antenna system. In the United States, see OSHA 1910.147.
- Care shall be taken in all operations to safeguard other people as well as property and to comply with all local safety procedures as established by the customer's site representative, as well as local building codes and fire protection standards.
- All persons performing work on the antenna system shall also comply with the Occupational Safety and Health Act (OSHA) standards and all other federal state and local laws, ordinances, regulations and codes relating to designated work.
- Unless the customer's representative on site specifically designates an individual responsible for site safety, the SATCOM Technologies Site Supervisor shall be responsible for and establish a site safety program for the SATCOM Technologies installation work. The site safety program shall incorporate all SATCOM Technologies safety procedures and requirements
- Never make internal adjustments or perform maintenance or service when alone or fatigued.

### **ELECTROMAGNETIC RADIATION**

- It is recommended that a lockout/tagout process be utilized while servicing the antenna system. In the United States, see OSHA 1910.147.
- Do not stand in the direct path of the feed system when the system is transmitting!
- Do not work on the feed system when the system is on!

**ALWAYS WORK SAFELY!**

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## 1.0 SCOPE

The VertexRSI Model 4.8-meter bolt-together antenna delivers exceptional performance for receive only and transmit-receive worldwide applications. The Model 4.8M KPK/KPC antennas offer all-metal reflectors that incorporate precision-formed panels, radials and hub assembly with matched tooling for ease of assembly without field alignment. The antenna features an innovative compact Cassegrain subreflector and unique feed design that results in high gain, low noise temperature, high antenna efficiency and excellent rejection of noise and microwave interference. A large center hub provides spacious accommodation for equipment mounting. The reflector is supported by a steel azimuth/elevation kingpost pedestal, providing stiffness and pointing accuracy. The pedestal is designed for full orbital arc coverage and is readily adaptable to ground or rooftop installations.

It is very important to understand the entire installation procedure to avoid any mistakes that could result in permanent damage to the antenna. Therefore, SATCOM Technologies strongly suggests the antenna installer read this manual thoroughly before starting the installation and follow the steps precisely. SATCOM Technologies disclaims any liability or responsibility for the results of improper or unsafe installation, operation, and maintenance practices. Should any installation questions arise that are not answered within this document, please contact:

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## 2.0 INSTALLATION

### 2.1 Before You Begin

#### 2.1.1 Antenna Foundation

Prior to installation of the antenna, the antenna foundation must be complete. The specific foundation structure drawing is presented in the installation drawing print package.

#### 2.1.2 Shipment Inspection

The VertexRSI Model 4.8-meter bolt-together antenna is packaged in several cartons. SATCOM Technologies has labeled each carton with model number and contents for easy identification. Once received, the antenna shipping cartons should be inspected and verified for proper antenna model number. If discrepancies are found, please contact SATCOM Technologies for correction. If exterior packing label is unavailable, open the carton for inspection.

Prior to the installation process, it is recommended that components and hardware received be compared to the packing list included inside each carton. Should any part be missing or if damage is apparent, please refer to Appendix A, "Reporting Loss or Visible Damage."

#### 2.1.3 Unpacking Instructions

Care should be exercised when uncrating and unpacking the equipment. Each container should be inspected as it is opened. The contents of each container should be checked against the work order-packing list inside each carton to verify correct part numbers and quantities. While parts inventory is taking place, organize the antenna installation processes. Make sure perishable items and small items are adequately stored to prevent loss and/or weather damage.

If a claim for shipping damages is to be made, save the packing material, the container, and the accompanying paperwork to substantiate the claim with the carrier. Notify SATCOM Technologies as soon as possible. Do not return any unit, subassembly, or assembly until authorization and shipping instructions are received from the factory.

#### 2.1.4 Support Equipment Description and Weight

This paragraph defines the specific machinery and instruments necessary to accomplish the field installation of the antenna.

**Table 1. Crane (Lifting Device)**

Task	4.8 Meter	
	Size (minimum)	Boom
Lift and position pedestal	8 Ton	40 Feet
Lift and position reflector assembly	8 Ton	50 Feet
Lift and position feed	5 Ton	50 Feet

Note: *The above table assumes unrestricted access to foundation on flat compacted surface. Any other condition will require on-site crane sizing.*

**Table 2. Weight Summary**

<b>Component</b>	<b>Unit Wt. (lbs.)</b>
Reflector assembly	750
Pedestal assembly	800
Az & El Jack drive assembly (less motor drive)	
Az - 10 ton	105
El - 10 ton	147
Shipping weight (typical)	2,800

**2.1.5 Tools for Installation**

This VertexRSI Model 4.8-meter antenna is designed for assembly by a crew of three with limited, special, heavy equipment or tooling. The following are tools and items needed for installation:

**Table 3. Tool List**

<b>#</b>	<b>Description</b>	<b>Model</b>	<b>Qty.</b>
1	3/8" Cordless Drill w \Chuck	29435A13	1 ea.
2	Battery Screw Driver	7183A51	1ea.
3	Battery Charger for Screw Driver	7183A53	1ea.
4	Spare Battery for Screw Driver	7183A55	1ea.
5	Battery Charger for Drill	4048A12	1ea.
6	Spare Batteries for above Drill	3972A22	1ea.
7	1/4" Flexible Ext. 4" to 6" Lg.	5521A23	1ea.
8	1/4" Adapter for Cordless Drill	5521A31	1ea.
9	1/4" Adapter for Elect. Screw Driver	5716A12	1ea.
10	1/4" Drive Deep Sckt. 5/16"		2ea.
11	1/4" Drive Deep Sckt. 3/8"		2ea.
12	1/4" Drive Deep Sckt. 7/16"		2ea.
13	1/4" Drive Sckt. Std. 5/16"		2ea.
14	1/4" Drive Sckt. Std. 3/8"		2ea.

15	1/4" Drive Sckt. Std. 7/16"		2ea.
16	1/4" Drive Ratchet	5540A36	2ea.
17	1/2" Drive Ratchet	7308A56	1ea.
18	1/2" Drive Sckt. 9/16"		1ea.
19	1/2" Drive Sckt. 3/4"		1ea.
20	1/2" Drive Sckt. 15/16"		1ea.
21	1/2" Drive Sckt. 1/2"		1ea.
22	Phillips Screw Driver #2	5682A28	2ea.
23	Slotted Screw Driver	5682A19	2ea.
24	Open Box Wrench 5/16"		2ea.
25	Open Box Wrench 3/8"		2ea.
26	Open Box Wrench 7/16"		2ea.
27	Open Box Wrench 1/2"		2ea.
28	Open Box Wrench 9/16"		2ea.
29	Open Box Wrench 3/4"		2ea.
30	Open Box Wrench 15/16"		2ea.
31	Putty Knives	3668A2	2ea.
32	24" Crescent Wrench	5385A18	1ea.
33	2 lb. Machinist's Hammer	5882A1	1ea.
34	Claw Hammer	6062A2	1ea.
35	Wrecking Bar	5992A2	1ea.
36	Tin Snips	3585A12	1ea.
37	Snap Ring Plier Set	5667A46	1ea.
38	Machinist's Flat File	4219A35	1ea.
39	Rat Tail File	4233A27	1ea.
40	Panel Align. Tool Punch Point w Handle	3603A2	2ea.
41	Spring Clamps	5167A8	4ea.
42	(Bolt Bags) Work Apron	6777A11	2ea.
43	Roll Emery Cloth 150 Grit	4684A021	1ea.
44	Allen Key Hex Sets	7162A13	1ea.

45	25' Tape Measure	6802A16	1ea.
46	Tool Box	6379A11	1ea.
47	Nylon Straps 2" X 10'	3383T466	2ea.
48	3 Ton Shackles	3558T51	2ea.

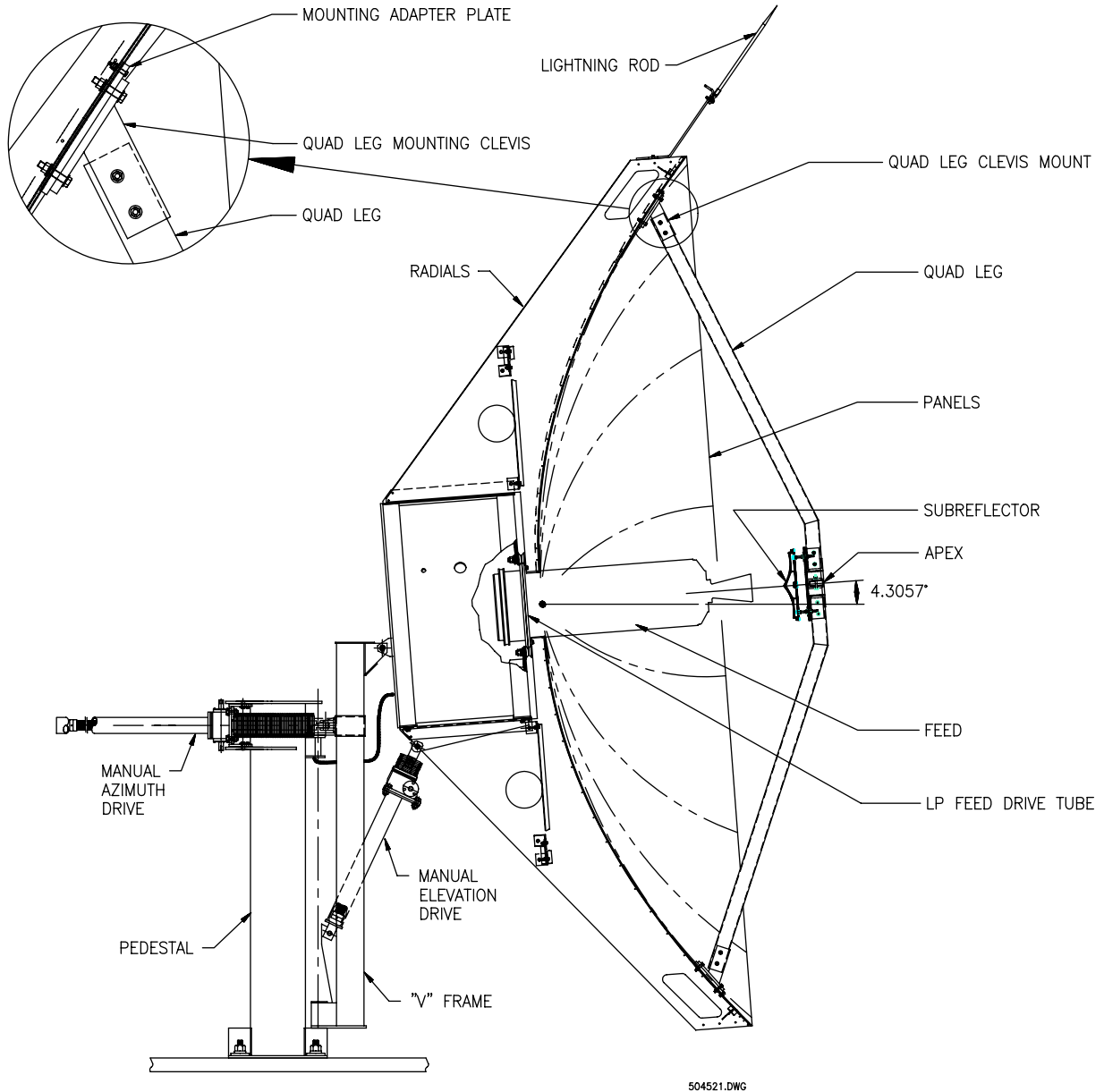
### 2.1.6 Applicable Documents

The following documents form a part of this manual. In the event of a conflict between a referenced document, this manual shall govern.

<u>Document No.</u>	<u>Description</u>
500-0231	Alignment Procedure for Antenna Position Transducer

### 3.0 INSTALLATION PROCEDURE

*Note: Refer to Figure 1 during installation. This figure is an overall view of the assembled antenna and can assist the installer with locating parts and understanding the relationship between the components.*



**Figure 1. Fully Assembled VertexRSI Model 4.8M Antenna**

### 3.1 Pedestal Installation

*Note: Verify actual anchor bolt layout to the foundation layout drawing.*

**Step 1.** Install the pedestal to the foundation. The pedestal should be lifted by placing a minimum of two nylon slings around the upper pedestal. Precaution should be taken to protect the finish of the pedestal. Bolts shall be tightened to a "Snug Tight."

*Note: "Snug Tight" defined as a few impacts of impact wrench or full effort on ordinary spud wrench.*

**Step 2.** Verify the pedestal is level in two directions using a spirit level on the vertical pedestal tube.

**Step 3.** Tighten the bolts securing the pedestal per AISC "Turn-of-Nut" procedure unless otherwise specified on installation drawing in print package.

### 3.2 Azimuth Drive Installation

*Note: The V-frame must be able to rotate freely without binding.*

**Step 1.** Install the azimuth manual drive assembly strut through the trunnion using the 1-3/4" -12UNF nuts and the 1-3/4" ID flat washers (See Figure 2). Tighten the nuts per AISC "Turn-of-Nut" procedure unless otherwise specified on installation drawing in print package.

**Step 2.** Install the rod boot over the azimuth screw shaft. Attach boot using the clamps provided with the boot.

*Note: Check for freedom of motion throughout the rotation angle of the trunnion.*

**Step 3.** Pin the strut end to the V-frame pick-up lug with pin, flat washer, and retaining rings.

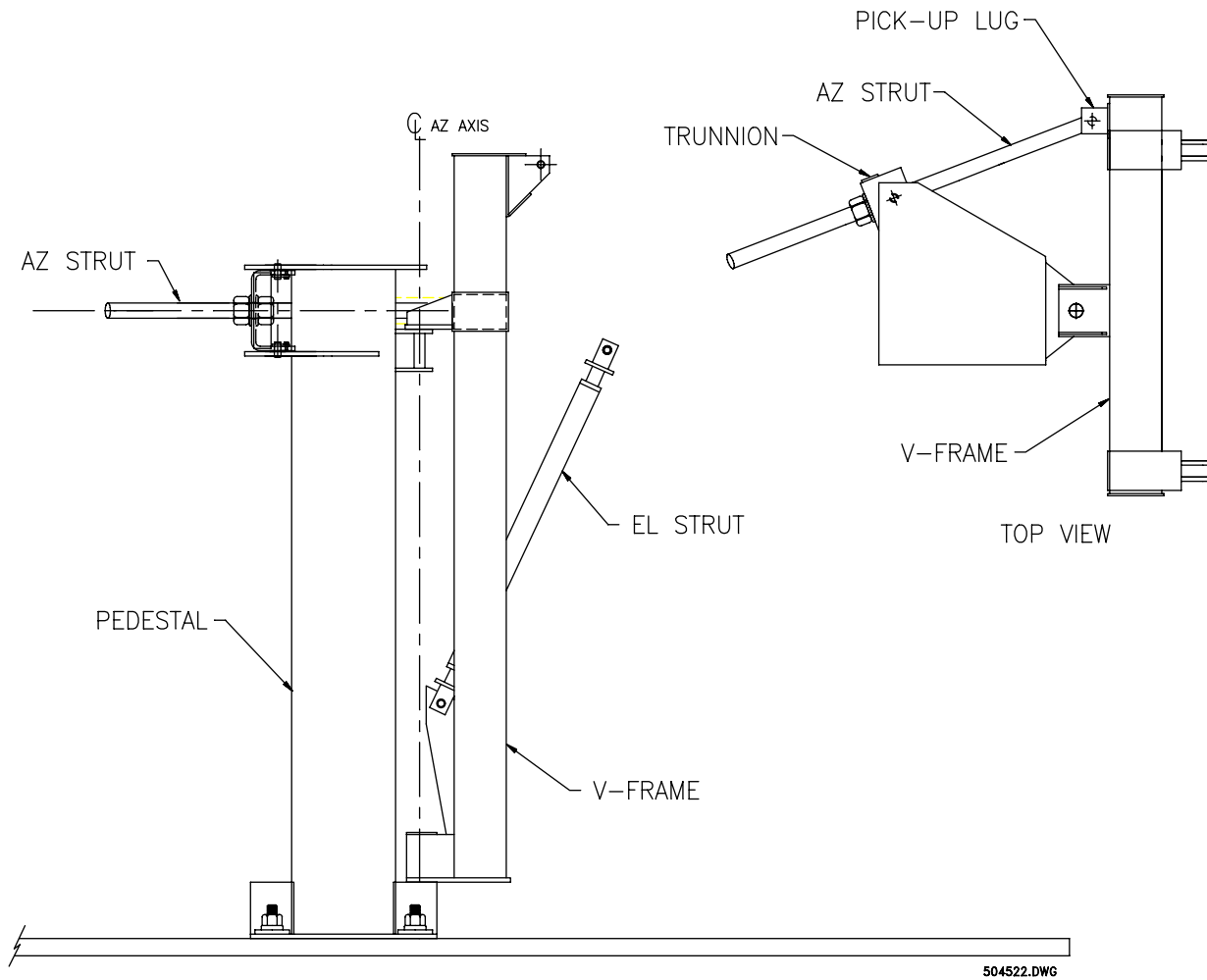
### 3.3 Elevation Drive Installation

**Step 1.** Install the elevation manual drive assembly to the pedestal V-frame. Pin one clevis end to the lower end of the V-frame. (see Figure 2).

*Note: This connection should operate smoothly and freely.*

**Step 2.** Install the motorized drive assemblies (if applicable) to the azimuth drive and elevation drive assemblies.

*Note: Motorized drives may be left off at this point and jacks can be manually driven.*



**Figure 2. Azimuth and Elevation Drive Installation**

### 3.4 Main Reflector Assembly

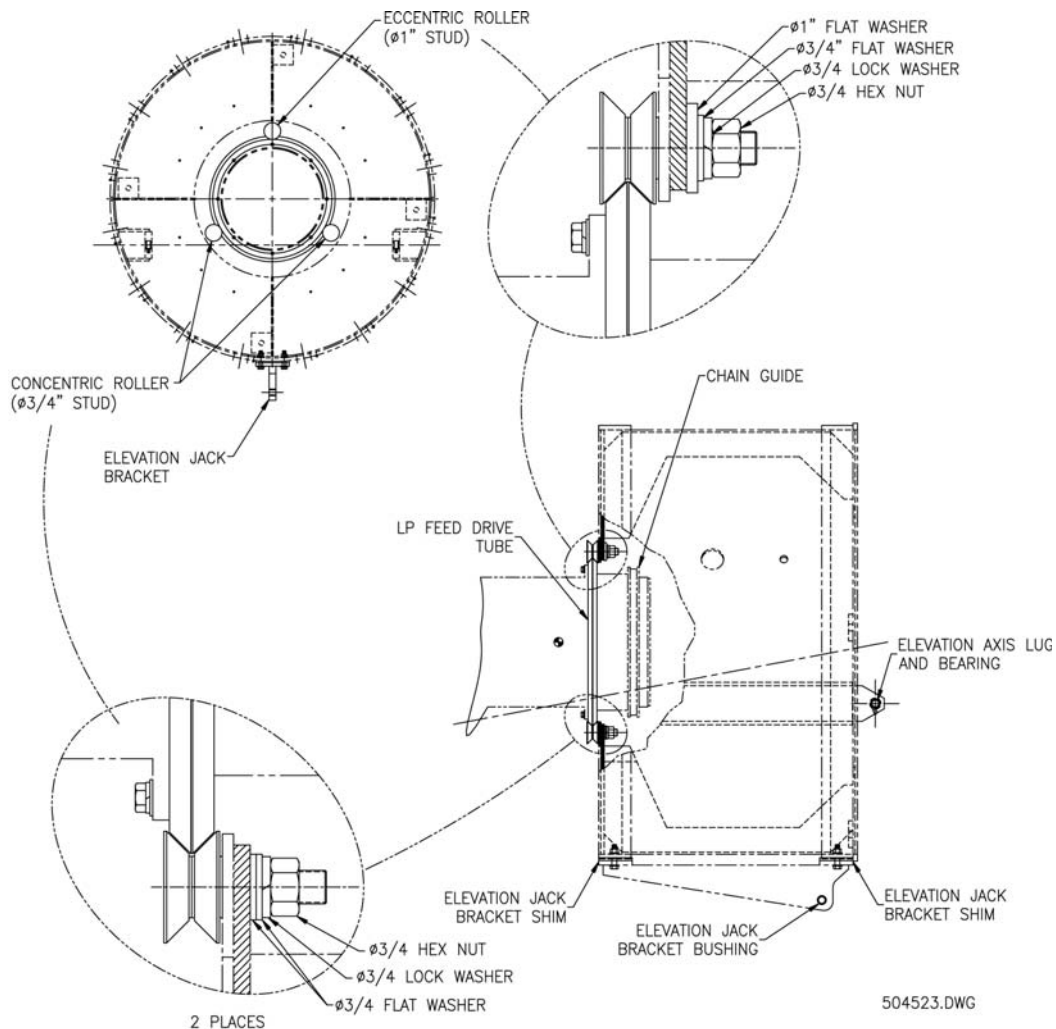
*Note: The reflector will be assembled on the ground prior to mounting on the pedestal. Sufficient space should be available to install the radials and panels and for lifting the assembled reflector to the pedestal.*

### 3.4.1 Feed Interface and Rainshield Installation

**CAUTION!** THE FEED RING AND RAINSHIELD (IF PURCHASED) MUST BE INSTALLED ON THE HUB PRIOR TO INSTALLING RADIALS AND PANELS. REFERENCE DRAWING 031842.

*Note:* Use the following procedure for a linearly polarized (LP) feed installation. Refer to Figure 3 of this document and Drawing 480019 in the print pack.

- Step 1.** Position the two concentric V-rollers on the hub.
- Step 2.** Position the LP feed drive tube, chain guide inside the hub, in the grooves of the two concentric V-rollers. (Concentric rollers have a  $\Phi=0.75$ " stud.)
- Step 3.** While the drive tube remains in contact with the two concentric rollers, tilt the drive tube away from the top of the hub and position the eccentric V-roller such that as the tube is lowered toward the hub the eccentric V-roller will seat in its mounting hole, capturing the drive tube in the three rollers. (The eccentric roller has a  $\Phi=1.00$ " stud.)



**Figure 3. LP Feed Interface Installation**



*Note:* The rotating axis of the roller of the eccentric roller assembly is slightly offset from the centerline of the stud. This provides a cam-like capability that is used to adjust the rolling pressure between the rollers and feed drive tube. The adjustment is made by turning the mounting stud in its mounting hole in the top of the hub using a hex wrench.

**Step 4.** Use hex wrench to rotate and adjust the eccentric roller such that the drive tube rolls smoothly minimum slop.

**Step 5.** Install flat washers, lock washers and hex nuts on rollers and fully tighten. Hold the stud stationary using a hex wrench while tightening the hex nut on each roller assembly.

**Step 6.** Check that the drive tube rolls smoothly. If not, loosen hardware on eccentric roller, readjust and retighten.

*Note:* Use the following procedure for a circularly polarized (CP) feed installation. Refer to Drawing 480019 in the print pack.

**Step 7.** Position the CP feed adapter plate on the top of the hub. The 1" diameter hole in the adapter plate should be aligned with the 1" diameter hole in the top of the hub.

**Step 8.** Install and fully tighten the mounting hardware.

**Step 9.** Attach the lower rainshield to the hub and place upper rainshield halves in place using the hardware supplied with the feed installation. Refer to Drawing 031842 in the print pack.

### 3.4.2 Radial Beam Installation

**CAUTION! THE FEED INTERFACE, EITHER CP OR LP, MUST BE INSTALLED ON THE HUB PRIOR TO INSTALLING RADIALS AND PANELS.**

**Step 1.** Position the hub assembly on cribbing approximately 15" high.

**Step 2.** Secure the hub to the ground using straps and ground anchors as a precaution against the reflector being overturned by wind during assembly.

*Note:* Leave access for personnel to enter the hub/reflector from underneath.

**Step 3.** Install the elevation jack bracket to the hub (if not factory installed). Completely tighten the mounting hardware. (See Figure 3 and Drawing 480112).

**Step 4.** Wipe down machined bands on the outside of the hub with a clean, dry cloth. Radial hub tee and radial mounting surfaces on the hub should be free of debris.

**Step 5.** Identify the locations of the quad leg radials on the hub. (See Drawing 480101). As radials are attached to the hub, make certain that the quad leg radials are oriented properly and are at 90° of separation from each other.

**Step 6.** Attach each radial beam, one at a time, to the hub with the ½" hardware provided. Each radial must be seated on the machined step at the bottom of the hub with the edge of the hub tee making contact with both alignment pins in the hub wall. (See Figure 4).

**Step 7.** Fully tighten the radial mounting hardware. After tightening hardware, check to ensure that the radial hub tee has remained in contact with the machined step and with the alignment pins. If not, loosen the hardware, adjust, and retighten.

*Note:* For windy conditions, lacing members should be installed as radials are installed. Refer to Section 3.4.7 in this document.

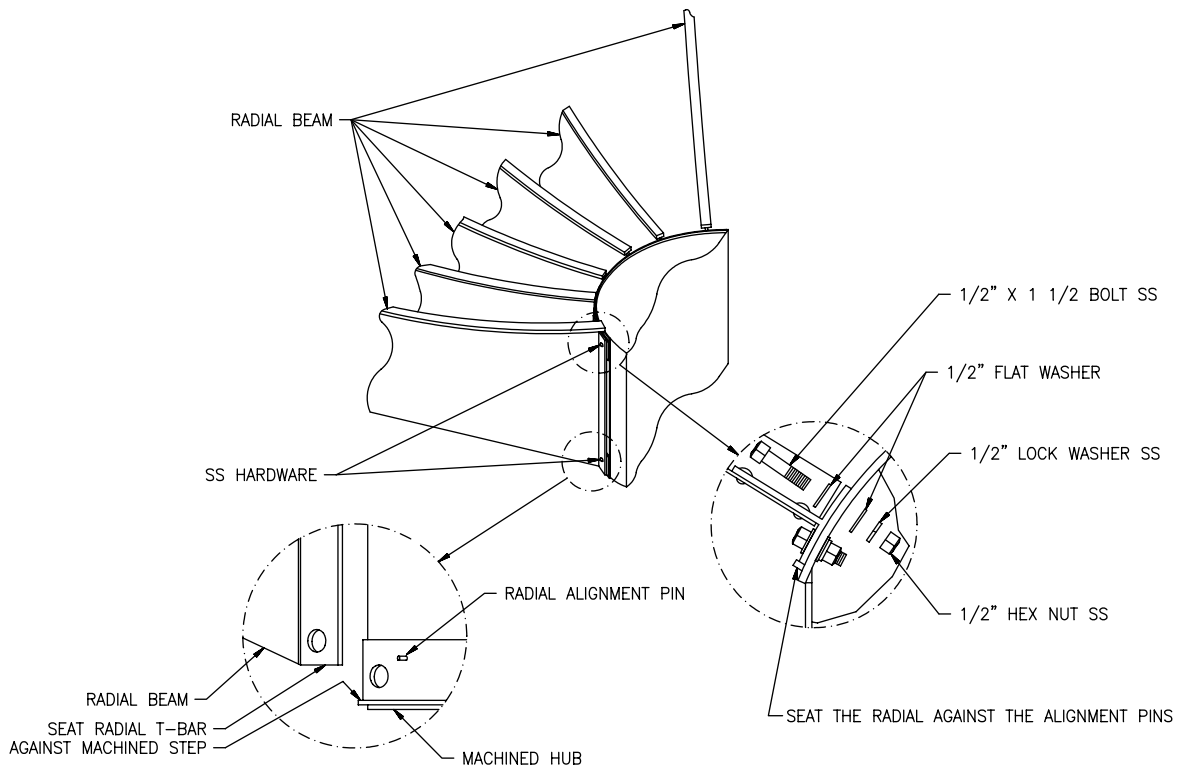
### 3.4.3 Outer Lacing Installation

Install the 16 contoured outer lacing members. (See Figure 5 and Drawing 480101).  
Finger-tighten hardware.

### 3.4.4 Reflector Panel Installation

*Note:* There are two different panels. There are eight panels with four 7/16" diameter quad leg-mounting holes and eight radials that do not have these holes. (See Drawing 480101). The panels with the quad leg mounting holes must be installed in their correct clocking positions so that the quad legs/apex/subreflector may be installed correctly.

- Step 1.** Wipe down top of radials with a clean, dry cloth. The surface contacting the panel should be free of debris. Also, wipe down the backside edge of each panel where the panel will contact the radial. This surface must also be free of debris.
- Step 2.** Maneuver a panel so that it lies on top of two adjacent radials and the outer lacing member in a reflector bay. Temporarily hang the panel from the heads of the outer lacing mounting bolts. (See Figure 5).
- Step 3.** Place the outer lacing shim between the panel and outer lacing member, aligning the holes in all three parts. (See Figure 5 and Drawing 480101).



504524.DWG

**Figure 4. Radial Beam Installation**

- Step 4.** Install machine screws (head on the panel side) through the panel and outer lacing members.
- Step 5.** Install machine screws (head on the panel side) through the panel and radials working from the outboard edge of the panel toward the hub.

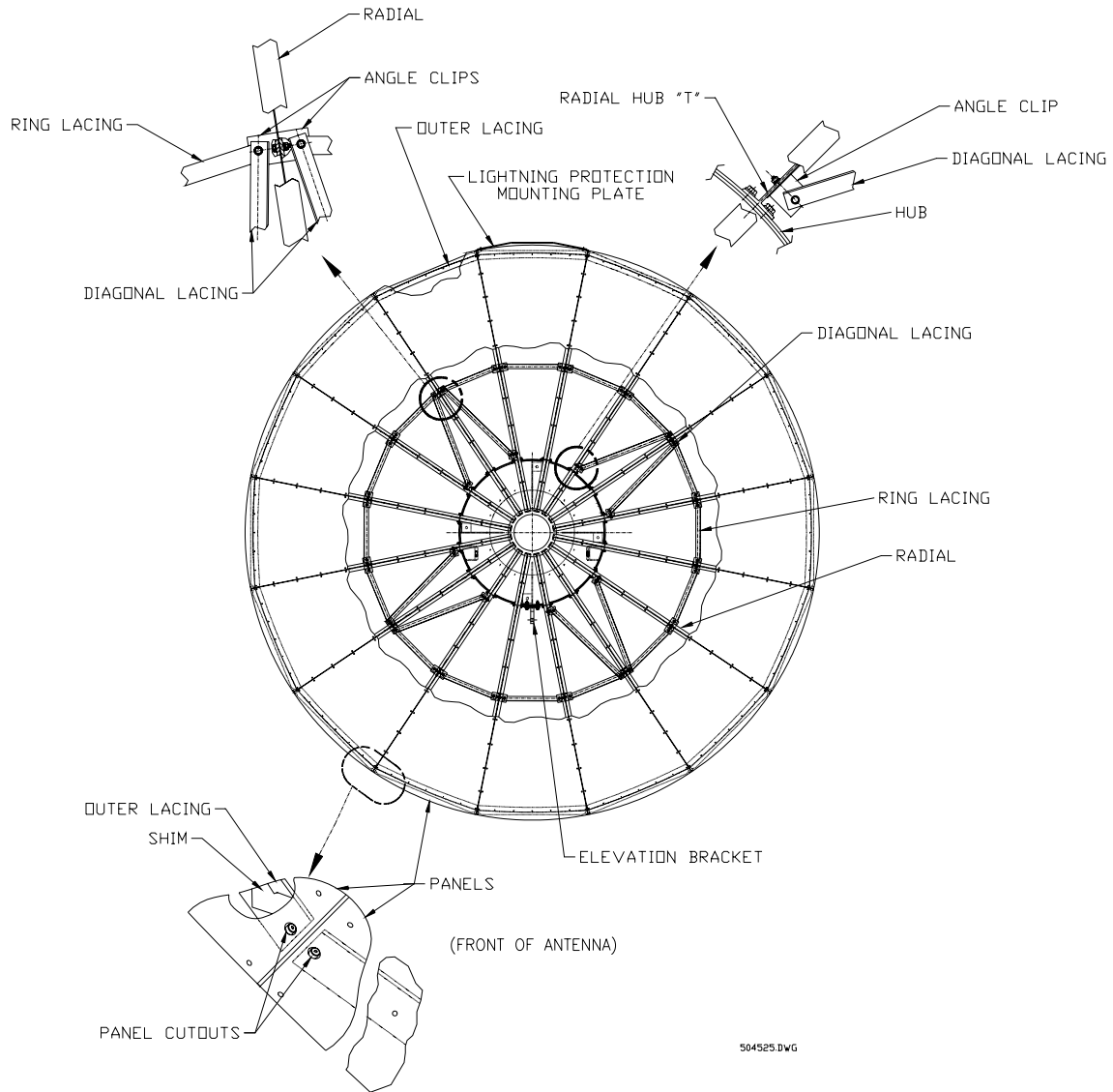
- Step 6.** Install one flanged lock nut on each machine screw. The nuts should be less than finger tight to allow movement of the structure until the last panel is installed.
- Step 7.** Repeat Step 1 through Step 6 for each reflector bay. Progressively work from one bay to the adjacent bay without skipping.
- Step 8.** Mounting hardware for the last panel must be installed from inside the reflector. The installer should stand where the radial is supporting his/her weight. Do not stand in the middle of panels.

### **3.4.5 Reflector Hardware Tightening Sequence**

- Step 1.** Completely tighten all panel-to-outer lacing screws for all bays.
- Step 2.** Completely tighten the panel-to-radial screws for each bay starting at the inboard edge of the panel working toward the outboard edge, alternating from side to side.
- Step 3.** Completely tighten the outer lacing-to-radial bolts for all bays.

### **3.4.6 Structural Lacing Installation**

- Step 1.** Install the 2-1/2" X 2-1/2" angle clips for mounting the torsional and ring lacing. Finger-tighten the hardware. (See Figure 5 and Drawing 480101).



**Figure 5. Reflector Assembly**

- Step 2.** Install the torsional and diagonal lacing members. Installation must be simultaneous as these members share fasteners in some locations. Fingertighten the hardware.
- Step 3.** Orient the horizontal surface of each structural lacing angle clip such that it is level. Fully tighten the mounting hardware.
- Step 4.** Fully tighten the mounting hardware for all ring and torsional lacing.

### 3.4.7 Main Reflector Assembly in Windy Conditions

*Note: When assembling the reflector in windy conditions, special care must be taken to avoid damaging reflector components during assembly. Windy conditions for this discussion are defined as steady winds exceeding 15 mph or gusts up to 20 mph. As each radial is installed to the hub, it should be connected with previously installed radials by installing the outer lacing members and ring and torsional lacing members. This procedure limits the movement caused by wind and minimizes the chances of damage occurring.*

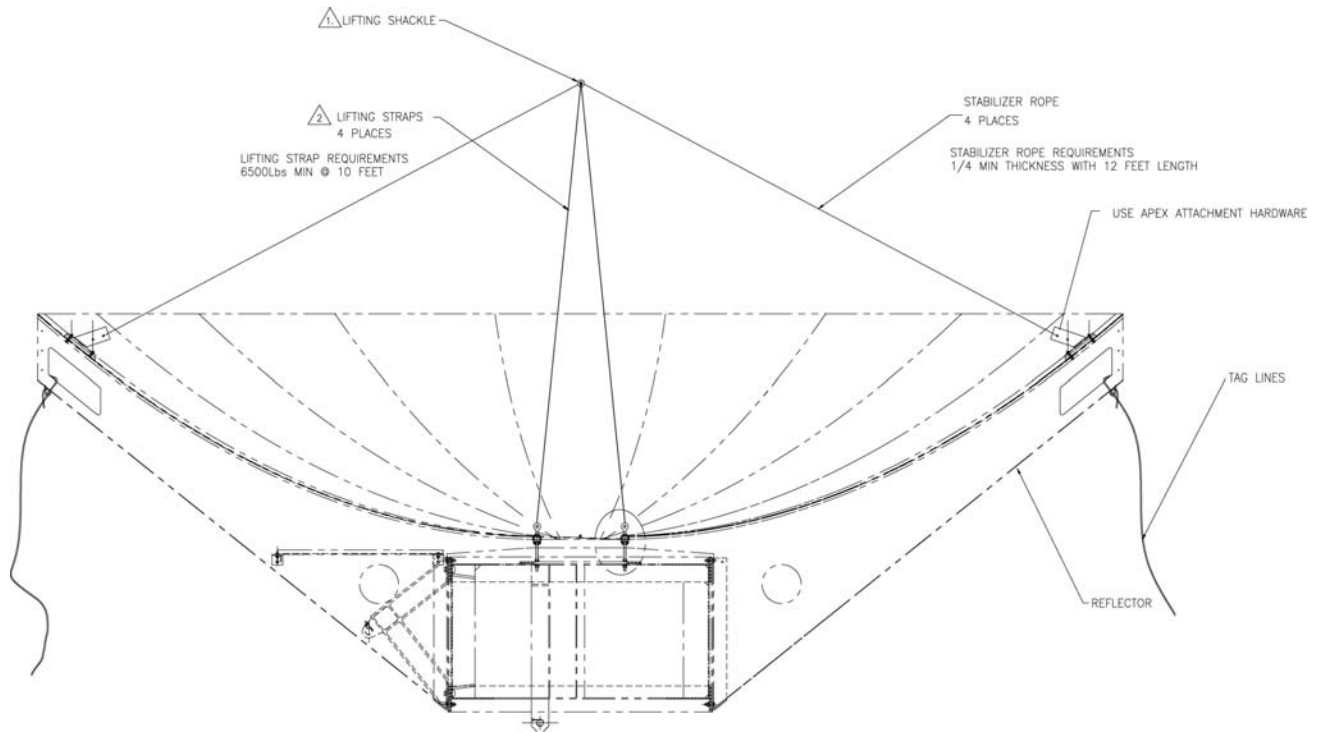
- Step 1.** Mount the first radial to the hub following the procedures in Section 3.4.2. Fully tighten hardware. Immediately tie the radial to the ground using nylon rope and wood or steel stakes or weights.
- Step 2.** Mount the next radial adjacent to the first. Fully tighten hardware. Install outer lacing member between the two radials. Install structural lacing angle clips, diagonal, and torsional lacing using the procedures described above. Lacing hardware should be finger tight
- Step 3.** Continue mounting radials to the hub, one at a time. Install lacing members after each radial is installed. Add more nylon ropes as needed to prevent excessive movement of the structure.
- Step 4.** It is not recommended that panels be installed in windy conditions. If the radial and lacing structure is to be left overnight, snug all bolts. Be certain to loosen all lacing hardware prior to beginning panel installation described in Section 3.4.4.

### 3.4.8 Apex/Quad Leg Mounting Clevises Installation

At each of the four clocking positions indicated, position the mounting adapter plate and clevis, oriented as shown in Drawing 480101. Mount the clevis and adapter plate to the reflector surface using the 3/8" hardware provided. Fully tighten hardware.

### 3.5 Reflector-to-Pedestal Installation

- Step 1.** Clean and lubricate the bearings on the elevation axis lugs and elevation jack bracket on the hub. (See Figure 3).
- Step 2.** Check the fit of the elevation axis pins in the elevation axis bearings on the hub and in the mating V-frame clevises. Also check the fit of the elevation jack pins. Use emery cloth or a file to remove any burrs, if necessary.
- Step 3.** Install reflector-lifting tool per Drawing 029448 provided in the print pack.
- Step 4.** Install shackle in lug of eyebolts. (See Figure 6).



**Figure 6. Reflector installation**

- Step 5.** Attach lifting straps to shackles.
- Step 6.** Install one bolt in each quad leg clevis.
- Step 7.** Loosely tie nylon rope from each quad leg mounting clevis to the lifting shackle (provided by the crane company).
- Step 8.** Use crane to pull slack from choker by picking up approximately 500 lbs.
- Step 9.** Tighten the nylon ropes.
- Step 10.** Attach tag lines to the reflector ring-lacing members.
- Step 11.** Lift the reflector and connect the elevation axis lugs to the pedestal per the assembly drawing in the print pack. To connect the axis, insert a drift pin through the axis lug on one side and install the axis pin through the other side. After one side is completely secured, remove the drift pin and insert the other axis pin completing the elevation axis joint.
- Step 12.** Pin the elevation jack to the pedestal V-frame.
- Step 13.** After the reflector has been secured to the pedestal assembly, remove the lifting equipment from the reflector. Walk only on the radial beams.

### 3.6 Feed Installation

Install the feed assembly per Drawing 480019. Use crane and choker to lift feed into position.

### 3.7 Apex/Quad Leg Installation

*Note:* Refer to Drawing 480101 and Figure 1 of this document for the following steps.

*Note:* Use the following steps if a lifting device is available.

**Step 1.** Attach the legs to the apex using the 3/8" hardware provided. Install shims as indicated. Snug the bolts; do not fully torque.

*Note:* The subreflector assembly may be attached to the apex prior to lifting the apex/quad leg assembly. (See Section 3.8).

**Step 2.** Lift the Apex/Quad Leg assembly with the lifting device and position such that the legs may be fitted into the reflector-mounted clevises. Attach the legs to the clevises using the 3/8" hardware provided. Snug the bolts; do not fully torque.

**Step 3.** Level the apex. The end of the leg that attaches to the apex should be roughly parallel to the apex plate. Fully tighten the leg attachment bolts at the apex and at the leg clevises.

*Note:* Use the following procedure if a crane is not available.

**Step 4.** Place the apex, quad legs and hardware in the reflector with the reflector in the stow position.

**Step 5.** While one installer holds the apex in position above the feed horn, another installer should attach the legs, one at a time, to both the apex and reflector-mounted clevises using the 3/8" hardware provided. Snug the bolts; do not fully torque.

**Step 6.** Level the apex. The end of the leg that attaches to the apex should be roughly parallel to the apex plate. Fully tighten the leg attachment bolts at the apex and at the leg clevises.

### 3.8 Subreflector Installation and Alignment

*Note:* Refer to Drawing 480101 and Figure 1 of this document for the following steps.

**Step 1.** On each of the three mounting studs on the subreflector assembly, install one nut, one flat washer, and one washer plate, in sequential order.

**Step 2.** Position the subreflector assembly between the feed horn and the apex such that the three studs are aligned with the 1-1/8" diameter holes in the apex.

**Step 3.** Lift the subreflector toward the apex. The studs should protrude through the apex. Install one washer plate, one flat washer, and one nut, in sequential order, on the end of the stud protruding through the apex. Hand-tighten the nut on the backside of the apex such that the apex supports the subreflector assembly.

**Step 4.** Level and set the height of the subreflector assembly. Using a tape measure, measure from the back of the subreflector to the main reflector at a minimum of three locations, 120 degrees apart. Adjust the nuts until the same height is measured at each of the locations and the height matches the dimension given on Drawing 480101.

**Step 5.** Center the subreflector in the main reflector. Using a tape measure, measure from the center point of the subreflector to the outboard edge of the reflector at a

minimum of three locations, 120 degrees apart, and reposition the subreflector assembly until it is centered. Fully tighten the subreflector assembly mounting nuts.

**Step 6.** Check the level, height, and centering position of the subreflector assembly after tightening the nuts to verify correctness. Loosen the nuts and repeat Steps 4 and 5 to adjust the level, height, and centering position, if necessary.

### **3.9 Limit Switch Installation**

**Step 1.** Verify limit switch installation, in the azimuth axis, is in accordance with the drawing provided in the print package.

**Step 2.** Adjust travel limit stops as required to trip limit switch within mechanical travel.

**Step 3.** Verify limit switch installation, in the elevation axis, is in accordance with the drawing provided in the print package.

**Step 4.** Adjust travel limit stop sleeves as required to trip limit switch within mechanical travel.

**Step 5.** Install the polarization limit switch stop in accordance with the drawing provide in the print package.

**Step 6.** Adjust position of stops to trip polarization limit switch travel at +/- 90°.

### **3.10 Positioning Transducers – Installation and Alignment**

**Step 1.** Install the positioning transducers and azimuth resolver (if applicable) per installation drawing in print package.

**Step 2.** Perform alignment of antenna position transducer in accordance with alignment procedure 500-0231.

### **3.11 Antenna Utility Electrical Installation**

**CAUTION! REMOVE ALL POWER TO THE ANTENNA PRIOR TO ELECTRICAL INSTALLATION.**

Install the antenna control cabling and electrical kits in accordance with the wiring schematics provided in the print package.

### **3.12 Pedestal/Reflector Assembly Protective Finish**

The pedestal/reflector assembly should be inspected on a regular basis and should be maintained as follows:

**Step 1.** Accumulations of dirt and/or grease shall be removed using a solution of hot water and detergent. After cleaning, rinse with clear water.

**Step 2.** Damaged or deteriorated surface finishes shall be repaired as follows:

#### **3.12.1 Reflector surface panels (painted aluminum)**

1. Lightly sand damaged area with 180 grit sanding pad to feather the edges.
2. Clean sanded area to remove any particles left by sanding.
3. Apply one coat of primer.
4. Allow primer to air dry.
5. Apply the first coat of flat white paint.
6. Allow first coat of paint to dry thoroughly.
7. Apply second coat of flat white paint.



### **3.12.2 Unpainted aluminum**

1. Wire brush to remove oxides.
2. Clean thoroughly using a solvent for greasy areas; hot water and detergent for dirt accumulations.

### **3.12.3 Painted aluminum**

1. Repeat of Steps A and B of 3.12.2.
2. Wipe down using clean rag.
3. Select applicable primer.
4. Mix according to manufacture's instruction.
5. Apply one coat of primer.
6. Allow primer to air dry.
7. Apply one coat of gloss white paint.

### **3.12.4 Galvanized steel components**

1. Remove dirt, grease and/or rust.
2. Apply one coat of Zinc rich (cold galvanizing type) paint.

### **3.12.5 Miscellaneous painted steel components**

1. Remove dirt, grease, and/or rust.
2. Apply one coat if primer.
3. Allow primer to air dry.
4. Apply the first coat of paint.
5. Allow first coat of paint to dry thoroughly.
6. Apply second coat of paint as required to cover.

#### **4.0 ANTENNA SYSTEM DRAWINGS**

A complete list of drawings for this antenna is included in the print package.

Reflector Installation

Pedestal Installation

Azimuth Drive Installation

Azimuth Drive Assembly

Motorization Kit

Azimuth / Elevation Transducer Installation

Azimuth / Elevation Limit Switch Installation

## 5.0 WARRANTY

SATCOM Technologies warrants the items ordered hereunder at the time of shipment to be free from defects in material, workmanship, and to conform to the contract specification. SATCOM Technologies' liability under this Warranty shall terminate one (1) year after date of acceptance or eighteen (18) months from the date of shipment, whichever comes first. Some individual products include extended warranties as stated in brochure(s) and extended warranties may be purchased as requested and quoted. Written notice of any defects shall be given SATCOM Technologies upon discovery and SATCOM Technologies shall promptly correct such defects by repair or replacement, at its option, without charge, either FCA SATCOM Technologies' plant or service in the field.

**IN NO EVENT SHALL SATCOM TECHNOLOGIES' LIABILITY UNDER THIS WARRANTY EXCEED THE COST OF REPAIR OR REPLACEMENT OF SUCH DEFECTIVE ITEM AND UNDER NO CIRCUMSTANCES SHALL SATCOM TECHNOLOGIES BE LIABLE FOR SPECIAL OR CONSEQUENTIAL DAMAGES.**

Specifically excluded from this Warranty are:

- a. Defects or nonconformance caused by and resulting from improper operation, maintenance, or storage of the equipment.
- b. Items of characteristically indeterminate life, such as bulbs, fuses, etc.

THIS WARRANTY CONSTITUTES SATCOM TECHNOLOGIES' SOLE AND EXCLUSIVE LIABILITY HEREUNDER AND BUYER'S SOLE AND EXCLUSIVE REMEDY FOR DEFECTIVE OR NONCONFORMING ITEMS AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS IMPLIED OR STATUTORY (INCLUDING THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE).

## 6.0 VENDOR INFORMATION

Contact SATCOM Technologies' sales department for information regarding the purchase, replacement, and/or special servicing of OEM components.

SATCOM Technologies  
2600 N. Longview St.  
Kilgore, Texas 75662-6842 USA  
Telephone: 903-984-0555  
Fax: 903-984-1826

## APPENDIX A. REPORTING LOSS OR VISIBLE DAMAGE

Some damage may occur to the parts during the shipping process. A claim should be filed with the carrier at the time of receiving the equipment or after completion of parts verification. Follow the "Reporting Loss or Visible Damage", "Reporting Concealed Damage", and "Reporting Missing Parts" when filling a claim with the carrier.

### **Reporting Loss or Visible Damage**

Make a note of any loss or damage on the freight bill or receipt signed by the carrier's agent. Failure to adequately claim such loss or damage may result in the carrier refusing to honor a damage claim. The form for such a claim can be acquired from the carrier.

### **Reporting Concealed Damage**

The contents may be damaged in transit it due to rough handling that may not show any external damage. For any of the concealed damage discovered after unpacking the unit, make a written request for an inspection by the carrier's agent, and file a claim with the carrier.

### **Reporting Missing Parts**

After opening the shipment, an inventory of the parts should be completed. Check items received in the shipment. If there is any item missing, please notify SATCOM Technologies immediately by contacting Project Managing Department.

### **Returning**

Thorough consideration has been taken by SATCOM Technologies to ensure that all antenna items arrive in safe working order. Occasionally, equipment may be received that is not in working condition due to reasons beyond manufacturer's control. Upon review of the completed claim forms, SATCOM Technologies will determine disposition as to return, repair and/or replacement. The return process can be expedited by following this procedure:

a. Notify SATCOM Technologies Project Managing Department by call or fax, giving a short description about the missing items or damaged components. (Phone (903) 984-0555, Fax (903) 984-1826).

b. Tag or identify the defective equipment, noting the defect or circumstance. Pack the equipment in a sturdy shipping container with some protective packing materials, and return to SATCOM Technologies.

c. When returning items to SATCOM Technologies, please include all available information regarding sales order number, purchase order number, delivery date and other pertinent information to properly identify the antenna. Also, please include the following information:

Your company name

Your address with city, state and country

Your telephone and fax numbers

The individual's name SATCOM Technologies should contact