

**Series 8060
6-Meter Earth Station
Antenna Installation**

Technical Manual

**Manual Part No. 42S043F
September 2003**

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SECTION 1 GENERAL INFORMATION

INTRODUCTION TO MANUAL

This manual contains information needed to properly install, operate, and maintain the Series 8060 6-Meter (6M) Earth Station Antenna for the 120° azimuth mount. This section contains general information on the 6M antenna. Sections 2 through 4 contain information pertaining to 6M antenna installation, operation, and maintenance. Section 5 describes the different configurations available for 6M antenna. All warnings and cautions should be reviewed before any procedures are performed. Failure to do so may result in personal injury or equipment damage.

DESCRIPTION

The 6M Earth Station Antenna provides high quality receive/transmit and receive-only capabilities for both domestic and international C-band or Ku-band applications. The antenna is designed with many standard and optional features to provide maximum user and application flexibility. The following list identifies the main features of the antenna:

- Shaped-Cassegrain reflector for high efficiency optics
- Stretch-formed reflector panels for superior gain and surface tolerance
- Built of galvanized steel for strength and durability
- Elevation-over-azimuth tripod mount for ease of installation and operation
- Dual-reflector system with multiple feed options for maximum flexibility
- Motorized option provides quick movement between satellites
- Dual band (both C-band and Ku-band) option
- Optional de-icing and lightning protection for environmental versatility
- Complies with FCC 2° spacing and CCIR Rec. 580-1 for superior sidelobe performance

The shaped-cassegrain reflector has 16 stretch-formed panels that are attached to the central hub with radial ribs and struts. The panels, ribs, struts, and hub are constructed of galvanized steel with stainless steel fasteners. The elevation-over-azimuth tripod mount design allows greater flexibility in operation and installation and provides continuous satellite arc coverage. The dual-reflector feed can be motorized or rotated manually. This design complies with all FCC sidelobe requirements for 2° spacing. The optional features, including feed options, are detailed in Section 5.

SPECIFICATIONS

Function/Item	Specification
General	
Antenna Diameter	6.15M (242 inches)
Antenna Optics	Cassegrain dual reflector
Feed Type	Corrugated conical horn
Reflector Construction	16 panels, precision stretch formed steel
Mount Configuration	Elevation over azimuth
VSWR	1.3:1 max
Gain at Midband (referenced to OMT port)	
Ku-band	
Transmit (14.25 GHz)	57.2 dBi
Receive (11.95 GHz)	55.9 dBi
C-band	
Transmit (6.175 GHz)	49.0 dBi
Receive (3.95 GHz)	45.5 dBi
Half Power Beamwidth (nominal)	
Ku-band	
Transmit (14.25 GHz)	0.25 dBi
Receive (11.95 GHz)	0.30 dBi
C-band	
Transmit (6.175 GHz)	0.56 dBi
Receive (3.95 GHz)	0.86 dBi
Radiation Pattern Sidelobe Envelope (Per FCC and CCIR)	
Envelope Defined By:	29 - 25 log θ dBi, $1^\circ \leq \theta \leq 7^\circ$ 8 dBi, $7^\circ < \theta \leq 9.20^\circ$
At least 90% sidelobes less than:	29 - 25 log θ dBi, $9.2^\circ < \theta \leq 20^\circ$ 32 - 25 log θ dBi, $20^\circ < \theta \leq 48^\circ$ -10 dBi, $48^\circ < \theta \leq 180^\circ$
Antenna Noise Temperature (referenced to OMT)	
Ku-band (11.95 GHz)	
Elevation	Temperature (K)
5°	70
10°	55
20°	40
40°	37
60°	35

SPECIFICATIONS Continued

Function/Item	Specification
C-band (3.95 GHz)	
Elevation	Temperature (K)
5°	53
10°	39
20°	30
40°	23
60°	20
Power Handling (CW)	
Ku-band	2 kW
C-band	5 kW
Feed Interface	
Ku-band	
Receive	WR-75G
Transmit	WR-75G
C-band	
Receive	CPR-229G
Transmit	CPR-137G
Power Requirements (motorized actuators and polarization drives)	208V ac, 60 Hz, three phase (US) 380V ac, 50 Hz, three phase (international)
Actuator Brake Motor Heater Power Requirements	208V-240V ac, phase to phase or phase to neutral 50/60 Hz operation, maximum per actuator -120VA
Current Full Load	
Azimuth/Elevation Actuators	1.9-Amps at 208V 0.9-Amps at 380V
Polarization Actuator	0.24-Amps at 208V (transformer provided for 380V)
Power Requirements (de-icing)	
Half de-ice	7.9 kVA
Full de-ice	15.8 kVA
Feed and subreflector only	1.0 kVA

SPECIFICATIONS Continued

Function/Item	Specification
Mechanical	
Antenna Pointing Range	
Non-motorized	
Polarization	360° continuous
Azimuth	360° continuous
Elevation	0° to 90° continuous
Motorized	
Polarization	180° continuous
Azimuth	220° (3 overlapping sectors each having 115° continuous)
Elevation	0° to 90° continuous
Antenna Pointing Speed (average)	
Polarization	2.6°/second
Azimuth	0.4°/second
Elevation	0.4°/second
(These speeds are for 60 Hz operation; for 50 Hz operation the speeds will be 5/6 of those shown.)	
Environmental	
Gain Loss	<0.5 dB in 30 mi/h winds (48 km/h) gusting to 45 mi/h (72 km/h)
Temperature Range	-40°F to 150°F (-40°C to 65°C)
Survival Wind Loading	125 mi/h (200 km/h) in stowed position 110 mi/h (175 km/h) in any position (manual) Drive to stow in 80 mi/h (129 km/h) wind (motorized)
Solar Radiation	360 Btu/hr/ft ² (1.14 kW sq meter)
Atmosphere Conditions	Salt, pollutants, and corrosive contaminants as found in coastal and industrial areas
Shipping Information	
Shipping weight	6000 lbs (2721 kg) (approximate)
Net weight	4000 lbs (1814 kg)
Shipping volume	500 ft ³ (14 m ³)

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SECTION 2 INSTALLATION PROCEDURES

GENERAL This section contains procedures for unpacking and installing the Series 8060 6-Meter Earth Station Antenna. General safety precautions and procedures are also described.

ViaSat thoroughly inspects and carefully packs all equipment before shipment. At the time of shipment, the carrier assumes responsibility for its safe delivery; therefore, do not return damaged units to ViaSat. Instead, file a claim with the carrier as noted in the paragraphs following the initial unpacking procedure given below:

1. Inspect shipping carton for visible damage.
2. Open the shipping carton.
3. Remove all packing material.
4. Inspect unit for visible damage.
5. Using packing list, check for missing items (see "How To Inventory Equipment Received" below).

WHAT TO DO ABOUT VISIBLE LOSS OR DAMAGE

Make a note of any loss or evidence of external damage on the freight bill or receipt, and have it signed by the carrier's agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier refusing to honor a damage claim. The form required to file such a claim will be supplied by the carrier.

WHAT TO DO ABOUT CONCEALED DAMAGE

Concealed damage means damage which does not become apparent until the unit has been unpacked. The contents may be damaged in transit due to rough handling, even though the carton may not show external damage. If you discover damage after unpacking the unit, make a written request for inspection by the carrier's agent within 15 days of the delivery date, then file a claim with the carrier since such damage is the carrier's responsibility. If you follow these instructions carefully, ViaSat guarantees its full support of your claims to protect you against loss from concealed damage.

HOW TO INVENTORY EQUIPMENT RECEIVED

Check off each item received against that list on the packing slip included with the shipment, and verify that this list matches the purchase order. If any items are missing, please notify ViaSat immediately and return a copy of the packing slip with the missing item(s) circled.

**HOW TO RETURN
EQUIPMENT**

ViaSat Satellite Networks makes every reasonable effort to ensure that all items arrive safely and in working order. When equipment is received, which is not in working order, return the equipment to the factory for repair or replacement. Return the equipment according to the following procedure. This procedure will apply whenever equipment is returned for warranty or other services.

- a) Notify ViaSat Satellite Networks of the problem and request a Return Material Authorization (RMA) number and shipping instructions. For a current list of telephone and email contact information refer on Contact Information section of the ViaSat internet site (<http://www.viasat.com>).
- b) Tag or identify defective equipment and note defect and circumstances, if any. If known, reference sales order, purchase order, and date equipment was received.
- c) Reship equipment in original shipping container or use a strong shipping container to protect equipment during shipment.
- d) Package equipment using shock-absorbing material around all sides of equipment.
- e) Seal container securely and mark outside of container FRAGILE.

NOTE

ViaSat will not accept freight collect. Be sure to ship all items freight prepaid.

WARNING

Electrical shock from voltages used in this system can cause injury or death. Prior to making any electrical connections or performing maintenance and repair, ensure power is removed. Electrical connections should be made only by qualified personnel in accordance with local regulation.

**GENERAL
MECHANICAL
SAFETY SUMMARY**

These are general mechanical safety precautions that are not related to any specific procedure. They are recommended precautions that personnel must understand and apply.

WARNING

Installation or maintenance of antennas may require persons to work at elevated work stations. Whenever persons are working at eight or more feet above ground and not on a guarded platform, they should wear safety belts with at least one, and preferably two, lanyards, with the exception that trained and qualified persons may work up to 25 feet if on an approved ladder. In the sentence above, approved usually means that the ladder is tied off once the person has climbed but before work begins.

WARNING

Overhead hazards, either because items may fall or because a person may strike them unintentionally, are typical around construction sites or during installation of large antennas. It is prudent to adopt the following rules:

- 1. Never stand underneath anything while it is being hoisted.**
 - 2. Always wear a hard hat, especially if someone is above you.**
-

WARNING

Ensure that all electrical tools and equipment are properly grounded.

Emergency Plan

Have an emergency plan. Know the procedures for obtaining first-aid and fire-fighting assistance. Plan your work and maintain good housekeeping; the safety and quality of the product are at stake.

**GENERAL
ELECTRICAL
SAFETY SUMMARY**

These are general electrical safety precautions that are not related to any specific procedure. These are recommended precautions that personnel must understand and apply.

WARNING

Avoid shorting circuits when using metal tools. Some circuits have high current capability which, when shorted, will flash and may cause burns and/or eye injury.

Remove all jewelry and exposed metal objects from body and clothing before performing maintenance, adjustments, and/or troubleshooting. Before working inside the equipment, remove all power, unless power is required to perform procedures. Do not replace parts with power on.

Replacement of fuses or other parts must be done using identical types and ratings. Substitution of non-identical parts may cause safety and fire hazards.

Servicing this equipment may require working with protective covers removed and ac power connected. Extreme caution must be exercised during these procedures.

Death or severe injury may result if personnel fail to observe safety precautions.

Resuscitation Personnel working with or near hazardous chemicals or voltages should be familiar with modern methods of resuscitation.

RECOMMENDED TOOLS AND EQUIPMENT Table 2-1 lists the tools and equipment required for efficient and convenient installation.

Table 2-1. Tools and Equipment Required For Installation

Quantity	Description
1 Set	Combination wrenches up to 1 1/2-inch size
2 Each	Alignment pins 1/8-inch and 1/2-inch taper
1 Each	Ball peen hammer, 24-ounce
1 Each	Pry-bar
1 Each	Band cutter
1 Each	20-foot scaffold (optional)

Table 2-1. Tools and Equipment Required For Installation - continued

Quantity	Description
1 Each	25-foot extension ladder
1 Each	12-foot stepladder
1 Each	6-foot stepladder
1 Each	50-foot tie line rope, 3/8-inch thick
3 Each	12-foot, 3500 lb capacity each, nylon lifting straps
1 Each	Hoist or crane capable of lifting 2000 lbs (refer to Figure 2-22)
1 Each	Torque wrench, 7-9 ft lb
1 Each	Torque wrench, 20-150 ft lb
1 Each	Torque wrench, 250-300 ft lb 3/4-inch drive
1 Each	Torque wrench, 600 ft lb 3/4-inch drive
1 Each	Open end torque wrench attachment, 3/4-inch drive
1 Each	Small Allen wrench set
1 Each	Medium Allen wrench set
1 Each	Large Allen wrench set
1 Each	1/2-inch Allen wrench
1 Each	Torpedo level
1 Set	Electrical tools (screw drivers, nut drivers, pliers, crimp tool, line-man pliers, needle nose pliers, channel lock pliers)
1 Set	3/8-inch drive ratchet set
1 Each	Grease gun with cartridges
1 Each	1/2-inch drive ratchet set with 15/16-inch socket and 3/4-inch deep well socket
1 Each	3/4-inch drive ratchet with a 1 1/8-inch, 1 1/4-inch, 7/8-inch sockets and 6-inch extension
1 Each	Angle finder or magnetic base inclinometer
1 Each	7/16-inch open end wrench
2 Each	9/16-inch open end wrench
2 Each	3/4-inch open end wrench
2 Each	1 1/8-inch open end wrench
1 Each	Pop Rivet tool with straight nose and long handles or air compressor with air driven riveter Pop Rivet Model PRG-450, SA PN 454858 or equivalent Air Driven Riveter PRG-540, MCS-540 or equivalent
1 Each	Drive Type Grease Fitting Tool, PN 282536
4 Each	20-foot SST cable, 3/8-inch
16 Each	Cable clamps, 3/8-inch

**RECOMMENDED
INSTALLATION
SEQUENCE**

In order to ensure proper and trouble-free installation, the following installation sequence is recommended:

1. Site Preparation
2. Assembly of Reflector
3. Assembly of Spars and Subreflector
4. Assembly of Mount
5. Installation of Reflector
6. Installation of Feed, Spars, and Subreflector
7. Electrical Installation

Appendix A provides a checklist with manual page number references. The checklist follows the recommended sequence listed above.

**RECOMMENDED
TORQUE VALUES**

The following list contains the recommended torque values for all 6M antenna fasteners

CAUTION

Do not torque any fasteners until specifically directed to torque a fastener. As fasteners are installed, tighten finger tight only.

Anchor Bolt Nuts	245 to 270 ft-lbs
1-inch Fasteners	600 ft-lbs
3/4-inch Fasteners	260 ft-lbs
1/2-inch Fasteners	76 ft-lbs
3/8-inch Fasteners	31 ft-lbs
1/4-inch Fasteners	9 ft-lbs

SITE PREPARATION

Refer to Series 8060 Earth Station Antenna Site Preparation Technical Manual #42S042 for information needed to properly locate and install the foundation for the 6-Meter (6M) Earth Station Antenna.

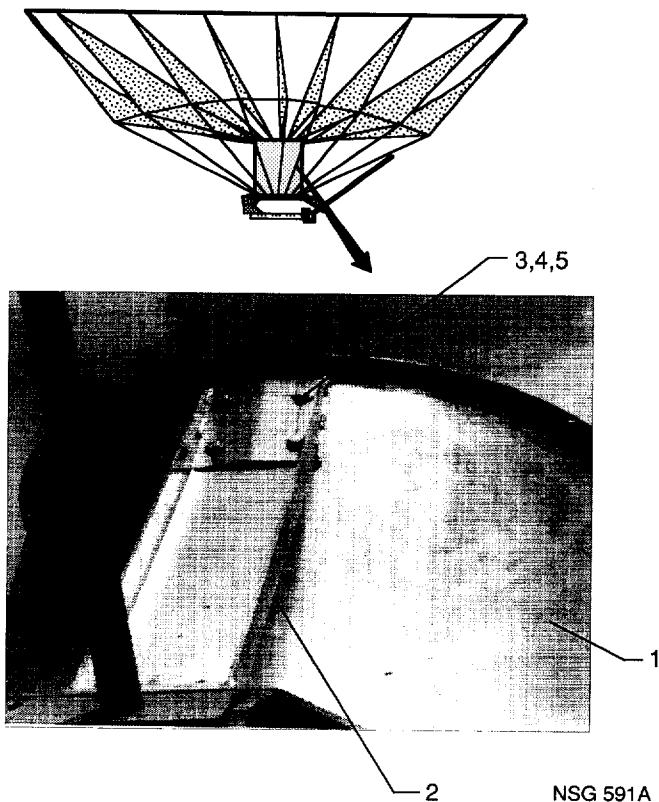
**ASSEMBLY OF
REFLECTOR**

The following procedure describes the complete assembly of the reflector which includes the reflector hub, panels, ribs, and braces. Perform the following procedure to assemble the reflector:

NOTE

The recommended procedure is to build the antenna at ground level and hoist the entire assembly into position; however, the A-frame can be attached to the bearing housing assembly and the reflector built using scaffolding. If this method is used, attach the A-frame and hub to the mount instead of on a foundation as indicated in the following procedure.

1. Remove hub (item 1 in Figure 2-1) from packaging and place in upright position.
2. Attach 3 hub braces (2) to hub using 12 hex head screws (3), 24 flat washers (4), and 12 hex nuts (5) as indicated in Figure 2-1.



- | | |
|---|--------------------------------|
| 1. HUB, 286530 | 4. 1/2-INCH FLAT WASHER, 88521 |
| 2. HUB BRACE, 286478 | 5. 1/2-INCH HEX NUT, 88518 |
| 3. 1/2 X 1 1/4-INCH HEX HEAD SCREW, 88877 | |

Figure 2-1. Assembly of Brackets To Hub

NOTE

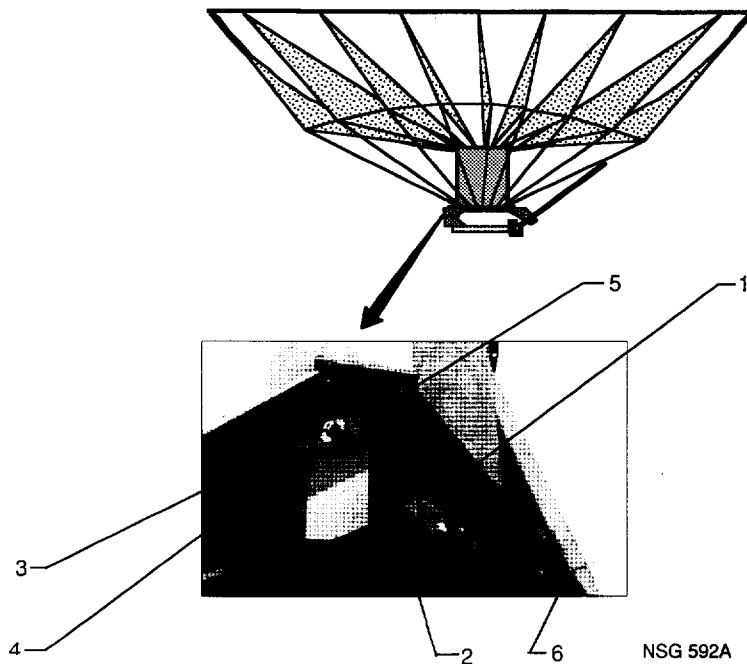
The following procedures assumes that the reflector is built on top of the hub with the hub on the ground level with the A-frame attached to a foundation and/or the reflector supported with 2X4s.

3. Secure A-frame to ground with enough clearance to gain access to center of hub.
4. Position right-hand elevation pivot bracket (Item 1 in Figure 2-2) onto the A-frame (2). Secure with greased pivot pin (3) using ball peen hammer on shoulder of pin with shoulder on inside portion of A-frame. (Grease fitting is not yet installed.)

NOTE

Elevation axis pivot pins shall be installed with the grease fittings positioned toward the inside of elevation pivot ears. This will allow for proper installation of elevation LSR drive bracket.

5. Hold pivot pin in place, slide a washer (4) on outside end, and drive cotter pin (5) into the pivot pin.



- | | |
|---|--|
| 1. RIGHT-HAND ELEVATION PIVOT BRACKET, 286476 | 5. 3/16 X 2-INCH COTTER PIN, 85564 |
| 2. A-FRAME, 454069 | 6. LEFT-HAND ELEVATION PIVOT BRACKET, 286475 |
| 3. PIVOT PIN, 454662 | 7. DRIVE TYPE GREASE FITTING, 75370 |
| 4. 1-INCH WASHER, 88538 | |

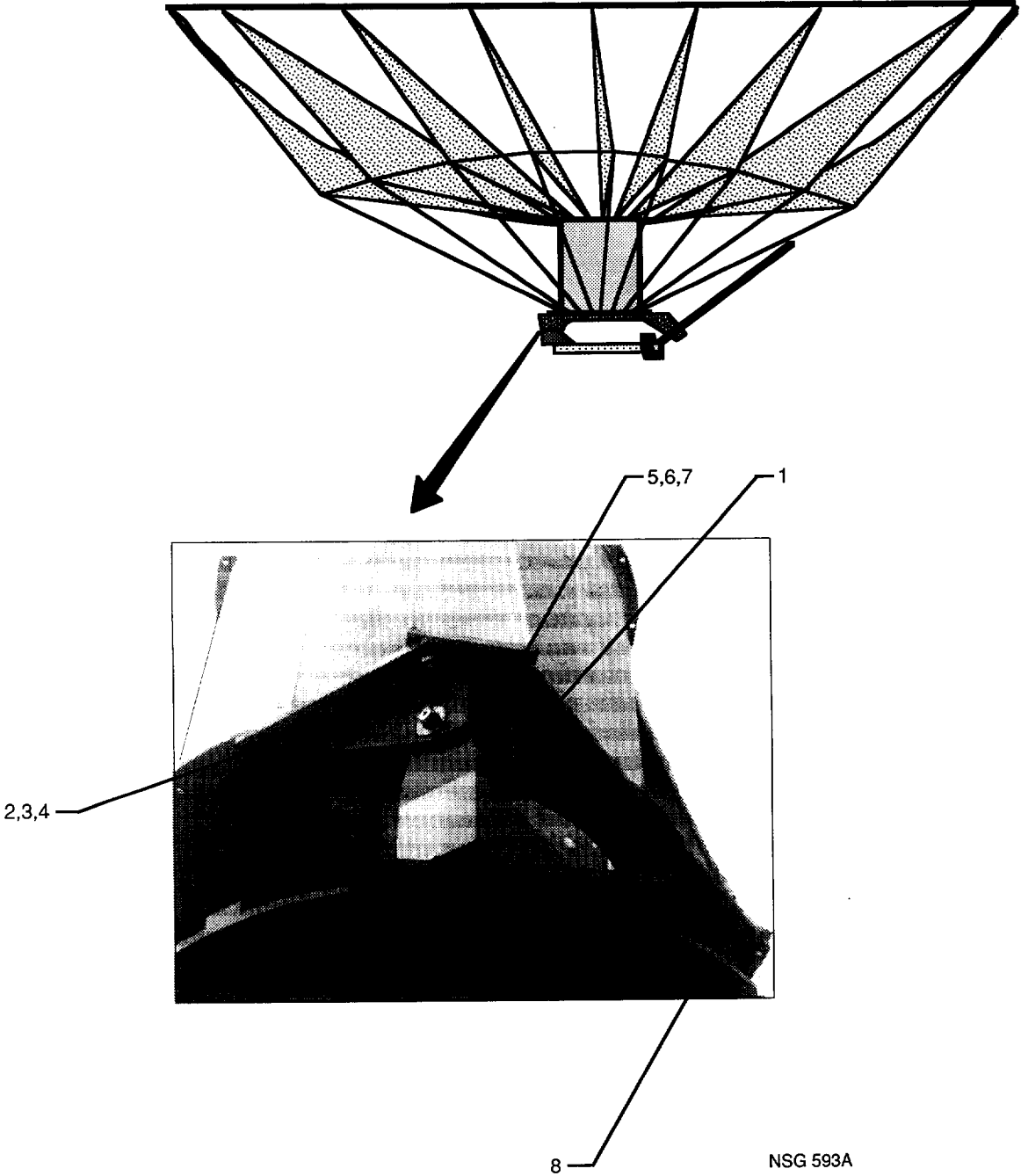
Figure 2-2. Mounting Pivot Brackets to A-Frame

6. Position left-hand elevation pivot bracket (6) onto the A-frame (2). Secure with greased pivot pin (3) using ball peen hammer on shoulder of pin with shoulder on inside portion of A-frame. (Grease fitting is not yet installed.)
7. Hold pivot pin in place, slide a washer (4) on outside end, and drive cotter pin (5) into the pivot pin.
8. Install drive type grease fittings (7) into pins using tool PN 282536, then lubricate.
9. Install three 3/4-inch eye bolts (PN 78503) in three of the six large holes on the inside bottom flange of the hub. Ensure eye bolts are spaced equal distance apart.
10. Attach hoist using three equal length straps to eye bolts so that the hub does not tilt.
11. Lift hub assembly onto the pivot brackets. Ensure vertical weld seam in hub is centered between pivot brackets.

NOTE

In the following six steps, the screws holding the pivot brackets to the hub flange should be inserted from the top of the flange down through the hole as illustrated in Figure 2-3. The screws that hold the pivot brackets to the hub braces may be inserted from either direction.

12. Secure right-hand elevation pivot bracket (item 1 in Figure 2-3) to hub flange using four hex head screws (2), four flat washers (3), and four hex nuts (4). At each bolt location, use a flat washer (6) as a spacer between the pivot bracket and the hub.
13. Secure hub brace to pivot bracket using two hex head screws (5), four flat washers (6), and two hex nuts (7). At each bolt location, use a flat washer (6) as a spacer between the pivot bracket and the hub brace.
14. Secure left-hand elevation pivot bracket (8) to hub flange using four hex head screws (2), four flat washers (3), and four hex nuts (4). At each bolt location, use a flat washer (6) as a spacer between the pivot bracket and the hub.
15. Secure hub brace to pivot bracket using two hex head screws (5), four flat washers (3), and two hex nuts (7). At each bolt location, use a flat washer (6) as a spacer between the pivot bracket and the hub brace.

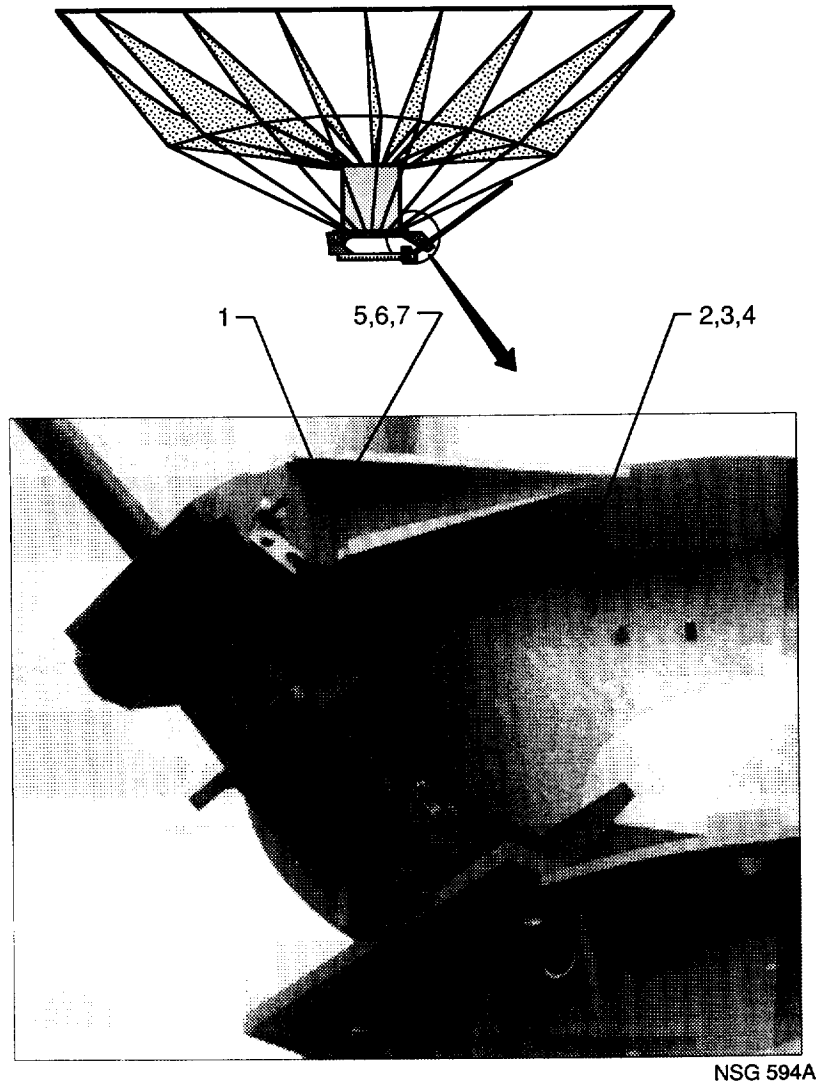


- 1. RIGHT-HAND ELEVATION PIVOT BRACKET, 286476
- 2. 1/2-13 x 2-INCH HEX HEAD SCREW, 88527
- 3. 1/2-INCH FLAT WASHER, 88521
- 4. 1/2-13 HEX NUT, 88518
- 5. 3/4-10 X 2 1/4-INCH HEX HEAD SCREW, 173823
- 6. 3/4-INCH FLAT WASHER, 88537
- 7. 3/4-10 HEX NUT, 88532
- 8. LEFT-HAND ELEVATION PIVOT BRACKET, 286475

Figure 2-3. Mounting A-Frame to Hub

INSTALLATION PROCEDURES

16. Attach elevation actuator bracket (item 1 in Figure 2-4) to hub flange using four hex head screws (2), four flat washers (3), and four hex head nuts (4). At each bolt location, use a flat washer (6) as a spacer between actuator bracket and hub.
17. Attach hub brace to elevation actuator bracket using 2 hex screws (item 5 in Figure 2-4), 4 flat washers (6), and 2 hex nuts (7). At each bolt location, use a flat washer (6) as a spacer between actuator bracket and hub brace.



- | | |
|--|--|
| 1. ELEVATION ACTUATOR BRACKET, 286477 | 5. 3/4-10- X 2 1/4-INCH HEX HEAD SCREW, 173823 |
| 2. 1/2-13 X 2-INCH HEX HEAD SCREW, 88527 | 6. 3/4-INCH FLAT WASHER, 88537 |
| 3. 1/2-INCH FLAT WASHER, 88521 | 7. 3/4-10 HEX NUT, 88532 |
| 4. 1/2-13 HEX NUT, 88518 | |

Figure 2-4. Mounting Elevation Actuator Bracket to Hub

-
18. Position elevation actuator (item 1 in Figures 2-5 and 2-6) to A-frame bracket and perform the following manual version or motorized version actuator installation.

MANUAL VERSION

- a. For manual elevation actuator, secure with greased pin (2) as indicated in Figure 2-5.
- b. Attach pin retainer (3), screw (4), and washer (6).
- c. Install drive type grease fittings (7) in each end of pin (2) and lubricate.

MOTORIZED VERSION

WARNING

A shear pin is provided in the drive coupling between the reducer and jack. Only the specified shear pin shall be used during the operation of the antenna. Any modification or substitution to the specified shear pin without written approval by ViaSat Antenna Engineering will void all warranties and shall nullify ViaSat of all liability of property or personal damage.

- a. For motorized elevation actuator, install two spacers (item 9 in Figure 2-6), one on each side of the actuator clevis between the A-frame ears, and secure with greased pin (2).
 - b. Place 1-inch washer (10) over pin (2) and install 3/16 x 2-inch cotter pin (11).
 - c. Install drive type grease fittings (7) in end of pin (2) and lubricate (motorized elevation actuator requires only one drive type grease fitting).
 - d. Install elevation actuator reducer vent plug (8).
19. Lower elevation actuator fully to the stored position (hub top plane horizontal to earth plane).
20. Position elevation actuator to hub bracket and secure with greased pins (item 5 in Figures 2-5 and 2-6) and secure as indicated below.

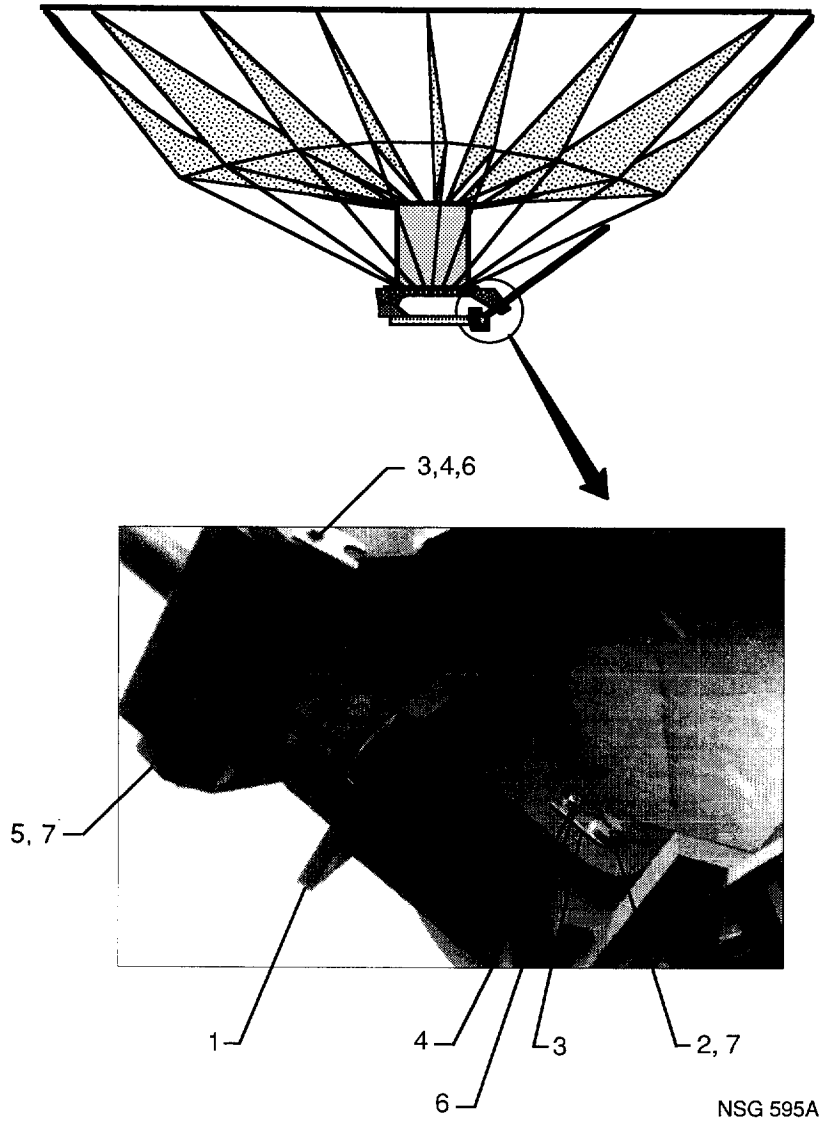
MANUAL VERSION

- a. Attach pin retainer (item 3 in Figure 2-5), screw (4), and washer (6) to each side of actuator bracket.

- b. Install drive type grease fittings (7) in pin (5) using tool PN 282536, then lubricate.

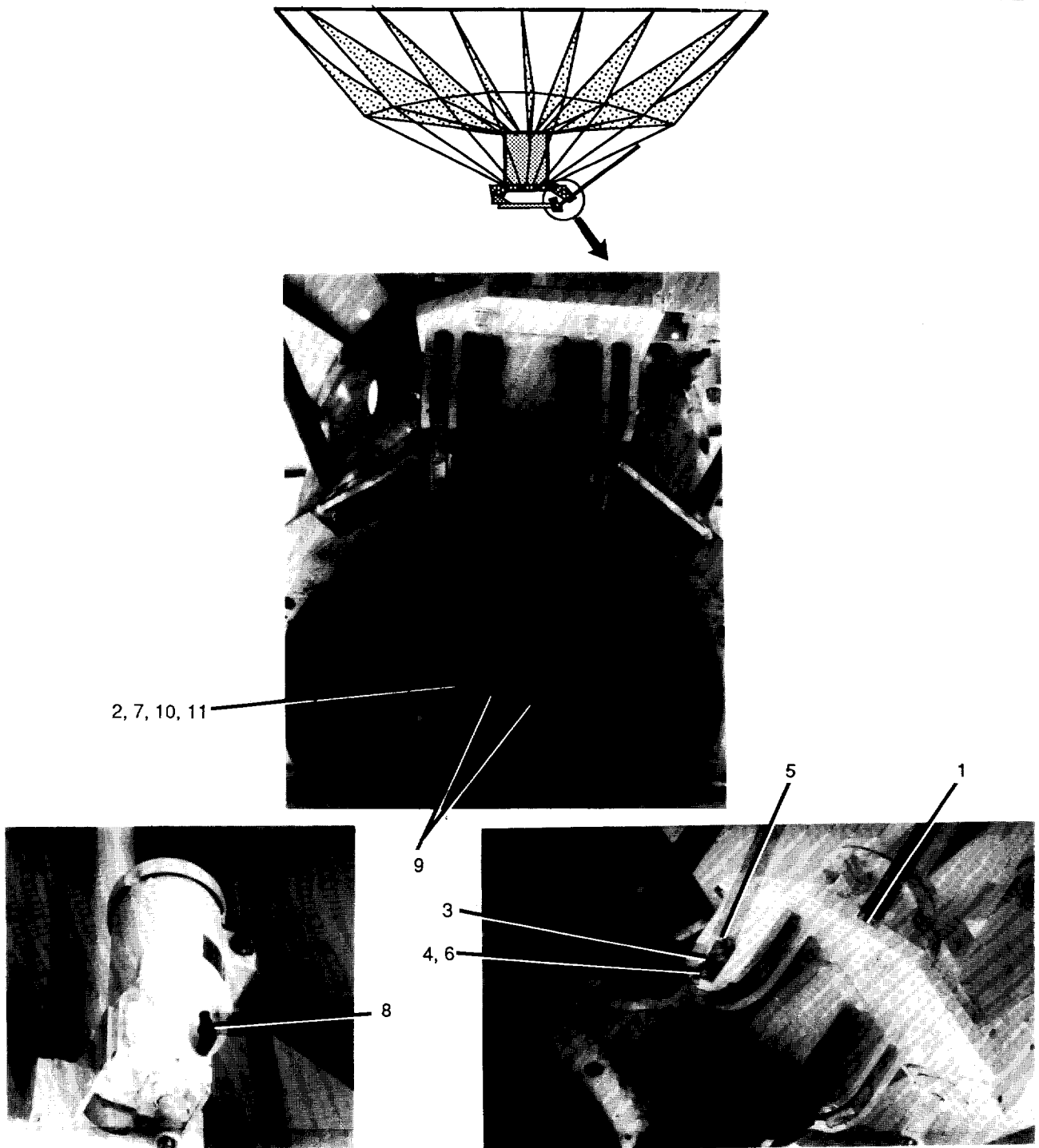
MOTORIZED VERSION

- a. Attach pin retainer (item 3 in Figure 2-6), screw (4), and washer (6) to each side of actuator bracket.
- b. Install drive type grease fittings (7) in pin (5) using tool PN 282536, then lubricate.



- | | |
|--------------------------------------|-------------------------------------|
| 1. MANUAL ELEVATION ACTUATOR, 454704 | 5. PIN, 454601 |
| 2. PIN, MANUAL, 454660 | 6. 1/4-INCH WASHER, 88536 |
| 3. PIN RETAINER, 454674 | 7. DRIVE TYPE GREASE FITTING, 75370 |
| 4. 1/4-20 X 1/2-INCH SCREW, 170724 | |

Figure 2-5. Mounting Manual Elevation Actuator to A-Frame and Hub



MAN 043-02

- | | |
|---|--------------------------------------|
| 1. MOTORIZED ELEVATION ACTUATOR, 478474 | 7. DRIVE TYPE GREASE FITTING, 75370 |
| 2. PIN, MOTORIZED, 454661 | 8. VENT PLUG ASSEMBLY |
| 3. PIN RETAINER, 454674 | 9. SPACER, 454677 |
| 4. 1/4-20 X 1/2-INCH SCREW, 170724 | 10. 1-INCH WASHER, 88538 |
| 5. PIN, 454601 | 11. 3/16 X 2-INCH COTTER PIN, 885564 |
| 6. 1/4-INCH WASHER, 88536 | |

Figure 2-6. Mounting Motorized Elevation Actuator to A-Frame and Hub

21. Lower hub assembly and remove hoist.

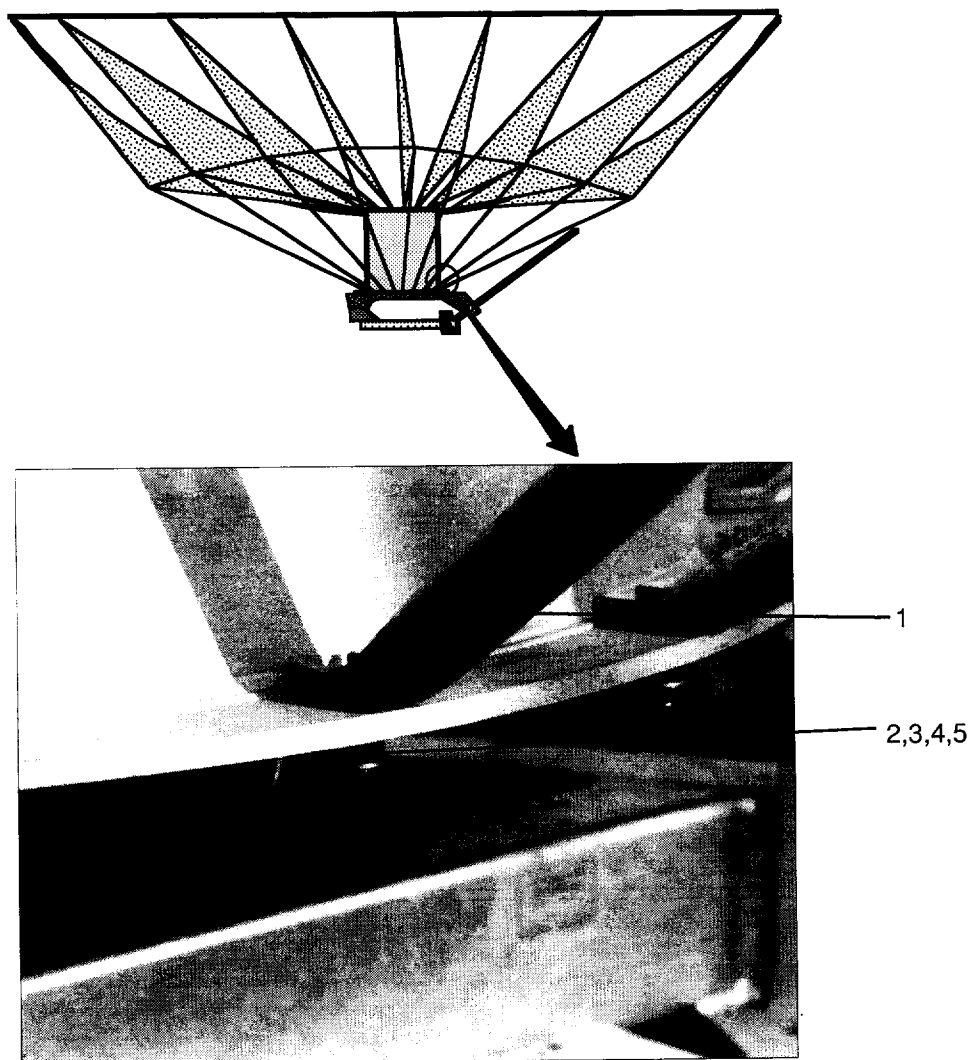
CAUTION

If it is necessary to walk inside the reflector during assembly, be sure to walk on the portion of the reflector closest to the hub and directly over the ribs. Avoid putting weight on unsupported parts of the reflector panels.

NOTE

Loosely install the following hardware (unless otherwise instructed) until assembly of the reflector is completed. The recommended screw tightening procedure is provided at the appropriate stage of installation.

22. Attach 4 struts (item 1 in Figure 2-7) to 4 open holes on hub base using 4 hex head screws (2), 4 5/8-inch nuts (3), 4 flat washers (4), and 4 hex nuts (5). Insert screws from top down through strut and hub flange. Then slip 5/8-inch nuts and 1/2-inch flat washers onto screws and secure with 1/2-inch nuts.



NSG 596A-1

- | | |
|--|--------------------------------|
| 1. STRUT, 286474 | 4. 1/2-INCH FLAT WASHER, 88521 |
| 2. 1/2-13 X 2-INCH HEX HEAD SCREW, 88527 | 5. 1/2-13 HEX NUT, 88518 |
| 3. 5/8-11 HEX NUT, 89879 | |

Figure 2-7. Assembly of Struts To Hub

WARNING

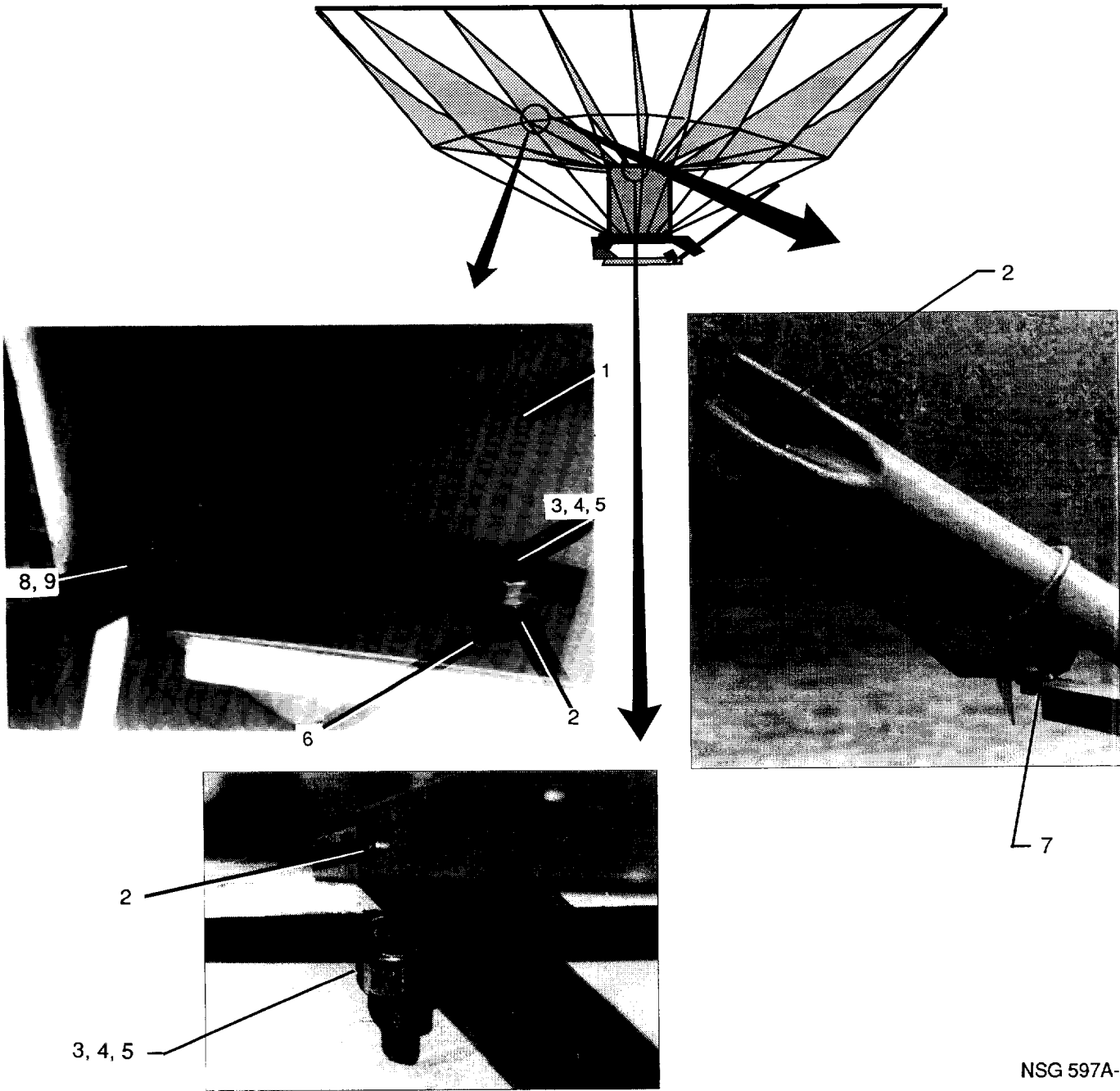
Ensure only one screw, nut, washer, and nut is removed at a time in the following step. Personnel injury or hub assembly damage could occur if more than one screw, washer, and nut are removed without properly securing the hub assembly.

23. Attach remaining 12 struts, one at a time, to hub base using existing screws, washers, and nuts which are holding elevation brackets.

CAUTION

In the following three steps, ensure rib is supported by hand until the rib is securely fastened to the strut.

24. Attach a rib (item 1 in Figure 2-8) to top outer hole of upper hub flange and secure with hex head screw (2), flat washer (4), 5/8-inch nut (3), flat washer (4), and hex nut (5). Insert screws from top down through washer, strut, and hub flange. Then slip 5/8-inch nuts and 1/2-inch flat washers onto screws and secure with 1/2-inch nuts.
25. Attach strut to strut-reinforcer (6) and reflector panel rib using hex head screw (2), 5/8-inch nut (3), flat washer (4), and 1/2-inch hex nut (5). Insert screw through strut, then through rib, and then through strut reinforcer bracket. Install 5/8-inch nut, then flat washer, and secure with 1/2-inch hex nut.
26. Secure strut shaft to rib using U-bolt (7), 2 flat washers (9), and 2 nuts (8) as indicated in Figure 2-8.
27. Repeat steps 24 through 26 for the other 15 ribs.



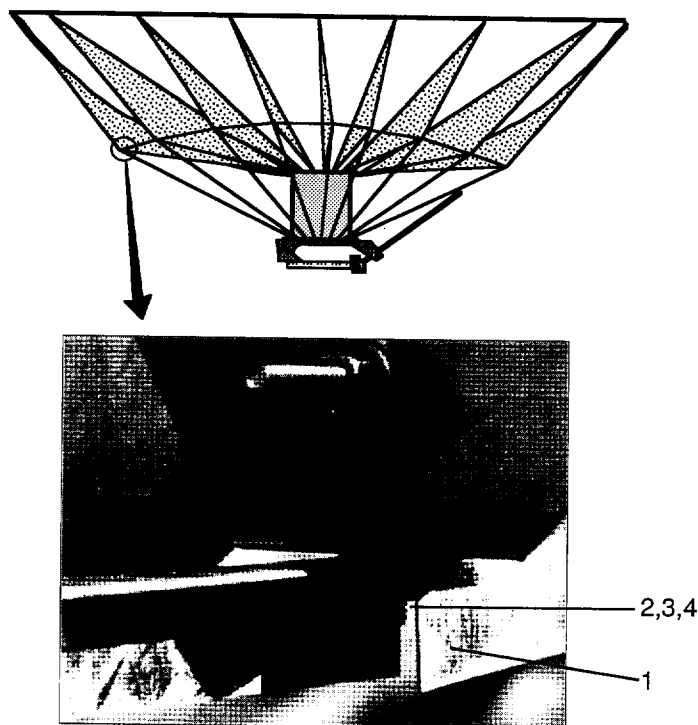
NSG 597A-2

Figure 2-8. Assembly of Reflector Panels To Hub

28. Attach 15 intercostal brackets (item 1 in Figure 2-9) to strut-reinforcers using hex head screw (2), flat washer (3), and hex nut (4). The intercostal brackets alternate in direction so as to nest together and share one fastener at each end. An intercostal bracket is not used where the elevation actuator is located.

WARNING

Use extreme care not to injure head or upper body on intercostal brackets when ducking under brackets to gain access to hub. The intercostal brackets will help to properly space the ribs apart to accept the panels, but may somewhat interfere with personnel carrying the panels to the backing structure.



NSG 598A-1

- | | |
|--|--------------------------------|
| 1. INTERCOSTAL BRACKET, 286445 | 3. 1/4-INCH FLAT WASHER, 76917 |
| 2. 1/4-20 X 3/4-INCH HEX HEAD SCREW, 87258 | 4. 1/4-20 HEX NUT, 86374 |

Figure 2-9. Assembly of Intercostal Bracket To Strut-Reinforcer

CAUTION

The panels contained in this crate must be properly handled to prevent damage during installation. Follow the procedure given below to ensure the panel is properly supported. A third person should be in the hub to install the screws which attach the panel to the hub.

Do not walk in the reflector until all panels have been installed. As rivets are installed in concentric circles from the hub outward, weight may be applied over the ribs. Avoid putting weight on unsupported parts of the reflector panels or on ribs where rivets have not yet been installed.

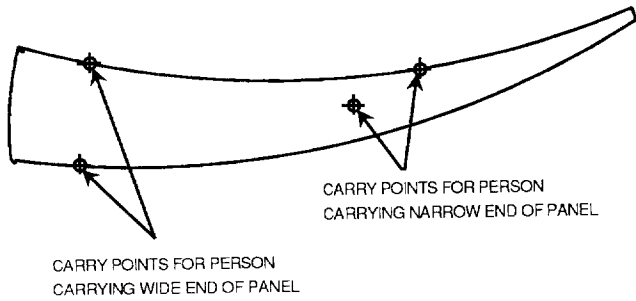
29. Open top of reflector panel crate marked "With Decal Panel" and the labeled "Open This Side Only."
30. Use two people to carry reflector panel using carrying points illustrated in Figure 2-10. Lift panel as illustrated in Figure 2-11 and carry panel as illustrated in Figure 2-12. Do not carry panel as illustrated in Figure 2-13.
31. Attach reflector panel with ViaSat logo decal loosely to hub directly over elevation actuator using 2 hex head screws (item 1 in Figure 2-14), 4 flat washers (2), and 2 hex nuts (3). Secure panel to ribs using rivets in outer corner holes which are just inside of rim. Rivets should be left loose at this time.

NOTE

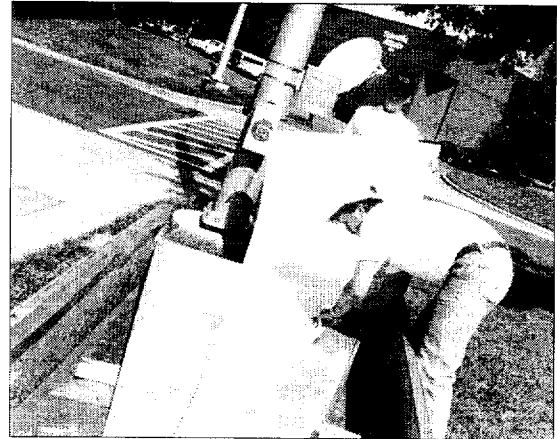
Do not fasten the remainder of the panel holes to the ribs at this time. Once all the panels have been placed onto the backing structure, the remainder of the rivets will be installed.

32. Repeat steps 30 and 31 for the next panel, but install it in the next clockwise position on the ribs.

INSTALLATION PROCEDURES



NSG 618A



NSG 619A

Figure 2-10. Reflector Panel Carrying Points

Figure 2-11. Lifting Reflector Panel



NSG 620A



NSG 621A

Figure 2-12. Carrying Reflector Panel

Figure 2-13. Wrong Way To Carry Panel

NOTE

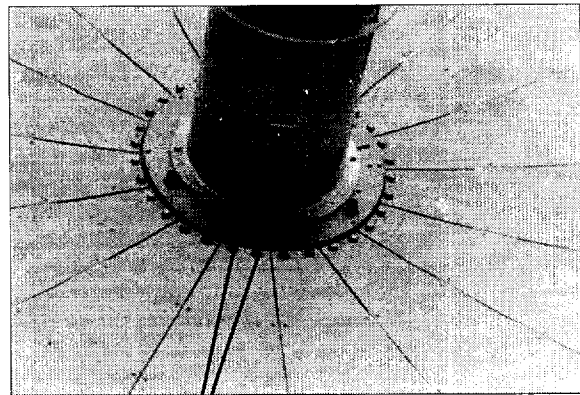
Loosely insert rivets in the following steps. Do not tighten rivets until instructed to do so.

33. Loosely insert rivets in outer hole spar tab corner hole on counterclockwise side of next panel. See Figure 2-15.
34. Use two people to carry reflector panel using carrying points illustrated in Figure 2-10. Lift panel as illustrated in Figure 2-11 and carry panel as illustrated in Figure 2-12. Do not carry panel as illustrated in Figure 2-13.
35. Install the panel as before in the next clockwise position on the ribs.
36. Install next three panels as described in steps 30 and 31.
37. Attach next panel as described in steps 33 and 34.
38. Install next three panels as described in steps 30 and 31.
39. Attach next panel as described in steps 33 and 34.
40. Install next three panels as described in steps 30 and 31.
41. Attach next panel as described in steps 33 and 34.
42. Install next panel as described in steps 30 and 31. When installing this last panel, it may be necessary to push up on each rib and tighten the strut fasteners to close the gap. After installing the panel, slightly loosen the strut fasteners again.
43. Install rivets to fasten panels to ribs, starting at hub and working in ever-increasing concentric circles toward rim.

NOTE

If the lighting protection kit is being installed, refer to its installation procedure in the Options Section to install the bracket to the rim of the reflector during the next step.

44. Install rivets to fasten panel rims to clips on rib ends. There are four rivets at the end of each rib (see Figure 2-16).

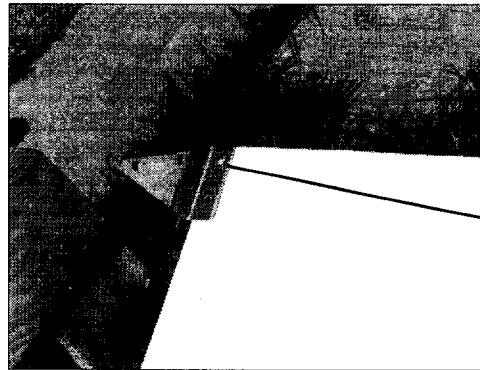


NSG 622A

1,2,3

- 1. 3/8-16 X 1-INCH HEX HEAD SCREW, 356460
- 2. 3/8-INCH FLAT WASHER, 88428
- 3. 3/8-16 HEX NUT, 76795

Figure 2-14. Assembly of Reflector Panels To Hub



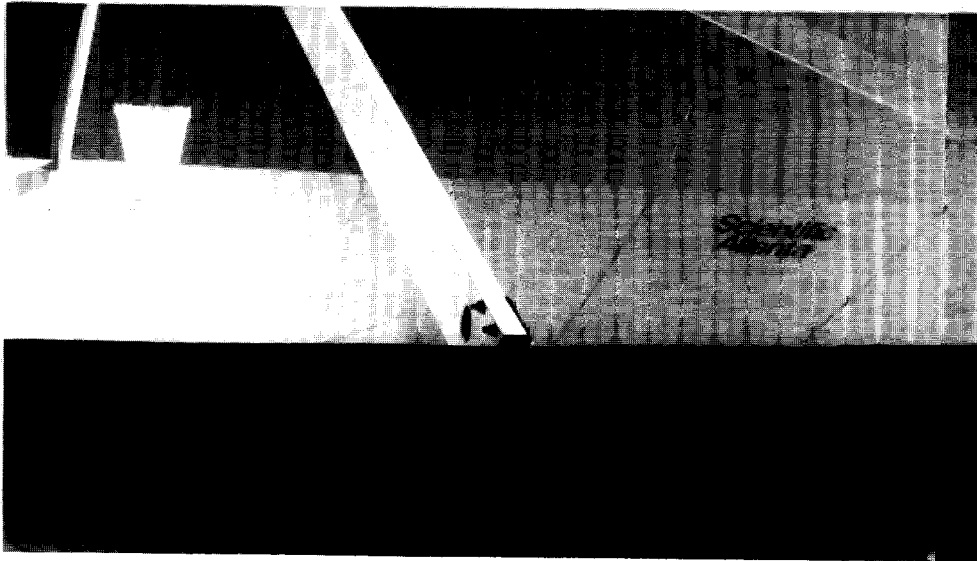
NSG 623A

1

2

- 1. SPAR TAB, 286442
- 2. 3/16-INCH RIVET, 454819

Figure 2-15. Assembly of Reflector Panels and Spar Tabs To Ribs



NSG 624A-1

Figure 2-16. Panel Rims To Clip On Rib Ends

45. Tighten panel-to-hub fasteners to 31 ft-lbs.
46. Torque rib-to-hub fasteners to 76 ft-lbs.
47. Torque strut-to-hub fasteners to 76 ft-lbs.
48. Torque strut-to-rib fasteners to 76 ft-lbs.
49. Tighten U-bolt fasteners snugly, being careful not to deform the strut reinforcer brackets.
50. Torque fasteners which hold elevation brackets to hub braces to 260 ft-lbs.
51. Torque fasteners which hold hub braces to hub to 76 ft-lbs.
52. Torque fasteners which hold intercostal brackets to strut-reinforcers to 9 ft-lbs.
53. After torquing all fasteners (reflector and mount), spray all zinc coated (yellow) fasteners with zinc rich Hard-Hat Rust-Oleum silver paint.

CAUTION

Do not climb over rim of reflector until all fasteners are installed and tightened. Then put weight only on ribs.

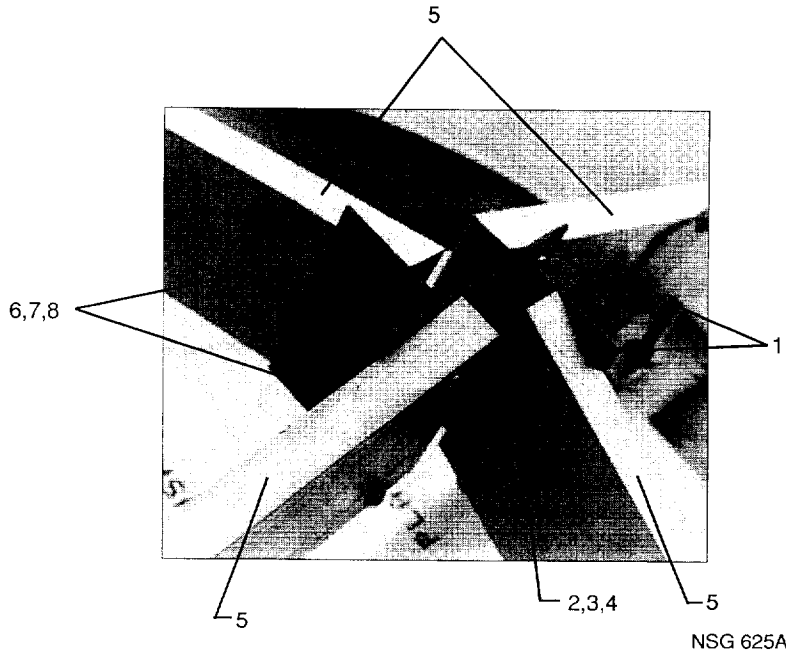
**ASSEMBLY OF
SPARS AND
SUBREFLECTOR**

Perform the following procedure to assemble the spars and subreflector on the ground prior to reflector installation on the mount. If a C-band or Ku-band system is being installed, perform the following steps. If a dual band (dichroic) system is being installed, go to the next procedure.

NOTE

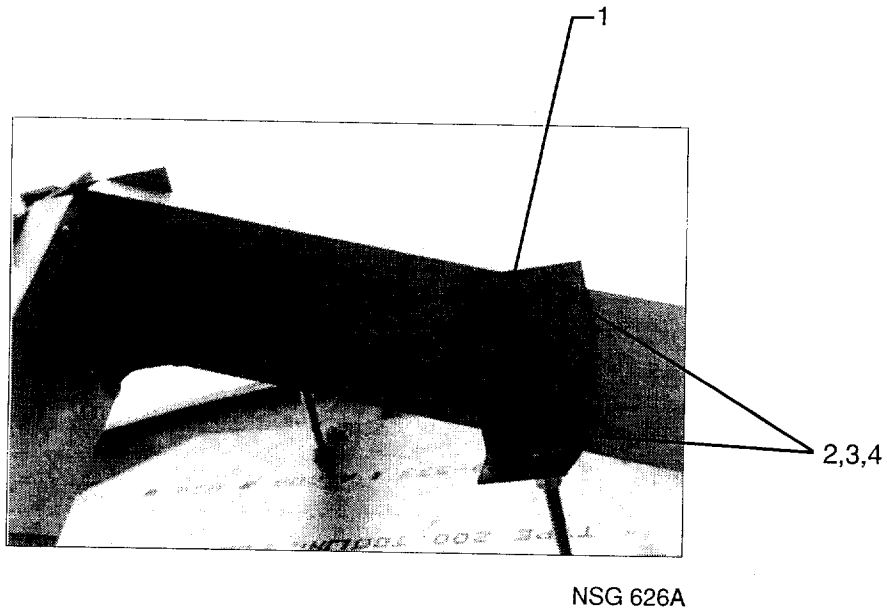
If the lighting protection kit is being installed, refer to its installation procedure in the Options Section to install the bracket to the L-bracket during the next step.

1. Attach 2 L-brackets (item 1 in Figure 2-17) together using 4 hex head screws (2), 4 flat washers (3), and 4 hex nuts (4).
2. Attach each spar (5) to L-bracket assembly using 2 hex head screws (6), 4 flat washers (7), and 2 hex nuts (8).
3. Attach subreflector adjustment brackets (item 1 in Figure 2-18) using 4 hex head screws (2), 4 flat washers (3), and 4 hex nuts (4).



- | | |
|--|--|
| 1. L-BRACKET, 286455 | 5. SPAR, 286479 |
| 2. 1/4-20 X 3/4-INCH HEX HEAD SCREW, 87258 | 6. 1/4-20 X 1 3/4-INCH HEX HEAD SCREW, 83338 |
| 3. 1/4-INCH FLAT WASHER, 76917 | 7. 1/4-INCH FLAT WASHER, 76917 |
| 4. 1/4-20 HEX NUT, 86374 | 8. 1/4-20 HEX NUT, 86374 |

Figure 2-17. Assembly of L-Brackets and Spars

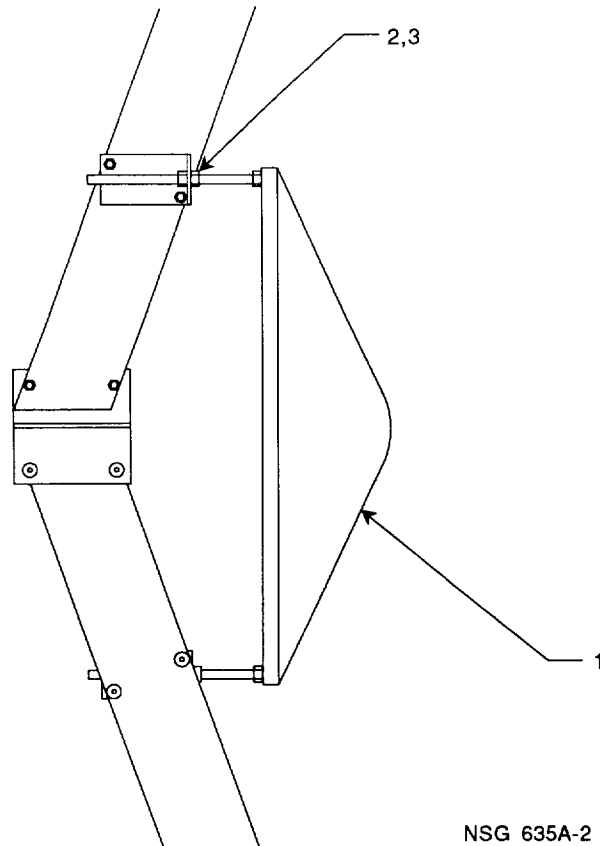


- | | |
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| 1. SUBREFLECTOR ADJUSTMENT BRACKET, 286441 | 3. 1/4-INCH FLAT WASHER, 76917 |
| 2. 1/4-20 X 1 3/4 HEX HEAD SCREW, 83338 | 4. 1/4-20 HEX NUT, 86374 |

Figure 2-18. Assembly of Subreflector Adjustment Bracket To Spars

INSTALLATION PROCEDURES

4. Install Ku-band or C-band subreflector (item 1 in Figure 2-19) by removing four hex nuts (2), four washers (3) and sliding subreflector into four brackets mounted on spars. Secure subreflector to spars using four hex nuts and four washers previously removed.



NSG 635A-2

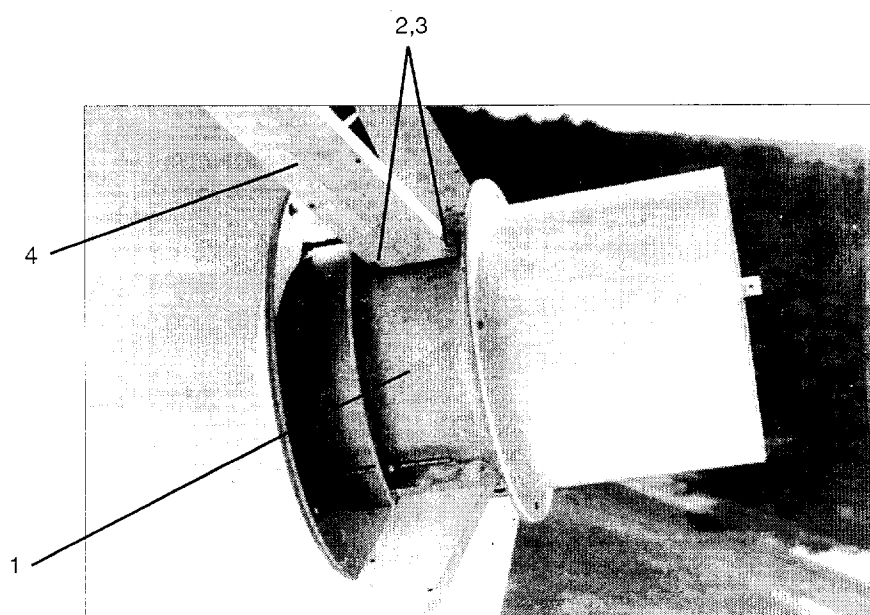
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|--|--------------------------------|
| 1. Ku-BAND SUBREFLECTOR, 454859 (454955, HEATED) | 2. 3/8-16 HEX NUT, 76795 |
| C-BAND SUBREFLECTOR, 454279 (454956, HEATED) | 3. 3/8-INCH FLAT WASHER, 88428 |

Figure 2-19. Ku-band or C-band Subreflector Installation

**Dual Band Spars
(Dichroic), Feed, and
Subreflector
Assembly**

Perform the following procedure to assemble the spars, feed, and subreflector for the dual band (Ku/C-band) antenna. If a single band antenna system is used, go to the preceding procedure.

1. Viewing feed mounting ring (item 1 in Figure 2-20) from the top, attach spars (4) to counterclockwise side of gussets on ring using two hex head screws (2) and two flat washers (3) on each spar. (The top of the ring has eight tapped holes for the cover and the bottom has four 3/8-inch clearance holes for adjustment screws.)

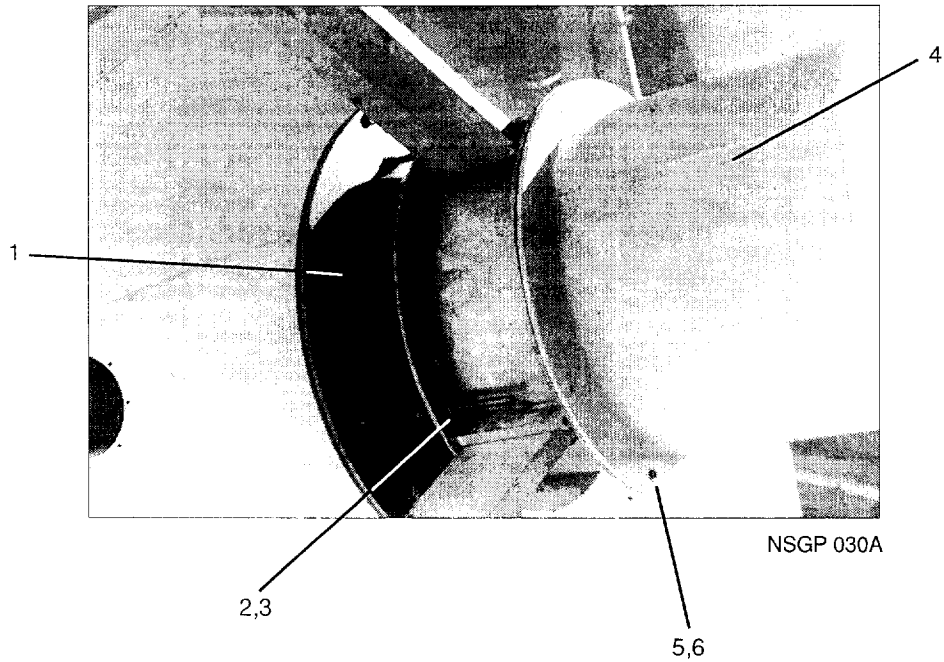


NSGP 031A

- | | |
|--|--------------------------------|
| 1. DICHROIC FEED MOUNTING RING, 454255 | 3. 1/4-INCH FLAT WASHER, 86374 |
| 2. 1/4-20 X 1 3/4-INCH HEX HEAD SCREW, 83338 | 4. SPAR, 454568 |

Figure 2-20. Dual Band Spars and Dichroic Subreflector Installation

2. Insert the dual band (C-band and Ku-band, dichroic) feed and subreflector assembly (item 1 in Figure 2-21) into the housing from underneath, aligning adjustment screws with holes in feed mounting ring.
3. Install four washers (2) and hex nuts (3) onto adjustment screws to fasten assembly into place.



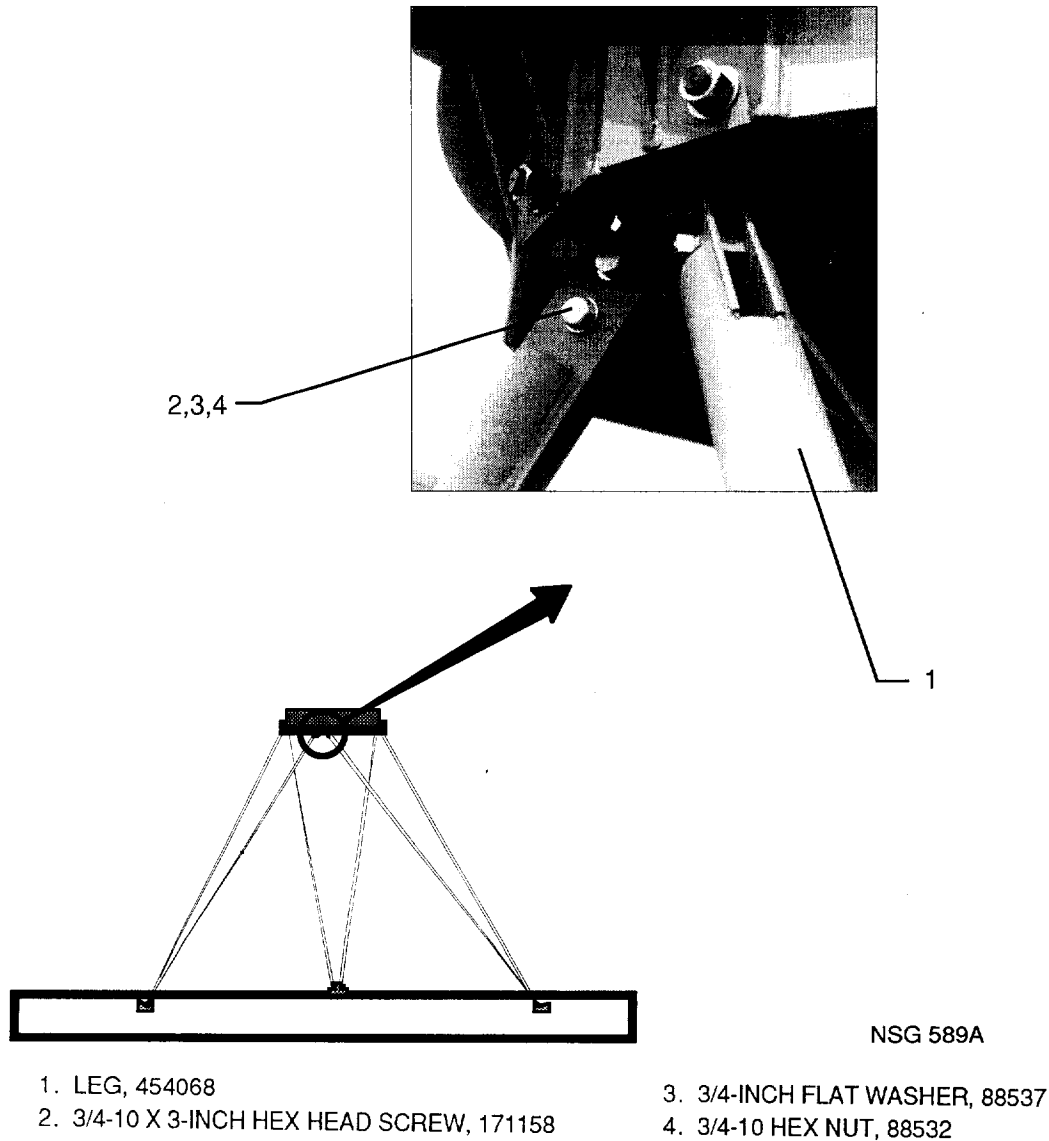
- | | |
|--|----------------------------------|
| 1. C/Ku-BAND SUBREFLECTOR ASSEMBLY, 454557 | 4. DICHROIC FEED COVER, 454253 |
| 2. 3/8-INCH FLAT WASHER, 88428 | 5. 10-24 X 5/8-INCH SCREW, 72456 |
| 3. 3/8-16 HEX NUT, 76795 | 6. #10 FLAT WASHER, 73275 |

Figure 2-21. Dual Band (Dichroic) Subreflector Installation

ASSEMBLY OF MOUNT

The following procedure describes the complete assembly of the mount for the reflector which includes the legs, bearing housing assembly, azimuth jack legs and braces (motorized), A-frame, and elevation jack. Perform the following procedure to assemble the mount:

1. Attach a hoist to the bearing housing assembly (PN 454941).
2. Lift bearing housing assembly and move to the center of the foundation to install legs (item 1 in Figure 2-22).
3. Attach one end of a leg (1) onto the bearing housing using 2 hex head screws (2), 4 flat washers (3), and 2 hex nuts (4) as shown in Figure 2-22. Repeat this operation for each of the remaining five legs.



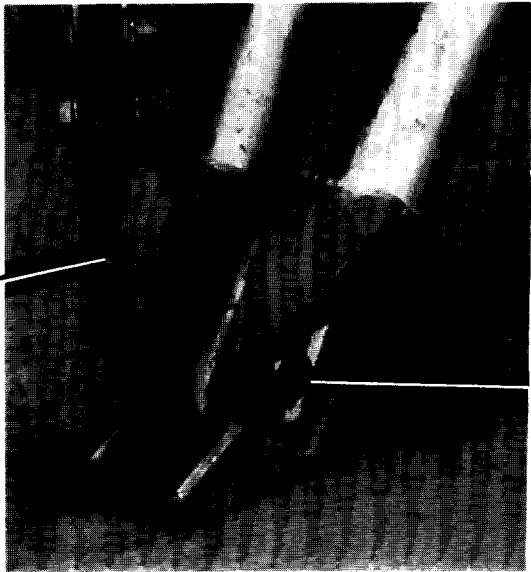
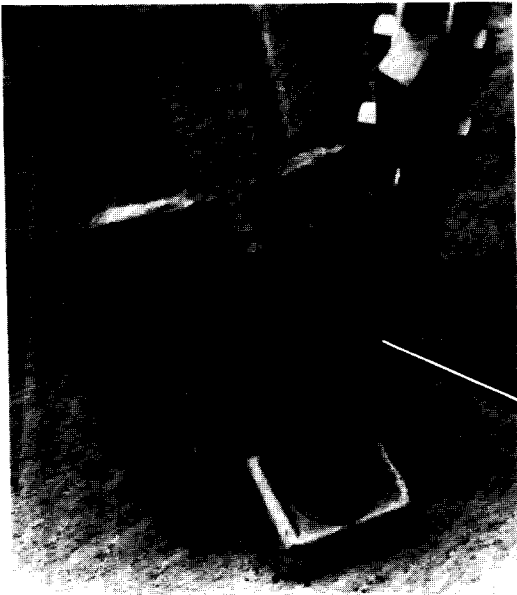
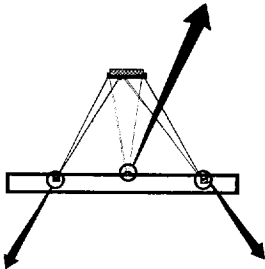
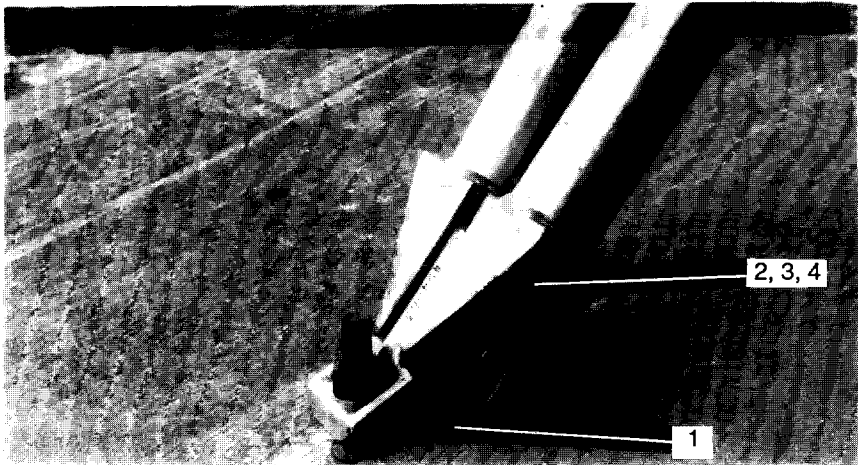
1. LEG, 454068
2. 3/4-10 X 3-INCH HEX HEAD SCREW, 171158

3. 3/4-INCH FLAT WASHER, 88537
4. 3/4-10 HEX NUT, 88532

Figure 2-22. Mounting Bearing Housing Assembly To Legs

INSTALLATION PROCEDURES

4. Attach the two leg assemblies closest to the reflector side (forward part of antenna foundation) to foundation foot (item 1 in Figure 2-23) using 2 hex head screws (2), 4 flat washers (3), and 2 hex nuts (4) as shown in Figure 2-23.
5. For a non-motorized mount, attach the other two pairs of legs as described above.
6. For a motorized mount, attach left azimuth actuator bracket (5) to left pair of legs and right actuator bracket (6) to right pair of legs. Then secure legs as described above using item 7 in place of item 2.
7. Level top of bearing housing assembly.
8. Torque all fasteners to recommended values.
9. When bearing housing is securely fastened, remove hoist from bearing housing.



NSG 590A-1

- 1. FOUNDATION FOOT, 454063
- 2. 1-8 X 3 1/2-INCH HEX HEAD SCREW, 171164
- 3. 1-INCH FLAT WASHER, 88538
- 4. 1-8 HEX NUT, 88533

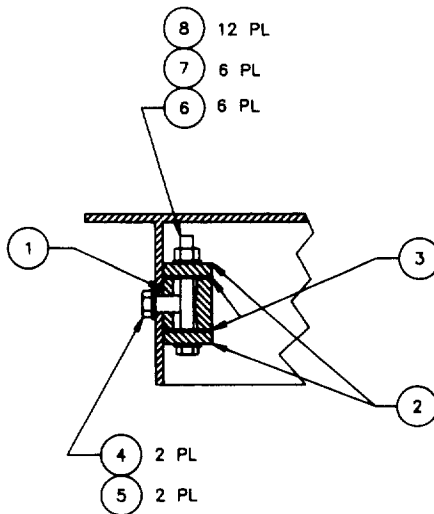
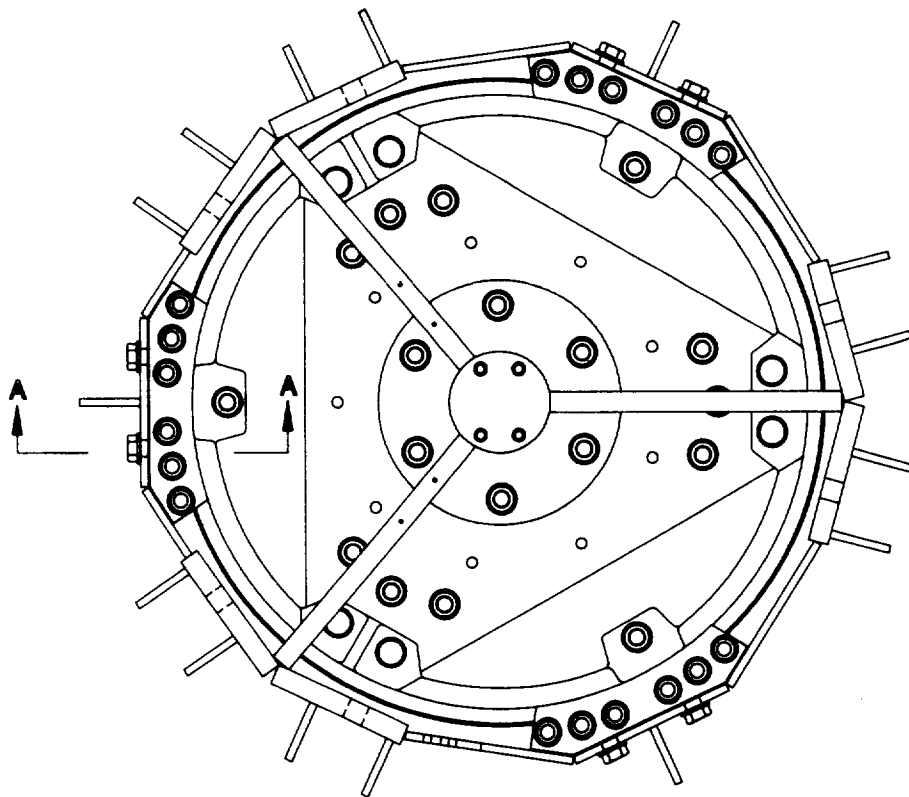
- 5. LEFT AZIMUTH ACTUATOR BRACKET, 454672
- 6. RIGHT AZIMUTH ACTUATOR BRACKET, 454673
- 7. 1-8 X 5-INCH HEX HEAD SCREW, 88746

Figure 2-23. Mounting Legs to Foundation

Azimuth Clamp Installation (Manual Version)

The azimuth clamps prevent the antenna from rotating in the azimuth direction. These clamps need to be installed during installation and reinstalled after each subsequent repointing of the antenna.

1. Clean azimuth ring of all dirt and grease.
2. Install clamp lever (item 1 in Figure 2-24) using 2 hex head screws (4) and 2 flat washers (5). The clamp lever must remain free to adjust up or down at this point. Do not torque fasteners.
3. Install 2 clamp plates (2) and 2 clamp plate liners (3) using 6 hex head screws (6), 6 hex nuts (7), and 12 flat washers (8).
4. Tighten each screw/nut pair until snug. This will align the clamp assembly with the azimuth ring.
5. Torque 3/4-inch fasteners installed in step 2 to 250 ft-lbs.
6. Make sure clamp plates and liners capture clamp lever and are pushed up against inside wall of center pivot assembly. Torque 5/8-inch fasteners installed in step 3 to 160 ft-lbs.
7. Repeat steps 2 through 6 at the other two locations of the azimuth ring.



SECTION **A-A**
TYPICAL 3 PLACES

MAN 043-07

- | | |
|---|---|
| 1. CLAMP LEVER, 454071 | 5. 3/4-INCH FLAT WASHER, 88537 |
| 2. CLAMP PLATE, 454072 | 6. 5/8-11 X 5-INCH HEX HEAD SCREW, 179549 |
| 3. CLAMP PLATE LINER, 455138 | 7. 5/8-11 HEX NUT, 89879 |
| 4. 3/4-10 X 3/4-INCH HEX HEAD SCREW, 171012 | 8. 5/8-INCH FLAT WASHER |

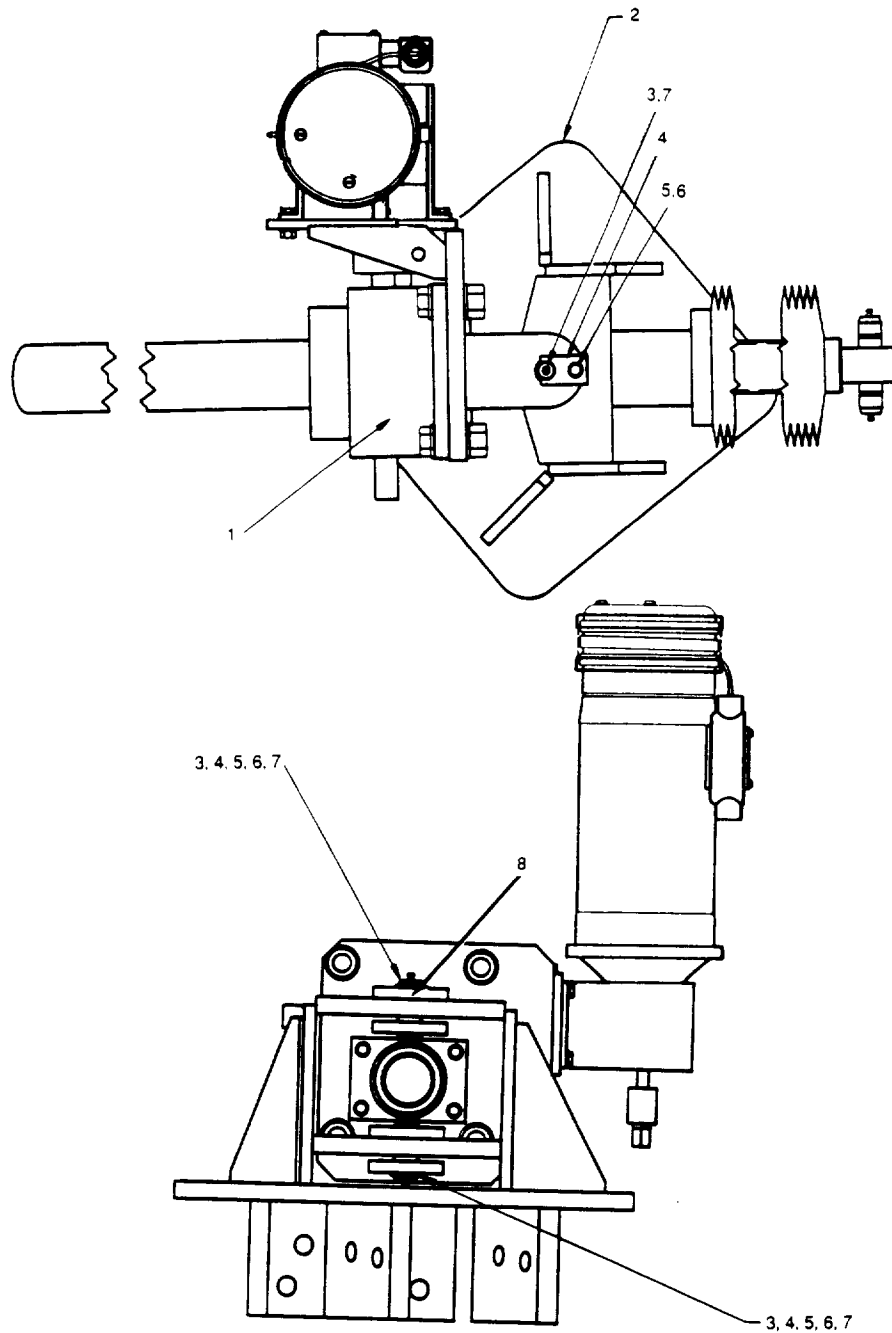
Figure 2-24. Azimuth Clamp Installation

**Mounting Azimuth
Actuator to Azimuth
Actuator Pivot
(Motorized)**

1. Mount azimuth actuator assembly (item 1 in Figure 2-25) onto azimuth pivot (2) with one flat thrust bearing (8) between items 1 and 2 (on top of item 2). (The bearing reduces the likelihood of corrosion.)
2. Install actuator mounting pins (3).
3. Secure pins using pin retainers (4), hex head screws (5), and flat washers (6).
4. Install drive type grease fittings (7) into pins using tool PN 282536, then lubricate.

WARNING

A shear pin is provided in the drive coupling between the reducer and jack. Only the specified shear pin shall be used during the operation of the antenna. Any modification or substitution to the specified shear pin without written approval by ViaSat Antenna Engineering will void all warranties and shall nullify ViaSat of all liability of property or personal damage.



NSG 637A- 2

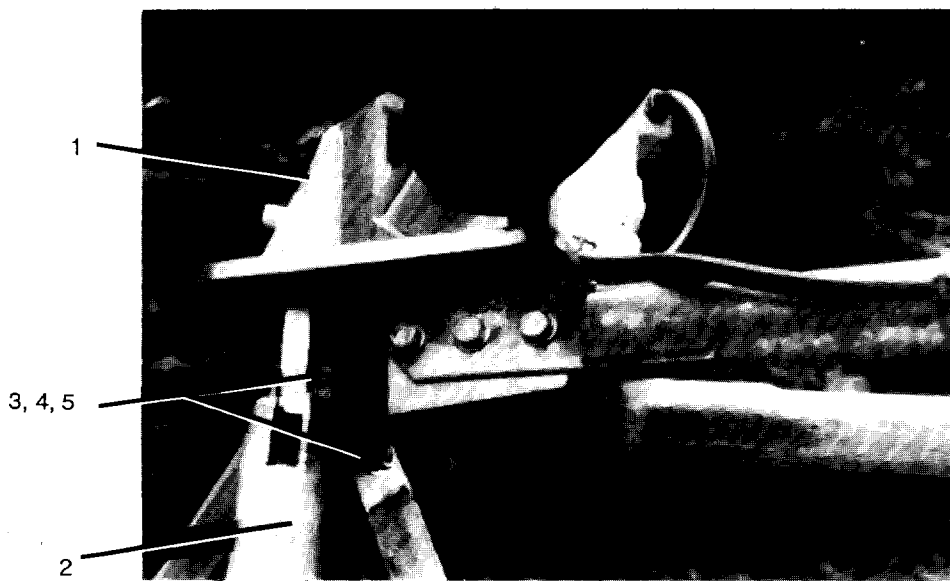
- | | |
|-----------------------------------|--|
| 1. AZIMUTH ACTUATOR ASSY, 478473 | 5. 1/4-20 X 1/2-HEX HEAD SCREW, 170724 |
| 2. AZIMUTH PIVOT, 454938 | 6. 1/4-INCH FLAT WASHER, 88536 |
| 3. ACTUATOR MOUNTING PINS, 454601 | 7. DRIVE TYPE GREASE FITTING, 75370 |
| 4. PIN RETAINER, 454674 | 8. FLAT THRUST BEARING, 171152 |

Figure 2-25. Attaching Azimuth Actuator To Azimuth Actuator Pivot

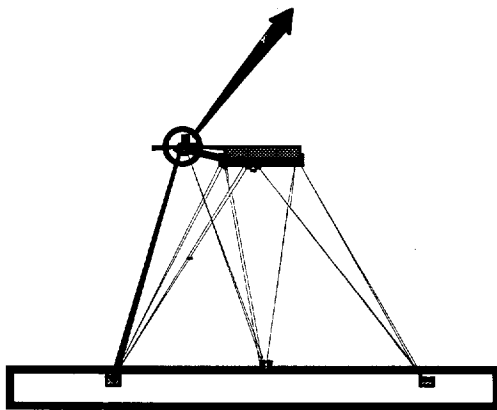
Mounting Azimuth Jack and Braces (Motorized)

The following procedure describes the assembly of the azimuth jack and braces for the motorized version. If the manual version is being installed, proceed to the next heading.

1. Attach a hoist to the azimuth jack/azimuth pivot assembly (item 1 in Figure 2-26).
2. Lift azimuth jack/azimuth pivot assembly at a position to install legs.
3. Attach top end of leg (2) onto azimuth jack assembly using 2 hex head screws (3), 4 flat washers (4), and 2 hex nuts (5) as shown in Figure 2-26. Repeat this operation for the other leg.



NSG 611A-1

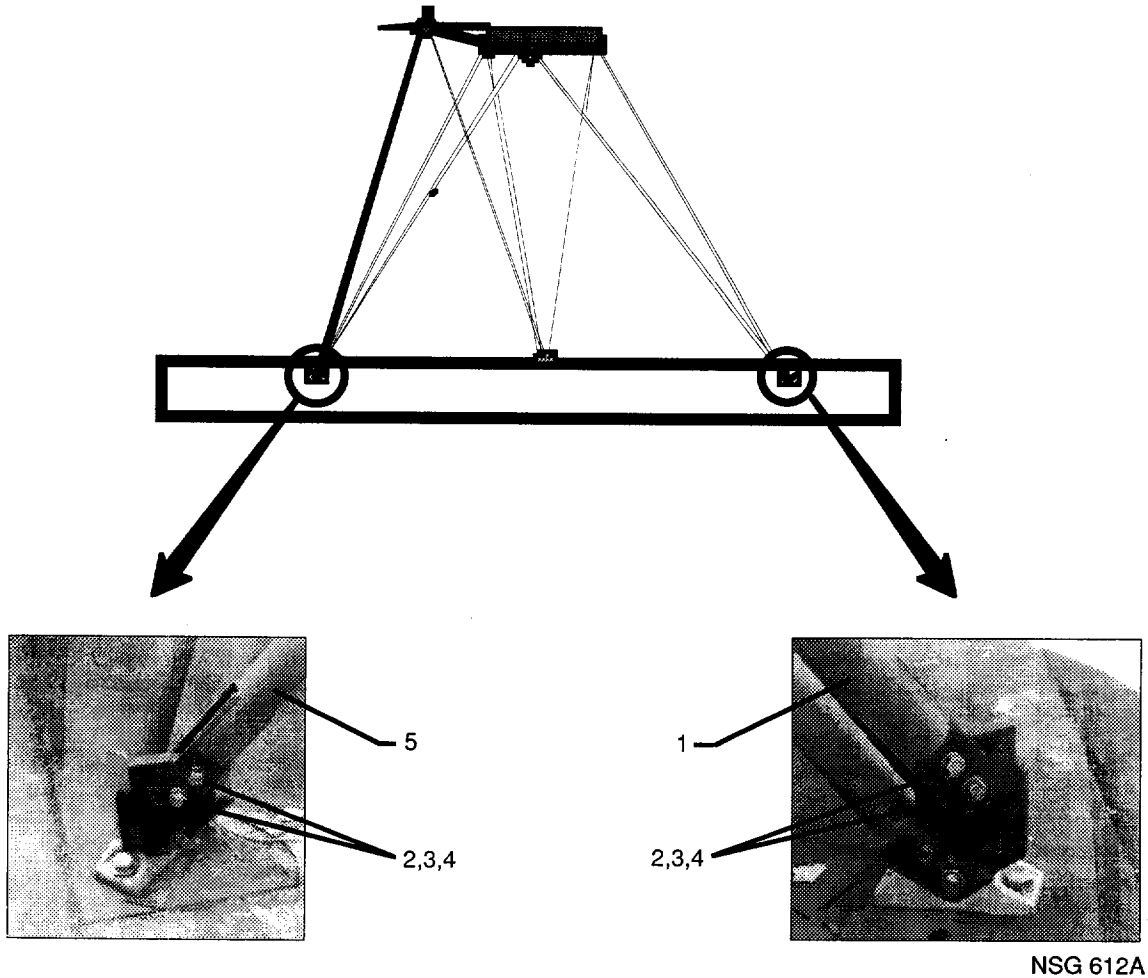


1. AZIMUTH JACK ASSEMBLY, 454944
2. LEG, 454937
3. 3/4-10 x 2 1/2-INCH HEX HEAD SCREW, 89855

4. 3/4-INCH FLAT WASHER, 88537
5. 3/4-10 HEX NUT, 88532

Figure 2-26. Mounting Azimuth Jack to Legs

4. Attach right azimuth leg (item 1 in Figure 2-27) to foundation foot using 2 hex head screws (2), 4 flat washers (3), and 2 hex nuts (4) as shown in Figure 2-27.
5. Attach left azimuth leg (5) to foundation foot using using 2 hex head screws (2), 4 flat washers (3), and 2 hex nuts (4) as shown in Figure 2-27.

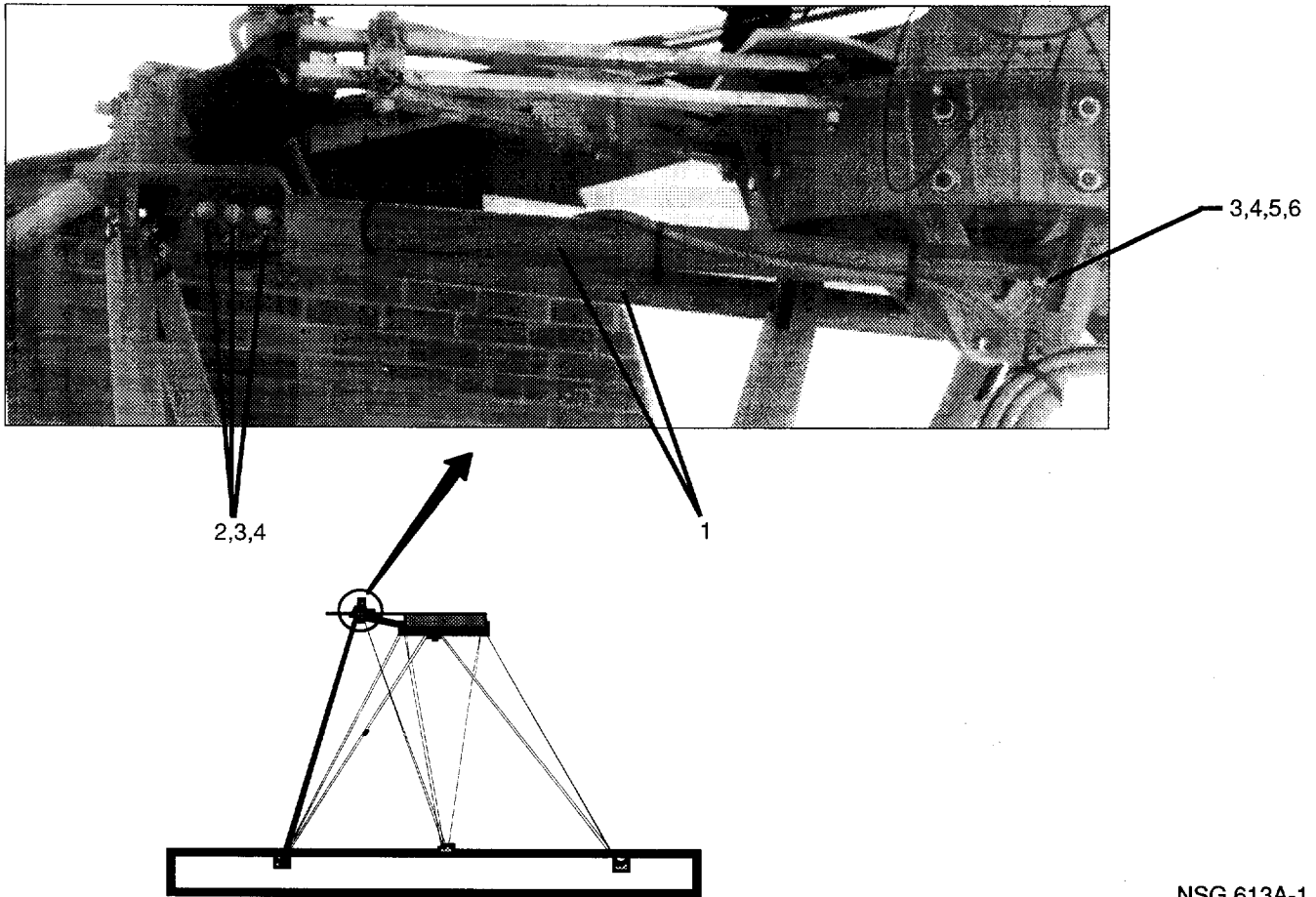


- | | |
|--|--------------------------|
| 1. RIGHT LEG, 454937 | 4. 3/4-10 HEX NUT, 88532 |
| 2. 3/4-10 X 2 1/2-INCH HEX HEAD SCREW, 89885 | 5. LEFT LEG, 454937 |
| 3. 3/4-INCH FLAT WASHER, 88537 | |

Figure 2-27. Mounting Azimuth Jack Legs to Foundation

INSTALLATION PROCEDURES

6. Attach brace attachment bracket (item 5 in Figure 2-28) to the lower of the two fastening points at the mount leg to bearing housing joint. The long leg of the bracket should be nearly horizontal and point toward the azimuth actuator pivot.
7. Attach azimuth jack assembly to horizontal braces (1) using 3 hex head screws (2), 6 flat washers (3), and 3 hex nuts (4) on each brace as shown in Figure 2-28.
8. Attach two braces to bearing housing assembly using hex head screws (6), 2 flat washers (3), and hex nuts (4) for each brace.
9. Level plate on azimuth jack actuator assembly.
10. Torque fasteners to recommended values.

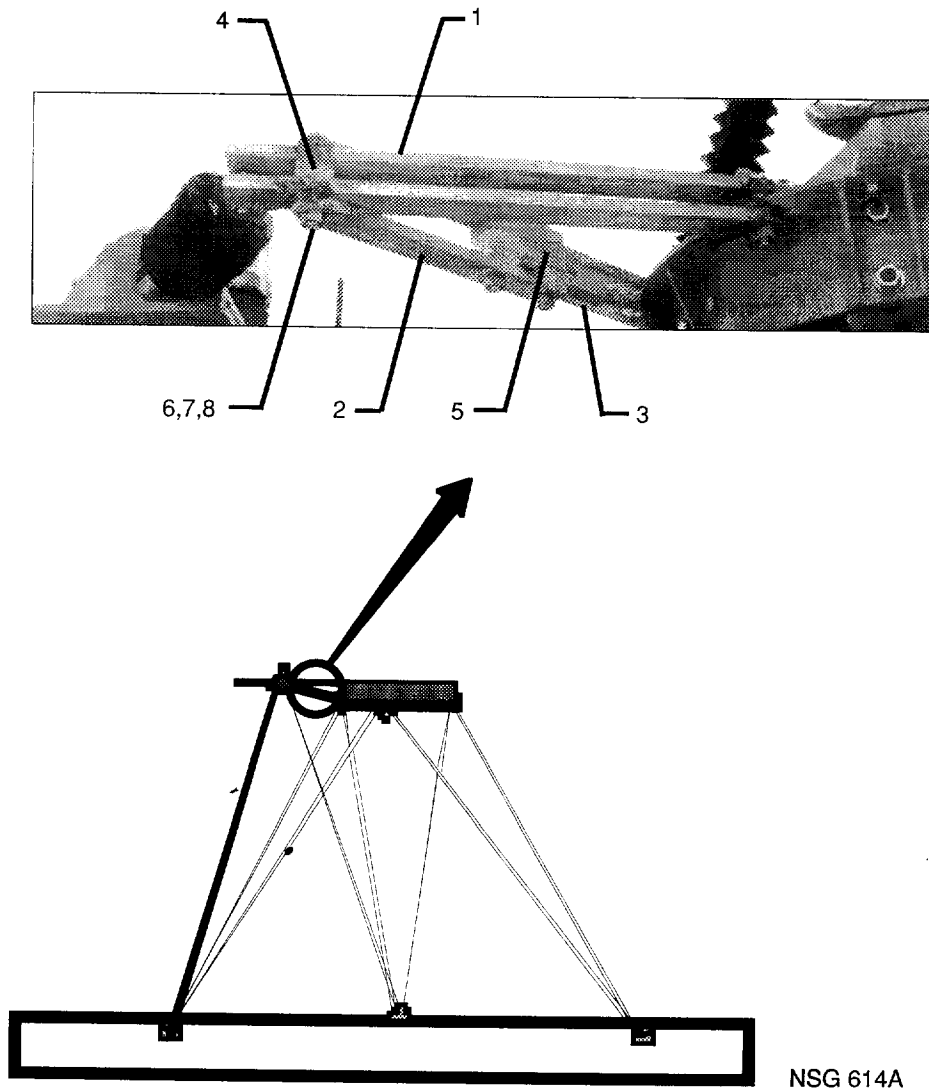


- | | |
|--|---|
| 1. HORIZONTAL BRACE, 454935 | 4. 3/4-10 HEX NUT, 88532 |
| 2. 3/4-10 X 2 1/2-INCH HEX HEAD SCREW, 89855 | 5. BRACE ATTACHMENT, 454936 |
| 3. 3/4-INCH FLAT WASHER, 88537 | 6. 3/4-10 X 2-INCH HEX HEAD SCREW, 170598 |

Figure 2-28. Mounting Azimuth Jack To Horizontal Braces

11. Mount azimuth actuator arms (items 1 in Figure 2-29), onto azimuth actuator clevis pin first, then mount remaining arms (2 and 3) using spacers (4 and 5), 3 hex head screws (6), 6 flat washers (7), and 3 hex nuts (8) as shown in Figure 2-29.

12. Do not torque fasteners at this point.



- 1. ARM, 454665
- 2. ARM, 454078
- 3. ARM, 454079
- 4. SPACER, 454664

- 5. SPACER, 454663
- 6. 1-8 X 7-INCH HEX HEAD SCREW, 173854
- 7. 1-INCH FLAT WASHER, 88538
- 8. 1-8 HEX NUT, 88533

Figure 2-29. Mounting Azimuth Jack to Arms

NOTE

The motorized azimuth pointing angle range is three 115° continuous sectors. These three sectors are:

Left Sector: 114° 42' left to 5° 18' right

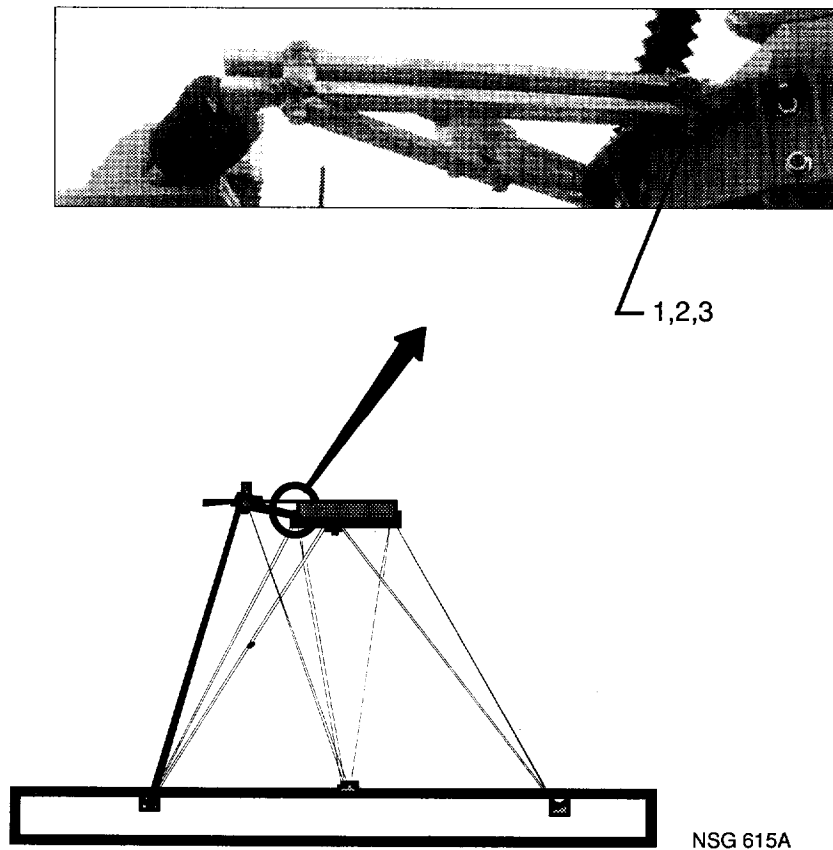
Center Sector: 60° left to 60° right

Right Sector: 6° 38' left to 113° 22' right

The manual azimuth pointing range is 360°.

13. In motorized version, install azimuth actuator arms to bearing housing flange using 2 hex head screws (item 1 in Figure 2-30), 4 flat washers (2), and 2 hex nuts (3) as indicated in Figure 2-31 (center sector). The left and right sectors make use of pads on the A-frame and an additional spacer (PN 454677).

14. Torque fasteners to recommended values.



1. 1-8 X 5-INCH HEX HEAD SCREW, 88746
2. 1-INCH FLAT WASHER, 88538

3. 1-8 HEX NUT, 88533

Figure 2-30. Assembly of Azimuth Actuator Arms (Motorized Version)

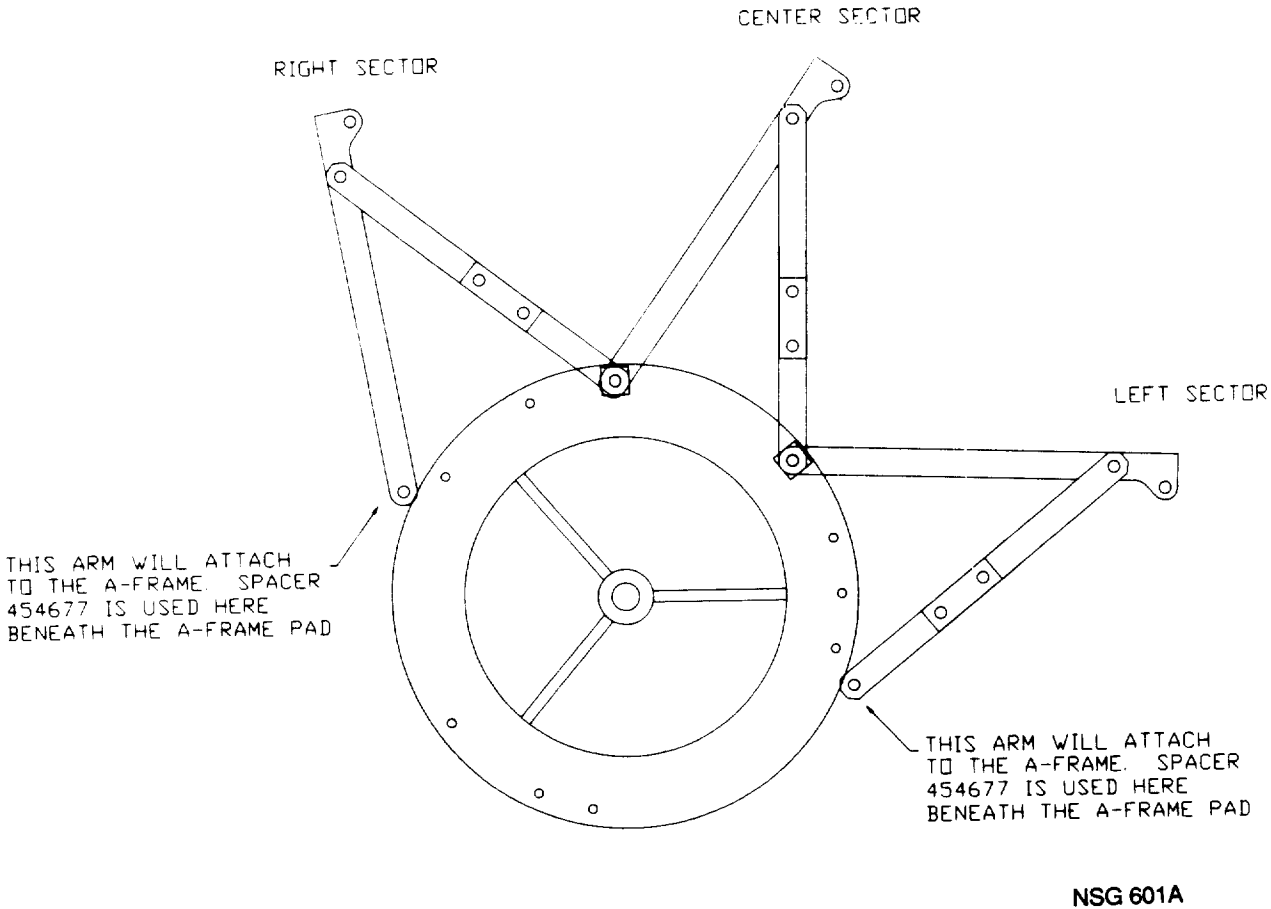
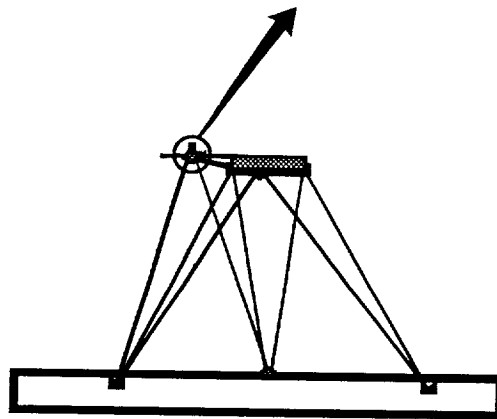
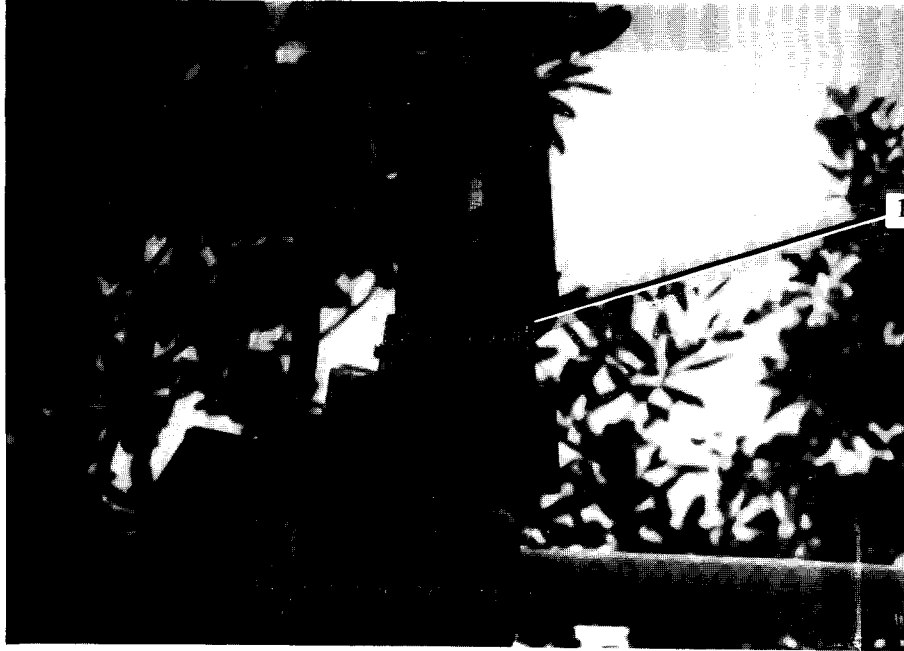


Figure 2-31. Sector Locations for Azimuth Actuator Arms (Motorized Version)

15. Install azimuth actuator reducer vent plug (item 1 in Figure 2-32) as shown in Figure 2-32.



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1. VENT PLUG ASSEMBLY

Figure 2-32. Azimuth Actuator Reducer Vent Plug Installation (Motorized Version)

INSTALLATION OF REFLECTOR

Perform the following procedure to mount the reflector assembly onto the mount.

CAUTION

Each nylon strap must have a minimum load capacity of 3500 pounds. For 3/8-inch stainless steel cable, always clamp free ends with two standard 3/8-inch cable clamps. Refer to Figure 2-33 for details.

1. Attach three 12-foot-long nylon straps cables to lifting hook of crane.
2. Position lifting hook directly over antenna (see Figure 2-33).
3. Have one person wearing soft-sole shoes enter the reflector, with the aid of a ladder, and verify the three 3/4-inch lifting eye bolts in the bottom inside flange of the hub are firmly installed.
4. Lower straps down through top of hub and secure the lower end of the three nylon straps to the three lifting eyes.
5. Raise the lifting hook on the crane and pre-load the nylon straps to a point just prior to lifting the reflector.
6. Attach boot straps around the nylon straps a foot above and below center of spar assembly to help steady the reflector.

CAUTION

The three nylon straps attached to the hub must carry the total reflector load. The attachment to the spar assembly is to stabilize the reflector and prevent tilting. If the spar assembly is allowed to carry the load, the reflector will be damaged.

7. Obtain one 3/8-inch tie line, 50 feet long, and attach to hub brace located near the rear of the hub (see Figure 2-33). The tie line should be used to rotate the reflector and prevent it from swinging.

WARNING

Make sure no person is in or under the reflector while it is being lifted and positioned. Personnel injury can result if the reflector assembly falls.

8. Lift the reflector/A-frame assembly and position it over the mount assembly. Rotate the reflector/A-frame assembly until the reflector is pointing forward (elevation actuator pointing away from forward portion of foundation).
9. With the reflector/A-frame assembly suspended just above the mount assembly, install one screw with washer (items 1 and 2 in Figure 2-34) from the top through one of the holes in the A-frame pads and the corresponding hole in the mount assembly.
10. Guide end of bolt through corresponding hole in elevation frame and install washer and nut (items 2 and 3) on the bolt.
11. Using the loosely-attached bolt as a pivot, align the remaining 6 holes and install the remaining 6 bolts, 12 washers, and 6 nuts.
12. Lower the crane until the total weight of the reflector is on the mount and tighten all 3/4-inch hardware to 260 ft-lbs torque.

WARNING

Personnel should never be hoisted in or out of the reflector by the crane. Personnel injury can result.

13. Using a 25 foot long extension ladder, have someone wearing soft-sole shoes enter the reflector. Disconnect and remove nylon straps, attached to spar assembly, and lifting eyes in the hub.

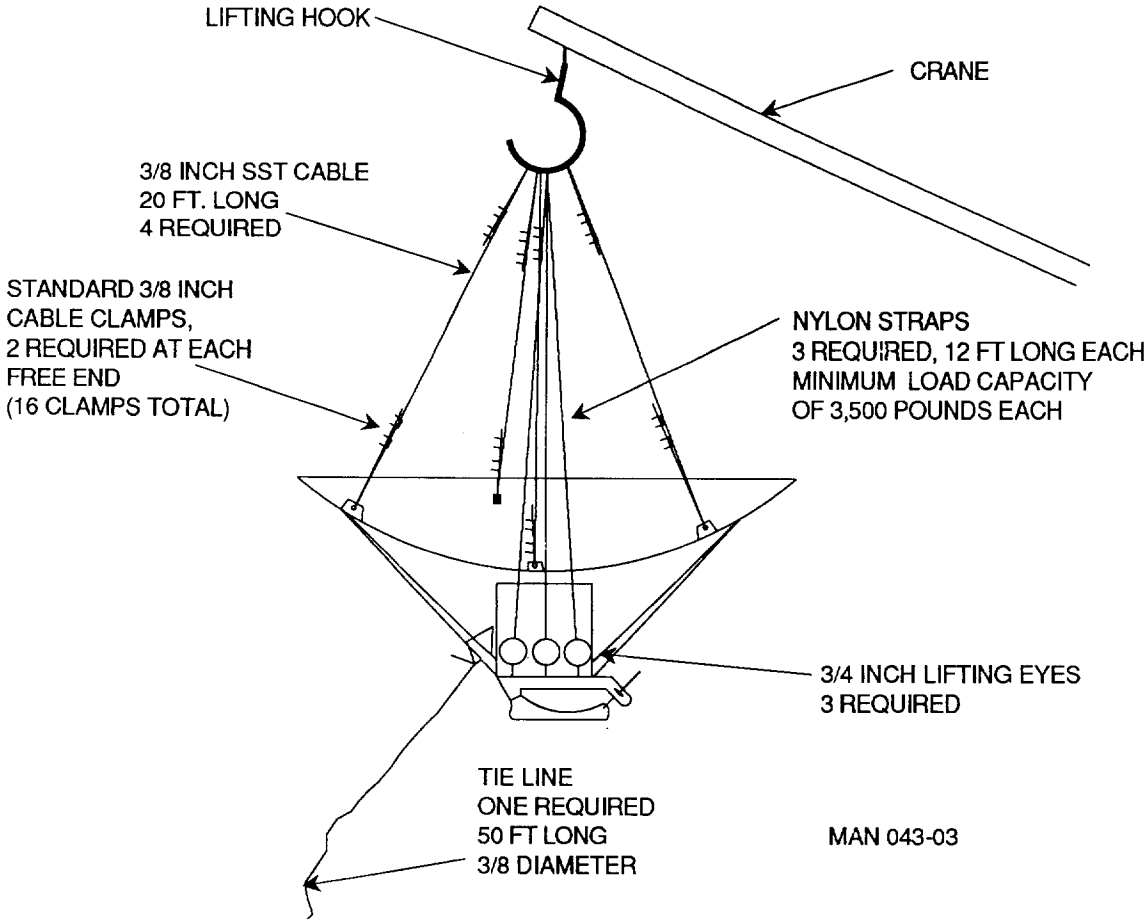
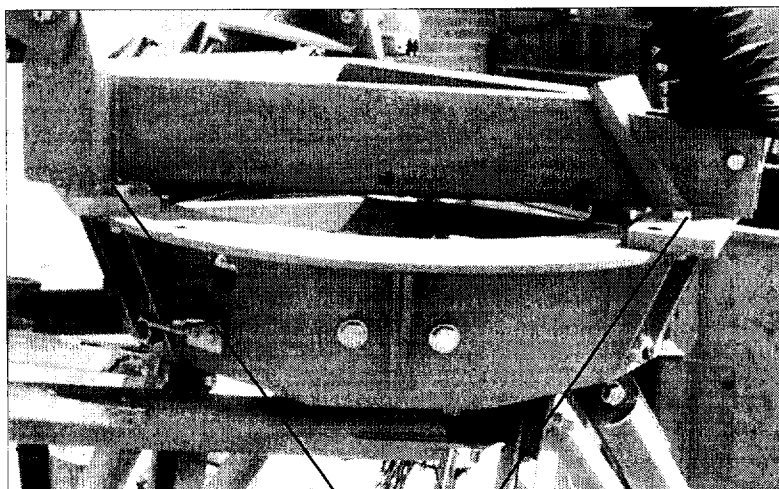


Figure 2-33. Hoisting of Reflector



1,2,3

NSG 628A

1. 3/4-10 X 2 1/2-INCH HEX HEAD SCREW, 89855
2. 3/4-INCH FLAT WASHER, 88537
3. 3/4-10 HEX NUT, 88532

Figure 2-34. Assembly of Reflector To Mount

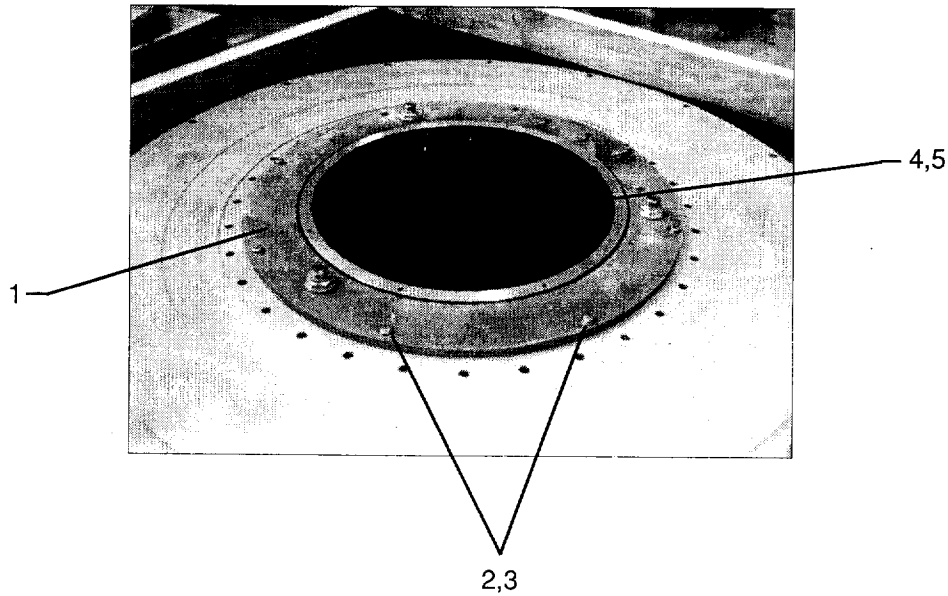
**INSTALLATION OF
FEED, SPARS, AND
SUBREFLECTOR**

The following procedures describe the installation of the automatic and manual polarization drive, feed, spars and subreflector for Ku-band and C-band, and the 6M dichroic feed. The installation drawings for the other feed assemblies are provided with the unit. Perform the following procedures to install the feed assembly and associated hardware.

**Manual Polarization
Drive Installation**

Perform the following procedure to install the manual polarization drive assembly into the hub. (If a motorized polarization drive assembly will be used, go to the next procedure.)

1. Slide manual polarization drive assembly (item 1 in Figure 2-35) into hub and align eight holes on drive assembly with eight holes on hub.
2. Attach polarization drive assembly to hub using eight hex head screws (2), and eight flat washers (3).
3. Insert grommet (5) into 1.25-inch hole at the side of the hub.
4. Slide lock rod assembly (4) through grommetted hole from outside of hub and screw rod into bracket on polarization ring assembly.



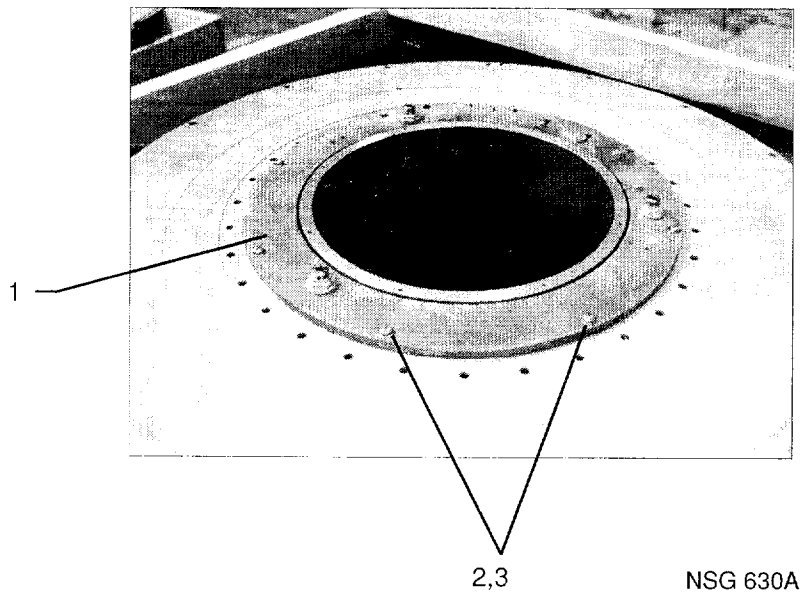
- | | |
|---|------------------------------|
| 1. MANUAL POLARIZATION DRIVE ASSY, 454244 | 4. LOCK ROD ASSEMBLY, 455092 |
| 2. 1/4-20 X 1-INCH HEX HEAD SCREW, 87259 | 5. GROMMET, 77636 |
| 3. 1/4-INCH FLAT WASHER, 76917 | |

Figure 2-35. Manual Polarization Drive Installation

Motorized Polarization Drive Installation

Perform the following procedure to install the motorized polarization drive assembly into the hub.

1. Tilt and slide motorized polarization drive assembly (item 1 in Figure 2-36) motor side first into hub and align eight holes on drive assembly with eight holes on hub.
2. Attach polarization drive assembly to lower half of hub using four hex head screws (2), and four flat washers (3).
3. Remove junction box mounting plate from the underside of feed ring and attach it to inside wall of hub using four hex head screws (2) and four flat washers (3).



- | | |
|--|--------------------------------|
| 1. MOTORIZED POLARIZATION DRIVE ASSY, 454250 | 3. 1/4-INCH FLAT WASHER, 76917 |
| 2. 1/4-20 X 1-INCH HEX HEAD SCREW, 87259 | |

Figure 2-36. Motorized Polarization Drive Installation

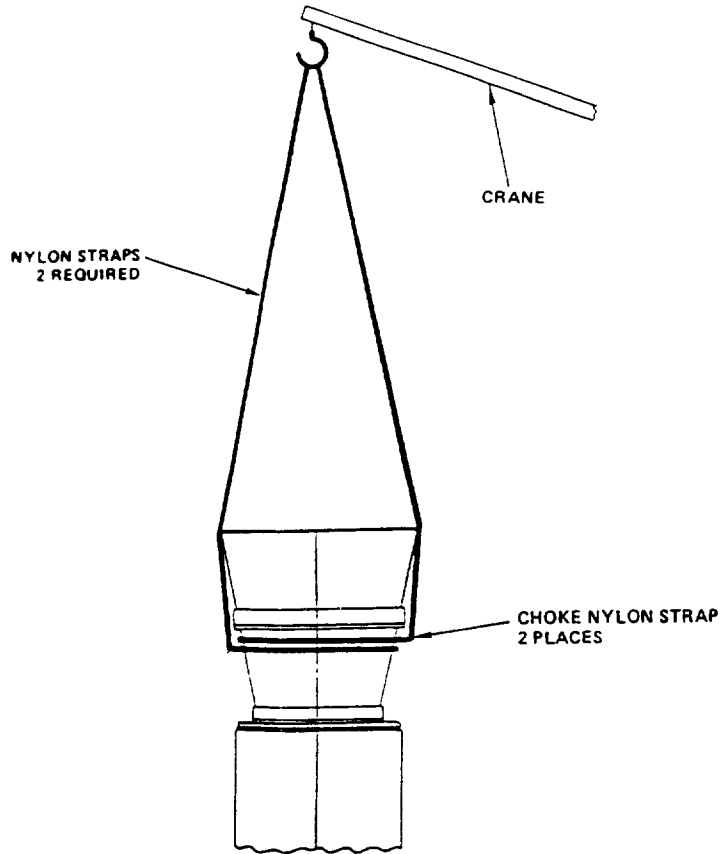
**Typical Feed
Installation**

Perform the following procedure to install the typical feed assembly into the polarization drive assembly.

NOTE

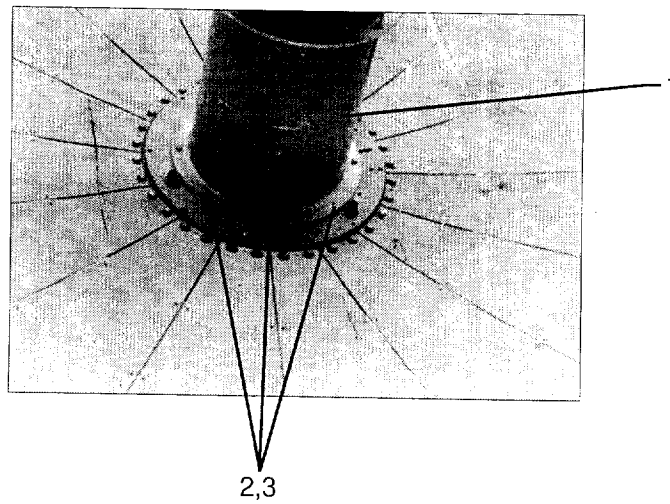
Before mounting the feed on the polarization drive assembly, study the feed installation drawing packed in the feed crate. The orientation of the feed ports to the LNA mounting holes is shown for each feed option.

1. Using a hoist as indicated in Figure 2-37, lift feed into position in center of antenna.
2. Slide feed assembly (item 1 in Figure 2-38) into polarization drive assembly and align eight holes on feed assembly with eight holes on drive assembly.
3. Secure feed assembly to polarization drive assembly with eight screws (2) and eight flat washers (3).



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Figure 2-37. Hoisting of Feed



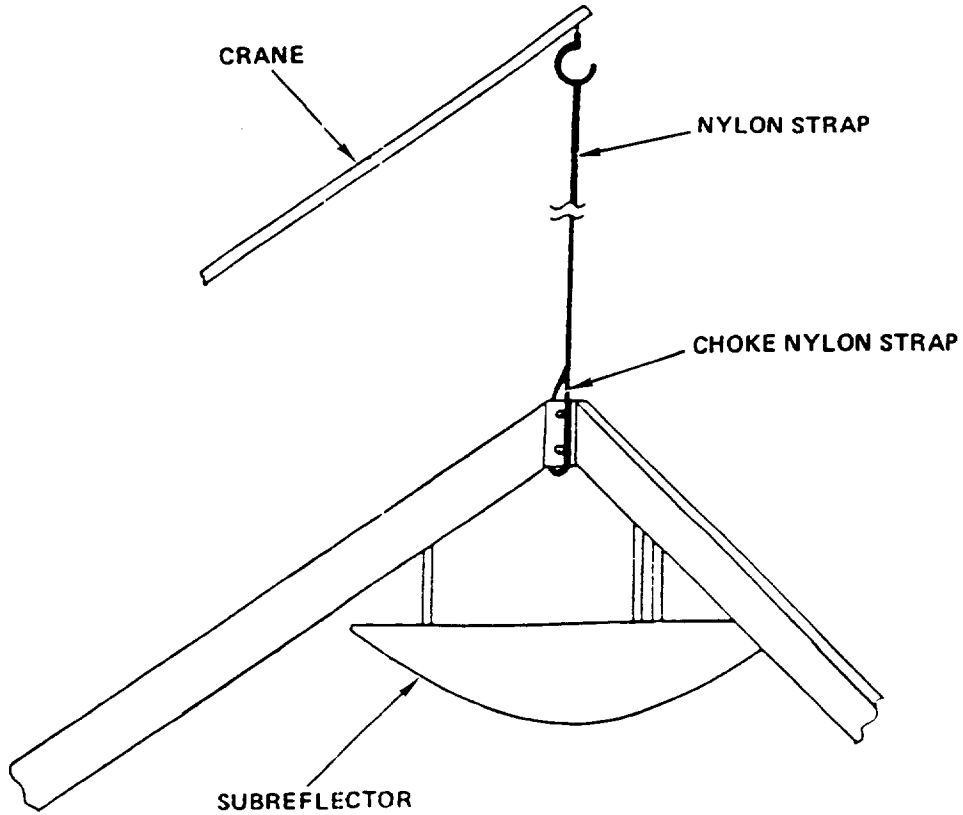
- 1. TYPICAL FEED ASSEMBLY
 - 2. 1/4-20 X 5/8-INCH HEX HEAD SCREW, 171511
 - 3. 1/4-INCH FLAT WASHER, 76917
- NSG 631A

Figure 2-38. Typical Feed Installation

**Spars Installation and
Subreflector
Adjustment**

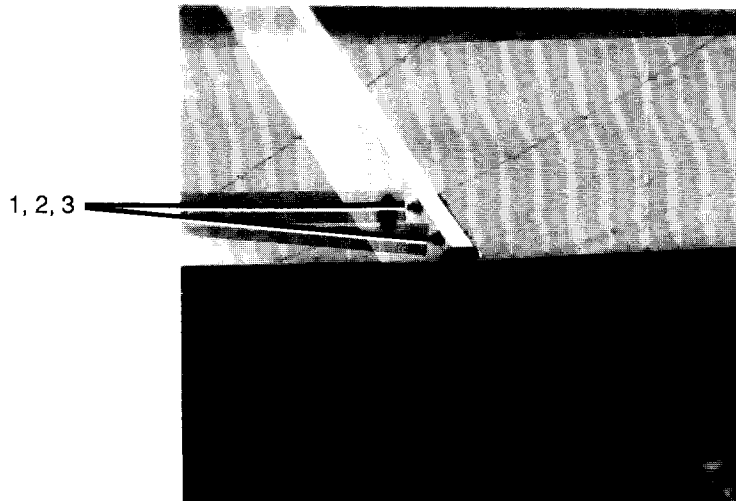
Perform the following procedure to install the spars on the reflector reflector and adjust the subreflector.

1. Using a hoist as indicated in Figure 2-39, lift spar assembly into reflector.
2. Attach spars to clockwise side of spar tabs using 2 hex head screws (item 1 in Figure 2-40), 4 flat washers (2), and 2 hex nuts (3).
3. Tighten all spar and spar bracket fasteners.



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Figure 2-39. Hoisting of Spars



NSG 627A-1

1. 1/4-20 X 1 3/4-INCH HEX HEAD SCREW, 83338
2. 1/4-INCH FLAT WASHER, 76917
3. 1/4-20 HEX NUT, 86374

Figure 2-40. Attaching Spar Assembly To Spar Tabs

4. Set the nominal feed to subreflector distance as shown in Figure 2-41. Refer to Section 3 for further details on subreflector adjustment.

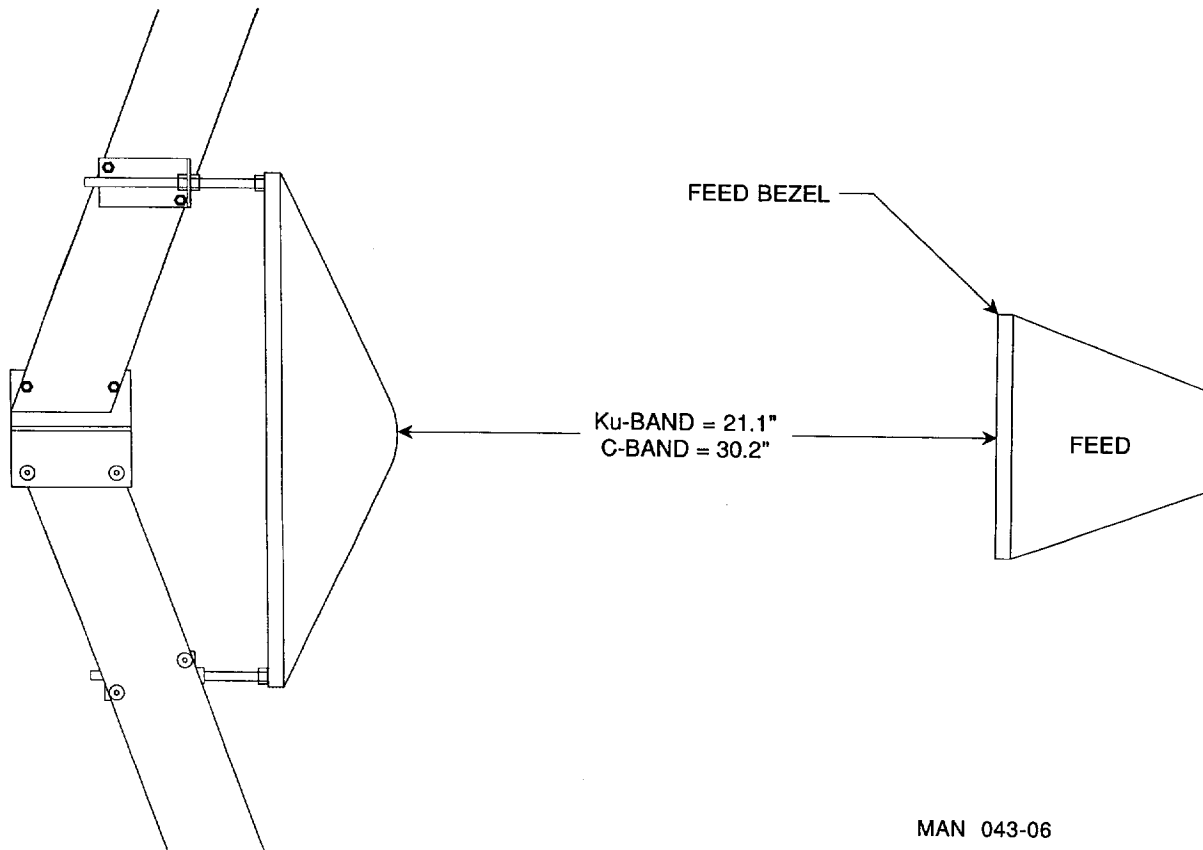


Figure 2-41. Ku-band or C-band Subreflector Adjustment

**Dual Band Spars
(Dichroic) Installation
and Adjustment**

Perform the following procedure to install the spars and adjust the subreflector for the dual band (Ku/C-band) antenna. If a single band antenna system is used, go to the preceding procedure.

1. Hoist spar assembly to the mounting position on the reflector.
2. Rotate spar assembly such that the holes in side of mounting ring will be facing front of reflector (nearest the ground) and attach 4 spars to antenna using two hex head screws (item 1 in Figure 2-40), four flat washers (2), and two hex nuts (3) on each spar as indicated in Figure 2-40.
3. Adjust assembly to nominal position shown in Figure 2-42.
4. After wiring the controls to feed assembly, mount cover (4) on top of feed mounting ring using eight screws (5) and washers (6). (Refer to information provided in kit to wire feed assembly.)

CAUTION

Do not paint dichroic subreflector for any reason. A severe degradation in RF performance will result if the dichroic subreflector surface is painted. The dichroic subreflector surface must be coated with only the recommended material.

NOTE

The dichroic subreflector surface is coated with a hydrophobic finish material called Vellox™. This coating system imparts extreme water repellency and resists formation of ice or snow. Re-coating of the surface is recommended immediately after installation. One aerosol can is supplied with the purchase of this feed option. (See Section 4 for periodic maintenance.)

5. Re-coat dichroic subreflector with Vellox™ spray finish.

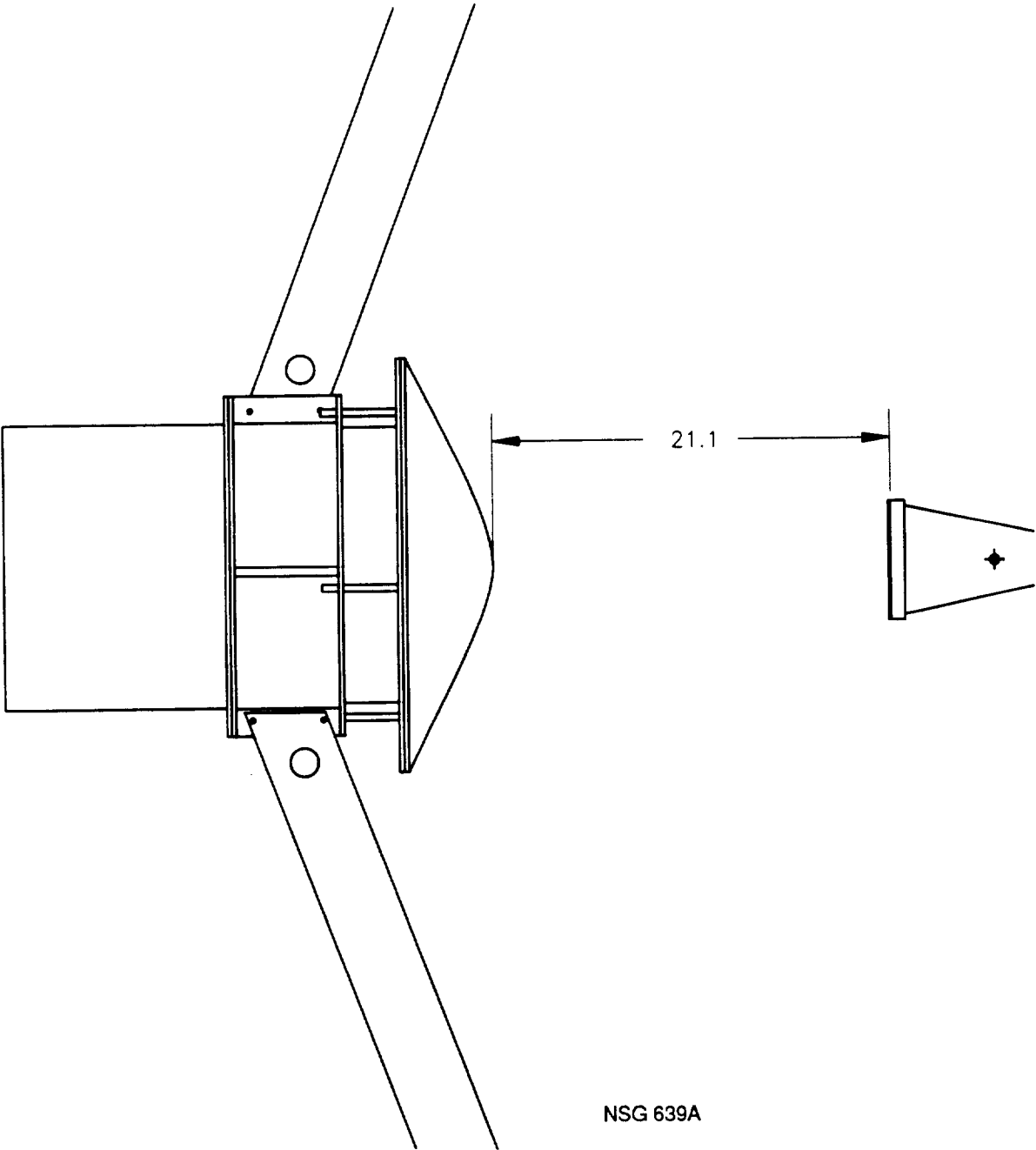


Figure 2-42. Dual Band (Dichroic) Subreflector Installation

**ELECTRICAL
INSTALLATION**

Controller, motors, limit switches, and wiring installation instructions are contained in the supplement to the controller manual. Specific installation instructions will vary depending on the actual controller and type of motors used for the 6M antenna installation. Refer to the applicable controller supplement for instructions on 6M electrical installation.

NOTE

When antenna installation is complete, refer to Section 4 for corrosion protection requirements.

SECTION 3 OPERATION

- 3-1 **General**
- 3-1 **Satellite Pointing Procedure**
- 3-1 **Feed Polarization**
- 3-2 **Subreflector Adjustment**

SECTION 3 OPERATION

GENERAL With this elevation-over-azimuth mount, pointing the antenna is accomplished by jogging or turning the screw (manual version) the antenna in elevation and jogging or simply positioning (manual version) the antenna in azimuth.

SATELLITE POINTING PROCEDURE With the feed installed and the electronics operational, use the following procedure for pointing at the desired satellite and peaking on the signal.

1. Refer to the Site Preparation manual to determine the required elevation and azimuth angles.
2. Move antenna to the required elevation angle by turning the elevation actuator on or, on manual version, by turning the elevation screw until the required angle is obtained. The elevation angle is measured from the horizon to the reflector boresight. A good reference surface for the reflector boresight is the vertical weld of the hub skin between the two elevation pivot brackets.
3. Rotate the antenna in azimuth by turning azimuth actuator on, or in manual version by installing optional fine adjust actuator (see Section 5 for operating instructions), loosening clamps, and turning fine adjust actuator nut until the satellite signal has been picked up. Tighten clamps, remove azimuth fine adjustment actuator and store adjustment actuator. (See Azimuth Clamp Installation procedure in Section 2 for proper installation and torquing requirements of clamps.)
4. In the manual version, peak up the signal by turning the elevation screw and manually turning the antenna in azimuth as necessary until the signal strength is at a maximum.
5. In the motorized version, peak up the signal by jogging the elevation and azimuth actuators as necessary until the signal strength is at a maximum.

FEED POLARIZATION

Peak the feed polarization on the signal as follows:

1. Rotate feed until the signal peaks.
2. Monitor receiver C/N meter or a power meter.
3. Rotate the feed counterclockwise until the signal decreases by 1 dB. Record the signal level. Mark a line on the feed mounting plate and a matching line on the hub.

4. Rotate the feed clockwise until the meter has passed through the peak and has decreased to the level recorded in step 3. Make a mark on the hub in line with the mark of the feed mounting plate.
5. Measure the distance between the marks on the hub. Calculate the mid-point between these marks. Rotate the feed until the mark on the feed mounting plate is aligned with the mid-point.
6. Secure the feed and feed locking block in position by tightening.

SUBREFLECTOR ADJUSTMENT

The following procedure should be used in the event that the antenna performance demonstrates that a subreflector adjustment is necessary. The purpose of the physical measurements to various points on the antenna is to minimize any tilt, or lateral displacement of the subreflector with respect to the main reflector surface and also to position the subreflector to its optimum optical location along the adjustment axis.

1. Ensure all antenna hardware including mount parts are installed and tightened properly prior to making any subreflector adjustment.
2. To establish a reference, measure the distance from the feed bezel to the subreflector apex as shown in Figure 3-1, distance A.

NOTE

A straight edge may be placed across the feed bezel and measurement may then be made from the inside of the straight edge to the subreflector.

3. Measure the distance between the edge of the subreflector and each corner of the feed horn as shown in Figure 3-1, distance B. Using the subreflector adjustment mechanism, adjust the subreflector until all four distances are equal; this removes any tilt with respect to the feed.
4. Measure from the center of the subreflector to each spar pickup point on the dish surface as shown in Figure 3-1, distance C. Any convenient and repeatable measurement point is acceptable as long as it is associated with the machined holes in the spars or the spar tabs. These three measurements should be equal within 0.1-inch nominal. If they are not equal, re-evaluation of the antenna geometry and installation is necessary.

NOTE

The subreflector adjustment screws should not be used to stress the subreflector in any way. It is advisable that adjustment be made with only three adjustment screws and the fourth tightened carefully after adjustment is complete.

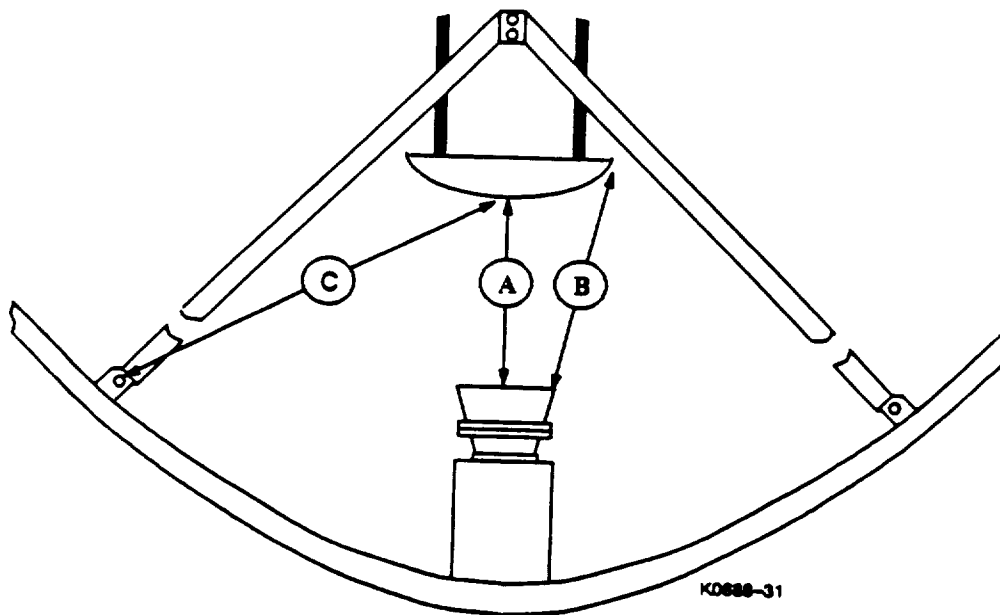


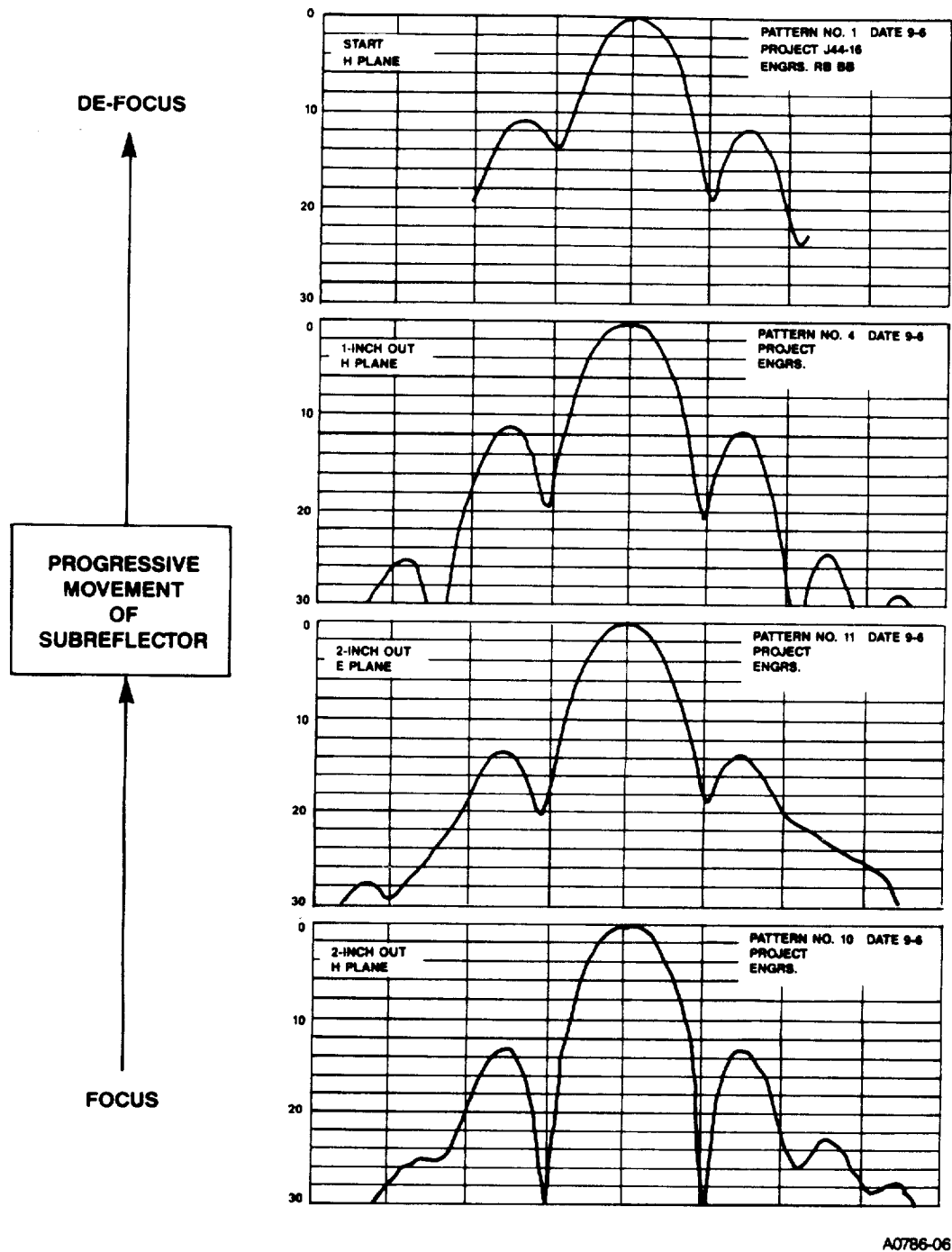
Figure 3-1. Feed, Reflector, and Subreflector Distances

5. The subreflector may now be adjusted toward or away from the main dish with the subreflector adjustment mechanism. By adjusting the support studs equally, the subreflector alignment is maintained. The nominal distance A in Figure 3-1 is 30.2-inches for C-band and 21.1-inches for Ku-band and C/Ku-band. Signal level monitoring equipment is necessary to accurately set the subreflector for the highest gain and the deepest radiation pattern nulls. The following equipment or its equivalent is necessary:

- Spectrum Analyzer
- Power Meter
- X-Y Recorder
- Time Base

The radiation pattern (relative power versus off-axis angle) should be recorded and evaluated for each adjustment of the subreflector. Typical patterns at various subreflector positions which are identified in Figure 3-2 show the changes which take place as the subreflector is moved closer to the optimum focal position.

- a. The first nulls to each side of the main beam will become deeper and eventually bottom out at some level (see Figure 3-2). This level varies depending on the antenna, but should be equal to or greater than 10 dB below the level of the first sidelobe. The deepest null in the H-plane sometimes occurs at a different subreflector position than in the E-plane. In this case, the subreflector should be set at a compromise position between the two planes (i.e., E-plane null depth approximately equals the H-plane null depth).
- b. The signal level of the main beam will also increase as the subreflector is moved closer to the focal position. The power meter can be used to monitor this change. The main signal level will peak at the antenna focus; however, this change will not be as sensitive as the change in the null depths. Peak main beam signal level and minimum first null depths should coincide for the best subreflector position.
- c. As the subreflector is adjusted toward the optimum focal position, the first sidelobe levels should decrease and remain symmetrical within 2 dB. The minimum sidelobe level will occur approximately at the same subreflector position as the highest signal level and lowest nulls. Should the sidelobes become asymmetrical (greater than 2 dB), step 3 above should be repeated. It is recommended that after each adjustment of the subreflector, the antenna azimuth and elevation adjustments be re-peaked to compensate for any beam steering due to axial misalignment.



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Figure 3-2. Typical Antenna Patterns for Various Subreflector Positions

SECTION 4 MAINTENANCE

4-1 General

4-1 Periodic Maintenance

- 4-1 • Weekly Maintenance
- 4-1 • Monthly Maintenance
- 4-1 • Bi-Monthly Maintenance
- 4-4 • Yearly Maintenance

4-4 Corrosion Protection

SECTION 4 MAINTENANCE

GENERAL The Series 8060 6-Meter Earth Station Antenna is designed for use in many different environmental conditions with minimum maintenance requirements. Several areas on the antenna require service at various intervals to ensure the proper use and operation. Modification to the suggested service intervals is expected pending customer operation and environmental conditions. The elevation pivot points are designed as pin joints which require lubrication. The azimuth axis rotates on rollers with each roller having a lubrication fitting. The azimuth ring requires a light film of grease on the roller surface top and bottom. The azimuth and elevation actuators contain a gearbox or reducer and a machine screw mechanism which require inspection and application of lubricant as required. The prime focus polarization drive mechanism requires no lubrication, but must be inspected to ensure proper operation. Structural fasteners used on the mount, actuators, reflector, and prime focus feed may require additional corrosion protection.

PERIODIC MAINTENANCE The suggested service intervals apply to a typical antenna installation and may vary due to environmental conditions.

Weekly Maintenance Ensure motorized antennas are driven in azimuth and elevation on a weekly basis. In areas of heavy snow and ice, mounts should be inspected before movement for excessive accumulation of ice, or damage may result.

Monthly Maintenance Apply electrical power, as necessary, to azimuth actuator, elevation actuator, and polarization drive assembly. Run each axis for two or three minutes in the normal operating sector. If a pressurization system is installed, check pressure of feed and transmit waveguide. Service as required.

Bi-Monthly Maintenance Perform the following procedures at least once every two months.

WARNING

Remove electrical power from antenna system prior to performing bi-monthly maintenance.

1. Remove potentiometer covers, inspect mechanical operation, and check for condensation accumulation. If moisture exists, open all drain holes. Apply a spray-type lubricant (WD-40 or equivalent) to all moving parts. Secure covers.
2. Remove limit switch covers, inspect switch operation, and repair as required. Secure covers.
3. Remove hub cover. Inspect polarization drive assembly, apply a spray-type lubricant (WD-40 or equivalent) to chain and drive sprocket. Inspect the feed chain for correct tension and lubricate if necessary with the spray-type lubricant. Ensure that feed rollers are all functional, inspect flexible transmit waveguide jumpers, if applicable, for fatigue, check limit switch operation. Inspect feed window for damage, replace window as required. Secure cover.
4. Inspect all cotter pins and other devices used as pin retainers. Replace if damaged or corroded; tighten if loose.
5. Inspect mount, reflector, and feed, for loose or missing fasteners and replace as required.
6. Check the oil level in both the azimuth and elevation actuator gear boxes and add Mobil SHC 634 oil, as required, to maintain a level of approximately half full.
7. Inspect azimuth and elevation machine screws. If the screws are coated with grease and the grease is in good condition, no further action is required. If either screw is not adequately coated, or if the grease is dry, hard, or contaminated, the lubricant must be renewed. Do not add grease to old grease of the screw. Clean the screw of old grease using a solvent. Dry the screw with clean cloths. Apply a thin uniform film coating of one of the following low-temperature greases.

CAUTION

If one of the following low-temperature greases is not used on the actuator machine screw, damage to the screw or motor could occur.

- Texaco Low Temperature #2346
- Shell Aeroshell #7
- Mobil Low Temperature #28

8. The antenna rotates in azimuth on rollers rotating about the azimuth ring. Inspect rollers. If a roller is not in contact with the azimuth ring, perform the following procedure:

NOTE

Three of the six rollers on the top of the azimuth ring are not adjustable.

- a. Loosen retaining nut on roller.
- b. Insert an Allen wrench on other side of roller.
- c. Turn Allen wrench to clock roller until roller hits surface. This action must be in the same orientation as that used to torque the retaining nut.
- d. Torque retaining nut to 150 ft-lbs.
- e. Verify all rollers rotate when azimuth is changed. Repeat steps a through d if necessary.

Apply a thin film coating of grease to the contact surfaces on all rollers.

9. Apply grease to all of the following grease fittings:

Elevation Axis	2 places
Elevation Actuator Pivot Pins (motorized version)	2 places
Elevation Actuator Pivot Pins (manual version)	2 places
Azimuth Pivot Pins (motorized version)	2 places
Elevation Clevis Pin (motorized version)	1 place
Elevation Clevis Pins (manual version)	2 place
Azimuth Clevis Pins (motorized version)	2 places
Azimuth Ring Rollers	12 places
Center Pivot Bearing	1 place

10. Inspect lubrication of manual elevation jack screw. If grease is dry or dirty, remove old grease and apply a new thin layer of grease.

Yearly Maintenance Perform the following procedures at least once every year.

1. Inspect the foundation pad for structural cracks and repair as required.
2. Inspect feed and feed radome.
3. Check torque values on all fasteners as follows:

Anchor Bolt Nuts	245 to 270 ft-lbs
1-inch Fasteners	600 ft-lbs
3/4-inch Fasteners	260 ft-lbs
1/2-inch Fasteners	76 ft-lbs
3/8-inch Fasteners	31 ft-lbs
1/4-inch Fasteners	9 ft-lbs

CORROSION PROTECTION Perform the following procedures after completing the installation and every 12 months thereafter.

NOTE

Pressurization of transmit waveguide runs and feed components should be maintained to prevent moisture from entering the system. Receive only pressurization is optional.

1. Evaluate the corrosion protection on the mount, actuators, and related hardware. If the protective finish is damaged, clean with a wire brush, remove all rust, and apply a coat of Rust-Oleum (or equivalent) spray-on cold galvanizing compound.
2. Evaluate the corrosion protection on the reflector surface, spars, feed, potentiometer brackets and related hardware. If the paint is scratched, chipped, beginning to flake, or just wearing thin, lightly sand with 320 grit (or finer) sandpaper and apply a coat of Rust-Oleum (or equivalent) primer and semi-gloss white paint.

NOTE

The dichroic subreflector surface is coated with a hydrophobic finish material called Vellox™. This coating system imparts extreme water repellency and resists formation of ice or snow.

3. Re-coat dichroic subreflector with Vellox™ spray finish after installation and every 6 to 24 months thereafter. One aerosol spray can is supplied with the purchase of the dichroic feed option. Additional supplies of Vellox™ can be obtained directly from:

Vellox Corporation
100 Park Street
Ayer, MA 01432
(508) 722-6302

SECTION 5 OPTIONS

5-1 **General**

5-1 **Feed Options**

5-4 **Azimuth Fine Adjustment Actuator**

- 5-4 • Azimuth Fine Adjustment Actuator Installation
- 5-4 • Azimuth Fine Adjustment Actuator Operation

5-6 **Model 8060 Lightning Protection**

5-6 **Transmit Waveguide Kits**

SECTION 5 OPTIONS

GENERAL For even greater versatility, there are several optional features for the Series 8060 6-Meter Earth Station Antenna. The antenna can be operated manually or motorized for high-speed movement between satellites. Any or all of the following de-ice options are available:

- Full Main Reflector De-Icing
- Half Main Reflector De-Icing
- Feed and Subreflector De-Icing

Lightning protection that includes rod air terminals and cabling to a single ground rod is also available. The antenna can use a wide variety of feed options for both domestic and international applications.

FEED OPTIONS The feed options available for the 6-meter antenna are listed in Tables 5-1 through 5-4.

NOTE

The specifications are subject to change without notice due to product improvements. Consult with ViaSat, Inc. sales department for current specifications.

Table 5-1. Domestic Ku-Band

Feed Type	2-Port Receive Only (DP)	2-Port Receive/ Transmit (RT)	3-Port Receive/ Transmit (DPT)	4-Port Receive (2) Transmit (4P)
Polarization	Linear	Linear	Linear	Linear
Frequency	11.7 to 12.2 GHz	11.7 to 12.2 GHz 14.0 to 14.5 GHz	11.7 to 12.2 GHz 14.0 to 14.5 GHz	11.7 to 12.2 GHz 14.0 to 14.5 GHz
Cross Polarization Isolation	35 dB	35 dB	35 dB	35 dB

OPTIONS

Table 5-1. Domestic Ku-Band - continued

Feed Type	2-Port Receive Only (DP)	2-Port Receive/ Transmit (RT)	3-Port Receive/ Transmit (DPT)	4-Port Receive (2) Transmit (4P)
Port-To-Port Isolation (Transmit to Receive Port)		70 dB	70 dB	70 dB
(Receive to Receive)	35 dB		35 dB	35 dB
(Transmit to Transmit)				35 dB

Table 5-2. Domestic C-Band

Feed Type	2-Port Receive Only (DP)	2-Port Receive/Transmit (RT)
Polarization	Linear	Linear
Frequency	3.7 to 4.2 GHz	3.7 to 4.2 GHz 5.425 to 6.425 GHz
Cross Polarization Isolation	35 dB	35 dB
Port-To-Port Isolation (Transmit to Receive)		30 dB
(Receive to Receive)	35 dB	

Table 5-3. Dual C-/Ku-Band

Feed Type	4-Port 2 C-Band Ports 2 Ku-Band Ports (C/KuRO)	6-Port 2 Ku-Band Transmit Ports 2 Ku-Band Receive Ports 2 C-Band Receive Ports (C/KuRT)
Polarization	Linear	Linear
Frequency	3.7 to 4.2 GHz 11.7 to 12.2 GHz	3.7 to 4.2 GHz 11.7 to 12.2 GHz 14.0 to 14.5 GHz
Cross Polarization Isolation	30 dB	30 dB
Port-To-Port Isolation (Transmit to Receive)		30 dB
(Receive to Receive)	30 dB	30 dB
(Transmit to Transmit)		30 dB

Table 5-4. International C-Band

Feed Type	2-Port Receive Only (DPC)	4-Port Receive (2) Transmit (2)(4PC)
Polarization	Circular	Circular
Frequency	3.625 to 4.2 GHz	3.625 to 4.2 GHz 5.85 to 6.425 GHz
Axial Ratio	0.5 dB	0.5 dB
Port-To-Port Isolation (Transmit to Receive)		80 dB
(Receive to Receive)	22 dB	20 dB
(Transmit to Transmit)		20 dB

**AZIMUTH FINE
ADJUSTMENT
ACTUATOR**

An Azimuth Fine Adjustment Actuator, part number 454709, is available for use on the manual mount. The actuator provides $\pm 20^\circ$ azimuth travel and can be attached in nine sectors for a total 360° movement.

**Azimuth Fine
Adjustment Actuator
Installation**

1. Mount pivot post (item 5 in Figure 5-1) using hex head screw (7) and flat washer (8) on top of triangular leg brace (inside of bearing housing assembly).
2. Insert clevis end of azimuth fine adjustment actuator through the 2-inch diameter hole in the side of the bearing housing assembly.
3. Pin clevis to pivot post using shoulder screw (6).
4. Install pivot support on bearing housing wall with azimuth fine adjustment actuator inserted into bearing housing flange and pivot support. Secure using hex head screw (2) and flat washer (3).

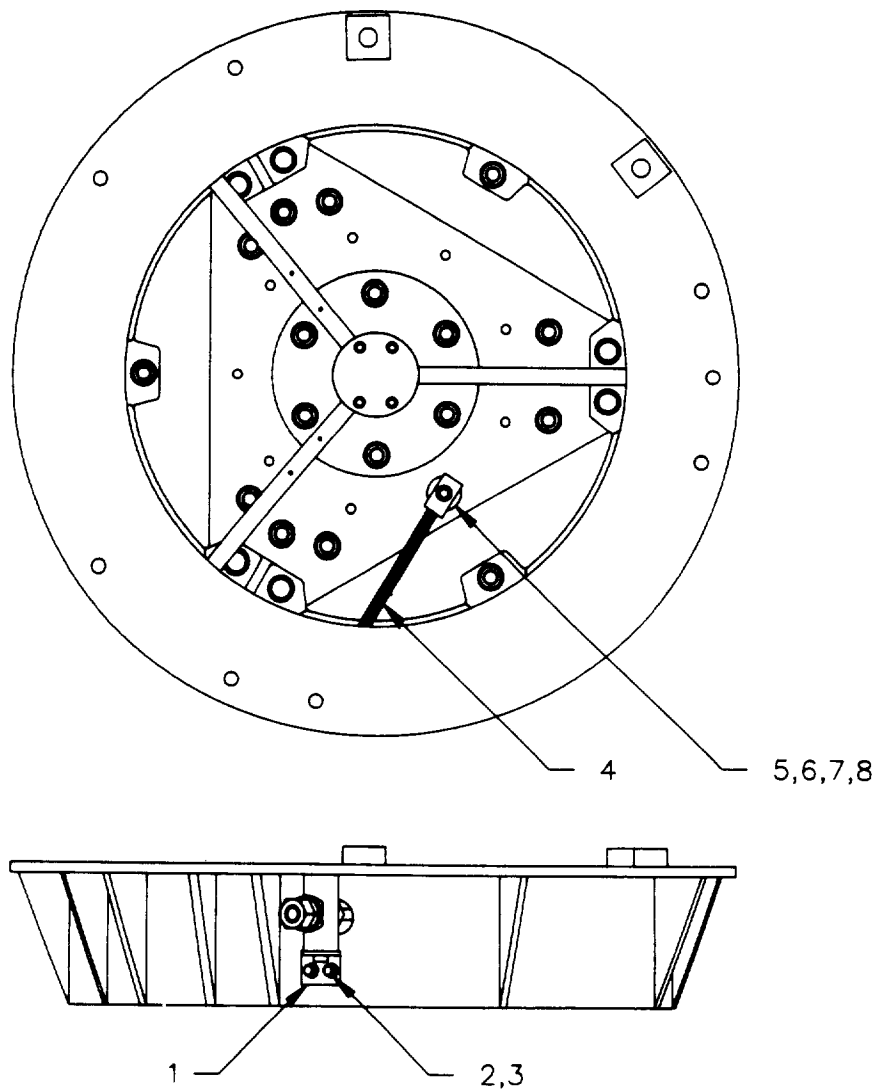
CAUTION

The fine adjustment actuator should not be used when winds exceed 10 mph.

**Azimuth Fine
Adjustment Actuator
Operation**

1. Loosen azimuth clamps.
2. Rotate 1-inch nut at actuator pivot to move antenna.
3. Do not exceed the following travel limits (pin-to-pin lengths).

14.5-inches to 20.5-inches
4. If the desired antenna position cannot be achieved within this range, perform the following procedure.
 - a. Remove shoulder screw pinning actuator clevis to pivot post.
 - b. Index pivot post in appropriate direction.
 - c. Reposition actuator clevis.
 - d. Install shoulder screw.
5. Upon reaching the desired azimuth pointing angle, tighten azimuth clamps, then remove azimuth fine adjustment actuator.



NSG 634A

- | | |
|---|--|
| 1. PIVOT SUPPORT, 454666 | 6. 5/8 X 1-INCH, 1/2-13 X 1/2-INCH SOCKET HEAD SHOULDER SCREW, 72682 |
| 2. 3/8-16 X 1-INCH HEX HEAD SCREW, 88514 | 7. 1/2-13 X 1-INCH HEX HEAD SCREW, 88525 |
| 3. 3/8-INCH FLAT WASHER, 88520 | 8. 1/2-INCH FLAT WASHER, 88521 |
| 4. AZIMUTH FINE ADJUSTMENT ACTUATOR, 454942 | |
| 5. PIVOT POST, 454671 | |

Figure 5-1. Attaching Azimuth Actuator To Azimuth Actuator Pivot

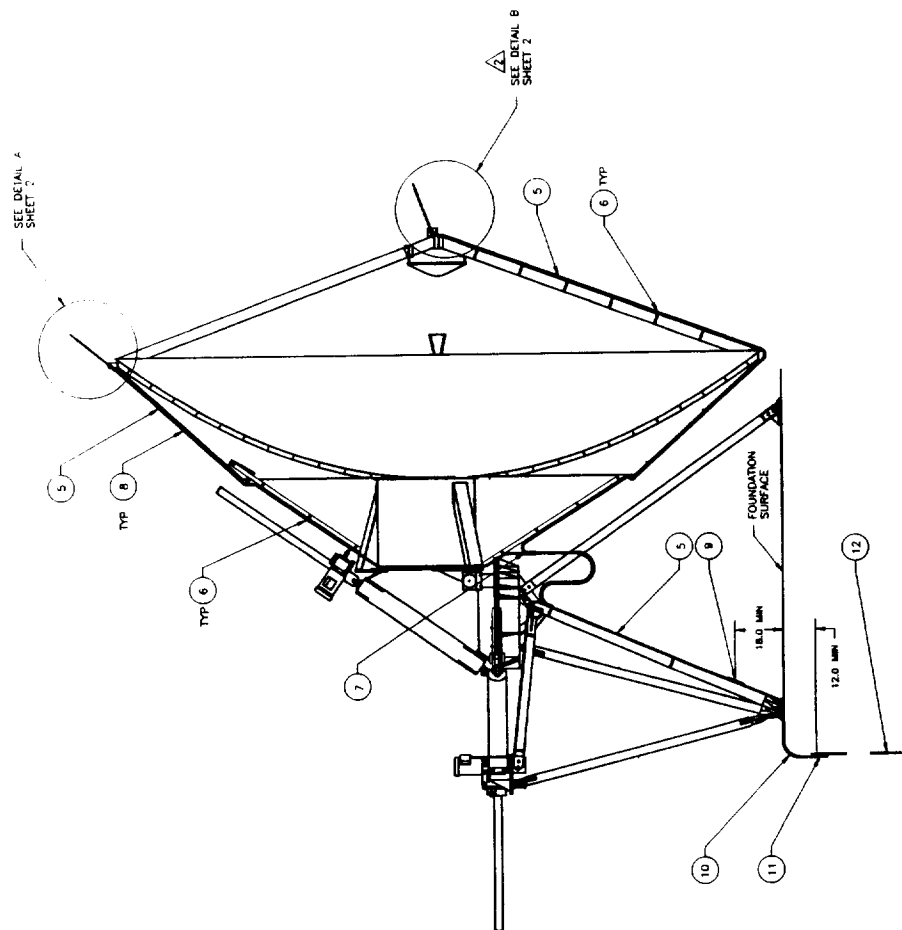
**MODEL 8060
LIGHTNING
PROTECTION**

The optional Model 8060 Lightning Protection kit can be purchased from ViaSat, Inc. Install the lightning protection kit in accordance with the procedures contained in Figure 5-2.

**TRANSMIT
WAVEGUIDE KITS**

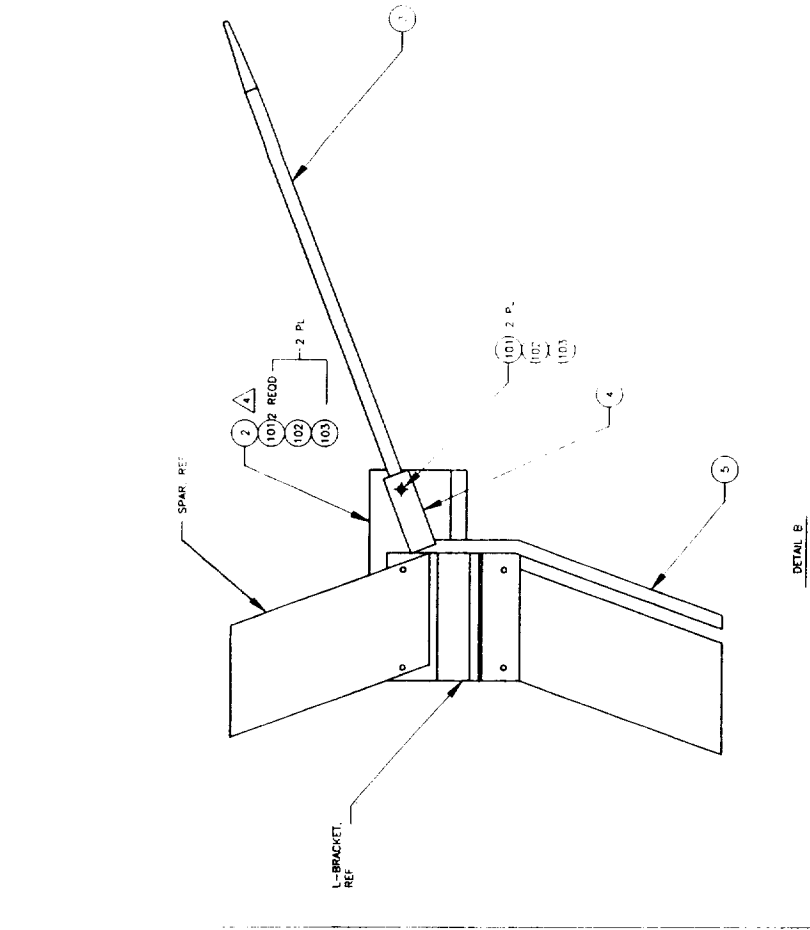
Transmit waveguide kits are available for the Ku-band or C-band antenna. The kits are designed to connect the customer supplied transmission line to the feed. These kits provide flexible waveguide, rigid waveguide, mounting brackets, and all other hardware required to accommodate antenna motion in azimuth, elevation, and polarization. Each kit includes installation instructions. For more information, contact ViaSat, Inc.

103	4	87259	SCREW, HEX. HD	1/4"-20x 1	
102	4	86374	NUT, HEX	1/4"-20	SST
101	8	76917	WASHER, FLAT	1/4	SST
100	4	454819	RVET	3/16 DIA	SST
12	1	368128	ROD, GROUND		
11	1	368127	CLAMP, GROUND ROD		
10	18	368126	CABLE, COPPER		
9	1	368125	CLAMP, BIMETAL		
8	14	368124	CLAMP, FLAT		
7	1	368123	CLAMP, PARALLEL		
6	14	83420	CABLE TIE, BLACK	22 INCH	
5	60	368122	CABLE, AL		
4	2	368121	CONNECTOR, VERTICAL		
3	2	368120	POINT, AL LIGHTNING		
2	1	455062	BRACKET, SUBREFLECTOR		
1	1	455061	BRACKET, REFLECTOR		

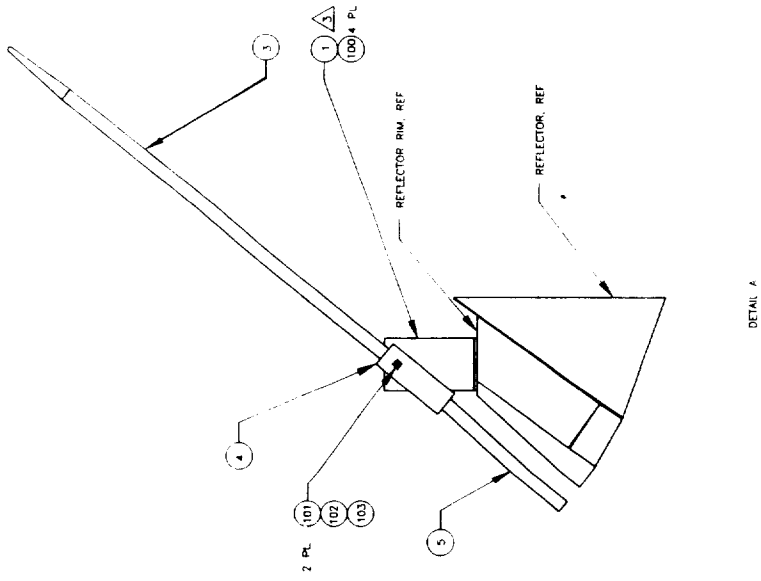


- NOTES:
- FOR BEST LIGHTNING PROTECTION AIR TERMINALS SHOULD ALWAYS BE LOCATED AT THE HIGH POINT OF THE ANTENNA AND POSITIONED WITHIN +/- 10 DEGREES OF TRUE VERTICAL.
 FOR ELEVATION TRAVEL OF 0 TO 70 DEGREES, AIR TERMINAL LOCATED AT THE REFLECTOR RIM WILL BE THE HIGHEST POINT.
 FOR ELEVATION TRAVEL OF 70 TO 90 DEGREES, AIR TERMINAL LOCATED AT THE SUBREFLECTOR WILL BE THE HIGHEST POINT.
 - OMIT AIR TERMINAL MOUNTING BRACKET ITEM 2, 455062, FOR OPTIONAL C/KU FEED INSTALLATION. ATTACH AIR TERMINAL DIRECTLY TO MOUNTING TAB LOCATED ON PROTECTIVE COVER.
 - SEE SHEET 2.
 - SEE SHEET 2.

Figure 5-2. Model 8060 Lightning Protection Installation (Sheet 1 of 2), 455060



NOTES
 △ ATTACH SUBREFLECTOR BRACKET ITEM 2, 455082, TO L-BRACKET WITH 1/4 INCH SCREWS, WASHERS, AND NUTS



NOTES
 △ ATTACH REFLECTOR BRACKET ITEM 1, 455061, TO RIM WITH 3/16 DIA RIVETS AT ONE OF THE HIGHEST RIB ATTACHMENT POINTS +/- 11.25 DEGREES FROM TOP OF ANTENNA

Figure 5-2. Model 8060 Lightning Protection Installation (Sheet 2 of 2), 455060

APPENDIX A

**INSTALLATION CHECKLIST WITH MANUAL
PAGE REFERENCES**

INSTALLATION CHECKLIST WITH MANUAL PAGE REFERENCES

REFLECTOR

NOTE

As fasteners are installed, tighten finger tight only, until specifically directed to torque a fastener. Do not climb over rim of reflector until all fasteners are installed and tightened. Then put weight only on ribs.

CHECK	PAGE
----- Attach three hub braces to hub.	2-8
----- Secure A-frame to ground. (Reflector will be built up on A-frame.)	2-9
----- Install left and right pivot brackets using pivot pins.	2-9
----- Install eyebolts inside bottom flange of hub. Attach 3 equal length straps to eyebolts and hoist hub onto pivot brackets. Vertical weld seam in hub should be centered between pivot brackets.	2-10

NOTE

When attaching elevation pivot and actuator brackets to hub and to hub braces, use 3/4" washers as spacers between brackets and hub flange, and between brackets and hub braces.

----- Install elevation actuator to A-frame and actuator bracket.	2-13
----- Attach struts, one at a time, to hub flange. On elevation actuator brackets, use existing screws, washers, and nuts.	2-16
----- Attach rib to top outer hole of upper hub flange. Snug but do not tighten fasteners. Make sure rib is supported by hand until next step is complete.	2-18
----- Attach strut to rib and strut reinforcer. Install U-bolt around strut and through rib and strut reinforcer. Snug but do not tighten fasteners.	2-18
----- Repeat above two steps for other 15 ribs.	2-18
----- Attach 15 intercostal members to strut reinforcer brackets. (Intercostals alternate in direction so as to nest together and share one fastener at each end. Intercostals will help to properly space the ribs apart to accept the panels.)	2-20
----- Rivet rim stiffener onto panel and, using two people, carefully remove panel from crate.	2-21
----- Fasten panels loosely to hub. Align panels in place on ribs and fasten with rivets in outer corner holes which are just inside of rim. Do not fasten remainder of holes to ribs. Insert a spar tab in every fourth panel using a long rivet at the counterclockwise corner of the panel. Continue the sequence until all panels have been installed on ribs. (To install the last panel, it may be necessary to push up on each rib and tighten the strut fasteners to close the gap. After installing the last panel, slightly loosen the strut fasteners again.)	2-24
----- Install rivets to fasten panels to ribs, starting at hub and working in ever-increasing concentric circles toward rim. Do not walk in reflector until all panels have been installed. As rivets are installed in concentric circles from hub outward, weight may be applied over ribs. Avoid putting weight on unsupported parts of the reflector panels or on ribs where rivets have not yet been installed.	2-26
----- Torque fasteners as follows: 3/8" fasteners which attach panels to hub to 31 ft-lb. 1/2" fasteners which attach rib to hub to 76 ft-lb. 1/2" fasteners which attach strut to hub to 76 ft-lb. 1/2" fasteners which attach strut to rib to 76 ft-lb. U-bolt fasteners snugly, but not enough to deform strut reinforcer bracket 3/4" fasteners which hold elevation brackets to hub braces to 260 ft-lb. 1/2" fasteners which hold hub braces to hub to 76 ft-lb.	2-27
----- Build spar, feed, (if C/Ku), and subreflector assembly on ground.	2-27

MOUNT

CHECK	PAGE
----- Torque feet to foundation (see Site Preparation manual).	N/A
----- Lift bearing housing into air above center of foundation.	2-32
----- Fasten legs to bearing housing.	2-32
----- Fasten legs to feet.	2-33
----- Level bearing housing.	2-33
----- Torque fasteners to values given in manual.	2-7

NOTE

If motorized, include brackets for azimuth jack at two appropriate feet and at top of two appropriate legs. The next steps pertain to the motorized mount only.

----- Lift azimuth jack and pivot assembly into position above foundation.	2-39
----- Fasten vertical legs to actuator pivot.	2-39
----- Fasten vertical legs to brackets at feet.	2-40
----- Fasten horizontal legs to actuator pivot and brackets at top of two main mount legs.	2-41
----- Level base of actuator with azimuth jack clevis pin.	2-41
----- Torque fasteners to values given in manual.	2-7
----- Assemble Actuator bars with azimuth jack clevis pin.	2-42
----- Position bearing for correct azimuth sector (see manual).	2-43
----- Fasten actuator bars to rim of bearing housing.	2-43
----- Torque fasteners to values given in manual.	2-7

REFLECTOR INSTALLATION

CHECK	PAGE
----- Set reflector/A-frame/elevation actuator assembly onto mount and fasten 3/4-inch hardware. Lift dish from inside hub. Lines may be tied to spar brackets but must not be allowed to carry any significant load (i.e. > 200 lbs.)	2-46
----- Install polarization drive, then lift cassegrain feed into dish and assemble.	2-50
----- Lift spar assembly into dish and assembly.	2-54
----- Torque fasteners to values given in manual.	2-7
----- Adjust subreflector to feed bezel distance per dimensions in manual.	2-56

CABLING

CHECK	PAGE
----- Route all motor control cables to west side of mount (see electrical installation manual).	N/A
----- Route all de-ice cables to east side of mount (see de-ice installation manual).	N/A

NOTE

Do not dress antenna until service loops for elevation and azimuth travel have been established. It is possible to run some cables inside of legs and spars to improve aesthetics. Provide a small loop for clearance of reflector rim for cables coming from the prime focus.