

Type ES37( )

# 3.7-Meter ESA



## *3.7-Meter Earth Station Antenna*

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# 3.7-Meter Earth Station Antenna

## **Introduction**

Like all Andrew earth station antennas, the 3.7-Meter Earth Station Antenna provides high gain and exceptional pattern characteristics. The electrical performance and exceptional versatility provides the ability to configure the antenna with your choice of linearly-polarized 2-port or 4-port combining network. That versatility is provided at the time of initial purchase, as well as in the future, as your satellite communication requirements evolve.

The aluminum reflector is precision formed for accuracy and strength requiring minimal assembly. The versatile pedestal mount can be purchased with either manual or motorizable capabilities. The pedestal mount features 180 degree azimuth coverage in three continuous 120 degree overlapping ranges and executes 90 degree continuous elevation adjustment. This large adjustment range provides non-critical foundation orientation and the ability to view geostationary satellites from horizon-to-horizon, from any location worldwide.

The motorizable pedestal mount features self-aligning bearings for the elevation pivots, resulting in "zero" backlash. This mount can be operated manually, but has the ability to be upgraded for motorized operation, including steptracking/Smartrack™ applications. The motorizable mount type is indicated by the ES37**MPK** or ES37**MPJK** letters within the antenna type number. The addition of the letter "J" within the antenna type number indicates that the mount includes azimuth/elevation machine jackscrews, instead of corresponding azimuth/elevation strut assemblies. The azimuth/elevation jackscrews are equipped for integration with the optional motor drive systems.

A manual pedestal mount is also available. It provides the same strong and versatile combination of mechanical features as the motorizable version; except that the elevation and azimuth axes are locking types, instead of bearing mounted types. This mount type is always equipped with manual struts and a fixed mount for the separately-ordered combining network. This mount has been designed for manual applications only and cannot be upgraded to a motorizable mount.

The aluminum enclosure and hot-dipped galvanized steel mount maintain pointing accuracy and ensures durability and reliability. The antenna and standard manual mount with enclosure will survive 125 mph (200 km/h) wind, in any position of operation, without damage or permanent deformation in moderate coastal/industrial areas. Severe conditions require additional protection.

Andrew provides a complete line of available options, including field-installed electrical anti-icing heaters, motor drive systems (with power interfaces addressing domestic and international standards), remote microprocessor antenna control for motor drive systems, pressurization equipment, and interconnecting HELIAX® cables and waveguide.

**Proprietary Data**

The technical data contained herein is proprietary to Andrew Corporation. It is intended for use in operation and maintenance of Andrew supplied equipment. This data shall not be disclosed or duplicated in whole or in part without express written consent of Andrew Corporation.

**Information and Assistance**

Andrew Corporation provides a world-wide technical support network. Refer to the technical assistance portion of this manual for the contact numbers appropriate to your location.

**Notice**

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

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

All designs, specifications, and availabilities of products and services presented in this manual are subject to change without notice.

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**Technical Assistance**

**24-hour Technical Assistance**

For technical assistance, call the following numbers at anytime.

Call From	Call To	Telephone	Fax
North America (toll free)	U. S. A.	1-(800)-255-1479	(800)-349-5444
Any Location (International)	U. S. A.	(708)-349-3300	(708)-349-5410

**Customer Service Center**

The Andrew Customer Service Center gives you direct access to the information and personnel service you need, such as the following:

- Place or change orders
- Check price and delivery information
- Request technical literature

You can call from any of the following:

Call From	Telephone	Fax
North America	1-800-255-1479 (toll free)	1-(800)-349-5444 (toll free)
United Kingdom	00-800-0-255-1479 (toll free)	00-800-0-349-5444 (toll free)
Australia	0011-800-0-255-1479 (toll free)	0011-800-0-349-5444 (toll free)
China	00-800-0-255-1479 (toll free)	00-800-0-349-5444 (toll free)
New Zealand	00-800-0-255-1479 (toll free)	00-800-0-349-5444 (toll free)
Hong Kong	001-800-0-255-1479 (toll free)	001-800-0-349-5444 (toll free)



# How to Use This Manual

## Overview

The scope of this manual is intended to provide station personnel with the base installation, operation, and maintenance requirements necessary for a 3.7-Meter C- or Ku-Band Earth Station Antenna. This manual provides a convenient reference for authorized operator/service personnel requiring technical information on general system or specific subsystem equipment.

The tables and figures presented in this manual are used as communication aids for the installation, operation, and maintenance of the 3.7-Meter Earth Station Antenna. These tables and figures instantly convey messages, as well as make the procedures easier to understand. This manual uses tables and figures for the following references:

- **Tables** The tables allow you to locate information quickly and easily.
- **Drawings** The drawings supplement the installation instructions by using a combination of graphics and verbage to assist you in simplifying complex procedures and clarifying components.
- **Photographs** The photographs compliment the installation instructions by providing actual examples of the steps being performed, which allow you to view the installation in concrete form.

## Content

The manual is divided into five distinct sections, each dealing with a specific technical topic relating to either system or component subsystem information. The sections contained in this manual are described and listed under the following technical headings:

- **How to Use This Manual** Describes the manual's purpose, content, and communication aids. Additionally, this section lists the related documentation for the 3.7-Meter Earth Station Antenna.
- **Getting Started** Provides the preliminary information needed to perform a successful installation. This section should be reviewed prior to the installation. The warnings, recommended tools, parts verification, instructions on reporting lost or damaged equipment, and installation checklist are located in this section.
- **Installation Procedures** Provides the procedures for the different phases of a 3.7-Meter Earth Station Antenna base installation. This section will help you easily find requirements for an individual task, as well as displays the sequence for each task execution.
- **Operation** Describes the controls, functions, and general operating procedures required for proper operation of the 3.7-Meter Andrew Earth Station Antenna.
- **Preventive Maintenance** Describes preventive maintenance procedures that are required to maintain proper functional operation of your new Andrew Earth Station Antenna.

# Getting Started

## Overview

The installation, operation, and maintenance of the 3.7-Meter Earth Station Antenna requires qualified and experienced personnel. Andrew installation, operation, and maintenance instructions are illustrated for such personnel. Additionally, the antenna should be inspected by qualified personnel to verify proper installation, maintenance, and condition of equipment as described in Preventive Maintenance. The basic equipment and accessories are either manufactured or design controlled by Andrew Corporation.

The prerequisite information necessary for the 3.7-Meter Earth Station Antenna can be found in this section. Furthermore, this section should be reviewed BEFORE performing the installation, operation, or maintenance. Warnings, recommended tools, and the antenna parts can be verified and/or determined with such a review.

## Warnings

When installing the 3.7-Meter Earth Station Antenna, be conscious of the warnings presented below. For further information or clarification of this information, contact the Customer Service Center. The warnings are as follows:

1. Electrical shock from voltages used in this antenna system may cause personal injury or death. Prior to making any electrical connections or performing maintenance or repair, ensure that the power is removed. Electrical connections should be made only by qualified personnel in accordance with local regulations.
2. Installation of antennas may require persons to work at elevated work stations. Whenever persons are working at eight or more feet above the ground and not on a guarded platform, they should wear safety belts with at least one (preferably two) lanyards.
3. Never stand underneath any object while it is being lifted.
4. Always wear a hard hat, especially if someone is above you.
5. Make sure no person is in or under the reflector while it is being lifted or positioned; personal injury can result if the reflector assembly falls.
6. Personnel should never be hoisted in or out of the reflector by the crane; personal injury may result.
7. Andrew earth station antennas supplied to standard product specifications will survive 125 mph winds in any operational position in moderate coastal/industrial areas. Severe conditions require additional protection. Should it be expected that winds will exceed 125 mph, it is recommended that Andrew antennas be steered to specific azimuth and elevation orientations to minimize wind forces upon the structure and thereby increase the probability of survival.
8. It is recommended that all cross-axis waveguide and coaxial cables are secure such that high winds will not cause excessive flexing. Position the antenna to an elevation of 90 degrees. The azimuth jackscrew should be placed in the center of its travel.
9. When the antenna is transmitting, severe eye injury or injury to other parts of the body can result from exposure to radio frequency (RF) energy. The antenna must be turned off before entering the area in front of the reflector and near the feed.

**NOTE:** Failure to follow an installation procedure could result in damage to equipment or personal injury.

Additional warnings will be displayed throughout this manual for your awareness. These warnings can be identified in warning boxes as shown in the following sample.



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

**Recommended Tools**

Andrew supplies all appropriate hardware/parts required for the installation of your 3.7-Meter Earth Station Antenna. All tools necessary for the installation process should be provided by the installation crew. Andrew recommends the following tools to be used for a proper installation of the 3.7-Meter Earth Station Antenna.

Tool	Size	Quantity
Open End or Combination Wrenches	5/16 Inch	2
	7/16 Inch	2
	9/16 Inch	2
	7/8 Inch	2
	3/4 Inch	2
	1/2 Inch	2
	1-1/4 Inch	1
Crane	1 Ton Minimum Capacity, extended end	1
Nylon Web Slings (2000 pound breaking strength)	3 Inch by 14 Foot	2
Rope or Cord (2000 pound breaking strength)	50 Foot	1
Shackles	5/8 Inch	2
Ladder	10 Foot Extension	1
Drive Sockets	1/16 Inch	1
	9/16 Inch	1
	7/8 Inch	1
	3/4 Inch	1
	1-1/4 Inch	1
Breaker Bar	1/2 Inch	1
Spud Wrenches	1-1/16 Inch	1
	1-1/4 Inch	1
Screw Driver	Standard	1
	Phillips	1
Allen Wrench	7/64 Inch	1
	3/16 Inch	1
	1/4 Inch	1
Tape Measure (or other measuring device)	Standard	1
Felt-tip Marker (or other marking device)	Standard	1
Hammer	Standard	1
Rubber Mallet	Standard	1
Pry Bar	Standard	1
Tin Snips	Standard	1
Safety Gloves (each installer)	Standard	1

**Table 2-1. Recommended Tools**

## **Parts Verification**

Upon receipt of your order, the shipment should be verified to ensure that all parts have reached your site. This process should occur before the installation process begins.

Andrew Corporation thoroughly inspects and carefully packs all equipment before shipment. If you find that there are missing components, please refer to page 9 for step-by-step instructions on how to properly report the equipment loss.

When you have received your order, verify that all parts contained in the shipment correspond to the parts listed on your packing list.

## **Reporting Equipment Loss or Damage**

If you find that there was damage caused to the equipment during the shipping process, a claim should be filed with the carrier. Follow the "Reporting Visible Loss or Damage" or "Reporting Concealed Damage" procedures when filing a claim with the carrier.

## **Reporting 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.

## **Reporting 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 an inspection by the carrier's agent, then file a claim with the carrier since such damage is most likely the carrier's responsibility.

## **Inventory Equipment Received**

After opening your shipment, an inventory of the parts should occur immediately. Check each item received in your shipment against the packing slip included with the shipment. If any items are missing, please notify Andrew Corporation immediately by contacting the Customer Service Center.



## **Returning Equipment**

Andrew Corporation tries to ensure that all items arrive safe and in working order. Occasionally, despite these efforts, equipment is received which is not in working condition. When this occurs, and it is necessary to return the equipment to Andrew Corporation for either repair or replacement, return can be expedited by following the procedure listed below:

### **Step 1**

Call the Andrew Customer Service Center and request a Return Material Authorization (RM) number, as well as an address to forward the material to.

### **Step 2**

Tag or identify the defective equipment, noting the defect or circumstances. Also, be sure to write the RM number on the tag. It would be helpful to reference the sales order and purchase order, as well as the date the equipment was received.

### **Step 3**

Pack the equipment in its original container with protective packing material. If the original container and packing material are no longer available; pack the equipment in a sturdy corrugated box, and cushion it with appropriate packing material.

### **Step 4**

Be sure to include the following information when returning the equipment:

- Your Company Name
- Your Company Address
- City, State, and Zip Code
- Telephone Number
- RM Number
- Problem Description
- Contact Name

**NOTE:** Absence of the RM number will cause a delay in processing your equipment for repair. Be sure to include the RM number on all correspondence.

### **Step 5**

Ship the equipment to Andrew Corporation using UPS, U.S. Postal Service, or other appropriate carrier; freight prepaid and insured. The material should be forwarded to the address given by the Andrew contact in Step 1.

## **Installation Sequence Checklist**

### **Site Preparation**

The 3.7-Meter Earth Station Antenna requires the installation team to perform the assembly in the sequence presented below. Moreover, this sequence should be reviewed to ensure a smooth installation. Use the following checklist to verify and/or determine the installation sequence.

Refer to Foundation Section for guidance in preparing location and installation of the 3.7-Meter Earth Station Antenna foundation.

### **Ground Mount Assembly**

- Unpack ground mount assembly
- Attach ground mount assembly to foundation
- Organize ground mount hardware
- Wax galvanized hardware in hardware kit
- Tighten ground mount hardware to foundation
- Attach azimuth strut weldment to ground mount assembly
- Assemble azimuth strut
- Mount azimuth strut to ground mount assembly
- Bolt elevation strut brackets to elevation strut
- Mount elevation strut to ground mount assembly
- Assemble manual actuator
- Remove manual actuator (after elevation/azimuth adjustment)

### **For MPK Types Only**

**For MPJK Types  
Only**

- Mount azimuth pivot assembly to ground mount assembly
- Bolt one jack to azimuth pivot assembly
- Unscrew jack
- Tighten galvanized hardware using A-325 tensioning procedure
- Lubricate jackscrews
- Pull protective boot over jackscrew
- Bolt elevation pivot assembly brackets to ground mount assembly
- Bolt second jack to elevation pivot assembly
- Unscrew jack
- Tighten galvanized hardware using A-325 tensioning procedure
- Lubricate jackscrews
- Pull boot over jackscrew

**Main Reflector  
Assembly**

- Remove protective covering from crate
- Pry top crate panel off
- Pry sides off crate
- Pry front off crate
- Unbolt reflector halves from bottom of crate
- Prepare assembly area with blocks of wood to assemble reflector
- Lay reflector halves on prepared assembly area
- Align reflector halves
- Insert all hardware as outlined in Installation Procedures

## ***Enclosure Assembly***

## ***Reflector-To- Mount Assembly***

- Add reflector-mounting ring
- Mount front and back hub-mounting rings
- Apply sealant to outside of reflector-mounting ring
- Perform recommended string test
- Remove rear and side covers from enclosure assembly
- Attach enclosure to mounting ring
- Apply sealant backing rod around enclosure/mounting ring mating surfaces
- Apply RTV sealant
- Route sling through upper holes of torsion box assembly
- Route two rope tag lines through torsion box assembly to be used as guides
- Place foam blocks on ground to avoid scraping reflector when lifted
- Raise reflector
- Bolt left bolt of enclosure bracket
- Rotate reflector to align right bolt
- Extend elevation strut or jackscrew, and attach to top of enclosure assembly
- Tighten hardware using A-325 tensioning procedure
- Carefully raise reflector to zenith position
- Remove hoisting apparatus

## ***Subreflector***

- Preassemble subreflector weldment
- Attach subreflector-mounting ring to strut assembly
- Attach angle clips
- Attach subreflector to reflector
- Adjust subreflector
- Tighten adjustment hardware

## ***Feed System***

- Refer to installation instructions packaged with the individual feed systems

# Installation Procedures

## Overview

This section provides installation procedures for the 3.7-Meter Andrew Earth Station Antenna. The installation procedures include instructions on the following antenna components:

- Mount
- Reflector
- Enclosure
- Reflector-to-Mount Assembly
- Subreflector
- Feed System (Refer to installation instructions packaged with the individual feed systems)

## Foundation Preparation

Before beginning the installation process on the ground mount assembly, ensure that the foundation has been prepared. Foundation specifications are provided by Andrew and may be used as a reference by civil engineering personnel when preparing the foundation for local soil conditions. These specifications are available before the shipment arrives by contacting the Customer Service Center.

Sweep foundation clean of any dirt or debris.

To ensure level, smooth surface for mount, remove excess concrete from shear caps and anchor bolts as shown in Figure 3-1.



Figure 3-1

## A-325 Tensioning

During the installation process, there are several references to the A-325 hardware tensioning procedure. The A-325 hardware must be properly tensioned to avoid slippage between bolted surfaces under high loads. Slippage can cause the corresponding assembly to move, causing antenna misalignment. When designated, the A-325 hardware should be tightened according to the following tensioning procedure.

**NOTE:** Tensioned bolts are for final connections only and should not be loosened for reuse.

### Step 1

Lubricate the bolt threads with the provided stick wax to reduce friction.

### Step 2

Insert the bolt, and add a flat washer—if required. **Do not** allow wax under the flat washer.

### Step 3

Add the nut, and finger tighten.

### Step 4

After the connections are complete, tighten the bolts until the surfaces are joined and the nuts are snug (for example, full effort of a person using an ordinary spud wrench). Do not proceed with Steps 5 and 6, unless the connection is final and is not intended to be loosened again.

**Note:** If the bolts are loosened after Steps 5 and 6, discard and replace with new hardware.

### Step 5

Using a felt-tip marker, mark the nuts and the ends of the bolts with a straight line as shown in Figure 3-1a and Figure 3-1b.

### Step 6

Tighten the nuts further with an extra long wrench until the nuts are moved 1/3 turn (120 degrees) as shown in **Figure 3-1a** for bolt lengths less than four diameters and 1/2 turn (180 degrees) as shown in **Figure 3-1b** for bolt lengths over four diameters.

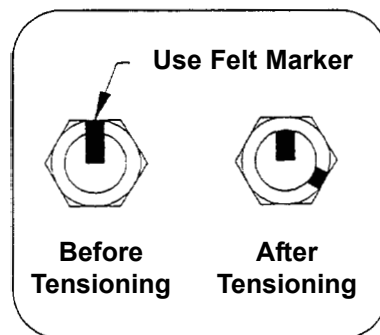


Figure 3-1a: A-325 Tensioning Procedure For bolts less than 4 diameters

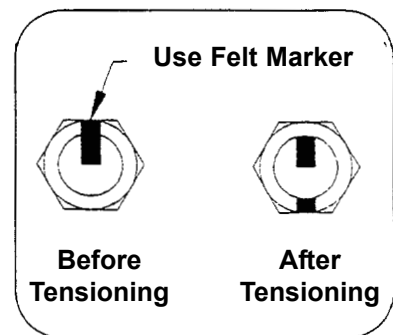


Figure 3-1b: A-325 Tensioning Procedure For bolts over 4 diameters

## **Mount**

The elevation/azimuth mount design simplifies installation, minimizes foundation requirements, and enables horizon-to-horizon coverage from any worldwide location. The ground mount assembly enables 180 degree positioning for selected azimuth viewing. Azimuth range coverage is plus or minus 90 degrees, divided into three 120 degree continuous ranges with a 30 degree overlap. Elevation adjustment is continuous from 0 degrees to 90 degrees.

After ensuring that the foundation has been properly prepared, the ground mount assembly process may begin.

## **Unpacking**

The pedestal ground mount assembly arrives in a packaged wooden crate as shown in Figure 3-2 below. The mount can be positioned manually or by using a crane; however, Andrew recommends that this procedure be performed using a crane to ensure speed and ease of installation.

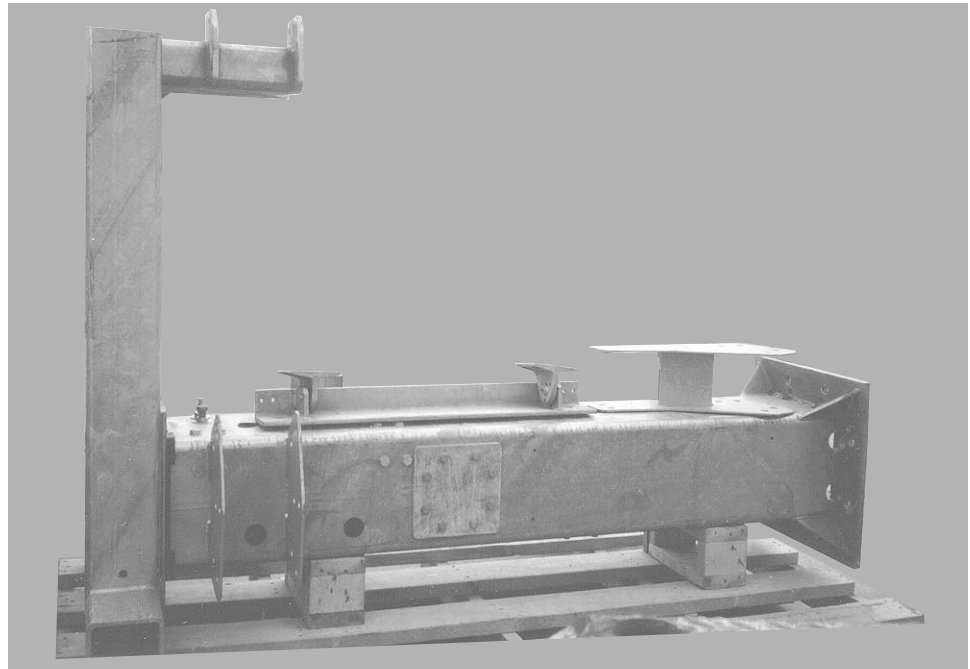


Figure 3-2: Crate Unpacking

## **Assembly (Using a Crane)**

As stated previously, the pedestal ground mount installation process can be conducted manually or by using a crane. The following steps provide the necessary procedures for installing the ground mount assembly *using a crane*.



**Step 1** Carefully remove the ground mount assembly (P/N 208800 - motorizable or P/N 202680-2 manual) from the packing crate. Leave the steel strapping intact to avoid disengagement of the panning frame from the square-tube weldment during the ground mount installation.

**Step 2** Securely attach the crane to the ground mount assembly using a sling, and carefully raise the entire ground mount as shown in Figure 3-3.



Figure 3-3: Raising Ground Mount Assembly

**Step 3** Align the ground mount assembly directly over the anchor bolts (P/N 203314 - manual or P/N 203666 - motorizable), which should have been previously mounted in the foundation pad.

**NOTE:** Ground mount positioning on the foundation is dependent upon predetermined azimuth viewing requirements. The ground mount assembly arm should be positioned opposite the satellite requirement. If your site is in the Northern hemisphere, your satellite will be located in the South. If your site is in the Southern hemisphere, your satellite will be located in the North.

**Step 4** Lower the ground mount assembly onto the anchor bolts with the corresponding hole pattern.

**Step 5**

Attach the ground mount assembly to the eight corresponding anchor bolts using a 3/4 inch flat washer and 2-3/4 inch hex nuts as shown in Figure 3-4a. One 3/4 inch hex nut is supplied with the anchor bolt kit and the second 3/4 inch hex nut is supplied with the antenna.

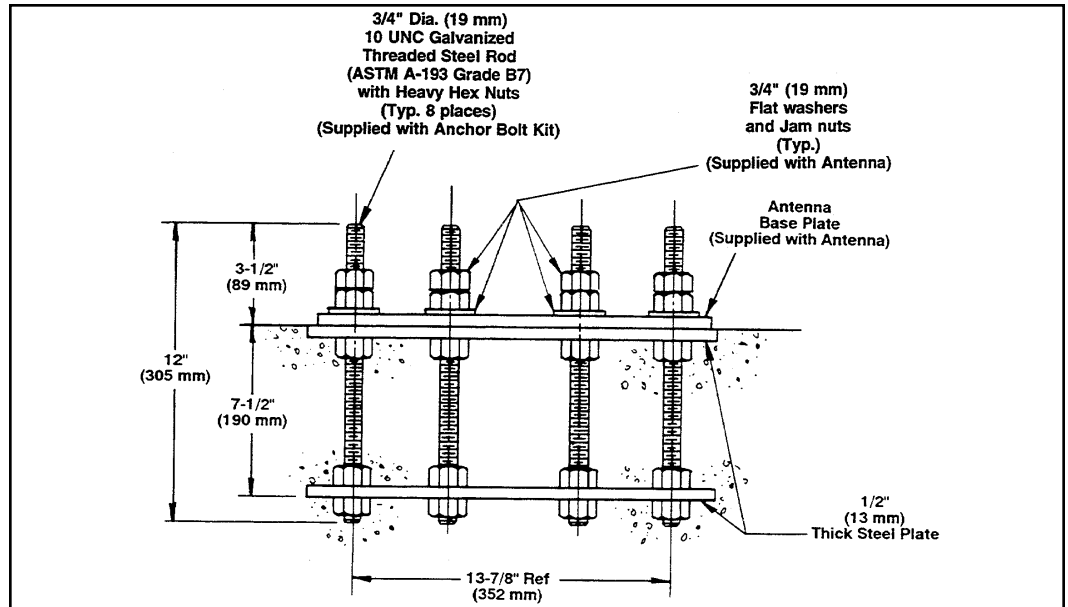


Figure 3-4a: Ground Mount Assembly Base Hardware

**Step 6**

Remove the steel strapping from the ground mount assembly.

**Step 7**

Tighten the foundation hardware using the A-325 tensioning procedure.

Figure 3-4b shows the ground mount assembly attached to the foundation.



Figure 3-4b: Ground Mount Assembly Base Hardware

## **Assembly (Without a Crane)**

As stated earlier, Andrew recommends the use of a crane during this installation process; however, we recognize that a crane may not always be available. If a crane is not available, the following steps provide the procedure for installing the ground mount assembly without a crane.

### **Step 1**

Carefully remove the ground mount assembly (P/N 208800-motorizable or P/N 202680-2- manual) from the packing crate. Leave the steel strapping intact to avoid disengagement of the panning frame from the square-tube weldment during the ground mount installation.

### **Step 2**

Lay the ground mount assembly on its side, in line with the anchor bolts (P/N 203314-manual or P/N 203666-motorizable) as shown in Figure 3-5.

**NOTE:** Ground mount positioning on the foundation is dependent upon predetermined azimuth viewing requirements. The ground mount assembly panning-frame arm should be opposite of the satellite requirement. If your site is in the Northern hemisphere, your satellite will be located in the South. If your site is in the Southern hemisphere, your satellite will be located in the North.



Figure 3-5: Ground Mount Assembly Alignment with Anchor Bolts

**Step 3**

Lift the ground mount assembly into an upright position. In the absence of a crane, it is recommended that a minimum of two people assist in the lifting of the mount assembly as shown in Figure 3-6a and Figure 3-6b.



Figure 3-6a: Manual Lift



Figure 3-6b: Manual Lift



Figure 3-7: Mount Alignment/Adjustment

**NOTE:** You may need to adjust the mount when lifting it to ensure that the anchor bolts are aligned directly underneath the base of the ground mount assembly as shown in Figure 3-7.

**Step 4**

Attach the ground mount assembly to the eight corresponding anchor bolts using a 3/4 inch flat washer and 2-3/4 inch hex nuts as shown in Figure 3-3a.

**NOTE:** Ground mount positioning on the foundation is dependent upon predetermined azimuth viewing requirements. The ground mount assembly arm should be opposite the satellite requirement. If your site is in the Northern hemisphere, your satellite will be located in the South. If your site is in the Southern hemisphere, your satellite will be located in the North.

**Step 5**

Remove the steel strapping from the ground mount assembly.

**Step 6**

Tighten the foundation hardware using the A-325 tensioning procedure.

Figure 3-8a illustrates the ground mount assembly attached to the foundation.



Figure 3-8a: Ground Mount Assembly Base Hardware

## **Motorizable Pedestal Ground Mount Assembly**

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

### **Step 1**

Position and mount 204737 azimuth tiller arm weldment to ground mount assembly as shown using 0.75 x 1.75 in. A-325 bolts and nuts. Tighten hardware per A-325 tensioning procedure. **NOTE:** Mounting position of azimuth tiller arm weldment is dependent upon predetermined azimuth range requirements as shown.

### **Step 2**

Apply supplied stick lubricant to set screw threads. Loosely install 0.50 x 1.0 in. set screws in azimuth and 0.50 x 1.50 in. set screws in elevation strut supports.

### **Step 3**

Position and mount 204754 elevation support angle assembly to ground mount as shown using 0.50 x 1.75 in. A-325 bolts, flat washers and nuts. Tighten hardware per A-325 tensioning procedure.

### **Step 4**

Loosely install supplied 0.75 x 2.00 in. A-325 bolts, flat washers and nuts in elevation support angle assembly. This hardware along with the upper elevation strut hardware will be attached to the antenna and tightened to the A-325 tensioning procedure at the time of antenna installation.

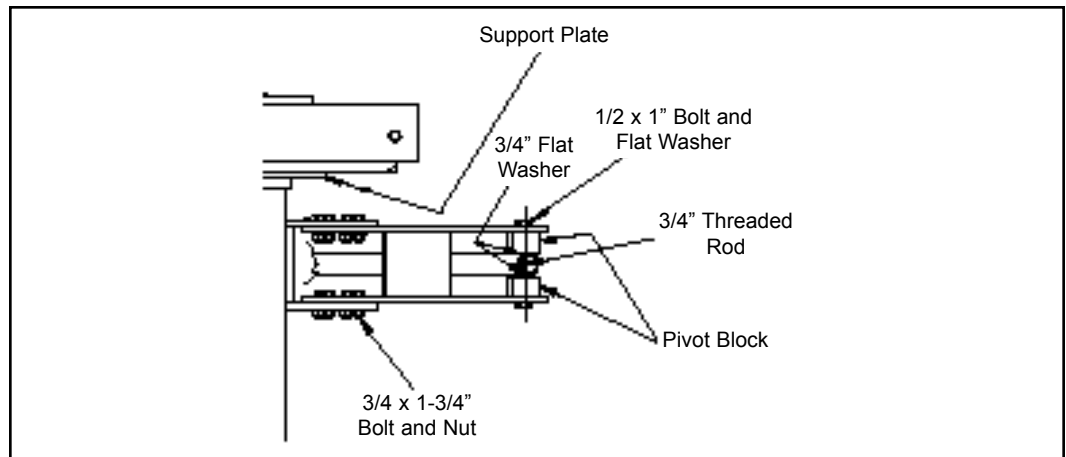


Figure 3-8b: Ground Mount Assembly Tiller Arm Hardware

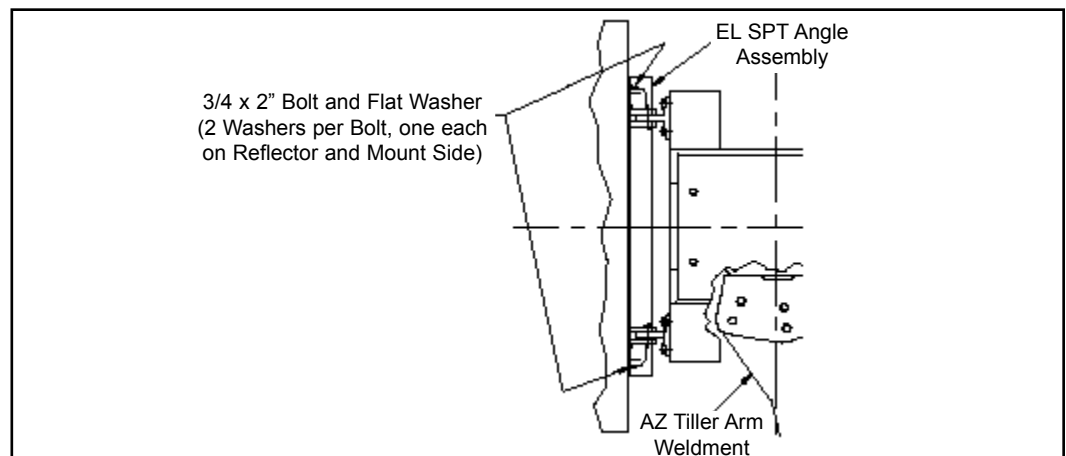


Figure 3-8c: Ground Mount Assembly Elevation Support Angle

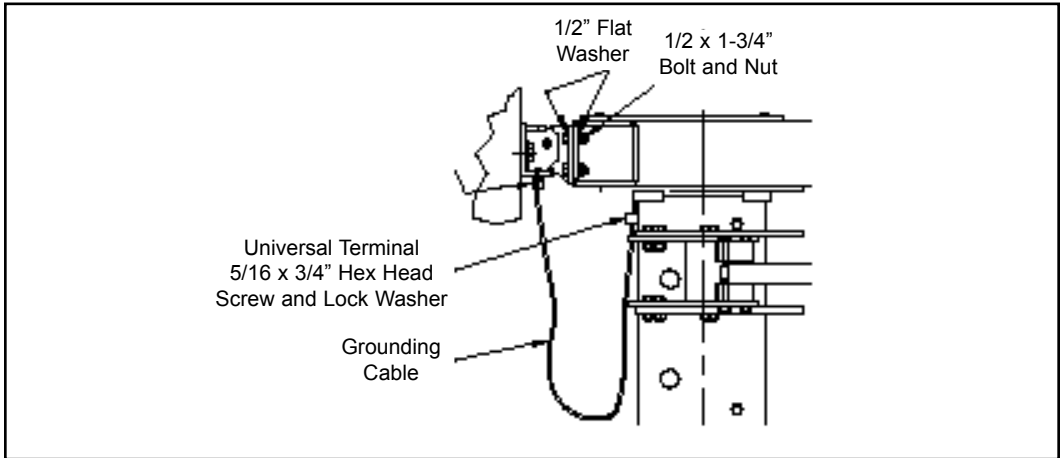


Figure 3-8d: Ground Mount Assembly Tiller Arm Hardware

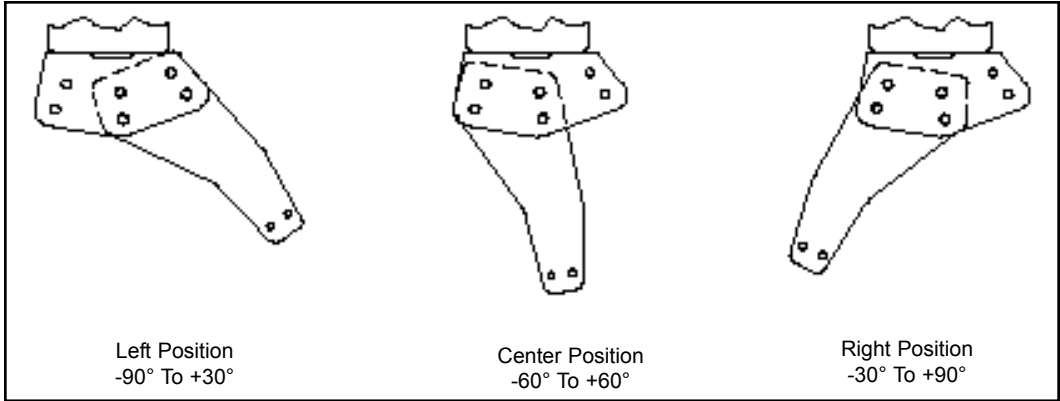


Figure 3-8e: Ground Mount Assembly Tiller Arm Hardware

## **Manual Pedestal Ground Mount Assembly**

### **Step 1**

Prepare the ground mount hardware in the mount hardware kit by sorting all bolts, nuts, and flat washers into separate sections as shown in Figure 3-9.



Figure 3-9: Hardware Separation

### **Step 2**

Wax two sides of each galvanized bolt with the stick wax provided. This allows a smooth installation of each galvanized bolt as shown in Figure 3-10.



Figure 3-10: Waxing Bolts



**Step 3**

Position and mount the azimuth tiller arm (P/N 203112) to the tiller-arm bracket on the left side (facing the satellite) of the ground mount assembly. This mounting position of the azimuth tiller arm is dependent upon pre-determined azimuth range requirements as shown in Figure 3-11.

**NOTE:** The ground mount assembly enables 180 degrees positioning for selected azimuth viewing. Azimuth range coverage is plus or minus 90 degrees, divided into three 120 degree continuous ranges with a 30 degrees overlap. Elevation adjustment is continuous from 0 degrees to 90 degrees.

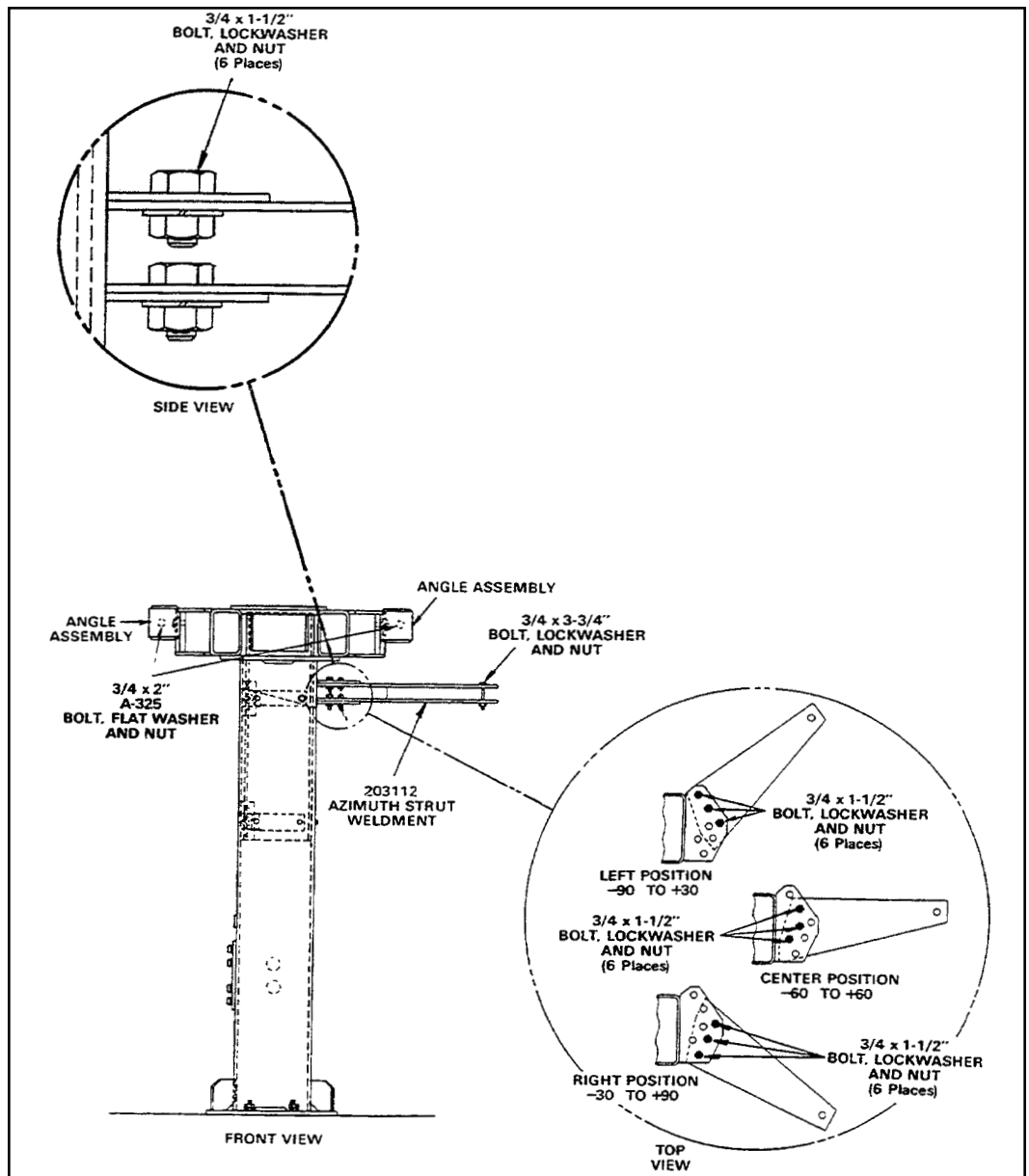


Figure 3-11: Azimuth Tiller Arm

**Step 4**

Tighten the hardware using the A-325 tensioning procedure.

An illustration of the final azimuth tiller arm is shown in Figure 3-12.



Figure 3-12: Azimuth Tiller Arm - Final Assembly

**Step 5**

Locate the elevation and azimuth struts (P/N 202951-2-manual) as shown in Figure 3-13.

**NOTE:** The azimuth strut is the strut on the right and the elevation strut is on the left.



Figure 3-13: Elevation and Azimuth Struts

**Step 6**

Insert pivot blocks (P/N 205876) onto the end of the azimuth strut using lubricated 1/2 inch bolt, flatwasher and hex nut as shown in Figure 3-14. A 3/4 inch flat washer should be inserted between the strut and the spacer block. Tighten hardware according to the A-325 tensoning procedure.



Figure 3-14: Azimuth Strut Assembly

**Step 7**

Slide the round strut assembly bracket (P/N 203875) on the end of the azimuth strut, and hand tighten the 1/2 inch setscrews before mounting it on the ground mount assembly as shown in Figure 3-15.



Figure 3-15: Azimuth Strut-Bracket Assembly

**Step 8**

Mount the second azimuth support plate (P/N 205875) pivot assembly to the rear end of the ground mount assembly as shown in Figure 3-16. Spacer blocks (P/N 205874) and 5/8 inch hardware (hex bolt, flatwasher, hex nut) should be inserted as shown in Figure 3-10.



Figure 3-16: Azimuth Pivot Assembly

**Step 9**

Mount the azimuth strut to each bracket on the ground mount assembly as shown in Figure 3-17a and Figure 3-17b. The front and rear brackets should be aligned as shown in Figure 3-18.

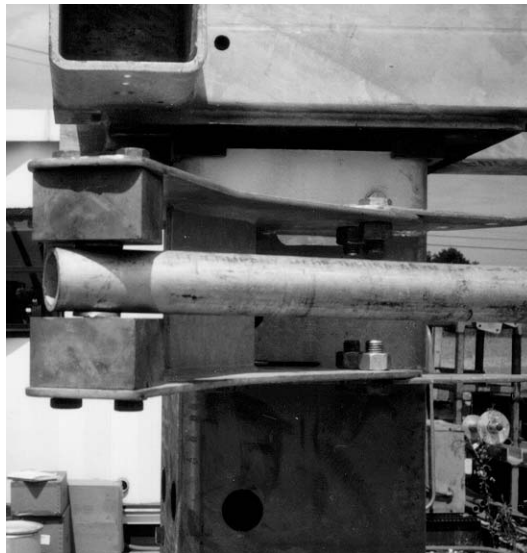


Figure 3-17a: Azimuth Strut Assembly - Front

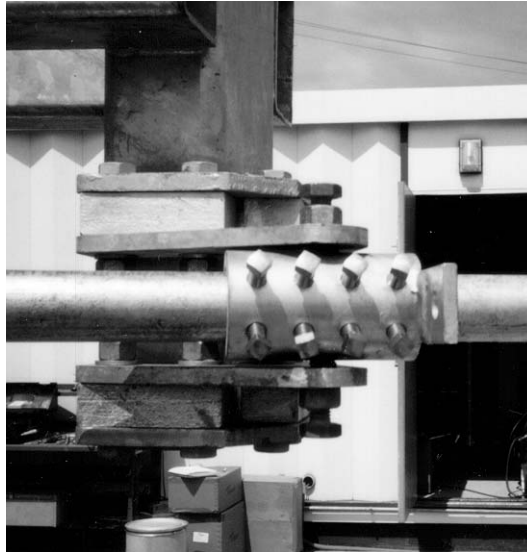


Figure 3-17b: Azimuth Strut Assembly - Rear

Figure 3-18 illustrates a final azimuth strut assembly mounted to the ground mount assembly.



Figure 3-18: Azimuth Strut Assembly - Final Assembly

**Step 10**

The next step is to install the elevation strut assembly. Begin by bolting the elevation strut tube assembly (P/N 205872) to the ground mount assembly as shown in Figure 3-19.



Figure 3-19: Elevation Strut Pick Up Assembly (Top View)

**Step 11**

Bolt the elevation bracket-support plates (P/N 205873) to the elevation strut tube assembly using 5/8 inch hardware (hex bolt, flatwasher and nut) as shown in Figure 3-20.



Figure 3-20: Bracket-Support Plates (Top View)

**Step 12**

The elevation strut tube assembly should now be bolted to the elevation strut bracket as shown in Figure 3-21a and Figure 3-21b.



Figure 3-21a: Elevation Strut Bracket

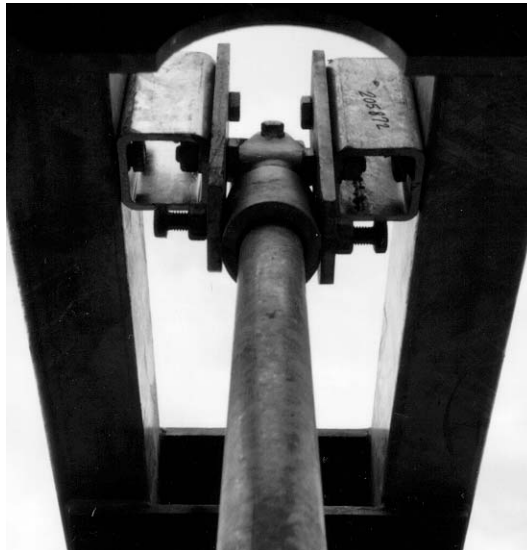


Figure 3-21b: Elevation Strut Bracket

## Manual Actuator Assembly

The manual actuator assembly (P/N 207882) is used to adjust the elevation and azimuth angles of the 3.7 meter antenna. The following steps provide the procedure used to assemble and install the manual actuator assembly.

### Step 1

Loosely attach the manual actuator assembly (P/N 207882) to the elevation strut as shown in Figure 3-22 using clamp segments, 1/4 inch screw, lockwasher and hex nut in each of the 12 connections.

**NOTE:** The drain hole should be positioned downward for proper water drainage.

### Step 2

Attach the base angle to the actuator (P/N 202661) using 1/2 inch screws, flatwashers and hex nuts as shown in Figure 3-22. **AVOID EXCESSIVE TORQUE ON THE MOUNTING HARDWARE.**

### Step 3

Ensure that the locking strut-support setscrew is firmly tightened on the strut assembly as shown in Figure 3-22.



Figure 3-22a: Manual Actuator Assembly

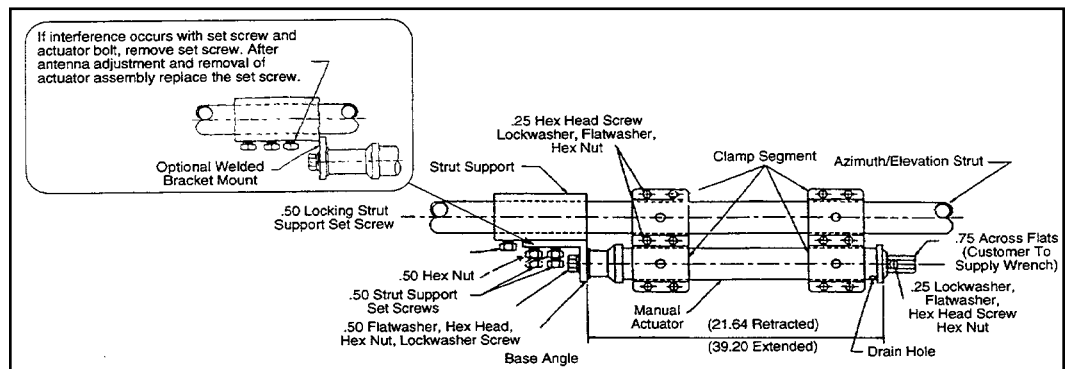


Figure 3-22b: Manual Actuator Assembly



- Step 4** Remove the two indicated strut-support setscrews, and attach the base angle to the corresponding strut support using the supplied 1/2 inch clamping nuts and the previously removed strut-support setscrews as shown in Figure 3-22b.
- Step 5** Securely tighten the remaining mounting hardware to achieve the clamping force.
- Step 6** Follow directions for “Acquiring a Satellite”.
- Step 7** Repeat the entire procedure for the remaining strut assembly.

### **Manual Actuator Assembly Removal**

After the adjustments have been made, the manual actuator should be removed. The following steps provide the procedure for the proper removal of the manual actuator assembly.

- Step 1** Remove the manual actuator assembly by first removing the hardware securing the actuator to the base angle.

**NOTE:** The adjustment kit assembly should be removed after the antenna has been adjusted. Store the manual actuator assembly and the corresponding hardware in a dry area for future use.

- Step 2** Remove the remaining clamp segments with the corresponding hardware.

- Step 3** After the antenna is pointed at the satellite, tighten all azimuth and elevation setscrews to 35 foot-pounds.

### **Motorizable Pedestal Ground Mount Assembly**

If you are assembling a motorizable pedestal mount (P/N 208800) follow the directions for ground mount assembly before beginning this section. The following steps provide the procedure for assembling the motorizable pedestal ground mount.

- Step 1** Bolt the azimuth pivot assembly (top and bottom) brackets to the ground mount assembly using 5/8 inch hardware (hex bolt, flatwasher and hex nut) as shown in Figure 3-23.



Figure 3-23: Azimuth Pivot Bracket Assembly

**Step 2**

Bolt one jack to the azimuth pivot assembly using 5/8 inch hardware (hex bolt, flatwasher and hex nut) as shown in Figure 3-24.

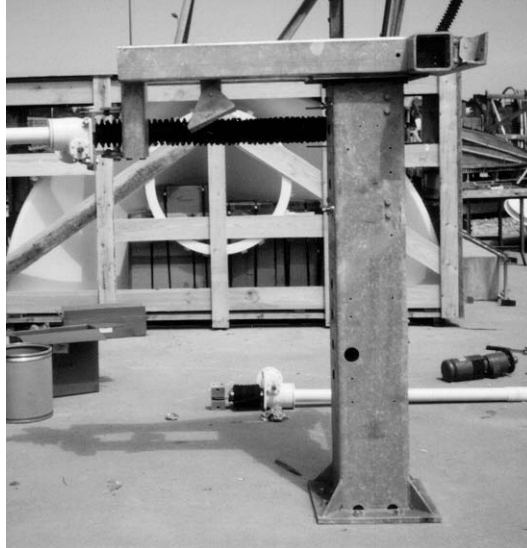


Figure 3-24: Jack Attachment

**Step 3**

Unscrew the jack using a spud wrench until it meets with the front azimuth strut weldment as shown in Figure 3-25a.



Figure 3-25a: Jack Unscrew Procedure

**Step 4**

Place pivot blocks (P/N 205876) on both sides of the jackscrew ends, bolting with lubricated 1/2 inch hex bolt, flatwasher and hex nut as shown in Figure 3-25b.



Figure 3-25b: Azimuth Jack Attachment

**Step 5**

Tighten the hardware using the A-325 tensioning procedure.

**Step 6**

Lubricate the jackscrews according to the maintenance instructions.

**Step 7**

Pull the protective boot over the jackscrew, and clamp at the end as shown in Figure 3-26.

**Note:** Position condensation drain holes downward.



Figure 3-26: Protective Boot Attachment

**Step 8**

Bolt the elevation pivot assembly brackets (P/N 208370 - left and P/N 208371 - right) to the inside of the ground mount assembly as shown in Figure 3-27.



Figure 3-27: Elevation Pivot Bracket Assembly

**Step 9**

Bolt the jack to the elevation pivot assembly using 5/8 inch hardware (hex bolts, flat-washers and nuts) as shown in Figures 3-28a and 3-28b.



Figure 3-28a: Elevation Jack

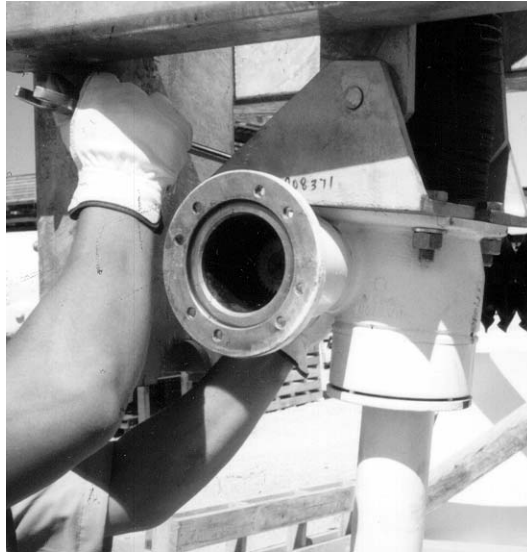


Figure 3-28b: Elevation Jack

**Step 10** Loosen the clamp on the jack boot.

**Step 11** Unscrew the jack by using a spud wrench until the jack connects to the back of the enclosure as shown in Figure 3-28c.



Figure 3-28c: Elevation Jack Extension

**Step 12** Tighten the hardware using the A-325 tensioning procedure.

**Step 13** Lubricate the jackscrews using the maintenance procedures.

**Step 14** Pull the protective boot over the jackscrew, and clamp it at the end as was performed with the azimuth jackscrew.

**Embedded Pipe  
Ground Mount  
Assembly**

Refer to Figure 3-29a for an overall view of the assembled embedded pipe ground mount assembly, reflector and subreflector assemblies.

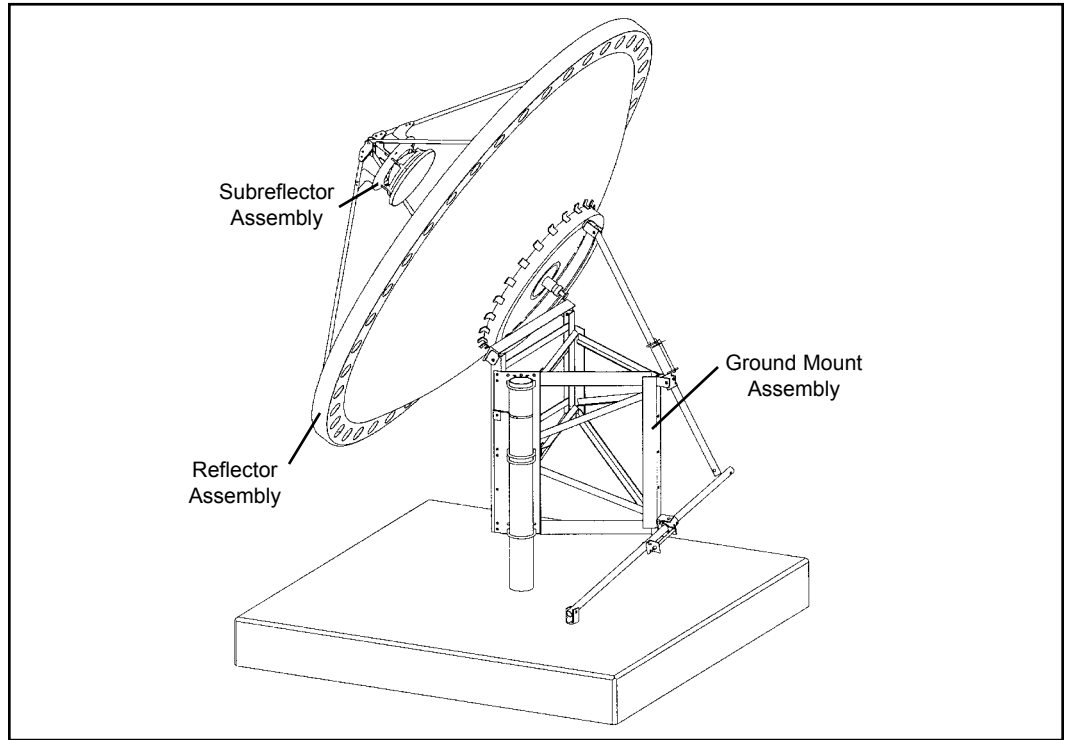


Figure 3-29a: Typical Embedded Pipe Mount Earth Station Antenna

**Step 1**

Attach the 104320 left side frame, to the 168 tube using four 104326 U-bolts, 100526-51 M16 nuts and 100522-51 lockwashers. Add an 100536-21 M16 X 40 long bolt, 100526-51 nut and two 100522-51 lockwashers at the top of the tube, as shown in Figure 3-29b. Arrange this bolt so that a flat rests on the top of the tube.

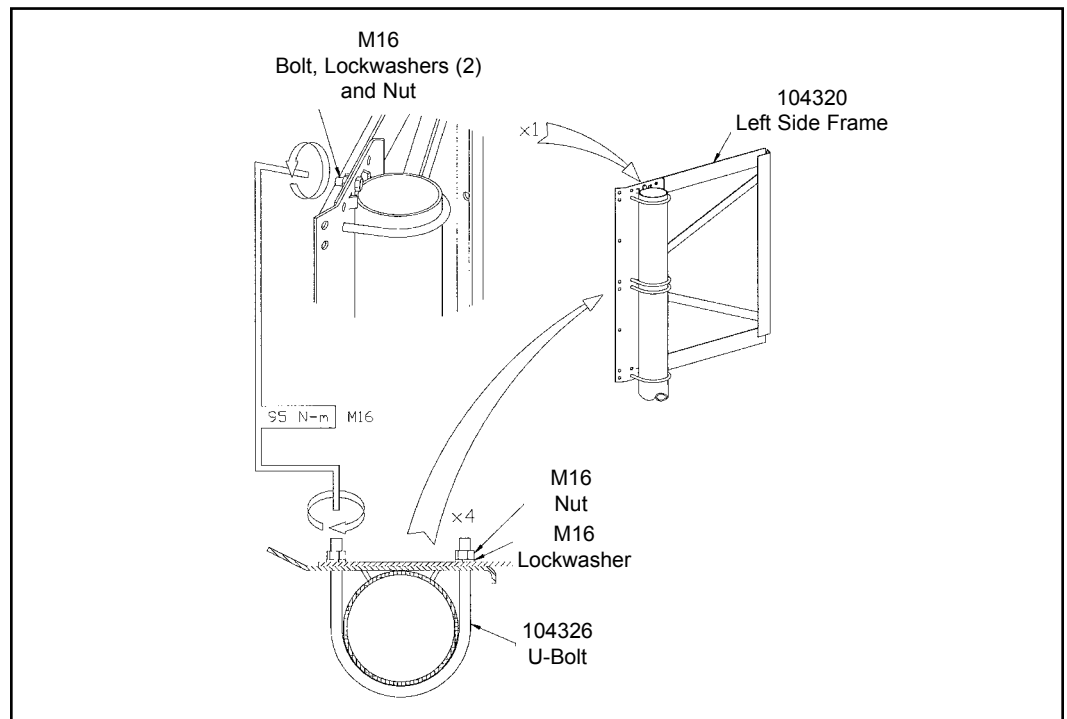


Figure 3-29b: Left Side Frame Attachment

## Step 2

Attach the 104319 front frame to the left side frame as shown in Figure 3-29c. Attach the 104325 braces to the left side by means of the U-bolts. Attach the right side frame and braces to the front frame and the right side frame to the left side frame, also shown. For all of these joints, use 100532-21 M16x40 long bolts, 100526-51 nuts and 100522-51 lockwashers. When assembly is in place, tighten to 95 N-m. (70 lbs-ft).

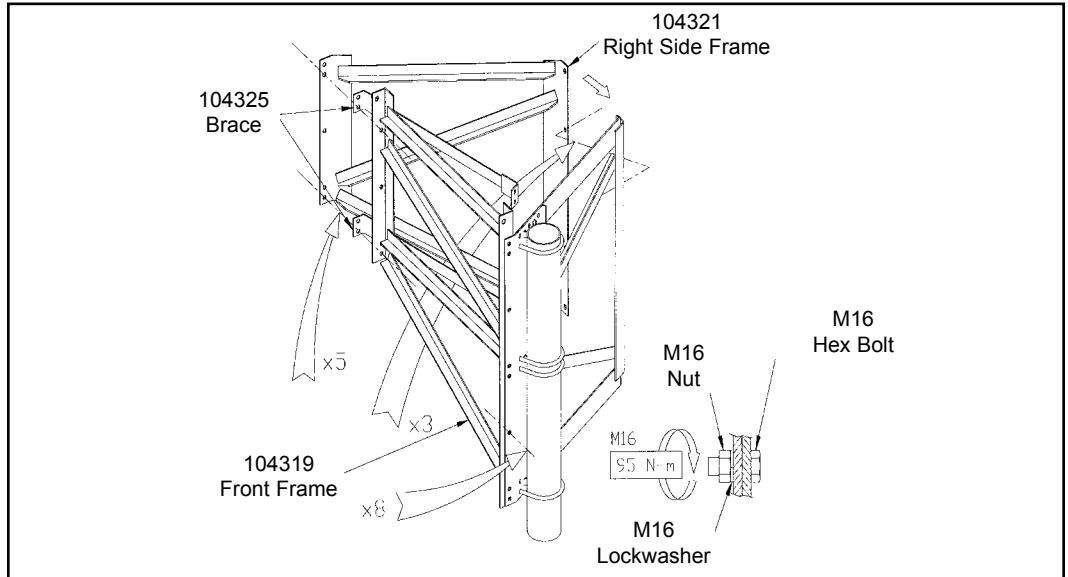


Figure 3-29c: Front Frame Attachment

## Elevation/Azimuth Strut Assembly

### Step 3

Attach 104638 U-bracket to one end of each 301899 support pipe using 100537-87 M20 X 100 hex bolt, 100526-57 M20 hex nut and 100522-57 lockwasher. Attach 301900 strut bracket to 49258 strut support using 45980-1 .625-11 x 2" long bolt and nut assembly. **Note:** Long bolt and nut assembly should not protrude inside diameter of 49258 strut support. Assemble strut bracket/strut support assembly to support pipe by sliding over strut with welded tab facing 104638 U-bracket. Snug the strut support in place using 9953-15 .50-13 x 1.5" long square head screws in three places. See Figure 3-29d. **Note:** For elevations above 75° reverse the strut support so the welded tab faces away from U-bracket.

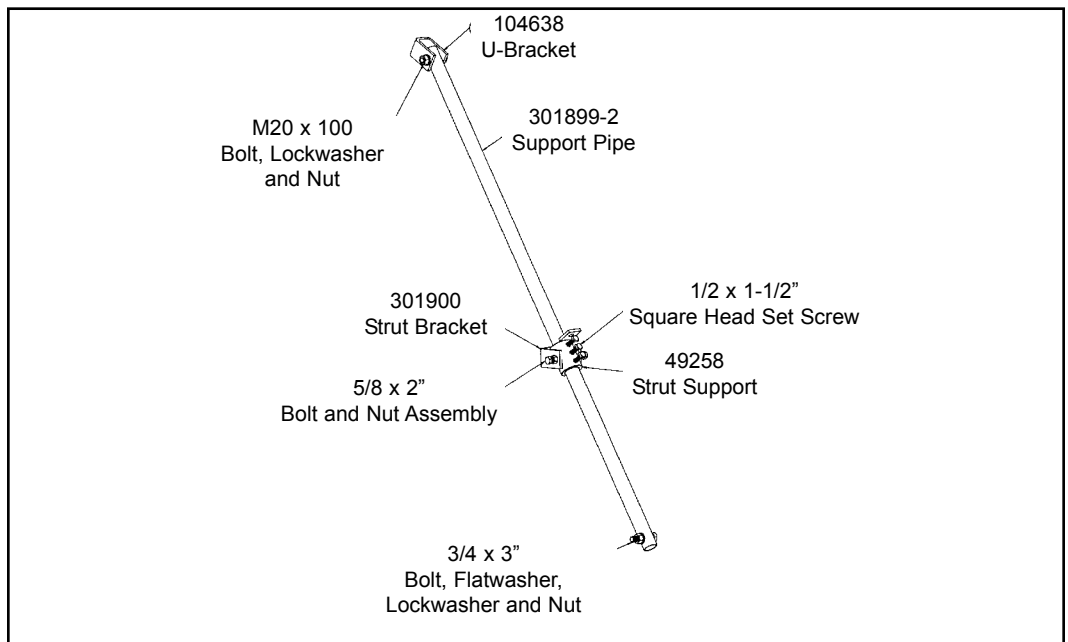


Figure 3-29d: Elevation/Azimuth Strut Assembly

**Step 4**

Attach the elevation strut to the top of the rear frame assembly as shown in Figure 3-29e using the 100537-15 M20 x 50 bolt, 100526-57 nut and 100521-57 flatwasher. Tighten bolts to 185 N•m. (136 lbs-ft).

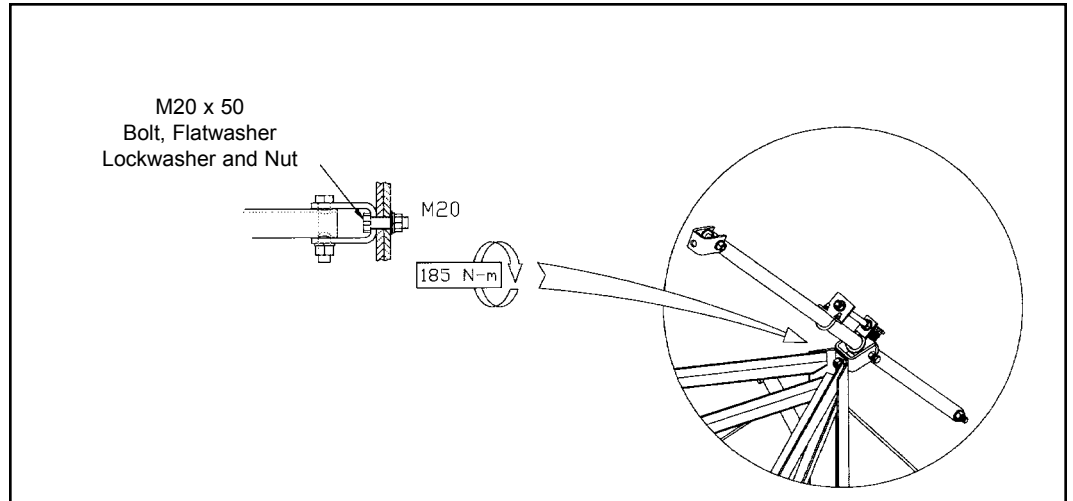


Figure 3-29e: Elevation Strut Attachment

Attach 301917 elevation axis weldment to the front of the frame assembly in two places using 100537-15 M20 x 50 long bolt, 100526-57 nut and 100522-57 lockwasher as shown in Figure 3-29f.

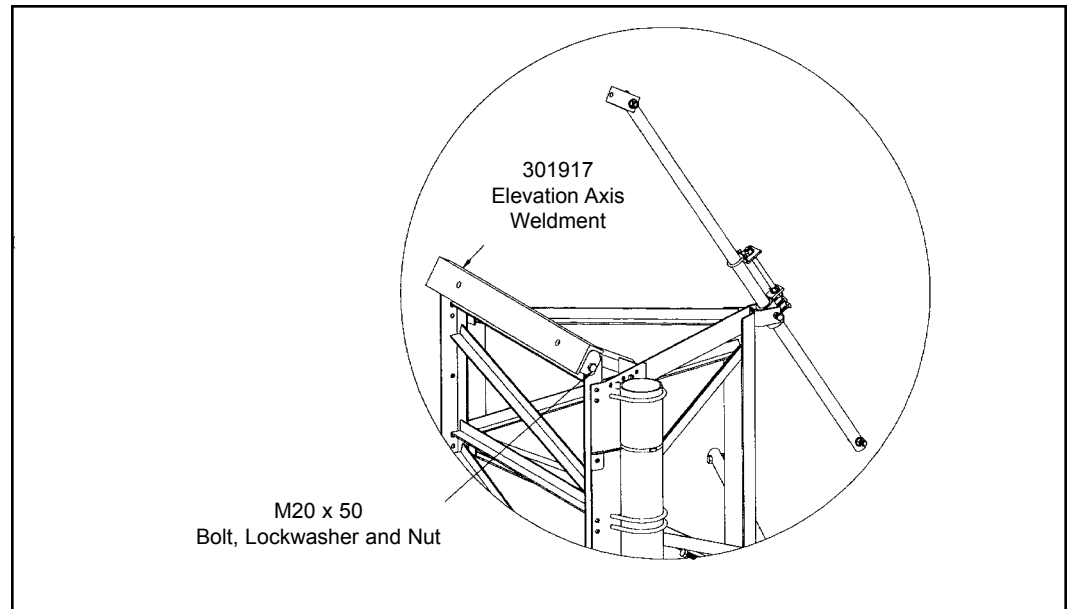


Figure 3-29f: Elevation Axis Weldment Attachment



**Step 5**

Attach the azimuth strut to the bottom rear of the frame assembly as shown in Figure 3-29g, using the 100537-15 M20 x 50 long bolt, 100526-57 nut, 100521-57 flatwasher and 100522-57 lockwasher. Attach the strut to the foundation anchor, as shown in Figure 3-29g.

**Step 6**

Install 301931 pointer where shown in Figure 3-29g by removing the mount bolt at specified location then reinstalling with 100521-51 flatwasher and pointer. Choose appropriate 221027 azimuth label for antenna location (Northern or Southern Hemisphere) and attach to 11809-24 clamp. Slide scale behind pipe and align with pointer and tighten. See Figures 3-29g and 3-29h.

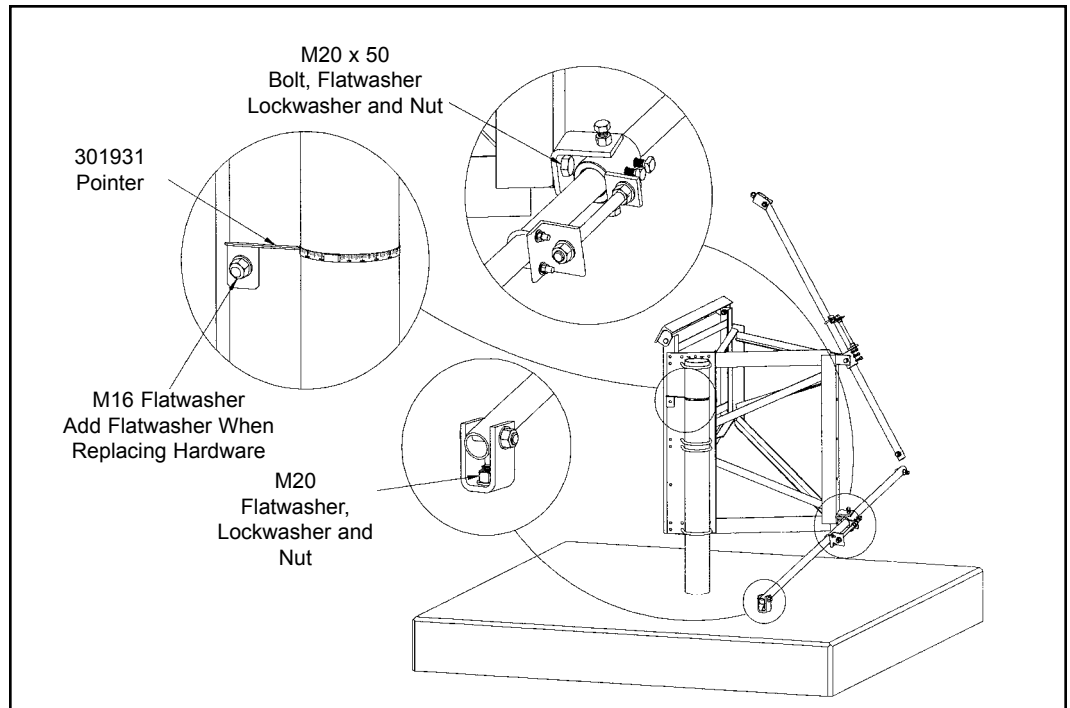


Figure 3-29g: Azimuth Strut/Pointer Attachment

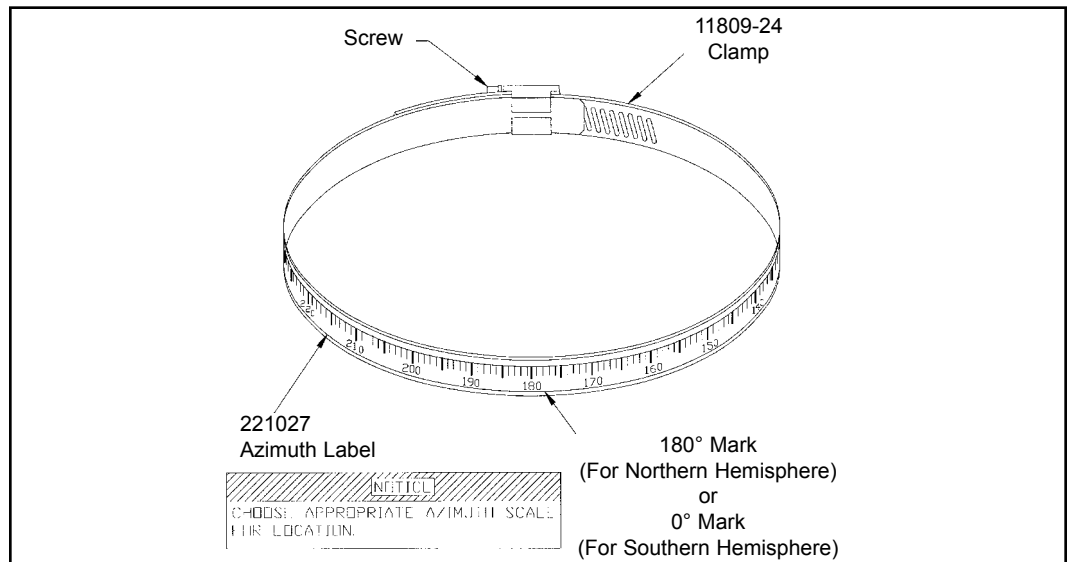


Figure 3-29h: Azimuth Label/Clamp

**Step 7**

Install fine az. adjustment, attach 40188-3 thread rod to 49712-3 bracket with 9999-167 .75-10 nuts and 9997-166 flatwasher. Slide threaded rod through welded tab and fasten using 9999-167 .75-10 nuts and 9997-166 flatwasher. **Note:** It will be necessary to temporarily remove one square head bolt for fine adjusting the threaded rod. After fine adjustment it is recommended that the fine adjustment rod assembly remain in place. If the threaded rod is removed the square head bolt must be replaced. Attach 49712-3 bracket to strut using 9956-67 U-bolt, 9999-109 .50-13 nut and 9974-4 lockwasher. See Figure 3-29i. Repeat for elevation strut.

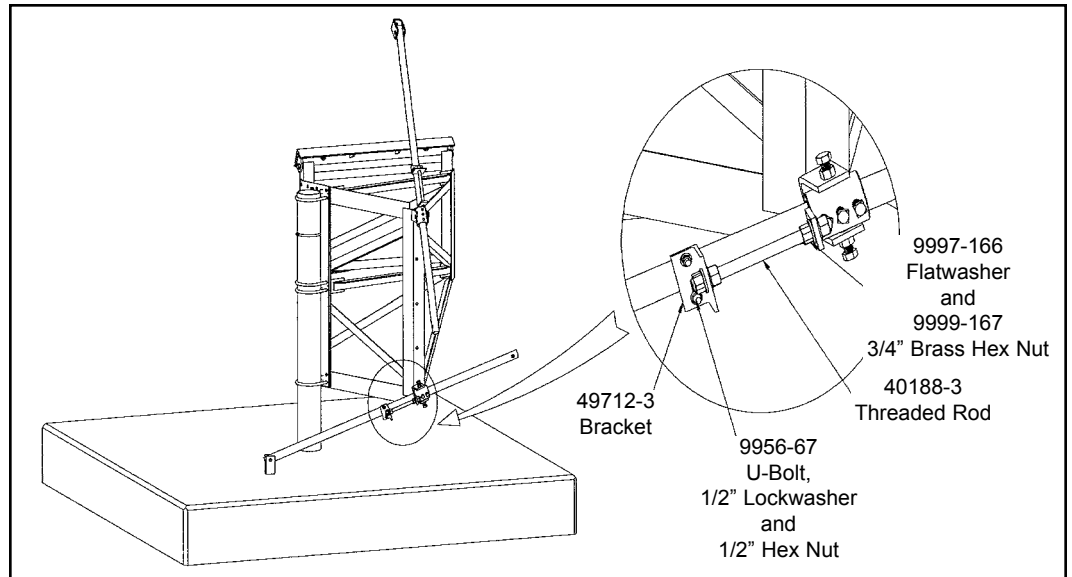


Figure 3-29i: Fine Azimuth Adjustment Attachment

The ground mount assembly is now completed with the necessary operational essentials. All ground mount options (such as motors) have separate instructional bulletins located in the parts kit that contains the option.

The next step in the installation process is the reflector assembly. Proceed to the instructions on assembling the reflector.

## **Reflector**

The precision-spun aluminum reflector assembly enables ease of installation and ensures accurate surface contour providing exceptional operating characteristics in the C-/Ku- frequency band.

**NOTE:** The instructions below are provided for the split-reflector style 3.7-Meter Earth Station Antenna. If you are installing the full reflector style, skip this section and proceed to Step 7.

## **Unpacking**

Upon receiving your 3.7-Meter Earth Station Antenna, notice that it is delivered in a wooden crate and covered with a white nylon sheath. The protective crate covering shields the product from being damaged during the shipment process.

While unpacking the shipment, ensure that the correct parts are included by checking them against the packing list. The following steps provide the procedure for unpacking the crate.

The crate arrives on site covered in a white sheath (domestic pack) or wood (export pack). See Figure 3-30a and Figure 3-30b.

### **Step 1**

Remove the protective covering from crate.

### **Step 2**

Pry the top crate panel off with a pry bar.

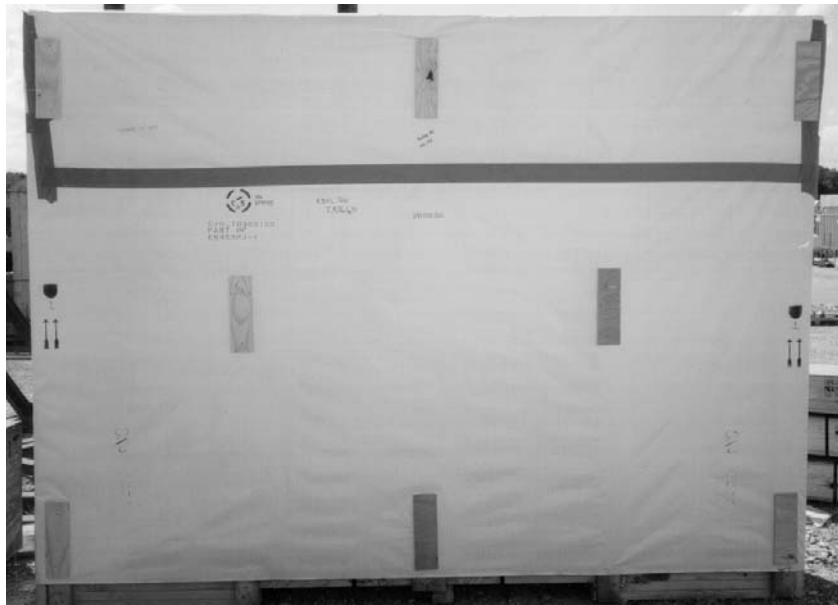


Figure 3-30a: Domestic Pack



Figure 3-30b: Export Pack



Figure 3-30c: Unpacking

**Step 3** Pry the short ends of the crate off by using a pry bar and hammer as shown in Figure 3-30c.

**NOTE:** Notice that the parts of your order are boxed and banded to your crate. Remove these boxes by snipping the banding with tin snips.

**Step 4** Take the front, long side of the crate off.

**Step 5** Unbolt the reflector halves from the bottom of the crate. **DO NOT PRY.**

**Step 6** Find a flat area for the reflector assembly. The area must be large enough for the reflector halves to lay adjacent to each other. Pieces of wood (such as 2" X 4" pieces) can be positioned to provide a level surface for the reflector to rest on, which will prevent scratching of the reflector.

**Note:** This area must be level or there may be problems in correctly aligning the reflector.

**Step 7** Lay the first half of the reflector (which has the flash located at twelve o'clock) face down on the blocks of wood.

**Step 8** Lay the second half of the reflector face down on the blocks of wood.

**Step 9** Unbolt the mounting ring from the crate, and set with the rest of the parts to be assembled.

**Step 10** Improve timeliness of clean up by discarding unneeded materials while unpacking the crate. You can place all wood and unneeded materials in one area away from the installation site.

### **Assembly**

Once the crate has been unpacked, you can begin assembling your Andrew earth station antenna. The reflector halves are placed next to each other to begin the assembly. The following steps provide the procedure for assembling the 3.7-Meter reflector.

**Note:** Figure 3-33c provided at the end of this section shows a diagram of the reflector assembly.

**Step 1** Station an installer under the reflector halves to begin the assembly.

**Step 2** See that the joint plates are clean, and then bring the reflector halves together aligning the joint-plate holes.

**NOTE:** The lip of one half fits over the other half, and the bolts match exactly when placed together correctly. Additionally, each half has a serial number and a red stripe that must match to ensure that you have the correct halves in the correct place.

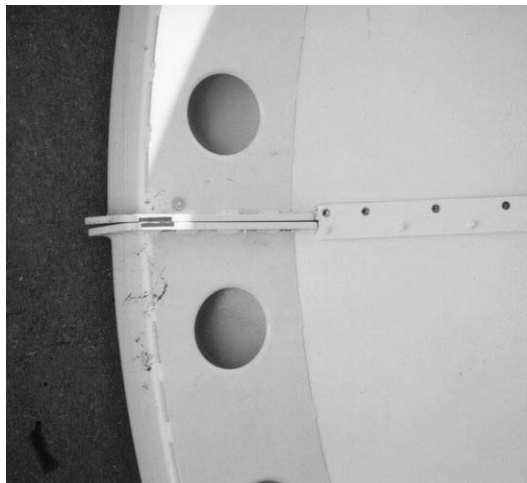


Figure 3-31: Reflector Seam Alignment

**Step 3**

Insert all of the joint-plate bolts, except for the socket-head shoulder bolts. All bolts should be inserted from the same direction using a 5/16 inch hardware—flat washer under a lock washer and nut. **DO NOT TIGHTEN.**

**Note:** DO NOT force bolts—manipulate reflector halves to allow free insertion.

**Step 4**

At both antenna seams, loosely install three location bolts and nuts (5/16 inch hardware) adjacent to the center hole as shown in Figure 3-32.

**NOTE:** The installer positioned under the reflector should insert the bolts from the underside, while the second installer inserts the flat washers under lock washers and nuts from the outside.



Figure 3-32: Seam Bolt Insertions

**Step 5**

**VERY IMPORTANT**

Add the alignment hex bolts to the end holes of the joint plates as shown in Figure 3-33a (outside and inside of plate) to ensure that it is evenly aligned; and use hex bolts to fill the rest of the joint plates as shown in Figure 3-33b. **THESE MUST NOT BE DRIVEN, BUT INSERTED BY HAND.**

**NOTE:** All bolts should be inserted from the same direction using a bolt, flatwasher under a lockwasher and nut on joint plate and a bolt and locknut on the seam.

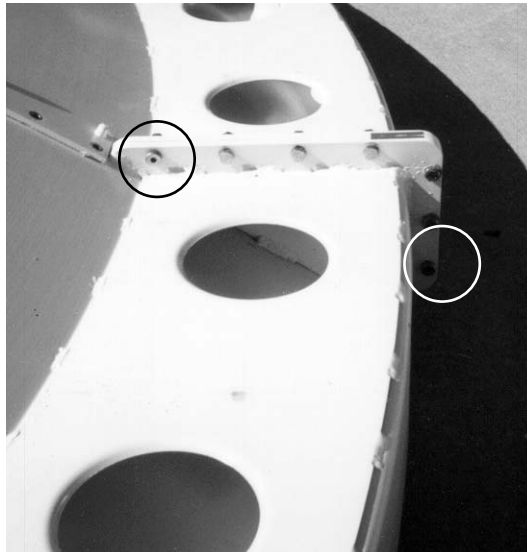


Figure 3-33a: Alignment Bolt Insertions

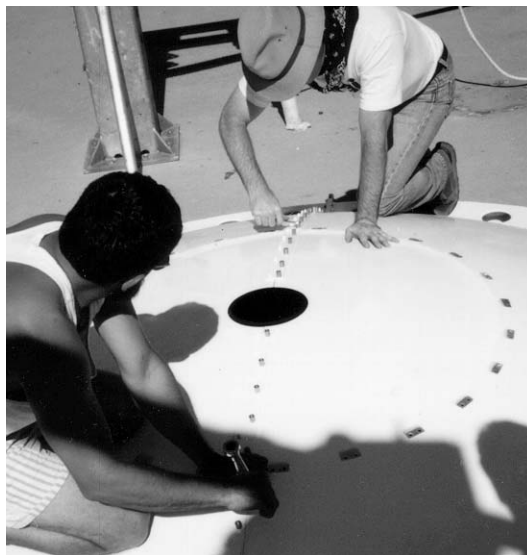


Figure 3-33b: Alignment Bolt Insertions

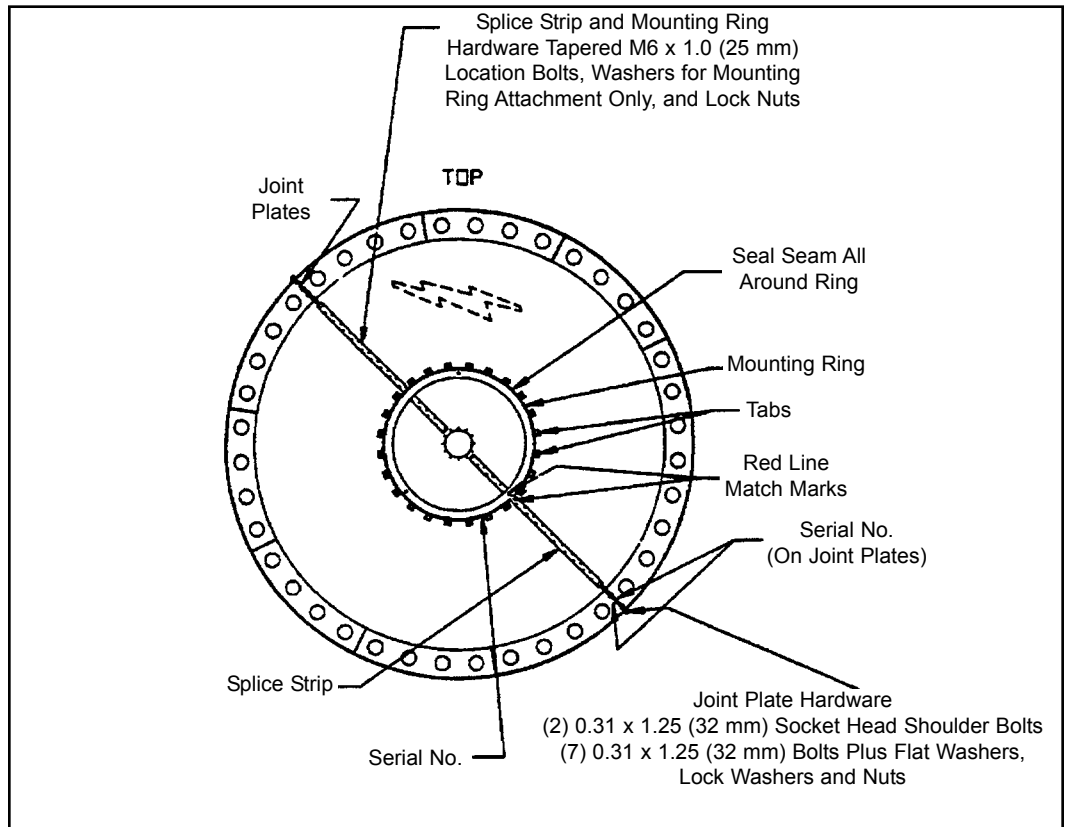


Figure 3-33c: Alignment Bolt Insertions

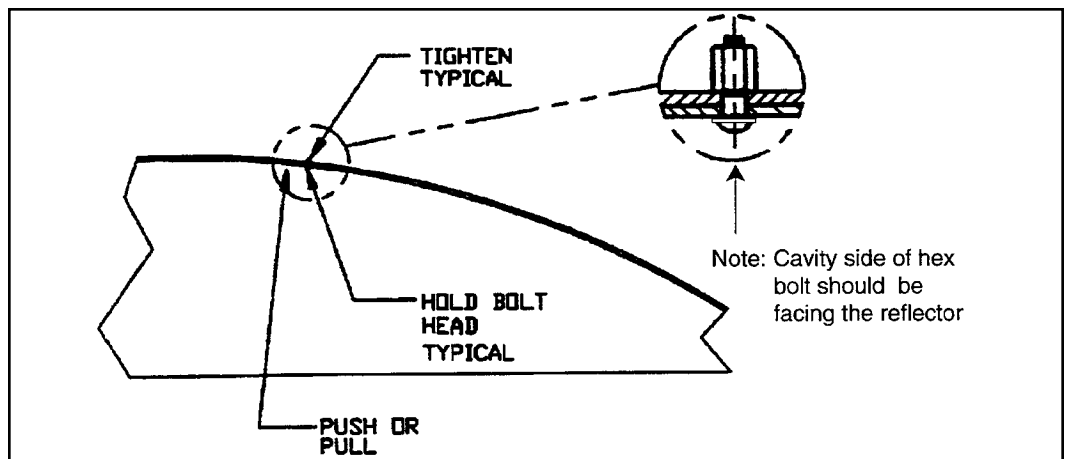


Figure 3-33d: Alignment Bolt Insertions

**Step 6**

Tighten the hardware if the seam is correct starting from the center and working towards the outside of the reflector. Before tightening hardware, verify that the reflector seam gap is even along its length. Push from both directions of the seam if necessary.

**NOTE:** The installer positioned inside the reflector must hold the bolt head with a wrench, while the nut on the outside is tightened.



**Step 7**

Add the reflector-mounting ring to the assembled reflector. Notice that the notches in the mounting ring fit over the reflector seam indicating where the mounting ring should be placed. There is also a red stripe placed on the mounting ring. This red stripe must be aligned with the red stripe on the reflector as shown in Figure 3-34a. When all bolts are inserted, tighten in a clockwise sequence, tabs on the mounting ring must be flush with the reflector as shown in Figure 3-34b.



Figure 3-34a: Mounting Ring Placement

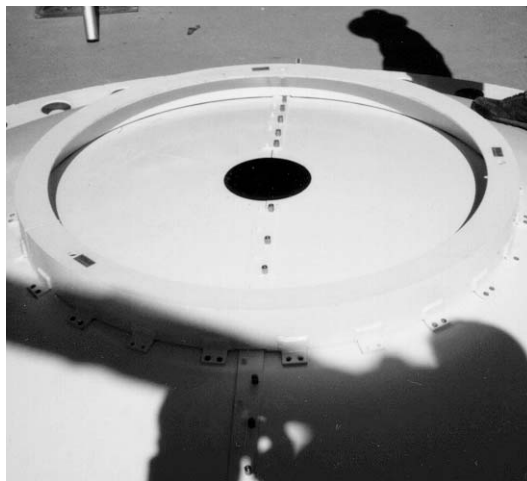


Figure 3-34b: Mounting Ring Placement

**Step 8**

Mount the front (P/N 202790) and back hub-mounting ring (P/N 49965) to the reflector with the appropriate hardware as shown in Figures 3-35a and b.

**NOTE:** These components are included as part of P/N 206319 Feed Hardware Kit. For K-Band Antennas, these components are included as part of P/N 301544 Feed Hardware Kit (2-Port) or P/N 301515 Feed Hardware Kit (4-Port).

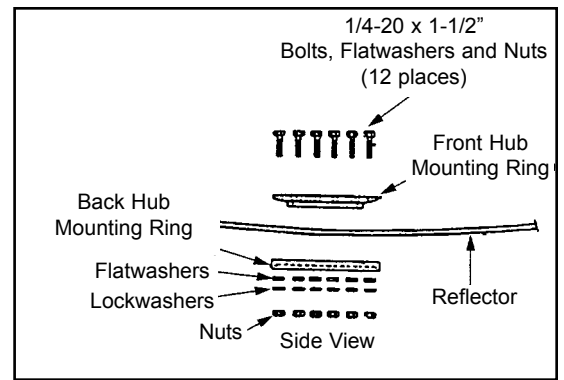
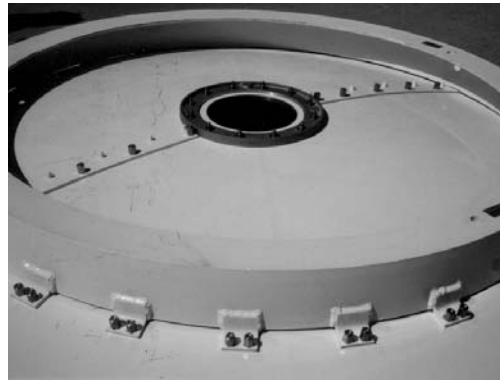


Figure 3-35a: Mounting and Center Rings      Figure 3-35b: Mounting and Center Rings

**Step 9**

For equipment enclosure versions only, apply a smooth, continuous bead of RTV sealant to the inside of the reflector mounting ring to seal the reflector and the mounting ring seam as shown in Figure 3-36.



Figure 3-36: Mounting Ring Sealant (Equipment Enclosure Versions Only)

## **Alignment Test**

As a final test of proper reflector alignment, Andrew recommends that a string test be performed. The following steps provide the procedure for the string test.

### **Step 1**

Attach a string at the twelve o'clock position of the reflector stretching to the six o'clock position of the reflector.

### **Step 2**

Attach a second string at the three o'clock position stretching to the nine o'clock position.

### **Step 3**

Verify its intersection to the first string as shown in Figure 3-37. If the strings touch, then the reflector has been correctly aligned. If they do not touch, then check all previous steps to ensure proper assembly before continuing.

**NOTE: A 1/16 inch gap is permitted.**

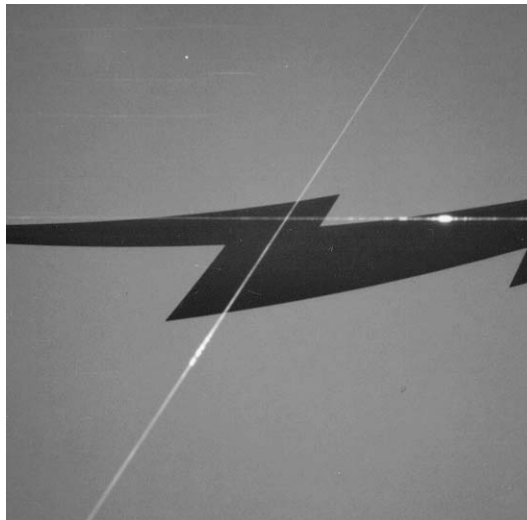


Figure 3-37: Reflector Alignment

### **Step 4**

Reposition the first string above the second string to check the accuracy of the first test.

**NOTE:** The reflector should be facing downward when the string test is performed. The person that is positioned under the dish should ensure that the strings are aligned correctly during the test.

You have completed the assembly of the reflector. Proceed to the next page for instructions on the enclosure assembly.

**Enclosure  
(Pedestal Mount  
Only)**

The enclosure (P/N 202934A) assembly attaches to the rear of the reflector. The enclosure provides weather protection for RF equipment and can accommodate up to a 4-port combiner network. An example of the assembled enclosure is presented in Figure 3-38a and Figure 3-38b.

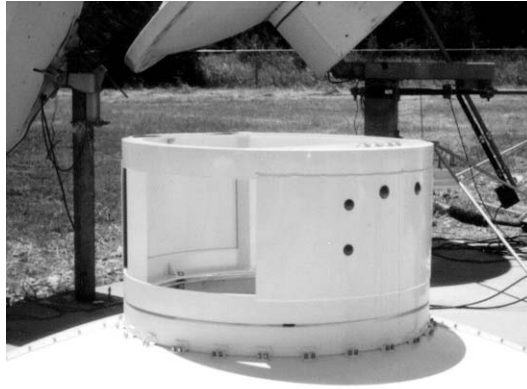


Figure 3-38a: Enclosure - Final Assembly

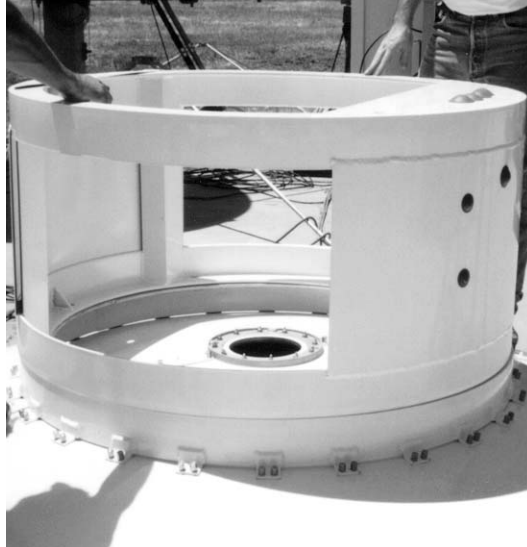


Figure 3-38b: Enclosure - Final Assembly

Before assembling the enclosure, verify that the appropriate parts are present. The following steps provide the procedure for the enclosure assembly.

**Step 1**

Remove the rear covers and corresponding side panels from the enclosure assembly.

**Step 2**

Raise the enclosure assembly, and attach to the mounting ring on the reflector using the appropriate hardware as shown in Figure 3-39a and Figure 3-39b.



Figure 3-39a: Enclosure Hardware

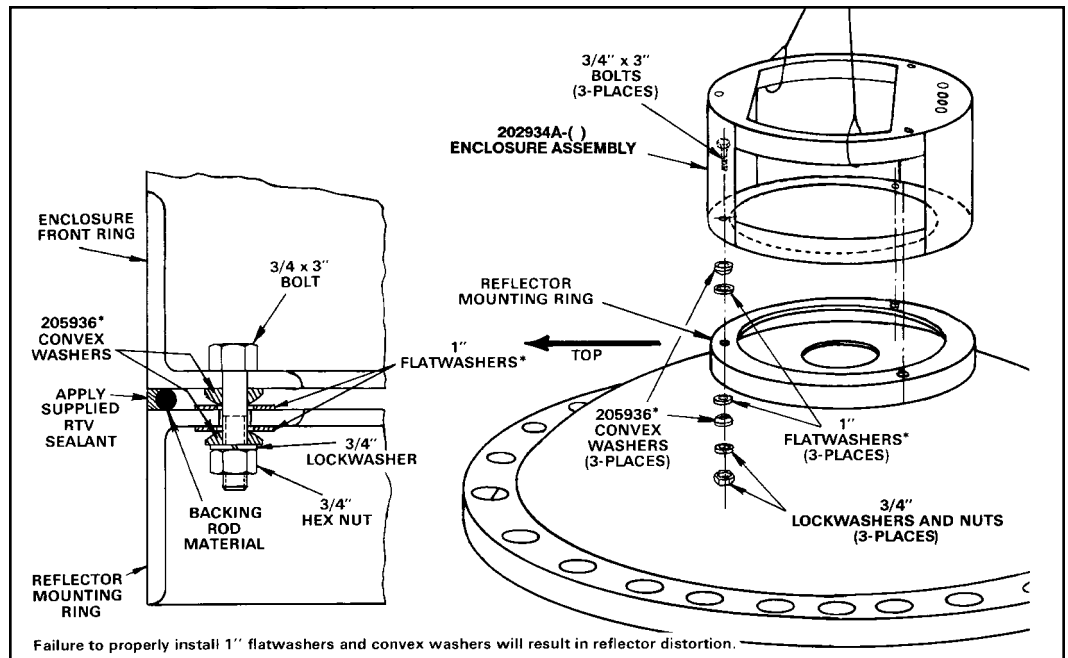


Figure 3-39b: Enclosure Hardware

**Step 3**

Install the supplied sealant backing rod material around entire circumference of the mounting ring/enclosure mating surfaces as shown in Figure 3-40.

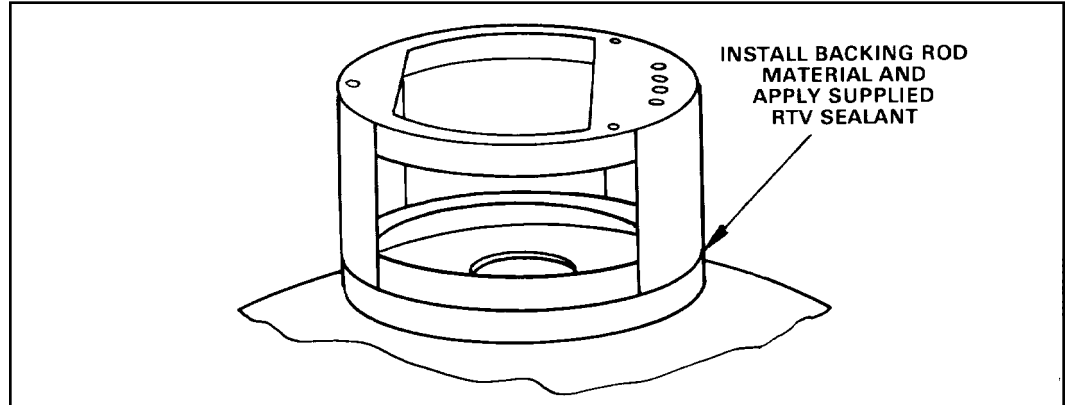


Figure 3-40: Backing Rod Assembly

**Step 4**

Securely tighten the enclosure mounting hardware using the A-325 tensioning procedure.

**Step 5**

Apply the supplied RTV sealant around the outer perimeter of the reflector-mounting ring/enclosure assembly junction as shown in Figure 3-41.

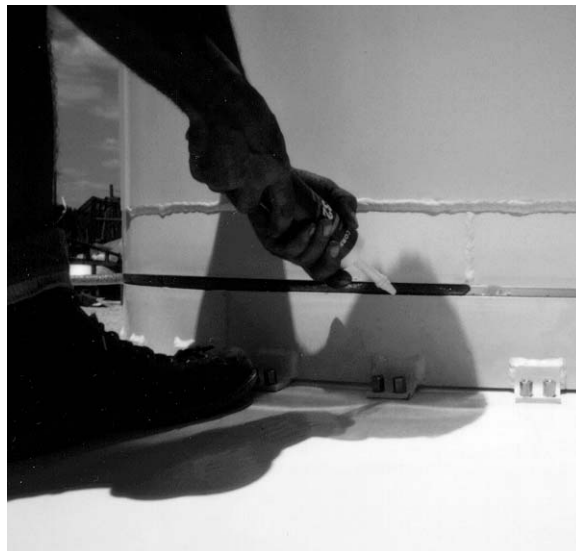


Figure 3-41: RTV Sealant

You have now completed the assembly of the enclosure and have mounted the enclosure to the reflector. Proceed to the next page for instructions on mounting the reflector to the ground mount assembly.

## **Reflector-to-Mount Assembly**

The reflector can be installed on the mount manually or by using a crane. However, Andrew recommends that this procedure be performed using a crane.

### **Using a Crane**

The following steps provide the procedure for installing the reflector to the mount using a crane.

#### **Step 1**

Route a sling through the upper holes in the reflector torsion box assembly, and connect the ends using a 5/8 inch shackle as shown in Figure 3-42.

**NOTE:** If using a steel sling, install foam pad protection in the upper reflector torsion box holes under the sling to avoid disfiguration of the reflector.

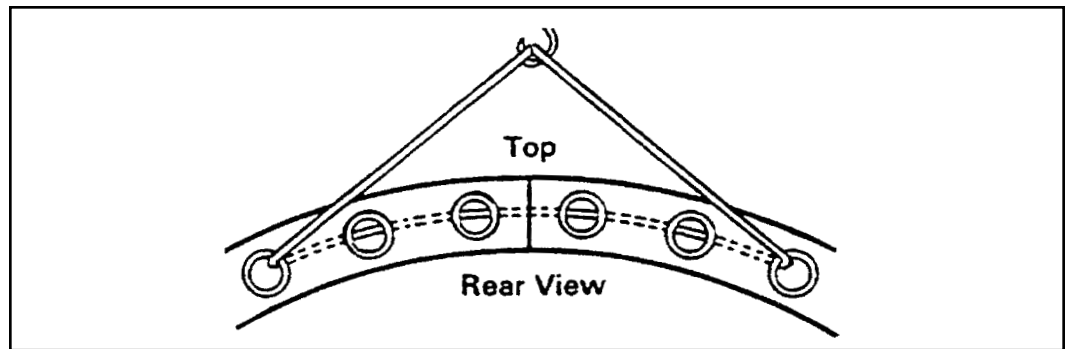


Figure 3-42: Sling Placement

#### **Step 2**

Route two rope tag lines through two consecutive holes in the torsion box assembly to be used as guides when the reflector is lifted with a crane.



Figure 3-43: Safety Rope Tag Lines

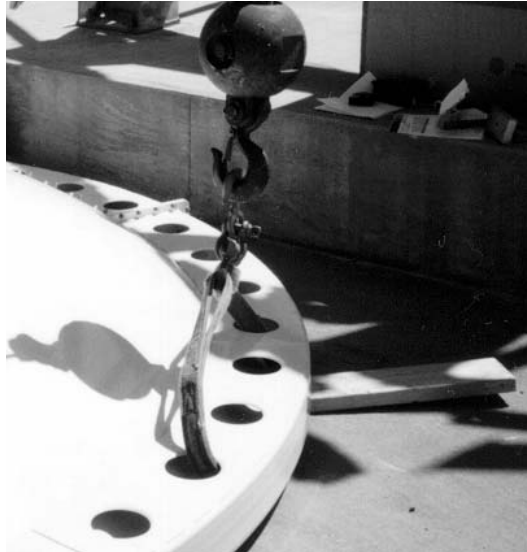


Figure 3-44a: Crane Lift

- Step 3** Verify that all hoist assembly hardware is fully in tact before lifting the reflector to avoid personal injury or damage to the reflector.
- Step 4** Route the crane's cable and hook from the hoist over the slings, and attach the shackle's hook to the crane's hook for raising the reflector.
- Step 5** Position a person at the end of each tag line to guide the reflector as it is being lifted, and position another person on the mount to crank the hoist.

**NOTE:** The crane's hook must be perfectly aligned with the top of the reflector's hook so that it can be lifted straight up.



Figure 3-44b: Crane Lift



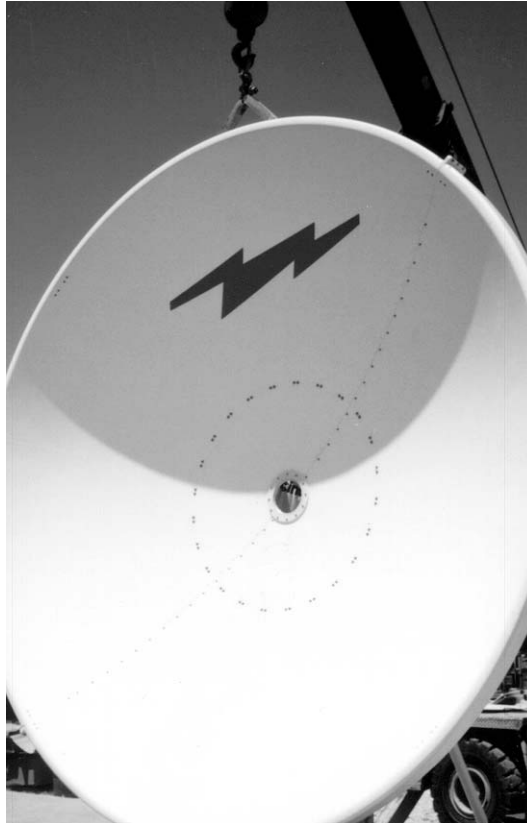


Figure 3-44c: Crane Lift

***Without a Crane***

The following steps provide the procedure for installing the reflector to the mount **without** the use of a crane.

***Step 1***

Route one rope tag line through two consecutive holes at the top of the reflector in the torsion box assembly.

***Step 2***

Place foam blocks (provided as packaging material) on the bottom lip of the reflector (between the ground mount and the reflector) to prevent the reflector from scraping the ground as it is lifted.

**Step 3**

Position three people at the top of the reflector to lift the reflector on its end, facing forward as shown in Figure 3-45.



Figure 3-45: Manual Lift of the Reflector to the Mount

**Step 4**

Position one person (of the three) on the mount to guide the reflector to the mount. Refer to Figure 3-46.

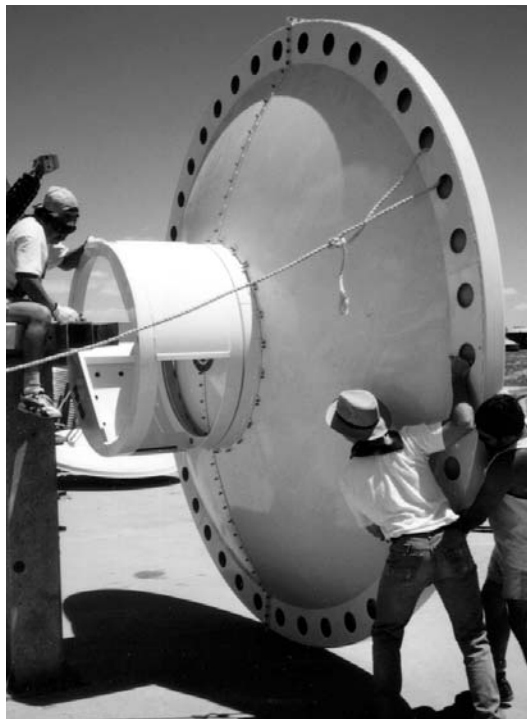


Figure 3-46: Reflector to Mount

**Step 5**

Align the enclosure bracket to the ground mount assembly. The left bolt should be inserted to hold reflector in place using 3/4" A-325 hardware (hex bolt, flatwasher and nuts as shown in Figure 3-47 and Figure 3-48.



Figure 3-47: Enclosure Bracket

**Step 6**

Have the two people on the ground rotate the reflector to connect with the right bolt of the enclosure bracket against the ground mount angle bracket. Facing the reflector, the right bolt should be inserted to hold the reflector in place using the appropriate hardware.

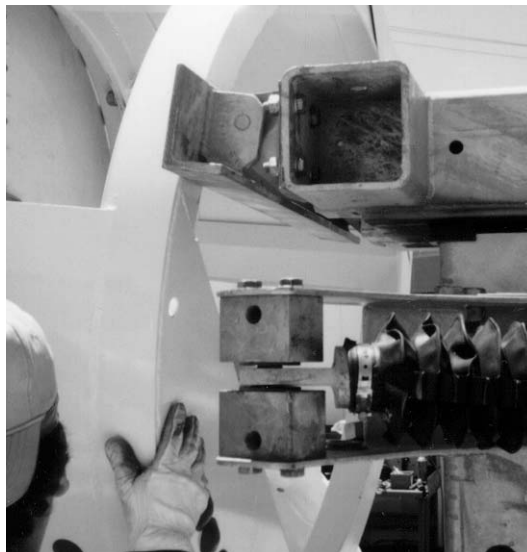


Figure 3-48: Enclosure Bracket Alignment

**Step 7**

Extend the elevation strut or elevation jackscrew, and attach it to the top rear of the enclosure assembly as shown in Figure 3-49.



Figure 3-49: Elevation Jack/Enclosure Attachment

**Step 8**

Tighten the hardware using the A-325 tensoning procedure.

**Step 9**

Carefully raise the reflector/enclosure assembly to the zenith (elevation = 90 degrees) position, and securely tighten the strut-support setscrews to 40 foot-pounds.

**Step 10**

Remove all hoisting apparatus.

The Reflector-to-Mount components can be verified and/or clarified in the following diagram.

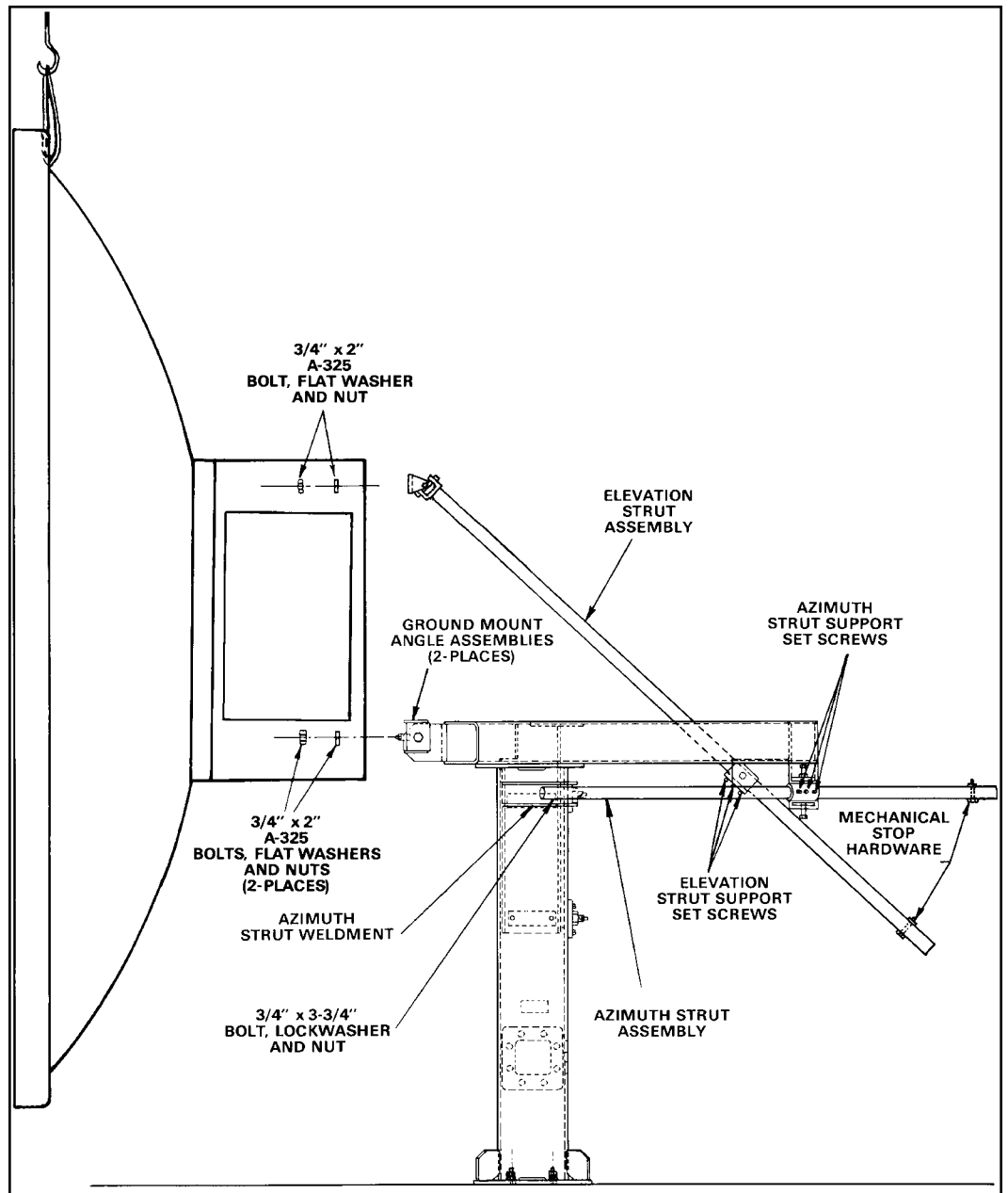


Figure 3-50a: Reflector to Mount

## Reflector-to-Mount Assembly

### Embedded Pipe Ground Mount

#### Step 1

Lift the reflector carefully onto the mount as shown in Figure 3-50b. Secure the reflector to the mount using 100537-15 M20 x 50 long bolts, 100526-57 nuts and 100522-57 lockwashers in three places. Tighten these three to 38 N•m.

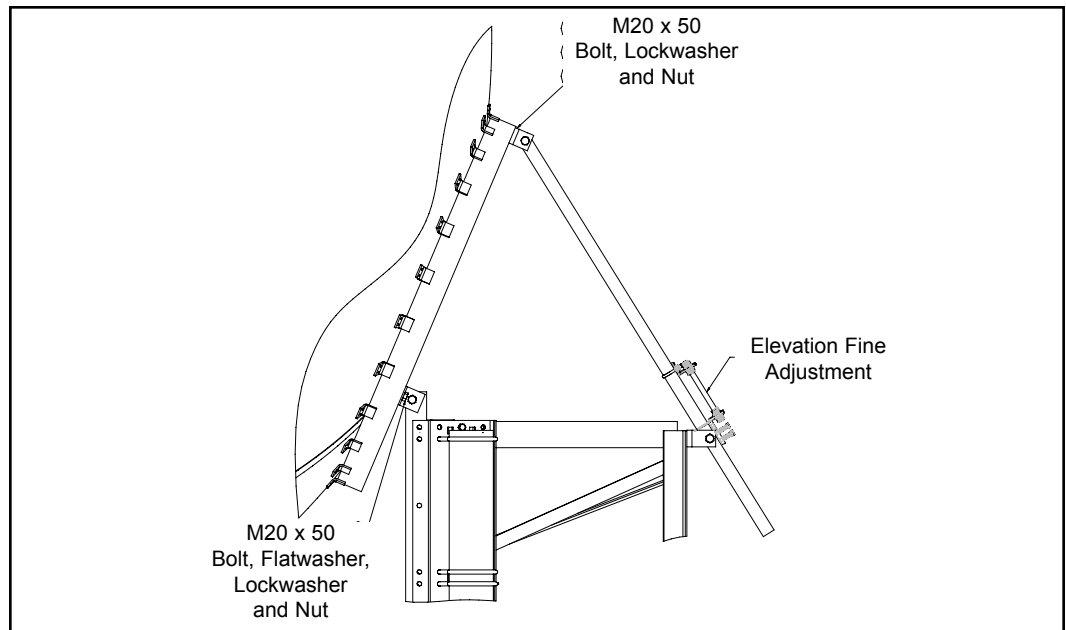


Figure 3-50b: Reflector to Mount

You have now completed the attachment of the reflector to the ground mount assembly. Proceed to the instructions on assembling and attaching the subreflector to the reflector.

## Subreflector

Once the reflector has been assembled to the mount, the subreflector must be installed. Figure 3-51 presents a final subreflector assembly.



Figure 3-51: Installed Subreflector

The following steps provide the procedure for assembling the subreflector.

### Step 1

Loosely preassemble the subreflector strut weldment (P/N 202775) using the supplied strut angles (P/N 202776) and the 3/8 inch by 2-1/4 inch bolts, lock washers, and nuts as shown Figures 3-52a and 3-52b.

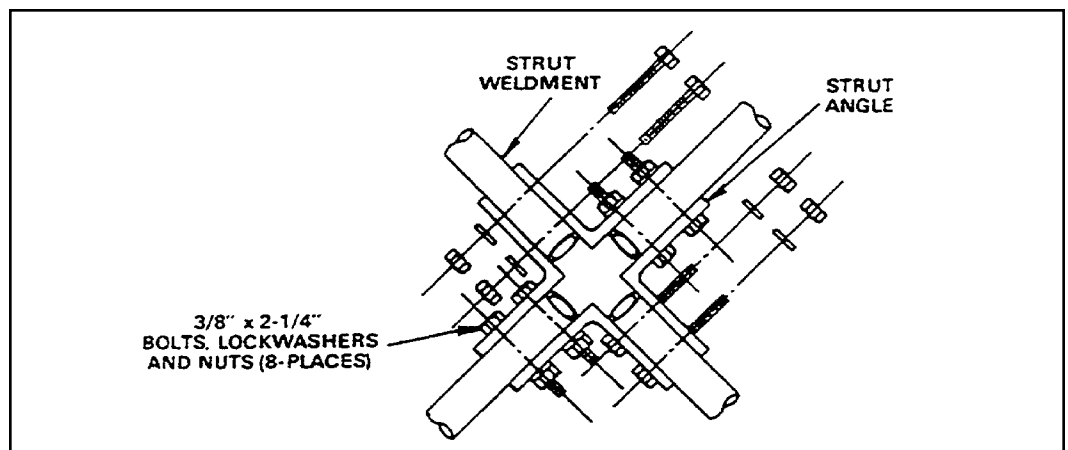


Figure 3-52a: Subreflector Strut Assembly

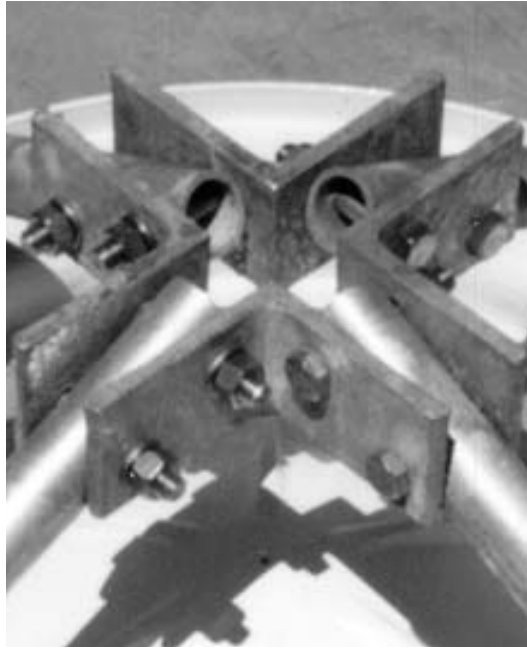


Figure 3-52b: Subreflector Strut Assembly

**Step 2**

Position and attach the subreflector-mounting ring (part of 205929 subreflector assembly) to the corresponding mounting holes in the strut-support plates using 3/8 inch by 1 inch bolts, oversized flat washers, lock washers, and nuts as shown in Figure 3-53a and Figure 3-53b.

**NOTE:** Ensure that one subreflector adjustment stud is located at the six o'clock position.

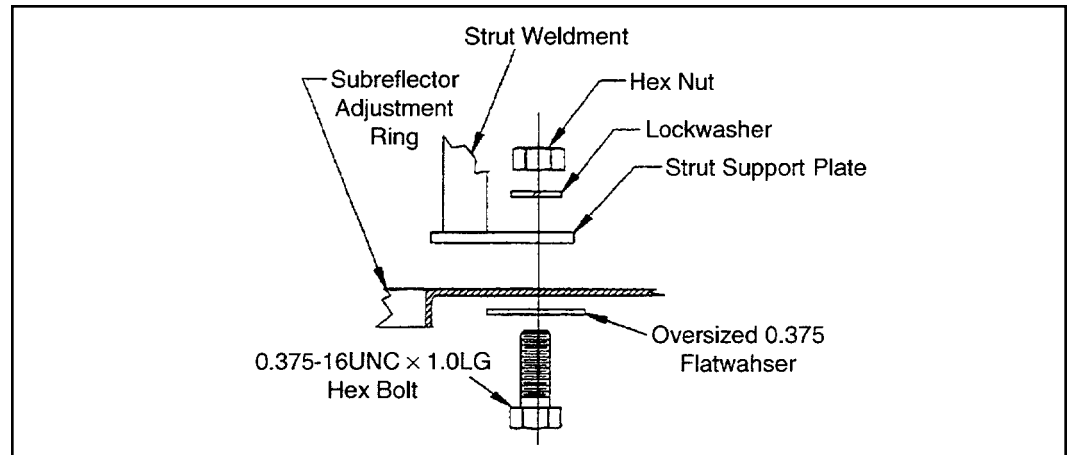


Figure 3-53a: Subreflector Assembly



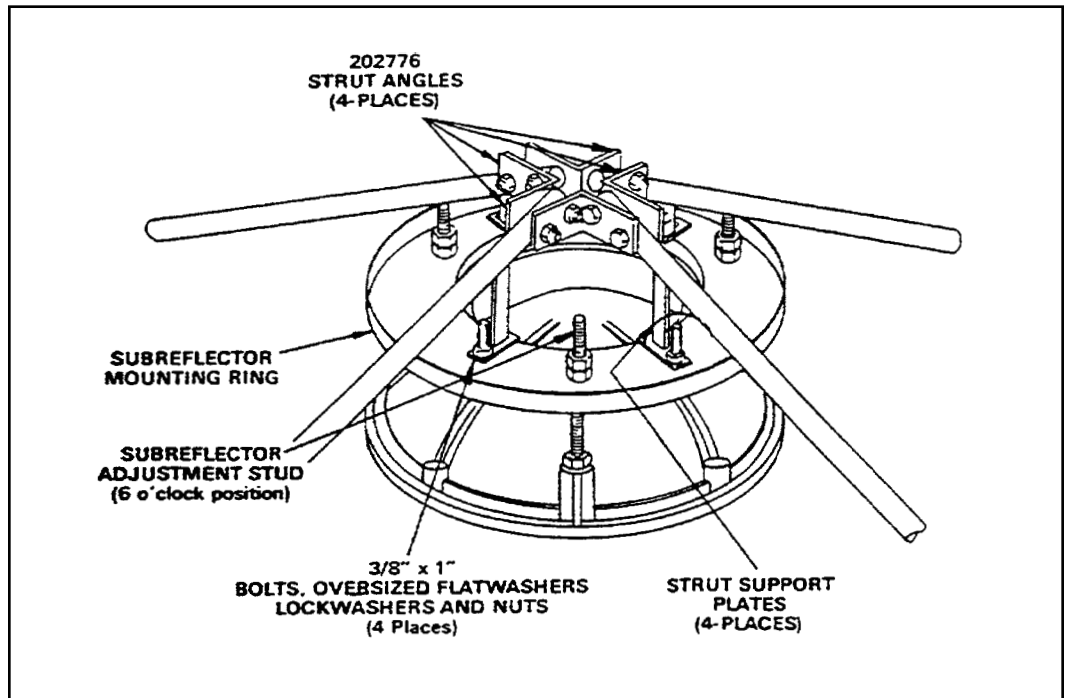


Figure 3-53b: Subreflector Assembly

**Step 3**

Attach the angle clips (P/N 49187) around the reflector perimeter at the indicated positions using the appropriate hardware as noted in Figure 3-53c.

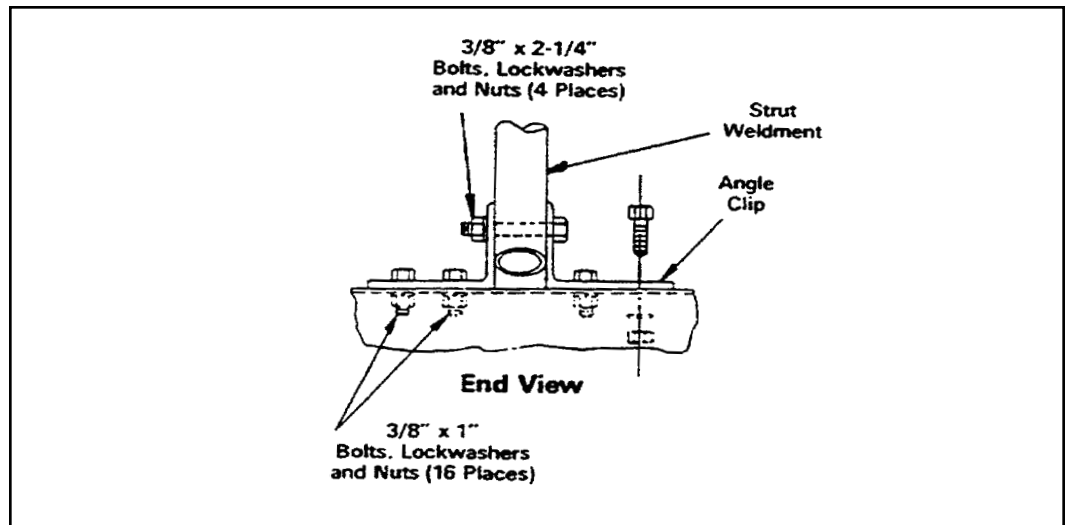


Figure 3-53c: Subreflector Assembly

**Step 4**

Raise and attach the preassembled subreflector strut assemblies between the corresponding angle clips using a tag line as shown in Figure 3-54a. The angle clips should correspond with the holes in the reflector.

**NOTE:** Ensure that one subreflector adjustment stud is located at the six o'clock position.

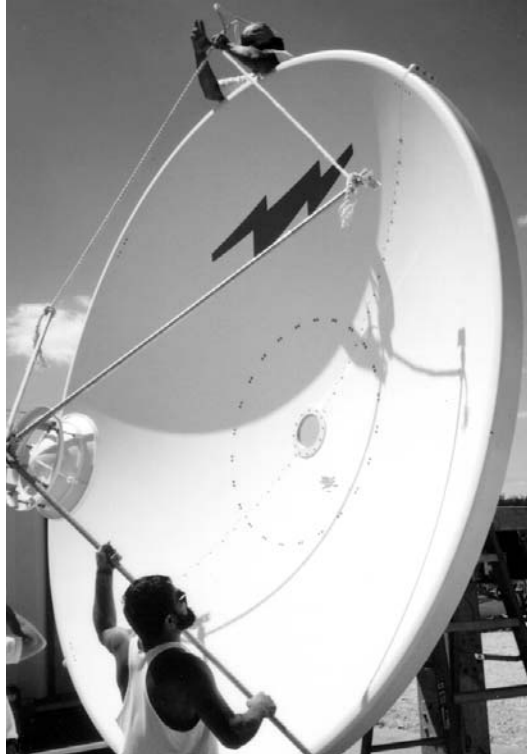


Figure 3-54a: Subreflector Attachment

## Subreflector Struts

### Embedded Pipe Ground Mount Assembly

#### Step 1

Loosely preassemble the 300056 Subreflector Struts using supplied 222888 strut supports and the 9963-127 3/8 inch by 2 1/4 inch bolts, 9974-63 lockwashers, and 9999-60 nuts as shown in Figure 3-54b, View A.

**Note:** At this time it is recommended (but not necessary) to install the Subreflector, for K- & Ku-Band, see Kit #301921; for C-Band, see Kit #301939.

#### Step 2

Attach the 49187 angle clips around the reflector perimeter at the indicated positions using 100521-51 3/8 x 1 inch bolts, 9974-63 lockwashers and 9999-60 nuts. See View B in Figure 3-54b.

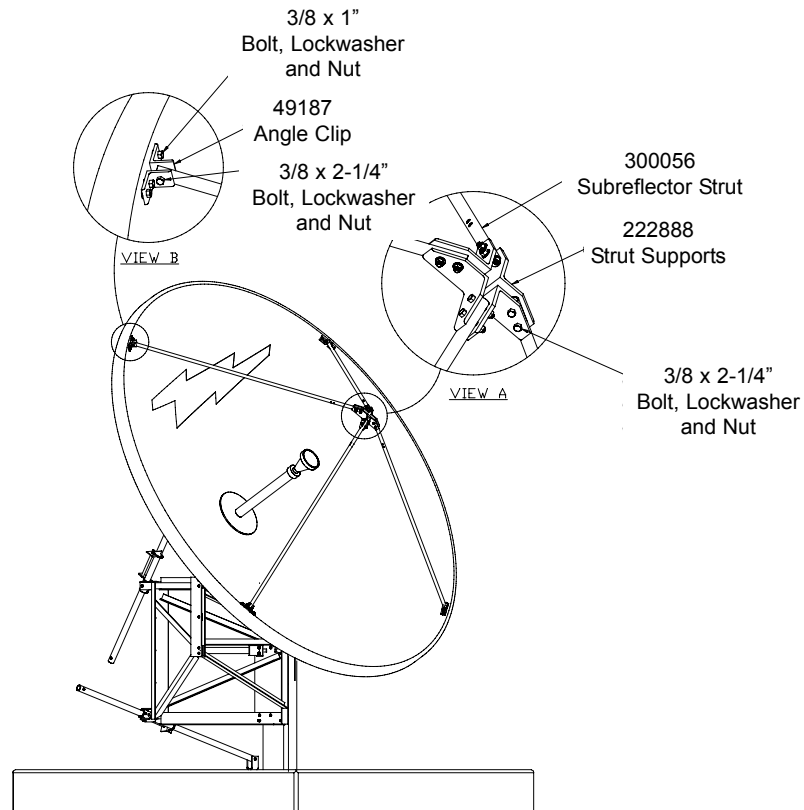


Figure 3-54b: Subreflector Strut Attachment

#### Step 3

Raise and attach the pre-assembled Subreflector strut assemblies between the corresponding 49187 angle clips using a tag line. Attach struts between angle clips using 9963-127 3/8 x 2 1/4 inch bolts, 9974-63 lockwashers and 9999-60 nuts.

#### Step 4

Tighten strut and all hardware at this time.

## **Subreflector Adjustment**

After the subreflector assembly has been attached to the reflector, the subreflector must be adjusted to ensure correct alignment. The following steps provide the procedure for adjusting the subreflector.

- Step 1** Position the supplied setting bar (P/N 203896 Ku-band, P/N 203896-3 C-band ) on the outer edge of the subreflector as well as on the outer edge of the front ring (P/N 202790) at the twelve o'clock (top) position.
- Step 2** Sweep the bar across the corresponding subreflector edge, and note the relative position.
- Step 3** Repeat this procedure at the six o'clock (bottom) position.
- Step 4** Use the noted position to indicate the required directional movement of the top portion of the subreflector aperture, which is relative to the aperture bottom using the subreflector stud-adjustment hardware (3 places) as shown in Figure 3-55.



Figure 3-55: Subreflector Alignment

- Step 5** Repeat Steps 1-4 at the three o'clock and the nine o'clock positions to indicate the proper aperture side adjustment.

**Step 6** Repeat the entire procedure until all four noted positions indicate that the subreflector aperture is set parallel to the ring (P/N 202790) as shown in Figure 3-56.

**Step 7** Temporarily tighten the adjustment hardware until after step 10 has been completed.



Figure 3-56: Subreflector Alignment

**Step 8** Measure and note the distance between either outermost angle clip bolt head and the subreflector rim.

**Step 9**

Obtain the corresponding measurements from the remaining subreflector struts, and adjust the subreflector mounting hardware (4 places) to achieve a maximum differential of 1/16 inch.

**Step 10**

Repeat the adjustment procedure performed in Steps 1-4, until all areas of the subreflector are uniform.

**Step 11**

Adjust the jam nuts, and securely tighten the adjustment hardware.

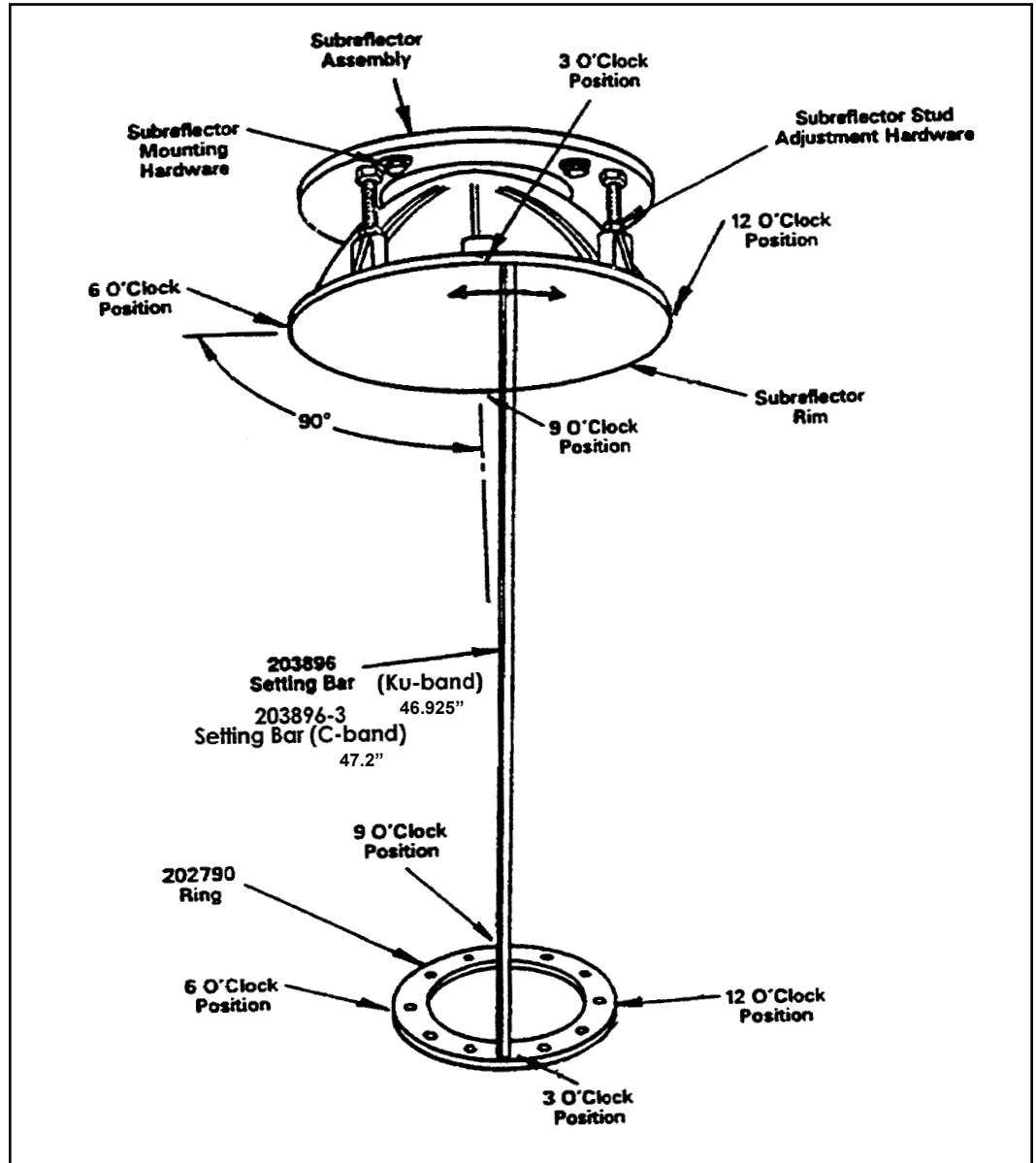


Figure 3-57: Subreflector Alignment

**Feed System**

You have now completed the subreflector assembly. By now, you can see that your installation of the 3.7-Meter Earth Station Antenna is almost complete. The feed system is the last phase of the base installation. **NOTE:** All antenna options (such as feed systems, motors, anti-icing, etc) possess installation instructions within the individual kits contained in the shipment.

# Operation

## Overview

After you have completed the assembly of your antenna, you are now ready to become operational. In order to operate the earth station antenna, you will need to direct it to the desired satellite adjusting both the elevation and azimuth angles appropriately. The following procedures provide details on how to correctly position your antenna on the desired satellite.

## Acquiring A Satellite

**NOTE:** Ensure that the feed system and all electronics are installed properly before proceeding.

Follow the procedures listed below when acquiring the desired satellite:

### Step 1

Evaluate and determine the required elevation and azimuth angles for the satellite of interest.

### Step 2

Loosely attach the manual actuator assembly (P/N 207882) to the elevation strut as shown in Figure 3-22 using the appropriate hardware.

**NOTE:** The drain hole should be positioned downward for proper water drainage.

### Step 3

Ensure that the locking strut-support setscrew is firmly tightened on the strut assembly as shown in Figure 3-22.

### Step 4

Remove the two indicated strut-support setscrews, and attach the base angle to the corresponding strut support using the supplied 1/2 inch clamping nuts and the previously removed strut-support setscrews as shown in Figure 3-22.

### Step 5

Securely tighten the remaining mounting hardware to achieve the clamping force.

### Step 6

Repeat the entire procedure for the remaining strut assembly.

**NOTE: DO NOT** loosen the Azimuth drive bearings.

### Step 7

Move the antenna to the desired azimuth angle by adjusting the manual actuator until the satellite signal has been spotted.

There are several procedures that may be used to properly acquire the satellite. Andrew recommends that a spectrum analyzer be used. The following procedures provide explanation as to how to use the spectrum analyzer.

While viewing the spectrum analyzer screen, a pure noise signal as shown in Figure 4-1 will probably be observed. Additionally, some transponder signals may be observed above the noise signal as shown in Figure 4-2.

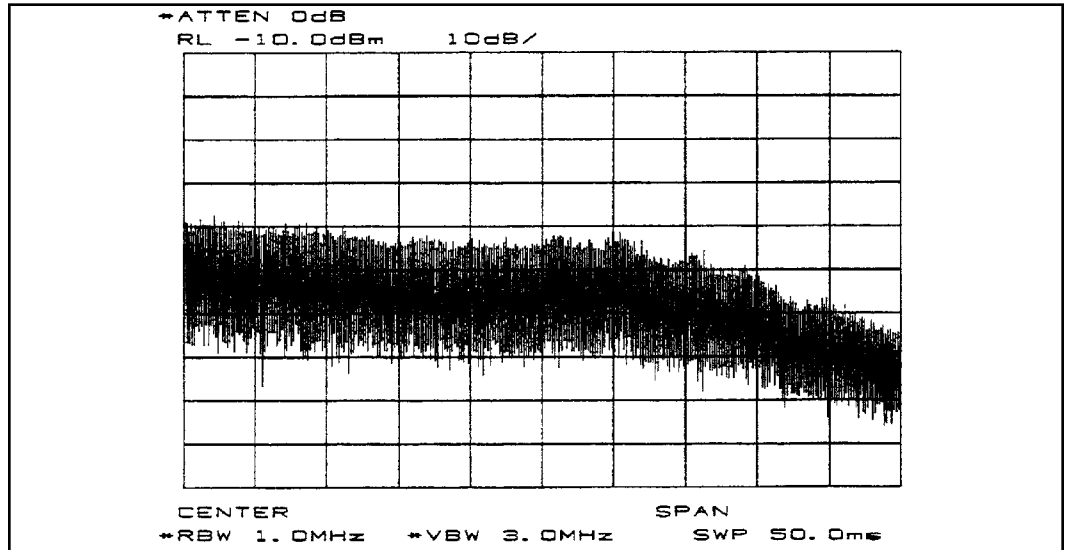


Figure 4-1: Pure Noise Signal on Spectrum Analyzer

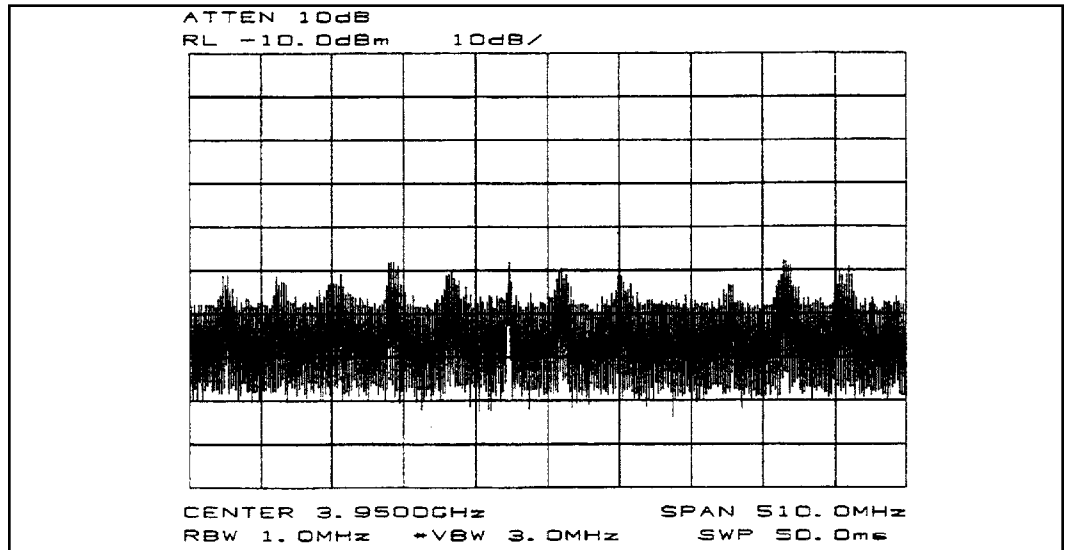


Figure 4-2: Minimum transponder Signal on Spectrum Analyzer



The following steps provide the procedure for acquiring a satellite.

**Step 1**

Manually move the antenna in the azimuth (scanning back-and-forth) to achieve the maximum (greatest amplitude) transponder signals.

- Scan in one direction until the amplitude continues to diminish and then scan in the opposite direction until the same condition occurs.
- Return to the position yielding the greatest amplitude.

The maximum azimuth excursion from the original setting should not exceed plus or minus 1.5 degrees or the antenna may begin to access a different satellite.

**Step 2**

With the antenna positioned in azimuth such that the transponder signals are maximized, follow the same procedure manually moving the antenna in elevation (scanning up-and-down) to further maximize the transponder signals.

**Step 3**

Repeat this procedure alternating between the azimuth and elevation excursions of the antenna to peak the transponder signal amplitude.

A transponder signal amplitude of 30 dB or greater from peak to average noise signal indicates the antenna is receiving the signal on the main beam. A transponder signal amplitude less than 30 dB or greater indicates the antenna is receiving the signal on a side lobe of the main beam.

**Step 4**

With the antenna peaked on a side lobe in azimuth and/or elevation, move the antenna in azimuth while observing the spectrum analyzer screen as shown in Figure 4-3.

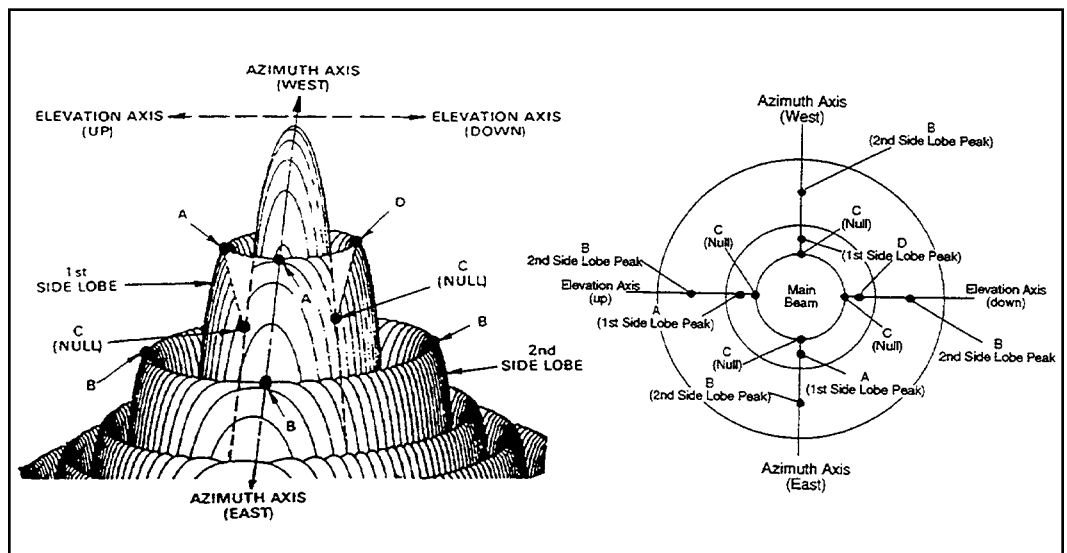


Figure 4-3: Antenna Radiation Pattern Topographical Diagram with Plan View

**Step 5**

If the signal amplitude diminishes and does not increase (position B) to the level noted when the antenna was peaked on the side lobe, the antenna is moving away from the main beam; reverse the direction of the antenna movement.

From the original side lobe position (position A), the signal amplitude should now diminish to a null point at position C (minimum amplitude showing only signal noise) and then symmetrically increase again to the same level at position D as noted at position A. At the null point (position C), the antenna is aligned with the alternate (elevation) axis. If the antenna was peaked on a side lobe in azimuth, it was appropriately aligned with the elevation axis; proceed with step 6. If the antenna was peaked on a side lobe in elevation, it was appropriately aligned with the azimuth axis; proceed with step 6 moving the antenna in azimuth rather than elevation.

**Step 6**

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

**Step 7**

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

**Step 8**

Rotate the feed assembly clockwise until 24 transponder signals are noted and of approximately equal amplitude.

**NOTE:** It is more accurate and visually easier to minimize the alternate set of transponder signals rather than maximizing the transponder of interest.

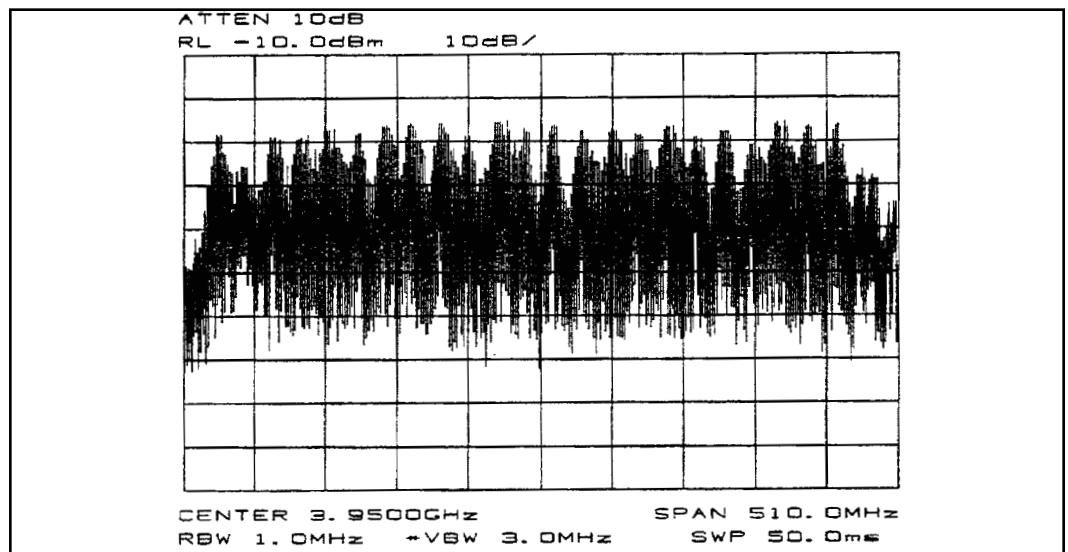


Figure 4-4: Polarization at 45 degrees from Optimum Setting

**Step 9**

With all 24 transponder signals of approximately equal amplitude appearing on the spectrum analyzer screen determine the specific antenna system and satellite parameters. Rotate the feed assembly as required until the appropriate (odd or even) transponder signals are maximized.

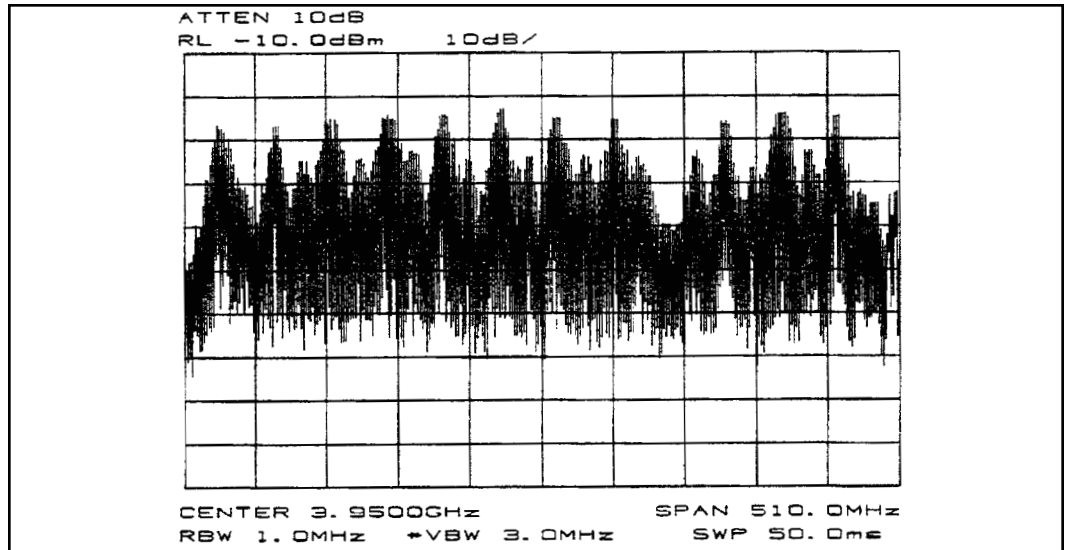


Figure 4-5: Maximizing Odd Transponders

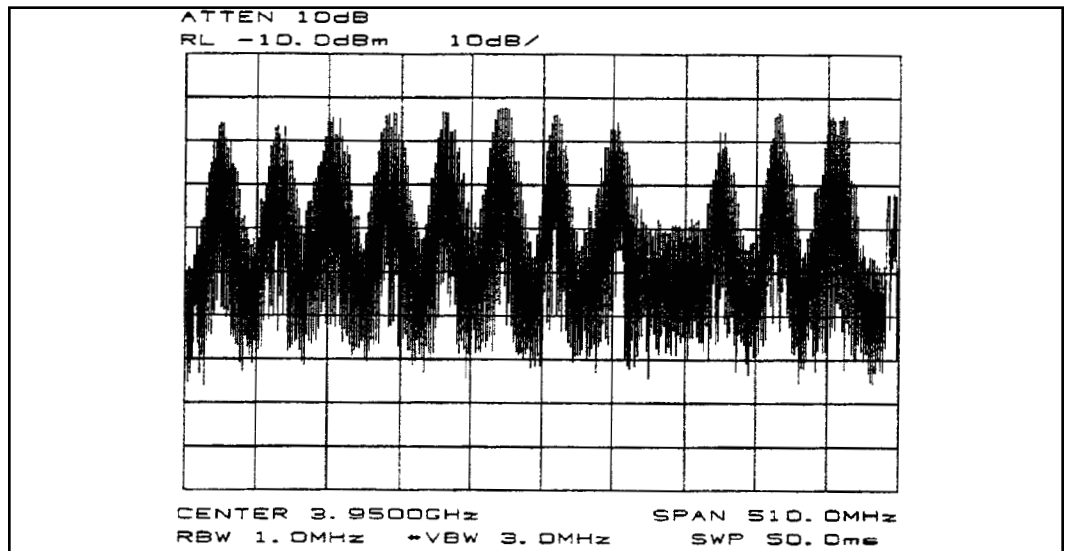


Figure 4-6: Optimum Polarization Setting

## **Manual Actuator Assembly Removal**

### **Step 1**

After you have successfully acquired the satellite and all adjustments have been made, the manual actuator should be removed. The following steps provide the procedure for the proper removal of the manual actuator assembly.

Remove the manual actuator assembly by first removing the hardware securing the actuator to the base angle.

**NOTE:** The adjustment kit assembly should be removed after the antenna has been adjusted. Store the manual actuator assembly and the corresponding hardware in a dry area for future use.

### **Step 2**

Remove the remaining clamp segments with the corresponding hardware.

### **Step 3**

After the antenna is pointed at the satellite, tighten all azimuth and elevation setscrews to 35 foot-pounds.

## **Embedded Pipe Ground Mount**

### **Elevation Adjustment**

#### **Step 1**

Loosen the M20 elevation hinge bolts slightly. If coarse adjustment (i.e. more than  $\pm 7.5$ ) is required then loosen the three square head bolts, and u-bolt to threaded rod, make adjustment then re-tighten U-bolt. Fine adjustment is performed by working brass nuts on either side of bracket/U-bolt assembly to push or pull antenna.

#### **Step 2**

Finally, tighten the M20 elevation pivot bolts to 185 N•m. (136 lbs-ft) and check all other fasteners relating to the elevation strut.

### **Azimuth Adjustment**

#### **Step 1**

Slightly loosen the eight M16 nuts on the main azimuth hinge u-bolts and square head bolts and nut, connecting bracket to concrete. Operate the azimuth adjustment strut in the same manner as the elevation adjuster. When adjustment is complete, tighten the square head bolts and nut, connecting bracket to concrete and finally tighten the eight nuts (M16) on the u-bolts to 95 N•m. (70 lbs-ft)

### **Conclusion**

Check that the fasteners on the mount are tightened to the following torque levels:

M16 - 95 N-m (70 lbs-ft)

M20 - 185 N-m (136 lbs-ft)

## **Subreflector Adjustment**

After the satellite has been acquired and testing has taken place with the spectrum analyzer, the subreflector **may** need to be adjusted to maximize optimum performance of your antenna. The following procedures should be followed if a subreflector adjustment is required to maximize optimum performance.

**NOTE:** All INTELSAT Type Approved antennas do not require subreflector adjustment. Using the provided setting bar and procedures will correctly place the subreflector.

Before proceeding, azimuth and elevation patterns should be conducted to determine the adjustments that need to be made. The goal is to achieve a high peak on the main lobe and even distances between the main lobe and sidelobes as shown in Figure 4-6.

**NOTE:** No adjustments should be made in the receive band.

If your pattern dictates a need to adjust the azimuth angle (the left sidelobe requires adjustment), the west side of the subreflector should be adjusted outward by loosening the screws on the subreflector and adjusting the left side outward. An easy way to remember this adjustment feature is through the acronym WOLD (West Out Left Down).

If your pattern dictates a need to adjust the elevation angle (the right sidelobe requires adjustment), the bottom side of the subreflector should be adjusted downward by loosening the screws between the subreflector and the struts and adjusting the bottom side of the subreflector downward. An easy way to remember this adjustment is through the acronym BOLD (Bold Out Left Down).

Each of these adjustments should be repeated until each sidelobe is of equal distance from the peak of the mainlobe.

After the BOLD and WOLD adjustments have been made, it may be necessary to adjust the main lobe. The goal is to achieve a high null depth (distance between lower intersection of sidelobes and top of main lobe) as shown in Figure 4-6.

In order to adjust the main lobe pattern characteristics **ALL** subreflector adjustment screws should be adjusted at the same degree (Note: Because the azimuth and elevation adjustments have been set, it is very important that the null depth adjustment be carefully conducted. Be careful not to alter any previous adjustments that have been made to the subreflector. Follow the procedure listed below when adjusting the null depth of the main lobe.

C-band feeds - Adjustment screws are 3/4 X 10. Move 1 turn per 1dB of imbalance.

Ku-band feeds - Adjustment screws are 1/4 X 20. Move 1 turn per 1 dB of imbalance.

All adjustments should be continued until the desired pattern is achieved. Upon completion the antenna should be properly aligned with the satellite for maximum performance.

# Preventive Maintenance

## Overview

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

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

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

## General Cleaning

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

## Electrical Parts

Minor cleaning, such as the removal of dust and loose foreign particles can be accomplished by one of the following:

- Vacuuming
- Using a soft brush or lint-free cloth
- Blowing out the dust and dirt with low pressure (5 to 25 psi), dry compressed air

When using air to blow off the contaminants, either avoid or be careful when directing the air stream on delicate parts. To remove imbedded dirt, grease, or oil from electrical parts; use a 50 percent solution of isopropyl (rubbing) alcohol and apply with a soft bristle brush. It may be necessary to brush some parts vigorously with a stiff bristle brush to remove imbedded and hardened dirt particles. If possible, avoid excessive use of cleaning solvent on electrical insulation. After cleaning, allow the cleaned parts to dry for 10 to 15 minutes before placing the equipment into operation.

## **Mechanical Parts**

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

## **Inspection**

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

## **Local Control/Motor Drive Controller**

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

- Check the front panel for illegible and indistinct panel markings.
- Check the three position selector switches (Azimuth Off/Slow/Fast, Elevation-Off/Slow/Fast, and Polarization-CCW/Off/CW) for smooth operation, audible clicking at each actuation (left to center and return) and spring return from right to center. For each of the two position selector switches (Azimuth-East/West, Elevation-Up/Down, and Local/Remote) check for smooth operation and audible clicking at each actuation.
- Inspect all wiring and cables for discolorization and burned insulation, dirt, breaks, security of connection and other signs of deterioration. Examine connections for dirt, flux, corrosion, and mechanical defects. Check for loose or broken lacing and cut, brittle, abraded, frayed, or cracked insulation.
- Examine connectors for corrosion, broken inserts and stripped threads. Check connector shells for distortion and dents, and contact pins for bends, misalignment, or other deformities. Check connector inserts for carbon tracking indicating arc-over.
- Check all electrical components for dirt, cracks, chips, breaks, discoloration and other signs of deterioration and damage. A discolored, blistered, or burnt condition is evidence of overload. Measure actual value of suspect electrical components and compare against specified value.

- Check transformer for an excessive wax deposit on the surface, discoloration, or a pungent odor indicative of burning varnish denoting overheating or a total breakdown.
- Check all terminal boards for broken or missing terminals and stripped threads. Check tightness of lead attaching hardware.
- Check each starter for a make-after-break provision through the release of one pushbutton as the alternate pushbutton is pressed.
- Check the relays and contactors for free operation of the armatures and contact condition. The contacts are usable even though pitted, burned, worn, or discolored. The contacts or contactor or relay assembly should be replaced only when the contact material has been completely torn away or worn off.
- Visually inspect all mechanical parts for freedom of operation without binding or interference. Check for security of all hardware and stripped or otherwise damaged threads. Check metallic parts for corrosion, dents, distortion, and other deformation.
- Check for evidence of water inside the enclosure. If any water is in evidence, check that all seals are intact and if not, use a coating of RTV-108 (silicone rubber sealant) to seal any exposed electrical fitting, bolt hole, or other possible water entry to the enclosed electrical components in order to maintain a waterproof condition.
- Check or change humidity absorber.

## **Antenna**

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

- Inspect all wiring and cables particularly the network to enclosure and enclosure to mount interfaces for discoloration and burned insulation, moisture entry, corrosion, dirt, breaks, security of connection, and other signs of deterioration. Examine connections for dirt, corrosion, and mechanical defects. Check for loose or broken lacing and cut, abraided, frayed, brittle, and cracked insulation.
- Examine connectors for corrosion, broken inserts and stripped threads. Check connector shells for distortion and dents, and contact pins for bends, misalignment or other deformities. Check connector inserts for cracks, and carbon tracking, burns or charring indicating arc-over.
- Check all electrical component for dirt, cracks, chips, breaks, discoloration, and other signs of deterioration and damage. A discolored, blistered, or burnt condition is evidence of overload.



- Operate the azimuth and elevation drives as well as the feed rotation in both the plus and minus direction from the local control/motor drive controller at least once every three months during antenna down time. Check the mechanical limit switches provided at the end points stop antenna and feed movement, and limit travel to prevent structural interference and damage. Check the mechanical limit switches for corrosion and water entry and the arm on each feed limit switch for free movement without binding. Be certain both feed rotation limit switch arms are not distorted and ride centrally on the actuating cam to open their corresponding limit switch.
- Inspect the azimuth and elevation jackscrew boots for security of attachment at both ends, for abrasion, tears, cuts, brittleness and other damage that may expose the jackscrew to the environment (water, dust, etc.). Minor repairs can be made with RTV-108 silicone rubber sealant.
- Visually inspect the feed window for dirt and the feed, feed supports, feed window, and reflector for distortion, foreign object damage and environmental deterioration due to ice and snow, dust, rain, hail, and high winds, etc. which may cause electrical component and/or structural deformation.
- Check the cable attachment to the resolvers and to the LNA or LNB's and enclosure mount interface for security, the cable routing for secure hanger attachment and the cable insulation for cuts, cracking, abrasion, and other deterioration. Check the LNA or LNB's and the resolvers for a secure mechanical attachment. Ensure proper torquing of polarization drive gear box setscrews and appropriate tensioning of corresponding drive chain assembly, if applicable.
- Check (if applicable) that the drain holes in the bottom of the enclosure are not obstructed and there is no evidence of water accumulation. Check the enclosure doors for proper closure and that the door seals are intact, not torn, abraded or otherwise damaged. Check that all other seals are intact and if not, use a coating of RTV-108 (silicone rubber sealant) to seal any exposed electrical fitting, bolt hold, or other possible water entry to electrical components in order to maintain a weatherproof condition. If the enclosure is provided with a vent fan, check for free operation of the fan blade. The fan bearings are permanently lubricated; any binding, abnormal noise or vibration necessitates replacement of the fan assembly. Check and replace the fan filter element if it appears dirty or obstructed with dust.
- Check for the appearance of surface lubricants that will cause the accumulation of dirt and grime. Clean off all excess surface lubricants with a cloth and if required, a cloth dampened not wetted with trichlorethylene, or equal.
- Visually inspect all mechanical parts for freedom of operation with no misalignment, binding or interference. Check all cabling for sufficient slack to prevent cable strain as well as adequate restraint to prevent abrasion or chaffing during antenna and feed movement.

## **Drive System Voltage and Current Checks**

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

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

### **Step 1**

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

### **Step 2**

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

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

### **Step 3**

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

- Step 4** Repeat preceding step (3) with the FEED CCW/OFF/CW switch in the alternate operating position.
- Step 5** Turn the AZIMUTH EAST/WEST switch to either position and while the antenna is rotating, carefully use a clamp on ammeter in accordance with the ammeter manufacturer's instructions to take current readings off each of the three conductors (phases) connected to the load side of the azimuth drive motor circuit breaker. Record the current draw in the equipment log and compare the readings to the reference values entered in the installation/acceptance check off. If the readings differ by more than five percent, refer to appropriate troubleshooting information and perform applicable corrective action. Then take voltage readings off each of the three conductors; the readings should agree with each other—within two percent. Turn the AZIMUTH switch to OFF.
- Step 6** Repeat steps (5) with the AZIMUTH EAST/WEST switch in the alternate operating position.
- Step 7** Turn the ELEVATION DOWN/UP switch to either position and while the antenna is rotating, carefully use a clamp on ammeter in accordance with the ammeter manufacturer's instructions to take current readings off each of the three conductors (phases) connected to the load side of the elevation drive motor circuit breaker. Record the current draw in the equipment log and compare the readings to the reference values entered in the installation/acceptance check off. If the readings differ by more than five percent, refer to appropriate troubleshooting information and perform applicable corrective action. Then take voltage readings off each of the three conductors; the readings should agree with each other within two percent. Turn the ELEVATION switch to OFF.
- Step 8** Repeat steps (7) with the ELEVATION DOWN/UP switch in the alternate operating position.
- Step 9** If all voltage and current readings are within tolerance, close the local control/motor drive controller inner door and place the LOCAL/REMOTE switch in the REMOTE position to return antenna control to the studio. Then close and lock the outer local control/motor drive controller door.

**Pedestal Mount  
Bearing Pad  
Adjustment**

The bearing pad (within the pedestal mount) adjustment rods/bolts require yearly adjustment and verification of torque value. With the antenna at zenith (90 degrees), follow the procedures presented below:

- Step 1** Loosen jam nuts on all adjustment rods/bolts.
- Step 2** Torque the upper adjustment rod evenly to 40 - 45 foot-pounds. Then torque the lower adjustment rod evenly to 40 - 45 foot-pounds.
- Step 3** Torque the upper adjustment bolt evenly to 40 - 45 foot-pounds. Then torque the lower adjustment bolt evenly to 40 - 45 foot-pounds.
- Step 4** Repeat steps 2 and 3 verifying all adjustment rods/bolts are evenly torqued within the limits specified.
- Step 5** Tighten the jam nuts.

## **Preservation of Component Parts**

### **Aluminum Parts**

When preserving the component parts, refer to the following paragraphs in this section.

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

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

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

### **Galvanized Surfaces**

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

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

### **Lubrication**

For long life and trouble-free operation be certain not to extend the lubrication schedule beyond the frequency recommended in Table 5-1. The frequency should be shortened if the antenna is subjected to an adverse environment (e.g., high temperature, extended periods of rainfall, high humidity, dust storms, etc). Any component or part should be immediately be lubricated if during inspection or operation, rough, jarring, or intermittent motion is noted, or if squeaky or other unusual noises are heard. Lubrication is required on all metal-to-metal rolling or sliding parts. Us the lubricants recommended. Do not over lubricate. Over lubrication can often be as damaging as under lubrication. Prior to the application of lubricant to any parts, use a clean cloth and/or bristle brush and

remove any old lubricant to prevent an excessive build-up. Remove indicated access plugs from square tube weldment and apply lubricant to panning frame tube assembly and corresponding thrust pads. Securely replace access plugs in square tube weldment. Be certain to remove any protective caps and clean off each lubrication fitting prior to injecting fresh grease. The elevation and azimuth jackscrew assemblies are equipped with a grease fitting and corresponding pipe plug on opposite sides of the jack housing. Remove the appropriate pipe plug and fill with grease until lubricant seeps from the pipe plug opening. Replace and securely tighten pipe plug.

The following is a list of the lubricant characteristics:

- Mobil Temp SHC32 A non-soap hydrocarbon fluid type grease. Operating temperature range is -65 degrees to 350+ degrees Fahrenheit (-54 degrees to 177+ degrees Celsius).
- Mobil SHC624 A low temperature synthetic oil for worm gear reducers. Operating temperature range is -40 degrees to 125+ degrees Fahrenheit (-40 degrees to 52+ degrees Celsius).
- Lightning Grease A grease lubricant containing molybdenum disulfide. Operating temperature range is -85 degrees to 300+ degrees Fahrenheit (-29 degrees to 149+ degrees Celsius).

## **Jackscrews/Motors**

Periodically inspect lifting screws on jackscrew assemblies to ensure adequate lubrication. Loosen Jackscrew boot clamps to expose the lifting screw assembly. Fully extend jackscrew assembly being careful not to exceed preset mechanical limits. Brush thin coating of Mobil SHC32 grease on exposed lifting screw. Replace boot and attach corresponding boot clamps. If lifting screw is rusty, remove existing lubricant with solvent and wire brush rusted area. Rinse with solvent and apply fresh grease.

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

## **Gear Motor/Housing Fill Drain Requirements**

Lube points 2 and 4, shown in Table 5-1, require removal of the indicated drain plugs and collecting/measuring the amount of SHC624 drain oil using measuring cup. The specified amount of oil must be added to the gear motor/housing (after installing the drain plug) via the fill/vent plug opening using supplied funnel. Addition of the oil requires use of an appropriate filling utensil. Use of a modified level stick will not correctly gauge the appropriate amount of oil in the gear housings.

Lube Point	Parts to be Lubricated	Action	Frequency	Service Type	Lube Type	Quantity /Points	Andrew Number
1	Elevation jackscrew housing	Lubricate	Every 3 months	Pressure Fitting	SHC32	1	49208
2	Elevation gear motor housing fill and drain	Inspect	Monthly	Pipe Plugs	SHC624	10 ounces	47497
		Change	Every 3 months				
3	Azimuth jackscrew housing	Lubricate	Every 3 months	Pressure Fitting	SHC32	2	49208
4	Azimuth jackscrew gear housing fill and drain	Inspect	Monthly	Pipe Plugs	SHC624	10 ounces	47497
		Change	Every 3 months				
5	Panning frame tube assembly and thrust pads	Lubricate	Every 3 months	Brush On	Lightning Lubricant	Surface Coverage	207912

Table 5-1: Antenna Lubrication Chart

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

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

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