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.74m Ka-Band Antenna Installation Guide

Model: AN8-074P

1037749-0001
Revision B
September 12, 2008

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Revision record

Revision	Date of issue	Scope
A	March 26, 2008	Production Release
B	September 12, 2008	Updated to reflect modifications to antenna design.

Important safety information

For your safety and protection, read this entire installation guide before attempting to install the AN8-074P Ka-band antenna. In particular, read this safety section carefully. Keep this safety information where you can refer to it if necessary.

Types of warnings used in this manual

This section introduces the various types of warnings used in this manual to alert you to possible safety hazards.

⚠ DANGER

Indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury.

CAUTION

Indicates a situation or practice that might result in property damage.

Product warning labels

The following safety alert labels are affixed to the antenna feed support arm, radio transmitter, and antenna reflector, respectively.

Feed support arm

Transmitter

Reflector (back side)

Safety alert labels on the antenna assembly

These labels advise that the antenna emits radio frequency (RF) energy. Because of this potential safety hazard, observe all cautions on these labels and in the next section, *Antenna installation safety*.

Antenna installation safety

Observe the following precautions when installing the satellite antenna. This manual also includes other safety alerts where appropriate concerning specific installation procedures.

⚠ WARNING

Only Hughes-certified installers may install or service Hughes antennas and their components. Installers must expressly acknowledge the Hughes requirements for Hughes installations.

⚠ DANGER

If you work on a roof, tower, or other high structure or use a ladder or scaffold to access the work site, follow these precautions to prevent personal injury or death:

- **Walk only on sound roof structures.**
- **Make sure the antenna assembly and installation surface are structurally sound so that they can support all loads (equipment weight, ice, and wind).**
- **Use safety equipment (for example, a lifeline) appropriate for the work location.**
- **Follow all manufacturer safety precautions for all safety and other equipment used.**
- **Perform as many procedures as possible on the ground.**

⚠ DANGER

- **To avoid electric shock, stay at least 20 ft from power lines.**
- **If any part of the antenna or mount assembly comes in contact with a power line, call the local power company to remove it. *Do not try to remove it yourself.***
- **For pole mount installations, be sure to obtain information regarding underground utilities in the proposed location before digging.**

Failure to heed these warnings could result in serious injury or death.

⚠ WARNING

Properly ground the antenna assembly according to all federal and local electrical codes.

⚠ WARNING

- **Do not work in high wind or rain; or if a storm, lightning, or other adverse weather conditions are either present or approaching.**
- **Do not attempt to assemble, move, or mount the antenna on a windy day. Even a slight wind can unexpectedly create sudden strong forces on the antenna surface.**

⚠ CAUTION

If the antenna or mount assembly begins to fall during the installation, do *not* attempt to catch it. Move away and let it fall.

⚠ WARNING

Antennas that have been improperly installed or attached to an unstable structure are susceptible to wind damage, which can be very serious or even life threatening. The product owner and installer assume full responsibility that the installation is structurally sound to support all loads (weight, wind, and ice) and is properly sealed against leaks.

⚠ CAUTION

Observe these precautions to avoid exposure to RF radiation, a potential safety hazard:

- **The antenna must be installed in a location not readily accessible to children and in a manner that prevents human exposure to potentially harmful levels of radiation.**
- **Antennas mounted in Puerto Rico, the continental United States, or at any site with a greater than 30° elevation angle must be installed such that the lower lip of the antenna reflector is at least 5 ft above any surface upon which a person might be expected to stand, and 3 ft 3 inches from any opening (such as a door or window) in a building or adjacent structure.**
- **Antennas mounted in Canada, Alaska, Hawaii, or any site with a less than 30° elevation must be installed such that the lower lip of the antenna reflector is at least 5 ft 9 inches above any surface upon which a person might be expected to stand, and 3 ft 3 inches from any opening (such as a door or window) in a building or adjacent structure.**
- **The antenna must be mounted such that no object that could reasonably be expected to support a person is within 6 ft 7 inches of the edges of a cylindrical space projecting outward from the antenna reflector toward the satellite.**
- **If the above distance requirements cannot be met, the antenna must be mounted in a controlled area inaccessible to the general public, such as a fenced enclosure or a roof.**
- **A fenced installation must have a locked entry, and the fenced area must be large enough to protect the general public from exposure to potentially harmful levels of radiation.**
- **Access to a roof installation in a commercial, industrial, or institutional environment must be limited by a door or a permanently fastened ladder that is locked to deny access to the general public.**
- **Once the transmitter becomes operational, maintain a safe distance; at least 3 feet.**

Failure to observe these cautions could result in injury to eyes or other personal injury.

⚠ CAUTION

- **All antennas of any type or size must carry an industry standard and government approved *Radiation Hazard Caution* label on the feed support arm.**
- **A fenced or roof installation in a commercial, industrial, or institutional environment must carry a *Radiation Hazard Caution* sign on the access door, gate, or permanently mounted access ladder within plain sight of anyone approaching the antenna from the front or sides of the reflector.**

Failure to observe these cautions could result in injury to eyes or other personal injury.

Note: Some installations may require additional precautions. See the HughesNet System ***Antenna Site Preparation and Mount Installation Guide*** (1035678-0001) for more information.

Contents

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Chapter 1
Overview

This Installation Guide explains how to assemble and install the Hughes AN8-074P .74m Ka-band antenna. It is written for qualified installers who are familiar with satellite antenna installation practices, and are capable of properly applying the information presented herein.

This chapter presents an overview of the AN8-074P antenna, a summary of the steps used to assemble and install the antenna, and supplemental information on tasks related to antenna installation. These topics are included in the following sections:

The model AN8-074P antenna

Each HughesNet antenna station consists of an antenna assembly and an indoor unit (IDU), which can be either a satellite modem or a satellite router. The IDU at a customer site requires an antenna and radio assembly to communicate with both the HughesNet satellite and the Network Operations Control Center (NOCC). The antenna is connected to the IDU by an intra-facility link (IFL) consisting of two cables: a transmit cable and a receive cable.

The Hughes model AN8-074P antenna is designed for Ka-band applications. Figure 1 shows the AN8-074P assembled, with a radio assembly.

Figure 1: The Hughes model AN8-074P .74m satellite antenna

Antenna installation summary

This section lists the basic steps and related tasks used to assemble and install the antenna. These procedures are listed in the order in which they are to be performed. For more detailed information on each task, refer to the chapters and documents listed.

1. Explain the installation process to the customer.
2. Conduct a site survey with the customer to identify a suitable location for the antenna. See the HughesNet ***Antenna Site Preparation and Mount Installation Guide*** (1035678-0001) for details.
3. Install and apply power to the IDU, following the instructions in the installation guide for the specific IDU you are installing.

Note: You must install the IDU before installing the antenna to determine the proper pointing values (azimuth, elevation, and tilt).

4. Connect your laptop computer to the IDU and enter the installation parameters from the installation reference sheet. See the HughesNet ***Ka-Band Antenna Pointing Guide*** (1037663-0001) for detailed instructions.
5. Determine the most suitable method for mounting the antenna and install the antenna mast. See the ***Antenna Site Preparation and Mount Installation Guide*** (1035678-0001) for details.

Note: It is critical that the antenna mast is plumb. The antenna cannot be adjusted to correct for a mast that is not plumb.

6. Attach the antenna reflector bracket to the Az/El mount. See Chapter 3 – *Installing the antenna and radio assembly*.
7. Attach the antenna reflector. See Chapter 3 – *Installing the antenna and radio assembly*.
8. Install the feed support arm. See Chapter 3 – *Installing the antenna and radio assembly*.
9. Install the radio assembly. See Chapter 3 – *Installing the antenna and radio assembly*.
10. Install the feed horn. See Chapter 3 – *Installing the antenna and radio assembly*.
11. Attach the Az/El mount and antenna assembly to the antenna mast pipe. See Chapter 3 – *Installing the antenna and radio assembly*.
12. Install the IFL transmit and receive cables between the IDU and the antenna. See Chapter 4 – *Cabling and connections*.
13. Ground the antenna assembly. See *Tasks related to antenna installation* on page 4.
14. Determine the proper azimuth, elevation, and tilt. See Chapter 3 – *Installing the antenna and radio assembly*.
15. Point the antenna in accordance with the instructions in the HughesNet ***Ka-Band Antenna Pointing Guide*** (1037663-0001).
16. Commission the IDU. For instructions, see the installation guide for the specific IDU you are installing.

Tasks related to antenna installation

This section discusses tasks related to antenna installation and explains where to find additional information.

Selecting the installation site

Before selecting an installation site, check the installation reference sheet to see if a customer-specific installation site has been pre-determined and specified. Also, refer to the HughesNet ***Antenna Site Preparation and Mount Installation Guide*** (1035678-0001), which discusses the factors that you should consider when selecting an antenna installation site.

The first and most important consideration when choosing a prospective antenna site is whether the area can provide an acceptable line of sight (LOS) to the satellite. A site with a clear, unobstructed view of the southern sky is necessary. Also, consider obstructions that may occur in the future, such as the growth of trees. Select your antenna site before performing the installation, so that the antenna will be able to receive the strongest signal available.

As with any other type of construction, a local building permit may be required before installing the antenna. It is the property owner's responsibility to obtain all permits. If necessary, modify the installation instructions in this manual in accordance with local building codes.

Installing the antenna mount

Before installing the antenna itself, you must first install a suitable antenna mount. If the system requires a pole mount installation, be sure to obtain information about the underground utilities in the proposed location. Have the appropriate utility company mark the location of any underground telephone wires, storm drains, etc. Also, because soils vary widely in composition and load capacity, it may be necessary to consult a local professional engineer to determine the appropriate foundation design.

For pole mounts that require a concrete base, you must allow at least 24 hr for the concrete to cure before installing the antenna. Be sure to plan and schedule the installation accordingly.

For complete information regarding antenna mount installation, including various mounting methods, refer to:

- The customer-specific installation reference sheet
- The HughesNet ***Antenna Site Preparation and Mount Installation Guide*** (1035678-0001).

Refer to the installation reference sheet for any customer-specific guidelines concerning the mount installation. Use only the installation method described in the reference sheet.

If the installation reference sheet does not specify a method, use only the mount installation methods documented in the HughesNet ***Antenna Site Preparation and Mount Installation Guide*** (1035678-0001). Most installations in a commercial, industrial, or institutional environment use a non-penetrating roof mount.

Installing the IDU

See the installation guide for the specific IDU you are installing.

Grounding

The entire antenna assembly must be grounded. For grounding information, refer to your training, best grounding practices, the Hughes Field Service Bulletin (FSB) ***HNS Broadband Requirements for RG-6 and RG-11 IFL Cable Connectors, Ground Blocks and Ground Block Location*** (FSB 050518_01), and applicable parts of the National Electrical Code (NEC).

Approved cables

For a list of approved coaxial cable types for the IFL between the antenna and the IDU, see the Hughes FSB, ***IFL Cable, Approved List (with lengths) for SPACEWAY Domestic Installations*** (FSB 080202_01). The FSB lists the maximum cable length for each approved cable type for all relevant radio types.

Because it is impossible to predict the requirements specific to each installation site, you must use your own judgement and best practices to determine how to route and connect the IFL transmit and receive cables.

Chapter 2

Antenna parts and required tools

This chapter describes the components and parts provided with the AN8-074P Ka-band antenna kit. It contains the following sections:

Antenna kit components

⚠ CAUTION

Metal components may contain sharp edges. Use care when un-packing and handling antenna parts.

This section identifies and describes the main components of the .74m Ka-band antenna kit. The antenna kit is shipped in three containers. Figure 2 identifies the contents of each container.

Note: To avoid potential damage, leave all components in their protective packages until required.

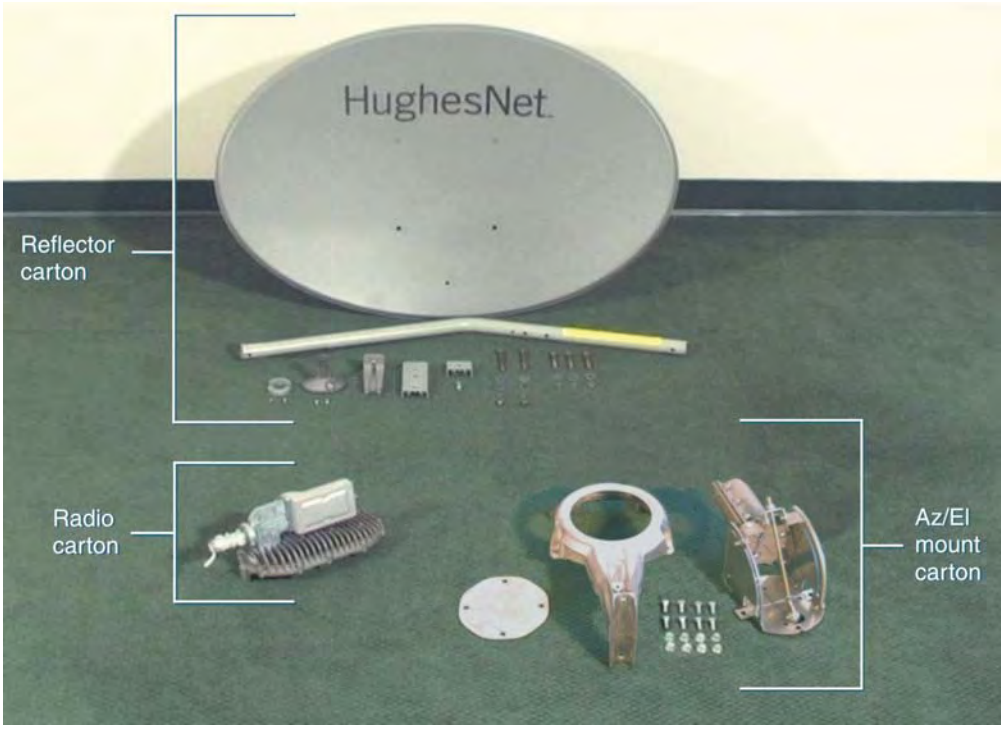

Figure 2: Antenna kit components

Note: The radio assembly is shipped separately and may not arrive at the same time as the other two cartons.

The main components of the antenna kit are:

- Az/El mount assembly
- Reflector bracket
- Antenna reflector
- Feed support arm
- Radio assembly
- Feed horn

Related components (not shown):

- Tri-mast or other mount

The following sections describe each component of the antenna kit.

Az/El mount assembly

The *Az/El mount assembly*, shown in Figure 3, consists of the Az/El canister, the elevation scale, and the fine azimuth and fine elevation tools. The Az/El canister supports the antenna. The elevation scale is used to coarse-point the antenna in the azimuth plane. The fine azimuth and elevation tools are used to finely adjust the azimuth and elevation of the reflector during antenna pointing.

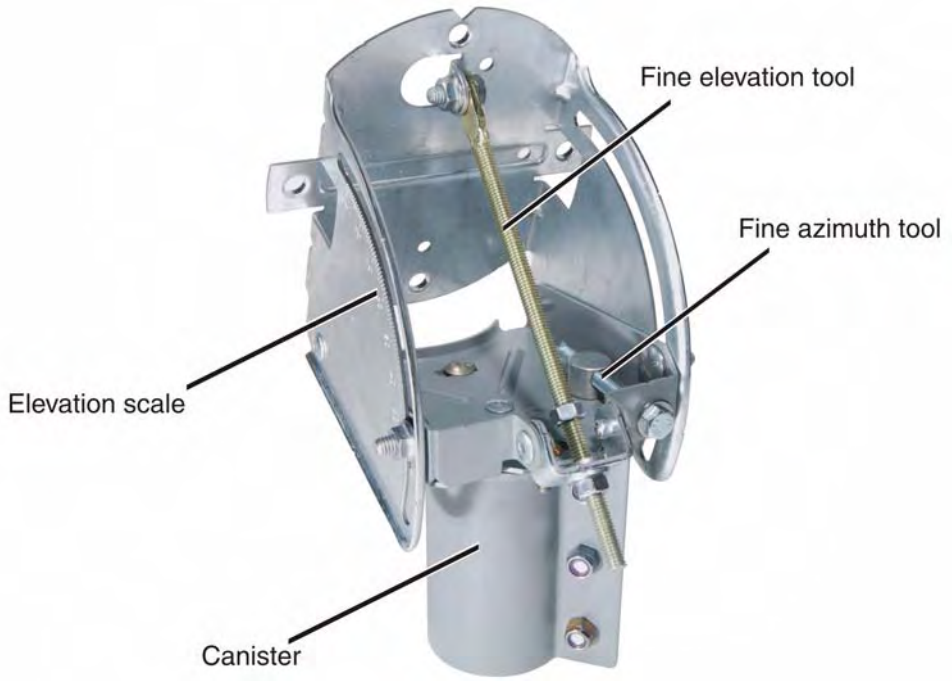

Figure 3: Az/El mount assembly

Reflector bracket and tilt plate

The *reflector bracket* supports the antenna reflector. The *tilt plate* allows the reflector to rotate so that it can be adjusted for proper tilt. The reflector bracket and tilt plate attach to the Az/El mount assembly. Figure 4 shows the reflector bracket and tilt plate.

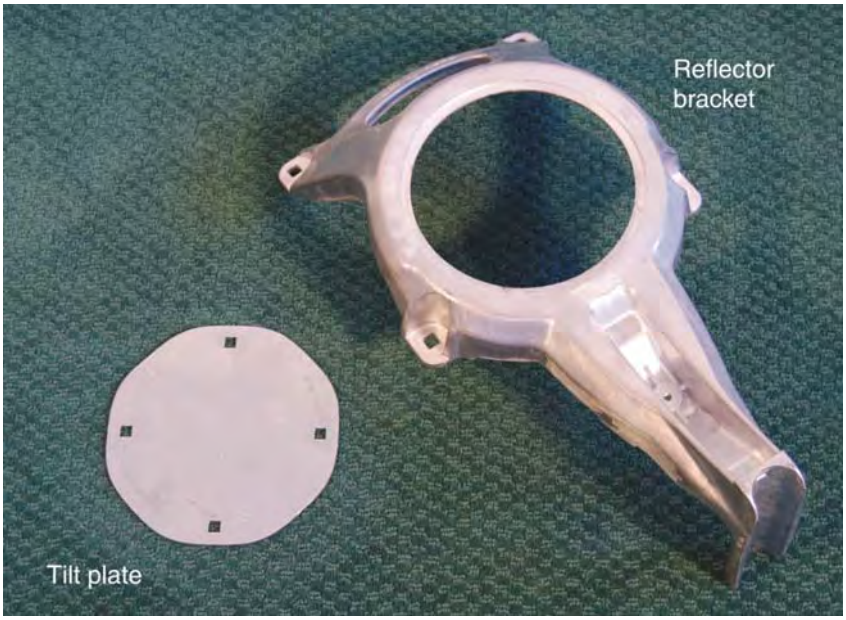

Figure 4: Reflector bracket and tilt plate

Antenna reflector

The antenna *reflector* shown in Figure 5 focuses the transmitted and received RF signals. It attaches to the reflector bracket.

Figure 5: Antenna reflector

CAUTION

To avoid damage to the antenna reflector, handle it with care. After assembly, do *not* use the reflector to rotate the antenna.

Feed support arm

Figure 6 shows the *feed support arm*. The feed support arm supports the radio assembly and feed horn. It attaches to the reflector bracket.

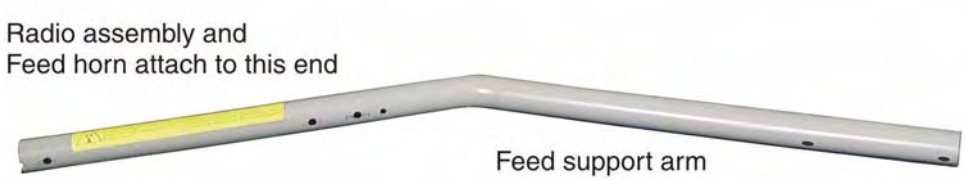

Figure 6: Feed support arm

Radio assembly

The *radio assembly* shown in Figure 7 consists of the radio transmitter, low noise block converter (LNB), transmit/receive isolation assembly (TRIA), and polarizing waveguide.

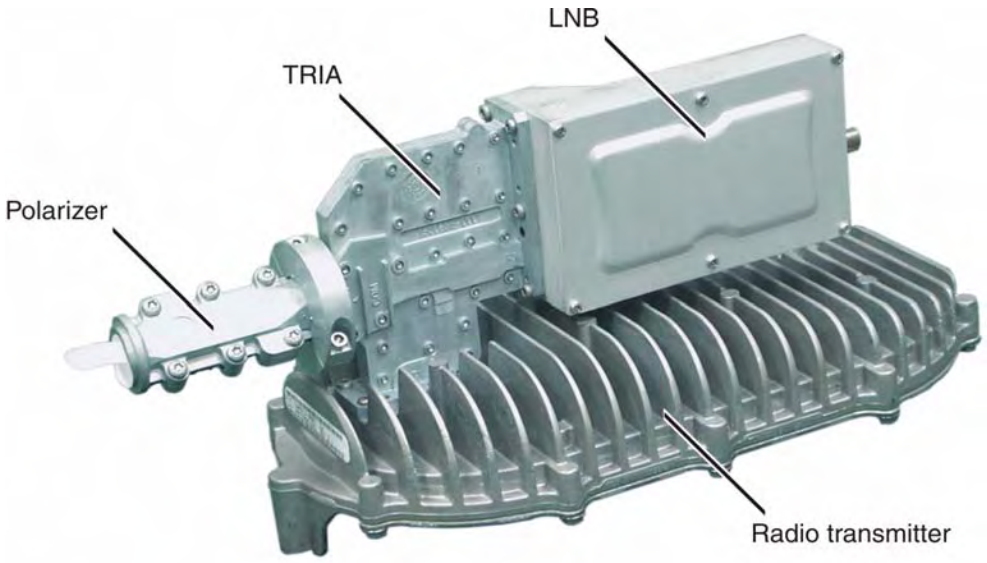

Figure 7: Radio assembly

Feed horn

The elliptical *feed horn*, shown in Figure 8, attaches to the polarizer on the radio assembly. The feed horn gathers the reflected signal from the reflector and focuses it toward the LNB.

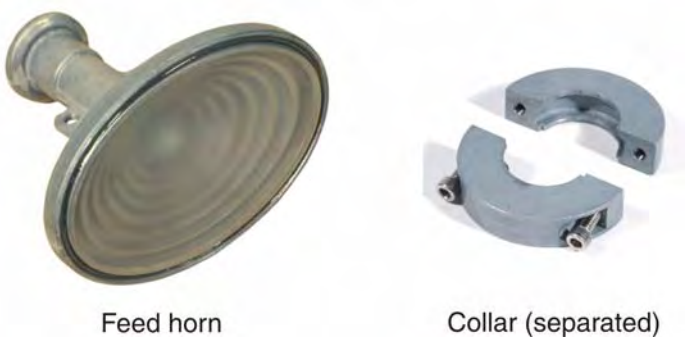

Figure 8: Feed horn and collar

Related Components

Tri-mast (or other antenna mount)

Although the tri-mast is not part of the antenna kit, it is described here because it is the most commonly used mounting option for the AN8-074P Ka-band antenna. As shown in Figure 9, the tri-mast can be positioned in a number of configurations to adapt it for mounting onto surfaces of various angles. For other suitable antenna mounting options, see the HughesNet system ***Antenna Site Preparation and Mount Installation Guide***, (1035678-0001).

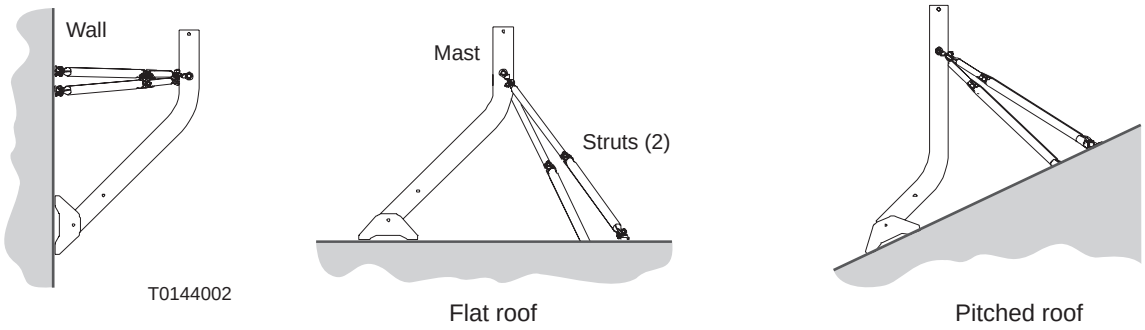

Figure 9: Tri-mast in various configurations

Small hardware parts list

Table 1 lists the small hardware parts included with the antenna kit and radio assembly.

Table 1: Small hardware parts

Part	Quantity	Listed parts are used to attach…	Illustration showing where parts are used
Parts shipped in bag 0200-1378			
5/16-inch × ¾-inch carriage bolt (½-inch hex head)	4	Tilt plate and reflector bracket to Az/El mount assembly	Figure 10 on page 17
5/16-inch hex head serrated flange nut (5/16-inch inside diameter)	4		
5/16 × ¾-inch carriage bolt (½-inch hex head)	4	Antenna reflector to reflector bracket	Figure 12 on page 19
5/16-inch hex head serrated flange nut (5/16-inch inside diameter)	4		
1/4 × ½-inch slotted screw (7/16-inch hex head)	1		
Parts shipped in bag 0200-1379			
1/4 × 1¾-inch hex bolt (7/16-inch hex head)	2	Feed support arm to reflector bracket	Figure 13 on page 20
1/4-inch flat washer	2		
1/4-inch lock washer	2		
1/4-inch hex nut	2		
1/4 × 1¾-inch hex bolt (7/16-inch hex head)	1	Feed horn support bracket and adapter bracket (long) to feed support arm	Figure 14 on page 21
1/4-inch flat washer	1		
1/4-inch lock washer	1		
Parts shipped in bag 0200-1380			
5/16 × 11¾-inch hex bolt	2	Radio assembly (transmitter) and adapter bracket (short) to feed support arm	Figure 15 on page 22 and Figure 16 on page 23
5/16-inch flat washer	2		
5/16-inch lock washer	2		
Parts shipped with radio assembly			
O-ring	1	Feed horn to radio assembly	Figure 22 on page 28
#6-32 hexagonal socket head (Allen) screw	4		
#4-40 x ½-inch Phillips head screw	2		

Tools

Table 2 lists the tools required to assemble and install the antenna.

Table 2: Tools required to assemble and install the antenna

Tool	Details
Socket wrench, ½-inch (with 3-inch extension)	For 5/16-inch bolts.
Open-end wrench, ½-inch	For 5/16-inch bolts. Two of the Az/El canister nuts are not accessible by socket wrench. Some nuts and bolts require a second wrench to prevent turning.
2 open-end or socket wrenches, 7/16-inch	For 1/4-inch bolts. Some nuts and bolts require a second wrench to prevent turning.
Torque wrench	With ½-inch and 7/16-inch sockets capable of torquing to 8 ft-lb.
Long-shaft hexagonal ball driver (7/64-inch)	For #6-32 Allen screws. Driver shaft should be at least 5 inches long.
Phillips-head screwdriver, 1/4-inch	For screw used to help secure antenna reflector to reflector bracket.
Bubble level	Used to make sure that the mast is plumb.
Compass	Used in determining antenna azimuth.
Pencil	Carpenter's pencil.
Weather grade silicon sealant	Used to keep moisture away from cable connections.
Weatherproofing tape	Used to keep moisture away from cable connections
Approved RG6 cable	Used for IFL between IDU and antenna.
UV-rated cable ties	Used to secure slack in cables to antenna mast.

Chapter 3

Installing the antenna and radio assembly

This chapter explains how to assemble and install the antenna, radio assembly, and associated hardware. Topics in this chapter include:

CAUTION

Before you install the antenna, read all safety information in *Important safety information* on page iii.

Determining the pointing values

Before installing the antenna, you must install and power up the IDU. Refer to the appropriate IDU installation guide for instructions.

Once the IDU is operational, connect it to your laptop using an Ethernet cable, then use your global positioning system (GPS) receiver to calculate the exact latitude and longitude of the antenna site. Follow the instructions in the HughesNet System ***Ka-Band Antenna Pointing Guide*** (1037663-0001) to enter the latitude and longitude information to determine the initial antenna azimuth, elevation, and tilt values. Record these values and keep them handy for reference as you install and point the antenna.

General instructions for assembling the antenna

Before you assemble the antenna, read these important instructions:

- Mast – *The mast must be installed before you can install the antenna.* For information on installing the antenna mast, see the HughesNet System ***Antenna Site Preparation and Mount Installation Guide***, (1035678-0001).

Note: The mast diameter must be 2.5-inch nominal pipe size (2.88-inch outside diameter).

- Sequence of steps – When you assemble the antenna, *be sure to follow the instructions in this chapter in the order they are presented.*

⚠ WARNING

For rooftop installations, assemble the antenna on the ground and then carry the fully assembled antenna up to the roof.

- Tightening hardware – *Do not tighten any nuts or other hardware until instructed to do so.* (See also the next item, *Torque*.)
- Torque – To ensure successful installation of the antenna, it is critical that you tighten all nuts and socket-head screws to the torque values shown in Table 3.

Table 3: Torque specifications

Fastener	Proper Torque Value
5/16-inch bolts	8 ft-lb.
1/4-inch bolts	5 ft-lb.

Installing the reflector bracket and tilt plate

Begin the antenna assembly by attaching the antenna reflector bracket and tilt plate to the Az/El mount:

1. Hold the reflector bracket in position over the Az/El mount so that the tilt scale faces the mount, as shown in Figure 10.

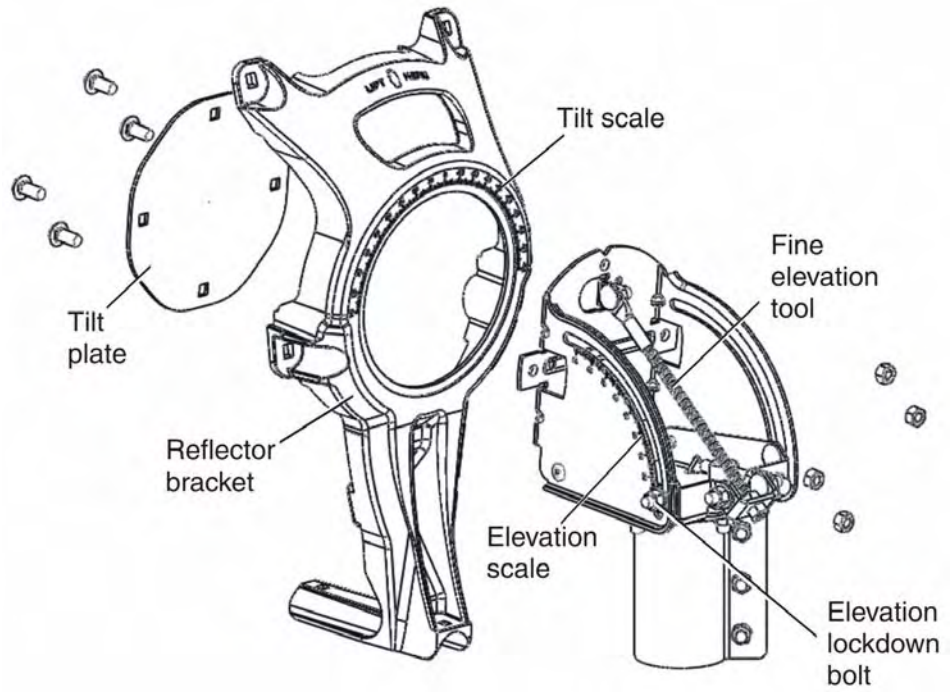

Figure 10: Attaching the reflector bracket

2. While holding the reflector bracket in position, lay the tilt plate over the opening in the reflector bracket so that the holes in the tilt plate line up with the corresponding holes on the Az/El mount. Because the hole pattern in the tilt plate is not symmetrical, be sure that the tilt plate notch is at the top so that you can line up the holes correctly.
3. Insert four carriage bolts (5/16-inch × ¾-inch with ½-inch hex head) into the holes in the tilt plate and through the holes in the Az/El mount. You are going to bolt the tilt plate to the Az/El mount, with the reflector bracket between them.

Note: Tighten all bolts to a torque value of 8 ft-lb.

4. Place a ½-inch hex flange nut on each of the four bolts from the opposite side and tighten the nuts lightly, only until snug. Once connected, the reflector bracket should rotate freely between the Az/El mount and the tilt plate.

When the reflector bracket and tilt plate are correctly positioned on the Az/El mount assembly, you should be able to clearly see the tilt scale numbers on the reflector bracket above the mount assembly tilt pointer, as shown in Figure 11.

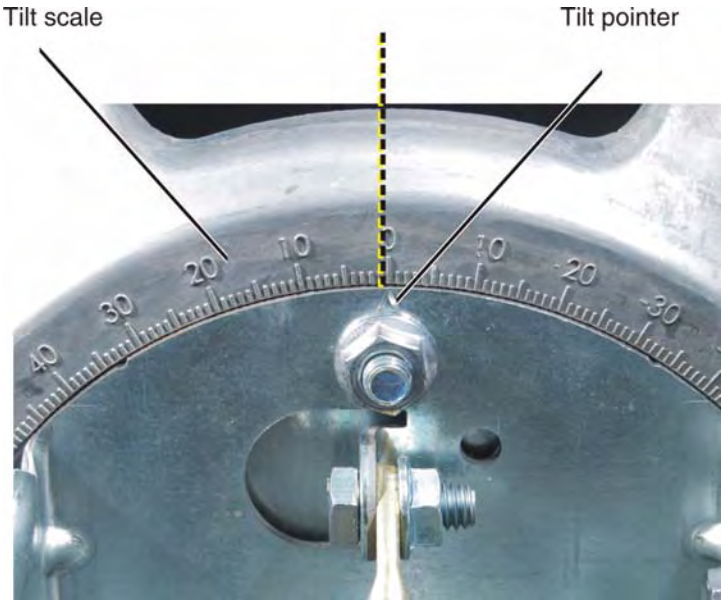

Figure 11: Tilt scale

Installing the antenna reflector

To attach the antenna reflector to the reflector bracket:

1. Hold the reflector against the reflector bracket so that the tailpiece notch is near the reflector bracket arm, as shown in Figure 12.
2. Insert four carriage bolts (5/16-inch × ¾-inch with ½-inch hex head) into the holes in the reflector and through the corresponding holes in the reflector bracket, as shown in the illustration.

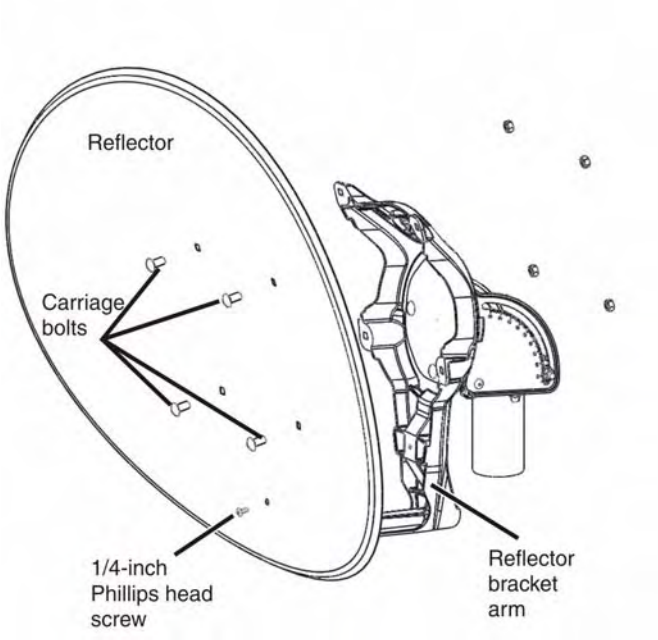

Figure 12: Attaching the antenna reflector

3. Insert the ¼-inch Phillips head screw through the hole near the bottom of the reflector, as shown in the figure, and into the corresponding hole in the reflector bracket arm.
4. Using a Phillips head screwdriver, tighten the ¼-inch screw.
5. From the back of the reflector bracket, secure the four bolts with four ½-inch hex flange nuts and tighten.

Note: Ensure that the carriage bolts are firmly seated before tightening the nuts.

Installing the feed support arm

To install the feed support arm:

1. Insert the feed support arm into the bottom section of the reflector bracket, as shown in Figure 13.
2. Insert two 1/4-inch × 1¾-inch bolts with 7/16-inch hex heads) down through the tailpiece into the feed support arm.

3. Place one flat washer, lock washer, and hex nut onto each bolt and tighten until secure.

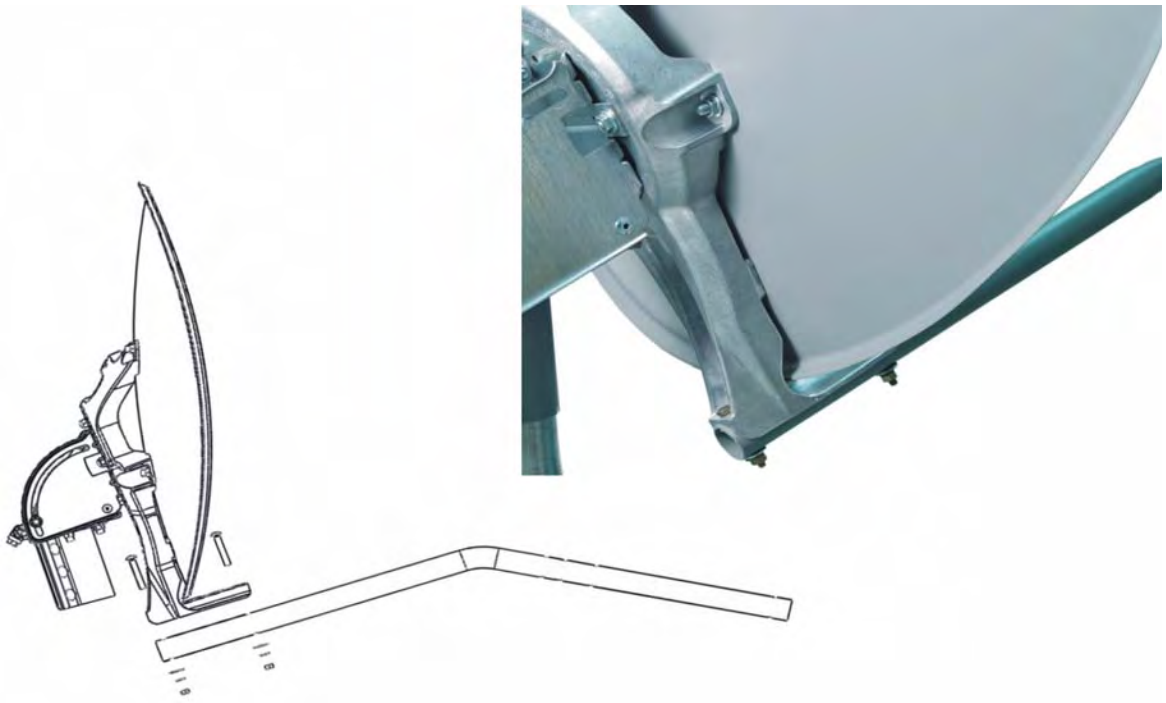

Figure 13: Attaching the feed support arm to the tailpiece

4. Check to make sure that the tailpiece does not shift from its proper position or become misaligned in the reflector bracket when pressure is applied to the feed support arm. If the tailpiece shifts, you must re-align it and tighten the bolts more securely.

Installing the radio assembly

To mount the radio assembly to the feed support arm:

1. Insert a single 5/16-inch × 1¾-inch bolt, with flat washer and lock washer through the feed support arm from underneath.
2. Position the long adapter bracket on the feed support arm so that the bolt fits through the hole.
3. Position the feed horn support bracket above the long adapter bracket on the feed support arm as shown in Figure 14.

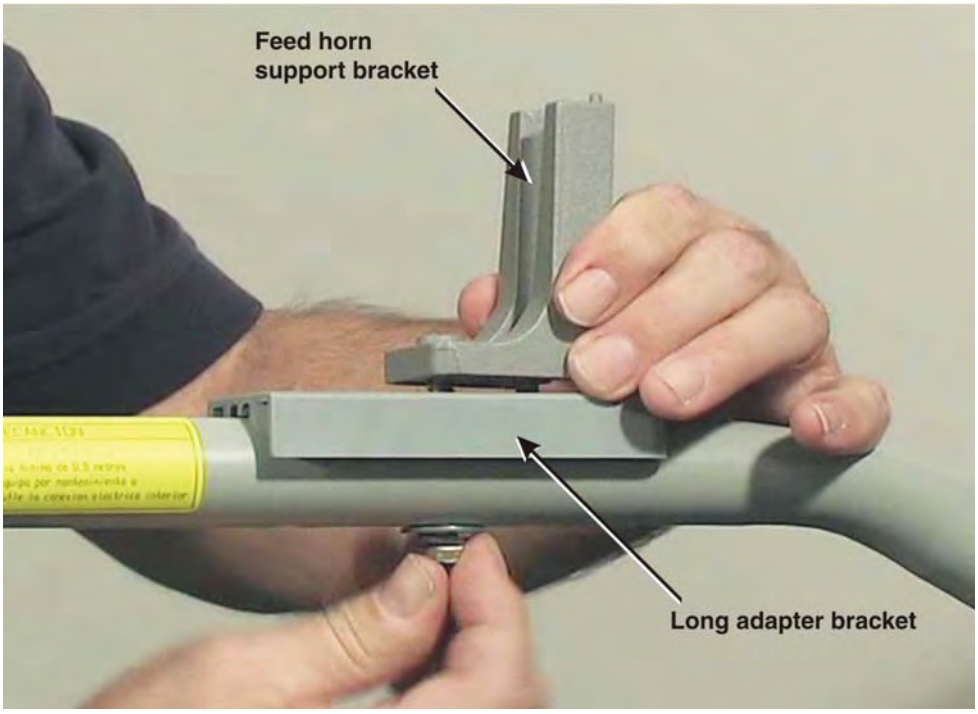

Figure 14: Positioning the radio and feed horn brackets

4. Attach the two pieces to the feed support arm by connecting a ½-inch nut to the bolt from above, and secure.
5. Position the radio assembly above the long adapter bracket so that the waveguide end of the radio is nearest to the reflector, as shown in Figure 15.

Figure 15: Attaching the radio assembly

6. Insert one 5/16-inch × 1¾-inch bolt, with flat washer and lock washer up through the feed support arm and long adapter bracket, and into the threaded socket on the front of the transmitter.
7. Tighten only enough to hold the radio in place.

CAUTION

Tighten the nut only enough to secure the radio and adapter bracket to the feed support arm. Excessive tightening of this nut can crack or crush the adapter bracket.

8. Place the short adapter bracket in position near the end of the feed support arm and lower the radio onto it as shown in Figure 16.

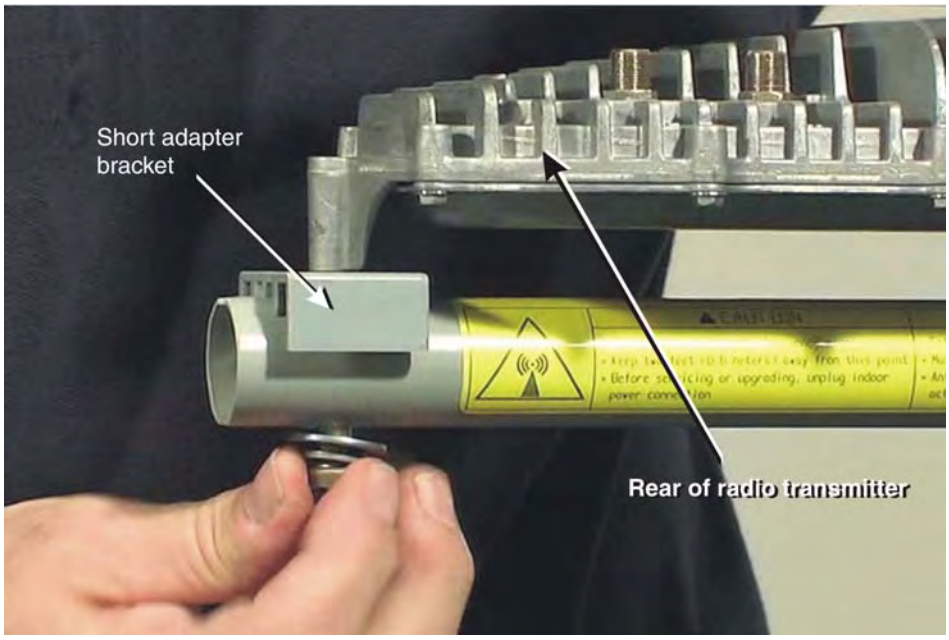

Figure 16: Securing the rear of the radio assembly

9. Insert one 5/16-inch × 1¾-inch bolt, with flat washer and lock washer, up through the feed support arm and the short adapter bracket, into the threaded socket on the transmitter.
10. Tighten the bolt to secure the bracket and radio to the feed support arm. Tighten only until snug. Do *not* tighten fully until instructed to do so.

CAUTION

Tighten the nut only enough to secure the radio and adapter bracket to the feed support arm. Excessive tightening of this nut can crack or crush the adapter bracket.

Adjusting transmit circular polarization

It may be necessary for you to reposition the polarizer waveguide on the radio assembly to set the proper polarization between the radio transmitter and the antenna reflector. Before proceeding with the installation, check the installation reference sheet to determine whether the installation calls for left-hand circular polarization (LHCP) or right-hand circular polarization (RHCP).

Once you determine which polarization setting is required, check the position of the polarizer waveguide to determine whether an adjustment is necessary. From the rear of the radio, looking toward the reflector, you can easily determine whether the polarizer is currently set for LHCP or RHCP by the way it leans. (See Figure 17.)

Note: There is no default factory setting for transmit polarization. Radios can be shipped with either setting.

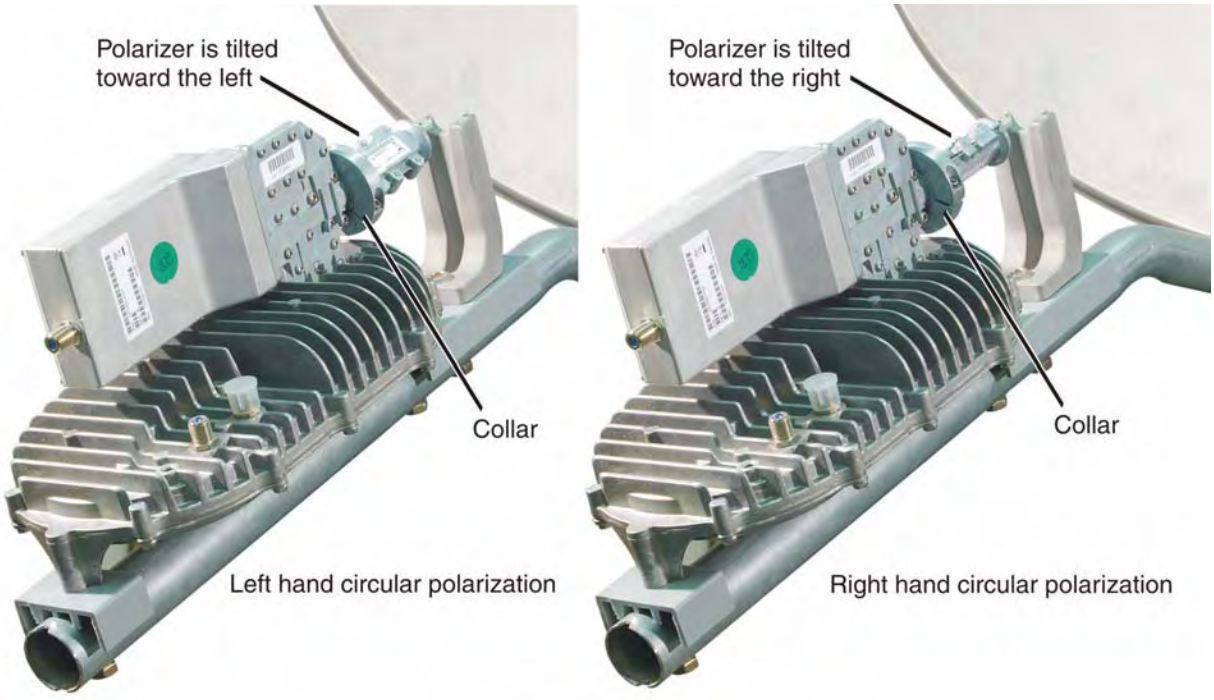

Figure 17: Determining the polarization setting

To reposition the polarizer:

1. Remove the two-piece polarizer collar by loosening and removing the two Allen screws.
2. Separate the polarizer from the TRIA and rotate it one quarter turn (clockwise for LHCP and counter-clockwise for RHCP), until the appropriate notch lines up with the key on the end of

the TRIA. As shown in Figure 18, the LHCP notch is adjacent to the L on the polarizer and the RHCP notch is adjacent to the R on the polarizer).

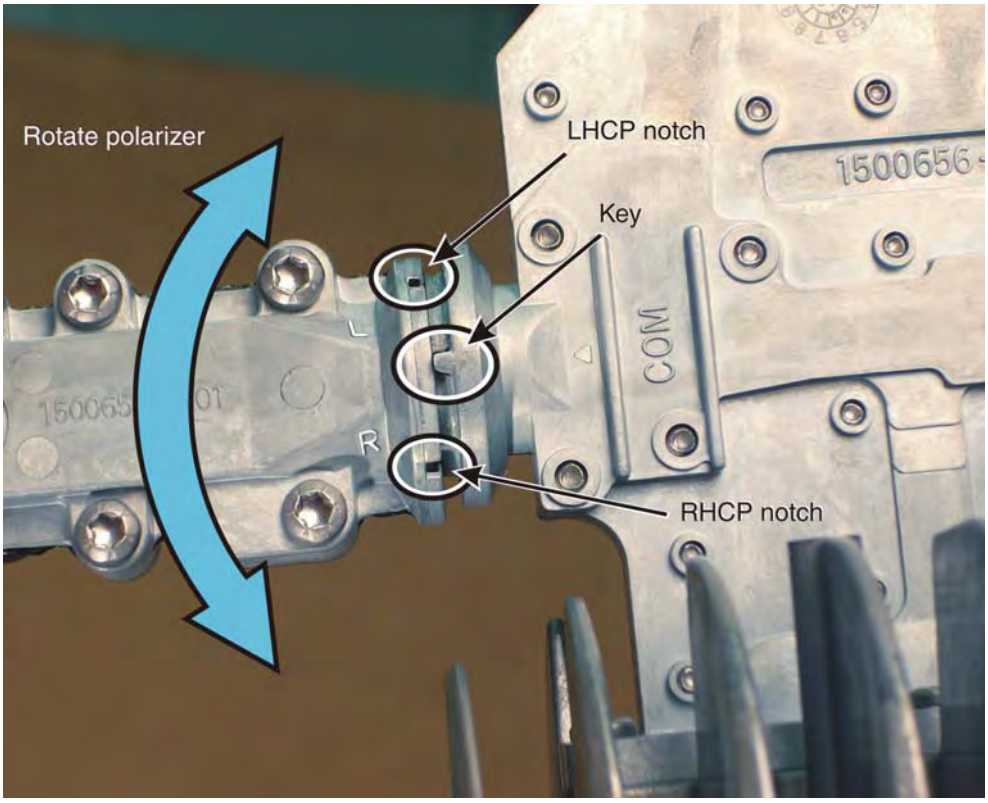

Figure 18: Adjusting circular polarization (collar removed)

3. Reseat the waveguide with the TRIA and reassemble the collar. When properly installed, both halves of the collar should join along the ridges on opposite sides of the waveguide as shown in Figure 19. Each half of the collar is notched to fit securely over the waveguide ridge.

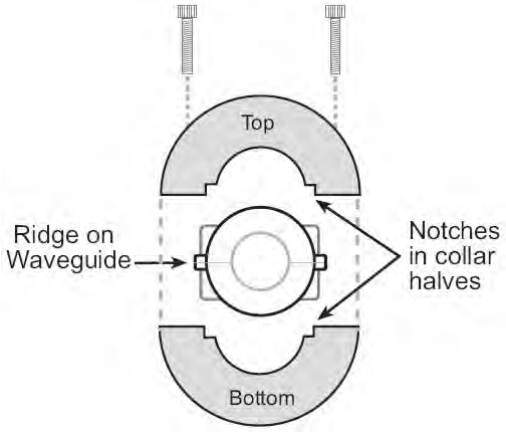

Figure 19: Securing the waveguide collar

Installing the feed horn

To attach the feed horn to the radio assembly:

1. Remove and discard the protective seal from the polarizer on the radio assembly (shown in Figure 20).

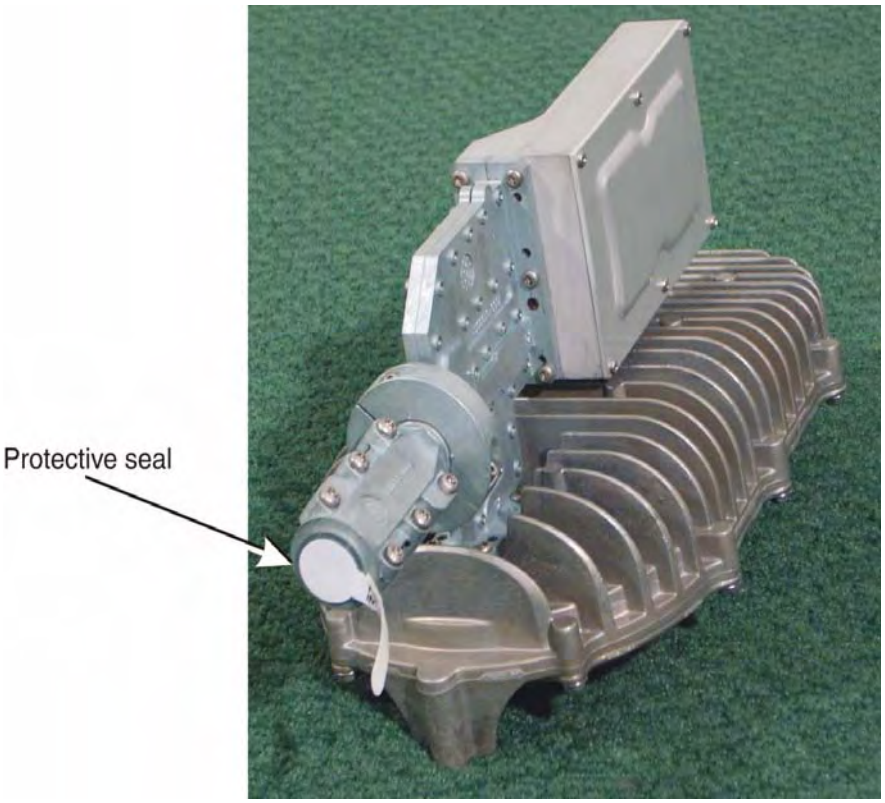

Figure 20: Remove the protective seal from the polarizer

2. Remove the dust cap from the stem of the feed horn and insert the O-ring into the groove inside the stem.
3. Place the feed horn on the feed horn support bracket so that the holes on either side of the feed horn fit into the corresponding pins on the bracket, as shown in Figure 21.

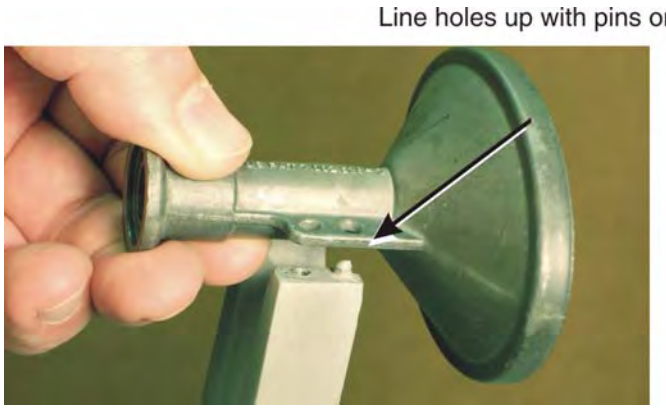

Figure 21: Aligning the feed horn on the adapter bracket

4. Fit the two sections of the feed horn collar around the ridge at the point where the feed horn meets the polarizer, as shown in Figure 22.

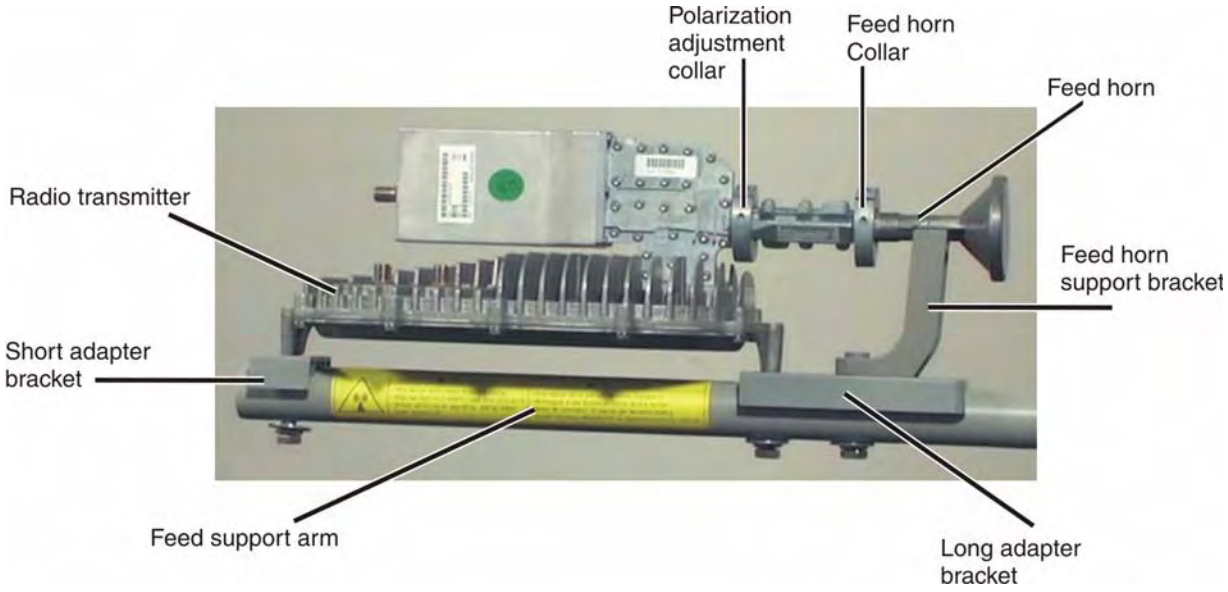

Figure 22: Radio assembly and feed horn installed

5. Rotate the collar until it seats into the notch on the feed horn. You *must* locate the notch before fully assembling the collar. Failure to do so will result in damage to the polarizer waveguide. When properly aligned, the two halves of the collar will line up with the seam on the polarizer waveguide as shown in Figure 23.

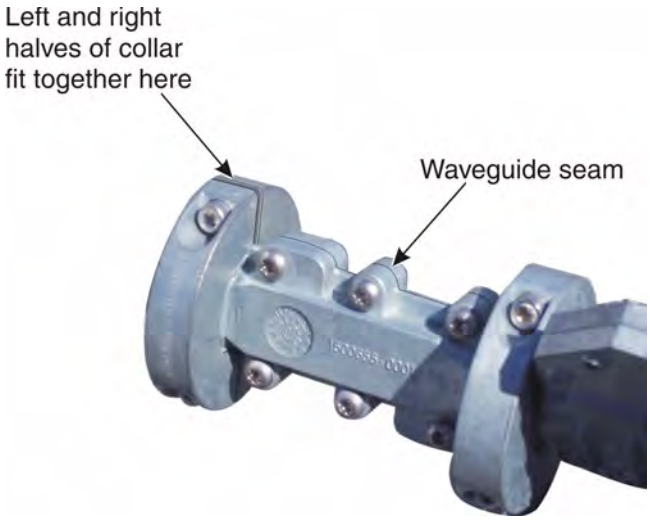

Figure 23: Aligning the collar on the waveguide

6. Insert and tighten two Allen screws into the collar to secure the feed horn in place.
7. Insert the final two mounting screws onto either side of the feed horn and secure it to the feed horn support bracket using a 1/4-inch Phillips head screwdriver.
8. At this point, fully tighten any hardware that is not tight, except for any nuts that are used for pointing adjustments. Leave such nuts either slightly loose or just snug.

Installing the antenna assembly onto the mast pipe

Follow these steps to install the assembled antenna assembly onto the mast pipe:

1. Before you install the Az/El mount assembly onto the mast pipe, use a bubble level to make sure that the mast is plumb. Check the mast at two perpendicular locations, as shown in Figure 24.

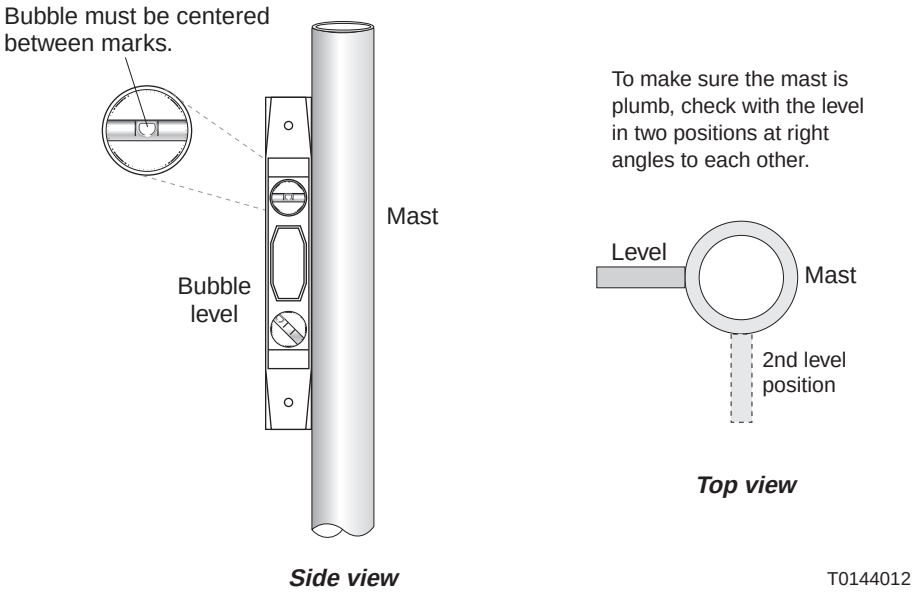

Figure 24: Making sure the mast is plumb

2. Slide the Az/El canister of the mount assembly down onto the mast as shown in Figure 25.

Note: The mast diameter must be 2.5-inch nominal pipe size (2.88-inch outside diameter).

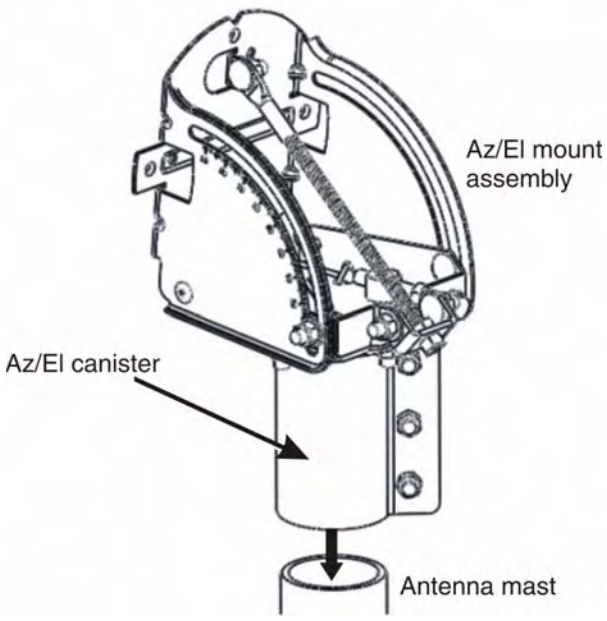

Figure 25: Installing the Az/El mount assembly

This completes the assembly phase of the antenna installation process. Depending on its orientation, the antenna should look similar to the one shown in Figure 26.

Figure 26: Assembled antenna

To proceed with the installation, you must route the IFL Tx and Rx cables between the antenna and the IDU. See Chapter 4 – *Cabling and connections*.

Chapter 4

Cabling and connections

This chapter illustrates where the antenna transmit, receive, and ground connectors are located; shows how to route the transmit and receive cables at the antenna; and explains how to connect the transmit and receive cables to the radio assembly. You must connect all of these cables before you can point the antenna toward the HughesNet system satellite.

Topics in this chapter include:

Cabling requirements

For a list of approved coaxial cable types for the IFL between the antenna and the IDU, see the Hughes FSB, ***IFL Cable, Approved List (with lengths) for SPACEWAY Domestic Installations*** (FSB 080202_01). The FSB lists the maximum cable length for each approved cable type for all relevant radio types.

Because it is impossible to predict the requirements specific to each installation site, you must use your own judgement and best practices to determine how to route the IFL cables.

CAUTION

Coaxial cables and connectors can corrode if exposed to moisture. Use *only* compression type connectors, and weatherproof them with dielectric grease and weatherproofing tape.

Note: For connector requirements, see the Hughes FSB, ***HN Broadband Requirements for RG-6 and RG-11 IFL Cable Connectors, Ground Blocks and Ground Block Location*** (FSB 50518_01).

Routing the cables at the antenna

Route the coaxial Tx and Rx cables at the antenna as follows:

1. Route the Tx cable (marked with blue electrical tape) over the Az/El mount assembly, down behind the reflector, and along the feed support arm to the rear of the transmitter, in a configuration similar to that shown in Figure 27.

Note: Do *not* exceed the minimum bending radius specified by the cable manufacturer.

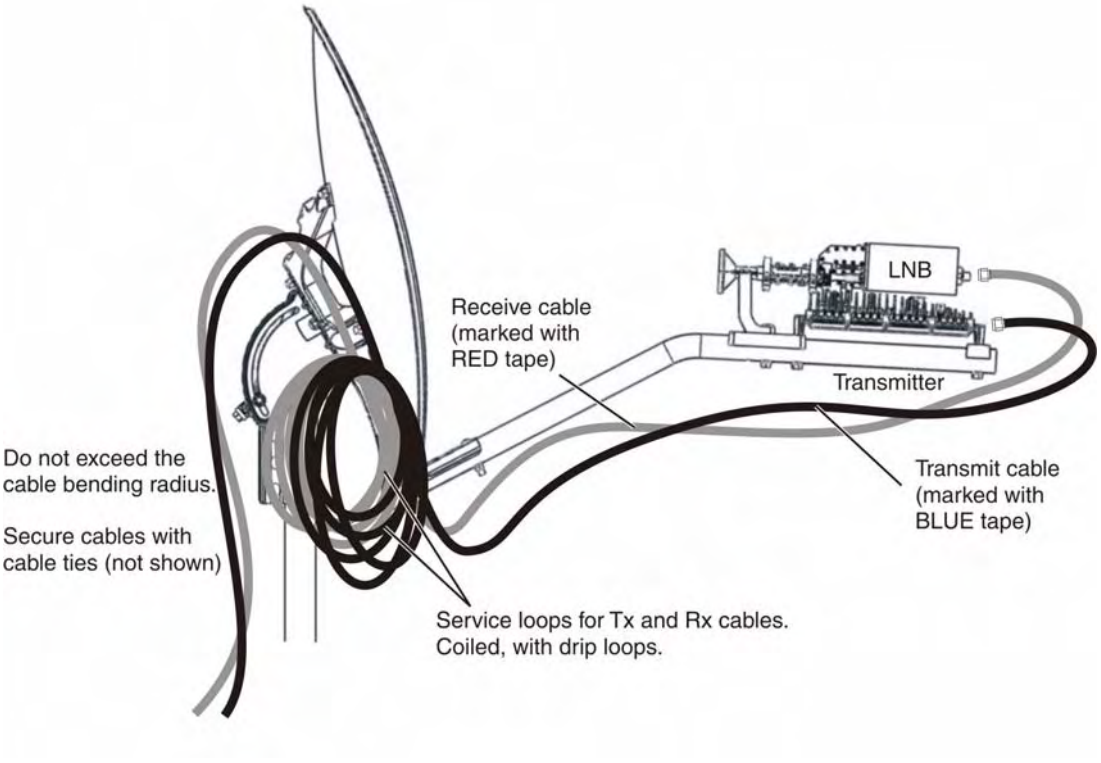

Figure 27: Transmit and receive cable configurations

2. Leave a 10-foot service loop and secure it to the mast, Az/El mount assembly, or reflector bracket.

Note:
1. Do *not* leave the service loop on the roof or other mounting surface.
2. Do *not* block access to the adjustment nuts on the Az/El mount assembly.

3. Coil the extra cable, leave a drip loop, and secure the Tx cable with cable ties.

4. Route the Rx cable (marked with red electrical tape) over the Az/El mount assembly, down behind the reflector, and along the feed support arm to the LNB, in a configuration similar to that shown in Figure 27 above.

Note: Do *not* exceed the minimum bending radius specified by the cable manufacturer.

5. Leave a 10-foot service loop and secure it to the mast, Az/El mount assembly, or reflector bracket.

Note:
1. Do *not* leave the service loop on the roof or other mounting surface.
2. Do *not* block access to the adjustment nuts on the Az/El mount assembly.

6. Coil the extra cable, leave a drip loop, and secure the Rx cable with cable ties.

Connecting the transmit and receive cables

This section explains how to connect the Tx and Rx cables to the radio assembly at the antenna.

Note: You should protect all outdoor cable connections with dielectric grease and weatherproofing tape as shown in Figure 28. However, because the antenna pointing procedure requires that you disconnect the cables, you should wait until the pointing process is complete before weatherproofing the connections.

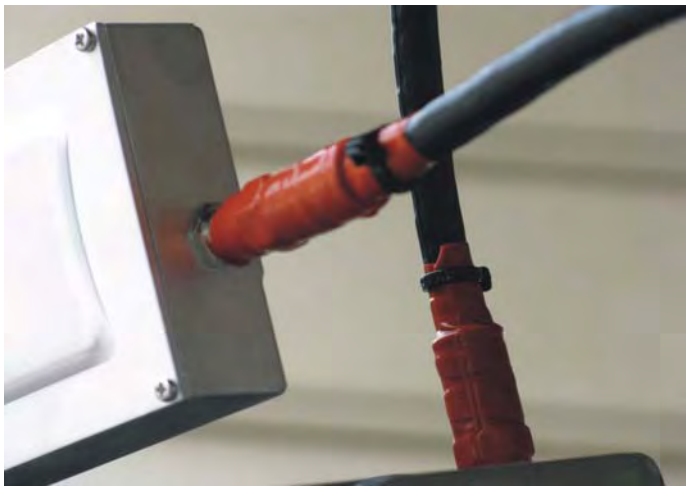

Figure 28: Weatherproofing the cable connectors

Transmit cable Connect the Tx cable to the radio transmitter as follows:

1. Remove power from the IDU.
2. Connect the Tx cable (marked with blue electrical tape) to the transmitter connector marked *IFL*, shown in Figure 29.

CAUTION

Coaxial cables and connectors can corrode if exposed to moisture. Use *only* compression type connectors, and weatherproof them with dielectric silicone grease and weatherproofing tape.

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3. Tighten the cable connector with a 7/16-inch wrench.
4. Apply dielectric silicone grease to the connection.
5. If necessary, secure the cable with cable ties.

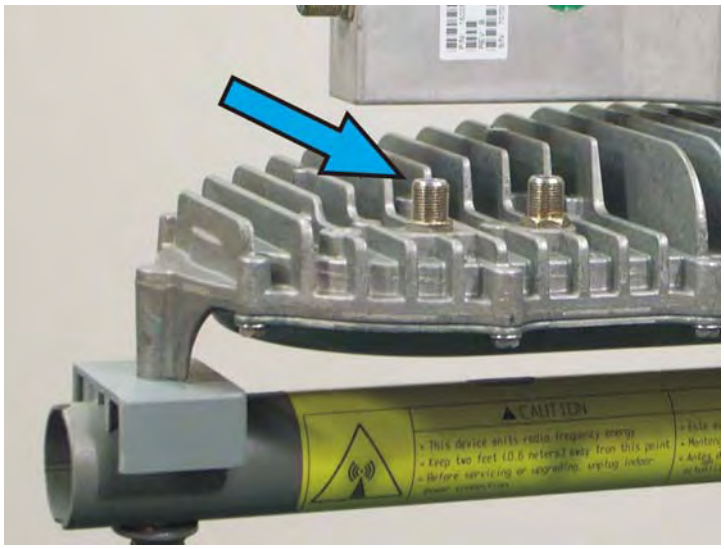

Figure 29: Transmit connector

Receive cable Connect the Rx cable to the LNB as follows:

1. Ensure that power has been removed from the IDU.
2. Connect the Rx cable (marked with red electrical tape) to the receive connector on the LNB, shown in Figure 30.

CAUTION

Coaxial cables and connectors can corrode if exposed to moisture. Use *only* compression type connectors, and weatherproof them with dielectric grease and weatherproofing tape.

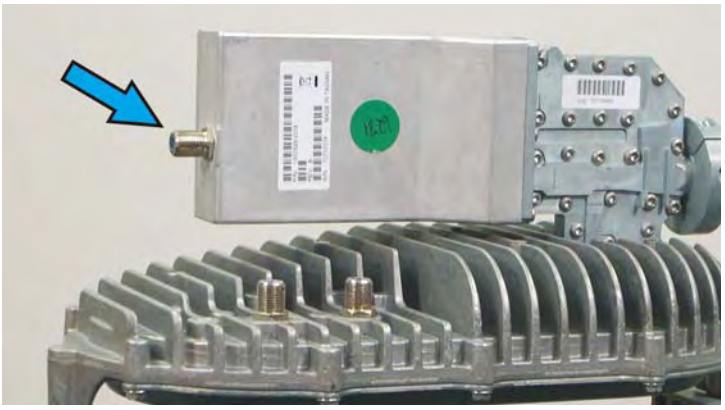

Figure 30: Receive connector

3. Tighten the cable connector with a 7/16-inch wrench.
4. Apply dielectric silicone grease to the connection.
5. If necessary, secure the cable with cable ties.
6. After both the Tx and Rx cables are connected to the radio and the IDU, reapply power to the IDU in accordance with the instructions in the IDU installation guide.

Ground connections

Ground the antenna mast at the Az/El mount. Figure 31 shows the locations of the ground screw. For specific grounding procedures, refer to the sources listed in *Grounding* on page 5.

Note: Although the radio transmitter contains a ground screw, a separate ground wire to the radio assembly is not required; the radio assembly is grounded though the metallic shield of the coaxial cable.

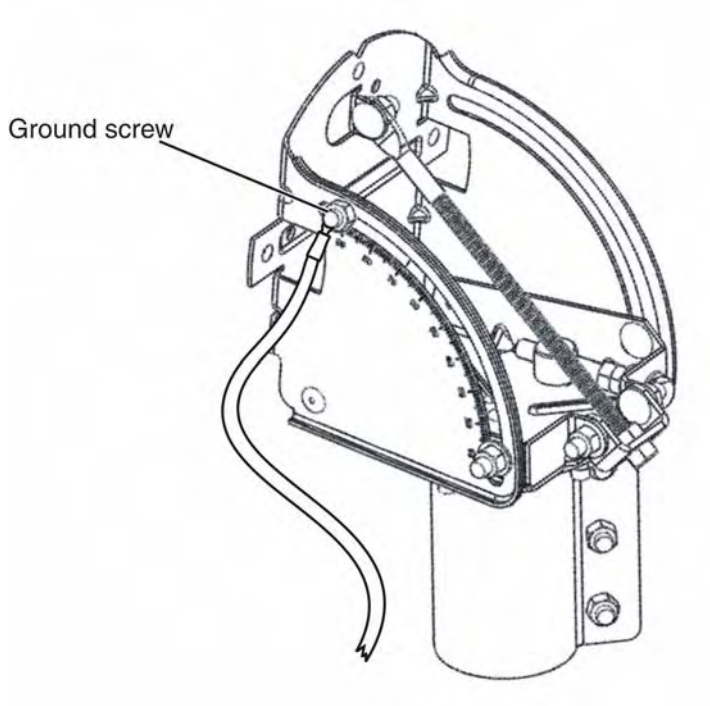

Figure 31: Ground screw on the Az/El mount

This completes the installation. You must now point the antenna. See the HughesNet ***Ka-Band Antenna Pointing Guide*** (1037663-0001) for details.

Chapter 5

Adjusting the antenna azimuth and elevation

This chapter describes the process by which to adjust the antenna azimuth and elevation to the correct position. As the installer, you will perform these procedures during the antenna pointing process. This chapter discusses the mechanical adjustments used to modify the position of the antenna only. It does *not* discuss the pointing process itself. For information on pointing the AN8-074P and all HughesNet Ka-Band antennas, see the HughesNet ***Ka-Band Antenna Pointing Guide*** (1037663-0001).

This chapter contains the following sections:

Adjusting the elevation

1. To begin, unlock the elevation by loosening the two 5/16-inch elevation lockdown nuts on either side of the Az/El mount. Figure 32 shows the location of the nuts (only one nut is shown).

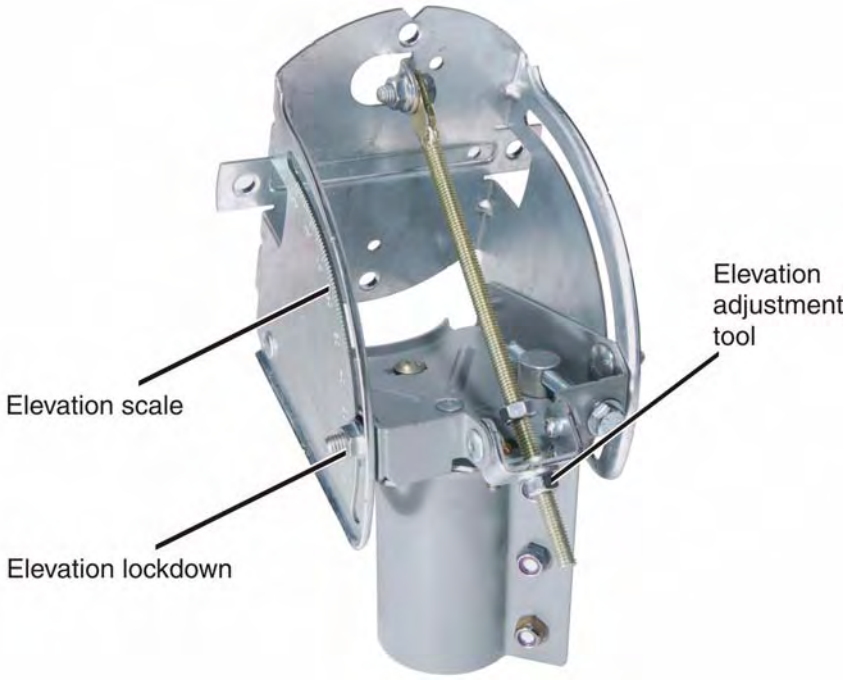

Figure 32: Elevation adjustment components

2. Loosen the top elevation adjustment nut and spin it counter-clockwise until it rides an inch or two up the elevation rod.
3. Use the lower nut to adjust the elevation. As shown in Figure 33, the black line on the bar behind the lockdown nut acts as a pointer to indicate the value in the elevation scale. For example, the antenna shown in the figure is adjusted to 26°.

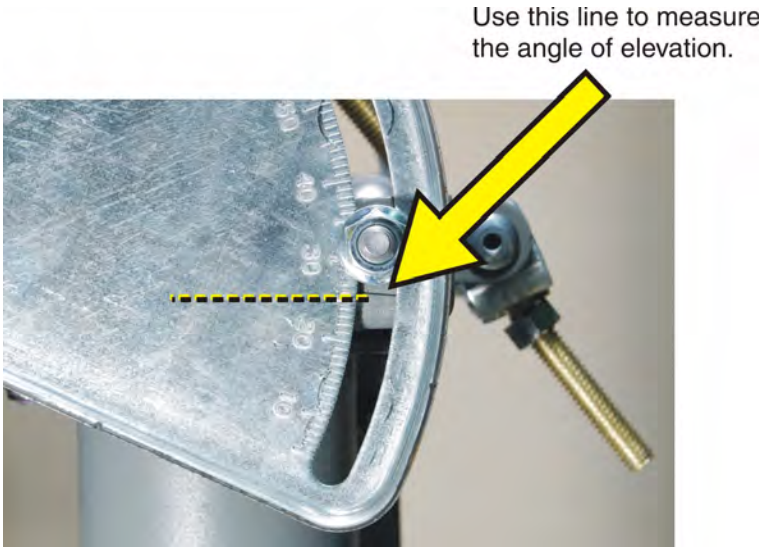

Figure 33: Elevation marker

4. Tighten the two lockdown nuts on either side of the Az/El mount using a ½-inch socket and torque wrench to secure the elevation setting in place.

Adjusting the azimuth

1. Ensure that the three 5/16-inch azimuth lockdown nuts at the bottom of the Az/El canister (shown in Figure 34) are loose enough that the canister rotates freely on the mast.

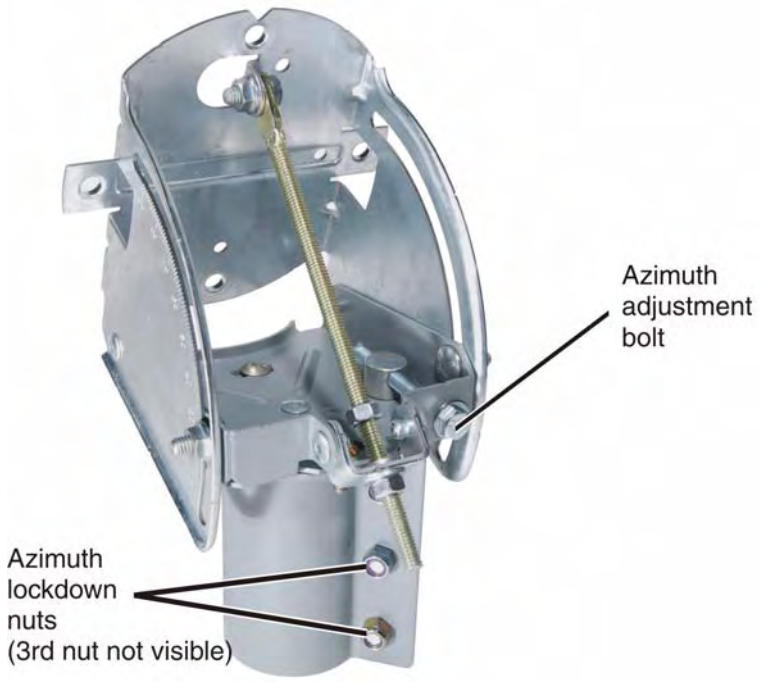

Figure 34: Azimuth adjustmen components

2. Manually point the antenna reflector in the appropriate direction as indicated on the installation reference sheet.

CAUTION

Do *not* attempt to adjust the azimuth manually by pulling on the antenna reflector or feed support arm. Doing so could cause permanent damage to the antenna.

3. Tighten the three lockdown nuts just enough so that the antenna does not rotate freely.
4. Using a 1/2-inch wrench, rotate the azimuth adjustment bolt shown in Figure 34 either clockwise or counter-clockwise until you reach the desired azimuth angle.

Note: Azimuth measurements are calibrated relative to *true* north, not magnetic north.

5. Using a compass, verify that the azimuth is correct and tighten the three lockdown nuts fully to secure the antenna in position.

Acronyms and abbreviations

A

Az – Azimuth

E

El – Elevation

F

FSB – Field service bulletin

ft – Foot/feet

ft-lb – Foot-pounds

G

GPS – Global positioning system

H

hr – Hour/hours

I

IDU – Indoor unit

IFL – Intra-facility link

L

LHCP – Left-hand circular polarization

LNB – Low noise block converter

M

m – Meters

N

NEC – National Electrical Code

NOCC – Network Operations Control Center

R

RF – Radio frequency

RHCP – Right-hand circular polarization

Rx – Receive

T

TRIA – Transmit/receive isolation assembly

Tx – Transmit

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