EXPLORER 3075 Ku or Ka-Band Antenna
Assembly and Operation Manual

EAR Controlled - ECCN EAR99

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Revision History

REV	ECO#	Date	Description	By
A		December 4, 2015	Initial Release	MDN
B		June 1, 2016	Updated to add eTria specific information and pictures, removed X-Band information.	MDN

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1. System Overview

1.1. Description

This chapter provides an overview of the EXPLORER 3000 Series antenna systems. The EXPLORER 3000 Series systems are a lightweight, man-portable, and airline-checkable terminal. Their ruggedized design features a carbon fiber reinforced polymer (CFRP) segmented reflector and tripod. Each terminal's modular RF assembly provides X, Ku, and Ka-Band communication options. The system can be easily assembled in less than ten minutes and requires no assembly tools.

1.2. Features

Features of the EXPLORER 3000 Series antenna systems include the following::

- Carbon Fiber Reinforced Polymer (CFRP) segmented reflector and tripod
- Multi-Band RF-Assembly (Ka or Ku)
- Easy assembly (no tools required)
- Airline-checkable carrying case
- Compliant with FCC, ITU, and MIL STD 188-164A standards

1.3. Components

The EXPLORER 3000 Series system provides the following main components:

- Reflector: 4-piece high precision carbon fiber reflector with quick- release fasteners.
- **RF Assembly (ODU):** The RF outdoor unit components are closely integrated with the antenna feed system, offering Ku-Band or Ka- Band.
- **Tripod**: The system includes a carbon fiber outrigger tripod to hold the positioner and RF systems. Both a high- and low-profile ruggedized version of the outrigger tripod base is available.

- **Travelling Case**: The **system's** lightweight, ruggedized backpack or hardened case is designed to withstand everyday portability and varying weather conditions. The reflector petals also have their own protective pouches, which fit securely inside the same travelling case above the Tripod and RF Assembly. NOTE: Your equipment may look different.

2. Assembly

Read this manual thoroughly and carefully before attempting to assemble or operate the EXPLORER 3075 antenna. This chapter provides the basic instructions for assembling the EXPLORER 3075, which involves the following:

- Unpacking the components
- Typical assembly of system

2.1. Unpacking the Antenna

Shipping case contents - Equipment and materials may vary according to the selected configuration. Be sure to verify the complete shipment of your system, ensuring that nothing was damaged, before beginning the assembly.

IMPORTANT Be sure to save the shipping case and packing materials. If the system needs to be returned for maintenance, you will be responsible for proper packing.

Table 2-1. EXPLORER 3075 Shipping Case Contents

Description	Qty
EXPLORER 3075 Reflector	1
EXPLORER 3075 RF-Assembly	1
EXPLORER 3075 Tripod	1
EXPLORER 3075 Assembly and Operation Guide	1
Transmit cable (Tx) L-Band (30 feet) **Not provided with eTria antenna.**	1
Receive cable (Rx) L-Band (30 feet) **Not provided with eTria antenna.**	1
Control/power cable (30 feet) **Not provided with eTria antenna.**	1

2.1. Removing the antenna from packaging

To remove the antenna from the shipping case:

1. Lay case on ground and open it.
2. Remove cabling and reflector petals and set them aside where they will not be in the way until they are needed.

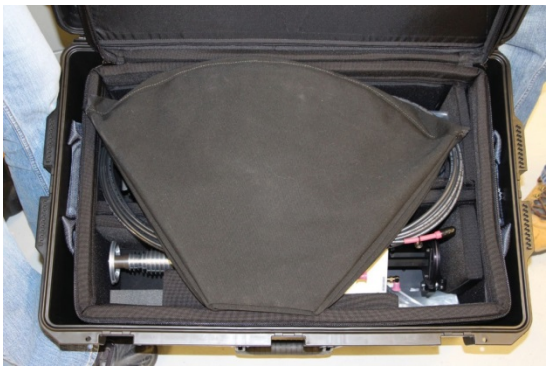


Figure 2-1. Inside of packaging

2.2. Typical Assembly

This section describes a typical assembly of the EXPLORER 3075 antenna.

Custom installation should follow similar practice, or call the factory for assistance. Prior to assembly, select a location to install the fly-away antenna where no obstacles exist in the line-of-sight towards the satellite. When operating in in the northern hemisphere, face the tripod towards south. When operating in the southern hemisphere, face the tripod towards the north.

2.2.1. Remove Tripod and extend legs

1. Set tripod on stable ground and spread open the tripod with one leg facing towards satellite (south or north).

2. Use the bubble level embedded within the tripod to ensure an even adjustment of the legs, then use the three levers to lock-in the final position of each leg.

Figure 2-2. Leveling the tripod legs

2.2.2. Install RF-Assembly upon Tripod.

1. On the top plate of the tripod, insert the circular knobs into the fitting holes that reside on the bottom of the RF-Assembly's positioner. NOTE: Shown below is a Ka-Band RF Assembly as an example. Your equipment may look different.

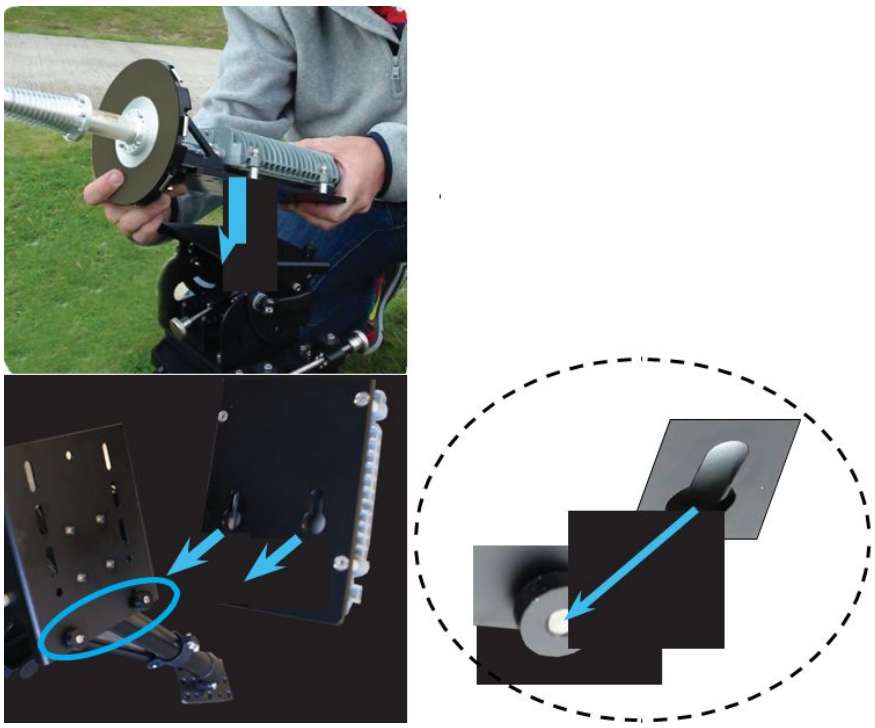


Figure 2-3. Installing RF assembly

2. Once the RF Assembly is placed within the positioner holes as shown above, use both locking levers to secure the two plates together.

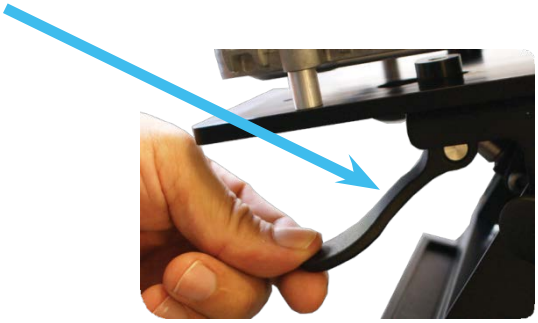


Figure 2-4. Locking positioner plates

2.2.3. Assemble the Reflector, by carefully snapping the petals into place.

1. Release the four locking mechanisms on the reflector hub.
2. Connect each petal to the central hub.
3. Re-secure the four locking mechanisms on the reflector hub

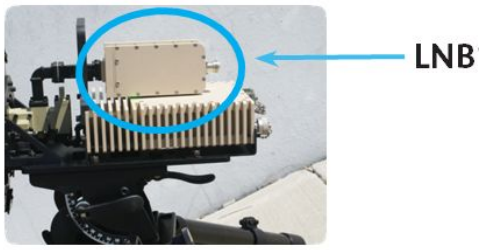
4. Use the latches to carefully secure each petal into place.

Figure 2-5. Assembling reflector petals

2.2.4. Attach the LNB to the RF-Assembly

Attach the LNB to the quick-connect socket on RF-Assembly if not already connected. NOTE: Your equipment may look different.

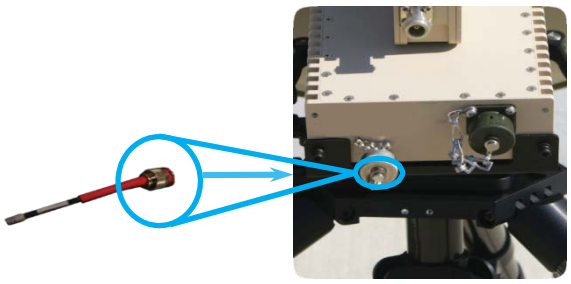
The eTria RF package has the LNB integrated into RF Assembly.



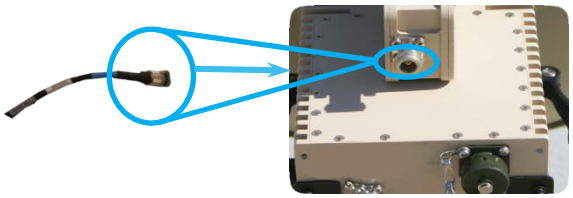
2.2.5. To connect the cables to the Antenna Ku/Ka

An Accord Ka-Band package is show below. Typical Ku-Band equipment will be similar and is connected the same way.

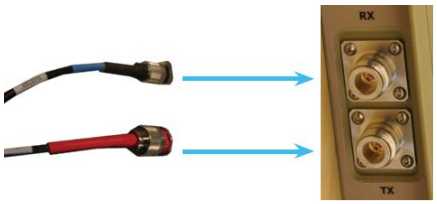
1. Connect **Red** IFL RG-6 *cable* to antenna's Transmit port. NOTE: Your RF Assembly may look different.



2. Connect **Blue** IFL RG-6 cable to antenna's Receive port. NOTE: Your RF Assembly may look different.



3. Connect opposite end of the **Blue** IFL RG-6 cable to the Receive (Rx) port on Modem.
4. Connect opposite end of the **Red** IFL RG-6 cable to the Transmit (Tx) port on Modem.

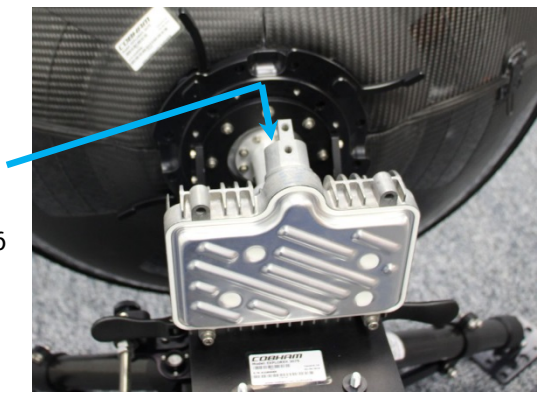


5. Connect Power Cable to Modem.

2.2.6. To connect the cables to the eTria Ka-Band Antenna

The Transmit & Receive are integrated together in the eTria Ka-Band package. Therefore only a single coax cable is required between the antenna and the modem. Cables are NOT provided in the eTria configuration of the 3075 antenna kit.

1. Connect F connector of an IFL RG-6 *cable* to antenna's Transceiver port.
2. Connect the other end of the TC/RX IFL RG-6 cable to the Transceiver port on the Viasat Modem.
3. Connect other cables to the Viasat Modem as needed.



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3. System Operation

This chapter describes the parameters of the EXPLORER 3075 that support the standard manual-pointing satellite acquisition process. In addition, the process to change between satellite frequency bands (Ku & Ka) is also provided at the end of this chapter.

3.1. Manual Satellite Acquisition Process

To be able to point your antenna to the satellite you will be using, you need to know;

- Where True North (not Magnetic North) is from your antenna position.
- Know what satellite you are going to be using (its' Longitude position, ie 123.0 W). And if your antenna services are Ku-Band, what polarity you will be transmitting on (Vertical or Horizontal).
- Know the Latitude and Longitude of where that antenna is positioned.
- Have access to a satellite calculator (available online, or from your dealer or airtime provider).

3.1.1. Determine Where The Satellite Is

Example 1: You are setting up the Ku-Band antenna at 38.0 N 122.0 W. You will be using satellite 95.0 W, Vertical Transmit. You enter the values (Latitude, Longitude & Satellite Longitude) into the calculator and it calculates the Elevation, (True) Azimuth and Polarization angles to the desired satellite from your location.

Input Values:

Antenna Latitude	38.0 N
Antenna Longitude	122.0 W
Satellite Longitude	95.0 W

Calculated Satellite Pointing angles:

True Azimuth	140.4 degrees CW from True North
Elevation	37.7 degrees
Vertical Polarization Angle	–30.2 degrees (Ku-Band Linear feed only)

Horizontal polarity is +/– 90.0 degrees from the Vertical Polarity Angle.

Example 2: You are setting up the Ka-Band antenna with eTria RF equipment at 38.0 N 122.0 W. You will be using satellite 95.0 W, Left Hand Circular Polarity (LHCP) Transmit. You enter the values (Latitude, Longitude & Satellite Longitude) into the calculator and it calculates the Elevation, (True) Azimuth and Polarization angles to the desired satellite from your location.

Input Values:

Antenna Latitude	39.0 N
Antenna Longitude	22.0 E
Satellite Longitude	9.0 E

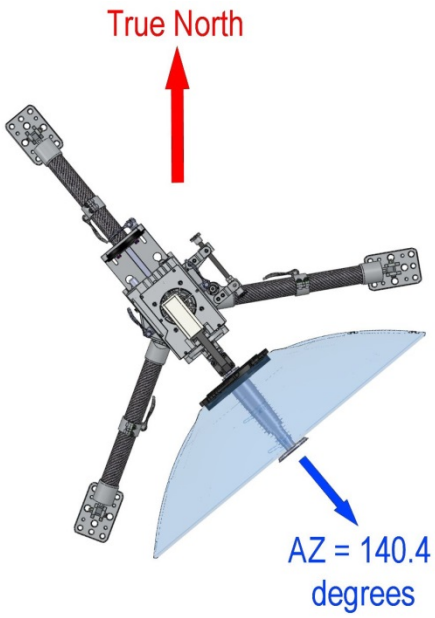
Calculated Satellite Pointing angles:

True Azimuth	200.1 degrees CW from True North
Elevation	42.9 degrees

LHCP is set in the eTria RF equipment by the satellite modem.

3.1.2. Position the Antenna Toward Satellite

NOTE: The graphic below represents the Course Azimuth antenna position using Example 1 above.



1. Mark a line to True North on the ground where the antenna will be placed.
2. Mark a line on the ground of the True Azimuth pointing angle to the satellite.
3. Position the antenna assembly over the True Azimuth line so that the feed tube of the dish is pointed inline to the satellite.

3.1.3. Adjust Tripod Stance and Level

Set Tripod on ground with two legs and the reflector facing towards satellite (south or north). The Tripod can be raised or lowered as required by operating environment. For instance, use a lower Tripod setting for increased stability, OR use *higher* tripod setting when avoiding nearby obstacles. Use the *bubble leveler* embedded within the tripod to ensure an even and stable adjustment of the legs.

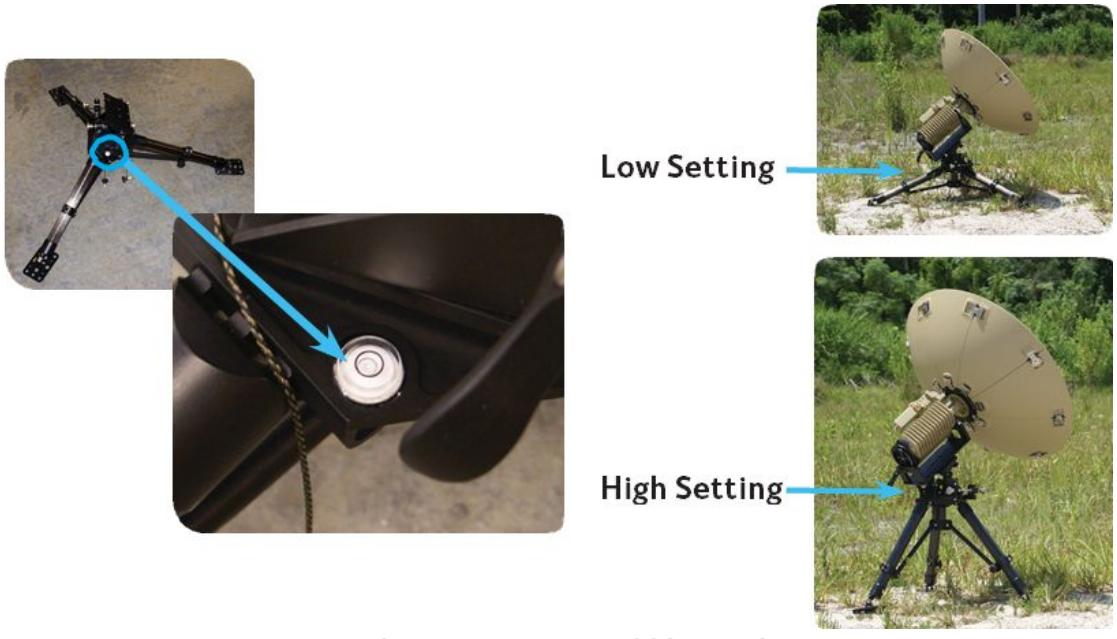


Figure 3-1. High/Low Setting & Bubble Leveler

NOTE: You may want to anchor the pedestal legs to ground for additional stability, especially in winds.

3.1.4. Adjust Elevation

Set and verify the *Elevation Angle* using the scale engraved into the side of the Tripod's adjustable plate, upon which the RF-Assembly was placed.

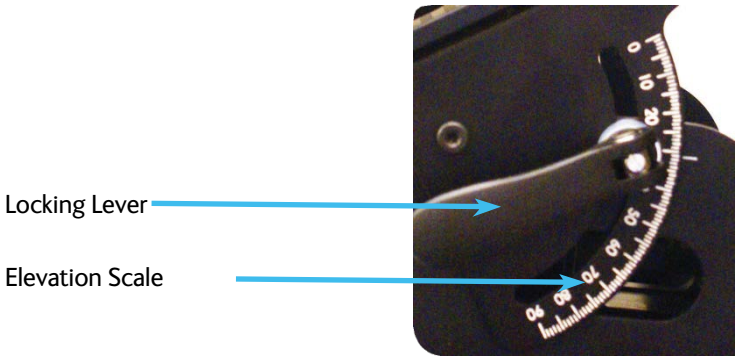


Figure 3-2. Setting Elevation Angle

3.1.5. Set/Adjust Polarity on Ku-Band RF Equipment

Set the POL angle by rotating the *Amplifier* on its axis to the left or right in its cradle. Utilize the *Polarity Angle Scale* engraved in the rear of the cradle as a reference for setting the angle. After making adjustments, use the locking lever to secure the amplifier in its desired position.

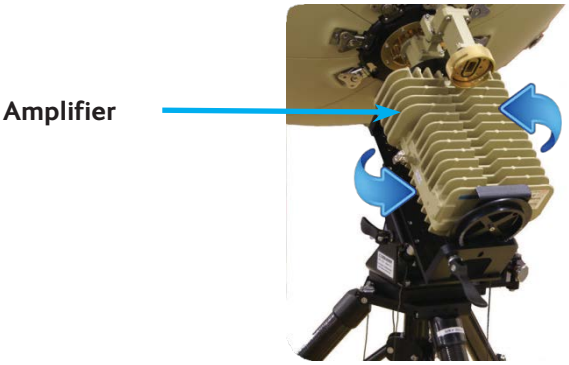


Figure 3-6. Rotating the amplifier

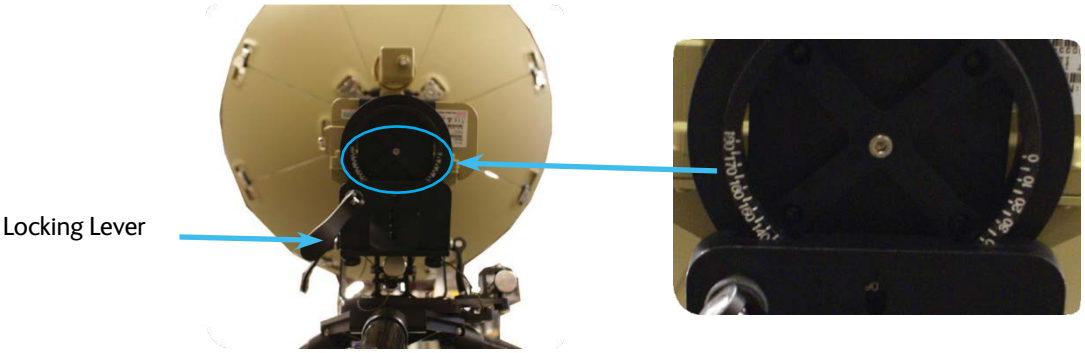
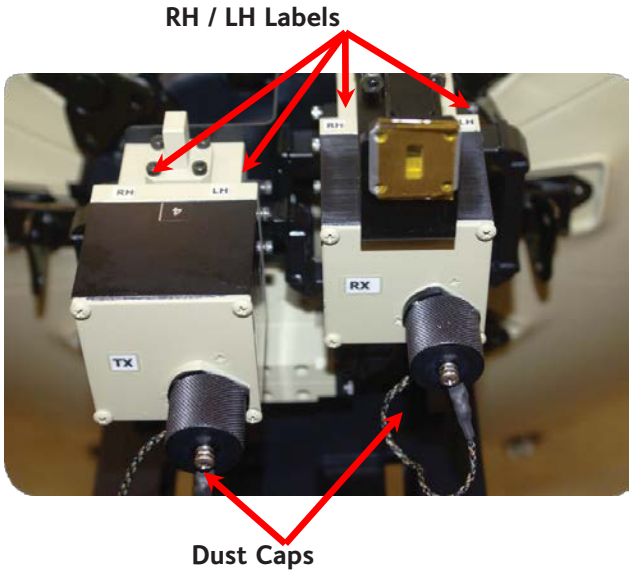


Figure 3-3. Setting Polarity in Ku-Band

3.1.6. Set/Adjust Polarity on Standard Ka-Band RF Equipment

The standard Ka-band RF equipment features a manually selectable polarization setting, which allows for either co-pol or cross-pol configurations. Polarization settings are achieved using a configuration switch, which resides beneath the dust caps located on the RX and TX ports of the RF assembly. Each switch can be turned clockwise or counter-clockwise to be oriented towards the "Right-hand (RH)" or "Left-hand (LH)" labels.



Ka-Band RF-Assembly Configuration Switch (beneath dust cap)

Figure 3-4. Setting Polarity in Ka-Band

Table 3-1. Setting TX Polarity in Ka-Band

This table describes how to orient the selectable settings in order to achieve the supported configurations.

Configuration	Receive Port (Rx) Setting	Transmit Port (Tx) Setting
TX - RH Co-pol	RH (counter-clockwise)	RH (clockwise)
TX - LH Co-pol	LH (clockwise)	LH (counter-clockwise)
TX - LH Cross-pol	RH (counter-clockwise)	LH (counter-clockwise)
TX - RH Cross-pol	LH (clockwise)	RH (clockwise)

3.1.7. Set/Adjust Polarity on eTria (Ka-Sat) Ka-Band RF Equipment

The polarity of the eTria RF equipment is controlled by the satellite modem.

3.1.8. Final Azimuth & Elevation Fine Adjustments

Fine-Tune the antenna's Azimuth (right/left) and elevation (up/down)

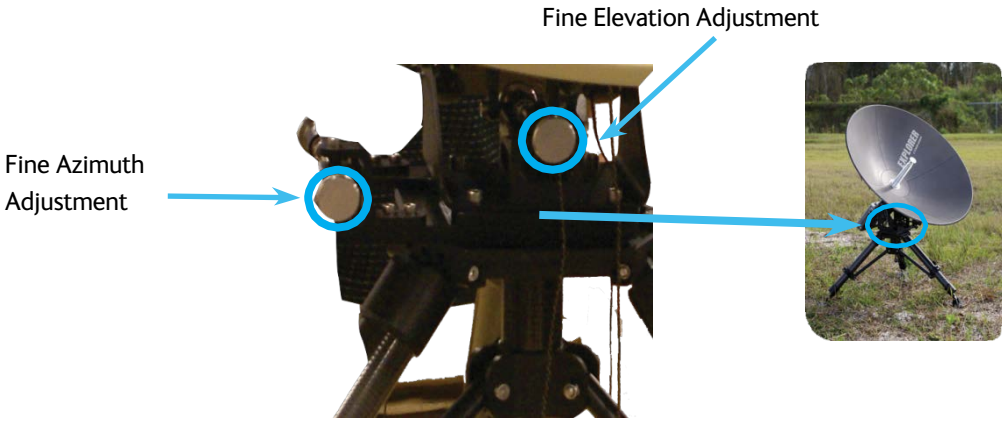
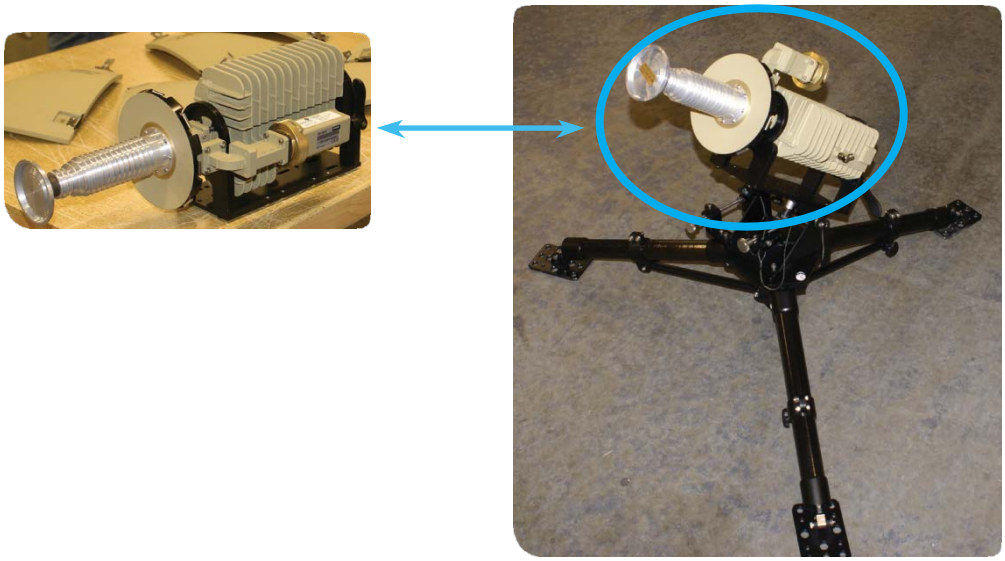


Figure 3-5. Fine-Tuning Azimuth and Elevation

3.2. Changing Frequency Bands

To change between frequency bands, it is required to attach the specific RF-Assembly designated for the desired band (Ku or Ka). Refer to Chapter Two for "Typical Assembly" instructions regarding 1) attaching an RF-Assembly to the Tripod's mounting plate and 2) attaching Reflector petals to the EXPLORER 3075's RF-Assembly.



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4. Product Specification

Tables 4-1 provides the technical specifications for the EXPLORER 3000 Series antenna system. Antenna characteristics are provided in two satellite frequency bands (Ku-band and Ka-band).

Table 4-1. EXPLORER 3075 Technical Specifications:

Antenna Characteristics		Ka-Band KA-SAT (Eutelsat)	GX (Inmarsat)	Ka-Band Commercial	Ku-Band
Feed		2 Port Circular	2 Port Circular	2 Port Circular	2 Port Linear
Frequency (GHz)	Rx	19.7 - 20.2	19.2 - 20.2	19.2 - 20.2	10.95 - 12.75
	Tx	29.5 - 30	29 - 30	29 - 30	13.75 - 14.5
Gain (dBi ± 0.2)	Rx	41.0	41.0	41.0	36.9
	Tx	45.5	44.5	45.5	38.5
Cross Pol Isolation (CP) / Axial Ratio (AR) (dB)	Rx	1.5 (AR)	1.5 (AR)	1.5 (AR)	30 (CP)
	Tx	1.5 (AR)	1.0 (AR)	1.5 (AR)	30 (CP)
Polarization	Rx		LHCP		
	Tx		RHCP		
G/T - Comm @ 30° EL, Midband (dB/°K)		17.0	17.3	17.0	15.7
Standard BUC options (Watts)		3	5	5	8 / 16
System EIRP (dBW)		50.3	51.5	52.5	47.5 / 50.5
Product number		TS3075210	407164A-00500	Contact sales for more information	

Assembly Time	Approximately 10 Minutes (typical)

Reflector	
Size	0.75 m Carbon Fiber Reinforced Polymer (CFRP)
Optics	Axis-Symmetric Stepped Ring Focus
Construction	Multi-Segment, Multi-band shaped parabolic

Mechanical	
Axis Drive System	2-Axis Positioner (manual point), polarization adjustment for Ku-Band
Mount Geometry	Elevation over Azimuth
Travel - Azimuth - Elevation	 ±15° Fine-Tuning 0° to 85°

Weights & Measures	
Antenna	10.4 kg (<23 lbs) for KA-SAT configuration with 3W eTRIA
Hardcase	<23 kg (<51 lbs) Shipping Dimensions: 79.5 L x 51.8 W x 31 H cm (31.3" x 20.4" x 12.2") Airline checkable (IATA-compliant)

Environmental		
Wind Speed	- Operational	40 km/h (25 mph) (not anchored) 48 km/h (30 mph), gusts up to 72 km/h (45 mph) (anchored)
Temperature	- Operational	-25° to +55°C (-13° to +131°F)
	- Survival	-40° to +80°C (-40° to +176°F)
Rain		<100 mm/hr
Humidity		0 to 100% (condensing)

Product number	
TS3075230	EXPLORER 3075

Accessories	
407164A-100	EXPLORER 3075 KA-SAT to GX Conversion Kit

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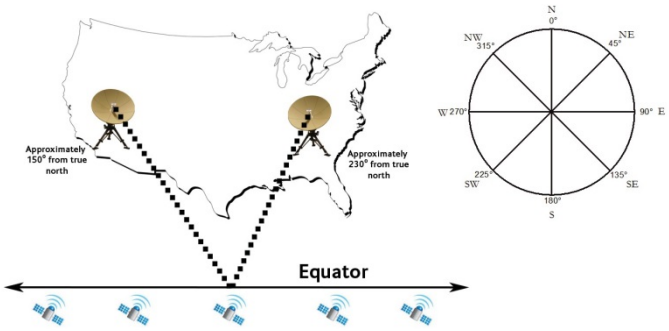
5. Glossary

This section contains a list of all acronyms and industry terms used in this guide.

A

AZ – See azimuth (AZ).

azimuth (AZ) – Azimuth angle in degrees measured clockwise from true north, not magnetic north.



B

Block up converter (BUC) – Converts an L-band input to the satellite frequency and amplifies the RF power.

BUC – See Block up converter (BUC).

D

dB – Logarithmic unit of measurement that expresses the magnitude of a physical quantity (usually power or intensity) relative to a specified or implied reference level.

dBm – Abbreviation for the power ratio in decibels (dB) of the measured power referenced to one milliwatt (mW).

dBW – (Decibel watt) Unit for the measurement of the strength of a signal expressed in decibels relative to one watt.

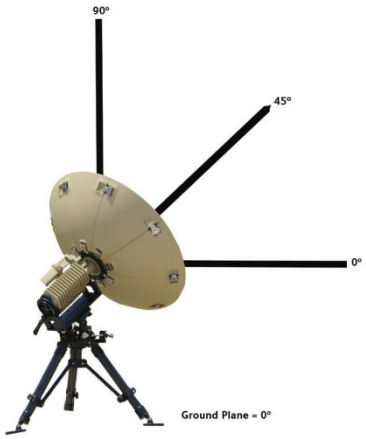
digital-to-analog converter (DAC) – Device for converting a digital (usually binary) code to an analog signal.

E

Effective Isotropic radiated power (EIRP) – Measure of the effective power emitted by a transmitter, or a measure of the signal strength received on Earth from a satellite.

EL – See Elevation (EL).

Elevation (EL) – Elevation angle in degrees measured from the horizon in an upward angle.



F

Federal Communications Commission (FCC) – Independent government agency that regulates interstate and international communications by radio and television and wire and cable and satellite.

G

G/T – See gain-to-noise temperature (G/T).

gain-to-noise temperature (G/T) – Measure of the receiving ability of an antenna/LNA (low noise amplifier) combination.

global positioning system (GPS) – Global Navigation Satellite System (GNSS) developed by the United States Department of Defense. GPS is a widely used aid to navigation worldwide. It uses satellite technology to enable a terrestrial terminal to determine its position on the Earth in latitude and longitude.

GPS – See global positioning system (GPS)

I

IDU – Indoor Unit

International Telecommunication Union (ITU) – United Nations organization that coordinates use of the electromagnetic spectrum and creation of technical standards for telecommunication and radio communication equipment.

ITU – See International Telecommunication Union (ITU).

L

L-band – RF signals in the frequency range of approximately 950 MHz to 1450 MHz.

LNB – See Low noise block down converter (LNB).

Low noise block down converter (LNB) – Converts satellite frequency to an L-band signal and amplifies the RF power.

O

Outdoor Unit - The RF Equipment mounted on your antenna.

P

POL – Polarization angle in degrees measured from vertical.

R

Radio Frequency (RF) – Frequency or rate of oscillation within the range of about 3 Hz to 300 GHz.

RF – See Radio Frequency (RF).

Rx – Receive.

T

Tx – Transmit.

V

Very small aperture terminal (VSAT) – Two-way satellite ground station with a dish antenna that is smaller than 3 meters. Data rates typically range from narrowband up to 4 Mbit/s. VSATs access satellites in geosynchronous orbit to relay data from small remote earth stations (terminals) to other terminals (in mesh configurations) or master earth station hubs (in star configurations).

VSAT – See Very small aperture terminal.

6. Technical Contacts

Your first technical contact always should be your Dealer, from whom you originally purchased the system. This is usually the fastest way to have your problem resolved. If your Dealer cannot resolve the problem, then they will contact **Sea Tel** directly and work together to resolve the problem.

For your reference, please write in the following information:

Dealer Name: _____

Dealer Address _____

Dealer Phone _____

Dealer Fax _____

Dealer Email Address _____

If, for some reason, you cannot contact your Dealer, then you can contact Cobham SATCOM Land:

Cobham SATCOM – Denmark:
Lundtoftegaardsvej 93 D
DK-2800 Kgs. Lyngby, Denmark
Tel: +45 3955 8800

Cobham SATCOM – Orlando:
2100 N Alafaya Trail Suite 300
Orlando, Florida 32826 USA
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