Norsat International Inc.

USER MANUAL

WAYFARER 1.8M KU-BAND
MANUAL FLY-AWAY ANTENNA

TABLE OF CONTENTS

RUGGED, ULTRA-PORTABLE HIGH-PERFORMANCE SATELLITE TERMINALS FOR COMMERCIAL APPLICATIONS

Copyright Notice

Revision History

REVISION	DESCRIPTION	Date YYYY/MM/DD
A	Release	2020/06/15

Acronyms

AZ	Azimuth
BUC	Block Upconverter
CCW	Counter-clockwise
CW	Clockwise
EL	Elevation
IFL	Interfacility Link
LNB	Low-noise Block Downconverter
OMT	Orthomode Transducer
POL	Polarization
RF	Radio Frequency
SSPA	Solid-Sate Power Amplifier
TRF	Transmit Reject Filter

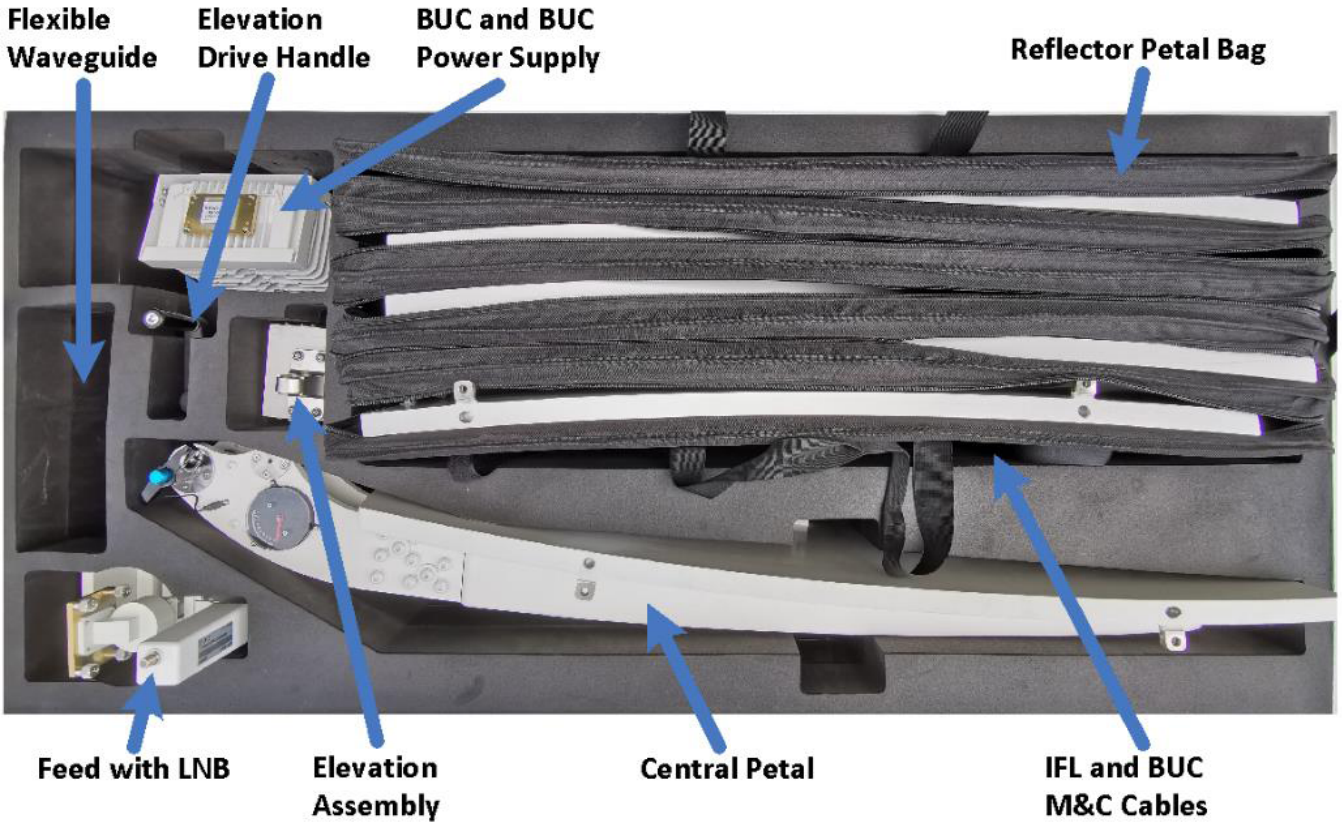
Safety

Caution 	**Grounding the Terminal** In urban areas, ground the terminal with a grounding conductor in accordance to national and local electrical codes.
Danger 	**FCC Radio Frequency Exposure Information for Mobile Transmitting Devices** When the power is on, maintain an off-axis safety distance of 0.7 meters (2.3 feet), where “off axis” means 0.9 meters (3 feet) from the center of the beam, and maintain an on-axis safety distance of 7 meters (23 feet).
Danger 	**Electrical Hazards in Wet and Windy Conditions** While the terminal is designed for outdoor use (e.g. optional waterproof power supply), observe the following safety precautions during windy and wet weather conditions. Some steps may not apply depending on the BUC configuration. 1. Check cable connectors and power cords for damage or tears. Replace cables and cords as needed. 2. Disconnect the terminal from its power source before you move it. 3. Disconnect the terminal from its power source if you suspect a power malfunction.
Warning 	**Hot Surfaces** When transmitting, do not touch the BUC as it may result in burns or injury.

Danger 	**Hazards of Microwave Radiation in Electromagnetic Fields** When the power is on, the area directly in front of the antenna is an Area of Restricted Occupancy. Observe the following safety precautions: 1. Limit human exposure time to the area directly in front of the main antenna assembly. 2. Never place any part of your body between the antenna and the Feed Horn assembly. 3. Never place any part of your body in line with the direction of the antenna transmission path. 4. Locate the terminal as far as possible from ungrounded metal. **Dielectric Heating** Dielectric heating is the heating of an insulating material caused by placing it in a high frequency electric field. When a human enters a Radio Frequency (RF) field, the body acts as dielectric. If the power in the RF field exceeds 10 milliwatts per centimeter, the individual will have a noticeable rise in body temperature. The severity of burns may vary from minor to major. Burns or other damage may result in long term injury or even death. The vital organs of the body are highly susceptible to dielectric heating. The eyes are also highly susceptible to dielectric heating. Do not look directly into devices radiating RF energy. You must not stand directly in the path of RF radiating devices
Warning 	**Unintentional Radio Interference** This equipment generates, uses, and radiates radio frequency energy. If you install and use the device according to the instruction manual, the device will not cause harmful interference to radio communications. If you operate the device in a residential area, it is likely to cause harmful interference to radio communications; you will correct the interference at your own expense.
Warning 	**Changes or Modifications to Equipment** Changes or modifications to this equipment, not expressly approved by the manufacturer could void the user's authority to operate the equipment. **Accessories and Devices** Use of non-approved accessories or devices may lead to a degradation in performance, damage to equipment, or potential hazards **Servicing the Equipment** Do not service the equipment alone unless another person is present to administer first-aid

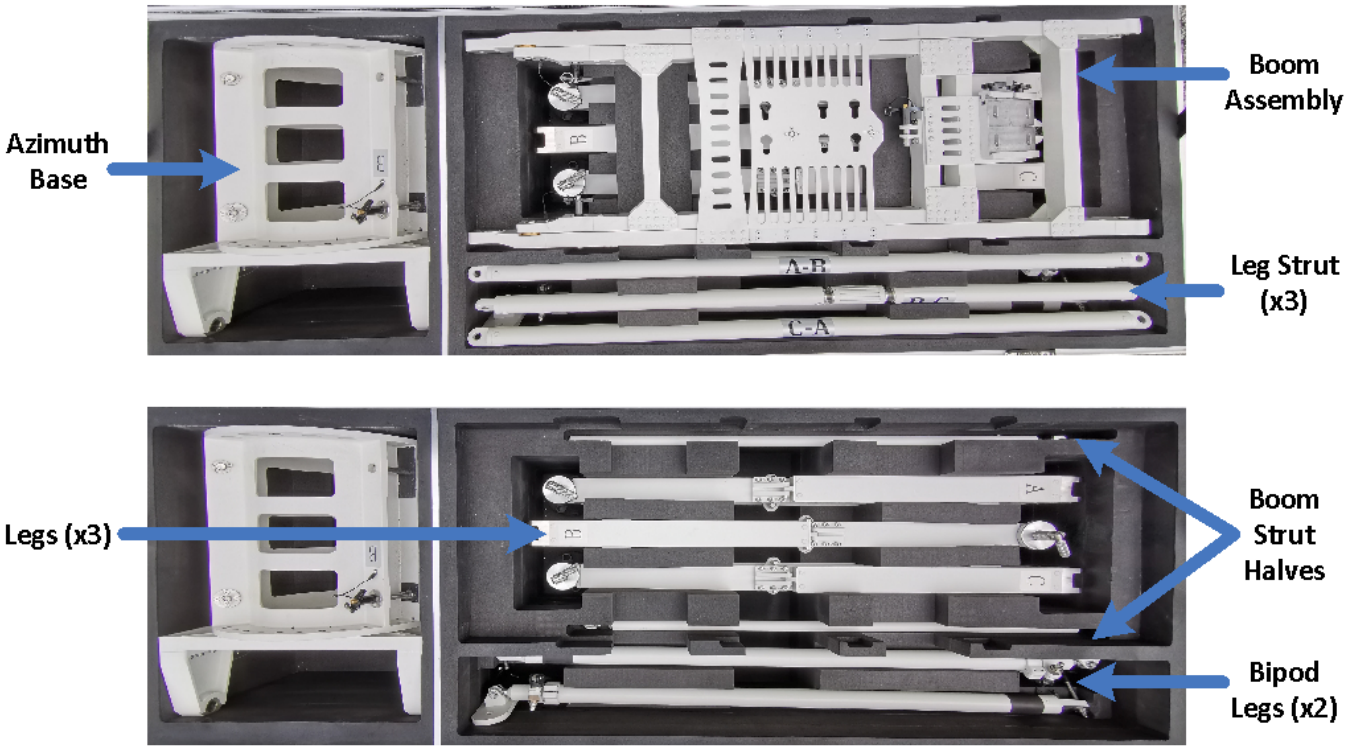
Case 1 - List of Contents

ANTENNA COMPONENTS	QUANTITY	DESCRIPTION
Central Petal	1	Reflector Petal and Boom Assembly mounting base
Reflector Petal Bag	1	Stores 5 disassembled antenna reflector petals
Feed	1	Feed with integrated LNB
Flexible Waveguide	1	Quick-release waveguide between BUC and Feed
Elevation Assembly	1	Telescopic rod for controlling elevation position
Elevation Drive Handle	1	Hand-powered crank for Elevation Assembly
BUC	1	Up to 100W ATOM BUC
BUC Power Supply (Optional)	1	Up to 600W ATOM BUC PSU
BUC M&C Cable (Optional)	1	Monitor and Control Cable for ATOM BUC
IFL Cable (Optional)	1	Interfacility Link Cable for Tx/Rx transmission
User Manual	1	User manual for WFM180KU



Case 2- List of Contents

ANTENNA COMPONENTS	QUANTITY	DESCRIPTION
Azimuth Base	1	Antenna main pedestal and mounting base
Boom Assembly	1	Foldable boom arm for mounting Feed
Boom Strut Halves	2	Support strut between Central Petal and Boom Assembly
Bipod Legs	2	Quick-release legs on Boom Assembly for high wind setup
Legs	3	Quick-release legs for staking/sandbags
Leg Struts	3	Two Solid Leg Struts and One Adjustable Leg Strut



1. Overview

The Norsat Wayfarer is an industrial strength transportable satellite communication system built strong for the most demanding users working with the most challenging applications and environments. The Wayfarer is manually operated, integrated, and versatile enough for deployment virtually anywhere, including mobile field offices, field vehicles, or directly on the ground. A complete satellite solution, the Wayfarer includes everything to meet your communication needs.

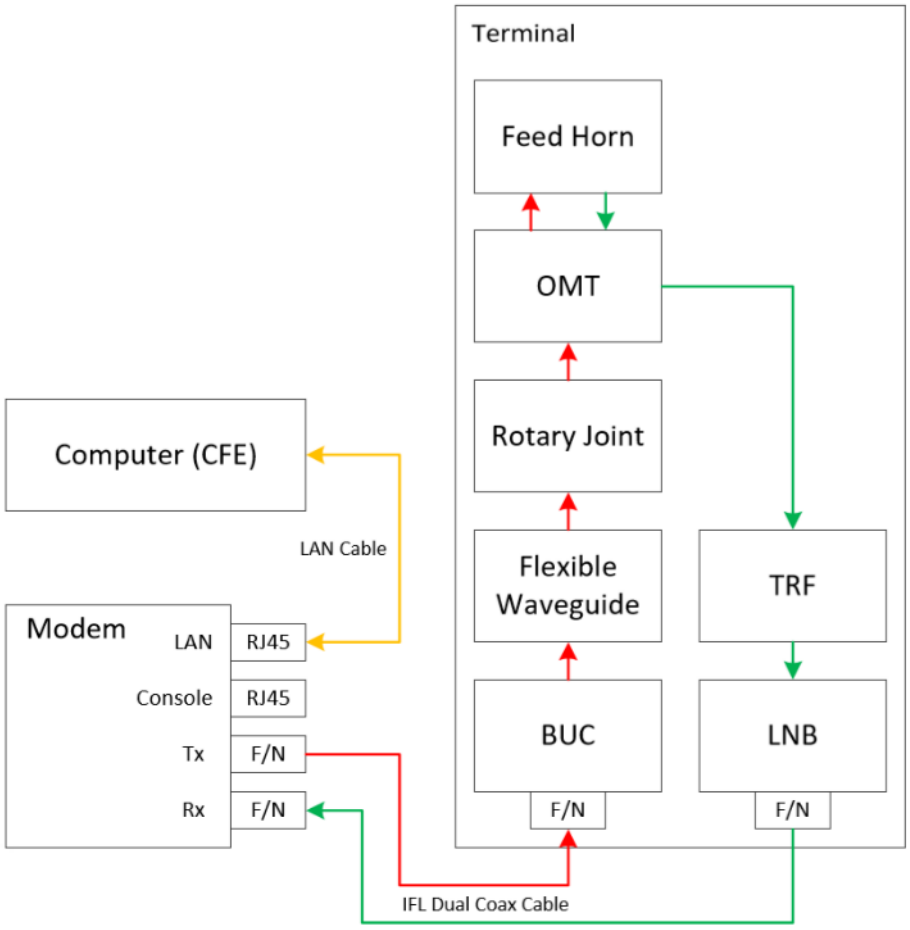
2. System Overview

The system consists of the terminal, the BUC, the LNB, and no other electronics. The antenna is equipped with two dials and an inclinometer to read its azimuth, polarization, and elevation position. In addition, the antenna has an analog compass to orientate the system.

On the transmit side, the terminal contains a BUC and SSPA to convert the L-Band Tx signals from the modem to Ku-Band RF signals and amplify them to the specified power levels. The amplified signals are passed through the flexible waveguide to the OMT before entering the feed. The feed projects the RF energy on to the parabolic reflector up to a satellite.

On the receive side, the receive RF energy is gathered by the reflector and focused on the feed, which directs the energy to the OMT. The OMT then splits the receive signal and passes it to the TRF and then the LNB, which outputs L-Band Rx signals to the modem.

Refer to the figure below for the system block diagram and the complete RF chain of the antenna when connected to a modem.



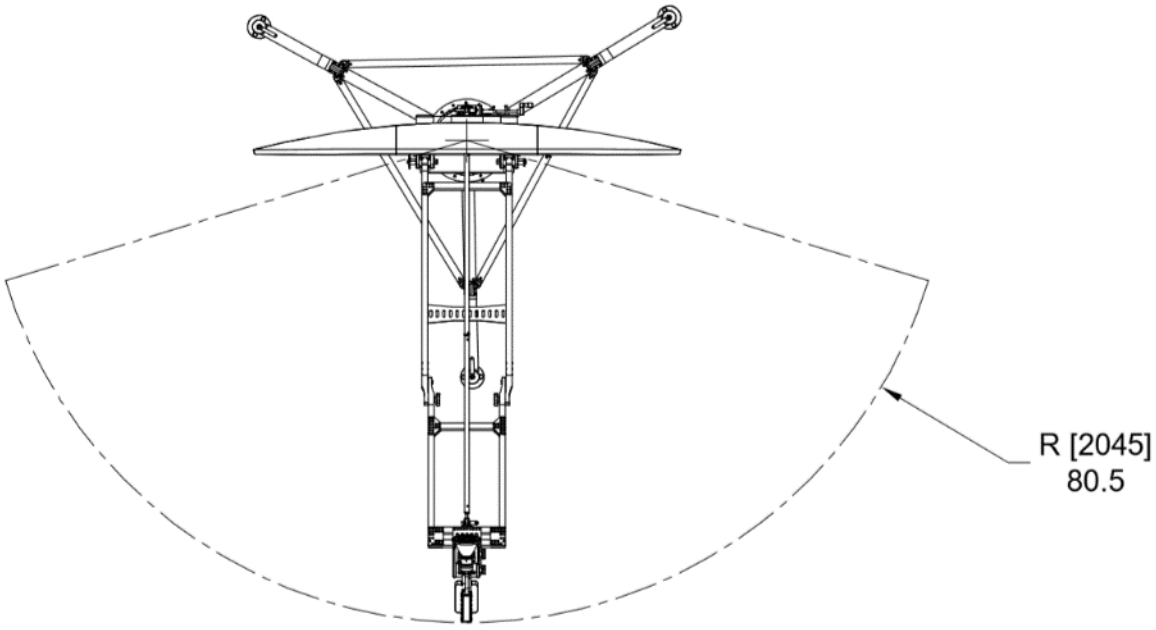
3. Hardware

3.1. Case Dimensions

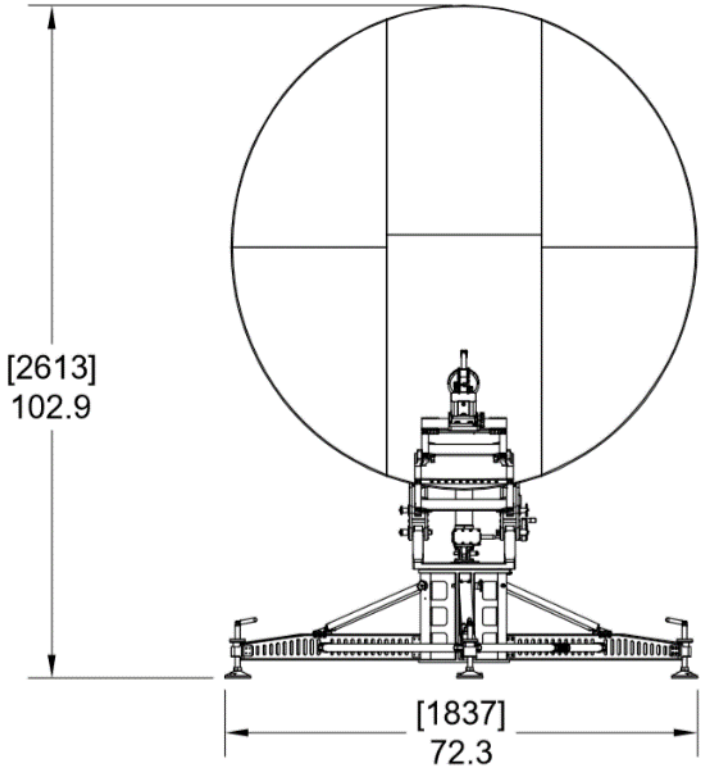
CASE NUMBER	DIMENSIONS	WEIGHT
Case 1 (Reflector, Feed)	145 cm x 77 cm x 82 cm	≤ 62 kg (excluding accessories)
Case 2 (AZ Base, Legs, Boom Assembly)	166 cm x 66 cm x 59 cm	≤ 70 kg

3.2. Antenna Dimensions

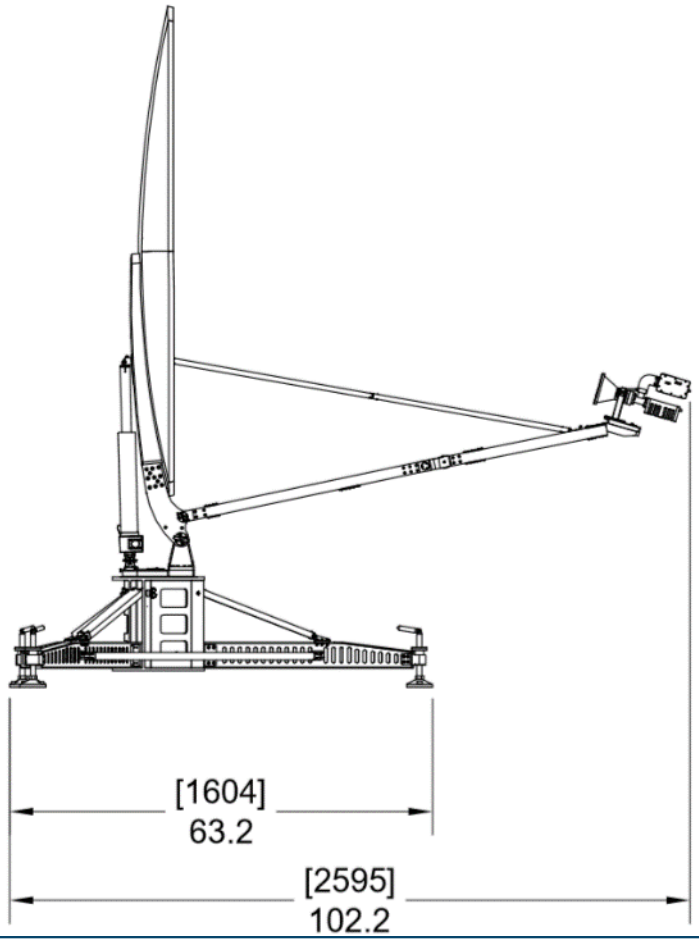
Top View of Antenna (in [mm])



Front View of Antenna (in [mm])



Side View of Antenna (in [mm])



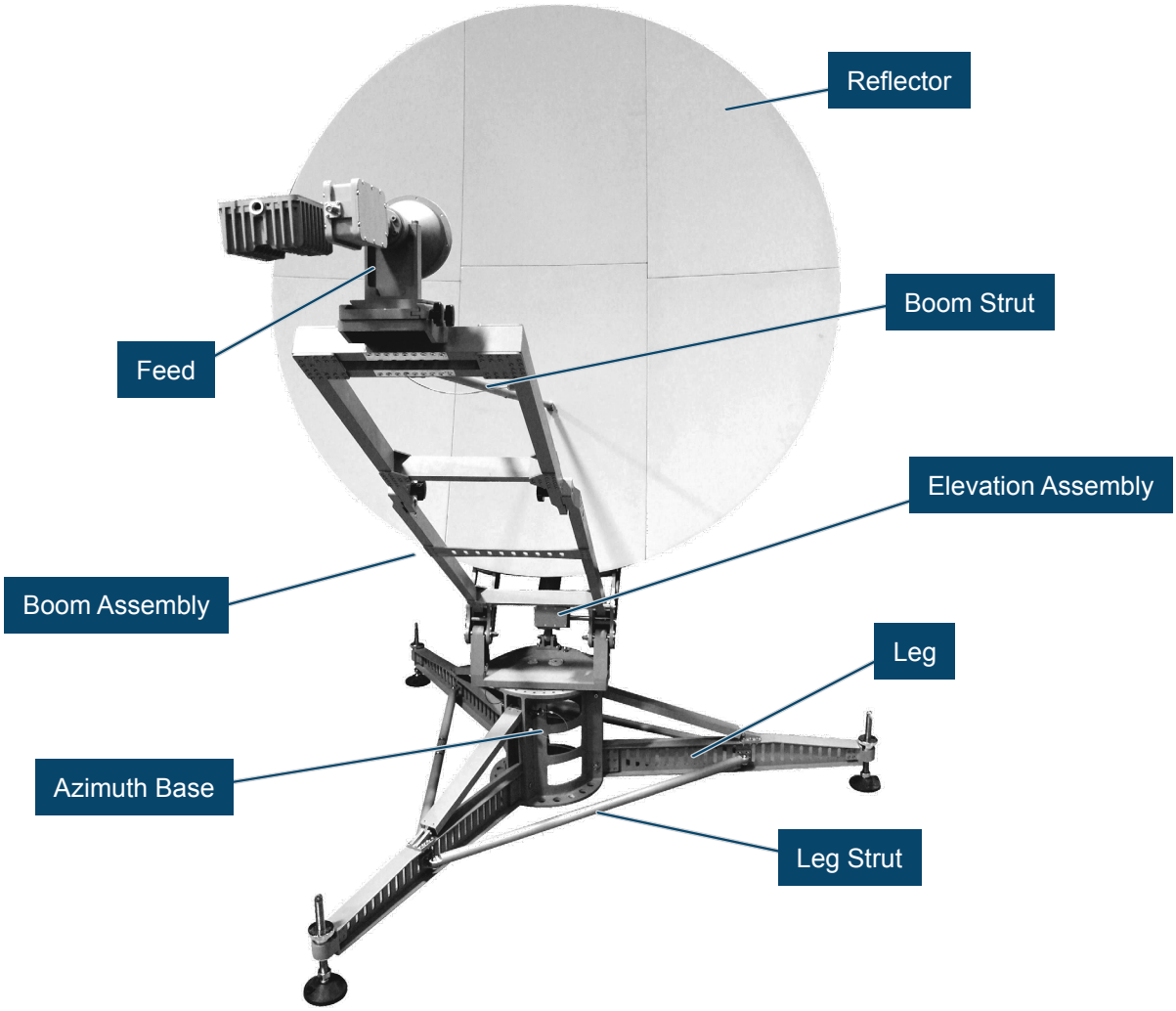
3.3. Introduction to System Components

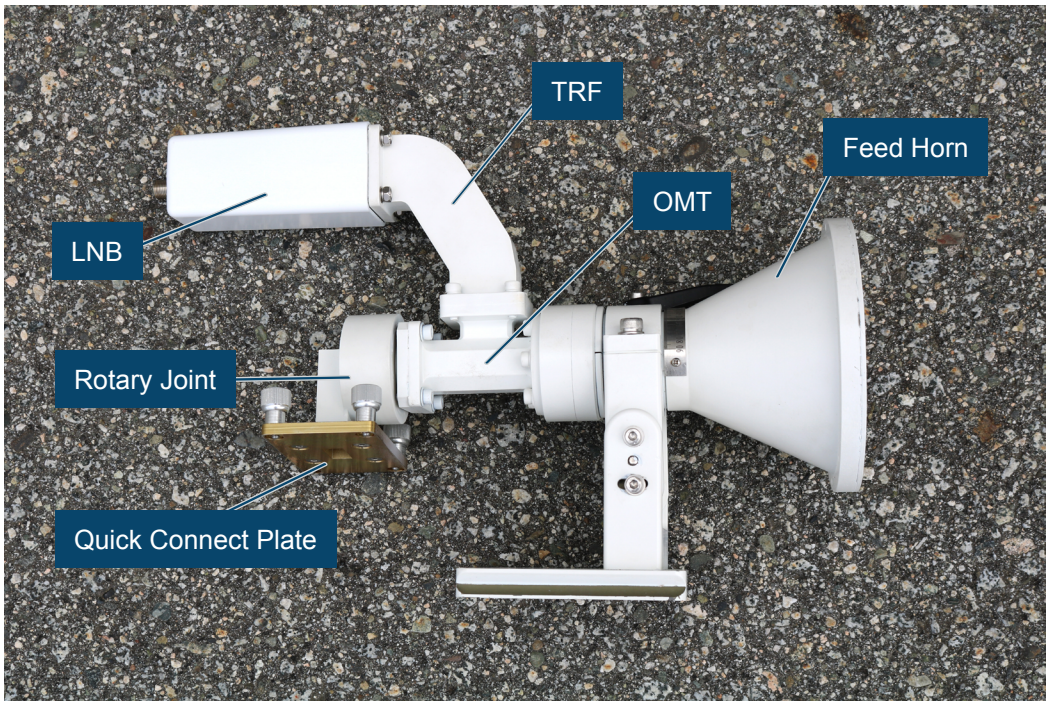
The Azimuth Base consists of a rotating platform about a fixed base. The Azimuth Base includes a Bubble Level and Compass to level and orientate the system. The azimuth angle is controlled by locking the position of the rotating platform with the Azimuth Adjustment Assembly. The Azimuth Adjustment Assembly can be mounted onto different locating holes across the Azimuth Base for rough azimuth adjustment and fine tuned with its lock nuts. The Legs attach onto the Azimuth Base and are secured in place by the Leg Struts. The Reflector mounts atop the Azimuth Base and is supported by the Azimuth Elevation Assembly.

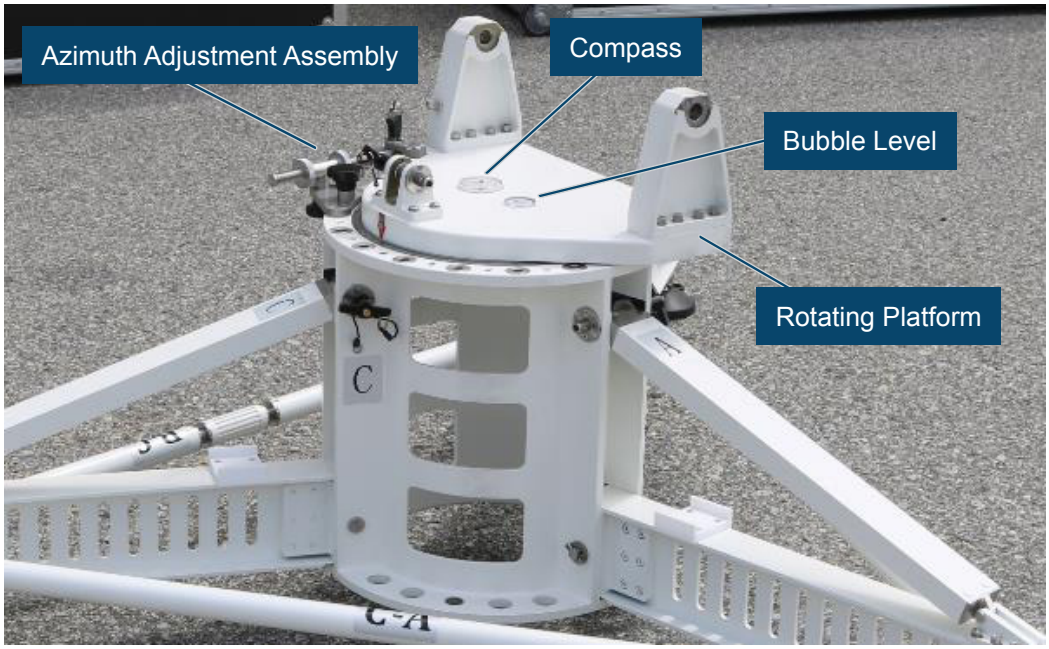
The Elevation Assembly consists of a telescopic rod connected to a worm gearbox. The Elevation Assembly controls the angle of the Reflector relative to the Azimuth Base. It is controlled by adjusting the length of the Elevation Assembly. The elevation movement is mechanically self-locking and can be manually controlled by attaching the Elevation Handle to the worm gearbox. The upper section of the Elevation Assembly can also be rotated by hand for quick extension and retraction during assembly and disassembly.

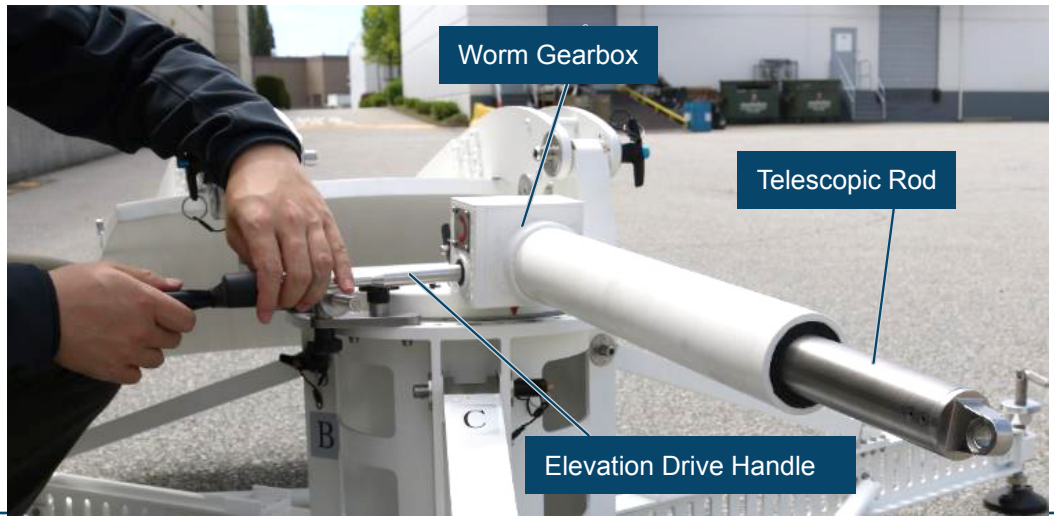
The Feed consists of the horn, duplexer, filter, and LNB. Its main functionality is to isolate the Tx and Rx signals and adjust the polarization of the system. The polarization angle can be adjusted by rotating the feed by hand and locked into place by tightening the polarization lock knob. The Feed mounts onto the Boom Assembly, which mounts onto the Reflector and is supported by the Boom Strut.

Refer to the image below for the location of the system components. Refer to the next page for component labelling on the Feed, Azimuth Base, and Elevation Assembly. Refer to Section 5.2.1 for more on the Azimuth Adjustment Assembly.









4. Assembly

Please follow the procedure below to set up the antenna for a typical satellite acquisition.

4.1. Site Selection

Follow the guidelines below to ensure optimal performance of the flyaway terminal:

1. Find a clear level area. The terminal can handle up to 3° offset.
2. Ensure that there is line of sight towards the equator and target satellite.
3. Ensure that you can provide a safe clearance area or prevent people from walking in the way of transmission

4.2. High Wind Setup

If the system is to be used in a high wind situation, follow the guidelines below to ensure you have sufficient ballast or equivalent tie downs to secure the base of the terminal. For increased rigidity, refer to Section 4.3.4 for bipod setup.

WIND SPEED (km/h)	50	70	100
BALLAST (kg)	20	65	95

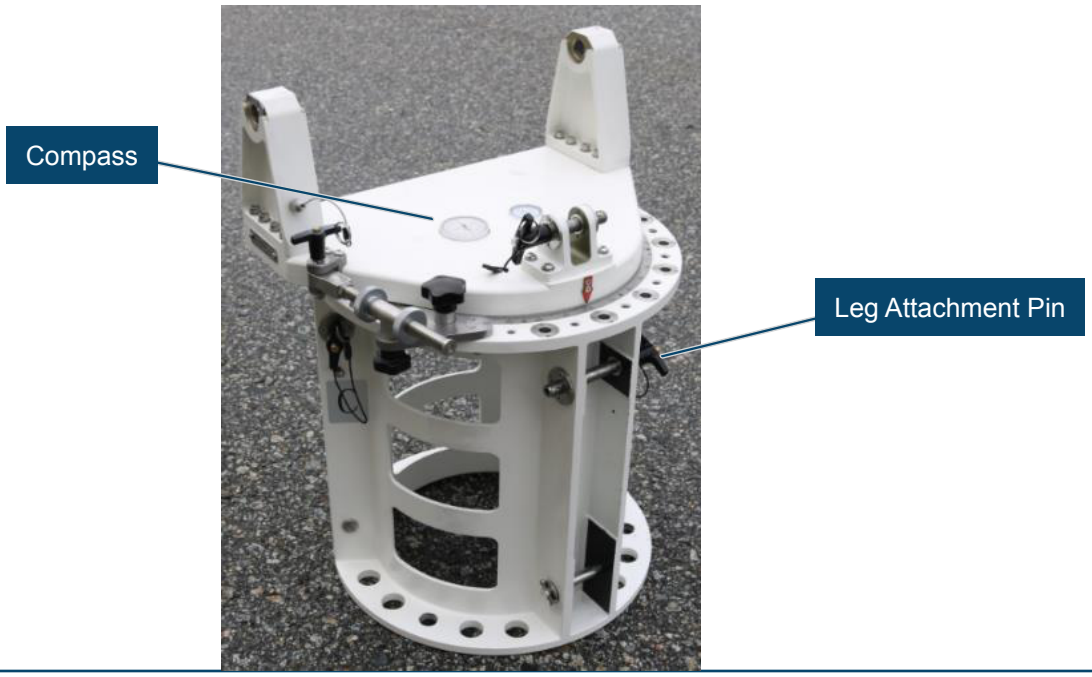
Note: The specified ballasts are per leg. Ballast should be located directly over footpad if possible.

4.3. Antenna Assembly

Fully read each step and any accompanying notes before performing the step.

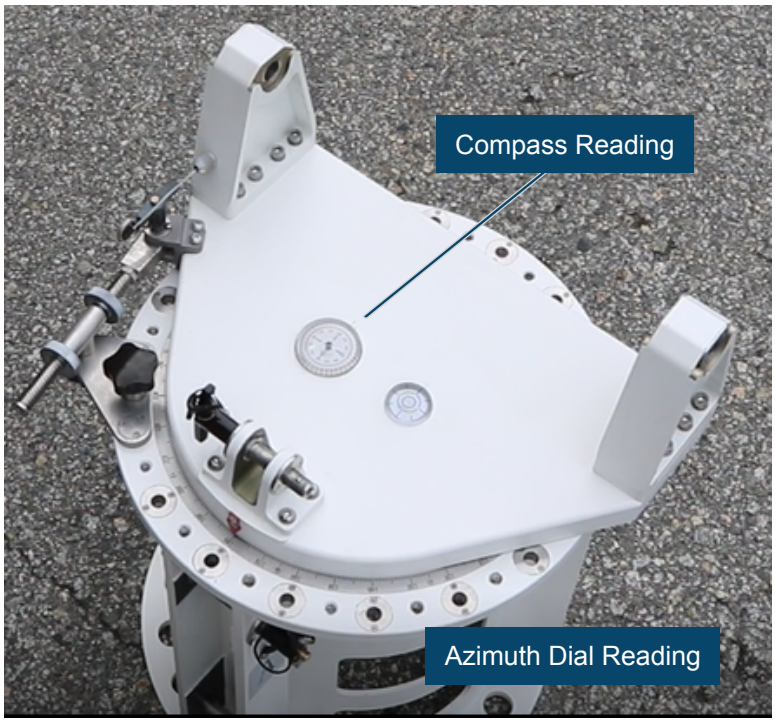
4.3.1. Tripod Base

1. Open Case 2.
2. Take out the Azimuth Base from Case 2 and place it upright on the ground. Take note of the components on the Azimuth Base for future instructions.



3. Rotate the Azimuth Base without adjusting the azimuth position until the reading from both the Compass and Azimuth Dial are equal.

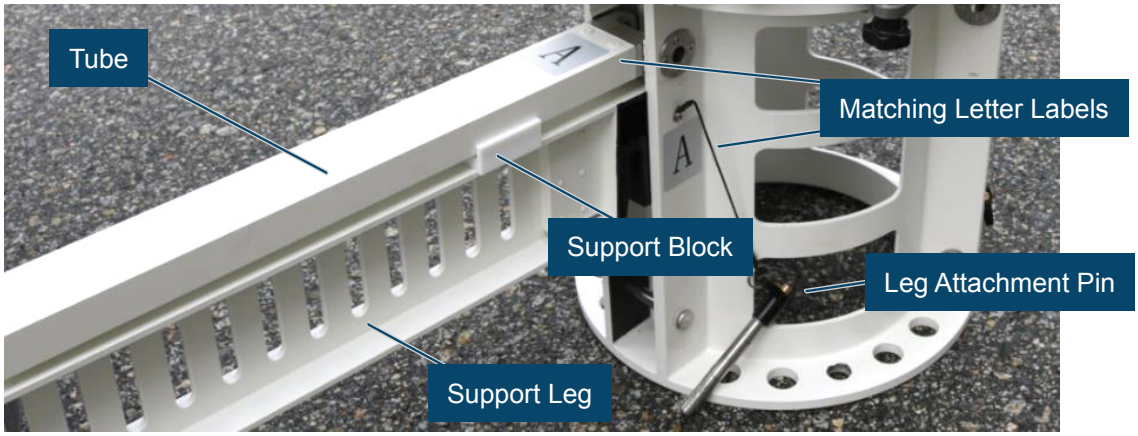
For example, if the Azimuth Dial reads 180 degrees, rotate the Azimuth Base until the Compass reads 180 degrees.



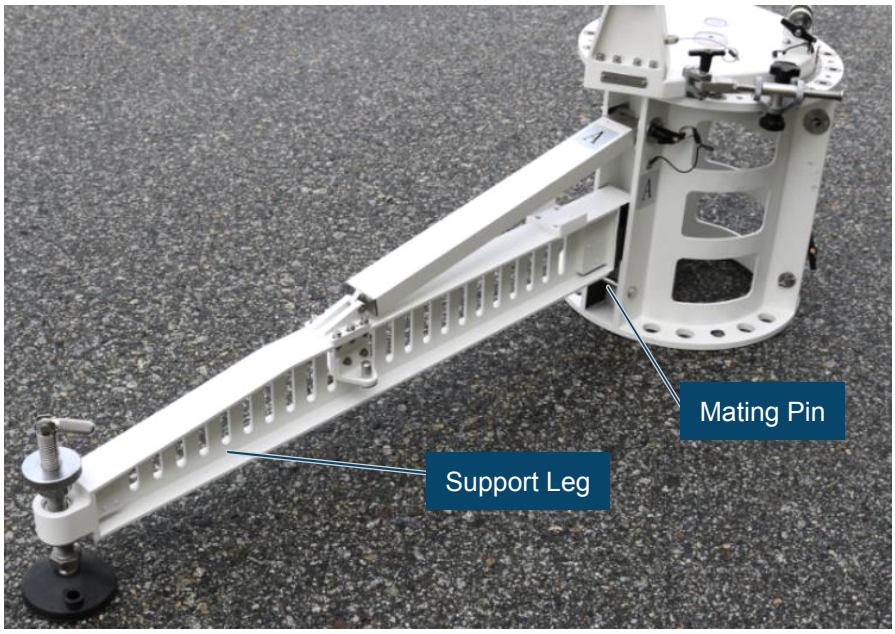
4. Attach the three (3) Legs onto the Azimuth Base in alphabetical order by following the steps below:

a. Take out a Leg from Case 2.
b. Identify the corresponding Leg Attachment Pin for the current Leg. Each Leg and Leg Attachment Pin is labelled with matching letters.
c. Remove the Leg Attachment Pin from the Azimuth Base.
d. While holding the Support Leg and Tube together, insert the Tube into the mating slot for the Leg Attachment Pin.

Note: The Support Leg has a plastic "U" shaped block to support the Tube when it is collapsed against the Support Leg.

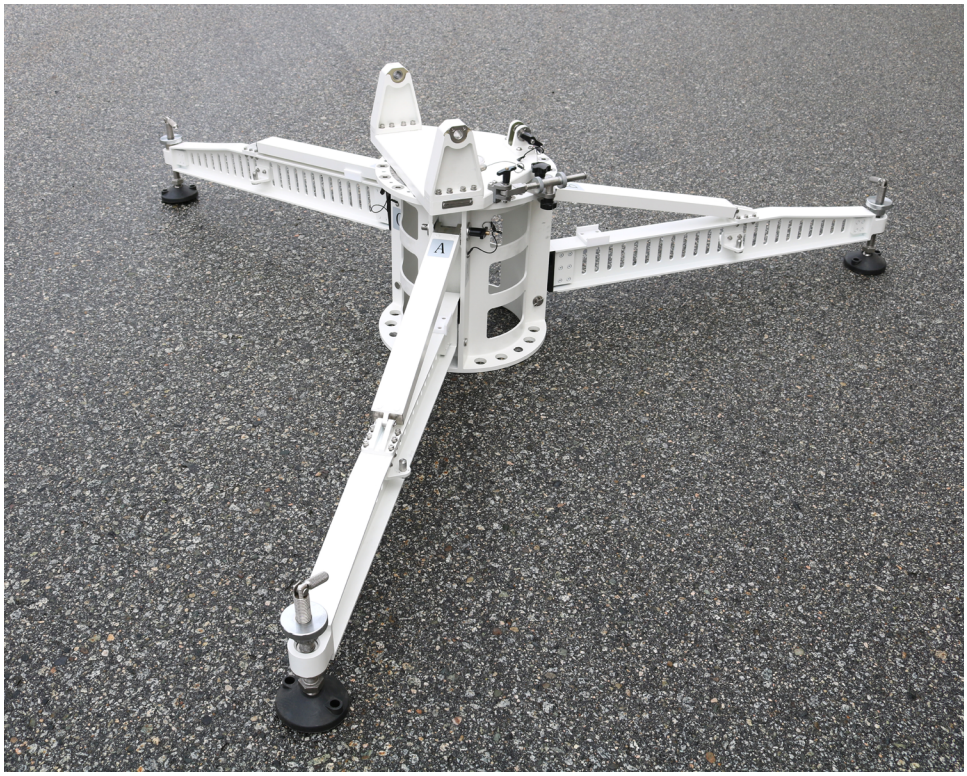


a. Ensure the Tube is fully inserted to align the pin holes.
b. Slide the Leg Attachment Pin to secure the Tube onto the Azimuth Base.
c. Gently Lower the Support Leg until it rests on the ground. Do not engage the Support Leg into its mating pin on the Azimuth Base yet.



4. Secure the three (3) Legs onto the Azimuth Base in alphabetical order by following the steps below:

   a. Tilt up the Azimuth Base along the target Leg
   b. Slide down the hinged Support Leg onto the Mating Pin on the Azimuth Base
   c. Lower the Azimuth Base until its rests on the ground while ensuring the Support Leg remains engaged on the Mating Pin



6. Take out the two (2) solid Leg Struts from Case 1 and slide them between the following Legs onto the Leg Pins Each Leg Strut is labelled to indicate between which legs it is to be installed in.
   a. Legs A and B
   b. Legs C and A

7. Slide on the adjustable Leg Strut between Legs B and C. Adjust strut length as needed and ensure the Leg Struct is extended symmetrically.

8. Tighten the adjustable Leg Strut by increasing its length as shown below.

4.3.2. Reflector

1. Open Case 1.
2. Take out the Central Petal from Case 1.
3. Remove the mounting pins from the Central Petal and mount the Central Petal onto the Azimuth Base.

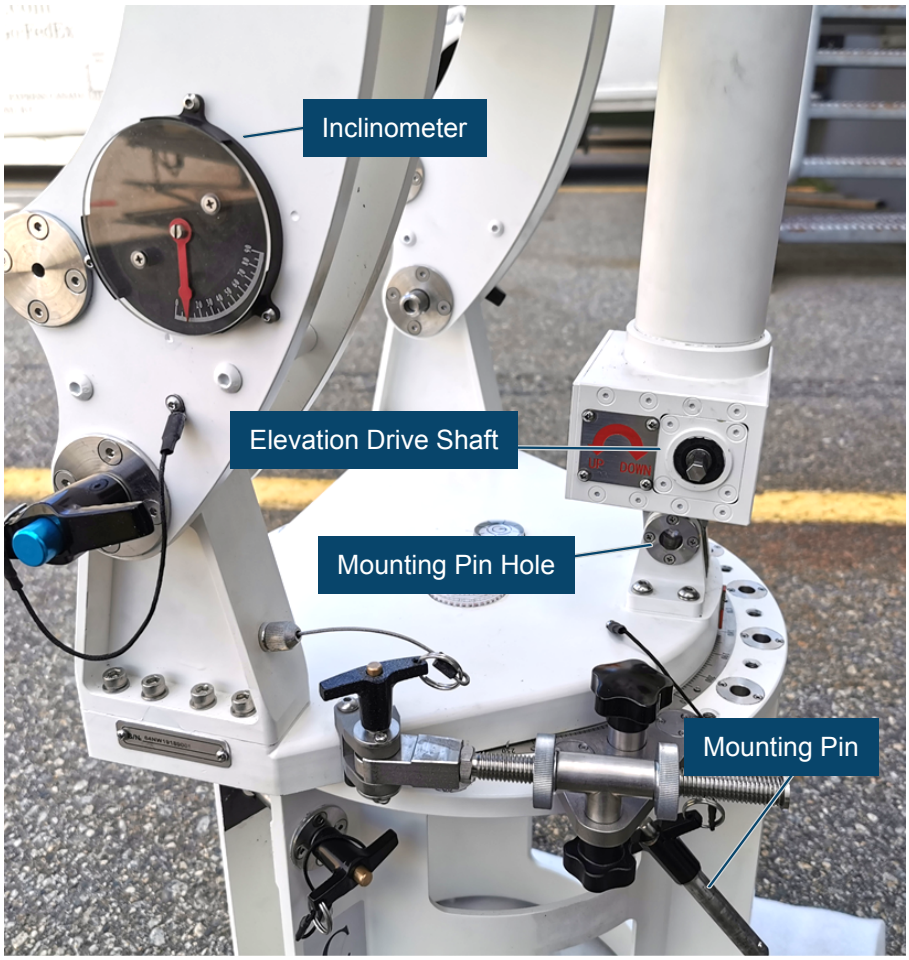
4. Re-insert the mounting pins to secure the Central Petal onto the Azimuth Base.

5. Slowly lower the Central Petal towards the front to limit.

6. Take out the Elevation Assembly from Case 1.

7. Orientate the Elevation Assembly so the Elevation Drive Shaft is on the same side as inclinometer on the Central Petal.

8. Attach the lower end of the Elevation Assembly onto the Azimuth Base and secure with the mounting pin.

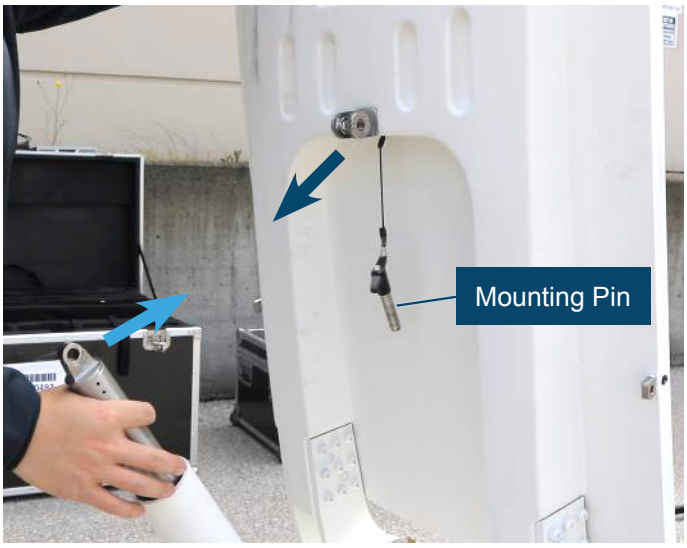


9. Extend the Elevation Assembly to approximately 18” by rotating the upper section by hand counter-clockwise.

10. Remove the Elevation Rod mounting pin on the Central Petal.

11. Rotate both the Central Petal and Elevation Assembly towards each other until the upper end of the Elevation Assembly connects to the Central Petal.

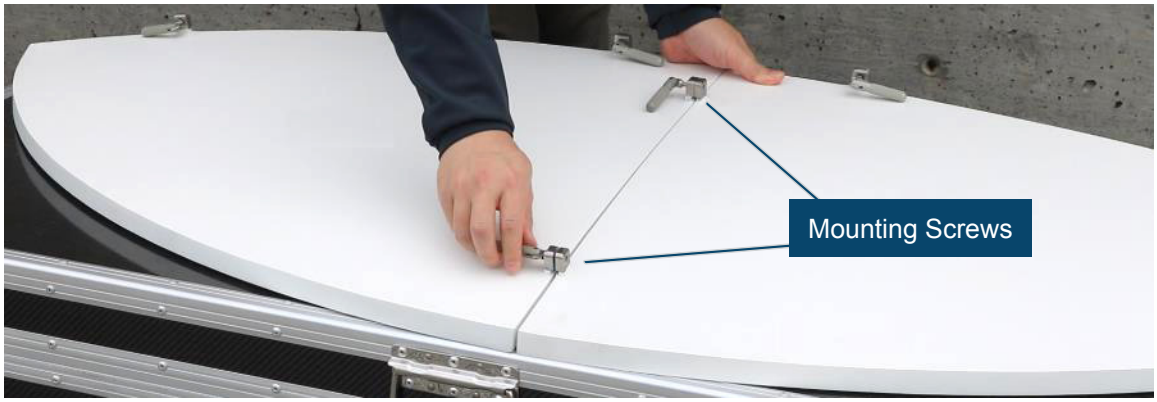
12. Secure the Elevation Assembly onto the Central Petal with the mounting pin.



13. Guide reflector Petal 2 onto the assembly by aligning the pins with the mating holes in the Central Petal. Then tighten screws to firmly attach.

Note: The Central Petal is also known as Petal 1

14. Assemble Petals 3 and 4 together with the two (2) screws as shown below.



15. Then mount the assembled petals onto the reflector and tighten the four (4) remaining screws to attach.

16. Repeat the above two steps with Petals 5 and 6 to complete the Reflector assembly.

4.3.3. Boom Assembly

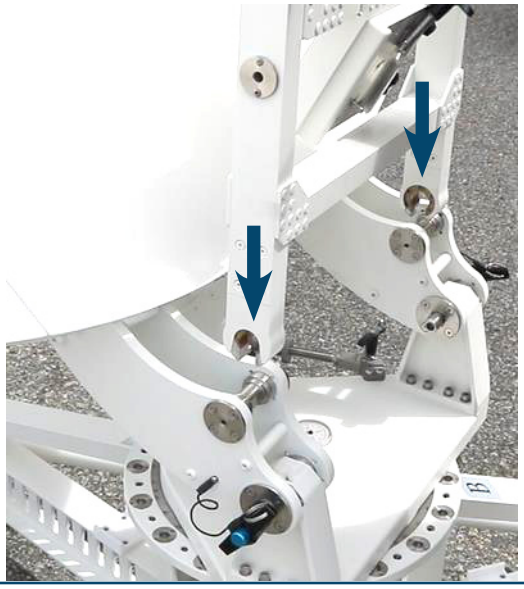
1. Set the Elevation angle to 50 degrees. Refer to Section 5.2.2 for Elevation Adjustment instructions.

Note: At 50 degrees, the Boom Assembly inserts nearly vertically.

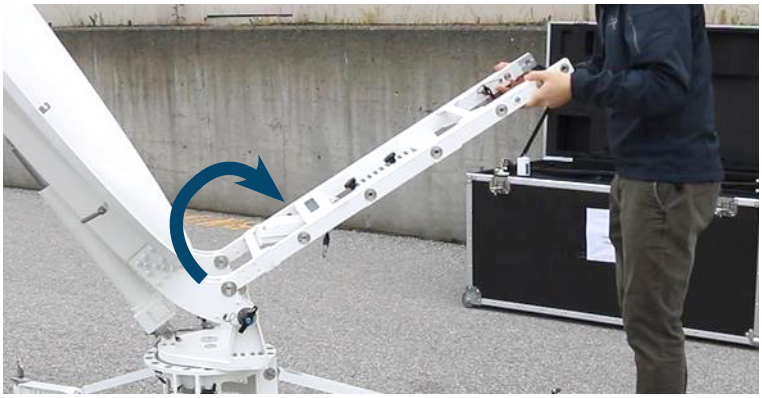
2. Take out the Boom Assembly from Case 2.

3. Hold the Boom Assembly vertically with the Central Petal interface pointing towards the ground and the BUC bracket thumbwheel knobs facing the Reflector.

4. Slowly lower the Boom Assembly downwards onto the flats on the Central Petal's upper axles until the Boom Assembly rests on the Central Petal.



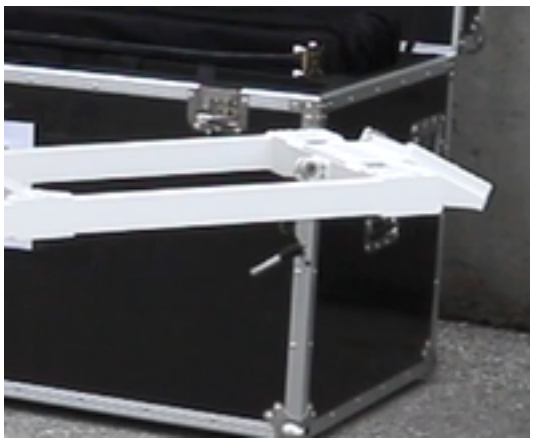
5. Rotate the Boom Assembly downwards to capture the Boom Assembly onto the Central Petal.



6. Remove the Boom Lock Pins and rotate the Upper Boom upwards to the open position. Then secure the Boom Assembly with the recently removed Boom Lock Pins in the open position.

Note: The Boom Assembly has two sets of Lock Pin holes for the open and closed positions.

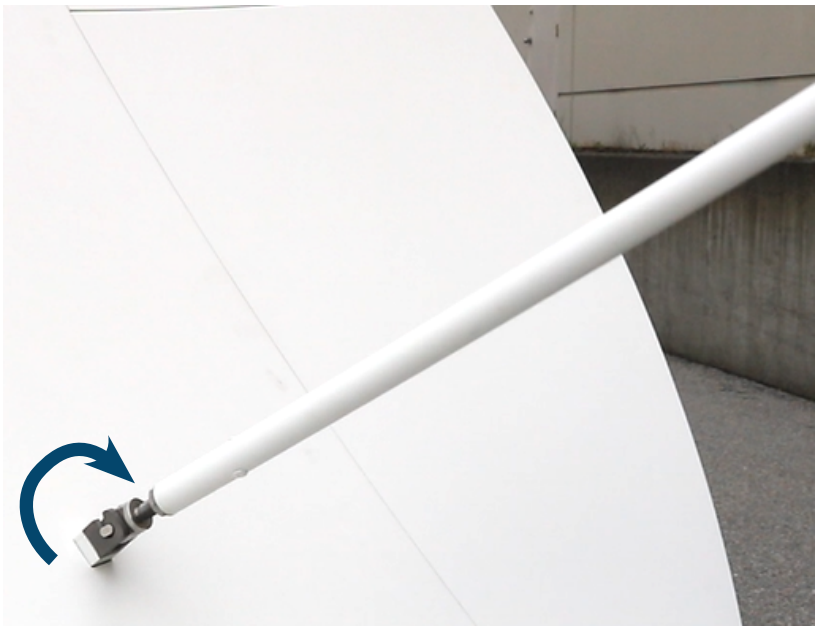
7. Remove the Lock Pin on the end of the Boom Assembly.



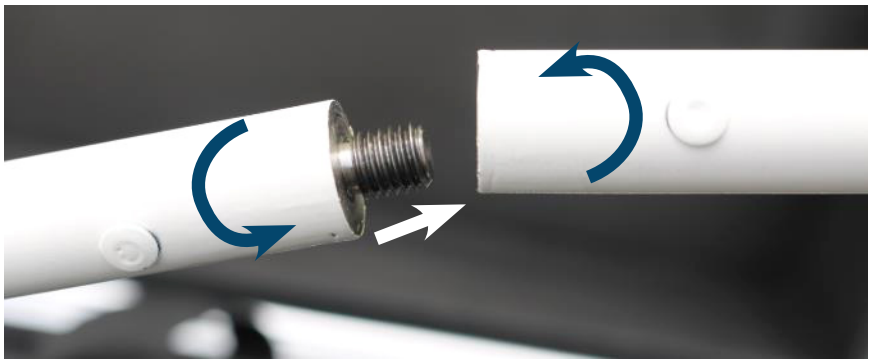
8. Gently lower the Boom Assembly until it rests on the ground.

9. Take out the studded Boom Strut half from Case 2.

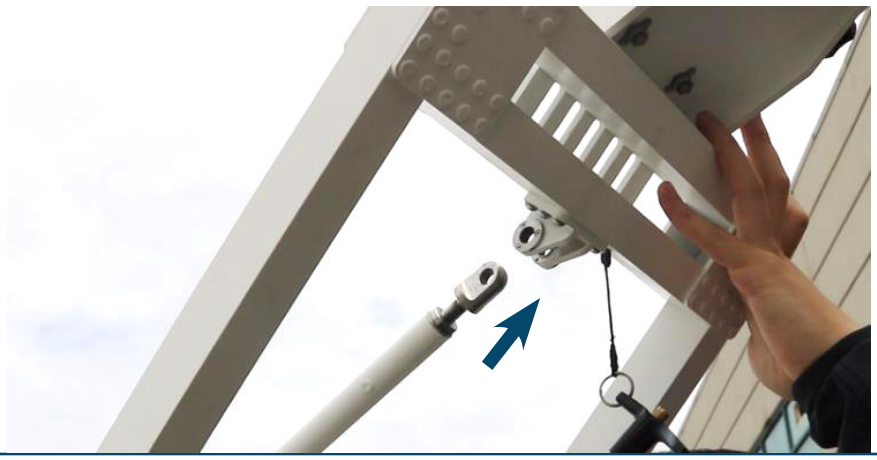
10. Insert the studded Boom Strut half into the front hook of the Central Petal. Then rotate the Boom Strut downwards to capture.



11. Take out the second Boom Strut half and fasten onto the first half.



12. Rotate the Boom Assembly and Boom Strut towards each other until the Boom Strut is captured in the Boom Assembly. Then secure the Boom Strut onto the Boom Assembly with the Lock Pin.



4.3.4. Bipod (Optional for High Wind Operation)

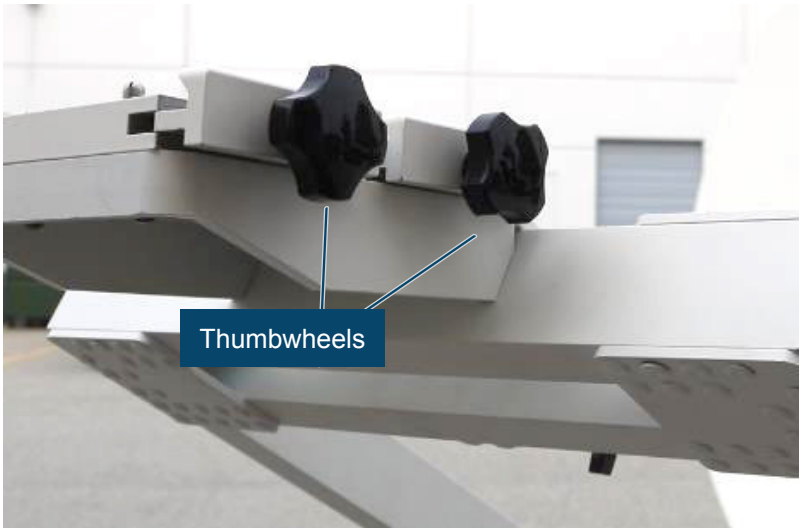
1. Take out the Bipod Legs from Case 2.
2. Repeat the following steps for each Bipod Leg:
   a. Insert the mounting pin through the Bipod Leg if it has been removed

b. Align and secure the Bipod Leg onto the Boom Assembly in the outermost mounting hole with the mounting pin. At higher pointing angles, the inner mounting holes may need to be used instead.

c. Adjust the length of the Bipod Legs by releasing the cam handle and sliding the Leg to the desired length. Then close the cam handle to lock.

4.3.5. Feed

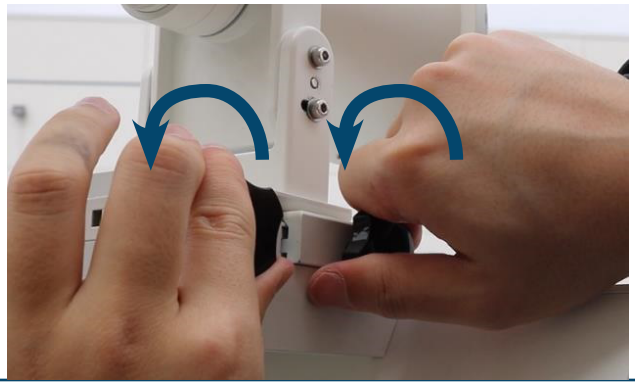
1. Loosen the two thumbwheels on the Feed Mount.



2. Take out the Feed from Case 1.

3. Insert the Feed downwards onto the Feed Mount. Locate the Feed onto the locating pin on the Feed Mount.

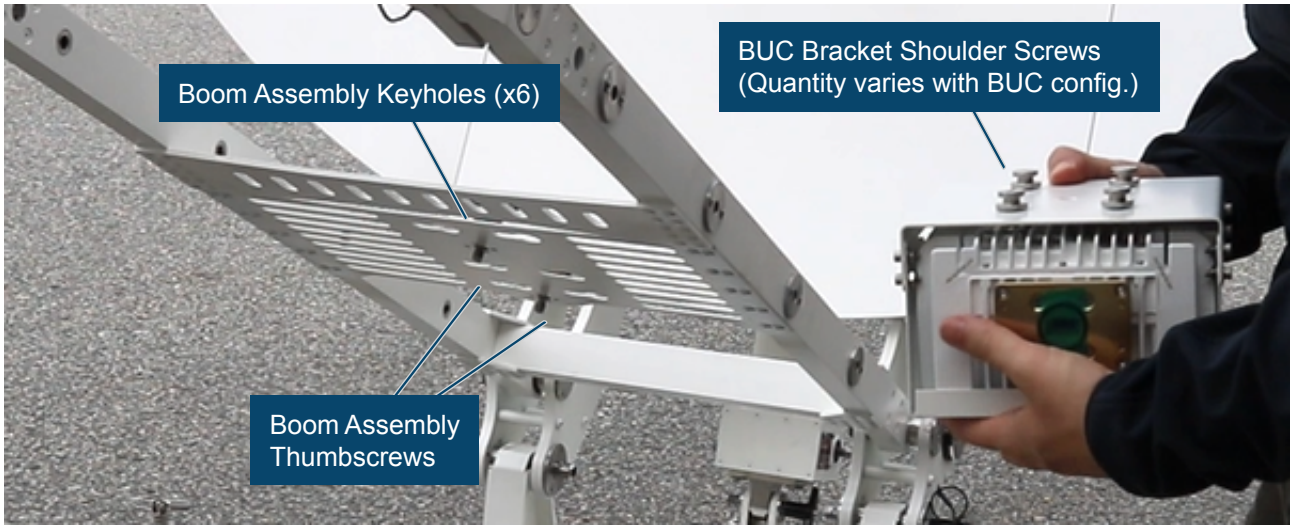
4. Tighten the thumbwheels counter-clockwise to lock the Feed into place.



4.3.6. BUC

1. Take out the BUC from Case 1.

2. Align the BUC with the BUC output facing towards the front of the antenna and locate the keyholes on the mounting plate on the Boom Assembly



3. Insert and slide the shoulder screws from the mounting bracket of the BUC into the Boom Assembly Keyholes.

4. Lock the BUC assembly by tightening the thumb screw clockwise in the center of the mounting plate.

5. Take out the Flexible Waveguide from Case 1.

6. Remove any waveguide covers from the BUC output and the end of the Flexible Waveguide with the captive screws. Ensure the gasket in the BUC groove is present before mounting the Flexible Waveguide.

7. Connect the end of the Flexible Waveguide with captive screws onto the BUC output and tighten with four (4) captive screws on the quick connect plate. Ensure the gasket is properly installed prior to fastening the Flexible Waveguide.

8. Connect the other end of the Flexible Waveguide to the Feed Assembly and tighten with four (4) captive screws on the quick connect plate. Ensure the gasket is properly installed prior to fastening the Flexible Waveguide.

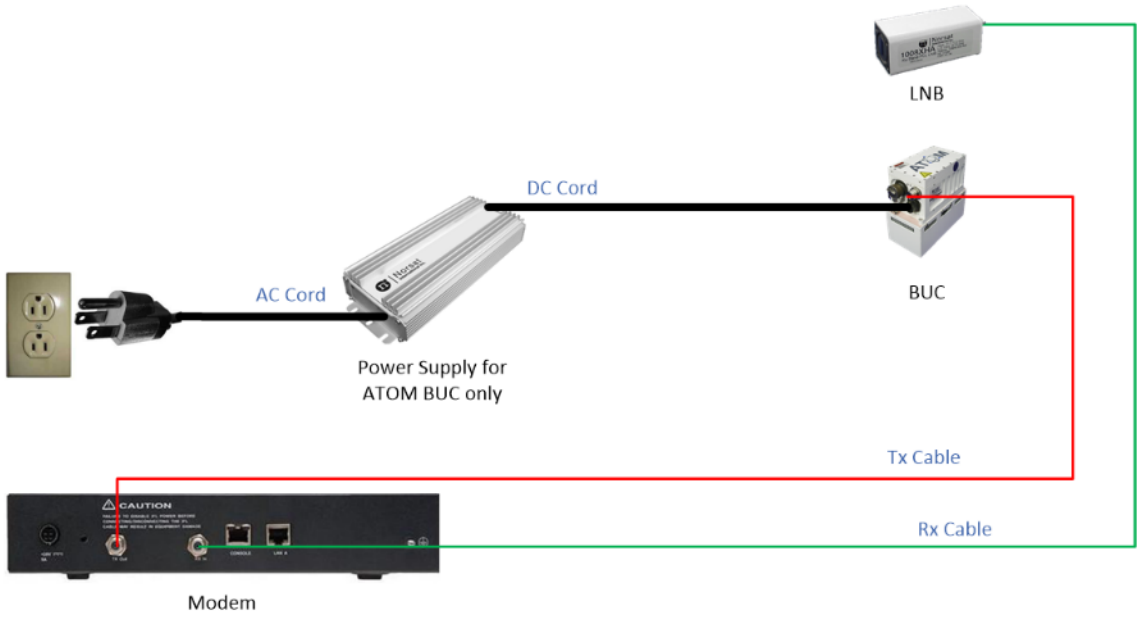
9. Antenna assembly is now complete.

4.4. Cable Connection

1. Connect the cables as shown in the table and figure below.

Warning: Connect the Modem Tx Coax Cable last and ensure user is clear of the antenna.

SIGNAL	FROM	TO	CABLE
Tx Signal	Modem Tx Port	BUC	Tx Cable (Red End)
Rx Signal	LNB	Modem Rx Port	Rx Cable (Green End)
DC Power (Optional)	Power Supply for ATOM BUC	BUC	DC Cord
AC Power (Optional)	AC Outlet	Power Supply for ATOM BUC	AC Cord



5. Operation

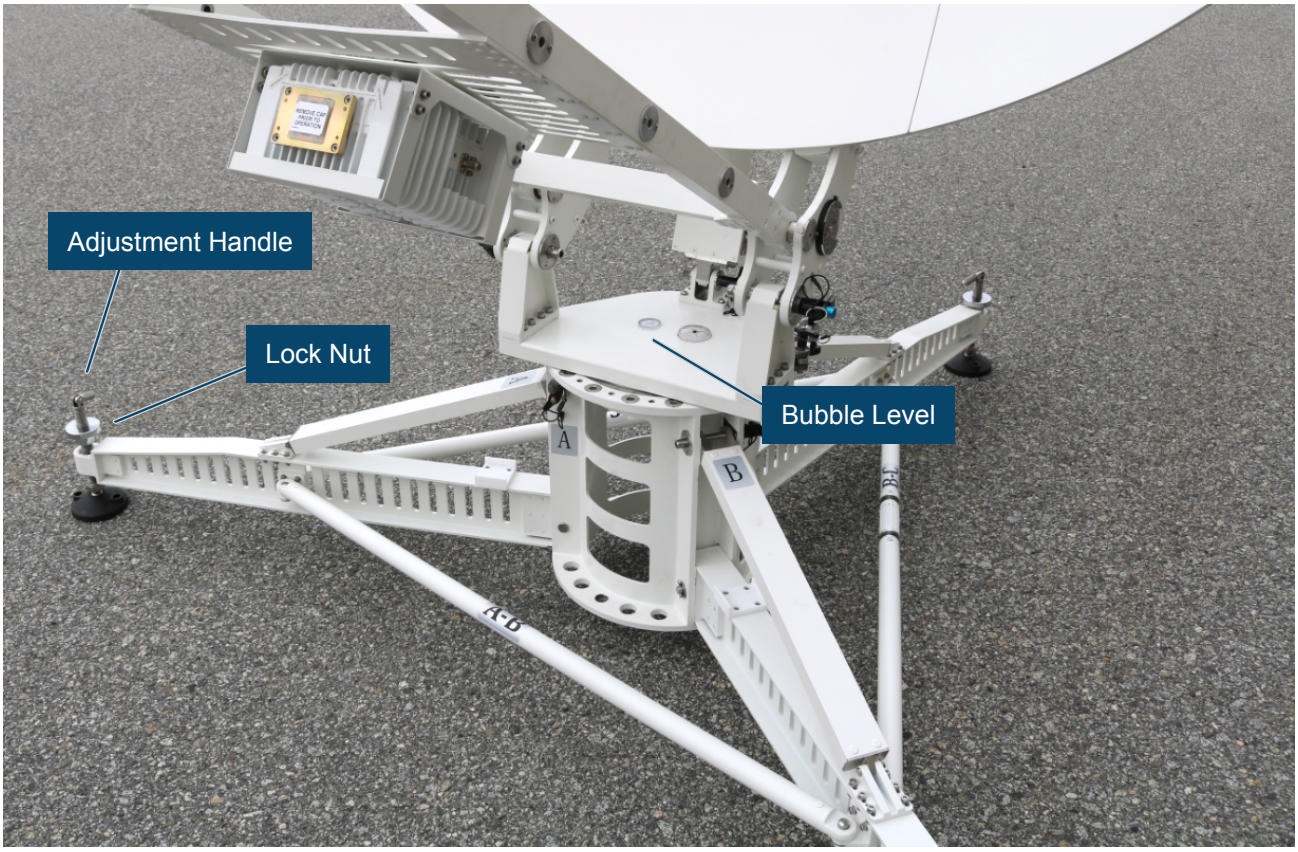
5.1. Levelling

1. Examine the location of the bubble in the Bubble Level on the Azimuth Base.

2. Decrease the height of the footpad(s) closest to the bubble and/or increase the height of the footpad(s) farthest from the bubble using their adjustment handles.
   a. Turn the adjustment handles CW or CCW to elevate or lower the foot respectively. Raise the Lock Nuts as needed.

3. Continue adjusting the footpad heights until the bubble in the Bubble Level is within the marked circle.

4. Lower the Lock Nuts on each footpad to limit.



5.2. Adjusting Antenna Position

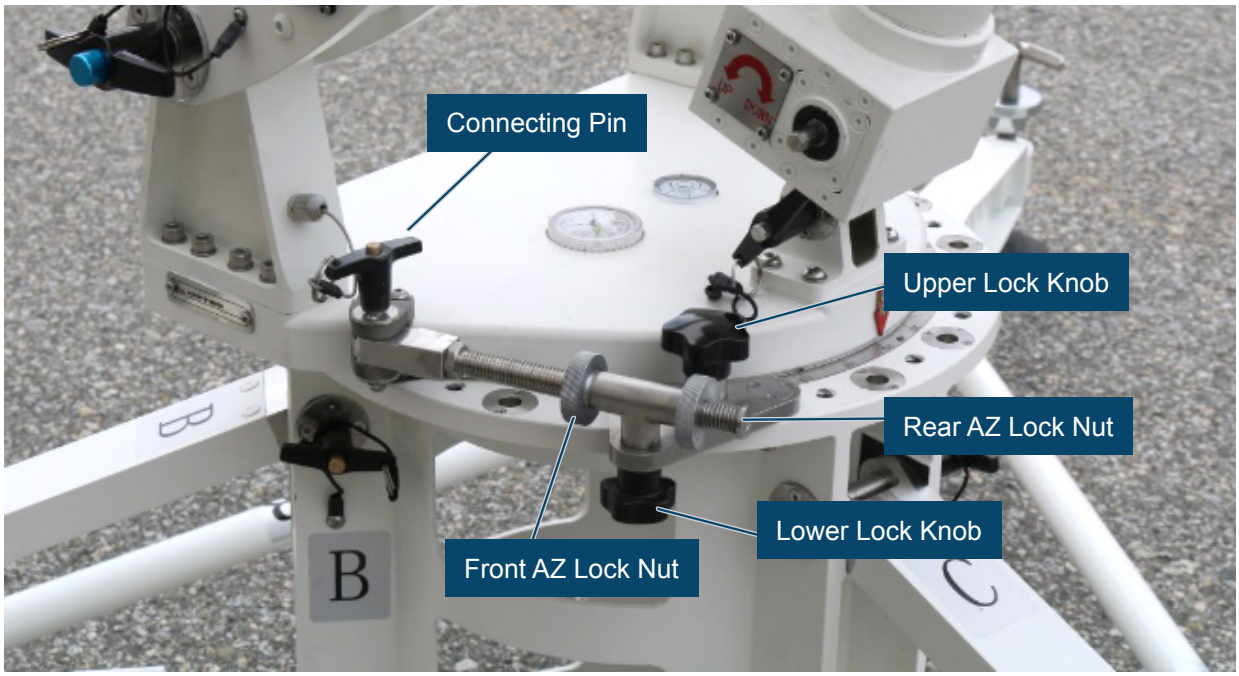
5.2.1. Azimuth Adjustment

5.2.1.1. Fine Adjustment

1. Loosen the AZ lock nuts and the lower lock knob
2. Adjust the AZ position by pushing the AZ adjustment assembly with an AZ lock nut
   a. The front AZ lock nut moves the AZ right
   b. The rear AZ lock nut moves the AZ left
3. Once the desired position is reached, tighten the AZ lock nuts and lower lock knob

5.2.1.2. Rough Adjustment

1. Remove the connecting pin
2. Loosen the AZ lock nuts and lower lock knob
3. Retract the AZ adjustment assembly out of the connecting pin slot
4. Loosen the upper lock knob
5. Lift AZ adjustment assembly upwards to remove from the AZ base
6. Rotate the AZ as needed
7. Reinsert the AZ adjustment assembly into the AZ base
8. Extend the AZ adjustment assembly into the connecting pin slot
9. Insert the connecting pin
10. Tighten the AZ lock nuts and lower lock knob

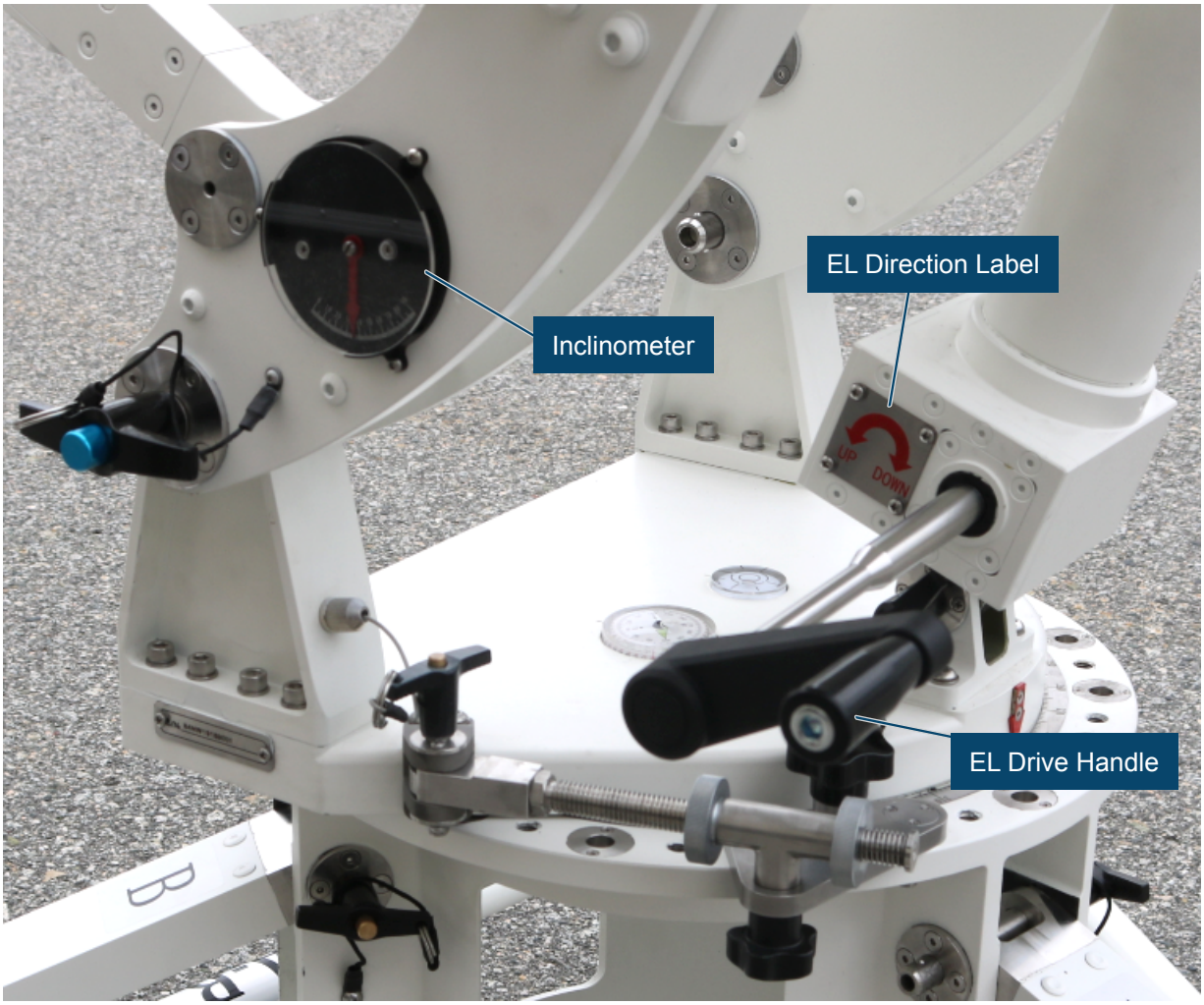


5.2.2. Elevation Adjustment

1. Mount the Elevation Drive Handle onto the Elevation Assembly.

2. Rotate the Drive Handle to raise or lower the Elevation. Refer to the label on the Elevation Assembly to indicate retraction and extension directions.

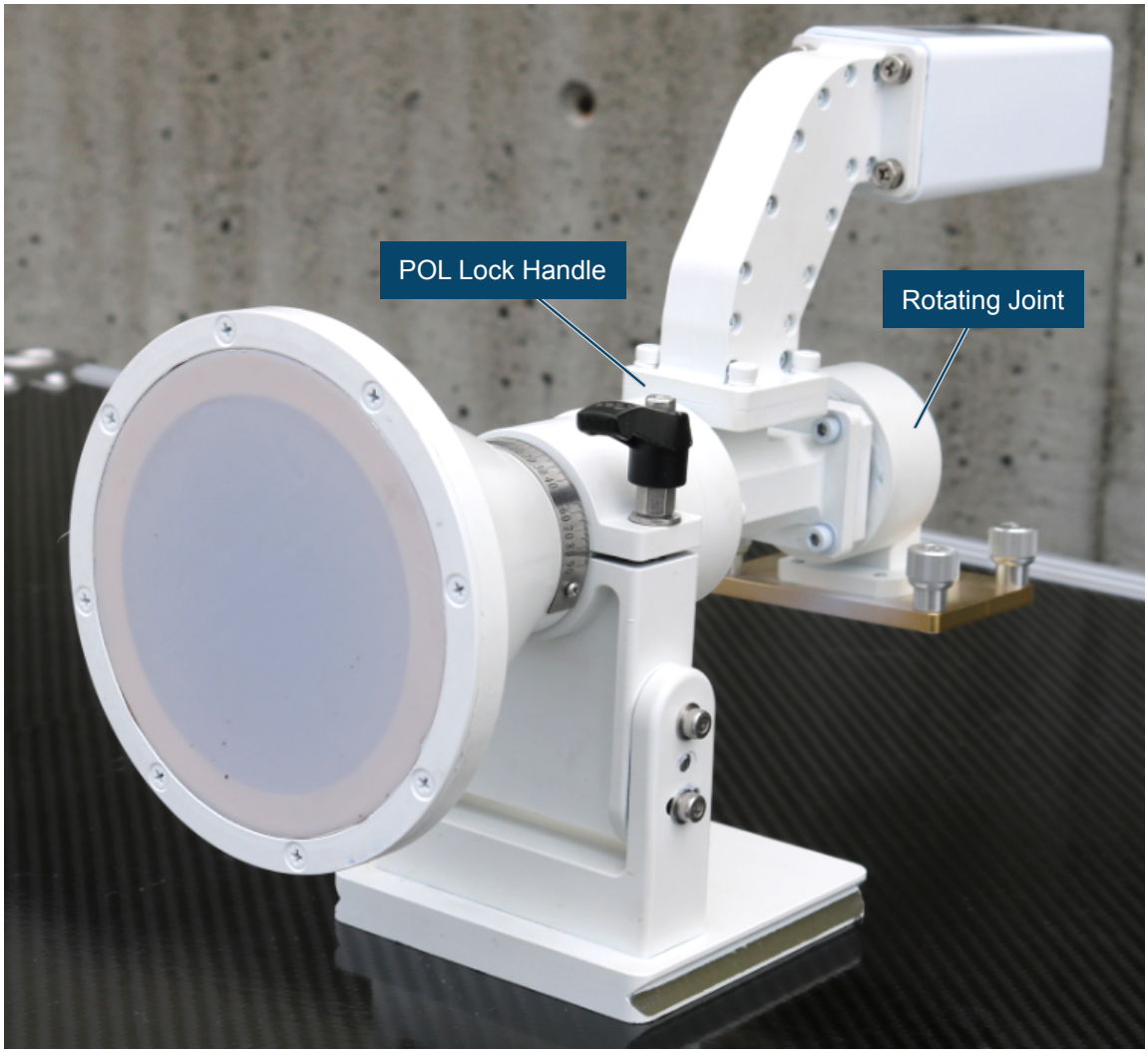
3. Use the Inclinometer on the Central Petal to read current elevation position.



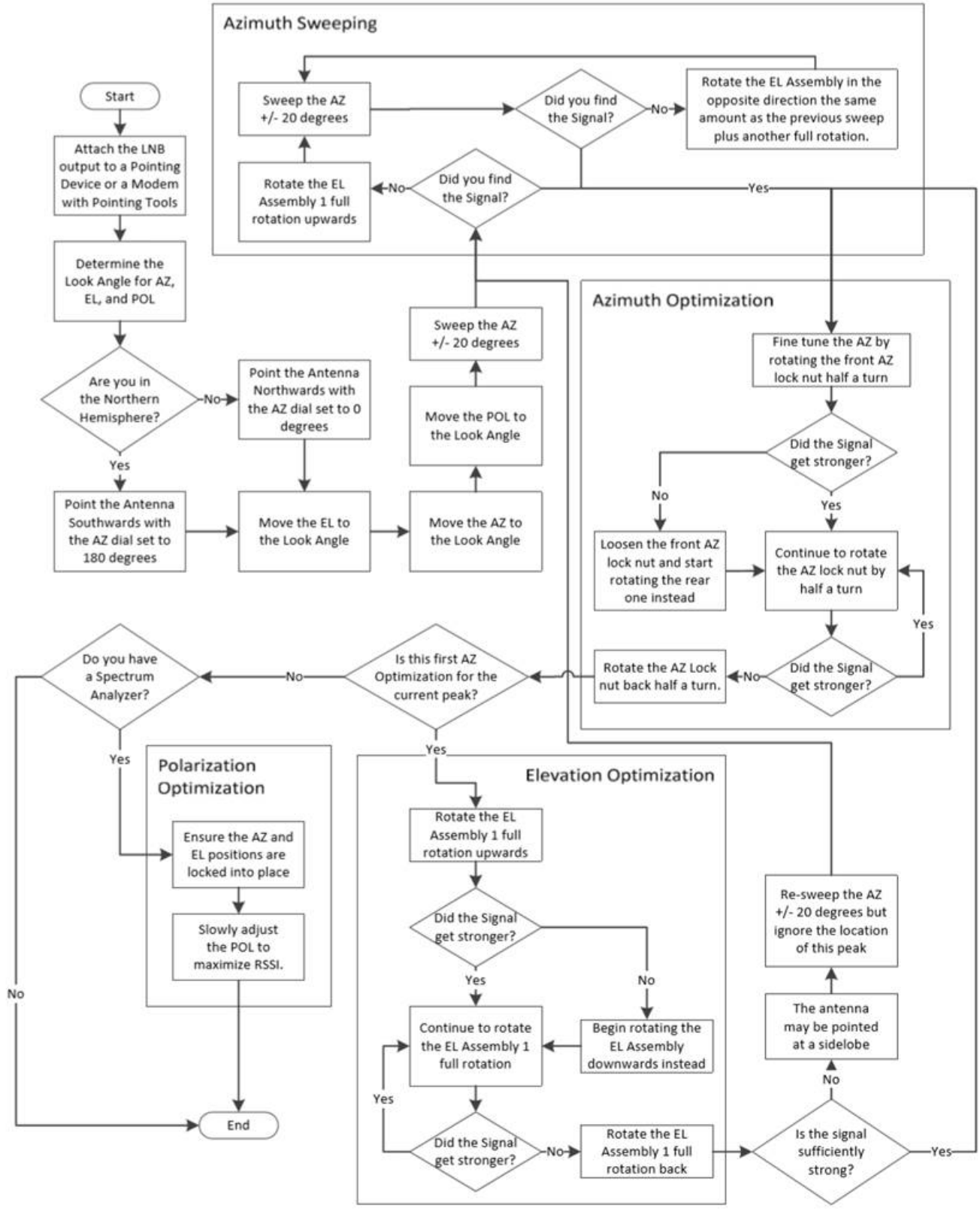
5.2.3. Polarization Adjustment

Warning: Ensure the Modem Tx Coax Cable is disconnected before making any polarization adjustments.

1. Loosen the Polarization Lock Handle.
2. Rotate the Polarization Assembly to the desired setting.
3. Use the Polarization Dial on the Feed to read the current polarization position.
4. Adjust the rotating joint so the waveguide exits downwards.
5. Tighten the Polarization Lock Handle.



5.3. Manual-Acquisition Flow Chart



6. Disassembly

Please follow the procedure below to disassemble and store the terminal. Refer to the List of Contents for Cases 1 and 2 for the specific location of each component in their cases.

6.1. Preparation

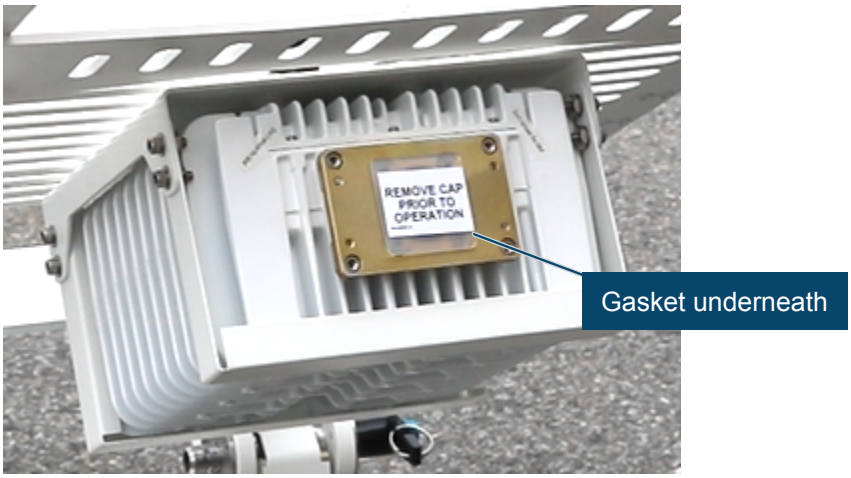
1. Disconnect the Tx Coax Cable from the Modem Tx Port.

Warning: Ensure this step is complete before proceeding with the disassembly

2. Disconnect the remaining cables attached to the antenna.
3. Coil the wires with their attached straps and store them in Case 1.

6.2. BUC

1. Disconnect the Flexible Waveguide from the Feed Assembly by loosening the four captive screws on the quick connect place on the Feed Assembly.



2. Reattached the waveguide covers onto the BUC and Flexible Waveguide. Ensure the BUC gasket is present in the waveguide cover.
3. Disconnect the other end of the Flexible Waveguide from the BUC output by loosening the four captive screws on the quick connect plate on the Flexible Waveguide.
4. Reattached the waveguide covers onto the LNB and Flexible Waveguide. Ensure the Flexible Waveguide gasket is present in the waveguide cover.
5. Coil the Flexible Waveguide and store the Flexible Waveguide in Case 1.

6. Unlock the BUC assembly by loosening the thumb screw in the center of the mounting plate.

7. Slide the shoulder screws of the BUC Bracket out from the mounting bracket keyhole and then downwards to fully detach the BUC assembly from the antenna.

8. Store the BUC in Case 1.

a. For 8W ELEMENT BUC:

I. Insert the BUC into the BUC cavity. There is no set orientation for it.

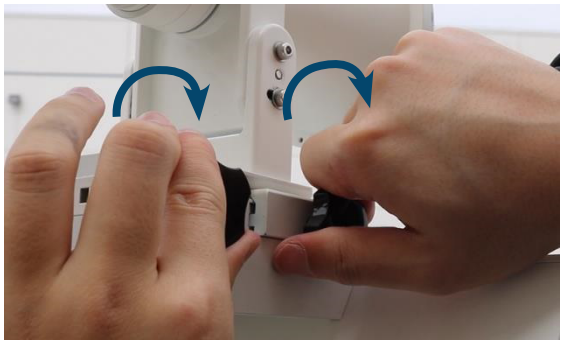
b. For 20/40W ATOM BUC:

I. Insert the BUC into the BUC cavity with the PSU facing downwards into the rectangular recess.

II. Place cables in the open space beside the BUC

6.3. Feed

1. Loosen the thumbwheels counter-clockwise to lock the Feed into place.



2. Continue loosening the thumbwheel until the Feed can be lifted upwards out of the Feed Mount.

3. Set the polarization to 0 degrees. Refer to Section 5.2.3 for polarization adjustment.

4. Store the Feed in Case 1.

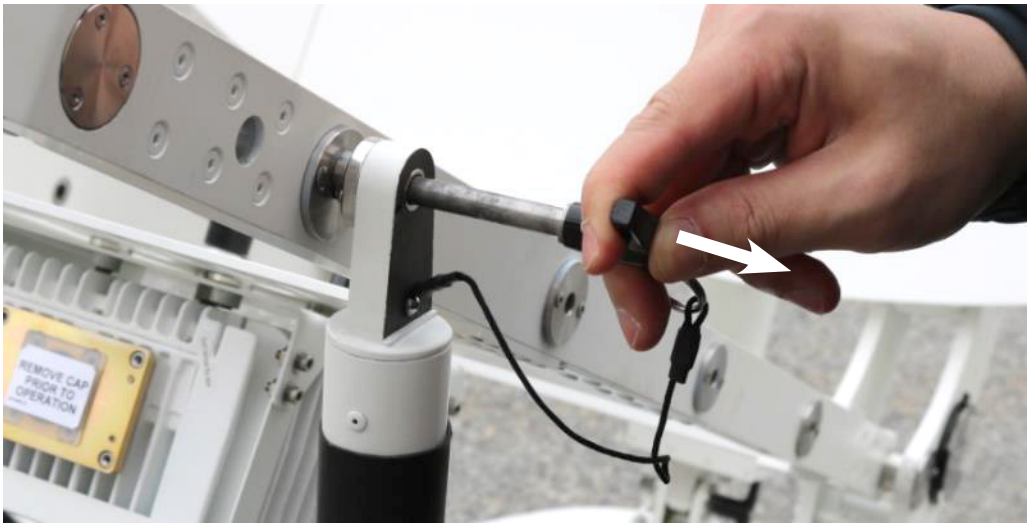
5. Re-tighten the loosened thumbwheels clockwise to limit on Boom Assembly.

6.4. Bipod

1. Repeat the following steps for each Bipod Leg:
   a. Retract the length of one Bipod Leg by releasing the cam handle and sliding the leg upwards to its limit. Then close the cam handle to lock.



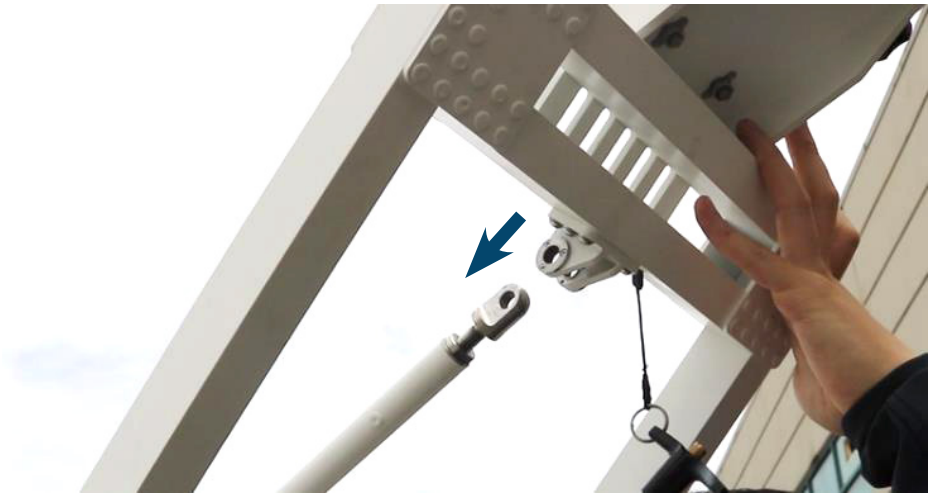
   b. Release the mounting pin from the Boom Assembly and remove the Bipod Leg.



   c. Reinsert the pin into the Bipod Leg.
2. Store both Bipod Legs in Case 2

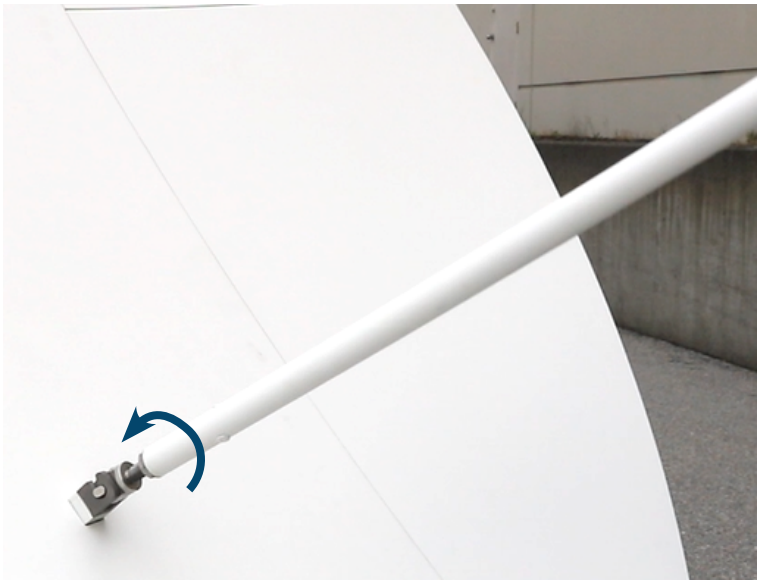
6.5. Boom Assembly

1. Remove the Lock Pin between the Boom Strut and Boom Assembly. The gently lower both the Boom Strut and Boom Assembly to the ground.



2. Disassemble the free end of the Boom Strut and store in Case 2.

3. Rotate the remaining Boom Strut half towards the Central Petal until it is flush against it. Then pull upwards to remove from the Central Petal hook.



4. Store the remaining Boom Strut half in Case 2.

5. Reinsert the Lock Pin for the Boom Strut into the Boom Assembly.

6. Remove the Boom Lock Pins and rotate the Upper Boom into the closed position. Then re-secure with the Boom Lock Pins.

7. Set the Elevation angle to 50 degrees. Refer to Section 5.2.2 for elevation adjustment.

8. Rotate the Boom Assembly until it is vertical.

9. Gently pull the Boom Assembly upwards to release it. If the Boom Assembly does not move, attempt pulling the Boom Assembly at slightly different angles.

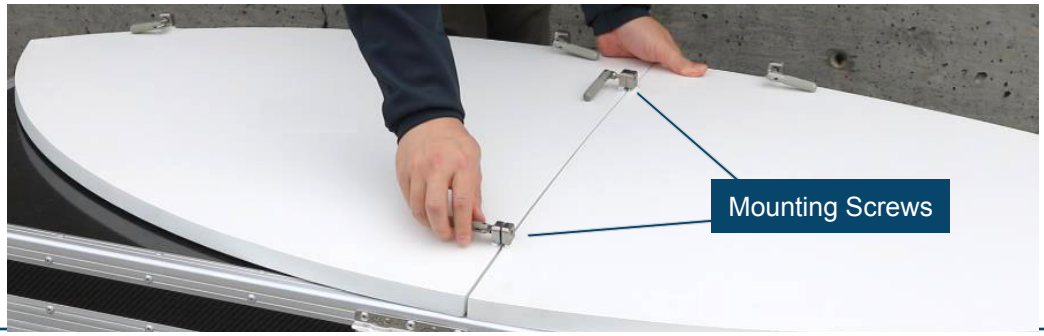
10. Store the Boom Assembly in Case 2.

6.6. Reflector

Note: Removal of the Reflector Petals require at least two people. One to loosen the petal screws and another to support the petal during disassembly.

1. Loosen the four (4) screws that attach Petals 5 and 6 onto the reflector assembly then pulling away the petals from the Central Petal.

2. Disassemble Petals 5 and 6 apart by loosening the two (2) screws on Petal 6.



3. Store Petals 5 and 6 in the Reflector Petal Bag in Case 1. Note the following when storing reflector petals:
   a. Petals are stored in descending order from back to front.
   b. The concave side of the petals face forward.
   c. Petals are inserted with the longest flat edge first into the reflector bag

4. Loosen the four (4) screws that attach Petals 3 and 4 onto the reflector assembly then pulling away the petals from the Central Petal.
5. Disassemble Petals 3 and 4 apart by loosening the two (2) screws on Petal 4.
6. Store Petals 3 and 4 in the Reflector Petal Bag.
7. Loosen the two (2) screws on Petal 2 then lifting the petal upwards from the Central Petal.
8. Store Petal 2 in the Reflector Petal Bag.
9. Engage all the zippers on the Reflector Petal Bag.

10. Release the mounting pin that secures the Elevation Assembly and Central Petal together.4

11. Gently rotate the Elevation Assembly and Central Petal away from each other until they rest on the Azimuth Base.

12. Re-insert the mounting pin into the Central Petal.

13. Retract the Elevation Assembly to limit by rotating the upper section by hand clockwise.

14. Release the mounting pin that secures the Elevation Assembly to the Azimuth Base and remove the Elevation Assembly.

15. Store the Elevation Assembly in Case 1.

16 Re-insert the mounting pin to the Azimuth Base.

17. Rotate the Central Petal so it is nearly vertical to the ground.

18. Release the mounting pins that secure the Central Petal to the Azimuth Base.

19. Lift up the Central Petal to remove it from the Azimuth Base.

20. Re-insert the mounting pins to the Central Petal and store it in Case 1.

6.7. Tripod Base

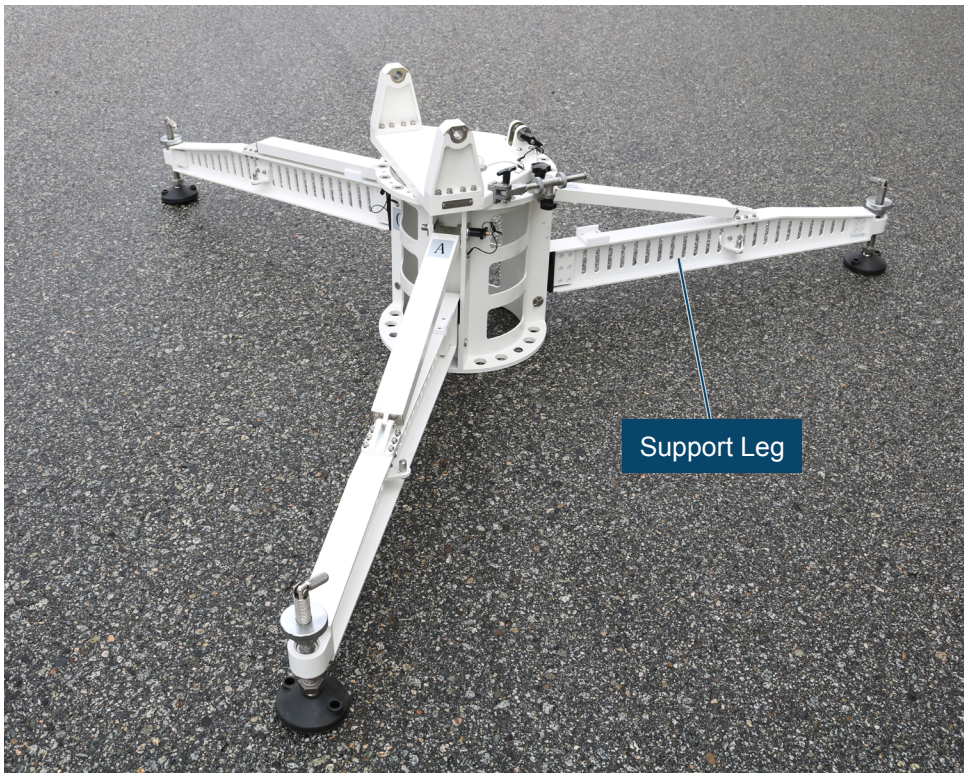
1. Retract the adjustable Leg Strut until it can be easily pulled upwards.

2. Store the adjustable Leg Strut in Case 2

3. Slide off the two solid Leg Struts.

4. Store the two solid Leg Struts in Case 2.

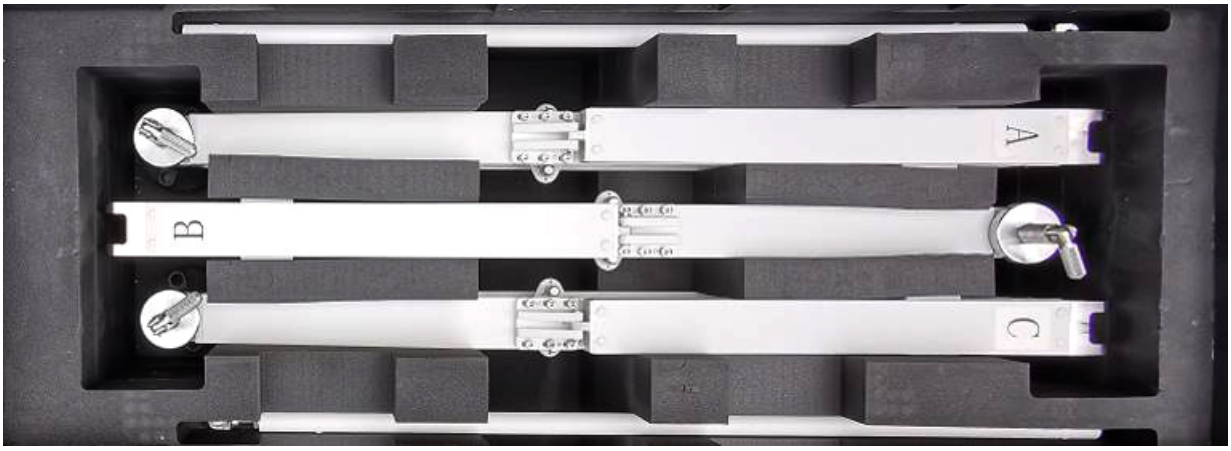
5. Disengage the three (3) Legs on the Azimuth Base in alphabetical order by lifting up the support leg while supporting and gently lowering the Azimuth Base with each leg disengagement.



6. Remove the Leg attachment pin for each leg and then slide the Legs out.

7. Reinsert the attachment pins into the Azimuth Base.

8. Store the Legs in alphabetical order and an alternating orientation in Case 2.



9. Set the Azimuth Base to 180 degrees. Refer to Section 5.2.1 for azimuth adjustment.

10. Store the Azimuth Base in Case 2.

7. Troubleshooting

PROBLEM	TROUBLESHOOTING STEPS
No or weak signal	1. Test reception with a different cable 2. Verify there are no obstructions in the look angle 3. Verify all other interfacing components, such as the modem and LNB, are functioning properly 4. If the problem is not corrected in the above steps, contact the terminal manufacturer
Unable to transmit	1. Check condition of Tx cable 2. Verify the flexible waveguide is installed tightly 3. Verify there are no obstructions in the look angle 4. Verify all other interfacing components, such as the modem and BUC, are functioning properly 5. If the problem is not corrected in the above steps, contact the terminal manufacturer
Azimuth has difficulties moving	1. Verify the azimuth base is not jammed 2. Perform a full azimuth sweep and observe if there is any resistance 3. Contact the terminal manufacturer
Elevation has difficulties moving	1. Verify the target angle is not beyond the elevation range 2. Verify the elevation gearbox is not jammed 3. Perform a full elevation sweep and observe if there is any resistance 4. Contact the terminal manufacturer
Polarization has difficulties moving	1. Verify the polarization lock knob is disengaged 2. Verify there is no interference between the polarization assembly and any components when moving within the polarization range 3. Contact the terminal manufacturer
Petals do not assemble onto Reflector Hub	1. Verify the numbered Petals are installed onto their proper location according to the Central Petal. 2. Verify the Petal fastener blocks are flush against the Petal body 3. Contact the terminal manufacturer

8. Maintenance

NO.	DESCRIPTION	FREQUENCY
1	Inspect and clean integrity of Feed window, replace when damaged	Once per month
2	Inspect waveguide sealing, if there is a leakage, dry out the components and seal with silicon fusion tape or replace damaged parts.	Once per month
3	Inspect screws and nuts, tighten or replace screws upon loosening or rusting	Once per month
4	Inspect system for any noise during operation. Clean up the transmission and lubricate if any noise	Once per month
5	Inspect paint integrity of the antenna, touch up when required	Once per month
6	Lubricate gears and transmissions.	Once per year
7	Clean the Petal surface	Every 3 months or required when exposed to extreme conditions

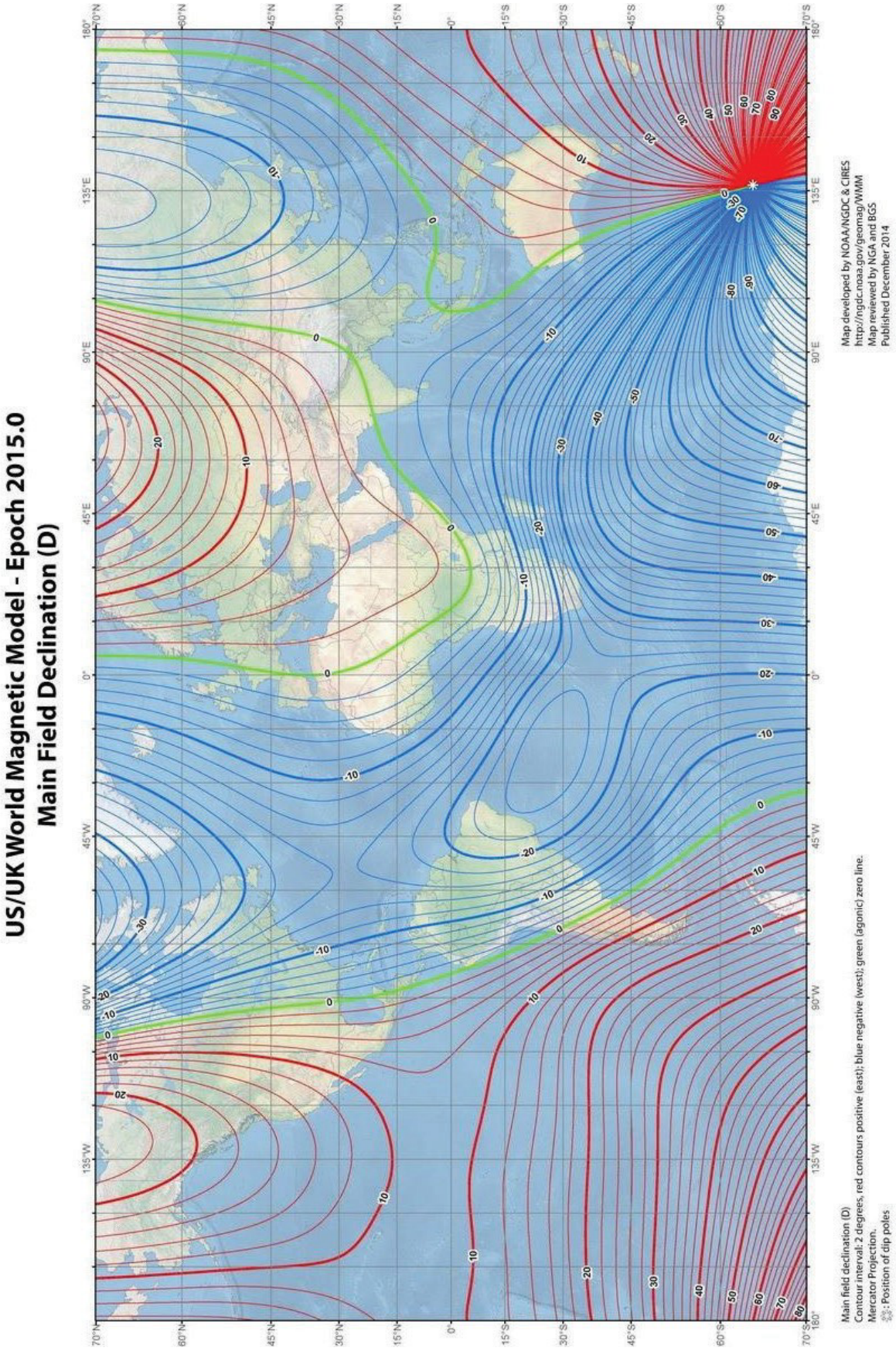
9. Technical Specifications

ELECTRICAL	
Reflector aperture	1.8m
Reflector material	Carbon fiber
Reflector type	Offset
Tx frequency	13.75 to 14.5 GHz
Rx frequency	10.7 to 12.75 GHz
Tx gain	46.3+20log(f/14.25) dBi
Rx gain	45.3+20log(f/12.5) dBi
Polarization	Linear
Cross polarization (On-Axis)	≥ 35dB
Tx/Rx isolation	Rx > 35dB Tx > 85dB
Sidelobe	First sidelobe < -14 dBi
Azimuth range	±180°
Elevation range	0° to 90°
Polarization range	±90°
Feed interface	WR75

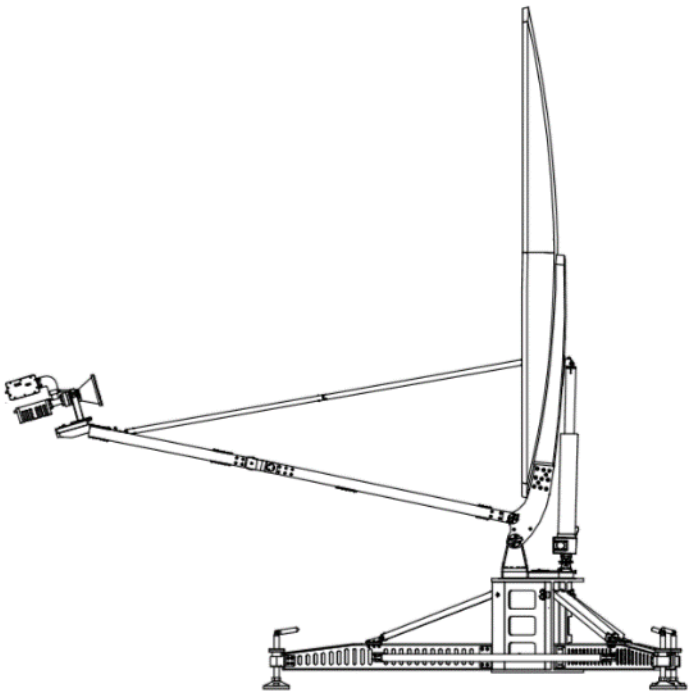
MECHANICAL		
Fiberboard case		
Case 1	Reflector	Size: 145 cm (L) x 77 cm (W) x 82 cm (H); Weight: ≤ 85Kg
Case 2	Pedestal assembly	Size: 166 cm (L) x 66 cm (W) x 59 cm (H); Weight: ≤ 64Kg

ENVIRONMENTAL	
Wind load - operational	40 km/h
Wind load - survival	65 km/h
Operational Temperature	-40°C to +60°C
Humidity	0-95% (20°C)
Water ingress	IP 65 (antenna only)

Appendix A – Magnetic Declination Map



US/UK World Magnetic Model - Epoch 2015.0 Main Field Declination. (2014, December). Retrieved from http://ngdc.noaa.gov/geomag/WMM



ABOUT NORSAT

Norsat International Inc., founded in 1977, is a leading provider of innovative communication solutions that enable the transmission of data, audio and video for remote and challenging applications. Norsat's products and services include customizable satellite components, portable satellite terminals, maritime solutions and satellite networks. The company's products and services are used extensively by telecommunications services providers, emergency services and homeland security agencies, military organizations, health care providers and Fortune 1000 companies.

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