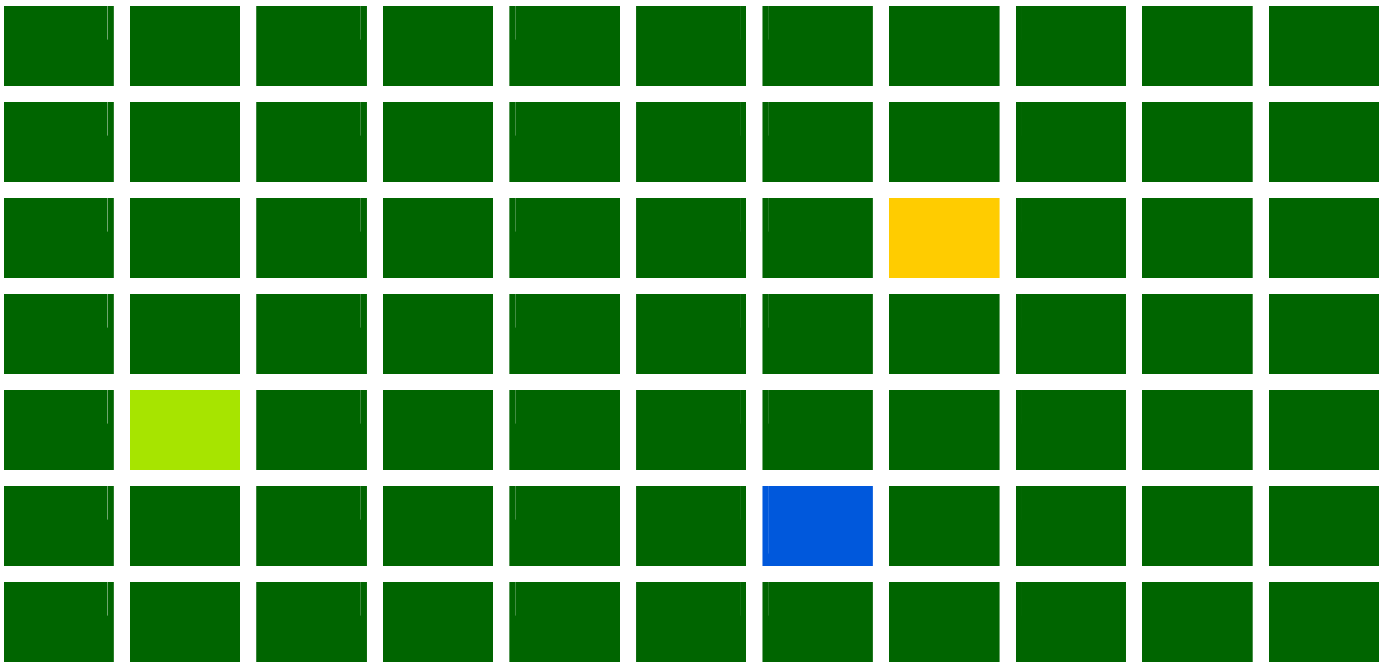
Norsat International Inc.

# Norsat ODU

## Operator's Manual

May 2004



Be certain.

**Please read this entire guide**

**Veuillez lire entièrement ce guide**

**Bitte das gesamte Handbuch durchlesen**

**Sírvase leer completamente la presente guía**

**Si prega di leggere completamente questa guida**

**Important**

Please read this entire guide before you install or operate this product. Give particular attention to all safety statements.

**Important**

Veuillez lire entièrement ce guide avant d'installer ou d'utiliser ce produit. Prêtez une attention particulière à toutes les règles de sécurité.

**Zu Beachten**

Bitte lesen Sie vor Aufstellen oder Inbetriebnahme des Gerätes dieses Handbuch in seiner Gesamtheit durch. Achten Sie dabei besonders auf die Sicherheitshinweise.

**Importante**

Sírvase leer la presente guía antes de instalar o emplear este producto. Preste especial atención a todos los avisos de seguridad.

# Notices

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## Revision History

| Date | Nature of Revision | Release |
|---|---|---|
| May 2004 | Initial Release | 1.0 |
| | | |

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CHAPTER 1

# Safety Precautions

IMPORTANT — Prior to operation of this equipment, proper authorization and/or licensing by relevant Authorities is required.

IMPORTANT — Prior to transmission of radiated signals authorization from the satellite operator is required

IMPORTANT — All safety precautions should be read and understood prior to deploying the Norsat NewsLink.

WARNING — FCC INFORMATION FOR UNINTENTIONAL RADIATOR PORTIONS AS PER FCC 15.19, 15.21 AND 15.105

*"This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provided reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense."*

WARNING — Changes or modifications not expressly approved by Norsat International could void the user's authority to operate the equipment.

WARNING — FCC RF EXPOSURE INFORMATION

To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 7.5 meters or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance is not recommended.

WARNING

FCC FREQUENCY COORDINATION AS PER FCC 25.203(C), 25.251 AND 101.103

To satisfy FCC frequency coordination requirements, the user must ensure that they co-ordinate proposed frequency and power usage with other terrestrial and satellite users prior to transmission.

WARNING

MICROWAVE RADIATION: HAZARDS CAUSED BY ELECTROMAGNETIC FIELDS

When in operation, i.e., power on, the area directly in front of the antenna reflector must be considered an Area of Restricted Occupancy.

Limit human exposure time to this area when the equipment is in operation.

Never place any part of the body between the antenna reflector and the antenna feed horn assembly, or in line with the direction of the antenna transmission path when the Norsat NewsLink is in operation.

Locate the terminal as far as practical from ungrounded metal.

CAUTION

GROUNDING

When used within urban areas, it is suggested that the Norsat NewsLink be earthed via a grounding elecrode in strict accordance with National and Local electrical codes.

Wherever possible, operate the Norsat NewsLink with the grounding conductor connected.

WARNING

HIGH VOLTAGE AND HIGH CURRENT POWER PRESENT

During periods of rain or strong wind, as well as in wet conditions, be especially attentive to the connectors and power cords of the equipment. Be on the look out for any electrical dangers caused by the equipment power coming in contact with water. Disconnect the equipment from the power source prior to moving it out of danger spots.

Immediately disconnect the equipment from the power source when unit power malfunction is suspected.

CHAPTER 2

# Norsat ODU Overview

The Norsat Outdoor Unit (ODU) is a portable antenna/RF assembly, that when coupled with an appropriate IDU, allows transmission of signals to a satellite and reception of signals from the satellite. Its design allows it to be carried by two people, with an in field deployment and setup time by a non-experts of less than 15 minutes.

## Features

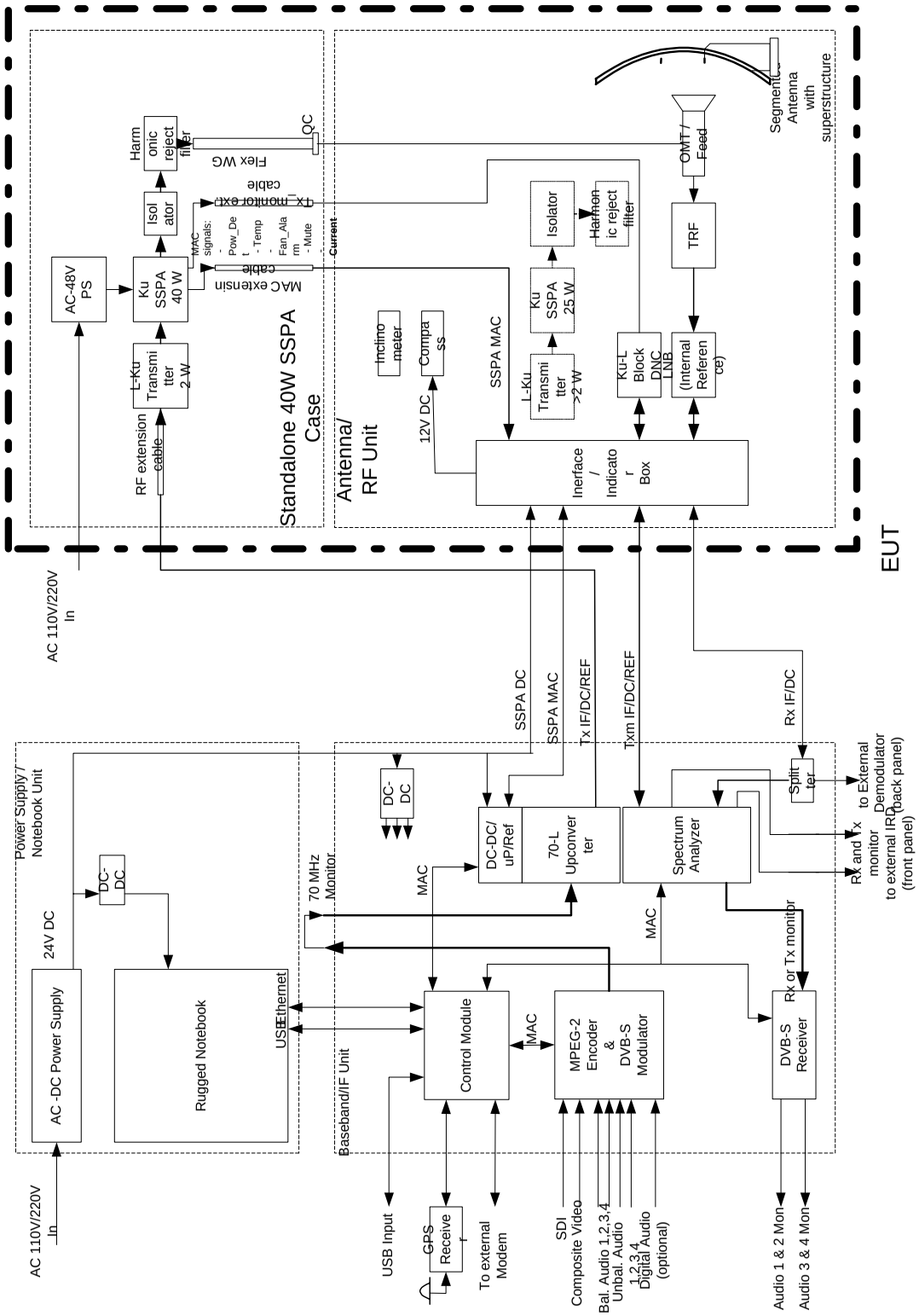
The Norsat ODU:

- Allows for quick on-location arrival and setup time
- Provides great flexibility to the on-site team as to the location of where the system can be operated due to its small size
- Allows for quick transport due to its portability, thus enabling teams to easily cover small live international events or reach a location that is typically not considered by conventional flyaway operations

## System Operation

A block diagram of the Norsat NewsLink is given in Figure 1.

**FIGURE 1** **Norsat ODU Block Diagram**



The Norsat ODU is enclosed in three cases; the RF Unit case (Model 3300-RF), Antenna Unit case (Model 3200-ANT), and Accessories case(Model 3200-AC). Once the team is on location, the antenna is removed from the case and assembled. After the antenna is assembled, it is connected to an appropriate IDU. The Norsat ODU is now ready for operation.

The antenna must be aligned to the proper elevation, azimuth and polarization for the desired satellite transponder. The polarization is set using the indicator located on the feed assembly. A compass located on the base of the antenna indicates the current azimuth, and an inclinometer located on the back of the dish indicates the current elevation. The azimuth and elevation values are set to the values calculated based on the satellite and terminal location.

The ODU has the capability to display a received signal strength if supplied by the IDU. If outfitted the user can watch the signal strength meter while the antenna is fine tuned to obtain an optimal signal strength.

**NOTE**

Once the ODU is properly aligned and the IDU parameters are set, the satellite operator is called to obtain approval for transmission. The user indicates to the satellite operator the selected satellite and transponder (frequency and polarization) they wish to transmit on. When authorization is given by the satellite operator, the team brings up a *continuous wave* (CW) signal at the requested power setting. This setting will be adjusted to the proper levels as indicated by the satellite operator. The polarization will then be checked using a cross-pol signal. The satellite operator will then request that the user turns modulation ON at low power. The power level is gradually increased until the maximum power level is reached. Once properly set, the satellite operator will give the team authorization to begin news transmission.

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CHAPTER 3

# Norsat Model 3300 ODU Description

The ODU is comprised of the following functional components:

- Antenna
- Transceiver
- Peripherals

A diagram of the ODU cases are given in the next section, followed by descriptions and specifications for each of the above listed components.

## ODU Cases

The ODU unit is contained in three cases: the RF Unit Case, The Antenna Unit Case and the Accessory Case. Figure 2 shows the disassembled antenna components when stored, and Figure 3 shows the assembled antenna.

The cases that house the Norsat ODU units are weatherproof, and there should be no water penetration when all winglocks are properly secured.

The cases will provide shock and vibration protection during storage, transport. However, care should be taken when handling the cases in consideration of the enclosed electronic equipment. .

The cases are equipped with a pressure relief valve that equalizes the pressure inside and outside the case. The pressure relief valve is located in the lid of each case. This relief is provided automatically should the pressure difference become too large, thus preventing the case from exploding due to extreme differences in atmospheric pressure. Alternatively, the case may be under a vacuum and hard to open. The valve can also be depressed by the user to manually equalize the pressure.

The RF Unit Case contains the following components:

SSPA

- Transmitter
- AC-DC Power Supply
- IFL Extension Cable assembly
- Feed Support
- Flexible Waveguide

The Antenna Unit Case contains the following components assembled into one piece:

- Antenna base petal
- Ku-L downconverter
- Interface Indicator unit
- Antenna tripod base
- Antenna mounting superstructure
- Compass
- Inclinometer

The Accessory Case contains the following:

Upper feed support arm with feed, OMT, TRF and LNB

- Feed support for 25W system
- Flexible waveguide
- Long elevation jack screw
- Short elevation jack screw
- LNB (quantity 2)
- Hardware spares
- Tripod legs (quantity 3)
- Antenna segments (quantity 3)
- Antenna segment storage bag
- 10 m IFL cable
- AC power cord

**FIGURE 2**

**ODU Stored**

**Upper Left: Antenna Unit case, Upper Right: Accessories case, Bottom: RF Unit.**

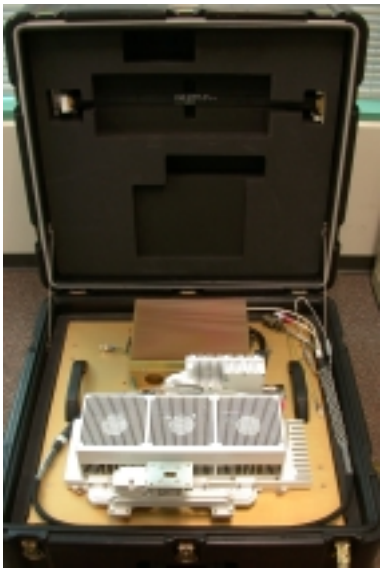


**FIGURE 3** **ODU Deployed**


## ODU Interfaces

The Norsat ODU has the following interfaces:

- Transmit IF
- Receive IF
- Transmit Monitor IF
- SSPA Control and Monitor
- AC Power

### Transmit IF (Tx)

The Transmit IF (Tx) connector is a 50 ohm N-type female connector, which is colour coded red. The signals supplied on this interface are:

Transmit IF (950 and 1450 MHz): the signal to be upconverted, amplified and transmitted to the satellite. This signal may be either a continuous wave (CW) or a modulated signal.

10 MHz reference: provides a reference signal for the Transmitter/Upconverter.

24 V DC: supplied to the Transmitter/Upconverter.

NOTE

The transmitter that is mounted on the Transmitter Base Plate requires the 10 MHz signal in order to operate.

### Receive IF (Rx)

The Receive IF (Rx) connector is a 50 ohm N-type female connector, which is colour coded green. The signals supplied on this interface are:

Receive IF: the received signal amplified and downconverted by the LNB.

24 VDC: supplied to the LNB.

NOTE

This interface does not supply a 10 MHz signal.

This cable is a 50 ohm cable rather than the usual 75 ohm cable for receive systems. The LNB has a 75 ohm connection, however, the impedance is changed in the Interface/Indicator unit.

### Transmit Monitor In (Tx Monitor)

The Transmit Monitor In (Tx Monitor) connector is a 50 ohm N-type female connector, which is colour coded blue. The signals supplied on this interface are:

Transmit Monitor IF: a downconverted sample of the transmitted signal; the transmitted signal is coupled and downconverted to L-band (950-1450 MHz).

10 MHz reference: supplied by the Baseband/IF unit to the Downconverter Module to lock the local oscillators used in the downconversion.

24 V DC: supplied to the Ku-L downconverter.

### SSPA Control and Monitor

The SSPA Control and Monitor connector is a multi-pin amphenol female connector. The signals supplied on this interface are:

SSPA Mute Control: allows the SSPA to be turned off by the IDU.

SSPA Temperature Sensor Reading: provides an indication of the SSPA temperature.

SSPA Power Detector Reading: provides an indication of the SSPA transmitted power.

Received Signal Strength Indication: provides an indication of the received signal strength. The receive signal strength is measured in the IDU and is displayed at the ODU. This Received Signal Strength is provided to the Antenna/RF unit for display via the Receive Signal Strength Indication signal.

Ground: ties the chassis of the IDU and ODU together.

### AC Power

AC Mains supply, 120240VAC, 50/60 Hz

## ODU Functionality

## Antenna

The antenna consists of the parabolic reflector, feed horn, OMT, flex waveguides, feed support with built in rigid waveguide and filters and mechanical support structure. The mechanical support structure positions and points the antenna reflector in order to aim the antenna beam at the required satellite.

## Transceiver

The Transceiver consists of block upconverter, a SSPA and a low-noise block (LNB) downconverter. The block upconverter converts the incoming L-band (950-1450 MHz) signal to Ku-band (14 -14.5 GHz). The LO in the Upconverter ios 15.45 GHz. That signal is then amplified by the SSPA, and fed through the antenna for transmission to the satellite. The upconverter/transmitter and SSPA are mounted on an aluminium baseplate and connected to the antenna assembly via waveguide and the IFL Extension cable

The LNB amplifies and then down-converts the down-linked Ku-band signal to an L-band signal. The ODU comes with a set of three LNBs for worldwide coverage. For instructions on switching between LNBs, refer to “Switching the LNB” on page 98.

Ku-band signal range for each of the LNBs provided with the Norsat NewsLink:

- A: 11.7 - 12.2 GHz (North America)
- B: 12.25 - 12.75 GHz (Austrailia/Asia)
- C: 10.95 - 11.7 GHz (Europe)

Corresponding L-band signal range for each of the LNBs provided with the Norsat NewsLink:

- A: 0.95 - 1.45 GHz
- B: 0.95 - 1.45 GHz
- C: 0.95 - 1.7 GHz

NOTE

The upconverter inverts the L-band Transmit IF signal. For example a Transmit IF signal of 1050 MHz is upconverted to 14.40 GHz. In addition the signal spectrum is inverted so the transmitting modulator should be set to Inverting

When used with a Norsat IDU spectral inversion is transparent to the user.

## Peripherals

The peripherals aid in antenna pointing and include the following:

- Compass
- Inclinometer
- Level
- Interface/Indicator Unit
- Ku-L Block Down-converter

## Compass

The fluxgate compass has a digital display with an accuracy of

degree. The compass is mounted on the base of the antenna in order to accurately indicate the azimuth of the antenna beam. The compass is powered by 12 V supplied from the Interface Indicator Unit. It is connected to the Interface Indicator unit by a flying lead with a multi-pin connector.

As with all fluxgate compasses, best performance occurs when the compass is level and there is no ferrous metal objects nearby. To compensate for both hard and soft magnetic interference, the compass should be calibrated. The compass is calibrated at the factory, however, it is beneficial to re-calibrate it at new locations or if the magnetic environment/interface changes. Refer to “Compass Calibration” on page 97 for instructions on re-calibration.

## Inclinometer

The inclinometer has a digital display with an accuracy better than 0.5 degrees and is powered by a standard 9 V battery. The inclinometer is mounted on the mechanical support of the antenna, located on the right hand side of the RF back plate, in order to accurately indicate the elevation of the antenna beam. The antenna has an offset angle of 18.9 degrees, which is pre-programmed into the inclinometer so that the angle indicated is the elevation angle of the antenna boresight.

Only the top button of the inclinometer should be used. The top button has the following functions:

- First press turns the inclinometer ON
- Pressing the button again for less than three seconds turns on the light; when the light is on, the inclinometer holds the last measurement
- Pressing the button again for less than three seconds turns off the light
- Pressing and holding the button for more than three seconds turns off the inclinometer

The inclinometer is calibrated at the factory. The mechanical variation is calibrated out at the factory.

NOTE

The angular offset between the aluminum backplate of the antenna and the antenna boresight is 8.6 degrees. Thus, if the antenna is adjusted so that the aluminum backplate is perfectly vertical, a normal inclinometer will read 90 degrees. In this position, the antenna boresight is 10.3 degrees above the horizon.

## Level

The spirit bulls-eye level is mounted on the antenna base in order to accurately indicate how level the support base is. The level is 1.250 inches in diameter, filled with clear mineral spirits. The mounting case is brass with a black finish. The sensitivity per 0.1 inch is 45 minutes, with a tolerance of ±10%.

## Interface/Indicator Unit

The Interface/Indicator contains an LED which becomes illuminated when the transmitter is ON. A three character display indicates the received power as specified by the IDU.

**Ku-L Block Downconverter**

Converts the Ku-band transmit signal, received from the SSPA monitor port, to transmit monitoring L-band (950-1450 MHz) signal.

NOTE

The Ku-L Block Downcinverter is non-inverting. For example a transmit monitor signal at 14.1 GHz is downconverted to 1050 MHz

CHAPTER 4

# Norsat MODEL 3300 ODU Deployment

WARNING

**FCC RF EXPOSURE INFORMATION**

To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of **7.5 meters** or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance is not recommended.

WARNING

**FCC Frequency Coordination as Per FCC 25.203c and 101.103**

To satisfy FCC frequency co-ordination requirements, the user must ensure that they co-ordinate proposed frequency and power usage with other terrestrial and satellite users prior to transmission.

IMPORTANT

Prior to operation of this equipment, proper authorization and/or licensing by relevant Authorities is required.

IMPORTANT

Prior to transmission of radiated signals authorization from the satellite operator is required.

## Deploying the ODU

The following steps describe the procedure for opening the case and assembling the antenna. Figure 4 shows the assembled ODU.

**FIGURE 4** **Assembled ODU**


## Opening the Travel Cases

1. Position the travel cases such that the arrow label on the case points upward.
2. Press the button in the center of the pressure-equalization valve until the airflow through the valve ceases.

**CAUTION**

This valve must be manually pressed in order to equalize the pressure inside the case before opening the case. Failure to do so may result in injury to the user, due to pressurization differences forcing the case open when the case latches are unlocked. Alternatively, the case may be under a vacuum and hard to open.

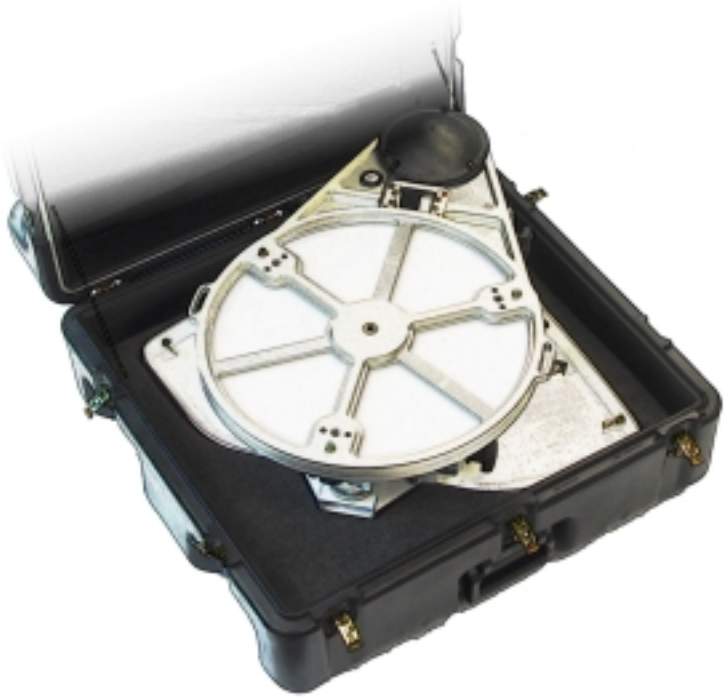
3. Unfasten the seven latches keeping the case lid shut:
    - Lift the winglever and turn it counter-clockwise.
    - Fold in the winglever until it is once again flush with the latch mechanism.

## Deploying the Antenna

This section details the procedure for assembling the components of the antenna.

4. The Antenna Unit case, Model 3300-ANT, contains the base of the antenna; refer to Figure 5.

**FIGURE 5** **Antenna Unit Case (Model 3300-ANT)**



**5.** The Accessories case, Model 3300-AC, contains the remaining components of the antenna except the feed support used with the 40W SSPA Unit; refer to Figure 6. The top layer contains the legs, IFL cable and power cord. The middle layer consists of the storage bag that contains the remaining three reflector segments of the antenna. The bottom layer contains the waveguide, feed assembly, feed arm, elevation jack screws and LNBs.

NOTE

The Accessory case may contain a feed support to be used with the 16W or 25W Newslink or SecureLink systems. These systems have the SSPA mounted on the back of the antenna and the waveguide port at the end of the feed arm.

The 40W Transmission Kit requires a waveguide port on the side of the feed arm. This feed arm is contained in the RF Unit Case (Model 3300-RF), under the SSPA baseplate.

**FIGURE 6** **Accessories Case (Model 3300-AC)**

6. Remove the IFL cable and Power cord.

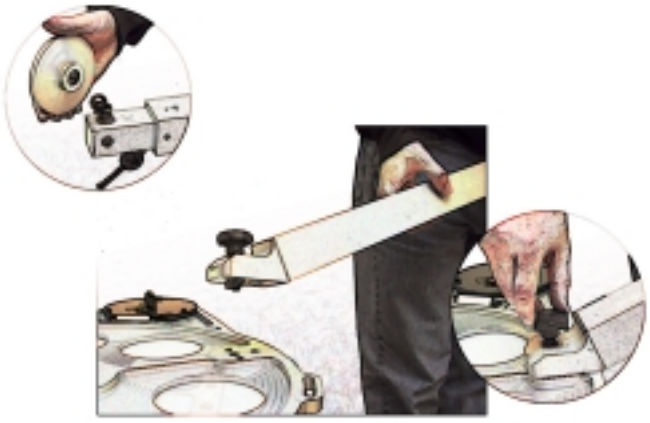
**FIGURE 7** **Tripod Legs and Feet**

**Tripod Legs**

7. Remove the three tripod legs and feet; refer to Figure 7.
8. Insert the foot support rod into the foot; refer to Figure 9.
9. With the support base remaining in the case, attach each of the three tripod legs to the support base; refer to Figure 8:
    i. Slip the two pins at the top of the leg into the guide slots on the support base; refer to Figure 9.
    ii. Once in place, turn the hand wheel clockwise, until tight, to secure; refer to Figure 9.
10. Remove the support base, with legs attached, from the case; refer to Figure 8.

**FIGURE 8** **Attaching Tripod Legs to Support Base**

**FIGURE 9** **Securing Tripod Legs to Support Base**



**Antenna Segment Storage Bag**

11. Remove the storage bag containing the antenna segments.

**FIGURE 10** **Elevation Jack Screw, Quick Adjust Collars and Elevation Fastening Collars**

### Elevation Jack Screw

12. Locate the following; refer to Figure 10:
    - Elevation jack screw: quantity 2 of different lengths; select the length appropriate for the required elevation.
    - Quick Adjust Collars: quantity 2
    - Elevation fastening collars: quantity 2
13. Remove the two elevation fastening collars and one quick adjust collar from the elevation jack screw.
14. Slide the first quick adjust collar onto the elevation jack screw to the required position, approximately 1/3” from the bottom, by depressing button.
15. Insert the elevation jack screw through the elevation base support hole, from the underside of the base; refer to Figure 11.

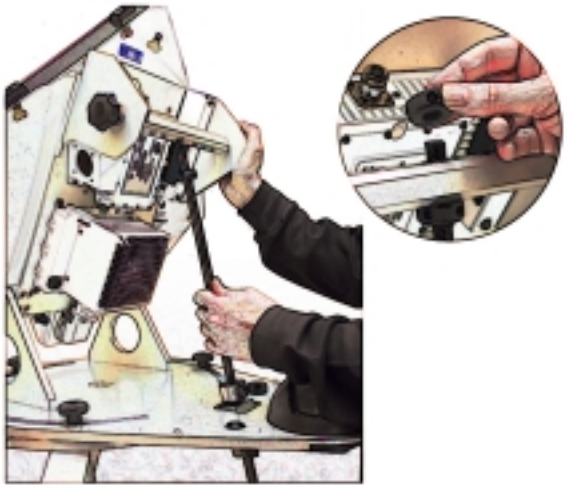
**FIGURE 11** **Elevation Base Support Hole**

16. Slide the second quick adjust collar onto the elevation jack screw to required position by depressing the button; refer to Figure 12.

**FIGURE 12** **Elevation Jack Screw Inserted into Support Base**

17. Thread one fastening collar on the elevation jack screw approximately 2 inches.
18. Slide the elevation jack screw into the dish elevation support hole; refer to Figure 13

FIGURE 13 **Elevation Screw Inserted into Dish Elevation Support Hole**



**NOTE** Figure 13shows a 25 W SSPA. The Model 3300 ODU may have

a 25W SSPA mounted on the back of the reflector if the 40W ODU was an upgrade for an existing system;

19. Thread the second fastening collar to the elevation jack screw, and tighten both collars to block to lock in place.

**Parabolic Reflector**

The reflector is divided into four segments that each comprise a quarter of the dish. One reflector segment is permanently fastened to the support base, leaving three reflector segments to be assembled.

20. Remove the three unsecured segments from the antenna segment storage bag.
21. Locate the segment with the A label, and align it with the A label on the permanently secured segment; refer to Figure 14
22. Insert the pins into the guide holes and fasten the cam locks by turning them clockwise, to secure the segment; refer to Figure 14 and Figure 15.

**FIGURE 14** **Guide Holes and Cam Locks**


23. Align the B label on each of the remaining segments; refer to Figure 15.
24. Secure the two segments together by inserting the pins into the guide holes, then fasten the cam locks by turning them clockwise.
25. Align this piece with the segments already fastened to the support base; refer to Figure 15.
26. Secure the piece by inserting the pins into the guide holes and fastening the cam locks by turning them clockwise.

FIGURE 15 **Assembling Antenna Segments**

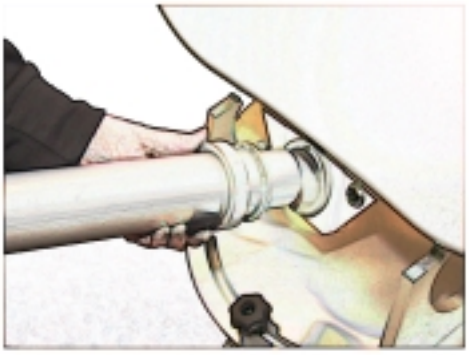
**Feed Support**

27. The Feed Supporti is stored under the SSPA Baseplate in the SSPA Unit Case.
28. Close and latch all seven winglevers on the Antenna Unit Case. This case will be the base of the SSPA Baseplate.
29. Insure the SSPA Unit case is oriented so the arrow is up. Presss the pressure relief valve and open the case by undoing the seven wingleavers.
30. Lift out the SSPA Baseplate and place it on top of the Antenna Unit Case
31. Locate the Feed Support; refer to Figure 16

FIGURE 16 **Feed Support**

32. Insert the feed support into the socket located at the bottom of the dish. The socket contains a tab that corresponds to a flat machined side on the feed arm; refer to Figure 17.

**FIGURE 17** **Feed Support Assembly**



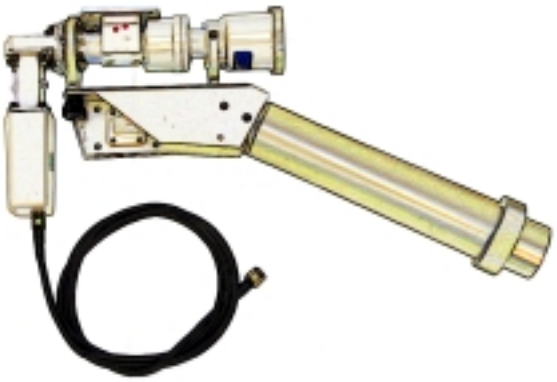
33. Spin collar until secured.

**NOTE** Be careful to not over-tighten the collar as this could make it difficult to remove.

### Feed Assembly

34. Locate the Feed Assembly; refer to Figure 18.

**FIGURE 18** **Feed Assembly**



35. Insert the feed assembly into the feed support socket. The socket contains a tab that corresponds to a flat machined side on the feed assembly; refer to Figure 19.

**FIGURE 19** **Feed Assembly Attachment**

36. Fasten the collar until secure.

**NOTE** Be careful to not overtighten the collar as this could make it difficult to remove.

### Feed Assembly Flexible Waveguide

37. Locate the flexible waveguide; refer to Figure 20. This flexible Waveguide is located in the Accessory case.

**FIGURE 20** **Feed Assembly Flexible Waveguide**

38. Insert one side of the flexible waveguide into the waveguide flange located in the feed assembly, and secure with the hand-tighten screws; refer to Figure 21.

**FIGURE 21** **Feed Assembly Flexible Waveguide Attachment Location.**

39. Turn the knobs clockwise to secure.
40. Insert the other end of the flexible waveguide into the OMT located in the feed assembly and secure with the hand-tighten screws.

### LNB Cable

41. The LNB cable will be attached to the LNB, and coiled with the feed assembly; refer to Figure 22

**FIGURE 22** **Left: LNB Cable; Right: LNB Cable Connection on LNB**

42. Insert the cable to the connector on the Interface/Indicator unit; refer to Figure 23.

**FIGURE 23** **LNB Cable Connection on Interface/Indicator Unit**

43. Secure cable to the feed assembly with nylon clips.
44. Secure cable to the feed arm with nylon clips.

**Level Antenna Base**

45. Using the knobs on each foot, adjust the height of the support legs until the bubble of the level indicator is centered in the target; refer to Figure 24.

**NOTE** The telescopic legs (optional) have two positions: normal and extended; i.e. they cannot be adjusted to lengths in between the minimum and maximum lengths.

**FIGURE 24** **Adjust the Height of Leg and Adjust the Length of the Leg (optional)**

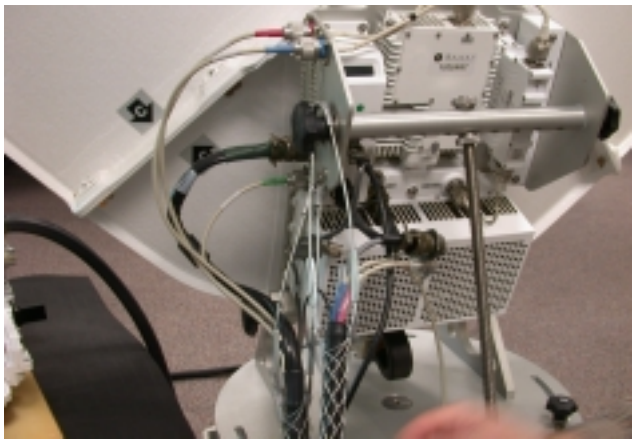
### Connecting the Transmitter

46. Position the SSPA Baseplate located on top of the Antenna Case such that waveguide output flange of the SSPA is located near the waveguide input flange of the feed support. Refer to Figure 25.

**FIGURE 25** **Position of SSPA Baseplate and Antenna**


47. Hang the strain relief of the IFL Extension Cable over the handwheel as shown in Figure X6

**FIGURE 26** **Strain Relief for IFL Extension Cable**



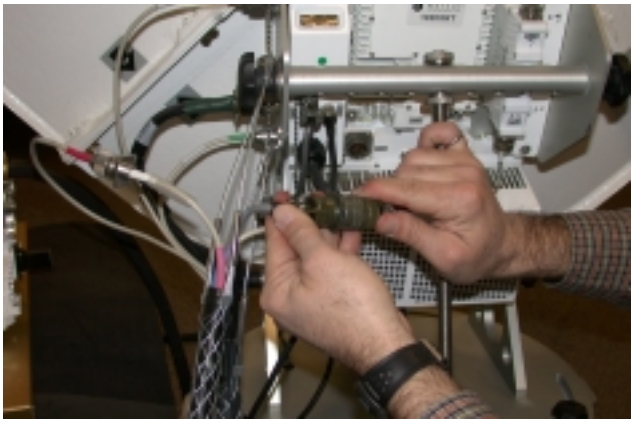
**Connecting the Control and Monitor Cable**

If the antenna is part of a NewsLink or SecureLink the SSPA control and Monitor cable will run between the IIBox and the SSPA mounted on the back of the antenna.

48. If this is the case then disconnect the Control and Monitor cable from the SSPA

**49.** Connect the SSPA Control and Monitor pigtail from the IIBox to the IFL Extension cable as shown in Figure 27.

**FIGURE 27** **Connection of SSPA Control and Monitor**

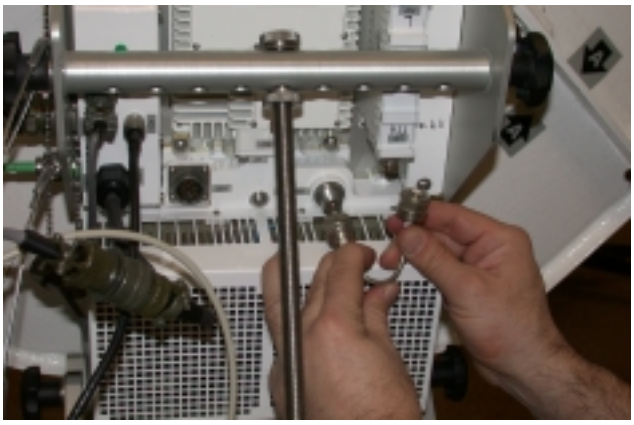


**Transmit Monitor Cable**

If the antenna is part of a NewsLink or SecureLink then the transmit monitor output of the SSPA will be connected to the Ku-L DNC.

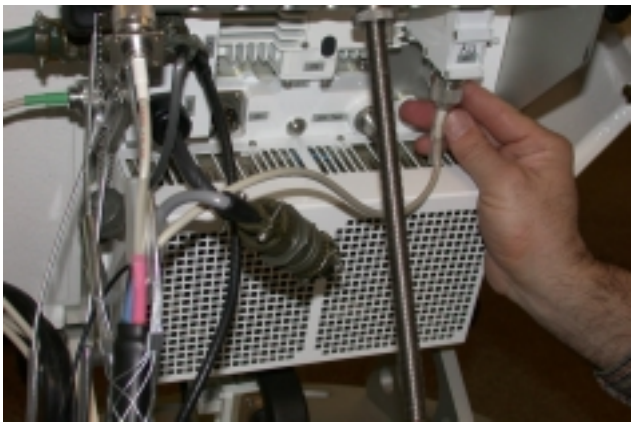
50. Disconnect the semi-rigid co-axial cable that connects the SSPA and the Ku-L Downconverter. Refer to Figure 28.

**FIGURE 28** **Disconnect Transmit Monitor Cable**



51. Connect the blue coded co-axial cable of the IFL extension to the Ku-L Downconverter. Refer to Figure 29

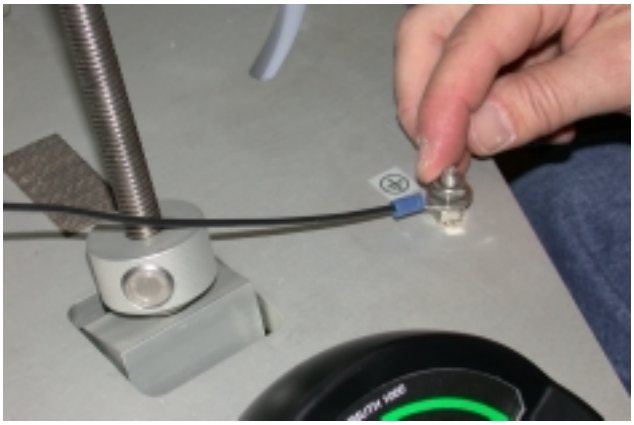
**FIGURE 29** **Connection of Transmit Monitor Cable**



**Ground Connection**

52. Connect the ground wire of the IFL Extension to the ground lug on the Antenna Az/El plate. Refer to Figure 30

**FIGURE 30** **Ground Connection**



**Waveguide Connection**

53. Locate the SSPA waveguide. This waveguide is stored in the lid of

the SSAPA Unit Case

54. Attach the waveguide end with the right angle adapter to the quick release flange of the SSPA
55. Attach the other end of the waveguide to the feed support waveguide flange. Refer to Figure 31.

**FIGURE 31** **SSPA Waveguide Interconnection**

# ODU and IDU Interconnections

The following steps describe the procedure for interconnecting the ODU and IDU units.

**CAUTION** All connections/disconnections should be made while IDU and ODU power is off.

## Interfacility Link

The IDU and ODU unit are connected via a multi-cable assembly called the interfacility link (IFL). .

**NOTE** Norsat offers either a 10m IFL or a 30m IFL.

When used with a Norsat IDU the IFL length must be selected in the Systems Settings > RF Unit screen

**Norsat IFL Cable Summary**

The IFL is comprised of five individually shielded cables encased in a braided sheath:

- Transmit IF
- Receive IF
- Transmit Monitor IF
- SSPA Power
- Monitor and Control

The three IF cables are 50 Ohm co-axial cables with N-male connectors on each end. In addition to the L-band IF signals, these cables also carry a 24 V DC, and the Transmit cables carry a 10 MHz reference.

While the SSPA power cable is provided as part of the IFL , power for the SSPA is provided by the ODU Power Supply.

**NOTE** The Rx IF cable does not carry a 10 MHz reference signal.

Each of the co-axial cables is colour coded:

- Transmit IF: Red
- Receive IF: Green
- Transmit Monitor: Blue

**CAUTION** All co-axial cables in the IFL carry 24 V DC.

The Monitor and Control cable contains the following control signals:

- SSPA Mute
- Temperature Sensor Reading
- SSPA Power Detector Reading
- SSPA Fan Alarm
- Receive Signal Strength

The SSPA Power and the Monitor and Control cables are terminated in a common multi-pin connector. The IDU side uses a male connector and the ODU side uses a female connector. The cable ends are labeled Antenna and Baseband accordingly. Each end of the cable has a strain relief.

## Interconnection

The following steps describe the procedure for interconnecting the Baseband/IF unit and Antenna/RF unit.

1. Assemble the ODU and IDU.
2. Locate the IFL cable; refer to Figure 32.

FIGURE 32 **IFL Cable**

**ODU Connections**

3. Attach the strain relief cable to the hook on the Antenna superstructure.
4. Attach the Red co-axial cable to the coded co-axial cable if the IFL extension.
5. Attach the Blue co-axial cable to the N-connector marked Tx Monitor and colour coded blue.
6. Attach the Green co-axial cable to the N-connector marked Rx and colour coded green.
7. Attach the multi-pin connector to the connector marked DC/Control.

**IDU Connections**

Refer to the IDU Operators Manual (for example Norsat NewsLink Operator's Manual) for IDU connections.

## Starting ODU

**AC Power Cordset Connection**

1. Locate the AC cordset. It is contained in the SSPA Unit Case.
2. Connect the screw type connector to the power supply on the SSPA baseplate.
3. When ready, connect the other end to the AC mains.

NOTE

The SSPA baseplate does not have an ON/OFF switch. Once the cord set is connected to the mains, power is apllied to the power supply and SSPA. The SSPA fans will be powered on, but power is not applied to the SSPA amplifier circuits.

The SSPA is controlled by the IDU. RF energy is not radiated until the SSPA and transmitter are commanded to be the IDU.

## Antenna Alignment

This section describes the steps required align the antenna to the desired satellite. The following basic information is required before alignment can begin:

- Satellite to be used
- Transmit frequency allocation
- Transmit polarization
- Receive beacon or other known carrier frequency
- Spectral signature from satellite
- ODU location .

This information is used to calculate the azimuth and elevation angles for the ODU and the polarization for the feed assembly.

**Setting the Antenna Azimuth**

1. Move the entire tripod to point in the direction of the satellite.
2. Level the Tripod before proceeding with antenna pointing. If required, place sandbags or weights on the tripod feet to stabilize the antenna.
3. +/-30 degrees of fine azimuth adjustment is provided.. This is done by loosening the three azimuth plate hand wheels/levers and rotating the reflector relative to the legs.
4. The antenna should be rotated until the compass bearing matchs the AZIMUTH (degrees) calculated. Refer to Figure 33.

**NOTE**

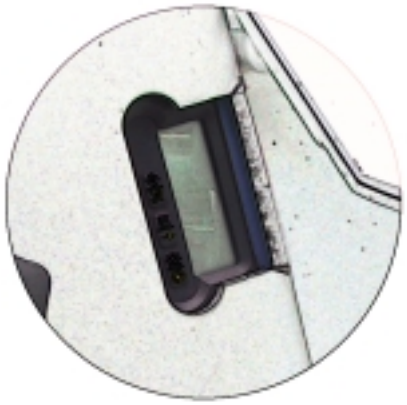
Azimuth calculation should be a magnetic bearing

FIGURE 33 **Compass**

### Setting the Antenna Elevation

5. Coarse adjustment is made by sliding the quick adjust collar to the approximate position.
6. Fine adjustment is done by turning the collar to engage the threaded rod.
7. The elevation should be adjusted until the inclinometer value matches the ELEVATION (degrees) calculated. Refer to Figure 35.

FIGURE 34 **Inclinometer**



### Setting the Antenna Polarization

8. Unlock the Feed Rotation by loosening the thumb screw under the Feed Assembly
9. Align the dot on the feed bracket with the calcuilated angle and then re-tighten the thumb screw. Refer to Figure 36.

FIGURE 36 **Polarization Adjustment**


**Signal Strength Meter**

The ODU is fitted with an LED display that can display the received signal strength . The signal strength is measured in the IDU and supplied to the ODU via the IFL. Refer to Figure 37

**FIGURE 37** **Signal Strength Meter**

CHAPTER 5

# Storing the Norsat Model 3300 ODU

**CAUTION** All connections/disconnections should be made while the power is off.

The following procedures describe the steps required to disassemble and store the Norsat Model 3300 ODU

## Powering Down

1. Shut down the IDU as directed in the IDU manual..
2. Power down the ODU by disconnecting the AC cordset from the AC mains

## Disconnecting the IFL

The following steps describe the procedure for disconnecting the ODU and IDU and storing the interconnection cables.

**CAUTION** All connections/disconnections should be made while the power is off.

3. Disconnect the IFL cable from the IDU and ODU.
4. Disconnect the power cord from the ODU  Power supply.
5. Wrap up the IFL cable and power cord, and secure with the provided Velcro strap; refer to Figure 38.
6. The IFL cable is stored in thw Accessories case and the ODU AC cordset is stored in the RF Unit Case

**FIGURE 38** **Secured IFL Cable and Power Cord**

## Disconnection of RF Unit

7. Locate and open the RF Unit case
8. Disconnect the flexible waveguide connecting the RF Unit and the feed support.
9. Store the flexible waveguide in the lid of the RF Unit case

## Dismantle Antenna Assembly

10. Locate and open the Accessories case, model 3300-AC.

**FIGURE 39** **Accessories Case (Model 3300-AC): Bottom Layer.**

11. Disconnect the LNB cable from the connector on the Interface/Indicator unit.
12. Release the nylon clips, located on the Feed Arm and Feed Assembly that secure the LNB cable.
13. Turn the knobs counter-clockwise to disconnect the waveguide from the OMT and waveguide flange.
14. Place the waveguide in the allocated slot in the Accessories case.
15. To disconnect the Feed Assembly from the Feed Arm, unfasten the collar by turning it counter-clockwise.
16. Remove the Feed Assembly from the Feed Arm.
17. Place the the Feed Assembly in the allocated slot in the Accessories case.
18. To disconnect the Feed Arm from the antenna base, unfasten the collar by turning it counter-clockwise.
19. Remove the Feed Arm from the antenna base.
20. Place the Feed Arm in the allocated slot in the RF Unit case.

**FIGURE 40** **Disassembling the Antenna Segments**

21. For the antenna segments labelled with a B, unfasten the camlocks by turning them counter-clockwise; refer to Figure 40.
22. Remove the antenna segments labelled with a B; refer to Figure 62
23. Disassemble the antenna segments labelled with a B by turning the camlocks counter-clockwise; refer to Figure 40.
24. Remove the antenna segment labelled with an A by turning the camlocks counter-clockwise; refer to Figure 40
25. Remove the first fastening collar securing the elevation jack screw and then remove the elevation jack screw from the dish elevation axle hole.
26. Remove the second fastening collar and the first Quick Adjust Collar.
27. Remove the elevation jack screw from the support base.
28. Thread the Quick Adjust Collars and fastening collars back onto the elevation jack screw for storage.
29. Place the elevation jack screw in the allocated slot in the Accessories case.
30. Locate the Antenna Segment Storage Bag; refer to Figure 41

**FIGURE 41** **Antenna Segment Storage Bag**

31. Packing the antenna segments, refer to Figure 42
    i. Place the first segment into the Antenna Segment Storage Bag, and cover with one of the flaps attached to the bag.
    ii. Repeat for the second segment.
    iii. Repeat for the third segment, but with the panel rotated 180 degrees to that of the first two segments.

**FIGURE 42** **Packing the Antenna Segments**

32. Place antenna segments into the Antenna Segment Storage Bag.
33. Place the Antenna Segment Storage Bag into the Accessories case; refer to Figure 43

**FIGURE 43** **Accessories Case (Model 3300-AC): Middle Layer**

## Storage of RF Unit

34. Lift the RF Unit baseplate off the Antenna Case and place it in the cutout provided in the RF Unit case.

## Storage of Antenna Base

35. Locate and open the Antenna Unit case.
36. Invert the support base with legs attached into the RF and Antenna Unit case.

**FIGURE 44** **RF and Antenna Unit Case (Model 3300-ANT)**

### Accessories Case (Model 3300-AC): Top Layer

37. Remove each support leg by turning the knob counter-clockwise.
38. Place the legs in the allocated spots in the Accessories case; refer to Figure 67 .
39. Place the IFL cable and Power Cord in the allocated spot in the antenna component case; refer to Figure 45

**FIGURE 45** **Accessories Case (Model 3300-AC): Top Layer**

## Closing Transit Cases

40. For each case, close the case lid and secure the seven latches:
    i. Lift the winglever and turn it clockwise.
    ii. Fold in the winglever until it is once again flush with the latch mechanism.

CHAPTER 9

# Troubleshooting

This chapter provides troubleshooting scenarios, along with suggested solutions.

## General

1. Check all cable connections to ensure they are secure and correctly hooked up.
2. Check your external power source to ensure the source is stable.

## DC Power Indication

Listen for the fans on the SSPA. If the fans are running there is DC power applied to the unit. Transmission must be enabled by the IDU.

## Transmission Indication

The ODU has a red LED that indicates the system is transmitting:

i. If the red LED is ON, this indicates that the transmitter is ON.

ii. If the red LED is OFF, this indicates that the transmitter is OFF.

**FIGURE 46.** **Transmission Indicator.**

## Cable By-pass Procedures

Each of the three co-axial cables in the IFL are of identical cable types, 50 ohm Belden 9907 with N(m) connectors, and can be substituted for each other.

For alignment of the antenna, the GREEN marked Receive IF coaxial cable must be correctly connected as described earlier. However, the RED and BLUE marked coaxial cables need not be attached.

For transmission, the RED marked Transmit IF coaxial cable must be correctly connected as described in earlier. However, the GREEN and BLUE marked coaxial cables need not be attached.

The BLUE marked Transmit monitor coaxial cable is only required for the Local Loopback and for monitoring the transmit spectrum on the Spectrum Analyzer.

## Receive IF Cable By-pass

If the GREEN marked Receive IF coaxial cable is damaged, antenna alignment can be done by substituting the BLUE marked Transmit Monitor cable or the RED marked Transmit IF cable.

**CAUTION**

The cable interchange should be done with the power OFF as all cables carry 24 V DC.

1. Disconnect both ends of the GREEN marked Receive IF coaxial cable.
2. To replace with the:
   i. RED marked Transmit IF coaxial cable, connect it in place of the GREEN marked Receive IF coaxial cable.
   ii. BLUE marked Transmit Monitor coaxial cable, connect it in place of the GREEN marked Receive IF coaxial cable.
3. Ensure that both ends of the replacement cable are connected to the appropriate RX connectors on the Baseband IF and Antenna RF units.

**NOTE**

Cable disconnection may result in alarms.

# Appendix A

## Compass Calibration

To calibrate the compass, the Antenna must be rotated slowly for one complete turn; two turns on initial calibration.

**NOTE** To avoid tangling the IFL cable, before beginning compass calibration, wind the IFL cable around the Antenna as many times as the Antenna will be rotated during the calibration procedure.

The following steps describe the calibration procedure:

1. Set-up the ODU unit.
2. Connect the ODU unit to the IDU unit.
3. Power up the IDU unit.
4. Remove all three azimuth clamping handwheels/levers so that the top plate of the tripod rotates freely.
5. Put the antenna in the lowest elevation possible so that the jack screw clears the legs.

**NOTE** Verify this can be done, otherwise remove the jack screw.

6. The compass will be powered on. Note the initial bearing.

**NOTE** When the compass is first turned ON, it will go through a test sequence which lasts for approximately 4 seconds. Do not press any buttons during this time. If buttons are pressed, the compass must be turned OFF and then ON again.

7. Rotate the antenna through two complete revolutions. Each rotation should take at least two minutes; i.e. slow and steady.
8. When the rotations are complete, depress and hold both the MODE and SET buttons until CAL appears.
9. A three digit number (ABC) will appear which indicates the quality

of the calibration:

i. A: indicates the quality of the calibration, with 9 being highest, and 7 being the minimum acceptable level.

ii. B: indicates quality of magnetic location, with 9 being the highest and three or lower being very poor.

iii. C: indicates the number of calibrations completed.

10. To exit calibration mode, depress the MODE button briefly.

## Switching the LNB

The Norsat NewsLink comes with a set of three LNBs for worldwide coverage. The following steps describe the procedure for switching between LNBs.

1. In the bottom layer of the Accessories case, locate and remove the new type of LNB required.
2. From beneath one of the two LNBs in the Accessories Case, locate the plastic bag which contains spare LNB screws, O-rings and a M3 metric hex wrench.
3. Using the hex wrench, remove the four screws securing the current LNB to the Transmit Reject Filter (TRF), located at the end of the feed arm.

**NOTE** Set these four screws, complete with lock washers and flat washers, aside as they will be used to re-attach the replacement LNB.

4. Remove the O-ring from the newly dismounted LNB.

**NOTE** If there is any sign of damage to the O-ring, discard it and use one of the spare O-rings provided.

5. Using a soft tissue or a clean cloth, remove all dirt or dust particles on the O-ring and in the O-ring groove in the replacement LNB.
6. Press the O-ring into the O-ring groove in the replacement LNB.
7. Locate the four screws previously set aside. Check each one to ensure they have the lock washer against the head of the screw, and the flat washer below it.
8. Position the replacement LNB against the TRF, ensuring that the rectangular opening in the LNB is oriented in the same direction as that in the TRF.
9. Using the screws and the hex wrench, firmly tighten the LNB to the waveguide.
10. When finished, replace the hex wrench in the bag of spares and place into the empty LNB pocket in the Accessories case.
11. Press the dismounted LNB into the pocket on top of this bag to secure it in place.