A Guide to TracVision 4

technical manual

- **Installation**
- **Configuration**
- **Maintenance**

KVH TracVision® 4

TracVision 4 Technical Manual Addendum

(ECO #5959, 6138, 6166)

The following changes have been made to Revision F of the TracVision 4 Installation and Technical Manual (KVH Part Number 54-0150).

An additional 3.15-amp fuse has been added to the CPU Board to better protect the Antenna Unit's electronics.

3.1.1 Blown Fuse or Wiring

1. Blown Fuse – The Antenna Unit is equipped with **two fuses** mounted on its CPU Board. If **either of these fuses** has blown or been broken, the Antenna Unit will not operate. Refer to *Section 4.4, "PCB Removal and Replacement,"* for details on the fuse locations and how to access the CPU Board.

4.3 TracVision 4 Field Replaceable Units

Table 4-1 has been updated to show two fuses and the new part numbers for the RF Detector PCB and European LNB.

FRU	Part Number
Radome	02-0925-04
CPU	02-0992
RF Detector PCB	**02-1237**
Antenna Gyro Sensor	02-1035
Antenna Gyro Gasket	24-0139
Elevation Drive Motor Assembly	02-0994-02
Elevation Drive Belt	24-0105-104
LNB (European System)	**02-1278**
LNB (North American System)	02-0870
Data Cable	32-0619-50
PC Cable	32-0628-06

Table 4-1

TracVision 4 Field Replaceable Units

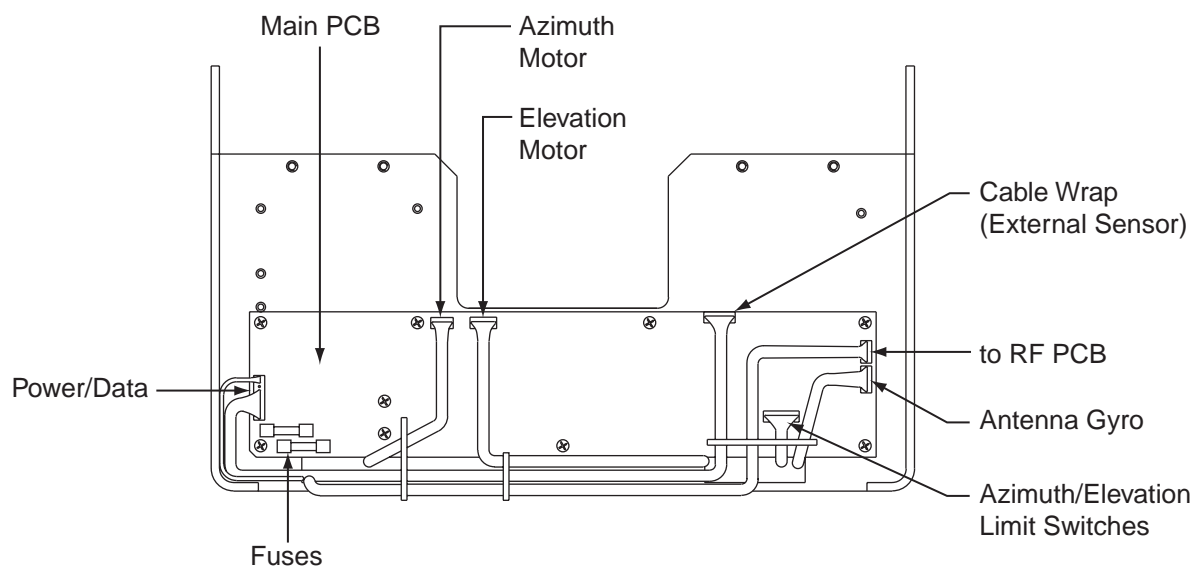| FRU	Part Number
Power Cable	32-0510-50
RF Cable	32-0417-50
IRD Ground Wire	32-0583-50
CPU Fuses	16-0017-3150

4.4   PCB Removal and Replacement

The printed circuit boards (PCBs) are protected by a cover fastened to the antenna support frame. The cover must be removed to gain access to the main power **fuses** and the PCB assemblies discussed below. Refer to Figure 4-2; remove (3) nuts and washers from the bottom flange and (4) screws, nuts, and washers from the upper flange. Remove the cover and set aside with the fasteners.

Figure 4-3 has been updated to show the additional fuse.

Figure 4-3

PCB Connector Locations (Rear View)

TracVision 4 Technical Manual Addendum

(ECO #5965, 5959)

The following changes have been made to Revision F of the TracVision 4 Installation and Technical Manual (KVH Part Number 54-0150).

An additional 3.15-amp fuse has been added to the CPU Board to better protect the Antenna Unit's electronics.

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4.3   TracVision 4 Field Replaceable Units

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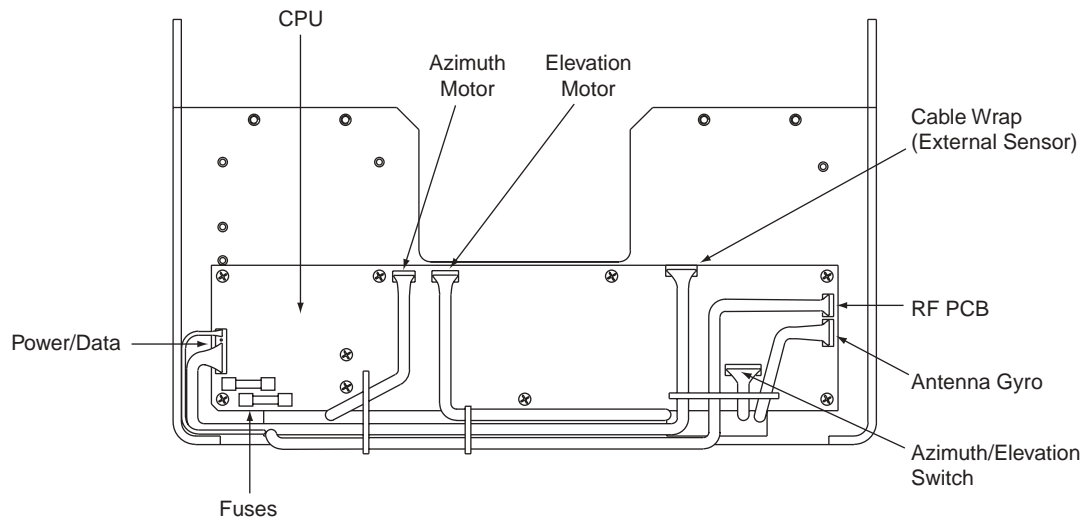| FRU	Part Number
Radome	02-0925-04
CPU	02-0992
RF Detector PCB	**02-1233**
Antenna Gyro Sensor	02-1035
Antenna Gyro Gasket	24-0139
Elevation Drive Motor Assembly	02-0994-02
Elevation Drive Belt	24-0105-104
LNB (European System)	02-0932
LNB (North American System)	02-0870
Data Cable	32-0619-50
PC Cable	32-0628-06

Table 4-1
TracVision 4 Field Replaceable Units

FRU	Part Number
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IRD Ground Wire	32-0583-50
CPU Fuses	16-0017-3150

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Figure 4-3 has been updated to show the additional fuse.

Figure 4-3
PCB Connector Locations
*(Rear View)*

TracVision 4 Technical Manual Addendum

(ECO #5641)

The following changes have been made to Revision F of the TracVision 4 Installation and Technical Manual (KVH Part Number 54-0150).

The azimuth shipping restraints have been changed to better protect the Antenna Unit from shipping damage.

2.2   Installing the Antenna Unit

9. Remove the foam elevation shipping restraint from the Antenna Unit.

10. Using a 10 mm wrench, remove the two azimuth shipping restraint bolts, washers, and spacers from the Antenna Unit, as shown in Figure 2-5.
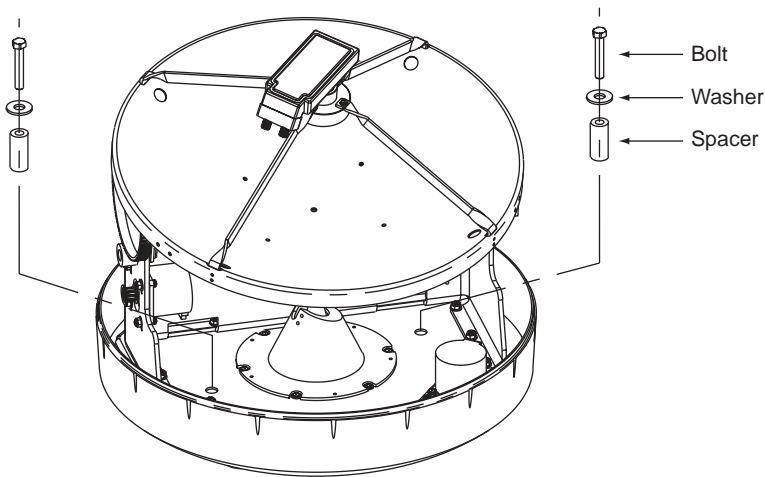
Figure 2-5
Azimuth Shipping Restraint Removal

The shipping restraints must be removed before power is applied. Save the restraints for reuse and be sure to install them whenever the Antenna Unit is moved from place to place. See Section 4.8, "Preparation for Shipment," *for instructions on preparing for shipment.*

4.8   Preparation for Shipment

If it is necessary to repack the Antenna Unit for shipment, the shipping restraints removed during installation must be replaced. Follow these steps to reinstall the restraints.

When rotating the azimuth mechanism by hand, go slowly! Hitting the mechanical stops with excessive force will damage the azimuth limit switch.

1. Rotate the azimuth mechanism slowly to find the limit switch stop. The front of the antenna should be facing the forward arrow.

2. Rotate the azimuth mechanism 180˚ in the opposite direction to ensure that the mechanism is not resting on the limit switch stop.

3. Insert the two azimuth shipping restraint bolts, washers, and spacers (removed during installation) into the rotating plate, as shown in Figure 4-11. Using a 10 mm wrench, secure the rotating plate to the metal base.

Figure 4-11
Azimuth Shipping Restraint Placement

Bolt
Washer
Spacer
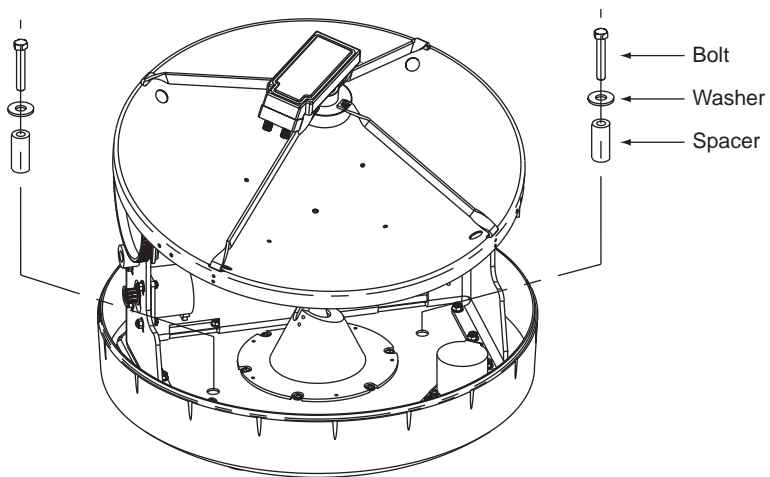
4. With the antenna reflector slightly elevated, slip the narrow end of the elevation shipping restraint beneath the lip of the reflector. Gently wedge the restraint inside the baseplate as shown in Figure 4-12.

Figure 4-12

Elevation Shipping Restraint Placement
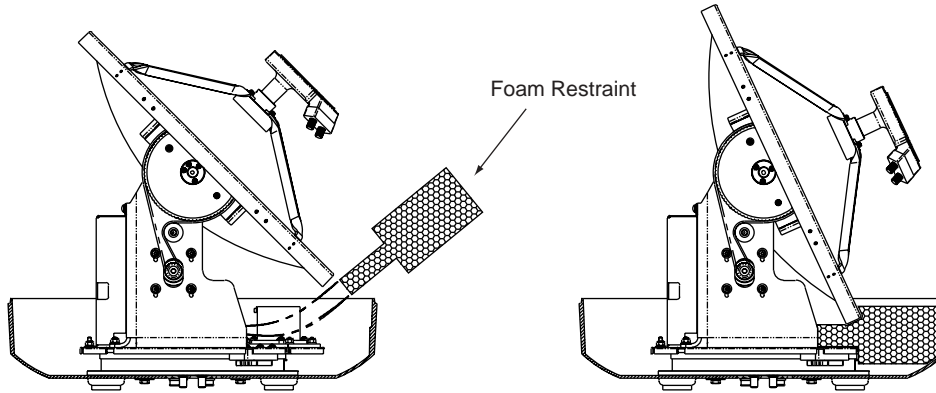
Foam Restraint

5. Pack the TracVision 4 unit in its original package.

6. As detailed in the warranty accompanying this product and printed on the last page of this manual, a Return Material Authorization (RMA) number is required prior to the return of the TracVision 4 system to KVH. Contact the KVH Technical Support Department at +1 401 847-3327 or via email at techs@kvh.com to obtain the RMA number. Please review your warranty to familiarize yourself with all requirements, liabilities, and policies.

TracVision 4 Installation and Technical Manual

This manual provides detailed instructions on the proper installation, use, and maintenance of the KVH TracVision 4 automatic satellite tracking system.

Throughout this manual, important information is marked for your attention by these icons:

A helpful tip that either directs you to a related area within the manual or offers suggestions on getting the highest quality out of your system.

An alert to important information regarding procedures, product specifications, or product use.

Information about installation, maintenance, troubleshooting, or other mechanical issues.

An electrical safety warning to help identify electrical issues that can be a hazard to either this KVH product or a user.

TracVision 4 Serial Number

This serial number will be required for all troubleshooting or service calls made regarding this product.

Direct questions, comments, or suggestions to:

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Internet: www.kvh.com	Internet: www.kvh.com

Click here to go to our state-of-the-art Customer Support web page...the fastest and easiest way to get all of your questions answered!

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KVH Part # 54-0150 Rev. F

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1 TracVision 4 System Overview

A complete satellite TV system, illustrated in Figure 1-1, includes the TracVision 4 connected to an integrated receiver/decoder (IRD) and a television set. A desktop or laptop computer is used to configure the system for satellite selection and conduct diagnostics. System specifications are provided in *Appendix A*.

TracVision 4 Antenna
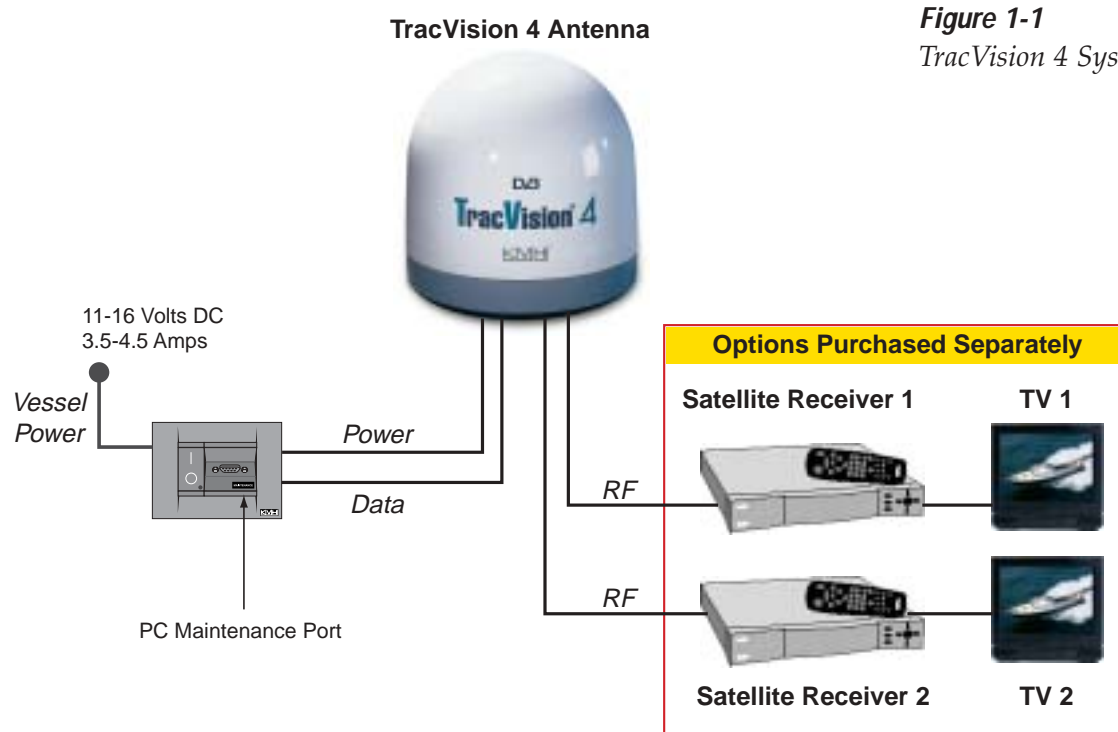
Figure 1-1
TracVision 4 System Configuration

11-16 Volts DC
3.5-4.5 Amps

Vessel Power

Power

Data

PC Maintenance Port

Options Purchased Separately

Satellite Receiver 1   **TV 1**

RF

RF

Satellite Receiver 2   **TV 2**

1.1 Materials Provided With TracVision 4 System

Table 1-1 lists the components and materials in the TracVision 4 shipping carton.

Table 1-1

TracVision 4 Packing List

Component	KVH Part No.
Antenna Unit	02-0989-01[†] 02-0989-02*
Installation Kitpack	72-0099
Data Cable	32-0619-50
PC Cable	32-0628-06
Power Cable	32-0510-50
RF Cable	32-0417-50
IRD Ground Wire	32-0583-50
Switchplate	02-1023
TracVision 4 Technical Manual	54-0150
TracVision 4 User's Guide	54-0150-01

[†]North American TracVision 4 systems only

*European TracVision 4 systems only

2 Installation

TracVision 4 is designed for simple installation and setup. Just follow these easy steps:

Step	Refer to Section...
1. Choose the hardware locations	2.1
2. Mount the Antenna Unit	2.2
3. Set the skew angle (Europe only)	2.2.1
4. Wire system components	2.3
5. Program the IRD (Europe only)	2.4
6. Install selected satellite pair	2.5.1
7. Load any user-selected satellites	2.5.2
8. Check out system	2.6

Table 2-1
Installation Process

Materials and Equipment Required for Installation

- Electric drill

- ⅜" (10 mm) drill bit and 3" (80 mm) hole saw

- Socket wrenches

- Flat tip and Phillips screwdrivers

- RG-6 (75 ohms) cable for a second RF signal cable (if necessary)

- Crimp tool (LRC #L3011B or equivalent)

- Light hammer; center punch; tape; scriber/pencil

- Terminal lug crimping tool; wire strippers

- A PC with terminal emulation software such as PROCOMM, Windows Terminal, or Windows 95/98 Hyperterminal

Plan the entire installation before proceeding! Take into account antenna unit placement, running cable distances between units, and accessibility to the equipment after installation. Cable lengths are detailed in Table 2-2.

KVH recommends the use of RG-6 (75 ohms) cable for RF wiring. Use of non-RG-6 (75 ohms) cables will result in degraded performance. The KVH warranty does not cover degraded performance due to improper wiring.

Below-decks Cable Lengths

The major considerations in locating the below-decks equipment are accessibility and cable lengths between units. Lengths of these cables are as follows:

Cable (Function)	Length
Data Cable (Switchplate to Antenna Unit)	50 ft (15 m)
RF Cable (Antenna to IRD)	50 ft (15 m)
Power Cable (Power to Antenna Unit)	50 ft (15 m)
IRD Ground Wire	50 ft (15 m)

2.1 Choosing the Best Location and Getting the Best Reception

- Since the TracVision antenna requires a clear view of the southern sky to receive satellite signals, the ideal antenna site has an unobstructed view of the horizon/satellite all around.

- Keep the antenna clear of any obstructions above decks. The antenna requires a 15º to 85º look angle to receive satellite signals.

Figure 2-1

Antenna Blockage
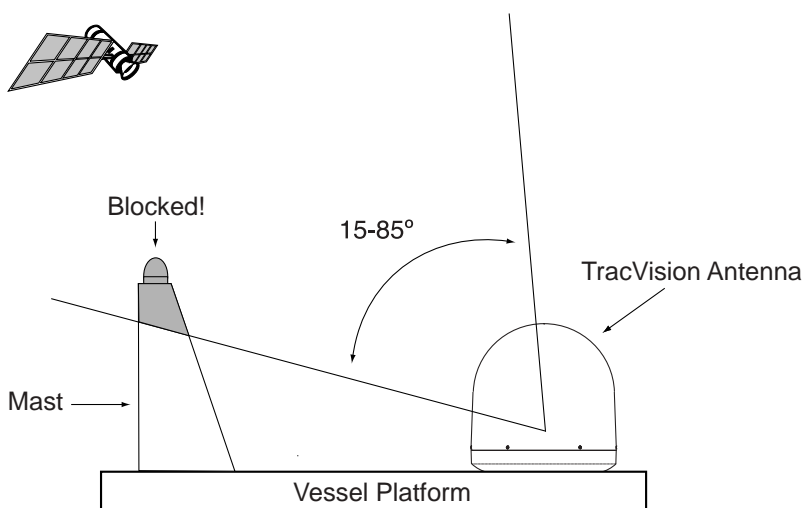
- To minimize tracking errors, place the Antenna Unit as close as possible to the intersection of the vessel's fore-and-aft centerline and midships. The antenna unit need not be located exactly on the vessel's fore-and-aft axis, but its centerline reference MUST be parallel to it.

- The mounting surface should be essentially flat and strong enough to carry the complete assembly (30 lbs/13.6 kg). Make sure that the mounting surface is rigid so that it cannot flex when the vessel vibrates. If necessary, add a strength member to the mounting site to stiffen it.

- Be sure to account for the radome height and the base dimensions, illustrated in Figure 2-2.

Radar Concerns

The TracVision antenna must be kept out of line with nearby radars, as their energy levels may overload the antenna's front-end circuits. In an ideal installation, the antenna is mounted 4 feet (1.2 M) above and 4 feet (1.2 M) away from the radar (measured from the center of the antenna dome to the center of the radar). The best placement for the TracVision antenna is above the radar. However, if there will be a significant horizontal separation between the radar and TV dome (i.e., at least 8 to 10 feet (2.4 to 3 M)), the TracVision antenna can be placed below the radar as there will be little chance of signal blockage.

The radome exterior is treated with a special finish selected for compatibility with the dome material and transparency to the satellite signals. Application of additional paints or finishes WILL degrade performance, potentially beyond acceptable limits.

The Antenna Unit should not be too high off the water (a height above the waterline no more than half the vessel length).

2.2 Installing the Antenna Unit

Specifics of installation will vary with vessel design but the following procedures are applicable in most situations and will result in a secure and effective installation.

Table 2-3 lists the components provided in the Antenna Unit Installation kitpack.

Table 2-3

Antenna Unit Kitpack Contents

Part	Qty.
¼-20 hex screws	4
¼ flat washers	8
¼-20 self-locking nuts	4
Plastic screw covers	6
Antenna base seal gasket	1
Tie-wraps	2
Core clamp	1

⚠️

Always lift the antenna unit by the gray baseplate, not the radome. Also be careful not to strike the exposed connectors extending from the bottom of the baseplate or allow them to carry the weight of the antenna unit.

Antenna Unit Mounting Procedure

1. Make sure you have chosen a suitable mounting location based upon the guidelines in *Section 2.1, "Choosing the Best Location and Getting the Best Reception."*

2. Using the base dimensions presented in Figure 2-2 on the following page or the template provided in *Appendix B,* lay out the four mounting bolt holes. Check the layout of the baseplate to ensure that it is parallel with the vessel's fore/aft axis.
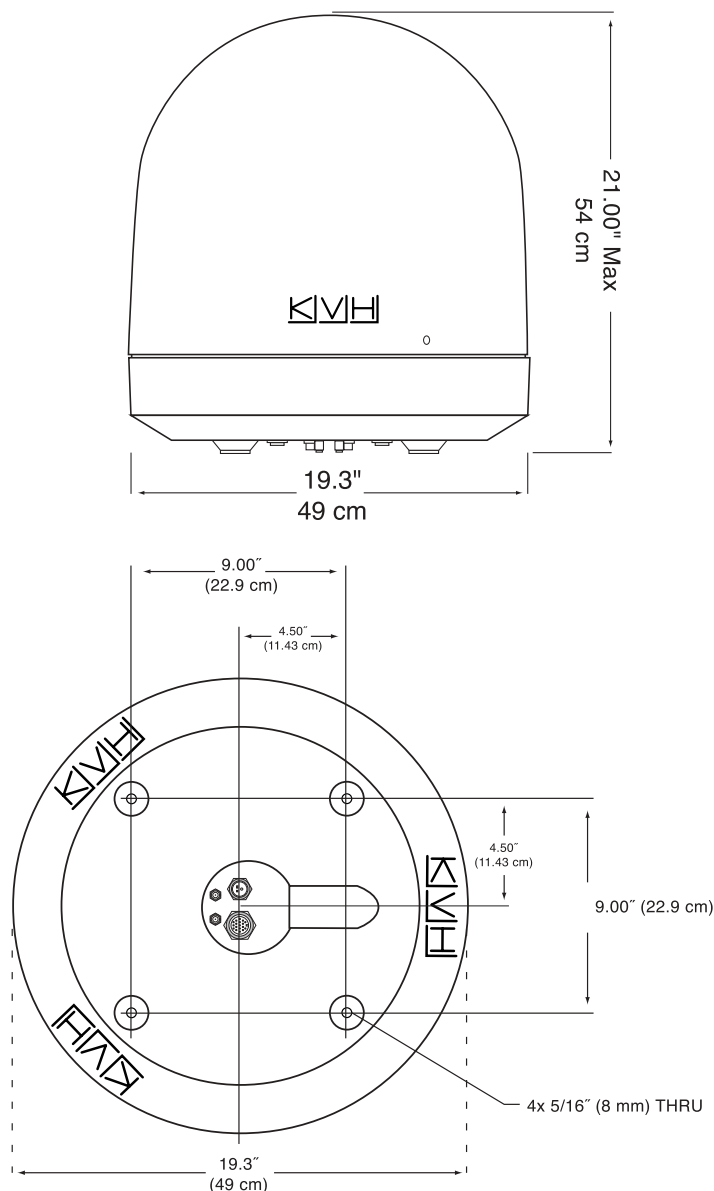
Figure 2-2
Antenna Unit Dimensions

21.00" Max
54 cm

19.3"
49 cm

9.00˝
(22.9 cm)

4.50˝
(11.43 cm)

4.50˝
(11.43 cm)

9.00˝ (22.9 cm)

4x 5/16˝ (8 mm) THRU

19.3˝
(49 cm)

A template of the baseplate mounting holes has been provided in Appendix B.

3. Drill four ⅜" (10 mm) bolt holes. Mark a 3" (80 mm) diameter circle in the center of the pattern and cut out to make a passage for the cables to connect to the baseplate. Smooth the edges of the hole to protect the cables.

4. Place the foam seal in position on the mounting surface with the hole centered over the cable access cutout and the paper backing on the bottom. Do not remove the paper backing at this time. Align the seal with the vessel's fore-and-aft line and the small end pointed forward as shown in Figure 2-3. Scribe a line all around the seal.

Figure 2-3
Baseplate/Foam Seal Orientation (Bottom View)

Foam Seal

J13 (power)

RF1

RF2

J14 (data)

Bow
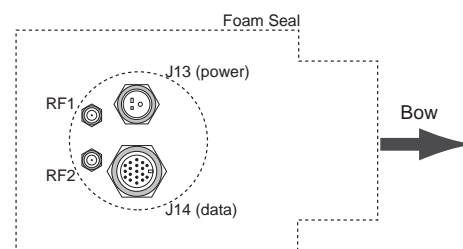
Figure 2-4

Baseplate Connector Assignments

Single IRD Installation

RF1

J13 (power)

RF2

J14 (data)

Second IRD Installation
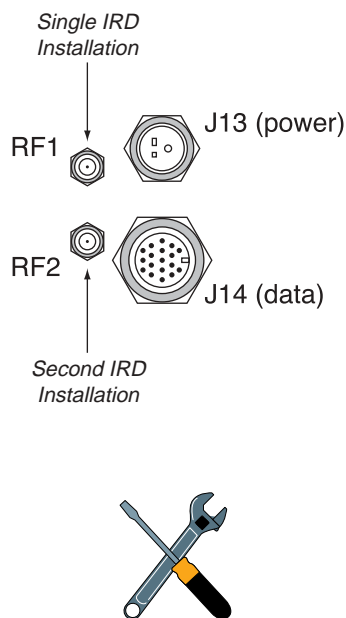
The foam shipping restraint must be removed before power is applied. Save the foam for reuse and be sure to install it whenever the Antenna Unit is moved from place to place. See Section 4.8, "Preparation for Shipment," *for instructions on preparing for shipment.*

Figure 2-5

Bolting the Antenna Unit to the Deck (Side View)

Bolt

Flat Washer

Antenna Unit Base

Foam Seal

Deck

Flat Washer

Lock Nut
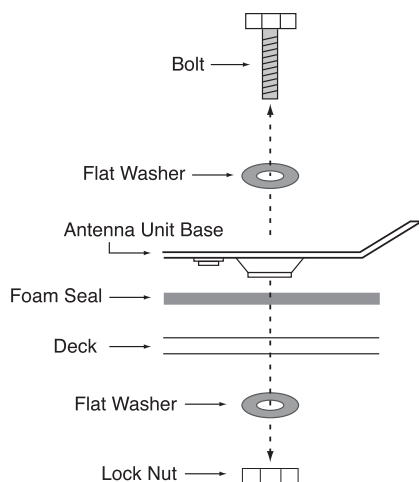
5. Remove and save the three screws holding the radome to the baseplate. Carefully lift the radome straight up until clear of the antenna assembly and set it aside in a safe place.

6. Position the baseplate assembly in place over the mounting holes and cable access. Ensure that all holes line up and that the connectors are centered over the cable access. Make any necessary adjustments before seating the foam seal in place permanently.

7. Clean the surface where the foam seal will be placed. Remove the paper backing from the foam seal to expose the contact cement. Lay the foam seal in place, adhesive side down, and press down firmly to bring the adhesive into full contact along the bottom. *Ensure the narrow end points toward the bow.*

8. Bring the Data Cable, RF Cable(s), and Power Cable up through the access hole and connect them to the baseplate. Turn the connectors down securely, but don't use excessive force; finger-tight is sufficient. Figure 2-4 illustrates the connector assignments.

    Do not use teflon gel on the cable fittings as it reduces signal strength at higher frequencies.

9. Remove the foam shipping restraints from the Antenna Unit.

10. Place the baseplate over the holes drilled in the foundation, ensuring the forward arrow points toward the bow. Rotate the azimuth mechanism plate to expose each mounting hole. *When rotating the azimuth mechanism by hand, go slowly. Hitting the stops with excessive force will damage the azimuth limit switch.*

11. Place a flat washer from the kitpack on a bolt and insert the bolt into its hole *from above* as shown in Figure 2-5.

12. Apply a flat washer and lock nut from underneath as shown in Figure 2-5.

13. Tighten securely until the foam seal is compressed as far as it will go and all four feet are bottomed against the mounting surface.

14. For European systems, please refer to *Section 2.2.1, "Setting the Skew Angle."* North American systems may proceed to step 15.

15. Replace the radome over the baseplate. Align the radome screw holes with the nut holders, insert the screws and tighten. Install a protective plastic screw cap from the kitpack over each screw. Several spare protective caps are provided.

2.2.1 Setting the Skew Angle *(European Systems Only)*

The Antenna LNB skew angle must be adjusted to optimize channel reception. Refer to your satellite service provider for the proper skew angle for the selected satellite service and geographical location.

Adjusting the LNB Skew Angle

1. Turn off the power to the Antenna Unit.

2. Remove the radome and set it aside.

3. Loosen the two wing screws securing the LNB within the choke feed as illustrated in Figure 2-6.

4. Refer to the LNB skew angle labels on the end of the LNB and on the LNB choke feed (pictured in Figure 2-7) and adjust the LNB as necessary to match as closely as possible the skew angle provided by your service provider.

5. Retighten the wing screws.

2.3 Wiring the TracVision 4 System

A switchplate has been provided to serve as the hub of the TracVision 4 wiring (with the exception of the RF cable, which will be connected to the IRD). This switchplate includes an ON/OFF switch and a DB9 maintenance port for easy access to the Antenna Unit's software and diagnostics.

Figure 2-6
Adjusting the European LNB Skew Angle
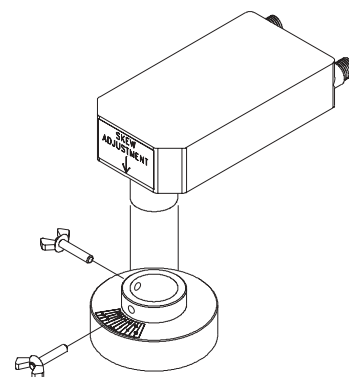
Figure 2-7
Skew Angle Labels
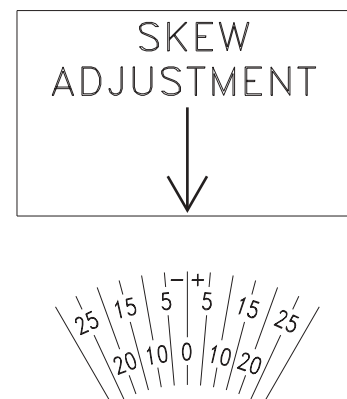
Follow these steps to begin the wiring process:

1. Select a location to mount the TracVision 4 switchplate. It should be flat and within reach of the cables connected to the Antenna Unit.

2. Create a panel cutout in the mounting surface. Figure 2-8 illustrates the mounting dimensions and a template has been provided in *Appendix C.*

Figure 2-8
Switchplate Panel Cutout
Dimensions

A full-scale panel cutout template has been provided in Appendix C.
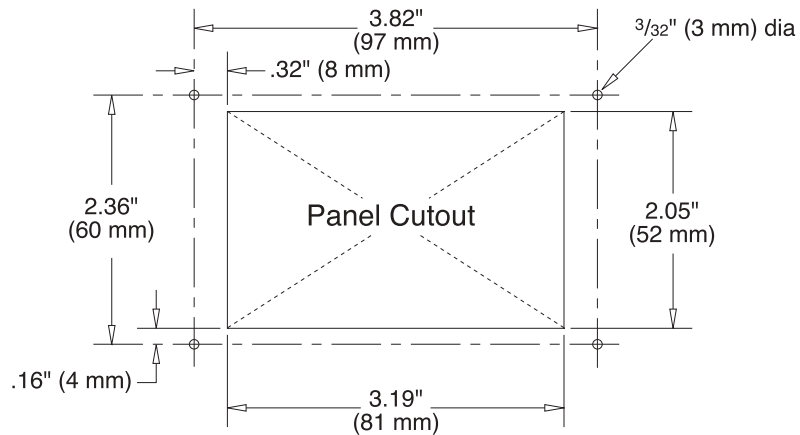
3. Run the Antenna power and data cables from the Antenna Unit and out through the panel cutout.

4. Run a cable from ship's power (11-16 Vdc) through the panel cutout.

You are now ready to wire the TracVision 4 system to the switchplate connectors and ship's power.

Tips for Safe and Successful Wiring

Figure 2-9
Correctly Securing Wires within
the Switchplate Connectors

*   When attaching cables to the TracVision 4 switchplate connectors, make sure the insulation is stripped back approximately ³⁄₁₆" (5 mm). Twist the wires gently to help achieve a good connection. Do not pinch insulation inside the connector.

*   After attaching the power and data cables to the appropriate terminal connector strips, tug gently to ensure a firm connection.
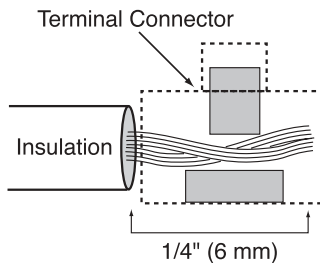
2.3.1   Wiring the Antenna Unit Data Cable

Find the TracVision 4 data cable where it comes through the panel cutout made earlier. Wire the data cable to the switchplate connectors as indicated in Figure 2-10. The connector board is etched with the same wire color identification to make the wiring process easier.

A comprehensive wiring diagram for the TracVision 4 system has been provided in *Appendix D.*

Figure 2-10

Data Cable Wiring Arrangement

BLU/WHT	Not Used
WHT/BLU	Not Used
BRN/WHT	PC GND
WHT/BRN	PC TXD
ORG/WHT	PC RXD
WHT/ORG	RF GND
GRY/WHT	RF TXD
WHT/GRY	RF RXD
GRN/WHT	Not Used
WHT/GRN	Not Used

Data Cable to Antenna
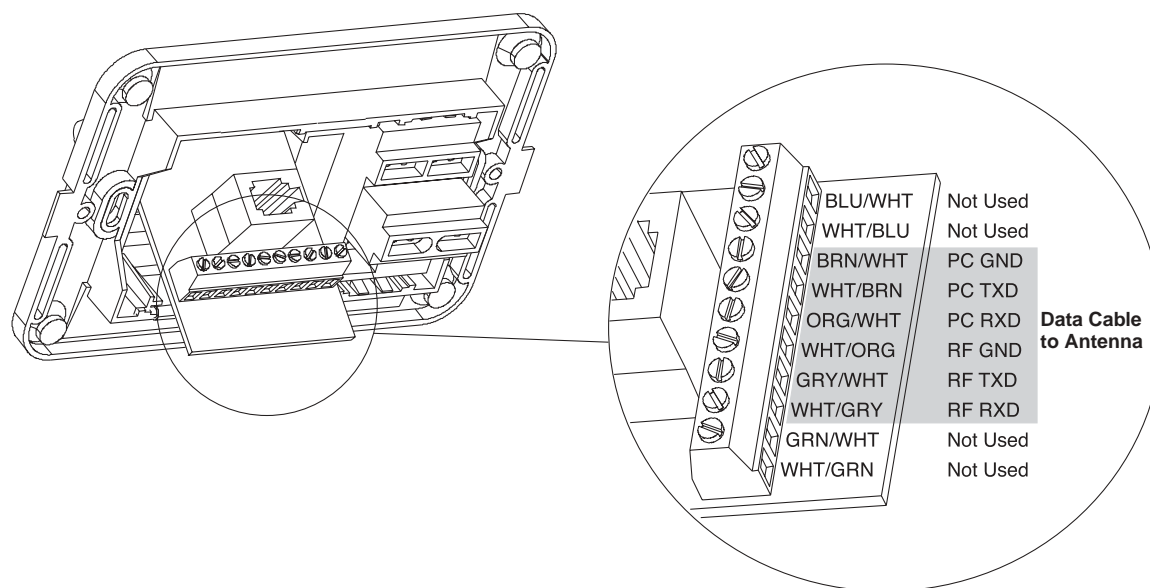
2.3.2   Wiring the Antenna Unit Power Cable

Find the TracVision 4 power cable where it comes through the panel cutout made earlier. Wire the antenna unit power cable to the switchplate connectors as indicated in Figure 2-11 (on next page). After wiring the power cable, connect the power indicator lamp, also as noted in Figure 2-11. After both the power cable and lamp are properly wired, carefully insert the lamp into its socket immediately below the switchplate connectors.

Figure 2-11
*Wiring the Antenna Unit Power
Cable and Indicator Lamp*

+12 Vdc (Red)
+12 Vdc — Lamp

Ground (Black)
Ground — Lamp

Lamp Socket
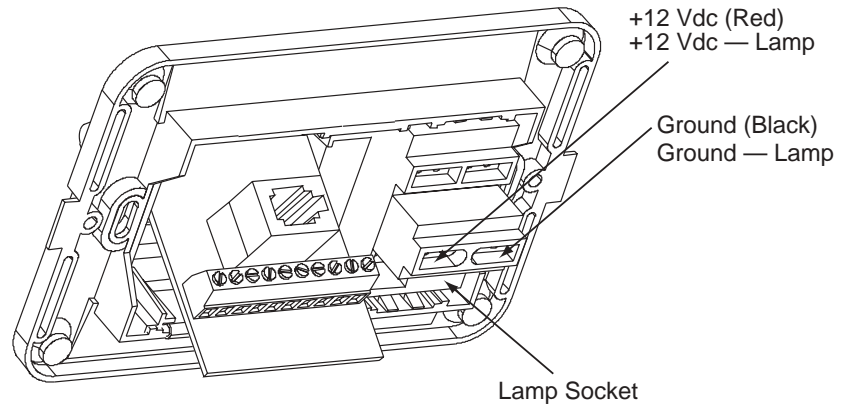
2.3.3   Connecting to Ship's Power

After completely wiring the indicator lamp and the data and
antenna cables, you must connect the switchplate to ship's power
as pictured in Figure 2-12.

Figure 2-12
*Wiring the Switchplate
to Ship's Power*

+12 Vdc — Ship's Power

Ground

IRD Ground Wire
(to IRD)

*Power supplied to the TracVision 4
MUST NOT exceed 16V or the
TracVision power supply will suffer
serious damage!*
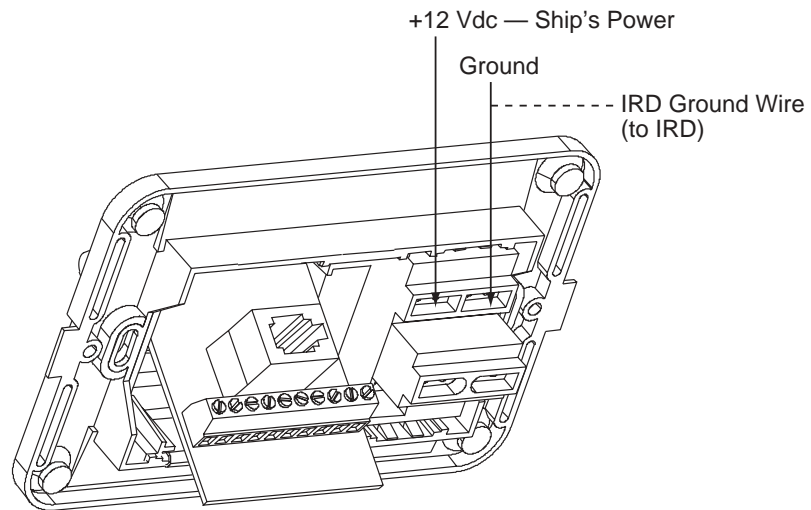
2.3.4   IRD Ground Cable

A grounding wire has been provided to connect your IRD to a
suitable ground and protect the system. Attach the grounding
wire to any suitable screw on the rear panel of the IRD with a
good contact with the IRD chassis. The other end should be
connected to a suitable ground, ideally the Ground connector on
the switchplate (see Figure 2-12).

2.3.5 Installing the Switchplate

After completing the switchplate wiring process, you must install the switchplate itself. This process, detailed in the following steps, is illustrated in Figure 2-13.

1. Drill four ⁵⁄₃₂" (4 mm) holes in the support frame.

2. Fit the switchplate assembly and support frame into the panel cutout made in Step 2 in *Section 2.3* and flush to the mounting surface.

3. Drill four ³⁄₃₂" (2.5 mm) holes in the mounting surface using the countersunk holes in the support frame as the template. Secure the support frame and switchplate assembly to the mounting surface using the four #6 self-cutting screws.

4. Snap the front cover into place to cover the screws and support frame.
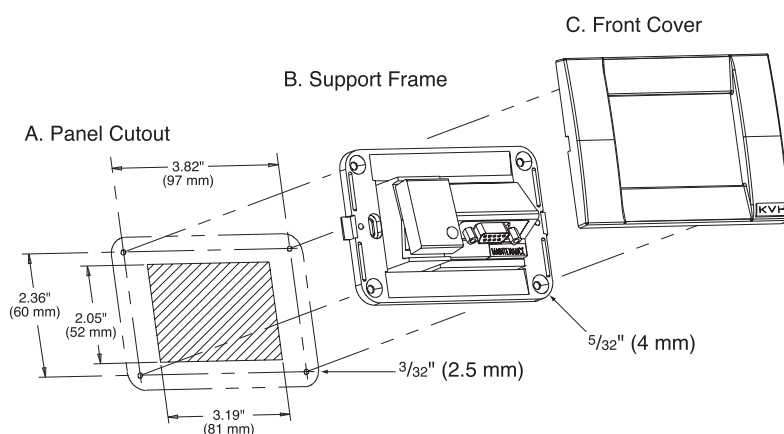
Figure 2-13
Mounting the Switchplate
Support Frame and Front Cover

C. Front Cover

B. Support Frame

A. Panel Cutout

3.82"
(97 mm)

2.36"
(60 mm)

2.05"
(52 mm)

⁵/₃₂" (4 mm)

³/₃₂" (2.5 mm)

3.19"
(81 mm)

KVH

Before securing the switchplate to the mounting surface, be sure to strain relieve the wires connecting to the switchplate connectors. Several tie-wraps have been provided to aid in strain relieving the wires.

2.3.6 Connecting an Antenna RF Signal Cable to the IRD

The RF signal cable is fitted with F-type connectors. One end should be connected to the plug labeled "RF1" on the base of the TracVision 4 system. The other connector should be connected to the IRD plug labeled "LNB" or "ANT/SAT." If a second IRD is to be hooked up to the TracVision 4 antenna unit, the RF cable for the second IRD should be connected to the plug labeled "RF2" while the other end is connected to the IRD plug labeled "LNB" or "ANT/SAT" on the second IRD.

The IRD that is connected to the RF1 cable controls which satellite the antenna is tracking. The IRD connected to RF2 can select different channels on that satellite but not change the satellite selection itself.

2.3.6.1 Connecting the Antenna RF Signal Cables to a Multiswitch *(North American Systems Only)*

Due to the signal polarization of the North American satellites, it is possible for TracVision 4 to support more than two IRDs aboard a vessel. To install more than two IRD/TV pairs, an active multiswitch (Channel Master model 6214IFD or equivalent) is placed between the Antenna Unit and the IRDs. The following sections provide details for both a single multiswitch and a multiple multiswitch installation.

Some multiswitches (either active or passive), such as the Channel Master model 6214IFD, may interfere with the 22 KHz tone sent by DSS Plus™ IRDs to the antenna. As a result, the antenna may not receive the signal to change satellites when you change channels using your DSS Plus remote. In this case, you will need to use the maintenance port satellite switch procedure explained in Section 2.5.1, "Installing Your Selected Satellites."

Multiswitch Installation for 3-4 IRD/TV Pairs

Figure 2-14 (on next page) illustrates typical wiring arrangements for three or four IRDs. Mount the multiswitch unit in accordance with the manufacturer's instruction sheet.

1. Connect the RF cable tagged "RF1" to the multiswitch input labeled "LNB RHCP +13V".

2. Connect a second RF cable to the antenna unit's RF2 plug and to the multiswitch input labeled "LNB LHCP +18V".

3. Connect the multiswitch outputs to individual IRD inputs. Use RG-6 cable terminated with F-type connectors for all RF connections. Terminate all unused output connectors with 75 ohm DC blocks (Channel Master #7184, Radio Shack #15-1259 or equivalent).
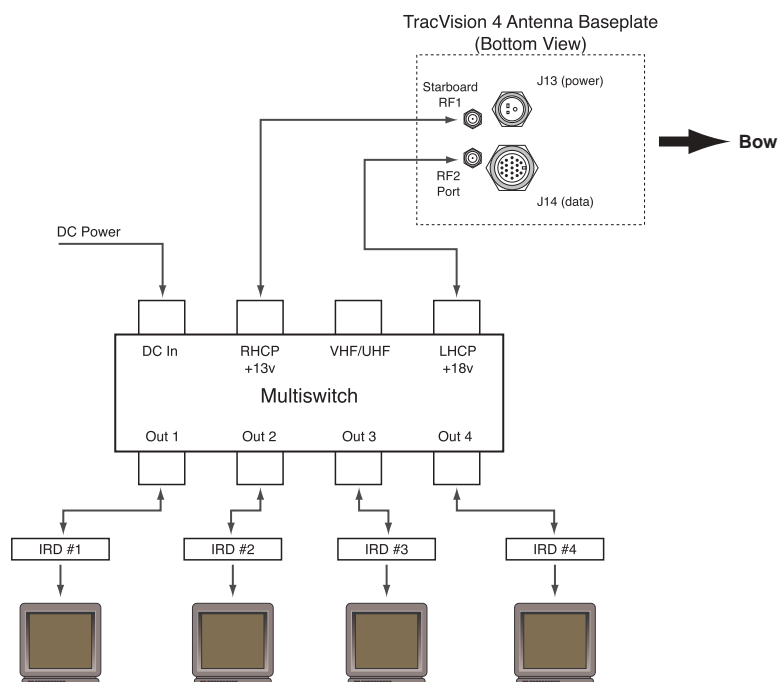
Figure 2-14
Single Multiswitch Installation (North American Systems Only)

Multiple Multiswitch Installation

If there is a need for more than four IRDs, it is possible to carry out a multiple multiswitch installation, as illustrated in Figure 2-15.

Due to the signal polarization in European satellites, the use of a multiswitch (active or otherwise) will result in a loss of signal and less than optimal operation with TracVision 4 systems used in Europe.
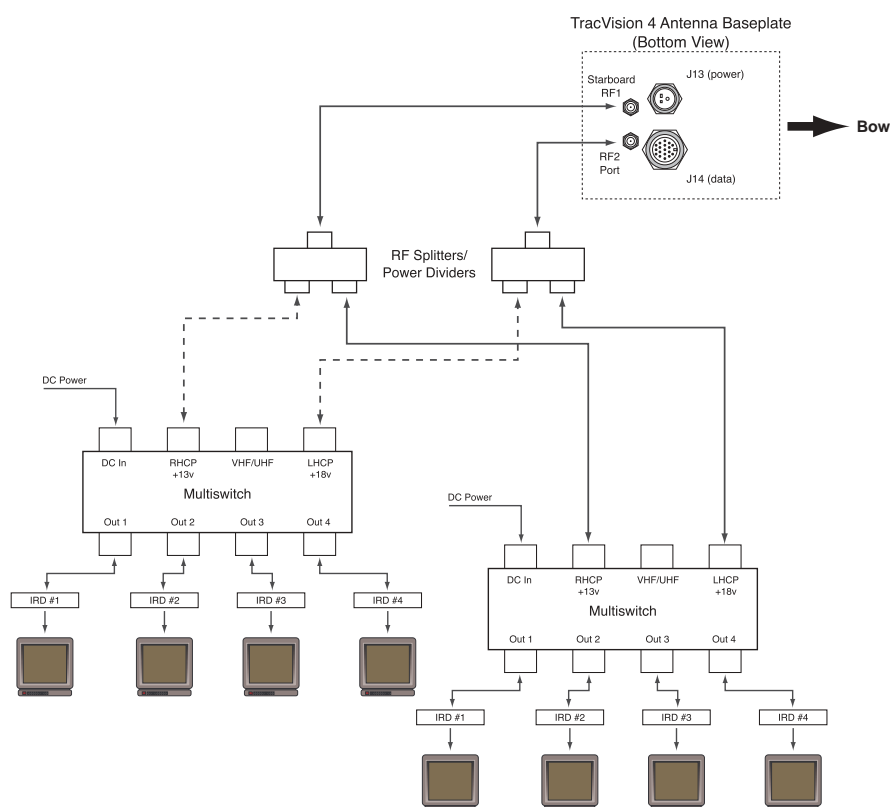
Figure 2-15
Multiple Multiswitch Installation (North American Systems Only)

2.4 Commissioning the IRD

Before it can be used, your IRD must be commissioned and/or programmed. Please refer to the user manual that accompanied your IRD for instructions on properly commissioning the system.

Programming European IRDs

Before the TracVision 4 system can be used in Europe, the IRD must be programmed to receive signals from the selected DVB satellite services. Programming is conducted using menu selections displayed on the TV screen. Please refer to the IRD user manual for specific instructions.

Table 2-4 provides some key data for use when programming the IRD.

Table 2-4

Key IRD Settings

Configuration Item	Setting
Antenna Alternative 1	DiSEqC 1
Antenna Alternative 2	DiSEqC 2
LNB Frequency	Universal

When programming the IRD with the antenna configuration data, make certain that your choices for Antenna Alternatives 1 and 2 match those installed as Satellites A and B during the Install Satellite procedure detailed in Section 2.5, "Selecting the Active Satellite."

It is also important that the IRD's settings for Antenna Alternatives 1 and 2 match the installed satellite settings as follows:

- Antenna Alternative 1 = Satellite A

- Antenna Alternative 2 = Satellite B

Section 2.5, "Selecting the Active Satellite," provides details on the satellite installation process.

Programming DSS Plus IRDs

If you are using multiple DSS Plus IRDs and intend to shift from one satellite to another, **only one** of the IRDs can be configured as a two-satellite receiver. All other IRDs must be configured as one-satellite receivers. The two-satellite IRD will determine which satellite the antenna is tracking while the other receivers can watch any channels available via that satellite. Refer to your IRD user manual for complete details on this process.

2.5   Selecting the Active Satellite

As noted previously, TracVision 4 can track a variety of DVB-compatible and DSS satellites. The system contains a preprogrammed library of European and North American satellites. It also has two open slots that you may use to program two additional satellites of your choice. Tables 2-5 and 2-6 list the possible satellite pairs.

Two of these satellites may be selected to reside in the system's active memory as Satellites A and B.

Table 2-5
Available Satellite Pairs - Europe
(European LNB required)

	Astra 1	Astra 2N	Astra 2S	Hispasat	Hotbird	Sirius	Thor
Astra 1		✓	✓		✓	✓	
Astra 2N	✓				✓		
Astra 2S	✓				✓		
Hispasat							
Hotbird	✓	✓	✓			✓	
Sirius	✓				✓		✓
Thor						✓	

Table 2-6
Available Satellite Pairs - North America
(U.S.-style LNB required)

	DSS_101	DSS_119	Echo_61	Echo_110	Echo_119	Echo_148	Expressvu
DSS_101		✓					
DSS_119	✓						
Echo_61				✓	✓		✓
Echo_110			✓		✓	✓	✓
Echo_119			✓	✓		✓	✓
Echo_148				✓	✓		✓
Expressvu			✓	✓	✓	✓	

2.5.1   Installing Your Selected Satellites

When you first connect to the system, it is programmed with the factory default satellite assignments:

Europe: Astra 1 (Sat A) and Hotbird (Sat B)

N. America: DSS_101 (Sat A) and DSS_119 (Sat B)

Should you wish to track a different satellite (either from the satellite library or a user-defined satellite), you must instruct the antenna which satellites will be in the active satellite pair.

Connecting to the TracVision 4 Maintenance Port

To do so, it is necessary to connect a PC to the terminal maintenance port on the switchplate. The diagnostics procedure requires terminal emulation software such as PROCOMM, Windows Terminal, or Windows 95/98 Hyperterminal. Use the settings appropriate to your application.

1. Connect one end of the PC data cable to the DB9 connector on the switchplate. Connect the other end to the serial port on the PC (a 9-pin/25-pin connector adapter may be needed for some PCs).

2. Open the terminal emulation software and establish the following settings:

    • 9600 baud

    • no parity

    • 8 data bits

    • 1 start bit

    • 1 stop bit

    • no flow control

3. Apply power to the TracVision 4 system and allow the system to complete full initialization. Data should be scrolling on the PC display to identify any system problems detected. If no data is seen, recheck your connections and the terminal software setup.

Installing the Satellite of Choice

Once the data connection has been made between the PC and the TracVision 4, you must assign the satellites you wish to have in the satellite pair. On the maintenance screen, put the antenna in Idle Mode by typing **HALT**, then enter the SATINSTALL command:

Command:	**SATINSTALL,<sat_a_name>,<sat_b_name><cr>** *(<cr> indicates a carriage return/ENTER key)*
Where:	<sat_a_name> = the name of your choice for Satellite A <sat_b_name> = the name of your choice for Satellite B

Tables 2-5 and 2-6 list the assigned names for satellites that are in the preprogrammed European and North American satellite library. If you do not wish to assign a pair of satellites, enter **None** as the name of Satellite B.

After you have assigned satellites as Satellites A and B, the final step is to tell the antenna which of the two satellites it should acquire and track. This step should be carried out the first time a satellite is selected, allowing the system to carry out the initial download of the channel guide. To do so, enter the Satellite Selection parser command as follows:

Command:	**@L,x<cr>**
Where:	x = A or B (one of your selected satellites as defined during the SATINSTALL process)

Choosing A or B will assign the antenna to acquire and track that installed satellite. To complete the process, type **ZAP<cr>** to restart the system.

For example, to assign Astra 2S and Hotbird for your satellite pair, and to track Astra 2S, you would enter the following data:

SATINSTALL,ASTRA2S,HOTBIRD<cr>

@L,A<cr>

ZAP<cr>

2.5.2   Programming User-defined Satellites

The TracVision 4 satellite library has two open slots that you may use to program two user-defined satellites in case you want to install/watch a satellite that is not in the KVH predefined list. To

How to tell the difference between High and Low bands:

High: 11.700 - 12.700 GHz

Low: 10.700 - 11.700 GHz

For your reference, the satellite configuration information for the predefined satellites is available on our web site at www.kvh.com/ footprint/index.html.

configure a user-defined satellite, the system must first be in Idle Mode (by typing **HALT**) and then information about the satellite must be provided, including:

- • Satellite name

- • Satellite position (longitude)

- • Transponder information for each of the following polarizations/frequencies:

  - vertical high & vertical low

  - horizontal high & horizontal low

- • Transponder information includes:

  - frequency

  - symbol rate

  - FEC code, and

  - network ID (in hexidecimal format)

- • Decoder type

This information can be obtained from your satellite service provider or from sites on the Internet, such as *www.satcodx.com*.

Entering User-defined Satellite Data

Once the link between the PC and the TracVision 4 is established as described in *Section 2.5, "Selecting the Active Satellite,"* it is necessary to provide initial longitude data regarding the user-defined satellite. To do so, enter the SATCONFIG parser command via PC as follows:

Table 2-7
SATCONFIG Parser Command

Command:	**SATCONFIG,USERX,YYY,Z,D,L<cr>** *(<cr> indicates a carriage return/ENTER key)*
Where:	X = 1 or 2 (satellite alternative) YYY = longitude (0-180) Z = E (East) or W (West) D = decoding type (0=test, 1=DSS-A, 2=DSS-B, 3=DVB) L = LNB polarization (C=circular, L=linear)
Function:	configures one of the user-configurable satellites with the longitude provided
Response:	if valid entry, echoes the input data if invalid entry, returns error message

After entering the SATCONFIG command, you must turn on the DEBUG mode by typing **@DEBUGON**. After entering the SATCONFIG and DEBUGON commands, enter the satellite transponder information via PC as follows:

Command:	**@SATCONFIG,X,N,F,S,C,ID,P,B,D<cr>**
Where:	@SATCONFIG = directs data to the RF Board
	X = satellite location A or B
	N = satellite table # (98 & 99 are slots for user-configured satellites)
	F = frequency in MHz (either 00000 or a range from 10700 - 12700)
	S = the satellite transponder symbol rate in Mbit/second (01000 - 29999)
	C = the FEC code (e.g., 12, 23, 34, 56, 67, 78)
	ID = the satellite network ID in hexidecimal format (0x####)
	P = the LNB polarization (v=vertical, h=horizontal)
	B = the LNB down conversion frequency (l=low, h=high, u=USA)
	D = decoding type (0=test, 1=DSS-A, 2=DSS-B, 3=DVB)

Table 2-8
Satellite Transponder Data Sequence

This information has to be entered for each of the four transponder categories:

- vertical high
- vertical low
- horizontal high
- horizontal low

TracVision 4 requires that the data fields for all four transponder categories be provided. If the selected satellite does not have information for one or more of the transponder categories, default information should be entered in the fields as follows:

Transponder Data	Default Value
Frequency	00000
Symbol Rate	27500
FEC Code	the same value as provided for those transponders with data
Network ID	0x0000
Polarity and Band	whichever combinations are not already provided

Table 2-9
Satellite Transponder Default Data

After entering this information, it is necessary to save these settings. To do so, type:

@SAVE,A (or **@SAVE,B** if this data is for Satellite 2)

@DEBUGOFF

After completing this process, restart the system by either cycling power or typing **ZAP** in the maintenance screen.

One of your user-defined satellite options has now been added to the TracVision 4 satellite library. This option will now be available as USER1 the next time the SATINSTALL command is given. If a second satellite is added, it will appear as USER2 in the SATLISTA list.

An Example of Configuring a User-defined Satellite

The following is an example of configuring the fictional YOURSAT 101 as the USER1 configured satellite. Prior to configuring this satellite or any others, be certain to get the most up-to-date information from one of the sources previously discussed.

Table 2-10

Sample Satellite Configuration Data

Yoursat 101 at 7 West, DVB decoder, Linear Polarization LNB

Horizontal High

Frequency	11.966 GHz
Symbol Rate	27500
FEC Code	3/4
Network ID	2048 (dec) = 0x0800

Vertical High

Frequency	11.823 GHz
Symbol Rate	27500
FEC Code	3/4
Network ID	2048 (dec) = 0x0800

Vertical Low

No Data Listed	

Horizontal Low

No Data Listed	

Based on this information, the data entered via the PC would look like this, assuming that YOURSAT 101 would be Satellite A:

```
SATCONFIG,USER1,7,W,3,L
@DEBUGON
@SATCONFIG,A,98,11966,27500,34,0x0800,H,H,3
@SATCONFIG,A,98,11823,27500,34,0x0800,V,H,3
@SATCONFIG,A,98,00000,27500,34,0x0000,V,L,3
@SATCONFIG,A,98,00000,27500,34,0x0000,H,L,3
@SAVE,A
@DEBUGOFF
ZAP
```

2.6   Checking Out the System

To complete the TracVision 4 installation, it will be necessary to verify that the system functions properly. Critical to ensuring that the system is configured and operating properly is to check the system startup routine to ensure that the system is operating within normal parameters.

1. Connect the PC to the antenna as described in *Section 2.5.1, "Installing Your Selected Satellites."*

2. Open the terminal emulation software and establish the following settings:

    - 9600 baud
    - no parity
    - 8 data bits
    - 1 start bit
    - 1 stop bit
    - no flow control

3. Apply power to the TracVision 4 system and allow the system to complete full initialization. Data should be scrolling on the PC display to identify any system problems detected. If no data is seen, recheck your connections and the terminal software setup.

4. After completing the review of the startup and operational routines, turn on the IRD and television and check the channels on the selected satellites. For European systems, view both horizontally and vertically polarized channels, if possible.

5. When all checks are completed, shut down the system.

Be certain to fill out and submit the warranty card to KVH to ensure that your TracVision 4 is fully covered under the 2-year parts and 1-year labor warranty.

Avoid turning the vessel for 60 seconds after turning on the antenna to allow the antenna gyro to initialize properly.

A sample startup sequence has been provided in Appendix E with the typical ranges and responses for the TracVision 4 during startup and operation.

2.7   Changing Geographic Location

If you move from Europe to North America, or from North America to Europe, you will need to modify your TracVision 4 system to receive satellite TV signals in the new geographic area.

To begin receiving satellite signals in the new area, perform the following steps.

Swap LNBs

To receive the proper satellite signals in the new geographic location, your TracVision antenna must be equipped with the appropriate LNB for that location. If moving from Europe to North America, you will need to install a North American-style LNB. If moving from North America to Europe, you will need to install a European-style LNB. Table 2-11 lists the part numbers for ordering these LNB options.

Table 2-11
LNB Part Numbers

Part Name	Part Number
European-style LNB	02-0932
North American-style LNB	02-0870

With the new part, you will receive an easy-to-understand instruction sheet for swapping the LNBs.

Install New Satellites

When you move to a new area, the list of available satellites changes. If you're moving to Europe, you will need to choose a new satellite pair from the list of available European satellites (see Table 2-5). If you're moving to North America, you will need to choose a new satellite pair from the list of available North American satellites (see Table 2-6). For details on installing these new satellites, refer to *Section 2.5.1, "Installing Your Selected Satellites."*

Replace the IRD

In order to receive satellite TV service in your new geographic location, you will need to purchase an IRD designed for that location. Refer to your satellite TV service provider for more information.

3 Troubleshooting

The troubleshooting matrix shown in Figure 3-1 identifies some trouble symptoms, their possible causes, and reference to troubleshooting solutions.

Figure 3-1
Troubleshooting Matrix

SYMPTOM	Blown fuse or wiring (Section 3.1.1)	Vessel turning during startup (Section 3.1.1)	Incorrect satellite configuration (Section 3.1.2)	Satellite signal blocked (Section 3.1.3)	Outside satellite coverage zone (Section 3.1.4)	Radar interference (Section 3.1.5)	Incorrect or loose RF connectors (Section 3.1.6)	Multiswitch interference (Section 3.1.7)	Passive multiswitch used (Section 3.1.8)	IRD faulty or improperly configured (Section 3.1.9)	Antenna gyro faulty (Section 3.2)	LNB assembly faulty (Section 3.3)
Antenna non-functional	X											
Antenna not switching channels/satellites			X					X		X		
No picture on TV set			X	X	X	X		X	X			X
Intermittent picture for short intervals		X		X	X	X	X		X		X	X
System works at dock but not on the move			X								X	
System will not find satellite	X	X	X	X	X	X	X		X			X
Snowy or pixelating television picture			X		X	X			X			

3.1 Causes and Remedies for Common Operational Issues

There are a number of common issues that can affect the signal reception quality or the operation of the TracVision 4. The following sections address these issues and potential solutions.

3.1.1 Blown Fuse or Wiring

If the Antenna Unit is installed but entirely non-responsive, there are two key factors to check as part of the troubleshooting process:

1. Blown Fuse – The Antenna Unit is equipped with a fuse mounted on its CPU Board. If this fuse has blown or been broken, the Antenna Unit will not operate. Refer to *Section 4.4, "PCB Removal and Replacement,"* for details on the fuse location and how to access the CPU Board.

2. Wiring – If the system has been improperly wired, it will prevent the Antenna Unit from operating correctly. *Section 2.3, "Wiring the TracVision 4 System,"* provides complete system wiring information.

3.1.2 Vessel Turning During Startup

If the vessel turns during the 60-second startup and initialization sequence that occurs immediately after turning on the power to the TracVision 4 unit, the antenna gyro will record that variable motion as "standing still." This may cause the antenna to track improperly. To solve this problem, turn TracVision 4 off for at least 10 seconds. Turn the system back on, making certain that the vessel is either motionless or travelling in a straight line for the 60 seconds immediately following power-up.

3.1.3 Incorrect Satellite Configuration *(European Systems Only)*

The satellite configuration on European IRDs must match the satellite settings on the TracVision 4 system.

Refer to your IRD user manual for complete instructions on configuring your IRD.

- Satellite A on the TracVision 4 must be the same satellite as IRD Alternative 1 (or A, based on your IRD) and must be assigned the IRD DiSEqC 1 setting.

- Satellite B on the TracVision 4 must be the same satellite as IRD Alternative 2 (or B, based on your IRD) and must be assigned the IRD DiSEqC 2 setting.

3.1.4   Satellite Signal Blocked

Satellite signals can be blocked or degraded by buildings, other vessels, or equipment on the vessel itself. Refer to *Section 2.1, "Choosing the Best Location and Getting the Best Reception,"* to make certain that the TracVision 4 unit is in the optimal location.

3.1.5   Outside Satellite Coverage Zone

TracVision 4 will provide outstanding reception within the 18" (45 cm) antenna coverage area for your satellite television service of choice. However, signal quality can be degraded as you approach the fringe coverage areas. Refer to your satellite television service manual to check the viable coverage area for a 18" (45 cm) antenna.

For your convenience, KVH provides links to several web sites that offer satellite coverage information. Simply go to our web site at www.kvh.com/footprint/ index.html.

3.1.6   Radar Interference

The energy levels radiated by radar units can overload the antenna front-end circuits. Refer to *Section 2.1, "Choosing the Best Location and Getting the Best Reception,"* to make certain that the TracVision 4 unit is in the optimal location with regard to your radar unit.

3.1.7   Incorrect or Loose RF Connectors

As part of preventive maintenance (described in *Section 4, "Maintenance"*) KVH recommends checking the Antenna Unit cable connections. A loose RF connector can reduce the signal quality. Refer to *Section 2.3.6, "Connecting an Antenna RF Signal Cable to the IRD"* for directions on proper Antenna Unit to RF cabling.

Baseline RF levels are included as part of the startup sequence provided in Appendix E.

3.1.8   Multiswitch Interference *(DSS Plus™ IRD Users Only)*

TracVision 4 has the capability to switch from one satellite to another when you choose TV channels that are carried by your two selected satellites. However, some multiswitches (either active or passive), such as the Channel Master model 6214IFD, may interfere with the 22 KHz tone sent by DSS Plus IRDs to the antenna. As a result, the antenna may not receive the signal to change satellites when you change channels using your DSS Plus remote.

Due to the signal polarization in European satellites, the use of a multiswitch (active or otherwise) will result in a loss of signal and less than optimal operation with TracVision 4 systems used in Europe.

In this case, you will need to use the maintenance port satellite switch procedure explained in *Section 2.5.1, "Installing Your Selected Satellites."*

3.1.9 Passive Multiswitch Used (North American Systems Only)

As noted in *Section 2.3.6.1, "Connecting the Antenna RF Signal Cable to a Multiswitch,"* using a passive multiswitch may cause some signal loss and possibly reduce the maximum reception range in fringe areas. An active multiswitch can be used to connect more than two IRDs to the TracVision 4 system. However, please refer to *Section 3.1.8, "Multiswitch Interference,"* for an explanation of a potential issue with the use of any type of multiswitch.

3.2   IRD Troubleshooting

The IRD that was provided with your satellite television service may also be the cause of less-than-ideal operation. First check the IRD's configuration to ensure it is set up for the desired programming. In the case of a faulty IRD, refer to your IRD user manual for service and warranty information. If the IRD is both configured properly and fully functional, contact your local KVH dealer or service center for assistance.

3.3   Antenna Gyro and LNB Faults

Section 4, "Maintenance," provides detailed instructions for authorized service personnel who may be required to replace the TracVision 4 antenna gyro or the LNB.

3.4   Computer Diagnostics

TracVision 4 has been designed to provide diagnostic readouts viewed on a personal computer having an RS-232 serial communication port. If you are unable to isolate a system problem, set up for computer diagnostics as described below. System problems will most likely be found somewhere through the diagnostic readouts.

The diagnostics procedure requires terminal emulation software such as PROCOMM, Windows Terminal, or Windows 95/98 Hyperterminal. Use the settings appropriate to your application.

Figure 3-2
DB9 Connector

1. Connect one end of the PC cable to the DB9 connector on the front of the switchplate. Connect the other end to the serial port on the PC (a 9-pin/25-pin connector adapter may be needed for some PCs).

2. Open the terminal emulation software and establish the following settings:

    • 9600 baud

    • no parity

    • 8 data bits

    • 1 start bit

    • 1 stop bit

    • no flow control

3. Apply power to the TracVision 4 system and allow the system to complete full initialization. Data should be scrolling on the PC display to identify any system problems detected. If no data is seen, recheck your connections and the terminal software setup.

4. After completing the diagnostic, shut down the system.
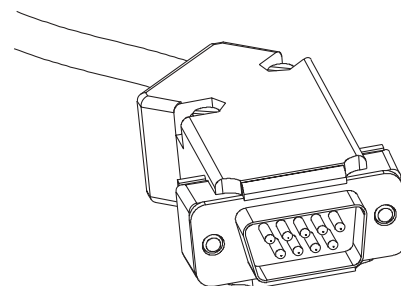
3.5   Maintenance Port Parser Commands

TracVision 4 system parser commands are detailed in *Appendix F*.

4   Maintenance

The following sections provide details on preventive maintenance and field replaceable units and parts for the TracVision 4 antenna unit.

4.1   Warranty/Service Information

KVH Industries, Inc. warrants TracVision 4 against defects in materials and workmanship for a period of two years and labor for a period of one year from the date of original retail purchase by the original purchaser. Labor is only warrantied if the TracVision 4 was installed by an authorized KVH dealer/installer. It is the customer's responsibility to verify the date of purchase by returning the warranty card included with the product to KVH within 30 days of purchase, or by providing a copy of a dated sales receipt for the KVH product under warranty with the warranty claim. If this date cannot be verified, the warranty period will begin 30 days after the date of manufacture of the original product purchased.

For additional information on KVH warranty, repair, and liability policies, please refer to the complete warranty statement provided at the conclusion of this manual.

4.2   Preventive Maintenance

TracVision 4 requires minimal preventive maintenance. The following routine housekeeping chores are sufficient to maintain peak performance.

Monthly

Wash the exterior of the radome and baseplate assembly with fresh water to remove salt deposits; a mild detergent may be added to remove grime.

- Use caution when spraying the radome directly with high-pressure water from a hose.

- Do not apply abrasive cleaners or volatile solvents such as acetone to the ABS radome.

The serial number for your TracVision 4 will be required during any service or calls. You will find the serial number on the inside front cover of this manual.

- Check all connectors on the Antenna Baseplate and IRD. Remove connectors and examine for signs of corrosion; clean as needed.

Semi-Annually

- Remove the radome and examine the interior of the Antenna Unit for signs of corrosion, loose connections, or frayed or broken wires.

4.3   TracVision 4 Field Replaceable Units

TracVision 4 components receive power from multiple sources. Do not open any electrical assemblies or attempt servicing until IRD power and vessel input power are disconnected.

The TracVision 4 has been designed with durability and low maintenance in mind. If you experience an operating problem or otherwise require technical assistance, contact your local authorized TracVision 4 dealer/installer or distributor first. If an authorized dealer/installer or distributor is not located nearby, contact KVH or KVH Europe directly at the telephone, facsimile, or e-mail listings inside the front cover.

Replacement part numbers for field replaceable units (FRUs) that can be serviced in the field are listed in Table 4-1. These parts may be obtained from any KVH authorized dealer/installer or may be ordered directly from KVH.

Table 4-1

TracVision 4 Field Replaceable Units

FRU	Part Number
Radome	02-0925-04
CPU	02-0992
RF Detector PCB	02-1141-02
Antenna Gyro Sensor	02-1035
Antenna Gyro Gasket	24-0139
Elevation Drive Motor Assembly	02-0994-02
Elevation Drive Belt	24-0105-104
LNB (European System)	02-0932
LNB (North American System)	02-0870
Data Cable	32-0619-50
PC Cable	32-0628-06
Power Cable	32-0510-50
RF Cable	32-0417-50

FRU	Part Number
IRD Ground Wire	32-0583-50
CPU Fuse	16-0017-3150

The Antenna Unit printed circuit boards, Antenna Gyro assembly, Antenna LNB, elevation stepping motor, and elevation drive belt may be removed and replaced on site using common hand tools. Other TracVision 4 service must be done by your authorized dealer/installer, distributor or by KVH. Evidence of tampering or unauthorized repairs will void the warranty. The following are step-by-step procedures for removing and replacing those components that may be serviced.

Figure 4-1 depicts the location of a number of components within the TracVision 4 Antenna Unit.

To help us continually improve the quality and reliability of our systems, please return any failed component to KVH after you receive your replacement part.

Figure 4-1
TracVision 4 Antenna Unit (Baseplate Cut Away)
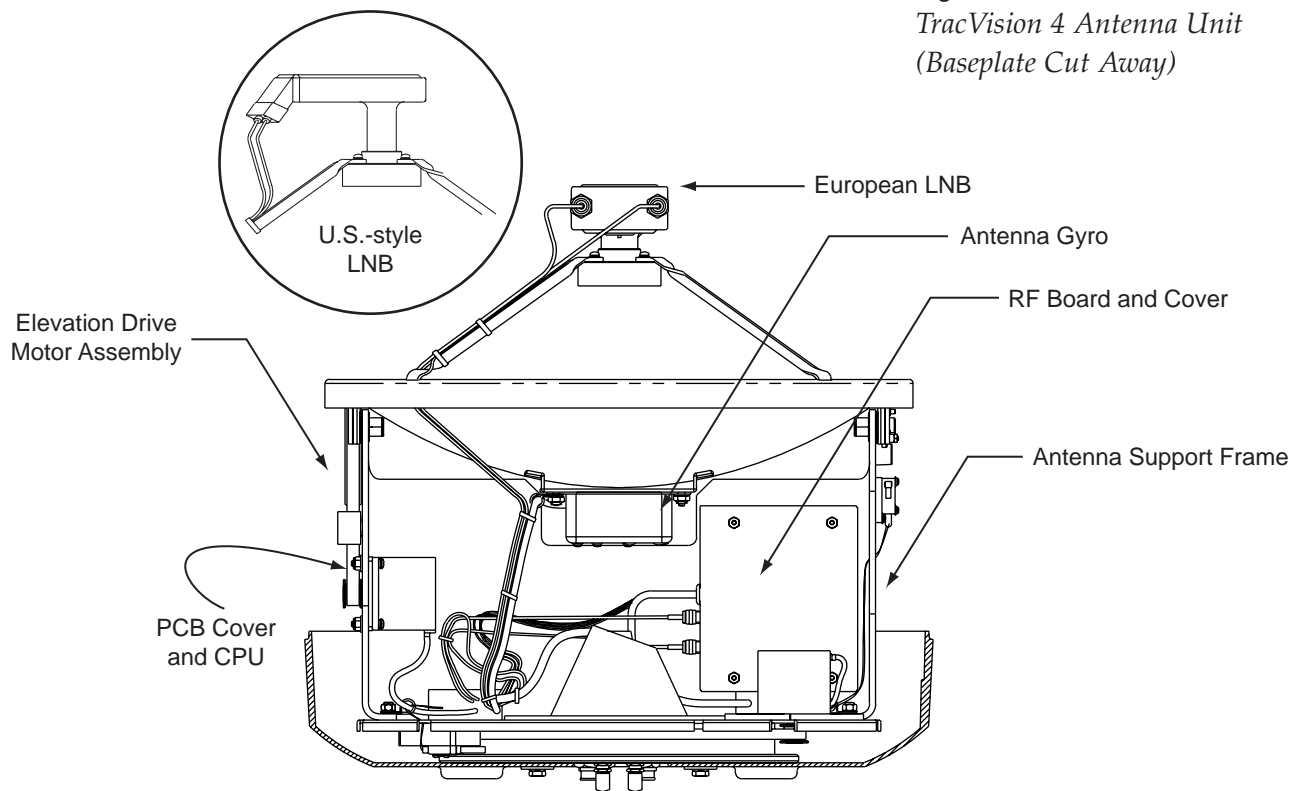
4.4 PCB Removal and Replacement

The printed circuit boards (PCBs) are protected by a cover fastened to the antenna support frame. The cover must be removed to gain access to the main power fuse and the PCB assemblies discussed below. Refer to Figure 4-2; remove (3) nuts and washers from the bottom flange and (4) screws, nuts, and washers from the upper flange. Remove the cover and set aside with the fasteners.

Figure 4-2
PCB Cover Plate Removal

The PCB cover fits snugly over the PCB. When removing or replacing the cover, take care to ensure that the cover does not dislodge any of the Molex connectors as this will cause system errors and improper operation.

Figure 4-3
PCB Connector Locations
(Rear View)

The PCBs are mounted to the antenna elevation mechanism support frame with machine screws and are interconnected by means of keyed Molex connectors. Figure 4-3 shows the PCB arrangement, connector locations, and functions while Figure 4-4 on the next page shows how the printed circuit boards are mounted to the support frame.
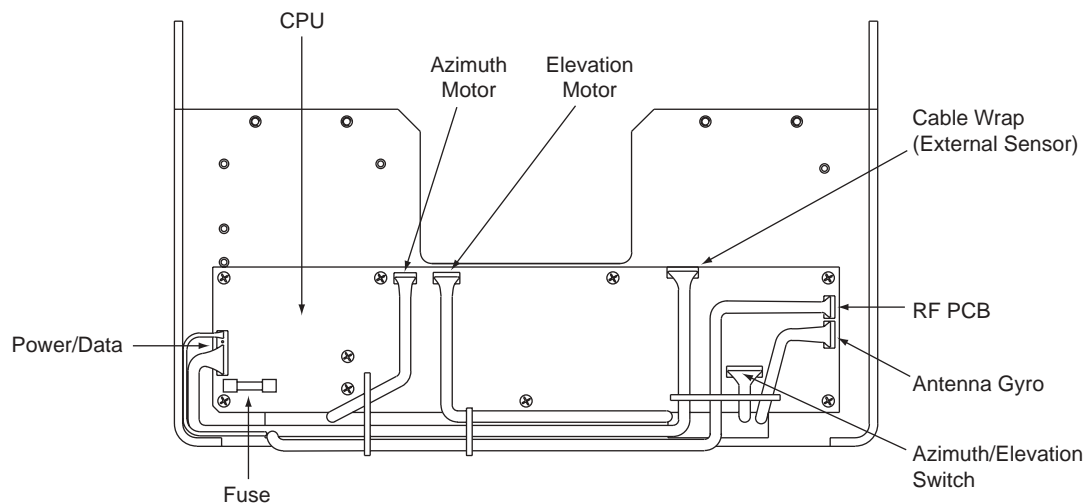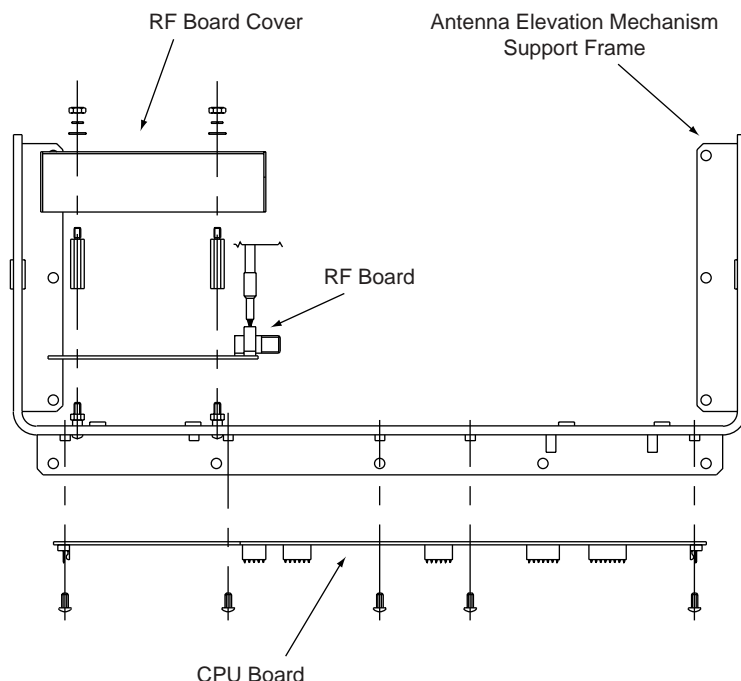
Figure 4-4
PCB Mounting (Top View)

4.4.1 CPU Board

1. Remove the seven Molex connectors from the CPU.

2. Remove seven #6-32 machine screws, lockwashers and flat washers from the PCB.

3. Remove the assembly from the main support.

4. Installation of the replacement assembly is the reverse of this. Reinstall all Molex connectors removed in Step 1.

5. Calibrate the Gyro and LNB as described in Section 4.5.

6. Reinstall your preferred satellites as instructed in *Section 2.5, "Selecting the Active Satellite."*

4.4.2 RF Detector

The RF Detector receives operating voltages from both the CPU board and the IRD (via the RF cable). Ensure that *all* power (including the IRD) is turned off before proceeding.

1. Use a ⁵⁄₁₆" socket to remove the four nuts and washers securing the RF Board cover. Set the hardware and cover aside.

2. Cut the tie-wrap securing the Data and RF Flash cables (pictured in Figure 4-5) to the RF Board.

Figure 4-5
Data and RF Flash Cables
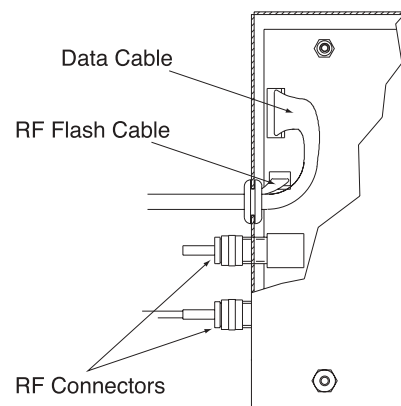
Figure 4-6
RF Cable Ferrules

Ferrules

!
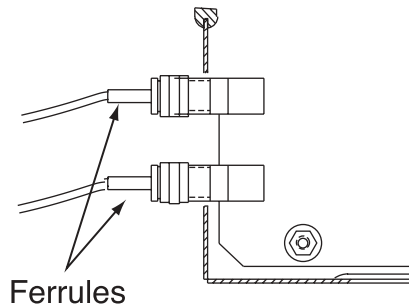
*Failure to hold the ferrules tightly
while loosening the RF connectors
can result in damage to the cables
and reduce the signal quality.*

3. Unplug the Data and RF Flash cables from the RF Board.

4. Observe which RF cable is attached to the top RF connector. If the top RF cable is not already marked with yellow tape, add a piece of tape or some identifying mark so that the RF cables can be plugged into the proper RF connectors on the new RF Board.

5. Remove the two RF cables from the RF connectors with a $\frac{7}{16}$" wrench. Hold the RF connector ferrule while loosening the connectors to avoid excess stress on or twisting of the cables. Refer to Figure 4-6.

6. Remove the four $1\frac{1}{16}$" standoffs with a $\frac{1}{4}$" nut driver/socket and set aside.

7. Remove the RF Board and discard.

8. Install the new RF Board, making certain to align the Board so that the RF connectors are facing to the inside. Figure 4-7 illustrates the alignment of the new RF Board, the standoffs, cables, and cover.

Figure 4-7
New RF Board Installation

Standoff

Data Cable

RF Flash Cable

RF Connectors
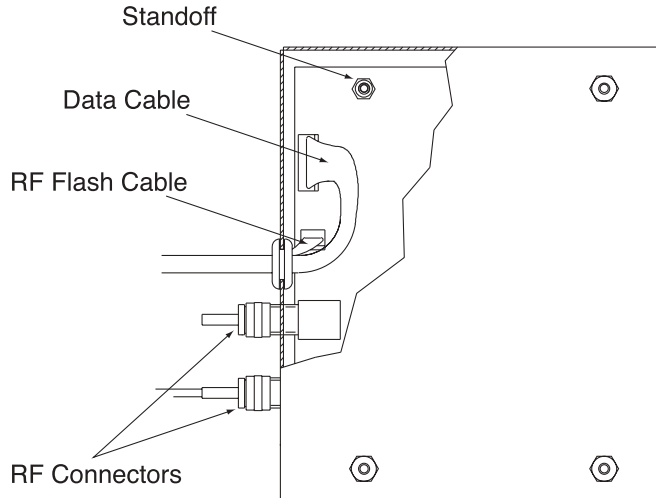
9. Apply a drop of Loctite to one end of the four $1\frac{1}{16}$" standoffs. Install the four standoffs, Loctite-applied end facing the RF Board, using the nut driver to tighten securely.

10. Reattach the RF cables, making certain that the RF cable originally attached to the top RF connector on the old RF Board is connected to the top RF connector on the new RF Board.

11. Attach the Data and RF Flash cables to the RF Board.

12. Insert the split rubber grommet surrounding the Data and RF Flash cables into the small slot on the new RF Board cover.

13. Secure the RF Board cover using the nuts and washers removed in Step 1.

4.5   Antenna Gyro Assembly

1. Remove the printed circuit board (PCB) cover, illustrated in Figure 4-2, using a #2 Phillips screwdriver and a ⅜" nut driver/socket.

2. Use the ⅜" nut driver/socket to remove the four nuts and washers securing the Antenna Gyro to the Antenna Reflector. The nut on the bottom right also secures another P-clip to the Antenna Reflector. Set the nuts and washers aside.

3. Disconnect the 7-pin Molex connector from the PCB. Place the old Antenna Gyro assembly aside.

4. Attach the 7-pin Molex to the new Antenna Gyro assembly.

5. Replace the antenna gyro gasket.

6. Use the nuts removed in Step 2 to attach the new Antenna Gyro to the Antenna Reflector. The bottom right nut should be used to secure the P-clip on the Antenna Gyro cable. The Antenna Gyro should be oriented so that the cable extends from the top of the gyro.

7. Carefully move reflector through its range of motion to ensure that the cable moves freely between the elevation mechanism and the lower assembly. Adjust the Antenna Gyro cable as necessary to ensure proper motion. Also ensure that the cables to the RF PCB do not interfere with the Gyro motion.

Make sure the cable jacket passes through the PCB access slot to protect the wires from the edge of the PCB frame.

Refer to Section 2.6, "Checking Out the System" *for complete details on connecting a PC to the system via the maintenance port.*

Antenna Gyro Calibration

1. With the PC connected to the maintenance port, apply power to the antenna unit.

2. Type **HALT<cr>** *(<cr> indicates a carriage return/ ENTER key)* while the system is performing the limit switch initialization routine . The system will complete the initialization function by finding the azimuth and elevation switch limits and then go to the home position. Record the 8-digital serial number that was displayed in the startup message.

3. Type **DEBUGON<cr>** to enter Debug Mode.

4. Type **ZAP<cr>**.

5. Type **HALT<cr>** while the system is performing the limit switch initialization routine. The system will complete the initialization function by finding the azimuth and elevation switch limits and then go to the home position.

6. Type **DEBUGON<cr>** to enter Debug Mode.

7. Type **=CALGYRO<cr>**.

8. Type **ZAP<cr>**.

9. Type **HALT<cr>** while the system is performing the limit switch initialization routine. The system will complete the initialization function by finding the azimuth and elevation switch limits and then go to the home position.

Steps 10 through 12 will speed the antenna's acquisition of the satellite when GPS input to the antenna is not present. It is not required to complete the Antenna Gyro replacement process but doing so will speed acquisition and improve system performance. If you are not entering the latitude and longitude as described in Steps 10 through 12, continue to Step 13 to complete the process.

10. Determine the latitude and longitude of the vessel location to the nearest degree.

11. Type **GPS,AA,B,CCC,D<cr>** where

    *   AA = Latitude in degrees
    *   B = N or S
    *   CCC = Longitude in degrees
    *   D = E or W

12. Verify that the response has the correct parameters.

13. Type **ZAP** to restart/reinitialize the system.

4.6   Elevation Motor and Belt Replacement

The elevation motor is mounted to the inside of the elevation drive assembly support frame. Machine screw/washer sets hold the drive motor in proper position to maintain proper tension on the toothed drive belt. When adjusting belt tension or changing the belt, do not remove the screws from the motor side, only loosen the external nuts on the belt side. Figure 4-8 shows the arrangement of motor, drive belt, and antenna pulley.
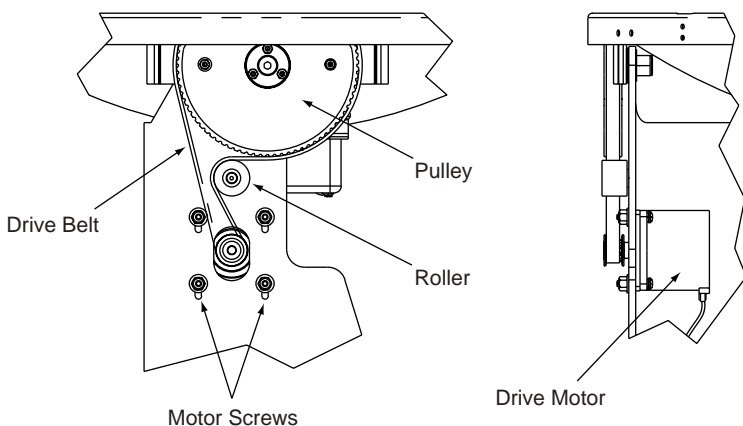
Figure 4-8
Elevation Drive Mechanism

4.6.1   Drive Belt Removal and Replacement

1. Loosen (4) #8-32 self-locking nuts until the motor is free to move upward. Raise the motor to the top of the slots and retighten the nuts to hold it there.

2. Roll the belt over the motor hub while slowly moving the antenna reflector through its vertical travel. Work the belt out from between the antenna pulley and reflector.

3. Carefully work the new belt in between the antenna pulley and the reflector. Ensure that the teeth are on the inside of the belt. Feed the belt behind the roller and over the motor hub. Once the belt is in place, work it back and forth to ensure that the belt is aligned and the teeth are engaged with the motor pulley.

4. Loosen the nuts and gently press downward on the motor hub until the drive belt is at proper tension. Adjust the belt tension for a maximum of $\frac{1}{8}$" (3 mm) deflection with moderate finger pressure between the motor and antenna pulley. Some readjustment may be necessary if the belt tension results in excessive antenna reflector vibration.

5. Tighten the holding nuts.

4.6.2 Elevation Drive Motor Removal and Replacement

1. Remove the Elevation Motor Molex connector from the PCB (illustrated in Figure 4-3). Feed the drive motor cable through the cutout to the front of the elevation drive assembly support frame.

2. Remove the four self-locking nuts and washers holding the motor in position. Withdraw the motor from the elongated slots.

3. Install the new motor with the open holes in the motor mounting plate behind the slots in the frame and the motor connector facing down, as shown in Figure 4-8. Reinstall the self-locking nuts and washers but do not tighten.

4. Raise the motor and work the toothed drive belt over the outer lip of the hub. Press down gently on the motor body while rotating the antenna reflector up and down to ensure free movement.

⚠️

Excessive belt tension may result in antenna reflector vibration.

5. Adjust the belt tension for a maximum of $\frac{1}{8}$" (3 mm) deflection with moderate finger pressure between the hub and gear. Some readjustment may be necessary if the belt tension results in excessive antenna reflector vibration. Tighten the motor's holding nuts.

6. Reconnect the Elevation Motor Molex connector to the PCB.

4.7   Antenna LNB Replacement

The LNB assembly receives preamplifier operating power from the IRD via the RF Detector PCB. Be certain that the IRD is turned off or disconnected from its power source before removing or reconnecting the LNB. The following sections provide replacement instructions for both the European and U.S.-style LNBs.

4.7.1   European LNB Replacement

1. Disconnect both RF coaxial connectors at the LNB. Be sure to hold the cable at the connector's base while unscrewing.

2. Observe the currently set skew value, as marked by the stickers on the LNB and choke assembly.

3. Loosen the wing screws and remove the LNB from the choke assembly (as pictured in Figure 4-9).

4. Place the new LNB into the choke assembly. Adjust the LNB's position so that it has the same skew value observed in Step 2.

5. Apply a small amount of thread-locking compound (e.g., Loctite 425 or equivalent non-permanent threadlocker) to the screw threads and tighten the wing screws to secure the LNB in position.

6. Reconnect the RF connectors. Be sure to hold the cable at the connector's base while fastening.

Figure 4-9
European LNB Removal
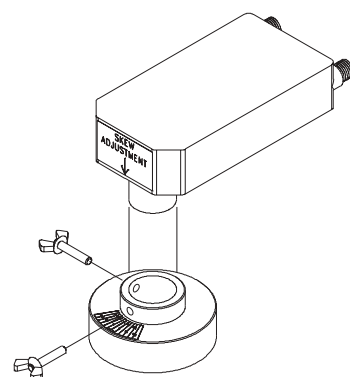
4.7.2   U.S.-style LNB Replacement

1. Disconnect both RF coaxial connectors at the LNB. Be sure to hold the cable at the connector's base while unscrewing.

2. Loosen (2) wing screws on the throat of the choke feed until the LNB is free to slide out. Withdraw the LNB as pictured in Figure 4-10.

3. Insert the replacement LNB as far as it will go. Be sure that it bottoms in the feedhorn. Be careful not to puncture or dislodge the plastic seal covering the LNB throat. Orient the LNB to align with the strut holding the pair of RF cables.

Figure 4-10
U.S.-style LNB Removal
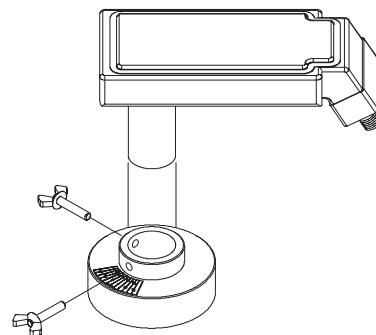
4. Apply a small amount of thread-locking compound (Loctite 425 or equivalent) to the wing screw threads and tighten the screws to secure the LNB in position.

5. Reconnect the RF connectors. Be sure to hold the cable at the connector's base while fastening.

4.8   Preparation for Shipment

If it is necessary to repack the Antenna Unit for shipment, the shipping restraints removed during installation must be replaced. Follow these steps to reinstall the restraints.

When rotating the azimuth mechanism by hand, go slowly! Hitting the mechanical stops with excessive force will damage the azimuth limit switch.

1. Rotate the azimuth mechanism slowly to find the limit switch stop. The front of the antenna should be facing the forward arrow.

2. Rotate the azimuth mechanism 180° in the opposite direction to ensure that the mechanism is not resting on the limit switch stop.

3. With the antenna reflector slightly elevated, slip the narrow end of the elevation shipping restraint beneath the lip of the reflector. Gently wedge the restraint inside the baseplate as shown in Figure 4-11.

Figure 4-11
Elevation Shipping Restraint Placement
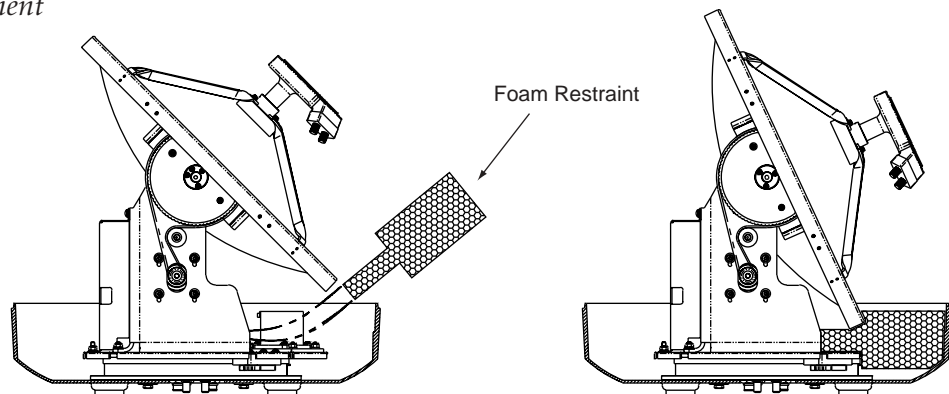
Foam Restraint

4. Insert the two azimuth shipping restraints between the edge of the baseplate and the rotating plate along the side of the antenna frame, as pictured in Figure 4-12.

5. Pack the TracVision 4 unit in its original package.

6. As detailed in the warranty accompanying this product and printed on the last page of this manual, a Return Material Authorization (RMA) number is required prior to the return of the TracVision 4 system to KVH. Contact the KVH Technical Support Department at +1 401 847-3327 or via email at techs@kvh.com to obtain the RMA number. Please review your warranty to familiarize yourself with all requirements, liabilities, and policies.

Figure 4-12
Azimuth Shipping Restraint Placement
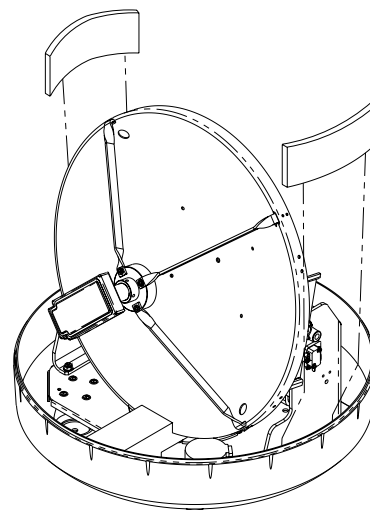
Appendix A
System Specifications

A.1   Antenna Specifications

Physical Characteristics

Antenna Unit	21" (53 cm) h x 19.2" (49 cm) d; 30 lbs (13.6 kg)
Operating temperature	−25° to +55° C (−13° to +130° F)
Storage temperature	−40° to +85° C (−40° to +185° F)
Humidity	to 100% non-condensing

Table A-1

TracVision 4 Antenna Physical Specifications

Input Power

Input	11–16v DC @ 3.5 amps nominal (4.5 amps peak)

Table A-2

TracVision 4 Power Specifications

Antenna System Performance

Minimum EIRP	50-51 dB
Elevation range	15° - 85°
Azimuth range	720°
Pitch/roll range	±15°
Pitch/roll rate	45°/second
Turn rate	45°/second
Yaw	±90° in 10 seconds
Tracking rate	30° per second
Position repeatability	0.1°
Surge/sway/heave	±0.2 G
Shock	20 G, 11 msec
Vibration	0.9 G rms over 5-33 Hz

Table A-3

TracVision 4 Performance Specifications

Appendix B
TracVision 4 Baseplate Mounting Holes Template

A template for the four mounting holes is presented on the following page.

Drill 3/8" (10 mm)
Bolt Hole

9" (229 mm)

Drill 3/8" (10 mm)
Bolt Hole

Appendix B
TracVision 4 Baseplate
Mounting Holes Template

Cut out for Cable Access

9" (229 mm)

3" (80 mm)

9" (229 mm)

Drill 3/8" (10 mm)
Bolt Hole

9" (229 mm)

Drill 3/8" (10 mm)
Bolt Hole
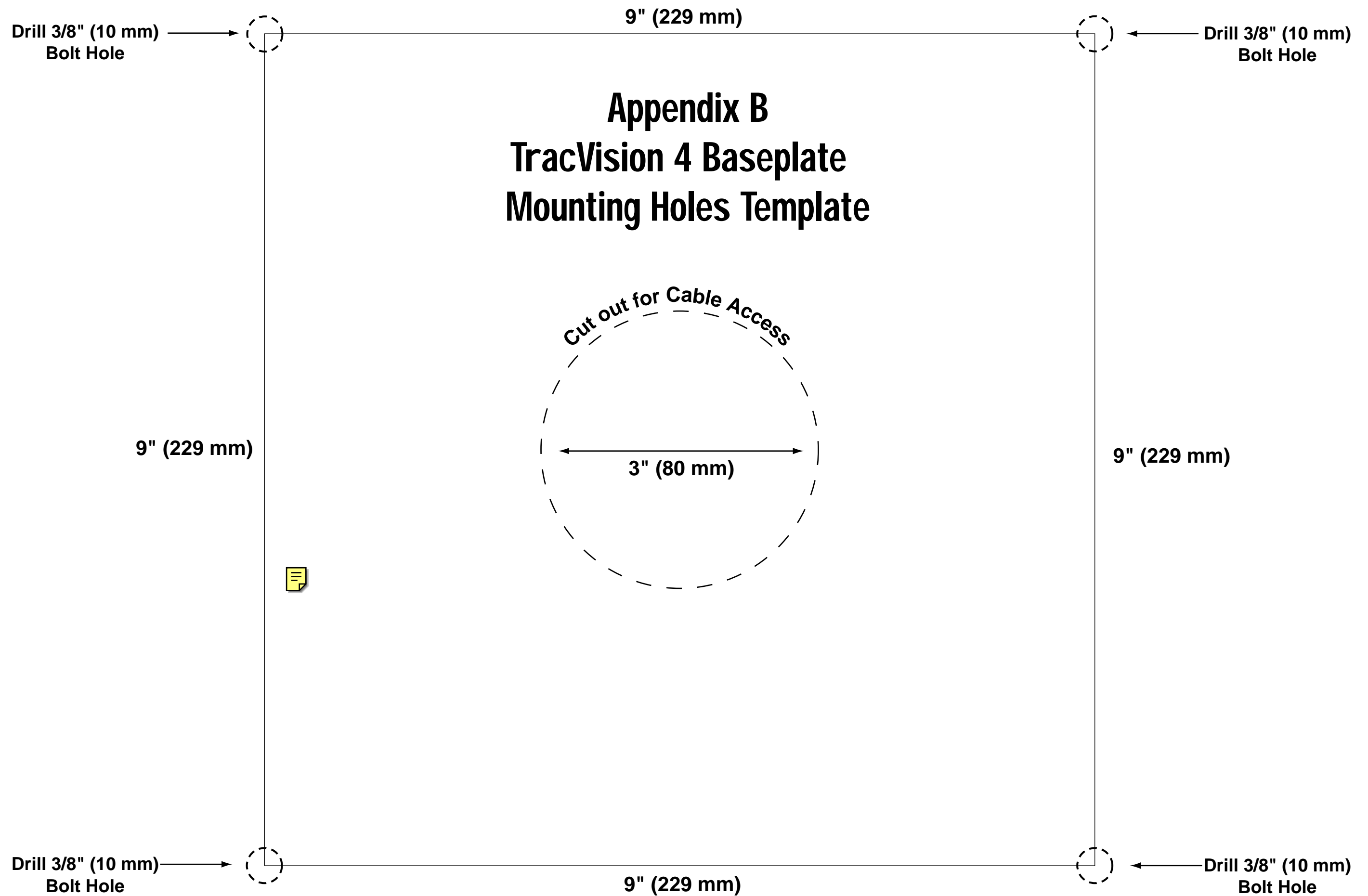
Appendix C
Switchplate Template

Panel Cutout

3/32" (3 mm) dia

2.05" (52 mm)

3.82" (97 mm)

.32" (8 mm)

3.19" (81 mm)

2.36" (60 mm)

.16" (4 mm)
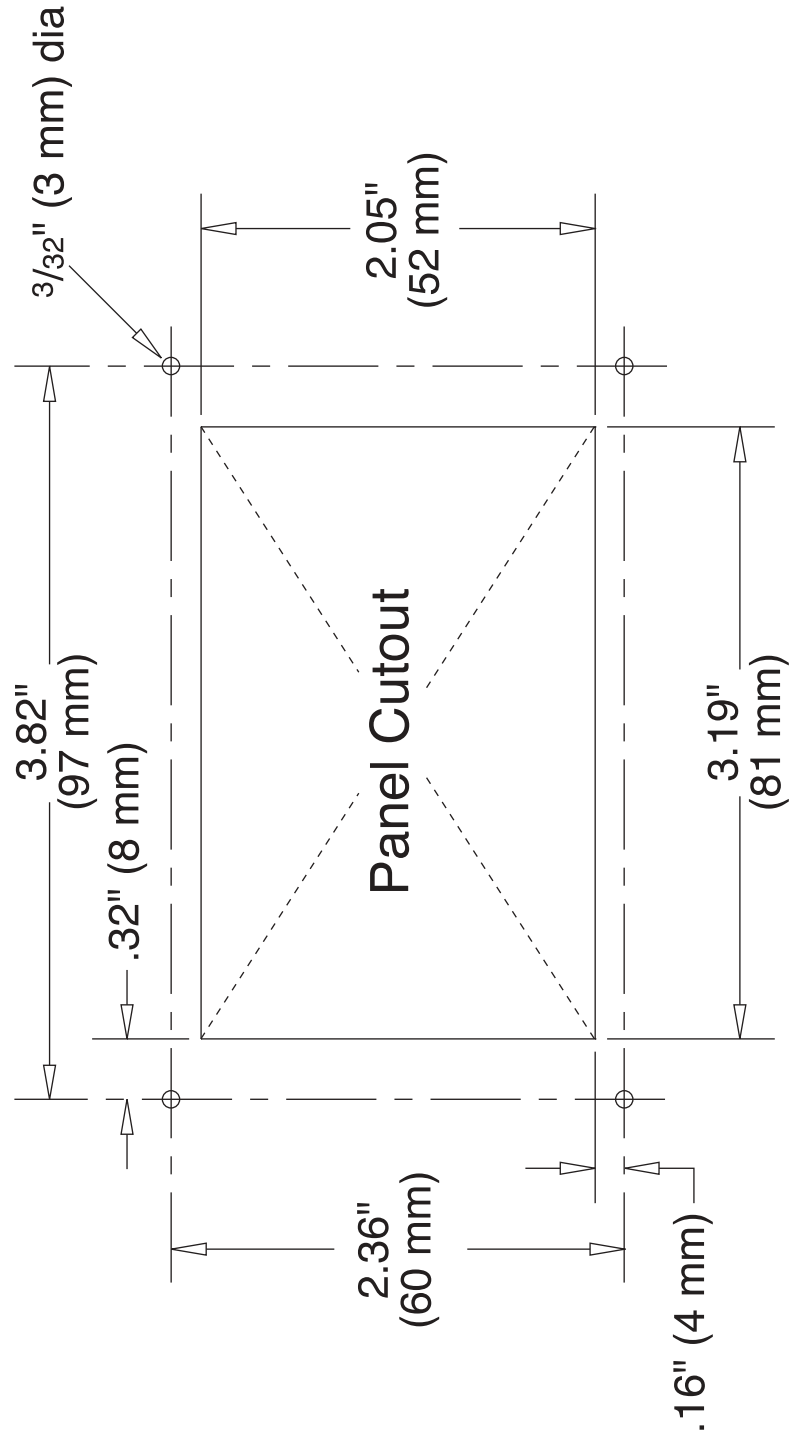
Appendix D
Comprehensive TracVision 4
Wiring Diagram

The comprehensive TracVision **4** wiring diagram is unavailable in PDF format. If you require a copy of this wiring diagram, please contact KVH Technical Support at **+1 401** 847-3327 or via email at techs@kvh.com. A copy of the diagram can be mailed or faxed to you upon request.

Appendix E
Startup Data Sequences

The data on the following pages presents a sample startup
data sequence registered by the TracVision 4 when receiving
signals from DIRECTV, the DISH Network, or ExpressVu. This
sequence may vary based on the software version loaded onto
the TracVision 4 system. This data can be recorded using the data
port and a PC.

```
?PGM
TracVision G4 Controller Rev X - Version X.XX - Serial number XXXXXXXX
NMB Motors
RF: ZAP
*** Initializing RF Controller ***
RF: S,A,H,U,V
RF: SATINSTALL,55,C,57,C
RF: S,A,H,U,V
RF: L,A------------------------------------Identifies Satellite A or B as currently
RF: SATCONFIG                               loaded for acquisition
RF: F,A,12368,20000,67,0X0000,V,U,2----------Satellite configuration data, Satellite A
RF: F,A,12368,20000,67,0X0000,V,U,2
RF: F,A,12238,20000,67,0X0000,H,U,2
RF: F,A,12238,20000,67,0X0000,H,U,2
RF: F,B,12374,20000,34,0X1004,V,U,3----------Satellite configuration data, Satellite B
RF: F,B,12374,20000,34,0X1004,V,U,3
RF: F,B,12381,20000,34,0X1004,H,U,3
RF: F,B,12381,20000,34,0X1004,H,U,3
RF: RF PCB Version 8.1 ---------------------Current RF software revision
RF: I,0,51496,00000,00516,0
RF COMM: PASS-------------------------------PASS is expected
Limit Switch Test
Limit Switch Status: PASS-------------------PASS is expected
*** Initializing Ext Sensor ***
RF: S,A,V,U,V
RF: ?
,=h,0,S,=h,1RF: S,A,H,U,V
RF: S,A,V,U,V
ES Status Timeout
,=h,0,S,=h,1ES Status Timeout
,=h,0,S,=h,1RF: S,A,V,U,V
ES Status Timeout
Running Sensorless. No Ext Sensor Detected---Configuring for sensorless operation
*** Initializing Antenna ***
*** NO GPS-Default Used *** -----------------Accessing default location based on sat install
GPS: UTC: 083000.00, Lat: 4131.00N, Long:  7115.00W
GPS: DSS_119 AZ = 238.9, EL = 22.1-----------Default satellite position based on sat install
```

```
GPS: DSS_101 AZ = 220.9, EL = 33.4
*** Initializing Rate Bias ***
RF: S,A,H,U,V
RF: S,A,H,U,V
A/D: 2480 1973 453
RF: S,A,H,U,V
RF: S,A,V,U,V
RF: S,A,V,U,V
A/D: 2042 2011 423
RF: S,A,V,U,V
A/D: 2036 1994 452
Gyro Bias: Az = 2040.87, El = 2002.51------------Expected range is 1700-2300
Gyro Uncertainty: Az =    3.00, El =    3.00
*** Entering Search Mode 1A ***
RATE BIAS: PASS--------------------------------PASS is expected
Searching for DSS_101, Threshold = 1000
RF: S,A,H,U,V
+POS: 199.9  33.5  118
RF: S,A,V,U,V
RF: S,A,V,U,V
+POS: 209.2  33.4  317
RF: S,A,V,U,V
RF: S,A,H,U,V
RF: S,A,H,U,V
+POS:  34.8  33.5  417
RF: S,A,H,U,V
Satellite Found: AZ = 119.1, EL =  33.4, RF = 1767
*** Entering Tracking ***
+POS: 149.8  33.4  812
RF: S,A,H,U,V
RF: S,A,V,U,V
RF: Freeze DAC = -00561
+POS: 130.4  32.5 2673
+POS: 129.7  31.9 2232
+POS: 129.1  31.4 2298
RF: S,A,V,U,V
RF: Freeze DAC = +00848
+POS: 128.8  31.2 2272
RF: S,A,H,U,V
*** Network ID Check ***------------------------Comparing the tracked satellite's network ID to
RF: S,A,H,U,V                                       the selected satellite's network ID
+POS: 127.4  32.3 2549
+POS: 129.0  31.6 2936
RF: Y,0X0000-----------------------------------Indicates positive satellite identification
*** Tracking DSS_101 ***------------------------Identifies satellite currently tracked
+POS: 128.5  32.0 2822                              (TV broadcast image should be available)
+POS: 129.3  31.2 2864
RF: S,A,H,U,V
+POS: 128.9  32.1 2800
```

Appendix F
Maintenance Port
Parser Commands

TracVision 4 system parser commands are parsed when the system receives an ASCII carriage return (Hex 0D). An ASCII line feed (Hex 0A) is permitted but is ignored in any transmitted command. All system responses are terminated with an ASCII carriage return followed by a line feed and ending with either an acknowledge character (ASCII > (Hex 3E)) or a not-acknowledge character (ASCII ? (Hex 3F)). The parser commands are shown below in boldface capital letters but they are not case-sensitive. In most cases the command is responded to with an echo; that is, if you type **ZAP**, for example, and press "ENTER" the response will be the command you have entered. For other commands the response is specific for each command, such as **VERSION**, **STATUS** or **HELP**.

F.1   System Commands

Software Version

Function:	reports software version and system type
Command:	**VERSION**
Argument:	none
Response:	KVH TVG4 Rev X - Version X.XX - XXX Motors

System Status Report

Function:	reports general system status
Command:	**STATUS**
Argument:	none
Response:	system status string

Initialize/Restart the System

Function:	initializes the system (perform a soft reset)
Command:	**ZAP**
Argument:	none
Response:	echoes the command, then reinitializes the system

Table F-1
System Commands

Help on Parser Commands

Function:	lists parser commands
Command:	**HELP**
Argument:	none
Response:	print a list of all parser commands

Calculate Skew Angle

Function:	report skew angle of the current satellite
Command:	**SKEWANGLE**
Argument:	none
Response:	SKEW ANGLE = XXXX.X

F.2   Manual Positioning Commands

To execute the following commands, first put the Antenna Unit in idle mode by typing **HALT** and pressing "ENTER." Positioning commands may be entered after the antenna comes to rest.

Table F-2

Manual Positioning Commands

Azimuth Angle

Function:	commands a manual azimuth angle that the mechanism moves to
Command:	**AZ,xxxx** (range is 0000-3599)
Argument:	desired azimuth angle of the mechanism relative to external magnetic reference, or baseplate fwd, 000°-359.9°
Response:	echoes the command; mechanism moves at a fixed velocity

Elevation Angle

Function:	commands a manual elevation angle that the mechanism moves to
Command:	**EL,xxx** (range is 100-850)
Argument:	desired elevation angle of the mechanism relative to up, or external sensor attitude reference, 10.0°-85.0°
Response:	echoes the command; mechanism moves at a fixed velocity

Azimuth CW Step

Function:	commands a 0.1 deg CW manual step in azimuth angle
Command:	**6**
Argument:	none
Response:	echoes the command

Azimuth CCW Step

Function:	commands a 0.1 deg CCW manual step in azimuth angle
Command:	**4**
Argument:	none
Response:	echoes the command

Elevation UP Step

Function:	commands a 0.1 deg UP manual step in elevation angle
Command:	**8**
Argument:	none
Response:	echoes the command

Elevation DOWN Step

Function:	commands a 0.1 deg DOWN manual step in elevation angle
Command:	**2**
Argument:	none
Response:	echoes the command

F.3   Operational Commands

Tracking Mode

Function:	starts active tracking of the satellite
Command:	**TRACK**
Argument:	none
Response:	echoes the command

Table F-3
Operational Commands

Idle Mode

Function:	halts active tracking and conical scan, then enters idle mode
Command:	**HALT**
Argument:	none
Response:	echoes the command

Current Cable Wrap Angle

Function:	sets or reports current cable wrap angle, defined as 0° (CCW limit) to 700° (CW limit); the value is expressed as 0000-7000 with an implied decimal
Command:	**WRAPANGLE,xxxx**
Argument:	the desired cable wrap angle setting
Response:	Wrap Angle = xxxx

F.4   Tracking and Conical Scan Commands

Table F-4

Tracking and Conical Scan Commands

Target Location

Function:	reports the target location in antenna frame. Data format is E### for elevation in degrees 000-900 and A#### for azimuth in degrees 0000-3599 with implied decimals
Command:	**TGTLOCATION**
Argument:	none
Response:	Target Location = A = E###, A#### B = E###, A####

Analog Signal Strength Report

Function:	reports signal strength from RF detector circuit in A/D counts (000-FFF Hex)
Command:	**SIGLEVEL**
Argument:	none
Response:	Signal Strength = xxxx

F.5   RF Board Commands

Serial Communications, Status/Polarization Report, Tone Changes

Function:	start serial communications, reports status & polarization/tone changes
Command:	**@S**
Response:	S,s,p,b,m <cr> every 5 seconds until <cr> is returned from system software
Where:	s = Satellite (a = Primary, b = Secondary) p = Polarization (v = Vertical, h = Horizontal, x = No LNB Power) b = Band (h = High Band, l = Low Band, u = USA) m = Mode (v = Valid, i = Invalid)*

* The Mode bit is used to evaluate the Satellite, Polarization & Band combination vs. the Frequency/Symbol Rate/FEC currently in RAM. This bit will be set to invalid if the Frequency for the selected combination is set to 0x0000; otherwise it will be set to valid. For example the Mode bit will be set to invalid when the frequency is set to 00000 to indicate that there is not a frequency to track for the LNB tone and voltage setting.

Report RF Tracking Parameters

Function:	reports all RF tracking parameters for primary & secondary satellites*
Command:	**@SATCONFIG**
Response:	F,x,fffff,S,C,ID,P,B,D <cr>
Where:	x = Satellite (a = Primary, b = Secondary) fffff = Frequency in MHz (00000 and 10700 to 12700) S = Symbol rate in Mbit/sec (1000 to 29999) C = FEC code rate (valid rates = 12, 23, 34, 56, 67, 78) ID = Satellite Network ID in hexidecimal format (valid range = 0x0000 to 0xffff hex) P = LNB Polarization (v = Vertical, h = Horizontal) B = the LNB down conversion frequency (l = low, h = high, u = USA) D = decoding type (0 = test, 1 = DSS-A, 2 = DSS-B, 3 = DVB)

* This command dumps all eight combinations of the Satellite/Freq/Sym/FEC/ID/POL/Band/Decode currently stored in RAM.

Table F-5

RF Board Commands

Set RF Tracking Parameters

Function:	sets RF tracking parameter
Command:	**@SATCONFIG,X,N,F,S,C,ID,P,B,D<cr>**
Response:	Echoes the input data
Where:	@SATCONFIG = directs data to the RF Board
	X = satellite location A or B
	N = satellite table # (98 & 99 are slots for user-configured satellites; *see Table F-6 for a complete list*)
	F = frequency in MHz (either 00000 or a range from 10700 - 12700)
	S = the satellite transponder symbol rate in Mbit/sec (01000 - 29999)
	C = the FEC code (e.g., 12, 23, 34, 56, 67, 78)
	ID = the satellite network ID in hexidecimal format (0x####)
	P = the LNB polarization (v = vertical, h = horizontal)
	B = the LNB down conversion frequency (l = low, h = high, u = USA)
	D = decoding type (0 = test, 1 = DSS-A, 2 = DSS-B, 3 = DVB)

Table F-6

Satellite Table Listing

Sat #	Sat Name	Sat Position
1	Astra 1	19.2° E
2	Hotbird	13° E
3	Astra 2N	28° E
4	Astra 2S	28° E
5	Thor	1° W
6	Sirius	5° E
7	Hispasat	30° W
17	Expressvu	91° W
18	Echo_61	61.5° W
19	Echo_110	110° W
20	Echo_119	119° W
21	Echo_148	148° W
22	DSS_101	101° W
24	DSS_119	119° W
98	User 1	
99	User 2	

ID Match/Decoded Network ID

Function:	report ID match and decoded network ID
Command:	**@CHECKID**
Response:	Y,0X#### N,0X#### Y,NoID N,NoID
Where:	Y = yes N = no 0X#### = network ID NoID = satellite unidentified

F.6   Installation Commands

Set/Report GPS Position

Function:	reports or sets default GPS position
Command:	**GPS\<cr\>** **GPS,XX,D,YYY,E**
Response:	GPS = XXD YYYE\<cr\> GPS: XXD YYYE
Where:	XX = latitude (0-90) D = S (South) or N (North) YYY = longitude (0-180) E = E (East) or W (West)

Report Satellite Names

Function:	report names for satellites A and B
Command:	**SATINSTALL**
Response:	SATINSTALL,\<sat_a_name\>,\<sat_b_name\>

Report Configured Satellite Names

Function:	report names for all configured satellites
Command:	**SATLISTA**
Response:	SATLISTA,\<sat_name1\>,...,\<sat_nameX\>

Report Valid Satellite B Selections

Function:	report names for all valid satellite B selections for a given satellite A selection
Command:	**SATLISTB,\<sat_a_name\>**
Response:	SATLISTB,\<sat_a_name\>,\<sat_b_name1\>..., \<sat_b_nameX\>

Install Satellite Pair

Function:	installs satellites A and B as the satellite pair
Command:	**SATINSTALL,\<sat_a_name\>,\<sat_b_name\>**
Response:	If valid pair, echoes the input data If invalid pair, returns error message

Configure Longitude of a User-configurable Satellite

Function:	configures one of the user-configurable satellites with the longitude provided
Command:	**SATCONFIG,USERX,YYY,Z,D,L<cr>**
Response:	If valid pair, echoes the input data If invalid pair, returns error message
Where:	X = 1 or 2 YYY = longitude (0-180) Z = E (East) or W (West) D = decoding type (0 = test, 1 = DSS-A, 2 = DSS-B, 3 = DVB) L = LNB polarization (C = circular, L = linear)

<p align="right">Table F-8
Debug Commands</p>

F.7   Debug Commands

Report Offset Angles

Function:	reports system offset angles
Command:	**OFFSETS** **OFFSETS,XXXXX,YYYY**
Response:	Offsets = XXXXX.X XXXXX.X
Where:	X = new azimuth offset (-1800 - 1800) Y = new elevation angle (-450 - 450)

Apply Default Values to Default Satellites

Function:	updates the default satellites to the default values
Command:	**SATPAIR,X**
Response:	displays numerous frequency commands and reports "Satellite Installation Complete"
Where:	X = 0 (satellites default to Astra and Hotbird) or X = 1 (satellites default to ExpressVu and EchoStar 119) or X = 2 (satellites default to DSS_101 and DSS_119)

Report Last Satellite Tracked/Update Value

Function:	reports the last satellite tracked or updates the last tracked satellite to the value input if it is different from the current value
Command:	**LASTSAT** **LASTSAT,X**
Response:	Last = <sat_name>
Where:	X = A (updates to satellite A) or X = B (updates to satellite B)

KVH Industries Limited Warranty
TracVision 4

Limited Warranty on Hardware

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