

TRACVISION[®]
BY KVH INDUSTRIES

TracVision M9 Standard Configuration



TracVision M9 Installation Guide

PLEASE READ!

Important Addendum to Your Product Manual

This addendum applies to the TracVision® M9 Installation Guide.

Input Power Requirements

The MCU input power requirements specified on page 11 of the Installation Guide are incomplete. The correct power requirements should read as follows:

Connect a power cable to 24 VDC (2.5 amps **continuous**) vessel power. Power supplied to the antenna **MUST NOT** fall below 18 VDC or exceed 30 VDC.

NOTE: If a 24 VDC power supply is not available, install an AC/DC converter that supplies 24 VDC (KVH part #19-0488 or equivalent).

Be sure to connect the MCU to a power supply that meets these minimum power requirements.





PLEASE READ! Important Addendum to Your Product Manual

This addendum applies to the TracVision M9.

Grounding Kit

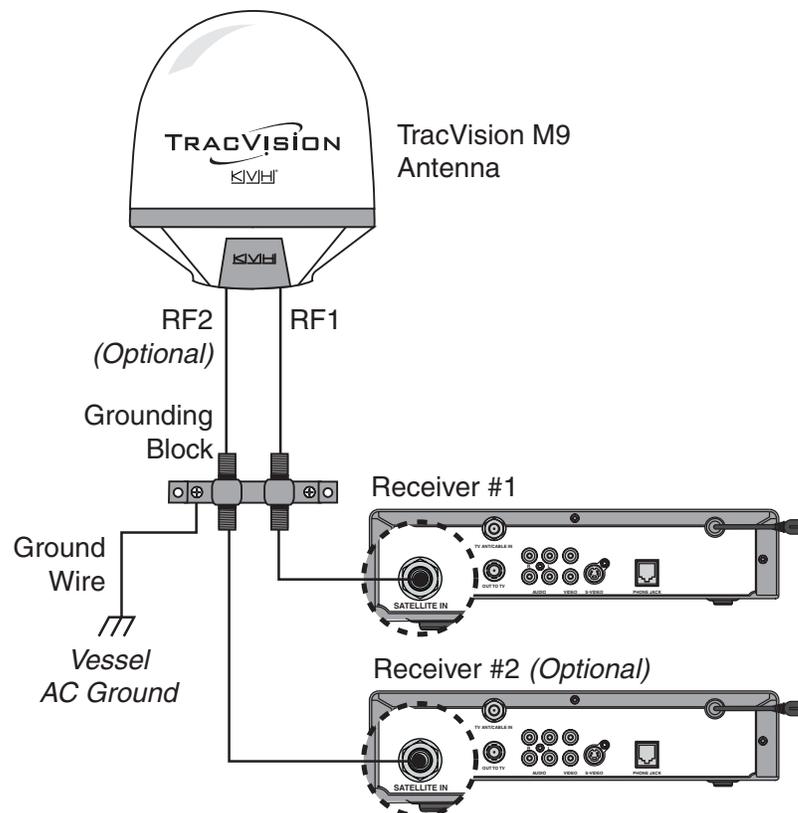
A grounding kit is now included with your TracVision system. When installed properly, this kit will provide a single ground point for the system and provide lightning protection.



Grounding Block

To install the grounding kit, follow the steps below.

- a. Connect the grounding block in-line with the antenna's RF cable(s), between the antenna and the receiver(s), as shown in the diagram below.
- b. Mount the grounding block inside the vessel.
- c. Attach the supplied ground wire to either ground screw on the grounding block. Connect the other end of the wire to vessel AC ground.



TracVision M9 Installation Guide

Standard Configuration with Master Control Unit (MCU)

These instructions explain how to install the TracVision M9 satellite TV antenna system on a vessel. Complete instructions on how to use the system are provided in the *User's Guide*.

Installation Steps

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Who Should Install the System?

To ensure a safe and effective installation, KVH recommends that a KVH-authorized marine technician install the TracVision antenna. KVH-authorized technicians have the tools and electronics expertise necessary to install the system. To find a technician near you, visit www.kvh.com/wheretogetservice.

Antenna LNB Types

The installation process differs slightly depending on the type of LNB (low noise block) that is installed in the antenna (circular or linear). These differences are noted throughout this manual. Appendix C on page 25 notes the type of LNB required for each region and satellite.

Technical Support

If you need technical assistance, please contact KVH Technical Support:

North/South America, Australia:

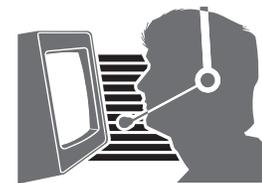
Phone: +1 401 847-3327

E-mail: techs@kvh.com

Europe, Middle East, Asia:

Phone: +45 45 160 180

E-mail: support@kvh.dk



1 Inspect Parts and Get Tools

Before you begin, follow these steps to make sure you have everything you need to complete the installation.

- a. Unpack the box and ensure it contains everything shown on the *Kitpack Contents List*. Save the packaging for future use.

IMPORTANT!

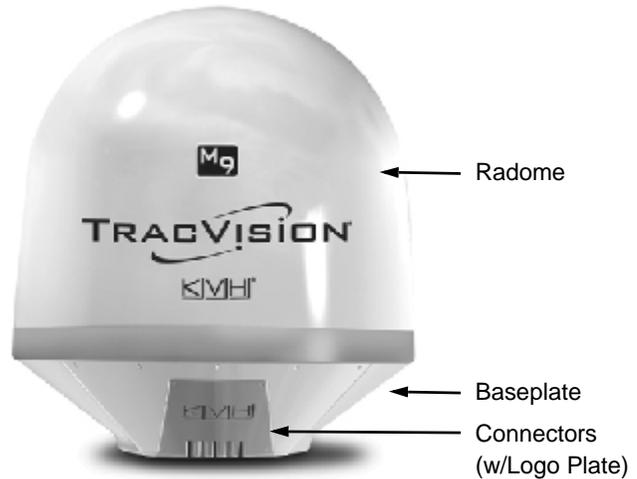
Always lift the antenna by the baseplate and never by the radome or any portion of the internal antenna assembly (see Figure 1).

- b. Carefully examine all of the supplied parts to ensure nothing was damaged in shipment.
- c. Gather all of the tools and materials listed below. You will need these items to complete the installation.

- Flat-head and Phillips-head screwdrivers
- Electric drill and 1/2" (13 mm) and #29 drill bits
- 17 mm socket wrench
- 9/16" open-end wrench
- Light hammer and center punch
- Adhesive tape
- Scriber or pencil
- Wire strippers
- 15-amp quick-tripping circuit breaker
- RG-6 or RG-11 RF coax cable(s) with Snap-N-Seal[®] F-connectors for connecting the antenna to the receiver(s) (see Step 4e on page 6 to determine the number and type of cables required)
- Connector installation tool (Augat IT1000 - KVH part #19-0242)
- Power cable for connecting vessel power to the MCU (see Figure 2)
- Satellite TV receiver and TV

Figure 1: TracVision M9 System Components

Antenna



MCU (Master Control Unit)

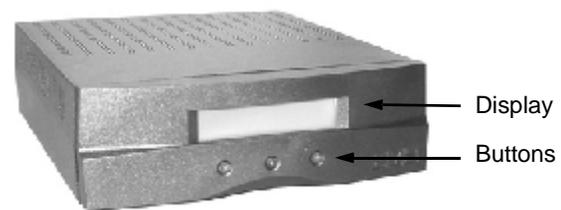


Figure 2: Power Cable Guidelines

Cable Length	Use Cable Gauge
< 40 ft (12 m)	12AWG (4mm ²)
40-70 ft (12-21 m)	10AWG (6mm ²)

2 Plan the Antenna Installation

Before you begin, consider the following antenna installation guidelines:

- Minimize blockage. The antenna requires a clear view of the sky to receive satellite TV (see Figure 3). The fewer obstructions, the better the system will perform.
- Make sure the mounting surface is wide enough to accommodate the antenna's base (see Figure 4). Also make sure it is flat, level, strong enough to support the antenna's weight (85 lbs, 38.6 kg), and rigid enough to withstand vibration.
- Be sure to preserve enough free space outside the access hatch to allow a technician to remove the hatch and perform maintenance.
- Select a location that is as close as possible to the intersection of the vessel's fore-and-aft centerline and midships.
- Select a location that is not too high above the waterline. Limit the height above the waterline to less than 1/2 the vessel's length.
- Do not mount the antenna at the same level as the radar because the radar's energy might overload the antenna. Ideally, you should mount the antenna 4 ft (1.2 m) above and 4 ft (1.2 m) away from the radar.
- Select a location that is at least 4 ft (1.2 m) away from any magnetized materials, large ferrous masses, cranes, engines, derricks, other antennas, devices with DC motors, electric winches, high-amperage cables, or battery banks. The antenna's internal compass sensor performs best in a benign magnetic environment.
- If you are mounting the antenna on a steel vessel, use an aluminum, brass, plastic, or wood platform (NOT steel or iron) to position the antenna at least 4 ft (1.2 m) above and 6 ft (1.8 m) away from the steel surface.

Figure 3: Blockage from Obstruction

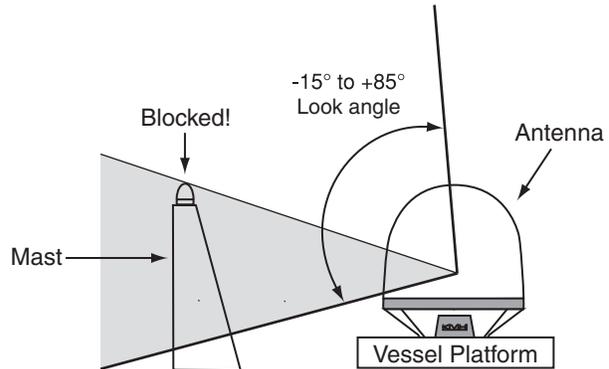
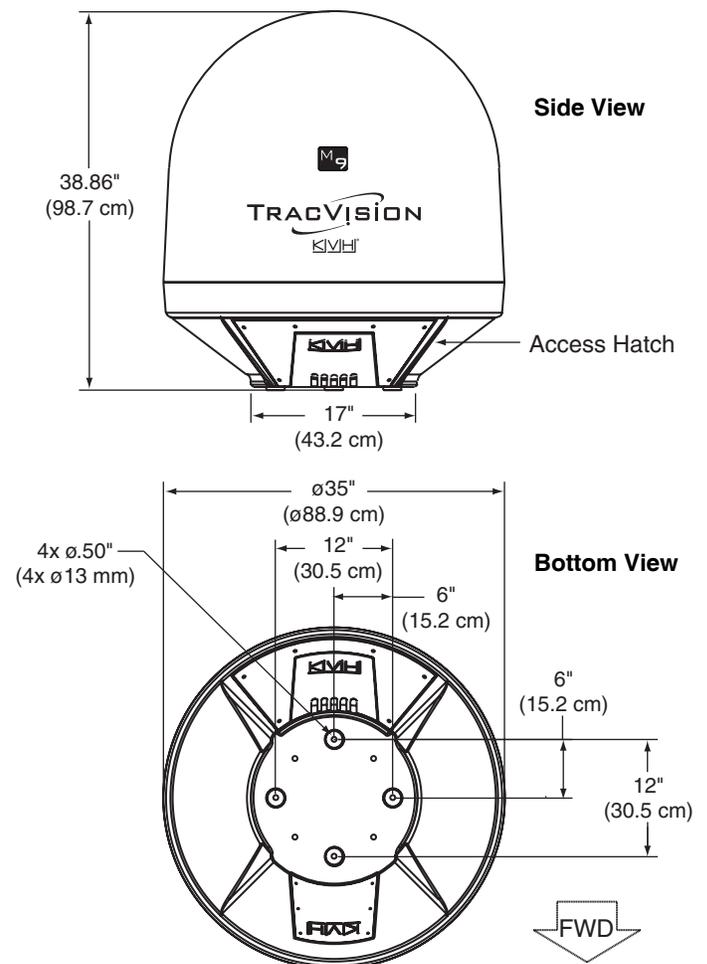


Figure 4: Antenna Dimensions



3 Plan the MCU Installation

Before you begin, consider the following MCU installation guidelines:

- Select an MCU mounting location in a dry, well-ventilated area belowdecks away from any heat sources or salt spray.
- Be sure the MCU's front panel will be easily accessible to the user. The owner will use the MCU's buttons to control the antenna.
- Be sure to leave enough room at the MCU's rear panel for connecting the cables (see Figure 5 for MCU dimensions).
- Since the supplied data/power cable is 100 ft (30 m) long, the MCU should be located within 100 ft (30 m) of the antenna.
- The kitpack contains parts for mounting the MCU either to a horizontal surface (using Velcro) or to a vertical surface (using the supplied flush mount bracket).

Prepare the MCU Mounting Site (Flush Mount only)

NOTE: Skip this step if you plan to mount the MCU to a horizontal surface instead.

- Using the MCU flush mounting template provided at the end of this manual, mark and cut out a hole in the mounting surface to accommodate the flush mount bracket (see Figure 6).
- Using the same template, mark the locations for the four MCU mounting holes.
- Using a #29 drill bit, drill a 0.136" (3.45 mm) hole at the four mounting hole locations. Later, you will mount the MCU using four #8 screws.

Figure 5: MCU Dimensions

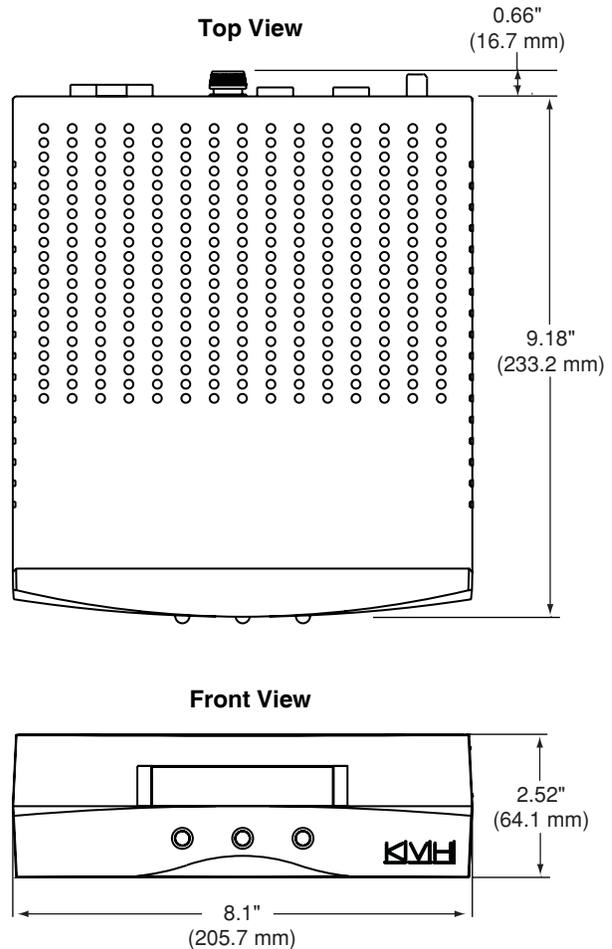
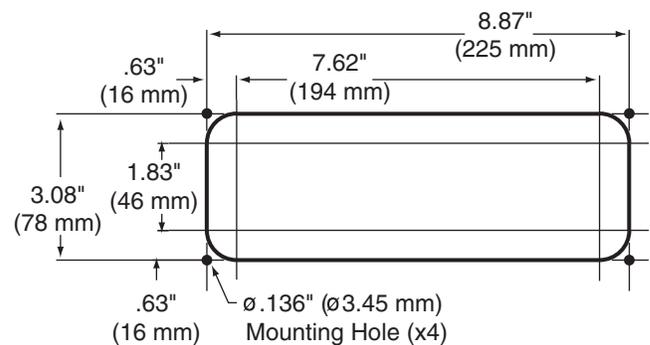


Figure 6: MCU Mounting Holes Layout



4 Prepare the Antenna Site

Once you have identified a suitable antenna mounting site, according to the guidelines provided in Step 2, follow these steps to drill the mounting holes and cable access hole to prepare the site for installation.

- a. Unfold the antenna mounting template (supplied in the Customer Welcome Kit) and place it onto the mounting surface. Make sure the "FWD" (forward) arrow points toward the bow and is parallel to the vessel's centerline (see Figure 7).

NOTE: You don't need to mount the antenna exactly on the vessel's centerline, but the antenna's forward arrow must be parallel to it.

- b. Use the template to mark the locations for the four mounting holes on the mounting surface.
- c. Drill a 1/2" (13 mm) hole at the four mounting hole locations you marked in Step 4b. Later, you will insert four M10 bolts from below to secure the antenna to the mounting surface.
- d. Mark a location for the cable access hole, either in the center of the antenna mounting hole pattern or in an area aft of the antenna. Later, you will route the data/power and RF cables through this hole and into the vessel.

IMPORTANT!

If you wish to route the cables through the bottom of the antenna's baseplate, rather than connecting at the side, you will need to modify the antenna's baseplate. See Appendix A on page 19 for details.

- e. Drill the cable access hole in the location you marked in Step 4d. Be sure to size the hole appropriately to accommodate the data/power cable and all required RF cables (see Figure 8 and Figure 9 to determine the number and type of RF cables required). Smooth the edges of the hole to protect the cables.

Figure 7: Antenna Mounting Holes Layout

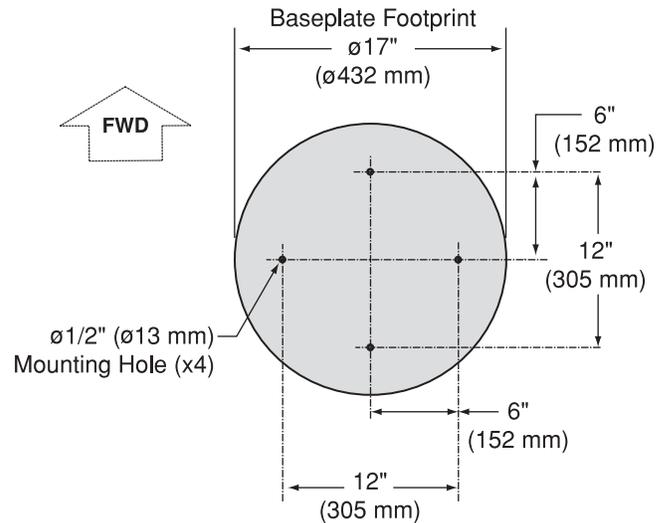


Figure 8: Number of RF Coax Cables Required

Connecting to:	# RF Cables
<i>System with Dual LNB</i>	
1 receiver	1
2 or more receivers	2*
<i>System with Quad LNB (Europe Only)</i>	
1 receiver	1
2 receivers	2
3 receivers	3
4 or more receivers	4**

* Multiswitch required for 3 or more receivers.
 ** Multiswitch required for 5 or more receivers.
 See Appendix B on page 23 for details.

Figure 9: RF Cable Guidelines

Cable Length	Use Cable Type
≤ 75 ft (23 m)	RG-6
> 75 ft (23 m)	RG-11

5 Wire the Antenna

Follow these steps to connect the data/power and RF cables to the antenna.

IMPORTANT!

If you wish to route the cables through the bottom of the antenna's baseplate, rather than connecting at the side, see Appendix A on page 19 for supplemental instructions.

- Route the data/power and RF cables belowdecks through the cable access hole. Leave an adequate service loop, approximately 8" (20 cm) of slack, in the cables for easy serviceability. Later, you will connect the data/power cable to the MCU and the RF cable(s) to the receiver(s).
- Position the antenna in place over the mounting holes with the baseplate's connectors (see Figure 10) facing the stern.
- Connect the data/power cable to the antenna (see Figure 11 and Figure 12); hand-tighten.

IMPORTANT!

Be sure to properly align the data/power cable with the antenna's baseplate connector before tightening. Connecting the cable at an angle may damage the cable's center tines.

- Using a 9/16" wrench, connect the RF cable(s) to the antenna. If you need to connect only one RF cable, connect the cable to the antenna's RF1 connector (see Figure 12). Connect any additional RF cables to the RF2, RF3, and RF4 connectors.

TIP: If you connect two or more RF cables, label both ends of each cable to match the connector. This will make it easier to identify the cables later.

- Place the rear logo plate over the cables, so each cable exits the proper opening (see Figure 13). Using six M4 screws, attach the logo plate to the baseplate.

Figure 10: Antenna Connectors

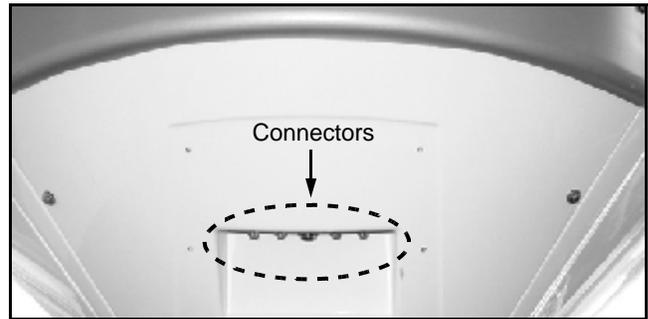


Figure 11: Data/Power Cable Connections

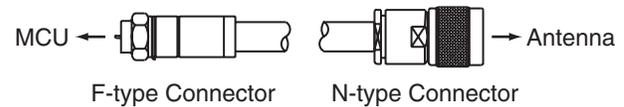


Figure 12: Antenna Baseplate Cable Connections

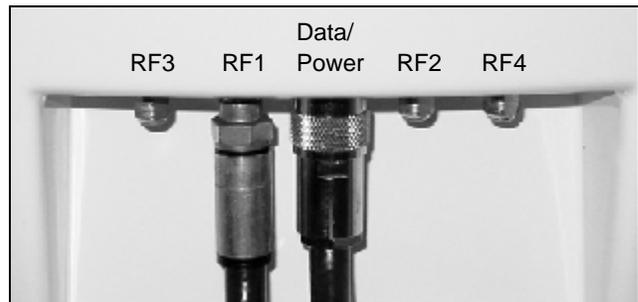
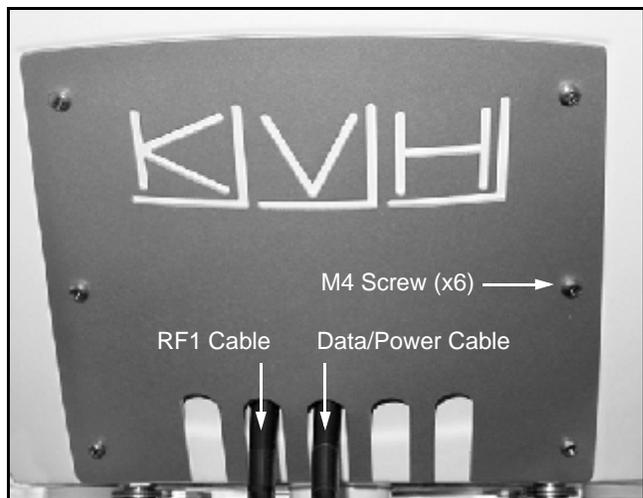


Figure 13: Rear Logo Plate Installed



6 Mount the Antenna

Follow these steps to mount the antenna to the mounting surface.

- a. Place the antenna baseplate over the holes drilled in the mounting surface.
- b. Make sure the four holes in the baseplate line up with the four holes in the mounting surface. Also make sure the connectors face the stern.
- c. At each of the four baseplate mounting holes, place an M10 lock washer and flat washer on an M10 bolt and insert the bolt into the hole from below (see Figure 14).

IMPORTANT!

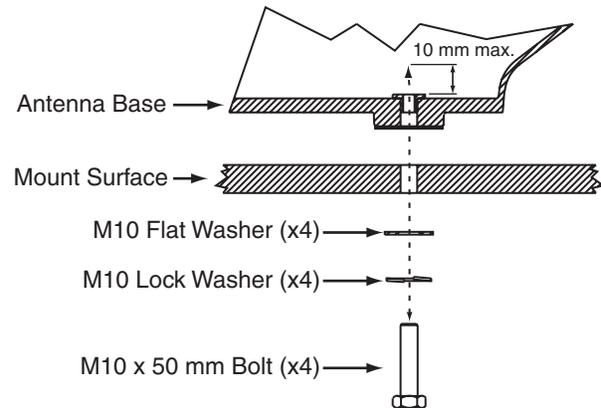
Make sure the mounting screws do not extend further than 0.4" (10 mm) into the antenna's baseplate. Inserting the screws any further will damage the antenna.

- d. Tighten all four bolts until the four rubber feet are bottomed against the mounting surface.

IMPORTANT!

Do not block the four small drain holes in the bottom of the antenna. These drain holes ensure that any moisture within the antenna will be able to escape.

Figure 14: Mounting the Antenna (Side View)



7 Remove the Restraints

Inside the antenna, three heavy-duty tie-wraps prevent the antenna assembly from moving during shipment. Follow these steps to remove these shipping restraints.

- a. Remove the eight #10-32 Phillips-head screws securing the radome to the baseplate (see Figure 15). Carefully lift the radome straight up until clear of the antenna assembly and set it aside in a safe place.

TIP: If you keep the radome topside, secure it with a lanyard to prevent it from falling overboard.

- b. Unfasten the two tie-wraps securing the reflector to the antenna frame (see Figure 16). To unfasten the tie-wraps, release the tab with a flat-head screwdriver.
- c. Unfasten the tie-wrap securing the antenna frame to the sensor bracket (see Figure 17).
- d. Save the tie-wraps for future use; the customer will need to reinstall them if he/she needs to relocate or reship the antenna.
- e. Reinstall the radome onto the antenna. Secure in place with the eight #10-32 screws you removed in Step 7a.
- f. Install a protective plastic screw cap (supplied in the kitpack) over each radome screw.

Figure 15: Removing the Radome

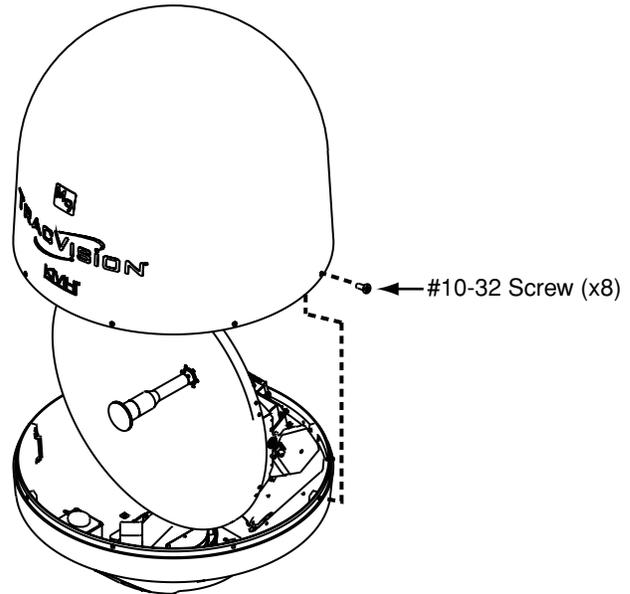


Figure 16: Locations of Shipping Restraints

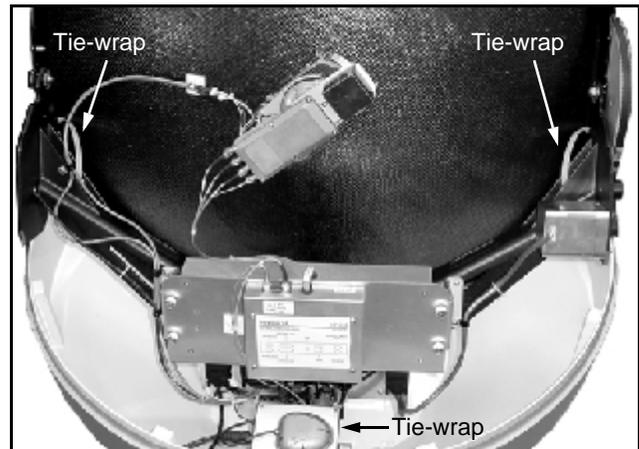
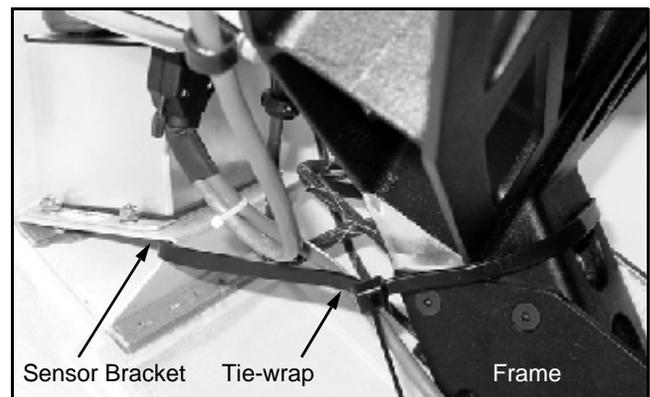


Figure 17: Close-up of Antenna Frame Shipping Restraint



8 Wire the Receiver(s) and MCU

Follow these steps to connect the antenna to the belowdecks equipment.

IMPORTANT!

If you wish to connect **three or more** receivers to the antenna, see Appendix B on page 23.

NOTE: System wiring diagrams are provided in Appendix F on page 31.

- a. If you are connecting two receivers to the TracVision system, decide which receiver will be the primary receiver. The primary receiver controls satellite selection.

NOTE: The secondary receiver will only be able to select a channel carried on the satellite that is currently selected on the primary receiver.

- b. Connect the RF1 cable from the antenna to the "Satellite In" jack on the primary receiver (see Figure 18).
- c. If you are connecting two receivers, connect the RF2 cable from the antenna to the "Satellite In" jack on the secondary receiver.

IMPORTANT!

Be sure all receivers are grounded properly. Connect a ground wire from the chassis of each receiver to the MCU's DC return. This will ensure all system grounds are the same potential.

- d. Connect the receiver(s) to the customer's television(s). Follow the instructions in the receiver's manual.
- e. Connect the data/power cable from the antenna to the "Output to Antenna" jack on the MCU (see Figure 19). Do not overtighten the connection; finger-tight is sufficient.

Figure 18: Receiver Wiring

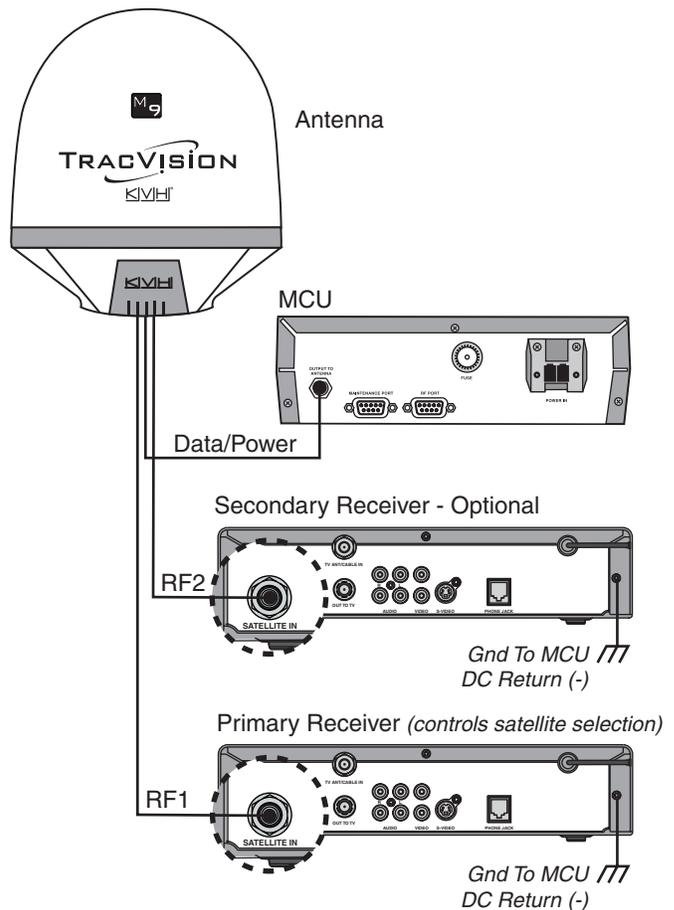


Figure 19: MCU Rear Panel



9 Connect Power

Follow these steps to connect power to the MCU. The MCU supplies power to the antenna.

- a. Before you begin, disconnect vessel power.

	CAUTION
<p>For your own safety, disconnect vessel power and make sure the circuit is dead before you connect any power wires.</p>	

- b. Connect a power cable to 24 VDC (2.5 amps) vessel power (for cable specifications, see Figure 2 on page 3). Power supplied to the antenna **MUST NOT** fall below 18 VDC or exceed 30 VDC.

NOTE: If a 24 VDC power supply is not available, install an AC/DC converter that supplies 24 VDC (KVH part #19-0488 or equivalent).

- c. KVH recommends you install a 15-amp circuit breaker between power and the MCU. The MCU does not have an on/off switch.
- d. Install the ferrite coil, supplied in the kitpack, onto your vessel power cable to help reduce conducted emissions. Make two loops in the cable and clamp the coil around the loops (see Figure 20). This ferrite coil must be installed to comply with the CE standard.
- e. Find the plastic power plug supplied in the kitpack (see Figure 21). Insert your vessel power wires into the plug's power (+) and ground (-) terminals. Tighten the plug's terminal screws to secure the wires in place.
- f. Plug the power connector plug into the "Power In" jack on the MCU. Secure in place with the two retaining screws.
- g. Connect the MCU ground wire (see Figure 22) to a suitable ground point.

Figure 20: Ferrite Coil Clamped onto Power Cable

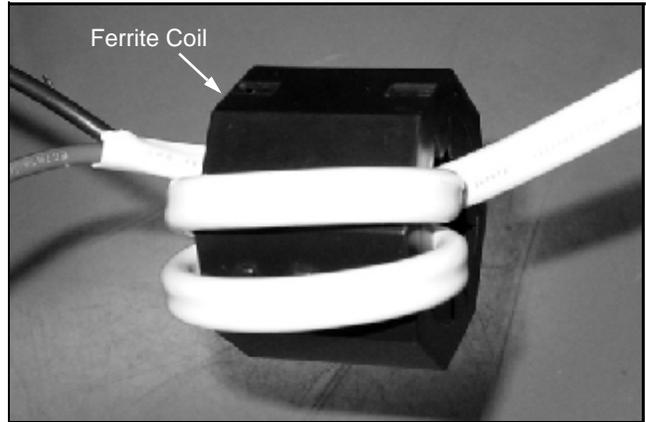


Figure 21: Power Plug

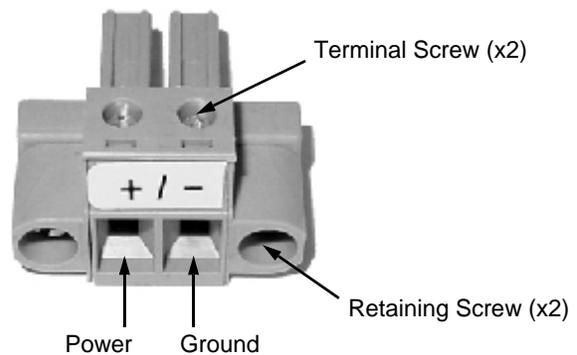
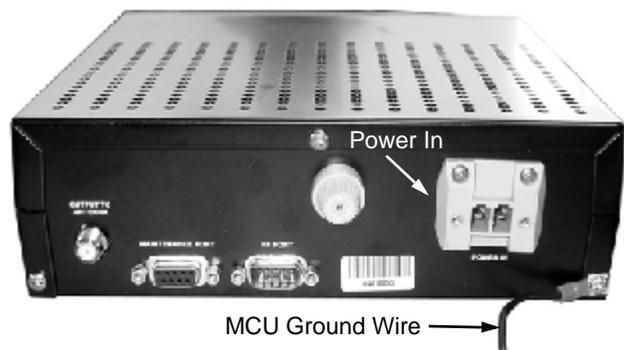


Figure 22: MCU Power Connection



10 Mount the MCU

In Step 3, you identified a suitable MCU mounting location. Now follow these steps to mount the MCU using one of the following options:

Option 1 - Velcro mount to a horizontal surface

Option 2 - Flush mount to a vertical surface

Option 1 - Velcro Mount

- Clean the bottom of the MCU and the mounting surface using a mild detergent.
- Peel the backing from the four supplied Velcro fabric squares and stick them to the bottom corners of the MCU (see Figure 23).
- Position the four Velcro hook disks onto the mounting surface. Drill screw holes for the disks and secure in place with #4-24 screws.
- Press the MCU firmly into place so the fabric's loop material engages the hook disks.

Option 2 - Flush Mount

- At the two holes in the bottom of the MCU, place a #6 flat washer on a #6-32 screw and insert the screw from below (see Figure 24). Do not tighten the screws yet.
- Slide the flush mount bracket backward onto the MCU until the two notches in the bracket engage the screws at the bottom of the MCU.
- Tighten the screws to secure the bracket to the MCU.
- In Step 3 on page 5, you cut out the mounting hole in the mounting surface. Insert the MCU and bracket assembly into this mounting hole and secure in place with four #8 screws and washers (see Figure 25).

Figure 23: Velcro Mounting

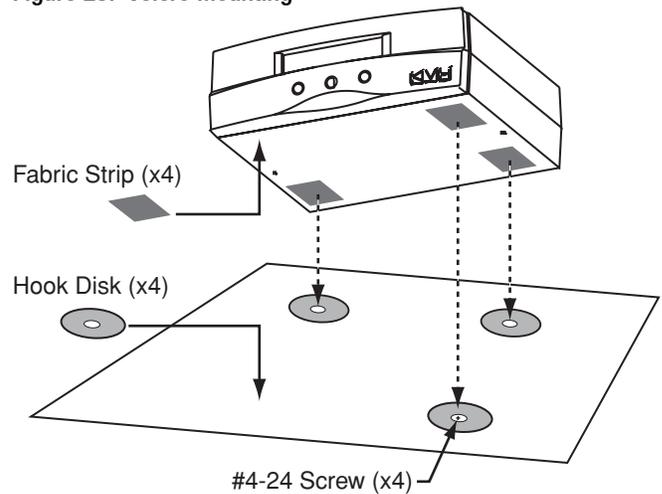


Figure 24: Flush Mount Bracket

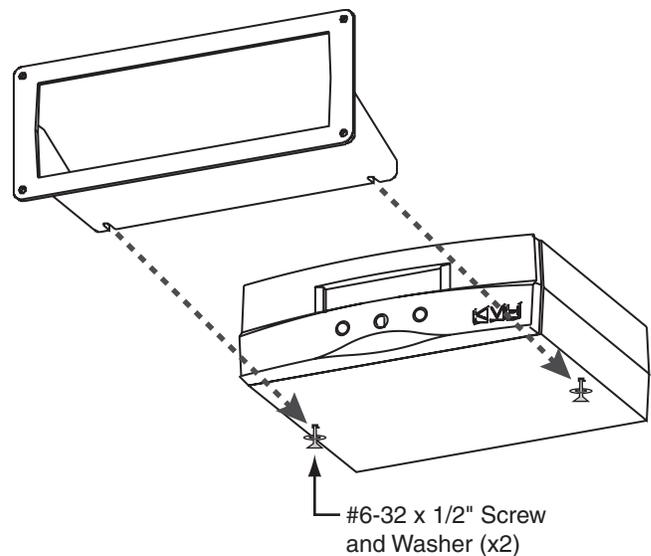
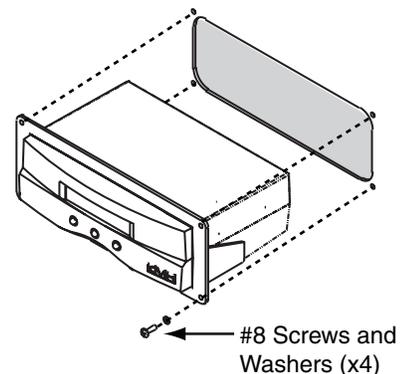


Figure 25: Flush Mounting the MCU to a Vertical Surface



11 Select Satellites

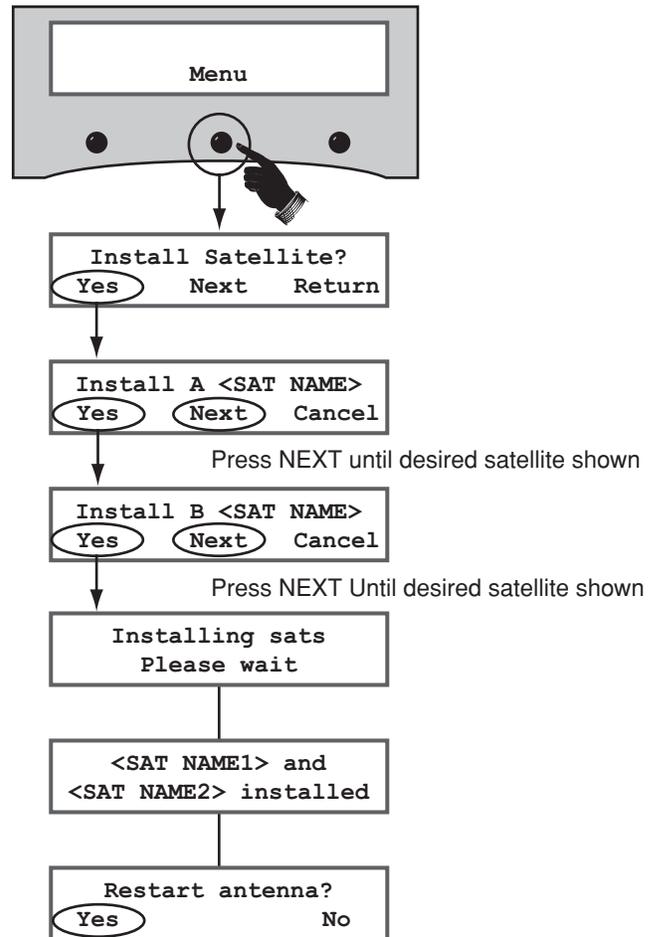
Follow these steps to turn on the system and set it up for the desired pair of satellites.

- a. Ensure the antenna has a clear, unobstructed view of the sky.
- b. Apply power to the receiver(s), TV(s), and MCU. Wait two minutes for system startup.
- c. Press the center **MENU** button on the MCU to access the onscreen menu (see Figure 26).
- d. At “Install Satellite?”, press **YES**.
- e. At “Install A <SAT NAME>”, press **NEXT** until the display shows the first (primary) satellite you want to select. Then press **YES**. (See Appendix C on page 25 for a list of available satellites.)

NOTE: If you don't find the satellite you want, you can set up a user-defined satellite (USER 1 or USER 2). See Appendix D on page 26.
- f. Repeat Step 11e to select the second satellite. If you want to set up the antenna to track just one satellite, select “None” instead.
- g. At “Restart Antenna?”, press **YES**. Wait two minutes while the antenna restarts.
- h. **(Linear systems only)** Set up the receiver(s) for the same satellites, and in the same order, that you set them up in the antenna:

Antenna	Receiver	DiSEqC
Sat. A	Alternative 1 or A	DiSEqC 1
Sat. B	Alternative 2 or B	DiSEqC 2

Figure 26: Satellite Selection Menus on MCU



12 Calibrate the Internal Sensor

The antenna's internal compass sensor is calibrated at the factory for a perfect-world environment. However, hard and soft iron effects on your vessel can distort the magnetic field around the antenna, causing errors in the sensor's reported heading. To compensate for these magnetic distortions, follow these steps to calibrate the internal sensor.

Turn On Autocalibration

Follow these steps to turn on the system's Autocalibration function. The Autocalibration function will allow the sensor to calibrate itself automatically.

- Press the center **MENU** button on the MCU to access the onscreen menu (see Figure 27).
- At "Install Satellite?", press **NEXT** until the display shows "Operations Mode?" Then press **YES**.
- At "Get Antenna Status?", press **NEXT** until the display shows "Control Compass?" Then press **YES**.
- At "Set Autocal on/off?", press **YES**.
- At "Autocal is: OFF", press **ON**.
- At "Autocal is: ON", press **RETURN**.

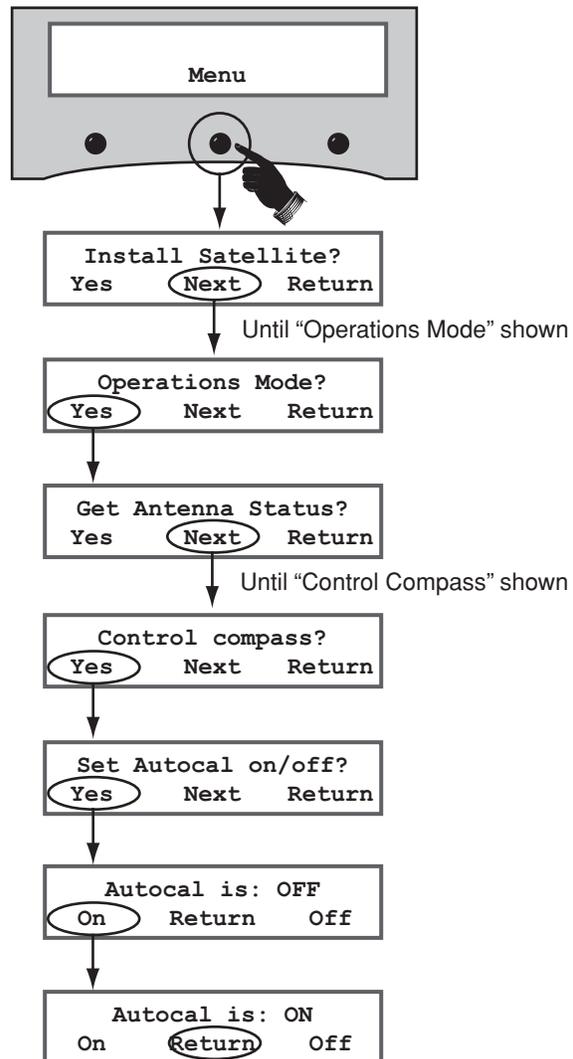
Run the Autocalibration Function

Follow these steps to steer the vessel through a complete circle to ensure the Autocalibration function effectively calibrates the sensor.

NOTE: If the antenna is installed on a large vessel, such as a tanker or cargo ship, you may omit this step. Simply leave the Autocalibration function set to ON.

- Select a calm day and navigate the vessel to a clear area. Excessive pitching and rolling can distort calibration data.
- Apply power to the TracVision system.
- Just before you begin, note the vessel's heading.

Figure 27: Turning On Autocalibration at the MCU



12 Continued...

- d. Steer the vessel at a slow, steady speed through a complete circle that takes at least two minutes to complete (see Figure 28). Use the heading you noted in Step c to confirm when you have completed a full circle.

Check the Calibration Score

Once you have completed the circle, follow these steps to check the calibration “score.”

- a. Press the center **MENU** button on the MCU to access the onscreen menu.
- b. At “Install Satellite?”, press **NEXT** until the display shows “Operations Mode?” Then press **YES**.
- c. At “Get Antenna Status?”, press **NEXT** until the display shows “Control Compass?” Then press **YES**.
- d. At “Set Autocal on/off?”, press **NEXT** until the display shows “Get Cal Score?” Then press **YES**.
- e. The display shows the score for the calibration you performed (see Figure 29).
- f. **If Accuracy = “BAD CAL”:**
Recalibrate the sensor by navigating through an additional circle. Repeat until you achieve a suitable accuracy rating.
- g. **If Mag. Environment = “POOR” or “BAD”:**
Check the area around the antenna for materials that might cause magnetic interference. Relocate the materials, if possible, or relocate the antenna to a more favorable magnetic environment (see Step 2 on page 4 for details). Then clear the calibration score (see Appendix E on page 30) and recalibrate the sensor.
- h. Press any button. The display returns to the “Get Cal score?” screen.
- i. Press **RETURN** until you exit the menu.

NOTE: The Autocalibration function turns off automatically once the system achieves a good calibration score.

Figure 28: Running Autocalibration

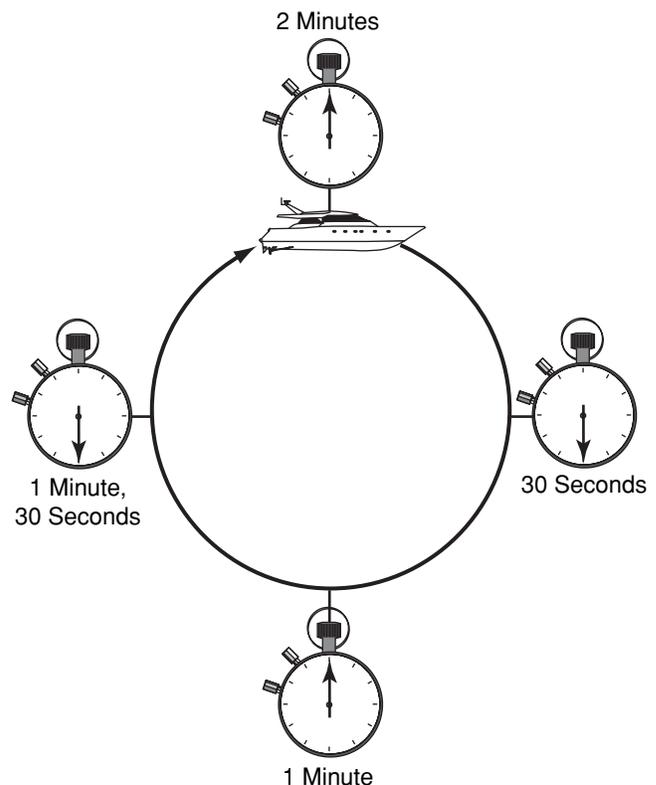
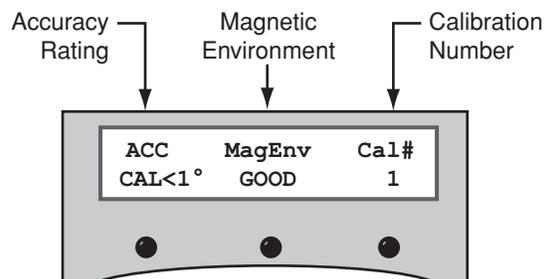


Figure 29: Calibration Score Example



Data Field	Description
Accuracy Rating	Degree of accuracy the sensor will provide (CAL<1° = within 1°)
Magnetic Environment	Quality of the antenna’s installation site
Calibration Number	Number of times the sensor was calibrated

13 Educate the Customer

The installation process is complete!

Before you depart the vessel, test the system to verify the antenna works properly. Then give the Customer Welcome Kit to the customer and explain how to use the system. Also be sure the customer understands the following:

- Keep the radome installed on the antenna at all times. The radome protects the antenna's moving parts from wind, rain, and debris.

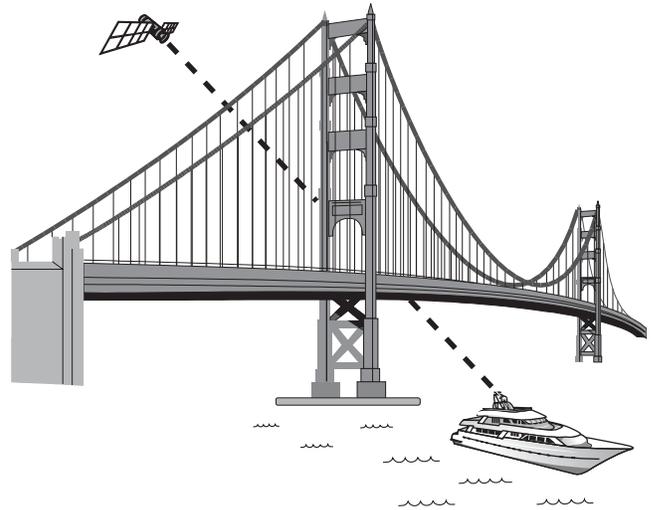


WARNING

It is dangerous to watch TV while piloting a vessel. The TracVision system is intended as a passenger entertainment product only.

- The antenna must have a clear view of the sky to receive satellite TV. Common causes of blockage include trees, buildings, bridges, and onboard equipment (see Figure 30).
- Heavy rain or snow may temporarily interrupt reception.
- Clean the antenna regularly. Dirt buildup on the radome can affect reception.
- The vessel must be located within the selected satellite's coverage area to receive its satellite TV signals. To view satellite coverage maps, visit www.kvh.com/footprint.
- Please register the system with KVH. The registration process is quick, easy, online, and ensures the best possible service from KVH. Visit www.kvh.com/register or refer to the Product Registration Form for details.
- Refer to the *User's Guide* for complete operation instructions and troubleshooting information.

Figure 30: Example of Satellite Blockage



Appendices

This section provides supplemental instructions for special or advanced configurations. It also provides system wiring diagrams and a mounting template for the belowdecks equipment.

Contents

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- B. Connecting Multiple Receivers...23
- C. Satellite Library...25
- D. User-Defined Satellites...26
- E. Clearing the Calibration Score...30
- F. Wiring Diagrams...31
- MCU Flush Mounting Template...35

A Optional Bottom Cable Entry Kit

Appendix

If you wish to route the system cables through the bottom of the antenna's baseplate, rather than connect the cables at the side of the baseplate, follow these steps to modify the antenna for bottom cable entry. Figure 31 shows the relevant parts of the antenna baseplate; refer to this figure throughout the procedure.

Remove the Radome and Restraints

1. Perform Steps 7a through 7d on page 9 to remove the antenna's radome and shipping restraints. You will need to rotate the antenna assembly by hand to access various parts of the baseplate.

IMPORTANT!

Once you have removed the restraints, handle the antenna very carefully. With the restraints removed, the internal antenna assembly rotates freely and, if not handled properly, can damage the limit switch.

Relocate the Cable PCB

1. Remove the tie-wrap securing the cable PCB (printed circuit board) wires to the baseplate access hatch (see Figure 32).
2. Remove the five #4-40 screws, washers, and nuts securing the cable PCB to the access hatch (see Figure 32).
3. Attach the cable PCB to the alternate cable PCB bracket (see Figure 33) using the five #4-40 screws and washers supplied in the kitpack. Apply a small amount of Loctite threadlocker to the screw threads before securing.

Figure 31: Interior of Antenna Baseplate (Antenna Not Shown)

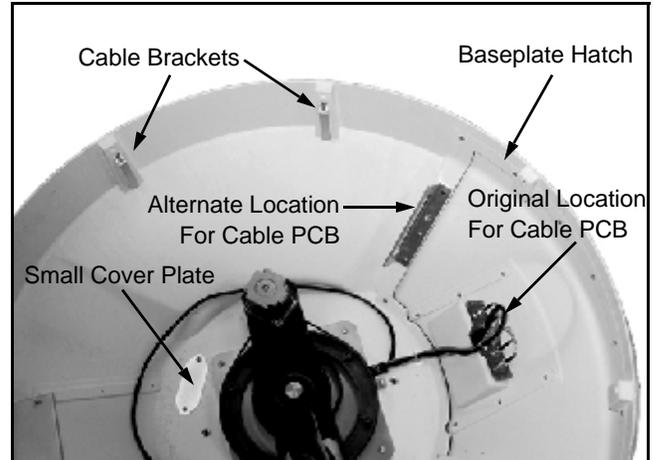


Figure 32: Cable PCB in Original Location

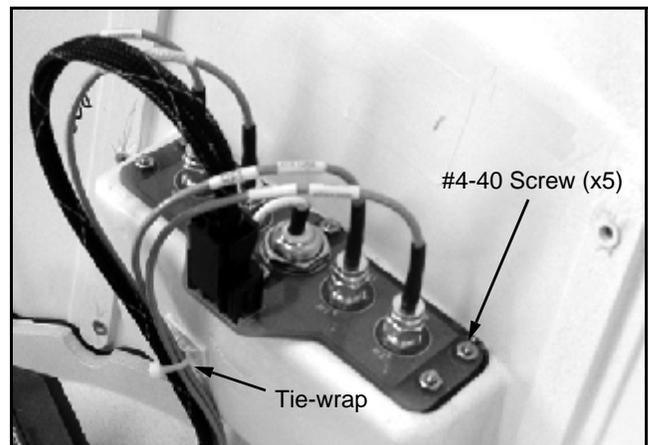
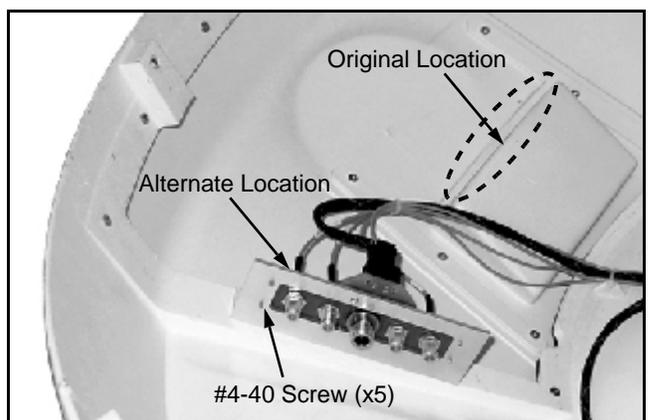


Figure 33: Cable PCB in Alternate Location

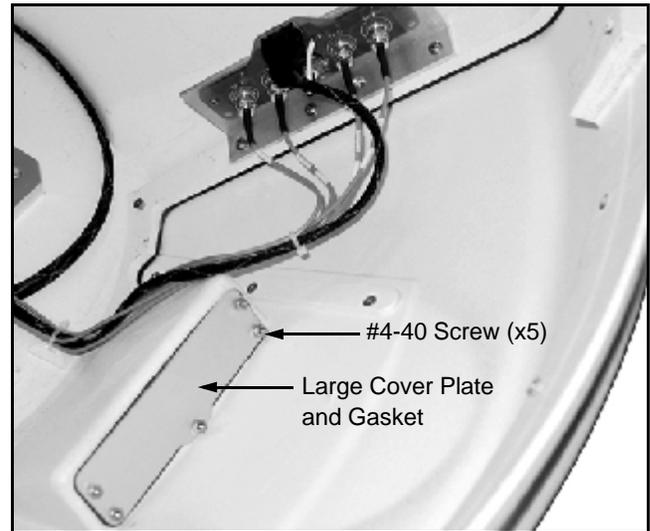


A Continued...

Seal the Original Cable PCB Location

1. Peel off the paper backing from the large cover plate gasket supplied in the kitpack. Attach the gasket to the supplied cover plate, making sure all holes are aligned. Also make sure all of the holes will align with the holes at the original PCB location, gasket side facing down.
2. Position the large cover plate and gasket (gasket side facing down) over the original cable PCB location. Secure in place with the five #4-40 screws and washers you removed earlier. Apply a small amount of Loctite threadlocker to the screw threads before securing (see Figure 34).

Figure 34: Large Cover Plate and Gasket



Prepare the Bottom Cable Access Hole

1. Remove the two M4 screws from the small cover plate and gasket inside the antenna baseplate. Remove the small cover plate and gasket (see Figure 35).
2. Peel off the paper backing from the rubber seal and carefully attach the rubber seal to the underside of the baseplate, ensuring a good seal around the rim of the bottom cable access hole (see Figure 36).

Figure 35: Small Cover Plate and Gasket

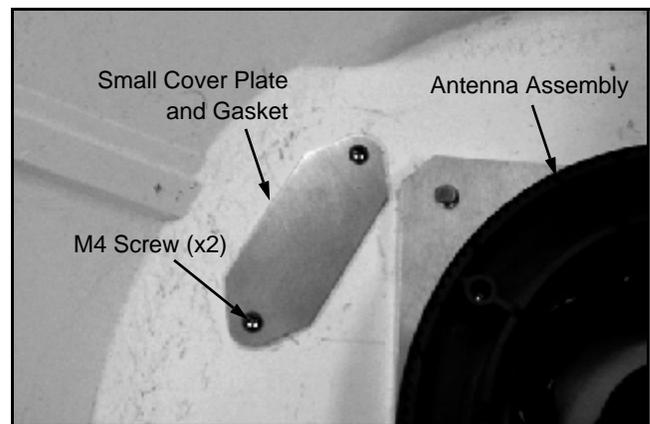
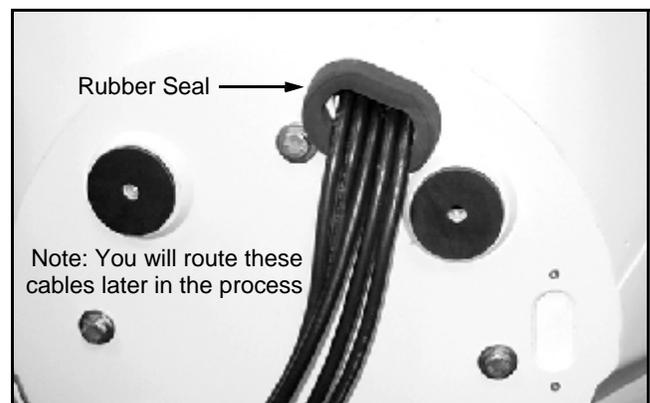


Figure 36: Rubber Seal on Underside of Baseplate



A Continued...

Route and Secure the Cables

1. Remove the four M4 screws securing the cable brackets to the inside rim of the baseplate (see Figure 37). Remove and save the cable brackets.
2. Route the data/power (F-type connector end) and RF cables belowdecks through the cable access hole. Leave an adequate service loop, approximately 8" (20 cm) of slack, in the cables for easy serviceability. Later, you will connect the data/power cable to the MCU and the RF cable(s) to the receiver(s).
3. Route the N-type connector end of the data/power cable (see Figure 38) through the baseplate's bottom cable access hole. Connect the data/power cable to the center connector on the cable PCB (see Figure 39).

IMPORTANT!

Be sure to properly align the data/power cable with the PCB connector before tightening. Connecting the cable at an angle may damage the cable's center tines.

4. Route the RF cable(s) through the baseplate's bottom cable access hole. Using a 9/16" wrench, connect the RF cable(s) to the cable PCB (see Figure 39). If you need to connect only one RF cable, connect the cable to the RF1 connector. Connect any additional RF cables to the RF2, RF3, and RF4 connectors. See Step 4e on page 6 to determine the number of RF cables required.

TIP: If you connect two or more RF cables, label both ends of each cable to match the connector. This will make it easier to identify the cables later.

5. Secure the data/power and RF cables to the inside rim of the baseplate, using the two cable brackets. Secure the brackets in place using the four M4 screws you removed earlier (see Figure 40).

Figure 37: Cable Brackets on Inside Rim of Baseplate

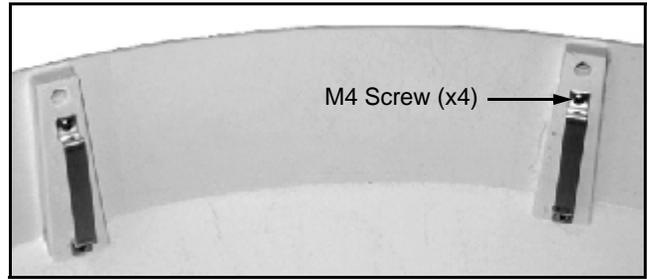


Figure 38: Data/Power Cable Connections

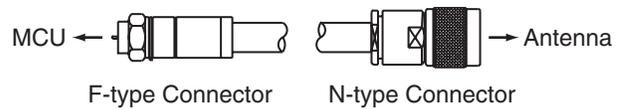


Figure 39: Cable Connections on PCB

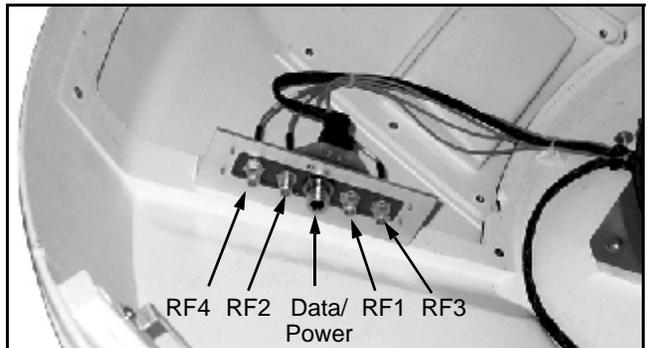
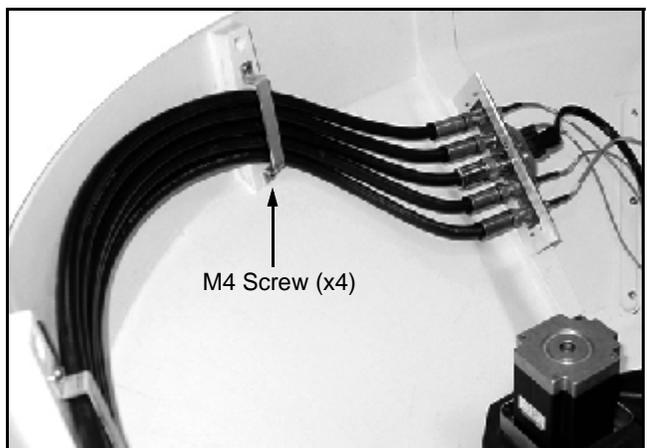


Figure 40: Cables Secured by Brackets



A Continued...

6. Attach the supplied cable exit shroud over the cable access hole inside the baseplate, using the two M4 screws you removed earlier from the cover plate (see Figure 41).

Replace the Logo Plate

1. Attach the supplied blank logo plate using six M4 screws (see Figure 42).
2. Discard the old logo plate, or save it in case you need to change the cable routing in the future.

The baseplate conversion process is complete!
Complete the remaining system installation steps starting with Step 6 on page 7.

Figure 41: Cable Exit Shroud Installed Over Cables

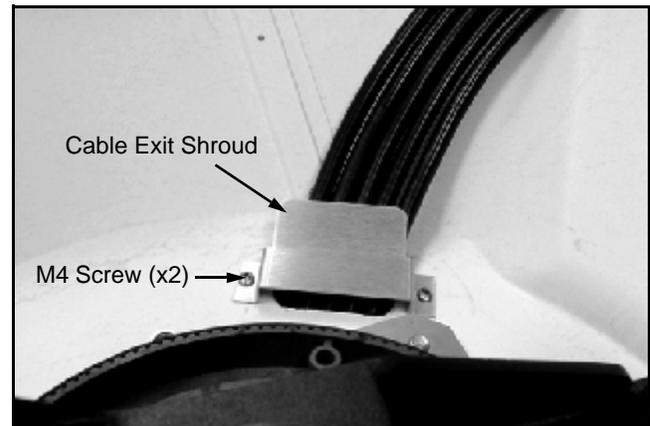
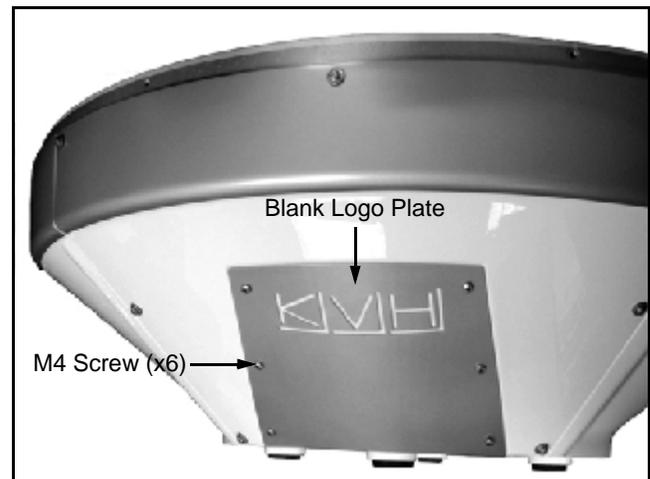


Figure 42: Blank Logo Plate (No Cable Slots)



B Connecting Multiple Receivers

IMPORTANT!

Only antennas equipped with a circular dual LNB or a linear quad LNB can support more than two receivers. Antennas equipped with a linear dual LNB support only two receivers.

Antenna with Circular Dual LNB

(North American systems only)

To connect three or more receivers, follow these steps to install an active (powered) multiswitch between the antenna and the receivers.

NOTE: You can purchase an active multiswitch, Channel Master model 6314IFD, from KVH (order part #19-0123).

1. Connect the RF1 cable from the antenna to the "RHCP +13V" jack on the multiswitch (see Figure 43).
2. Connect the RF2 cable from the antenna to the "LHCP +18V" jack on the multiswitch.
3. Connect the receivers to the individual outputs of the multiswitch.
4. Terminate any unused multiswitch outputs with 75 ohm DC blocks (Channel Master #7184, Radio Shack #15-1259, or equivalent).

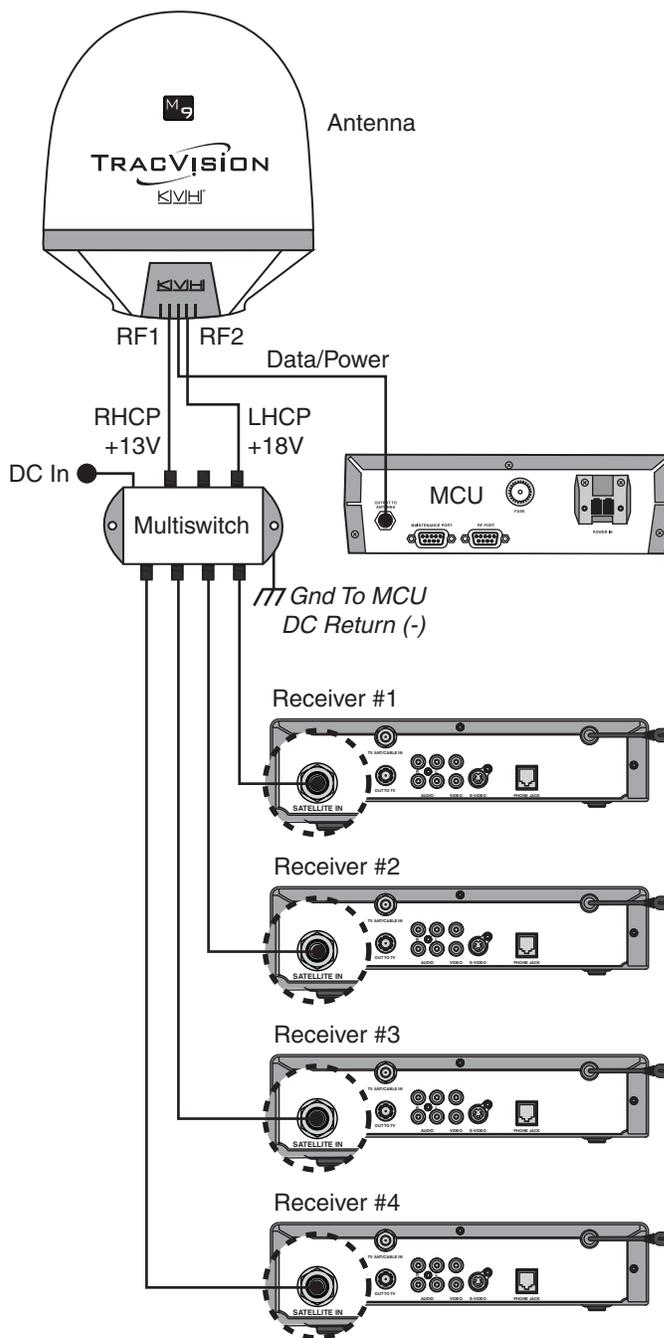
IMPORTANT!

Be sure the multiswitch is properly grounded. With the multiswitch grounded, you do not need to ground the individual receivers.

IMPORTANT!

(DIRECTV only) Multiswitches block a receiver's 22 KHz tone that the antenna needs to switch satellites automatically. Therefore, the customer will need to manually switch satellites using the buttons on the MCU.

Figure 43: Multiswitch Wiring - Antenna with Circular Dual LNB



B Continued...

Antenna with Linear Quad LNB

(European systems only)

Follow these steps to connect three or four receivers directly to the antenna.

NOTE: If you need to connect more than four receivers to the TracVision system, install an active multiswitch that generates a 22 KHz tone (such as Spaun model 5602NF - KVH part #19-0413). Connect the multiswitch in accordance with the manufacturer's instructions.

1. Decide which receiver will be the primary receiver. The primary receiver will control satellite selection.

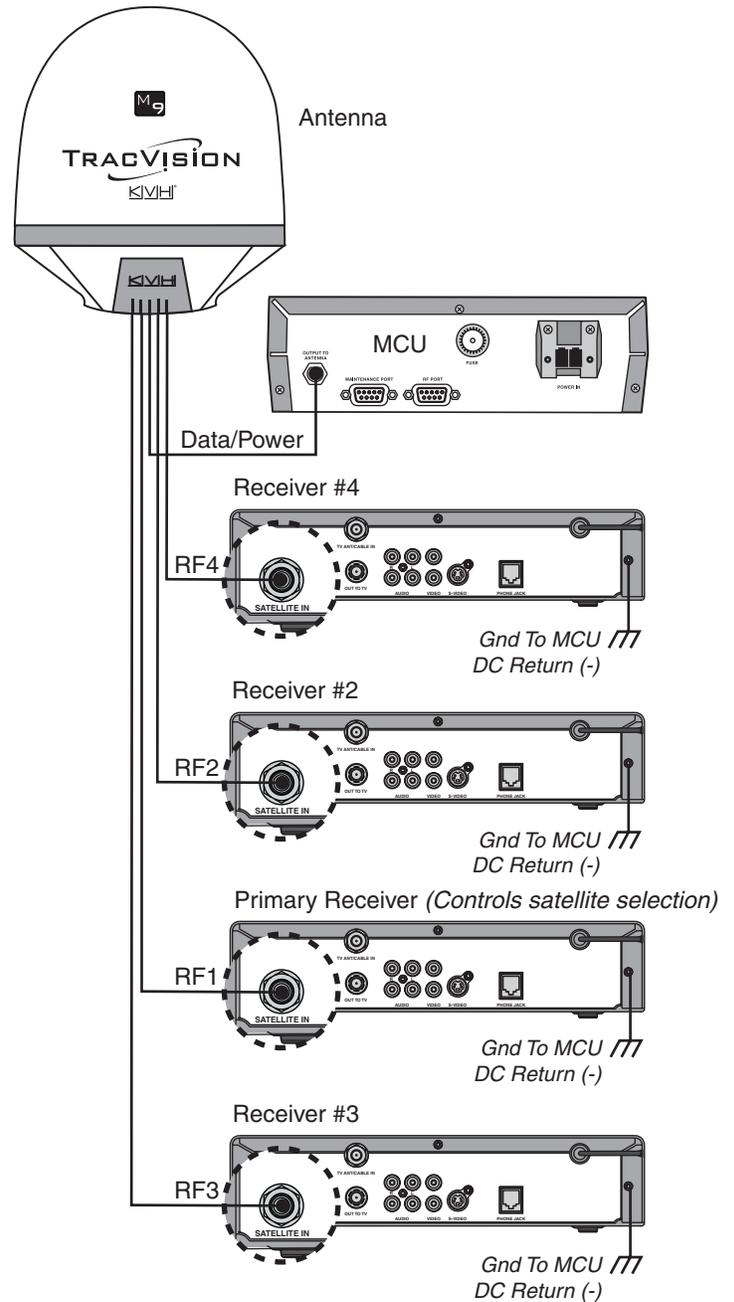
NOTE: The additional receivers will be able to select any channel carried on the satellite that is currently selected on the primary receiver.

2. Connect the RF1 cable from the antenna to the "Satellite In" jack on the primary receiver (see Figure 44).
3. Connect the RF2 cable from the antenna to the "Satellite In" jack on the second receiver.
4. Connect the RF3 cable from the antenna to the "Satellite In" jack on the third receiver.
5. Connect the RF4 cable from the antenna to the "Satellite In" jack on the fourth receiver.

IMPORTANT!

Be sure all receivers are grounded properly. Connect a ground wire from the chassis of each receiver to the MCU's DC return. This will ensure all system grounds are the same potential.

Figure 44: Receiver Wiring - Antenna with Linear Quad LNB



Satellite Library

Appendix

The TracVision M9 antenna can track a variety of DVB-compatible and DSS (DIRECTV) satellites. Most popular satellites are programmed in the antenna's library (see the tables below).

North America

Standard Circular Dual LNB Required

Satellite, Longitude	Name in Library
DIRECTV, 72°W	DSS_72
DIRECTV, 101°W	DSS_101
DIRECTV, 110°W	DSS_110
DIRECTV, 119°W	DSS_119
EchoStar, 61°W	ECHO_61
EchoStar, 110°W	ECHO_110
EchoStar, 119°W	ECHO_119
EchoStar, 148°W	ECHO_148
ExpressVu, 82°W	EXPRESSVU
ExpressVu, 91°W	EXPRESSTV

Asia

Standard Circular Dual LNB Required

Satellite	Name in Library
Asiasat 4, 122.2°E	ASIASAT
Sinosat 1*, 110.5°E	SINOSAT

Latin America

Galaxy Circular Dual LNB Required

Satellite	Name in Library
Galaxy 3C, 95°W	GALAXY3CN

Europe

Linear Quad LNB Required

Satellite	Name in Library
Astra 1, 19.2°E	ASTRA1
Astra 2N, 28.2°E	ASTRA2N
Astra 2S, 28.2°E	ASTRA2S
Hispasat, 30.0°W	HISPASAT
Hotbird, 13.0°E	HOTBIRD
Hotbird WB, 13.0°E	HOTBIRDWB
Sirius, 5.0°E	SIRIUS
Thor, 0.8°W	THOR
Arabsat, 26°E	ARABSAT
Nilesat, 7°W	NILESAT
Turksat 1C, 42°E	TURKSAT1C
Eutelsat W3A, 7°E	EUTEL_W3A

Mexico

Linear Dual LNB Required

Satellite	Name in Library
PAS 9, 58°W	PAS_9

Australia & New Zealand

Linear Quad LNB Required

Satellite	Name in Library
Optus B1*, 160°E	OPTUS_B1
Optus C1, 156°E	OPTUS_C1

* Special LNB required. Call KVH at 1-401-847-3327.

D User-Defined Satellites

Appendix

The satellite library in the TracVision antenna includes two slots for user-defined satellites (USER 1 and USER 2). You can program one or both of these library slots for any satellite you wish that is not already set up in the library.

Connect a Laptop to the Antenna

To program your user-defined satellite(s), you first need to connect a Windows® laptop computer to the TracVision system and start Windows HyperTerminal.

TIP: If you are a KVH-authorized technician, you can use the KVH Flash Update Wizard instead of HyperTerminal. Enter commands in the wizard's "Antenna Comms" window. You do not need to flash the antenna to enter commands.

1. Turn off the TracVision antenna.
2. Using a straight PC serial data cable, connect your laptop to the DB9 Maintenance port on the back of the MCU (see Figure 46).

NOTE: If your computer does not have a DB9 serial COM port, you can use the USB-to-RS232 adapter manufactured by IOGear (IOGear part number GUC232A) or Belkin (Belkin part number F5U109).

3. Open Windows HyperTerminal and establish the following settings for your COM port (see Figure 47):
 - Bits per second: 9600
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow control: None

TIP: To view characters on the screen as you type, set up HyperTerminal to echo typed characters. Select "Properties" from the File menu; select "ASCII Setup" at the Settings tab; then select "Echo typed characters locally" at the ASCII Setup window.

Figure 45: Technician Programming the Antenna



Figure 46: Maintenance Port on MCU



Figure 47: HyperTerminal Settings



D Continued...

4. Apply power to the TracVision antenna. Data should soon be scrolling in your HyperTerminal window (see Figure 48). If no data appears, check your connections and make sure you're using the correct COM port.
5. Follow the steps in the next section to program the antenna via the HyperTerminal window.

Program Your User-Defined Satellites

To configure a user-defined satellite, you will need to program into the antenna the following information about the satellite (see Figure 49):

- Satellite name
- Satellite longitudinal position
- Transponder information for all combinations of polarization and band:
 - vertical high
 - vertical low
 - horizontal high
 - horizontal low
- OR**
- right
- left
- Frequency
- Symbol rate
- FEC code rate
- Network ID
- Decoder type

NOTE: You can find this satellite information on the web at www.lyngsat.com or www.satcodx.com (neither website is affiliated with KVH).

Figure 48: Antenna Data Scrolling in Window

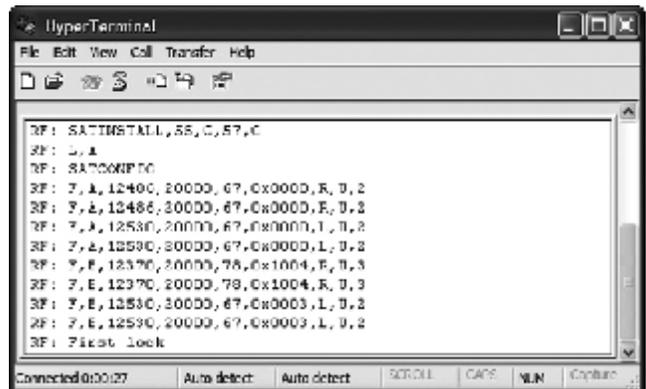
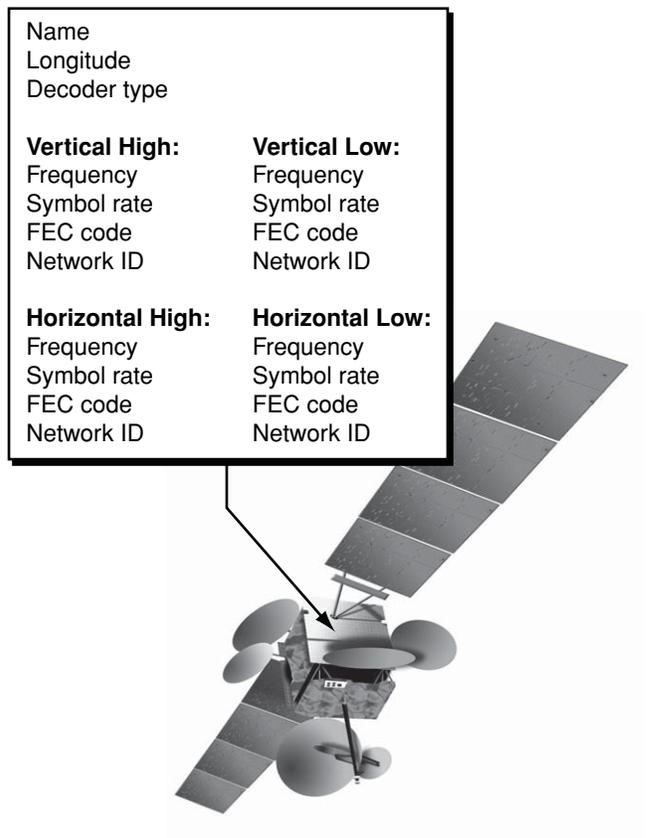


Figure 49: Identifying a Linear Satellite



D Continued...

Enter the following commands via Windows HyperTerminal or KVH Flash Update Wizard.

1. Type **HALT** then press Enter.
2. Type **DEBUGON** then press Enter.
3. Type the following **SATCONFIG** command then press Enter. Italics indicate a variable field (see Figure 50 for definitions).

SATCONFIG,USERA,B,C,D,E →

4. Type **@DEBUGON** then press Enter.
5. Type the following **@SATCONFIG** command then press Enter. Italics indicate a variable field (see Figure 51 for definitions).

@SATCONFIG,F,G,H,I,J,K,L,M,N →

6. Repeat Step D5 for each polarization/band:
 - Vertical High • Horizontal High
 - Vertical Low • Horizontal Low

OR

 - Right • Left

If your selected satellite does not have data for one or more of these transponder categories, you can enter the following defaults instead:

Transponder Data	Default Value
Frequency	00000
Symbol rate	27500
FEC code rate	Same value as other transponders
Network ID	0x0000

7. Type **ZAP** then press Enter. The antenna restarts. Wait two minutes for system startup.
8. Follow the steps in Step 11 on page 13 to select your new USER 1 or USER 2 satellite.

Figure 50: SATCONFIG Command Fields

Field	Description
A	User-defined satellite in library (1=User 1; 2=User 2)
B	Longitude (0-180)
C	E (East) or W (West)
D	Decoding type (2=DSS; 3=DVB)
E	Polarization (C=circular; L=linear)

Figure 51: @SATCONFIG Command Fields

Field	Description
F	User-defined satellite in library (A=User 1; B=User 2)
G	Satellite table # (98=User 1; 99=User 2)
H	Frequency, MHz (00000 or 10700-12750)
I	Symbol rate, kilosymbols per second (01000-45000)
J	FEC code rate (12, 23, 34, 56, 67, or 78)
K	Network ID, hexadecimal (0x####)
L	Polarization (V=vertical; H=horizontal; R=right; L=left)
M	LNB down conversion frequency (L=low [9750 MHz]; H=high [10600 MHz]; G=Galaxy [10500 MHz]; S=Sinosat [11300 MHz]; U=USA [11250 MHz])
N	Decoding type (2=DSS; 3=DVB)

D Continued...

Example - Linear Satellite

The following is an example of programming a linear user-defined satellite (USER 1).

Satellite Name: YOURSAT 123 at 7°W

Transponder Data	Value
<i>Horizontal High</i>	
Frequency	11.966 GHz
Symbol rate	27500
FEC code rate	3/4
Network ID	2048 (dec) = 0x0800
<i>Vertical High</i>	
Frequency	11.823 GHz
Symbol rate	27500
FEC code rate	3/4
Network ID	2048 (dec) = 0x0800
<i>Vertical Low</i>	
No data listed	
<i>Horizontal Low</i>	
No data listed	

Commands you would enter into the antenna via HyperTerminal or KVH Flash Update Wizard:

```

HALT
DEBUGON
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
ZAP

```

Example - Circular Satellite

The following is an example of programming a circular user-defined satellite (USER 1).

Satellite Name: YOURSAT 456 at 122°W

Transponder Data	Value
<i>Right</i>	
Frequency	12.225 GHz
Symbol rate	20000
FEC code rate	5/6
Network ID	4100 (dec) = 0x1004
<i>Left</i>	
Frequency	12.456 GHz
Symbol rate	20000
FEC code rate	5/6
Network ID	4100 (dec) = 0x1004

Commands you would enter into the antenna via HyperTerminal or KVH Flash Update Wizard:

```

HALT
DEBUGON
SATCONFIG,USER1,122,W,3,C
@DEBUGON
@SATCONFIG,A,98,12225,20000,56,0x1004,R,U,3
@SATCONFIG,A,98,12456,20000,56,0x1004,L,U,3
ZAP

```

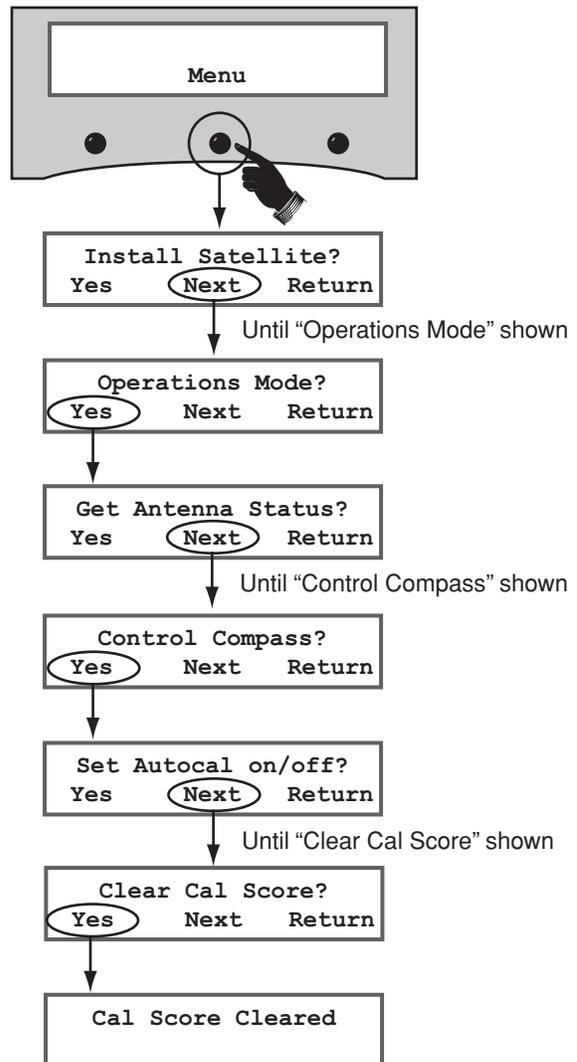
E Clearing the Calibration Score

If you needed to relocate magnetic materials near the antenna, or you relocated the antenna itself, follow these steps to clear the calibration score. You need to clear the system's stored calibration data before you can calibrate the internal sensor for a different magnetic environment.

1. Press the center **MENU** button on the MCU to access the onscreen menu (see Figure 52).
2. At "Install Satellite?", press **NEXT** until the display shows "Operations Mode?" Then press **YES**.
3. At "Get Antenna Status?", press **NEXT** until the display shows "Control Compass?" Then press **YES**.
4. At "Set Autocal on/off?", press **NEXT** until the display shows "Clear Cal Score?" Then press **YES**.
5. Wait a few seconds while the Autocalibration function resets.
6. When the display shows "Cal Score Cleared", turn off the TracVision system.
7. Wait 10 seconds, then turn on the TracVision system.

You can now calibrate the sensor for the new magnetic environment. See "Calibrate the Internal Sensor" on page 14 for calibration instructions.

Figure 52: Clear Compass Cal Menus on MCU



F Wiring Diagrams

This appendix provides system wiring diagrams for the following receiver configurations:

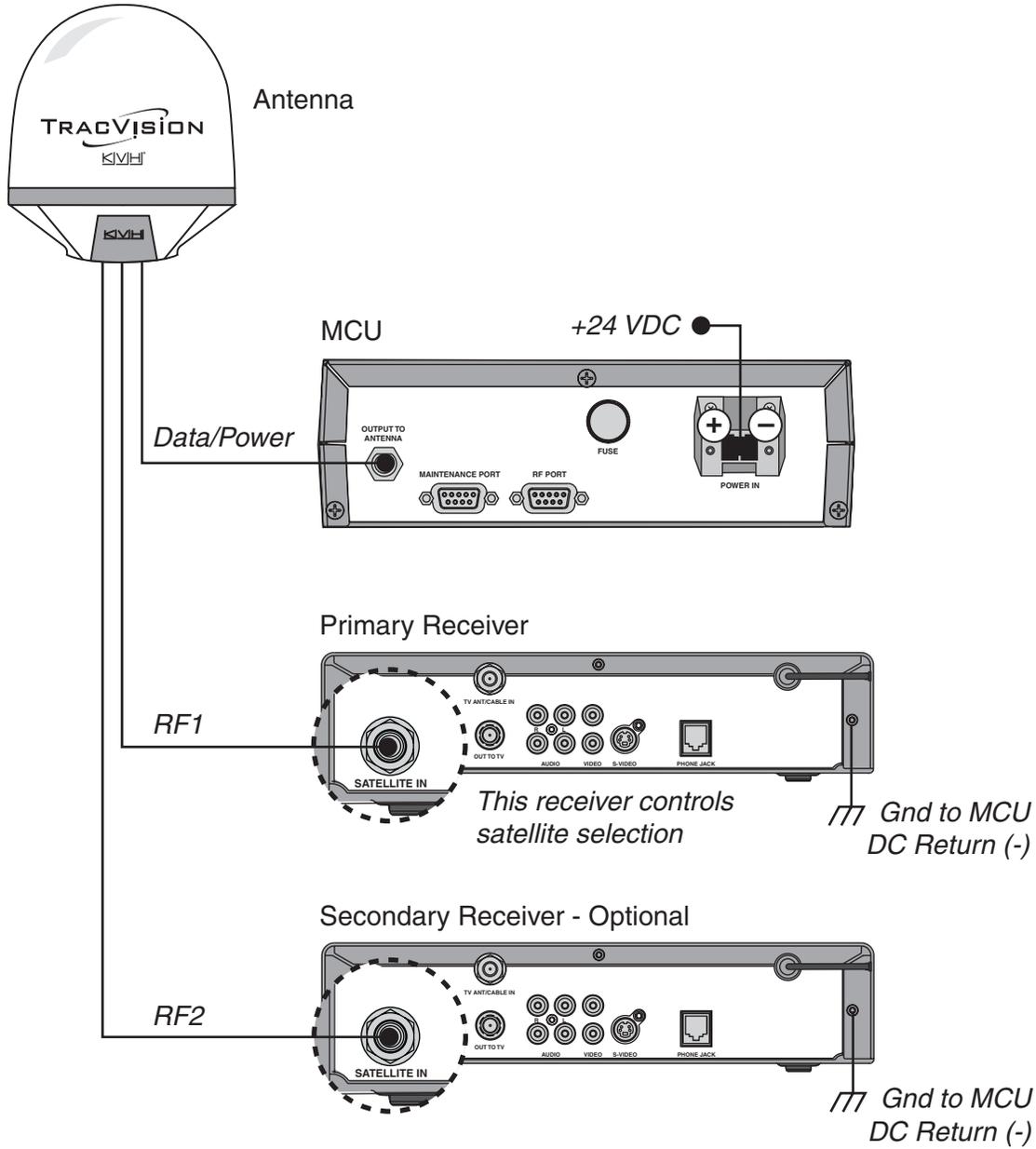
- One or two receivers
- Three or more receivers (circular)
- Three or more receivers (linear quad)

IMPORTANT!

The wiring diagrams on the following pages are intended as a quick reference only. Be sure to follow the complete wiring instructions provided earlier in this manual.

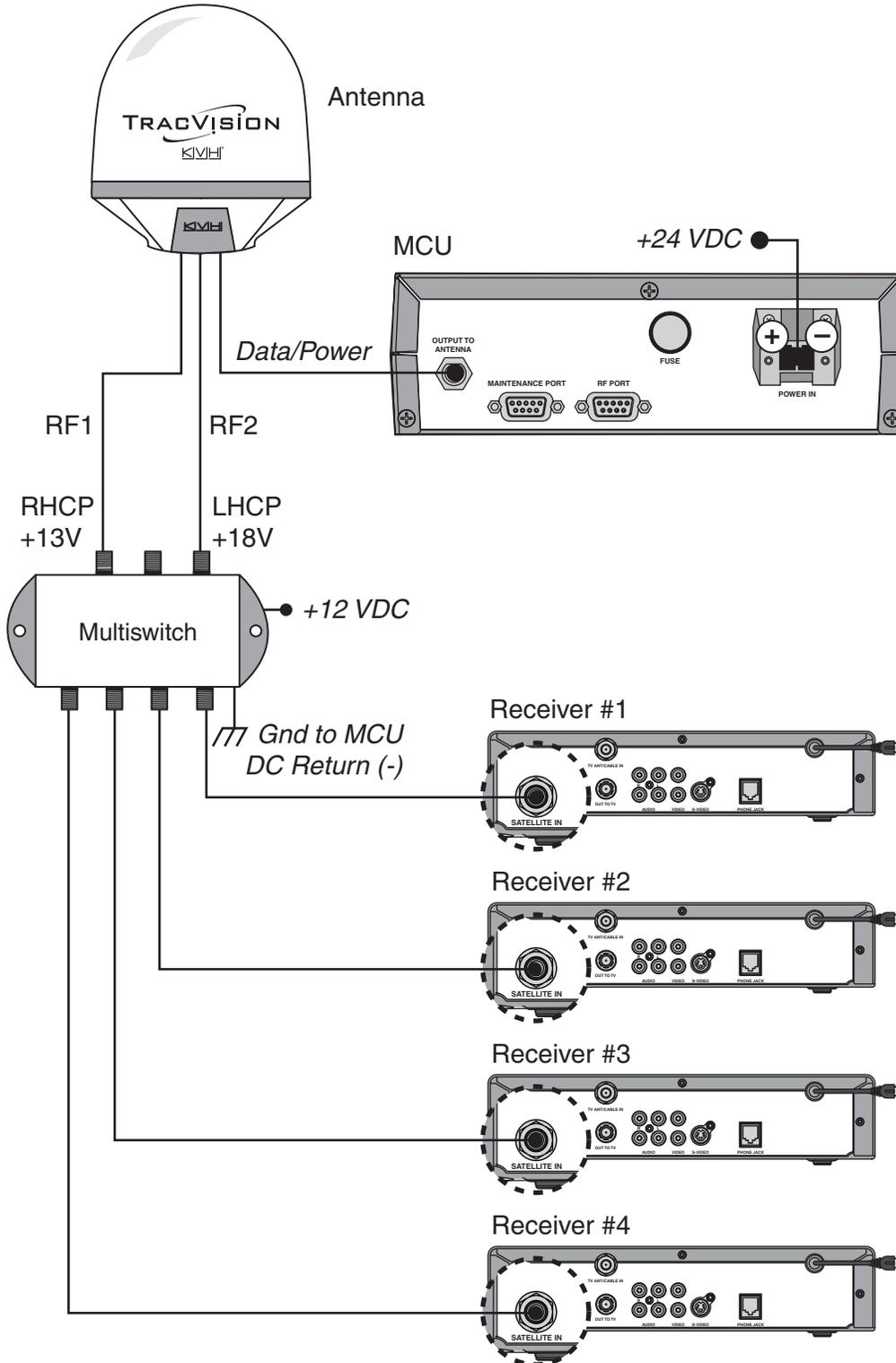
F Continued...

Wiring One or Two Receivers



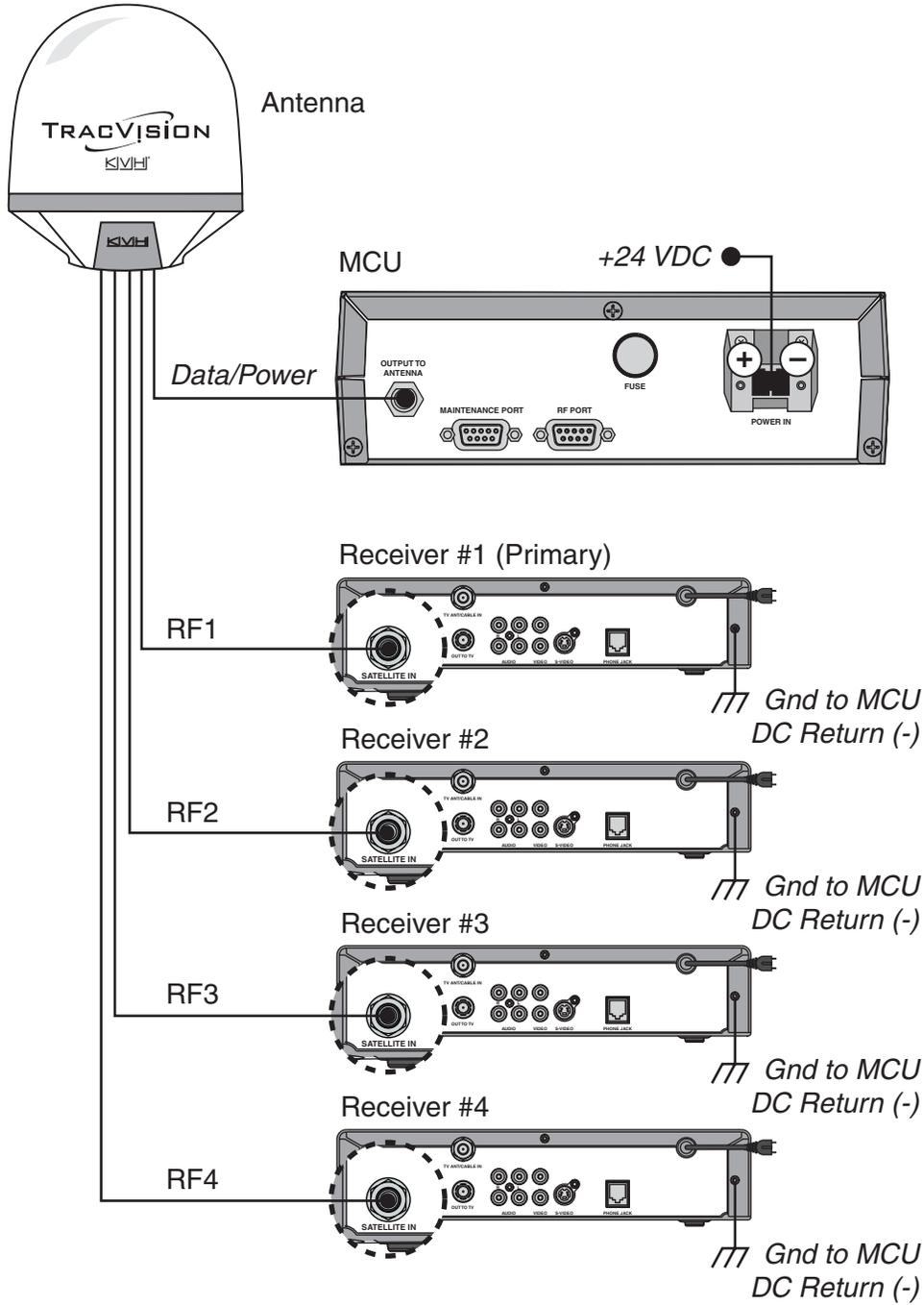
F Continued...

Wiring Three or Four Receivers (Circular only)



F Continued...

Wiring Three or Four Receivers (Linear Quad only)





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