

TRACVISION[®]
BY KVH INDUSTRIES

TracVision M7

GyroTrac™ Configuration



TracVision M7 Installation Guide

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GyroTrac Configuration

These instructions explain how to install the TracVision M7 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.

Linear vs. Circular Systems

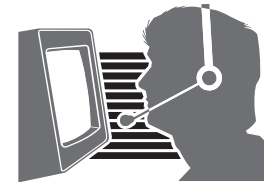
The installation process differs slightly depending on the type of LNB (low noise block) that is installed in the antenna (linear or circular). These differences are noted throughout this manual. Appendix B on page 27 notes the type of LNB required for each region and satellite.

Technical Support

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

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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!

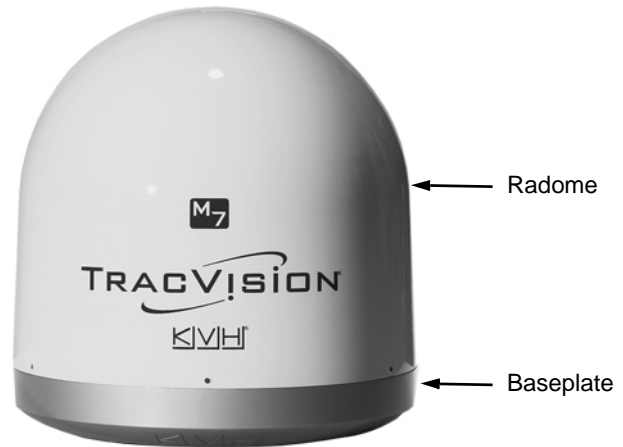
Always lift the antenna by the baseplate and never by the radome or any portion of the internal antenna assembly (see Figure 1).

- 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), 1/8" (3.5 mm) and #29 drill bits
- 3" (80 mm) hole saw
- Socket wrenches
- 7/16" open-end wrench
- Light hammer and center punch
- Adhesive tape
- Scriber or pencil
- Wire strippers and terminal lug crimper
- 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 7a on page 9 to determine the number and type of cables required)
- Connector installation tool (Augat IT1000 - KVH part #19-0242)
- Power cables for connecting power to the switchplate and ADCU (see Figure 2)
- Satellite TV receiver and TV

Figure 1: TracVision M7 System Components

Antenna



GyroTrac Sensor



ADCU (Advanced Digital Control Unit)



Figure 2: Guidelines for Power Cables

Cable Length	Use Cable Gauge
< 40 ft (12 m)	14AWG (2.5mm ²)
40-70 ft (12-21 m)	12AWG (4mm 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 (55 lbs, 25 kg), and rigid enough to withstand vibration.
- Select a location that is as close as possible to the intersection of the vessel's fore-and-aft centerline and midships.
- 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.

Figure 3: Blockage from Obstruction

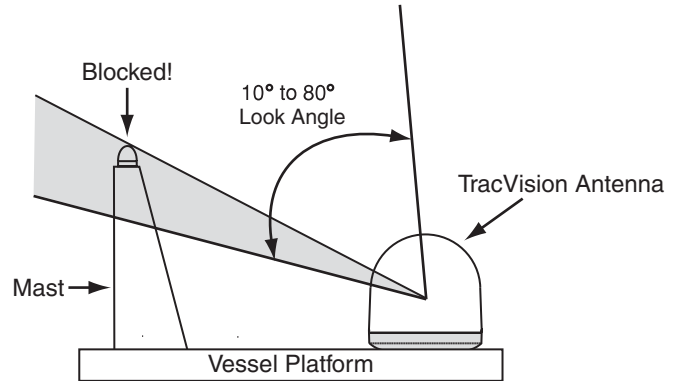
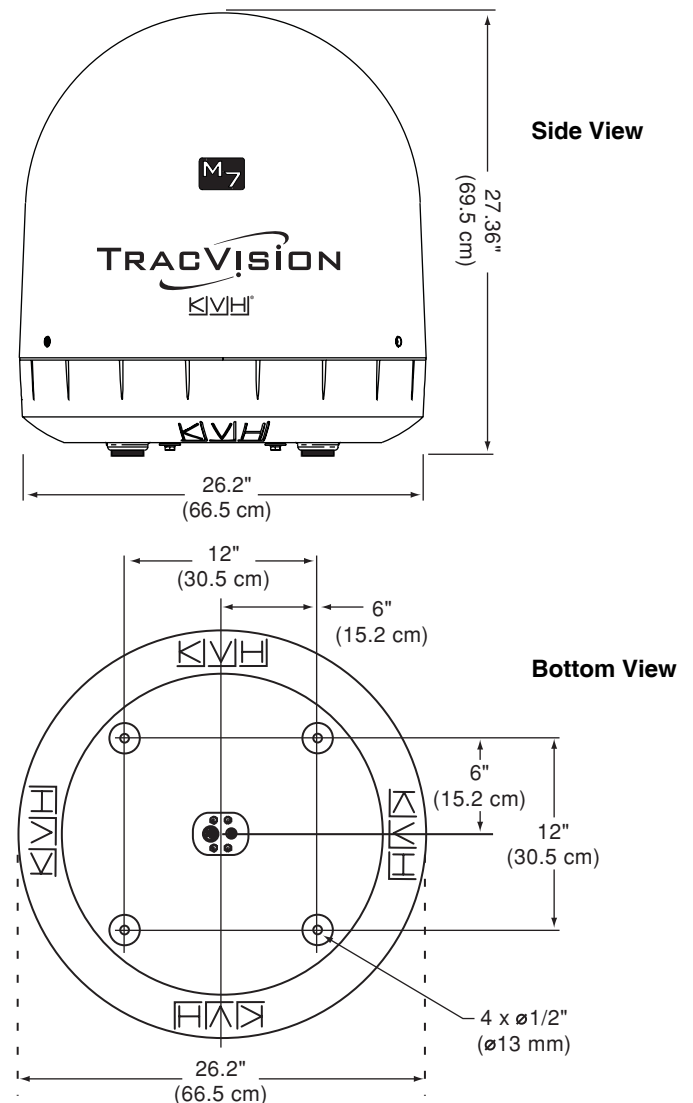


Figure 4: Antenna Dimensions

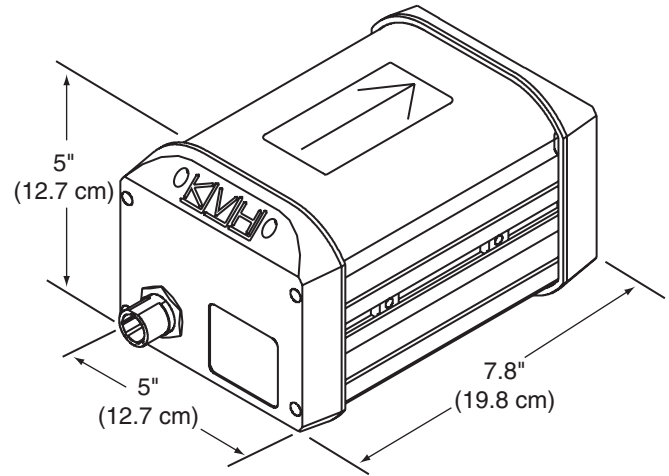


3 Plan the Sensor Installation

Before you begin, consider the following GyroTrac sensor installation guidelines:

- Select a sensor mounting location in a dry area belowdecks as low as possible in the center of the vessel. Do not mount the sensor in a bilge.
- Make sure the mounting surface does not flex and is rigid enough to withstand vibration.
- Select a location that is at least 4 ft (1.2 m) away from any magnetized materials, large ferrous masses, cranes, derricks, antennas, devices with DC motors, CRT monitors, loudspeakers, electric winches, high-ampere cables, or battery banks. The sensor performs best in a benign magnetic environment.
- If you need to fabricate custom mounting brackets, be sure to make them from a non-ferrous material, such as wood, brass, aluminum, fiberglass, or plastic. Also be sure to use stainless steel bolts or nails.
- If you are mounting the sensor on a steel vessel, enclose the sensor in a fiberglass container and use an aluminum, brass, plastic, or wood platform (NOT steel or iron) to position the sensor at least 4 ft (1.2 m) above and 6 ft (1.8 m) away from the steel surface.

Figure 5: GyroTrac Sensor



4 Plan the ADCU Installation

Before you begin, consider the following ADCU installation guidelines:

- Select an ADCU mounting location in a dry, well-ventilated area belowdecks away from any heat sources or salt spray.
- Be sure the ADCU's front panel will be easily accessible to the user. The owner will use the ADCU's buttons to control the antenna.
- Be sure to leave enough room at the ADCU's rear panel for connecting the cables (see Figure 6 for ADCU dimensions).
- Consider the lengths of the connecting cables. The ADCU must be located close enough to the antenna and the GyroTrac sensor so that you can connect the supplied cables.
- The kitpack contains parts for mounting the ADCU either to a horizontal surface (using Velcro) or to a vertical surface (using the supplied flush mount bracket).

Prepare the ADCU Mounting Site (Flush Mount only)

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

- Using the ADCU 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 7).
- Using the same template, mark the locations for the four ADCU 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 ADCU using four #8 screws.

Figure 6: ADCU Dimensions

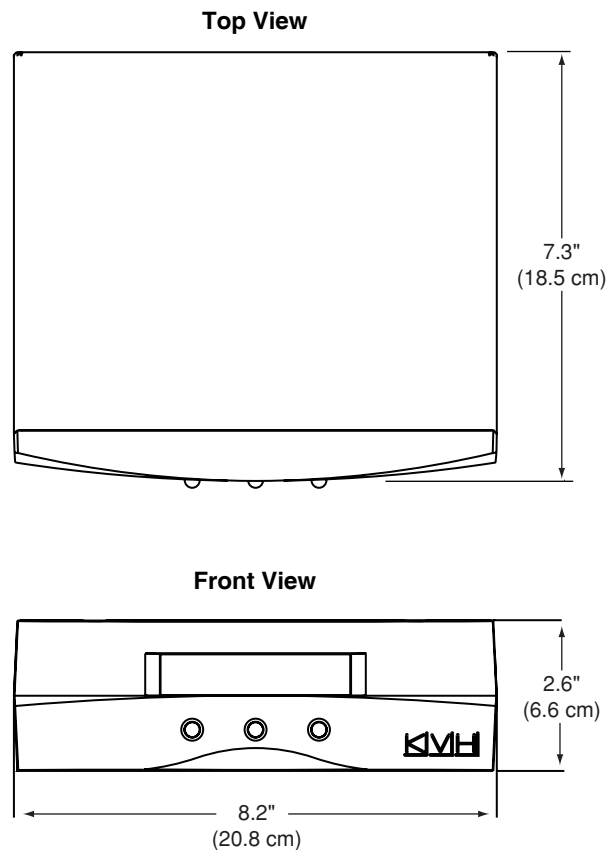
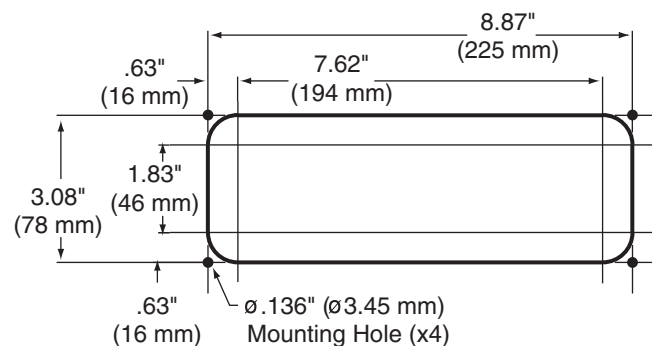


Figure 7: ADCU Mounting Holes Layout



5 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 8).

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 and cable access hole on the mounting surface.
- c. Drill a 1/2" (13 mm) hole at the four mounting hole locations you marked in Step 5b. Later, you will insert four 3/8"-16 bolts through these holes to secure the antenna to the mounting surface.
- d. Cut out the 3" (80 mm) cable access hole in the location you marked in Step 5b. Smooth the edges of the hole to protect the cables. Later, you will route the data, power, and RF cables through this hole and into the vessel.
- e. Clean and dry the antenna mounting surface.
- f. Peel off the paper backing from the supplied foam seal to expose the adhesive. Then press the foam seal down firmly onto the mounting surface, ensuring the hole in the foam seal aligns with the cable access hole in the mounting surface (see Figure 9).

Figure 8: Antenna Mounting Holes Layout

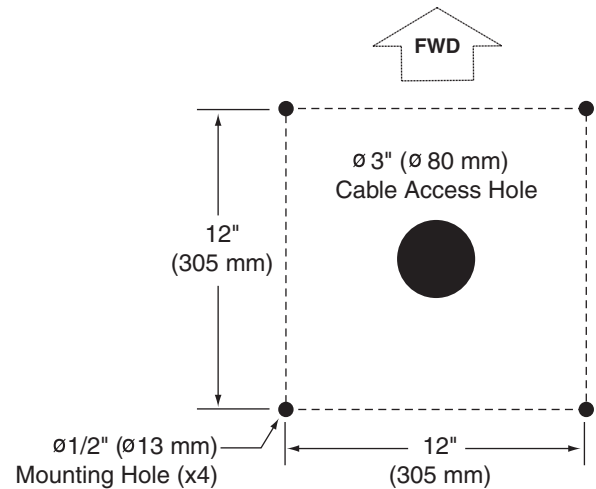


Figure 9: Foam Seal



6 Remove the Restraint

Inside the antenna, a foam block prevents the antenna assembly from moving during shipment. Follow these steps to remove this shipping restraint.

- a. Remove the six #10-32 Phillips screws securing the radome to the baseplate (see Figure 10). 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. Remove the foam block that is wedged beneath the antenna's reflector (see Figure 11). Save this restraint for future use; the customer will need to reinstall it if he/she needs to relocate or reship the antenna.

IMPORTANT!

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

Figure 10: Removing the Radome

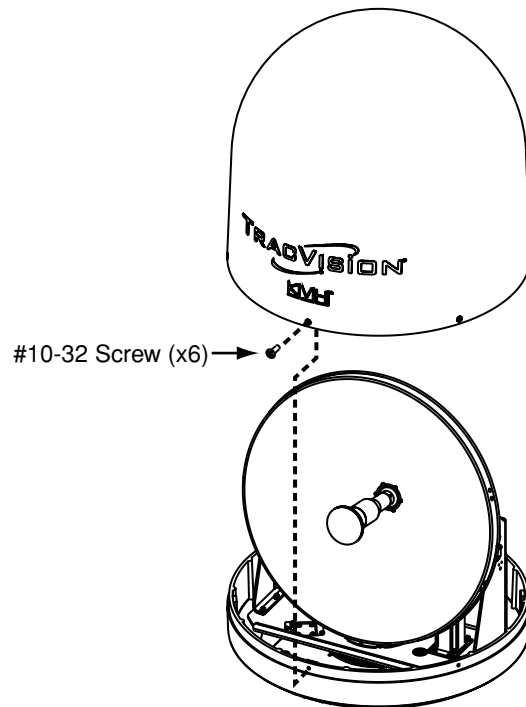


Figure 11: Foam Block Shipping Restraint



7 Wire the Antenna

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

- a. First determine the number of RF coax cables required for your particular installation (see Figure 12). (See Figure 13 to determine the type of cable required.)
- b. Route the data, power, and RF cables belowdecks through the 3" (80 mm) 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 and power cables to the ADCU and the RF cable(s) to the receiver(s).
- c. Connect the data cable to the "Data" jack on the bottom of the antenna (see Figure 14). Hand-tighten until the connector locks in place; do not use excessive force.
- d. Connect the power cable to the "Power" jack on the bottom of the antenna. Hand-tighten until the connector locks in place; do not use excessive force.
- e. Connect the RF coax cable(s) to the antenna. If you need to connect just one RF cable, connect the cable to the "RF1" jack on the bottom of the antenna. Hand-tighten, then tighten with a 7/16" wrench for 1/4 turn to ensure an electrical and weather-proof connection. Connect any additional RF coax cables to the antenna's RF2, RF3, and RF4 jacks, in that order.

***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.*

Figure 12: 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.

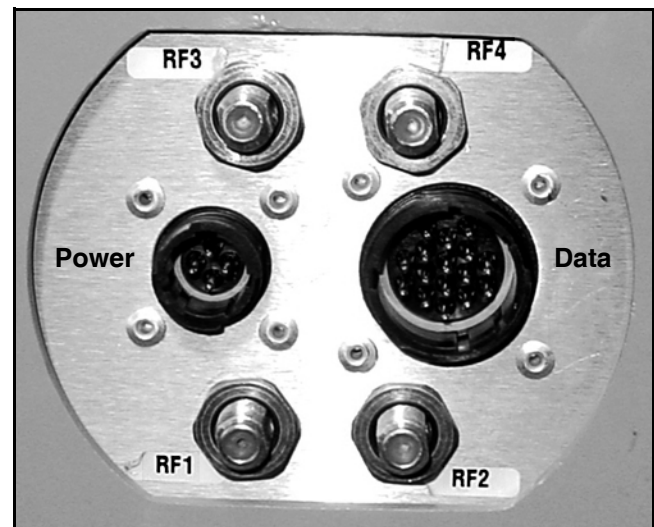
** Multiswitch required for 5 or more receivers.

See Appendix A on page 25 for details.

Figure 13: RF Cable Guidelines

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

Figure 14: Connectors on Bottom of Antenna



8 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 forward arrow inside the baseplate points toward the bow and is parallel to the vessel's centerline (see Figure 15).
- c. Make sure the four holes in the baseplate line up with the four holes in the mounting surface.

IMPORTANT!

You will need to rotate the antenna assembly by hand to see all four mounting holes. Rotate the antenna assembly slowly. If it hits a mechanical stop with excessive force, the limit switch might become damaged.

- d. At each of the four baseplate mounting holes, place a 3/8" flat washer on a 3/8"-16 bolt and insert the bolt into the hole from above (see Figure 16).
- e. Secure each mounting bolt to the mounting surface using a 3/8" shoulder washer, a 3/8" flat washer, and a 3/8"-16 lock nut from below. Tighten all four bolts until the four rubber feet are bottomed against the mounting surface and the foam seal is fully compressed.

TIP: If you are installing a linear system, you may wish to keep the radome off for now. Later, you will need to adjust the skew angle of the antenna's LNB.

- f. Reinstall the radome onto the antenna. Secure in place with the six #10-32 screws you removed in Step 6a.
- g. Install a protective plastic screw cap (supplied in the kitpack) over each radome screw.

Figure 15: Forward Arrow in Antenna Baseplate

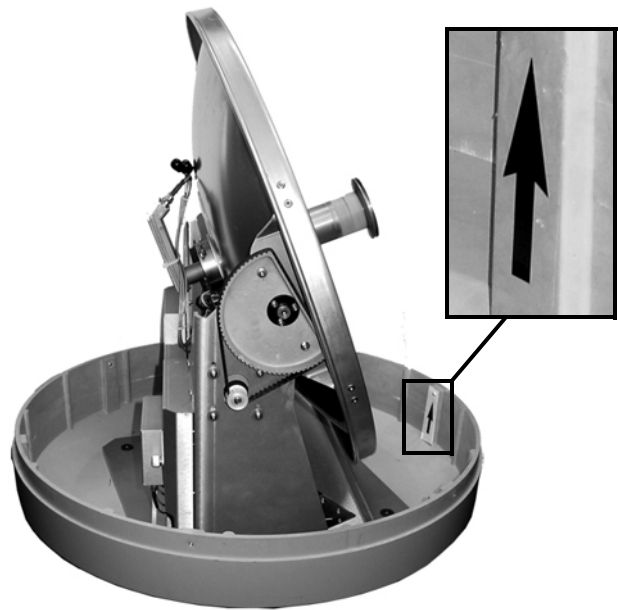
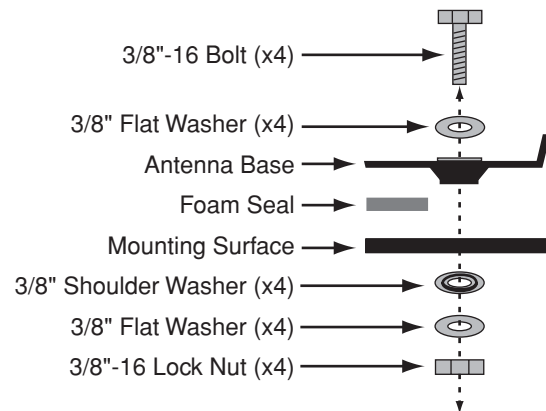


Figure 16: Mounting the Antenna (Side View)



9 Mount the Sensor

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

Option 1 - Mount to a horizontal surface

Option 2 - Mount to a vertical surface

IMPORTANT!

If you are unable to mount the sensor exactly level, you can enter offset values into the system later to compensate for a minor misalignment. See Appendix E on page 40 for details.

Option 1 - Mount to a Horizontal Surface

- a. Position the sensor on the mounting surface so that its forward (“FWD”) reference points toward the bow and is parallel to the vessel’s centerline within $\pm 5^\circ$ (see Figure 17).
- b. Place the horizontal bracket on the mounting surface and align it in the same manner as the sensor.
- c. Using the holes in the bracket’s mounting feet as a template, drill four 1/8” (3.5 mm) holes in the mounting surface. Later, you will attach the bracket to the mounting surface at these four holes.
- d. At each of the four mounting feet, insert a #8 fiber washer from above, and insert a #8 fiber washer from below (see Figure 18). *The fiber washers will isolate the sensor from ground.*
- e. Secure the horizontal bracket to the mounting surface using four #8 screws and flat washers.
- f. Place the sensor onto the bracket. Make sure the sensor’s forward (“FWD”) reference points toward the bow and its “Up” arrow points upward.
- g. Secure the sensor to the horizontal bracket using four #10-32 screws, lock washers, and flat washers. Insert the screws into the four T-nuts held within the sensor’s housing track.

Figure 17: Sensor Alignment

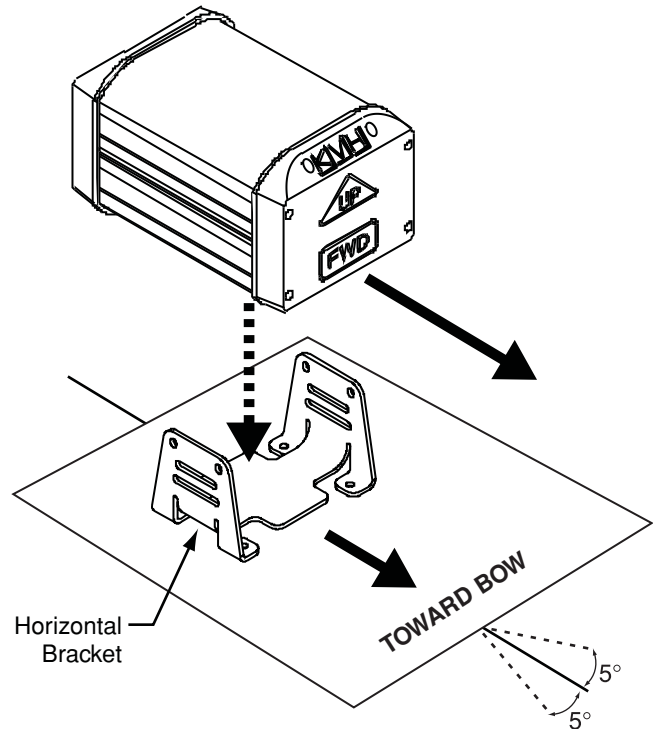
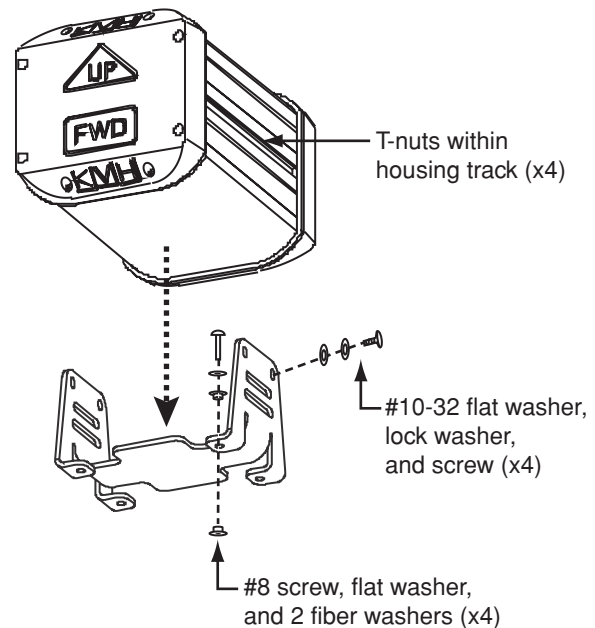


Figure 18: Sensor Mounting to a Horizontal Surface



9 Continued...

Option 2 - Mount to a Vertical Surface

- The vertical bracket allows you to mount the sensor (within its horizontal bracket) either perpendicular or parallel to the mounting surface (see Figure 19). Be sure to orient the vertical and horizontal brackets so that the sensor's forward ("FWD") reference will point toward the bow and will be parallel to the vessel's centerline within $\pm 5^\circ$ (see Figure 17 on page 11). Also make sure the sensor will be level with the deck.
- Using the holes in the vertical bracket's mounting feet as a template, drill four 1/8" (3.5 mm) holes in the mounting surface.
- Secure the vertical bracket to the mounting surface using four #8 screws and flat washers (see Figure 20).
- Secure the horizontal bracket to the vertical bracket using four #8 screws, eight flat washers, eight fiber washers, and four self-locking nuts (see Figure 20). *The fiber washers will isolate the sensor from ground.*
- Place the sensor onto the horizontal bracket (see Figure 21). Make sure the sensor's forward ("FWD") reference points toward the bow and its "Up" arrow points upward.
- Secure the sensor to the horizontal bracket using four #10-32 screws, lock washers, and flat washers. Insert the screws into the four T-nuts held within the sensor's housing track.

Figure 19: Bracket Orientation Options

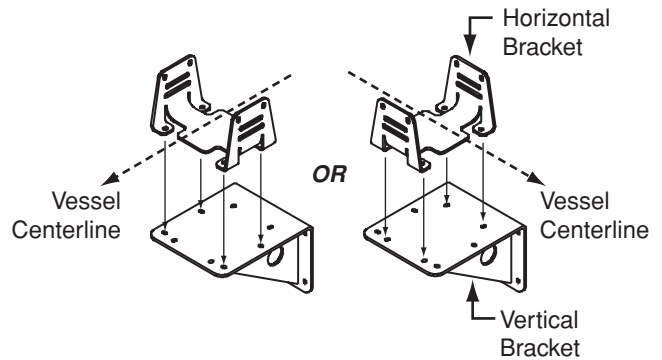


Figure 20: Bracket Mounting

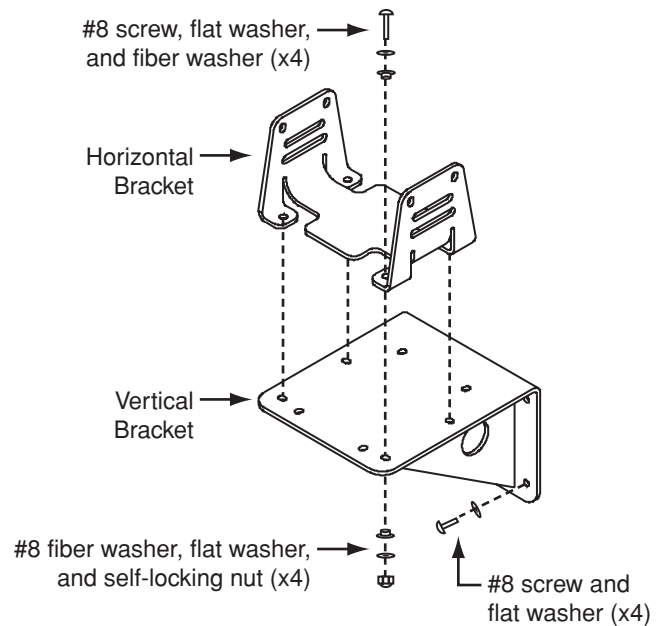
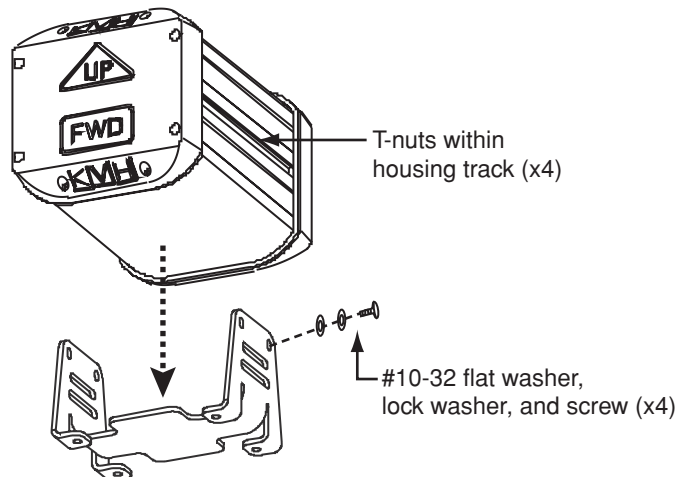


Figure 21: Sensor Mounting to a Vertical Surface



10 Wire the Receiver(s)

In Step 7, you routed the RF coax cables from the antenna, through the cable access hole, and into the vessel. Follow these steps to connect the RF coax cable(s) to the customer's satellite TV receiver(s).

IMPORTANT!

If you wish to connect **three or more** receivers to the antenna, see Appendix A on page 25.

- 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.

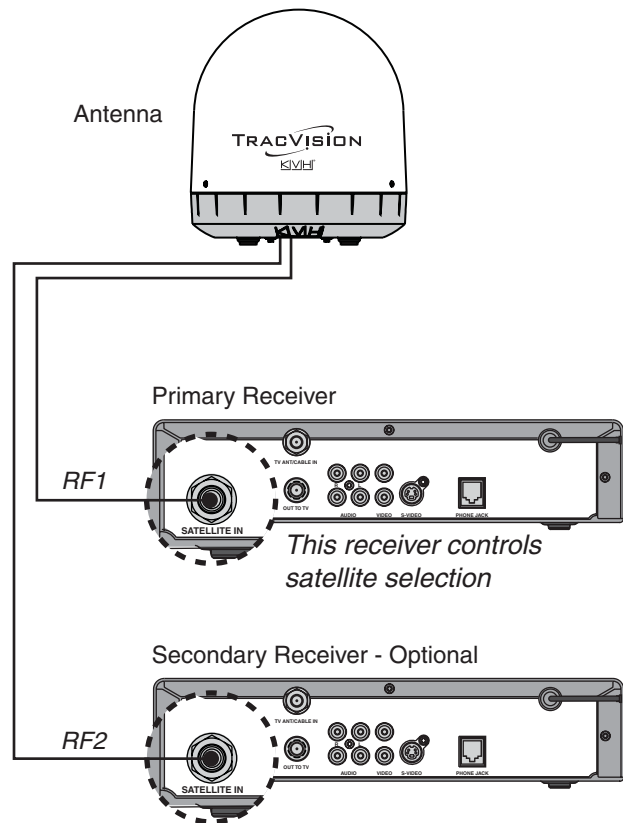
- b. Connect the RF1 cable from the antenna to the "Satellite In" jack on the primary receiver (see Figure 22).
- c. If you are connecting two receivers, connect the RF2 cable from the antenna to the "Satellite In" jack on the secondary receiver.

IMPORTANT!

Be sure all receivers are grounded. If the receiver has a 2-prong power plug, run a ground wire from the receiver's chassis to a suitable ground point. If a potential exists between AC and DC grounds, connect the wire to the ADCU's DC return instead.

- d. Connect the receiver(s) to the customer's television(s). Follow the instructions in the receiver's manual.

Figure 22: Wiring the Receivers to the Antenna



11 Wire the ADCU

Follow these steps to connect the antenna and sensor cables to the ADCU.

NOTE: System wiring diagrams are provided in Appendix G on page 42.

- a. First dress the antenna data and power cables from the antenna. Strip back the insulation of each wire approximately 1/4" (6 mm) and gently twist each wire to ensure a good electrical connection.
- b. Find the five terminal strip connectors in the kitpack. You will connect the wires to these plastic connectors first. Later, you will plug them into the rear panel of the ADCU.
- c. Connect the data cable from the antenna to the **red** and **yellow** ADCU terminal strip connectors, as shown in Figure 23. Be sure to snip and insulate any unused wires from the cable, including the drain wire (shield).

IMPORTANT!

The diagrams refer to wires by **body color/ stripe color**. For example, "Blue/White" means the blue wire with white stripe.

- d. Connect the power cable from the antenna to the **red** ADCU terminal strip connector, as shown in Figure 23.
- e. Connect the sensor cable to the GyroTrac sensor. Hand-tighten until the connector locks in place. Route the other end of the cable to the ADCU.
- f. Connect the sensor cable to the **blue** ADCU terminal strip connector, as shown in Figure 24.
- g. (Optional) If you wish to connect the vessel's GPS to the TracVision system, connect the GPS to the **blue** ADCU terminal strip connector, as shown in Figure 24. A GPS input will speed up satellite acquisition.

NOTE: For details on connecting other onboard equipment, such as an autopilot, plotter, radar, or remote display, see Appendix D on page 32.

Figure 23: Wiring the Antenna to the ADCU

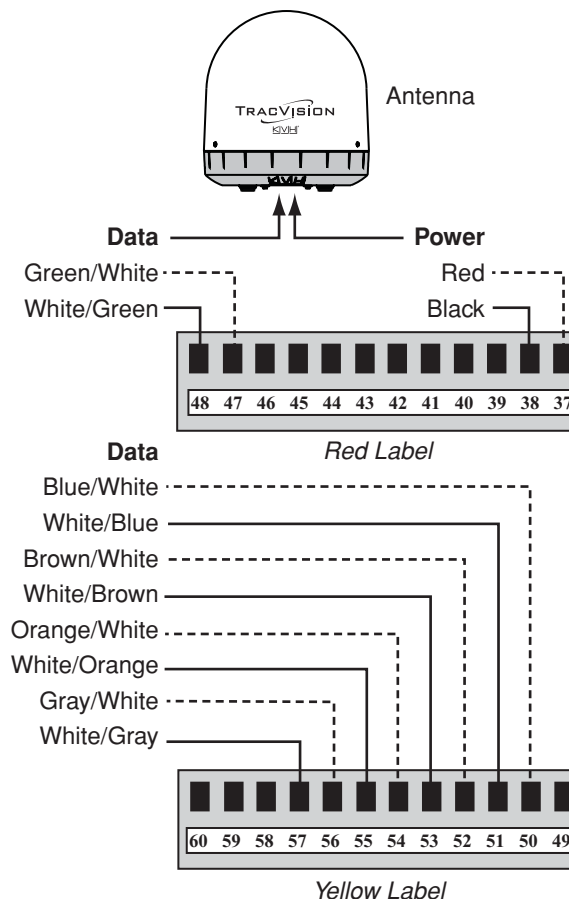
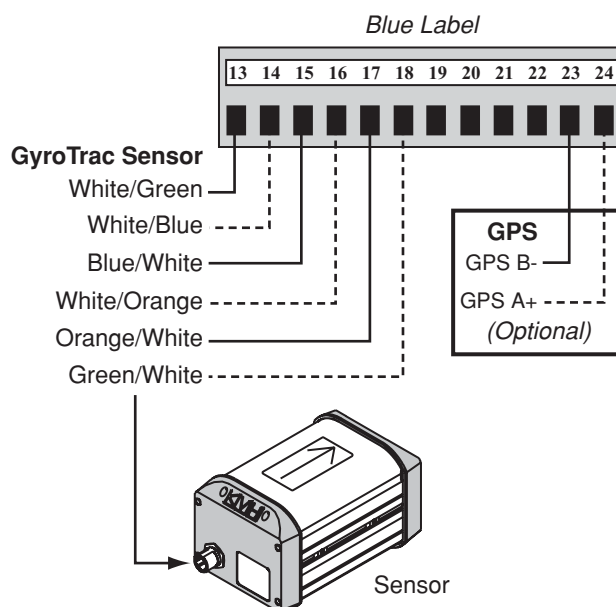



Figure 24: Wiring the Sensor and GPS to the ADCU



12 Connect Power

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

- a. Before you begin, disconnect vessel power.

 **CAUTION**

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

- b. Connect a power cable to 12 VDC vessel power (for cable specifications, see Figure 2 on page 3).

IMPORTANT!

Power supplied to the antenna must not fall below 11 VDC or exceed 16 VDC.

- c. KVH recommends you install a 15-amp circuit breaker between vessel power and the ADCU. The ADCU does not have an on/off switch.
- d. Connect your vessel power wires to the power (+) and ground (-) terminals on the **green** ADCU terminal strip connector, as shown in Figure 25.
- e. Plug all of the terminal strip connectors into the rear panel of the ADCU. Be sure to plug them into their correct positions, as shown in Figure 26.
- f. Using tie-wraps, strain-relieve all wires at the ADCU. If a ferrite is installed on the cable, position the ferrite as close as possible to the terminal strip connections and strain-relieve the wires next to the ferrite (see Figure 27). Also be sure to allow just enough slack in the cables for easy serviceability.

IMPORTANT!

Double-check all of your wiring before continuing. If wiring is incomplete or incorrect, electronics may become damaged when you apply power.

Figure 25: Wiring Vessel Power to the ADCU

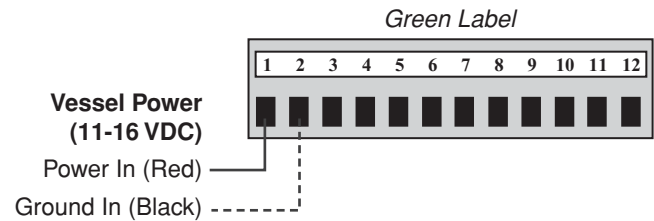


Figure 26: Plugging In the ADCU Terminal Strip Connectors

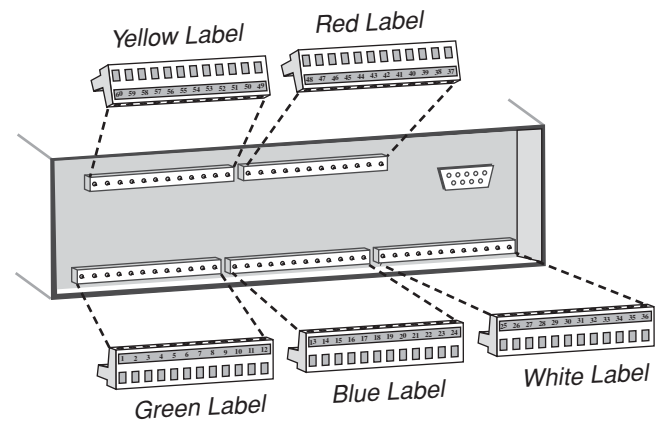
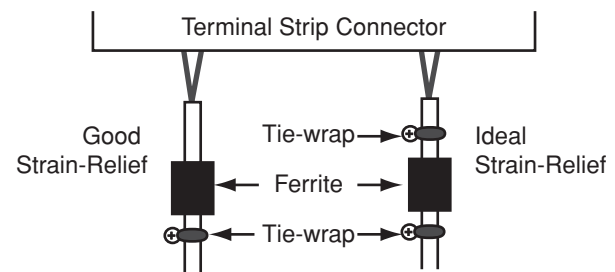


Figure 27: Effective Strain-Relief of ADCU Wires



13 Mount the ADCU

In Step 4, you identified a suitable ADCU mounting location. Now follow these steps to mount the ADCU 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 ADCU 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 ADCU (see Figure 28).
- 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 ADCU firmly into place so the fabric's loop material engages the hook disks.

Option 2- Flush Mount

- At the bottom of the ADCU, loosen the two #6-32 screws (see Figure 29).
- Slide the flush mount bracket backward onto the ADCU until the two notches in the bracket engage the screws at the bottom of the ADCU.
- Tighten the screws to secure the bracket to the ADCU.
- In Step 4 on page 6, you cut out the mounting hole in the mounting surface. Insert the ADCU and bracket assembly into this mounting hole and secure in place with four #8 screws and washers (see Figure 30).

Figure 28: Velcro Mounting the ADCU to a Horizontal Surface

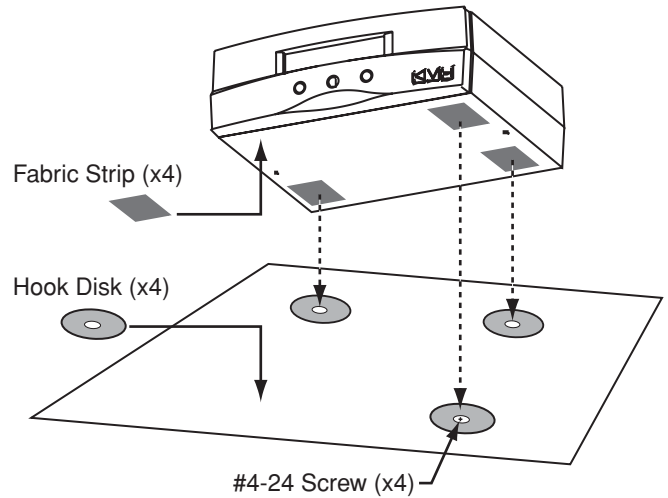


Figure 29: Flush Mount Bracket

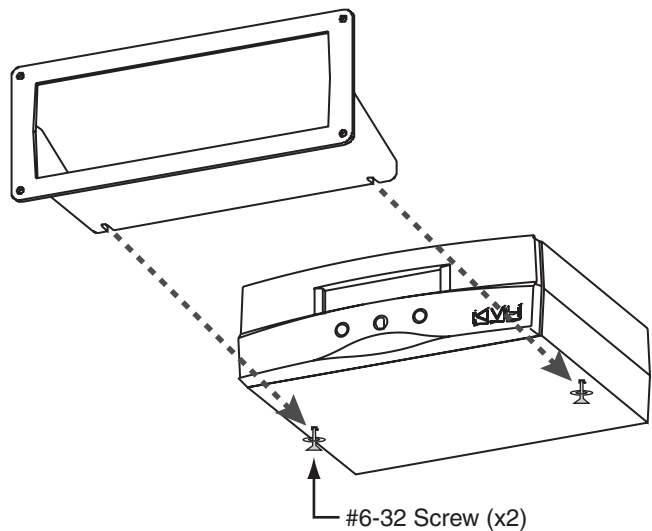
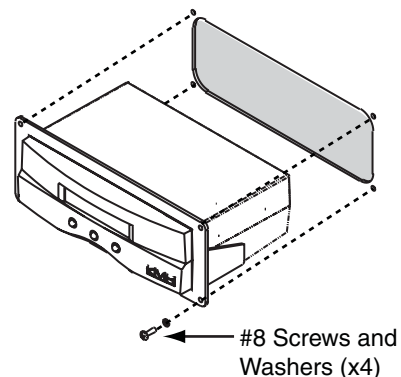


Figure 30: Flush Mounting the ADCU to a Vertical Surface



14 Select Satellites

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

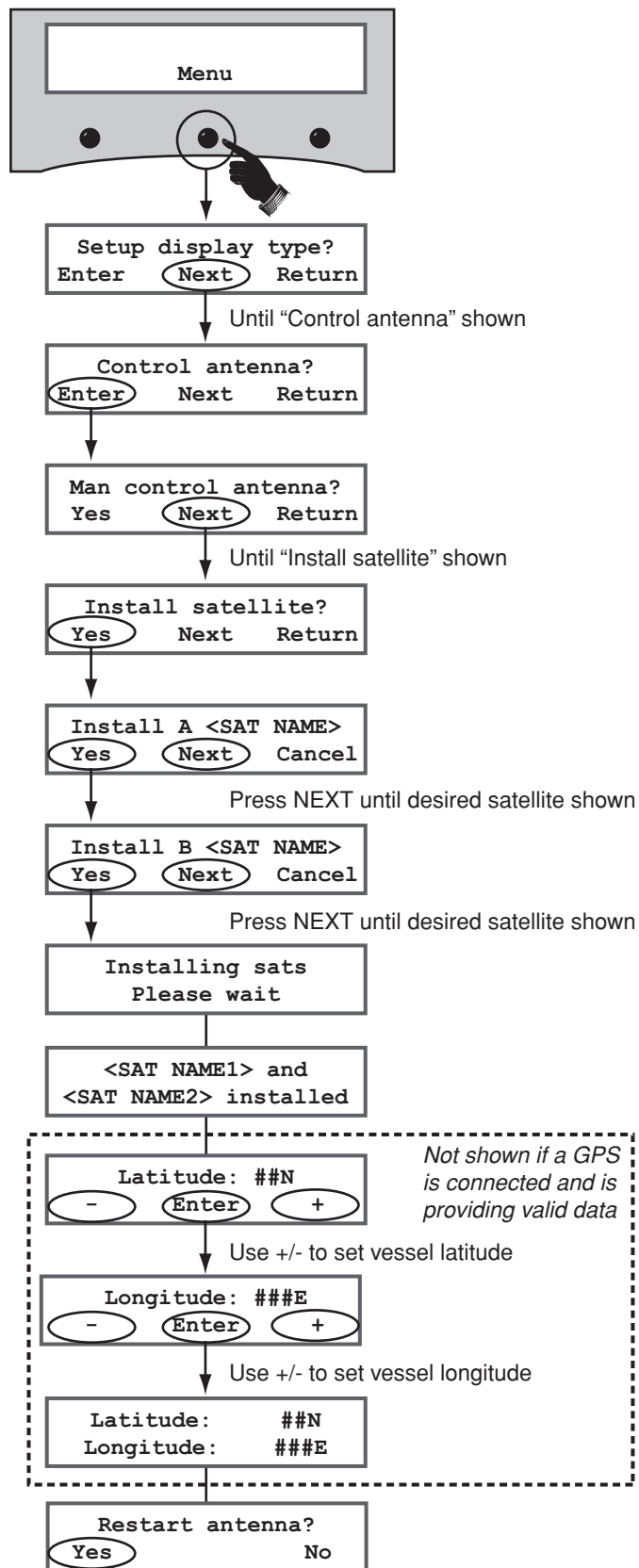
- Ensure the antenna has a clear, unobstructed view of the sky.
- Apply power to the receiver(s), TV(s), and ADCU. Wait two minutes for system startup.
- Press the center **MENU** button on the ADCU to access the onscreen menu (see Figure 31).
- At “Setup display type?”, press **NEXT** until the display shows “Control antenna?” Then press **ENTER**.
- At “Man control antenna?”, press **NEXT** until the display shows “Install satellite?” Then press **YES**.
- At “Install A <SAT NAME>”, press **NEXT** until the display shows the first (primary) satellite you want to select. Then press **YES**. (See Appendix B on page 27 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 C on page 28.

- Repeat Step 14f to select the second satellite. If you want to set up the antenna to track just one satellite, select “None” instead.
- (If necessary)** At “Latitude”, use the - and + buttons to set each digit of the vessel’s latitude. Press **ENTER** to accept each digit.
- At “Longitude”, set the vessel’s longitude.
- At “Restart antenna?”, press **YES**. Wait two minutes while the antenna restarts.
- (Linear 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 31: Satellite Selection Menus on ADCU



15 Get the LNB Skew Angle (Linear only)

To optimize reception, the antenna's linear LNB must be set to the correct skew angle for the satellite(s) you want to track. Follow these steps to determine what the correct skew angle should be for the currently selected satellite and vessel position.

TIP: You might also be able to get the correct skew angle from the customer's satellite service provider.

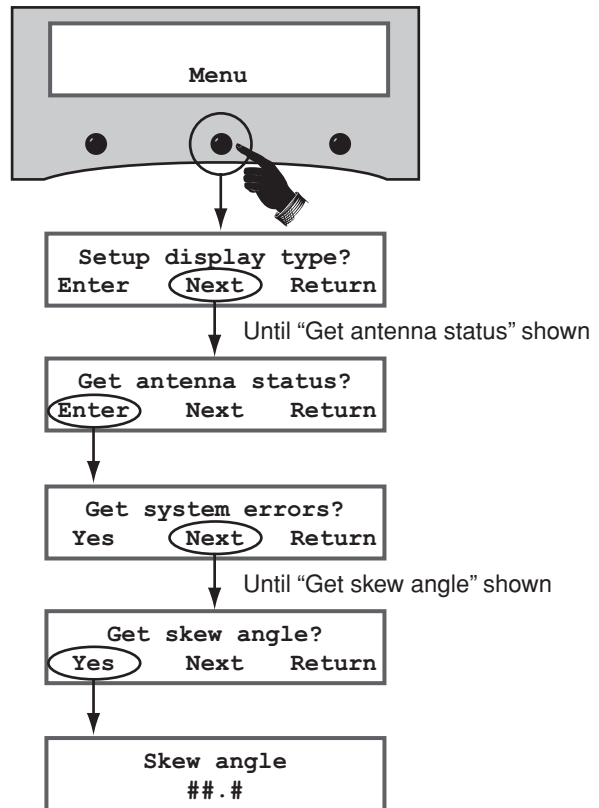
- Press the center **MENU** button on the ADCU to access the onscreen menu (see Figure 32).
- At "Setup display type?", press **NEXT** until the display shows "Get antenna status?". Then press **ENTER**.
- At "Get system errors?", press **NEXT** until the display shows "Get skew angle?". Then press **YES**.
- The display shows the calculated skew angle for the selected satellite and position. Note this number for future reference.

NOTE: If you did not connect a GPS to the system, the antenna will use the position information you entered in Step 14 to calculate the correct LNB skew angle. The antenna will also use this position information to speed up satellite acquisition.

- Press any button. The display returns to the "Get skew angle?" screen.
- Press **RETURN** until you exit the menu.

*TIP: This procedure provides the correct skew angle for the currently selected satellite only. If you installed a pair of satellites in Step 14, you might wish to calculate the **average skew** for the two satellites and set the LNB to that skew angle instead. To find the average skew, first select the second satellite and repeat the procedure above to get the calculated skew angle for the second satellite. Then add the two skew angle numbers together and divide by two to get the average skew angle.*


Figure 32: Skew Angle Menus on ADCU



16 Set the LNB Skew Angle (Linear only)

Follow these steps to set the antenna's LNB to the skew angle you noted in Step 15.

- a. Turn off and unplug the receiver(s).
- b. Disconnect antenna power.

	CAUTION
Disconnect power from the antenna and the receivers before you adjust the LNB. The antenna's moving parts can cause injury.	

- c. Remove the antenna's radome, if you installed it earlier in Step 8f.

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

- d. Locate the LNB on the back of the antenna's reflector (see Figure 33).
- e. Loosen the two wing screws on the LNB choke feed. These wing screws secure the LNB in place.
- f. Adjust the LNB clockwise or counter-clockwise until the skew arrow on the LNB points to the skew angle that you noted in Step 15 (see Figure 34).

IMPORTANT!
Be sure to keep the LNB fully inserted into the choke feed to ensure optimum performance.

- g. Tighten the wing screws to secure the LNB in place.
- h. Reinstall the radome (as explained in Steps 8f-g on page 10).

Figure 33: Wing Screws Securing the LNB to the Reflector

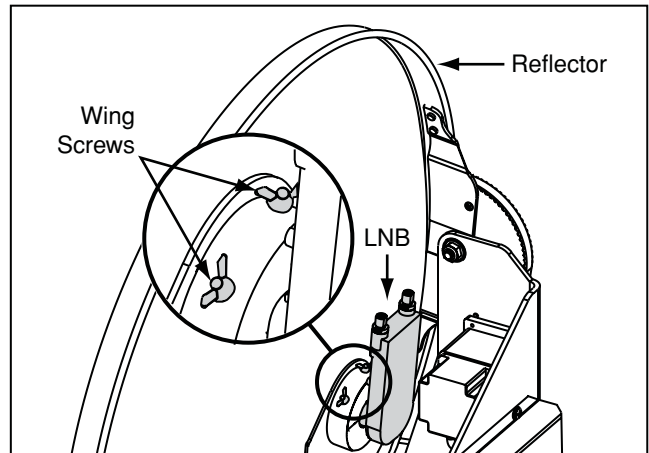
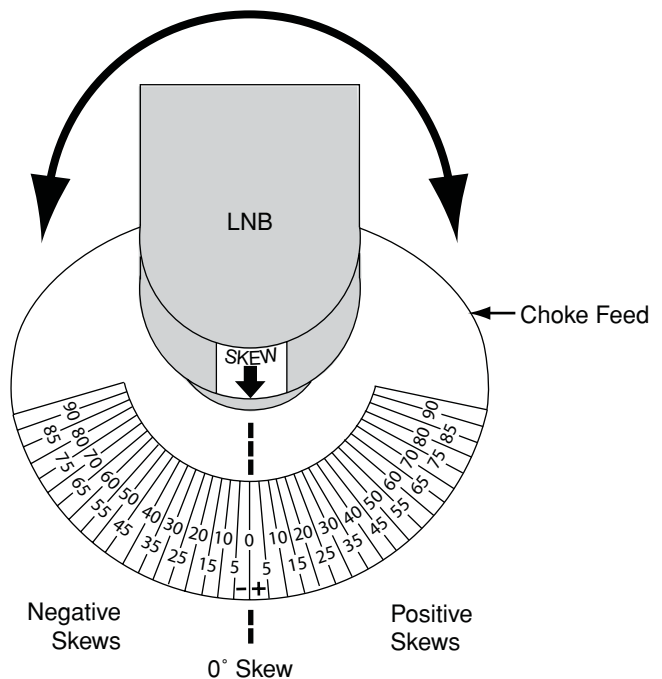


Figure 34: LNB Skew Angle Adjustment



17 Calibrate the Sensor

Every GyroTrac 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 sensor, causing errors in its reported heading. To compensate for these magnetic distortions, follow these steps to calibrate the sensor.

Run the Autocalibration Function

The system's Autocalibration function is set to "On" at the factory. This function allows the sensor to calibrate itself automatically when you steer the vessel through two circles.

- 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.
- Steer the vessel at a slow, steady speed through two full circles that take at least two minutes each to complete (see Figure 35). Use the heading you noted in Step 17c to confirm when you have completed each full circle.

TIP: Try to time your turns so that it takes approximately 30 seconds to turn 90°. Each circle does not have to be completely round, but make sure you turn a full 360° for each.

Check the Calibration Score

Once you have completed the two circles, follow these steps to check the calibration "score."

- Press the center **MENU** button on the ADCU to access the onscreen menu (see Figure 36).
- At "Setup display type?", press **NEXT** until the display shows "Control compass?" Then press **ENTER**.
- At "Set Autocal on/off?", press **NEXT** until the display shows "Read cal score?" Then press **YES**.

Figure 35: Running Autocalibration

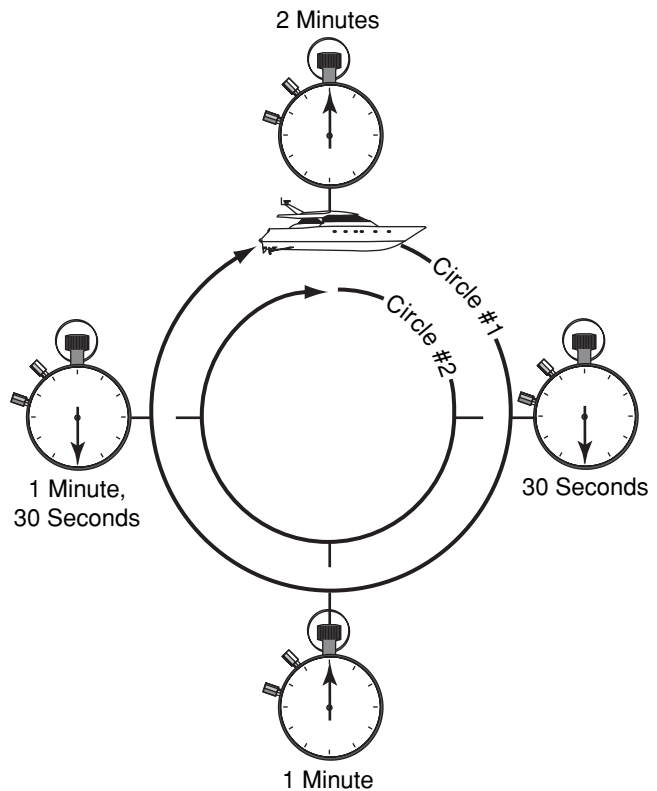
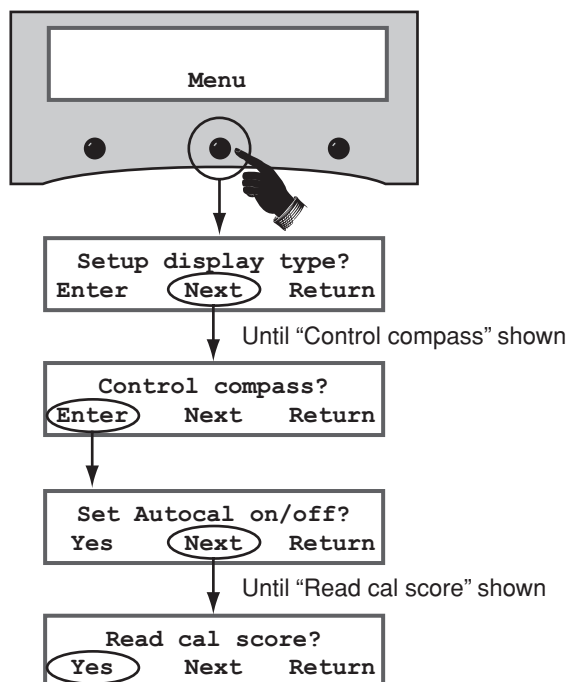


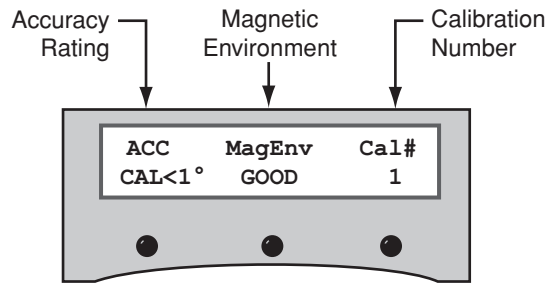
Figure 36: Viewing the Calibration Score on the ADCU



17 Continued...

- d. The display shows the calibration score for the calibration you just performed with the Autocalibration function (see Figure 37).
- e. **If Accuracy = "BAD CAL":**
Recalibrate the sensor by navigating through two additional circles. Repeat until you achieve a suitable accuracy rating.
- f. **If Mag. Environment = "POOR" or "BAD":**
Relocate the sensor to a more favorable magnetic environment (see Step 3 on page 5 for guidelines). Then clear the calibration score (see Appendix F on page 41) and recalibrate the sensor.
- g. Press any button. The display returns to the "Read Cal score?" screen.
- h. Press **RETURN** until you exit the menu.

Figure 37: Calibration Score Example



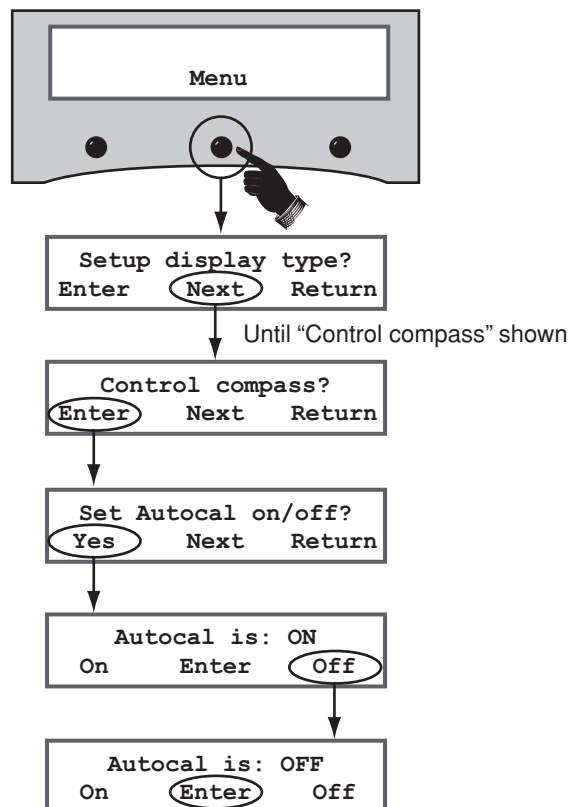
Data Field	Description
Accuracy Rating	Degree of accuracy the sensor will provide (CAL<1° = within 1°)
Magnetic Environment	Quality of the sensor's installation site
Calibration Number	Number of times the sensor was calibrated

Turn Off Autocalibration

Once you have achieved a good calibration score, follow these steps to turn off the Autocalibration function.

- a. Press the center **MENU** button on the ADCU to access the onscreen menu (see Figure 38).
- b. At "Setup display type?", press **NEXT** until the display shows "Control compass?" Then press **ENTER**.
- c. At "Set Autocal on/off?", press **YES**.
- d. At "Autocal is: ON", press **OFF**.
- e. At "Autocal is: OFF", press **ENTER**. The display returns to the "Set Autocal on/off?" screen.
- f. Press **RETURN** until you exit the menu.

Figure 38: Turning Off Autocalibration at the ADCU



18 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.

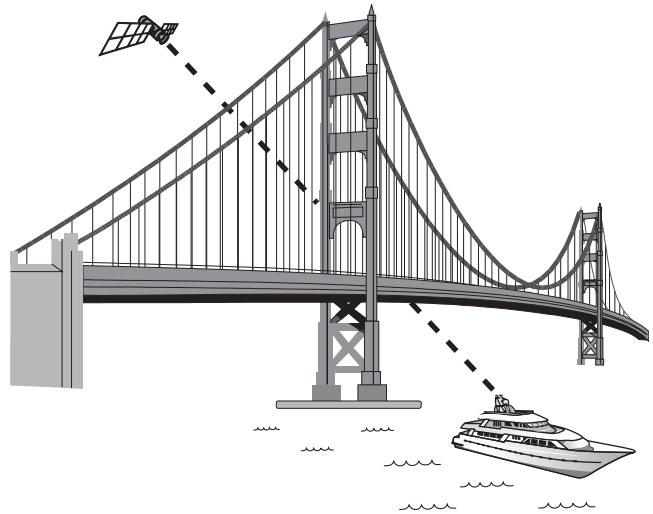


WARNING

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 39).
- 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.
- You need to activate the receiver for the desired satellite TV service before the receiver can decode satellite signals. KVH can help you activate a DIRECTV receiver; just call KVH's Activation Department at 1-888-584-4163 (Mon.-Fri., 8:30 am - 5 pm ET)
- Refer to the *User's Guide* for complete operation instructions and troubleshooting information.

Figure 39: 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

- A. Wiring 3+ Receivers, 25
 - B. Satellite Library, 27
 - C. User-Defined Satellites, 28
 - D. Connecting External Equipment, 32
 - E. Entering Sensor Offset Values, 40
 - F. Clearing the Calibration Score, 41
 - G. Wiring Diagrams, 42
- ADCU Flush Mounting Template, 49

A Wiring 3+ 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 40).
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).

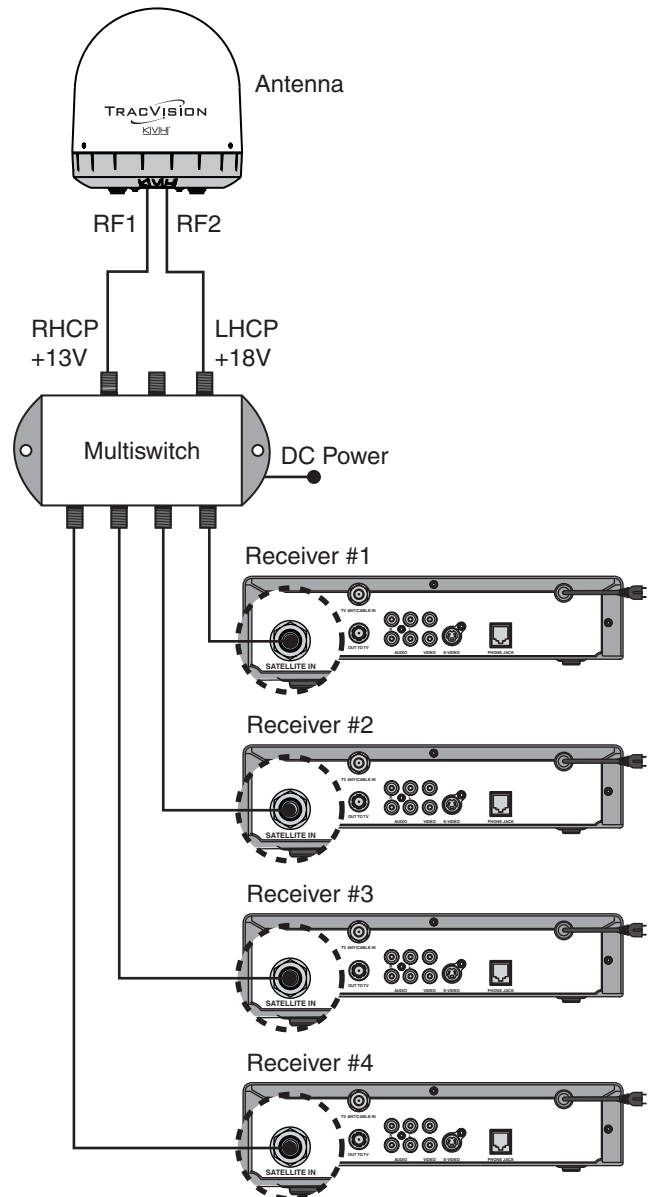
IMPORTANT!

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 ADCU.

Figure 40: Multiswitch Wiring - Antenna with Circular Dual LNB



A 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.

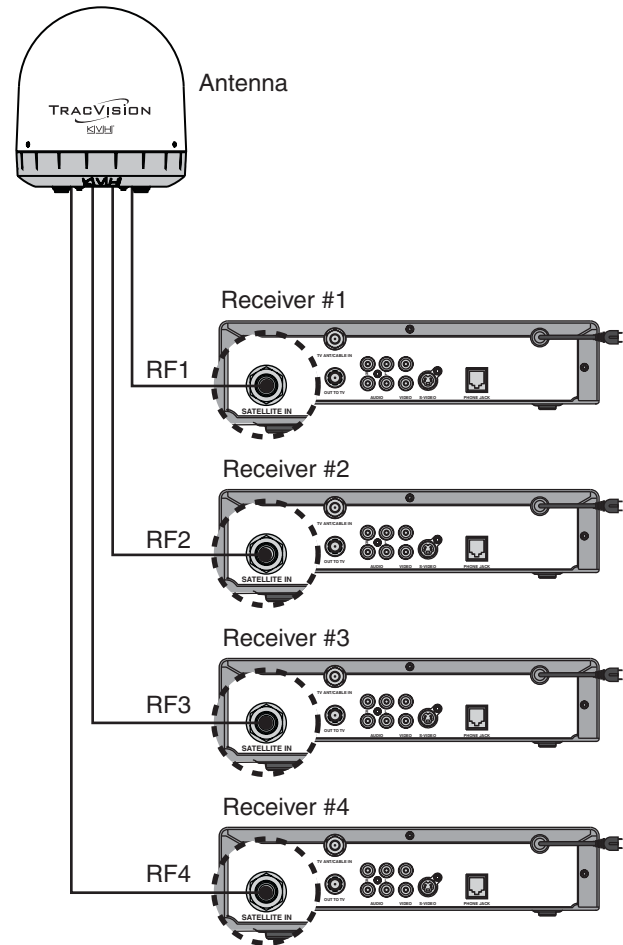
NOTE: The additional receivers will be able to select any channel carried on the satellite that is currently selected on the primary receiver.

2. Connect the RF1 cable from the antenna to the "Satellite In" jack on the primary receiver (see Figure 41).
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. If the receiver has a 2-prong power plug, run a ground wire from the receiver's chassis to a suitable ground point. If a potential exists between AC and DC grounds, connect the wire to the ADCU's DC return instead.

Figure 41: Receiver Wiring - Antenna with Linear Quad LNB



B Satellite Library

Appendix

The TracVision 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 Dual or 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 Dual 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.

C 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 ADCU (see Figure 43).

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 44):
 - 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.

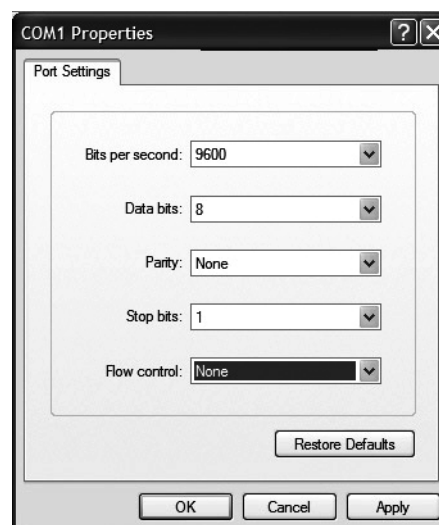
Figure 42: Technician Programming the Antenna



Figure 43: Maintenance Port on ADCU



Figure 44: HyperTerminal Settings



C Continued...

4. Apply power to the TracVision antenna. Data should soon be scrolling in your HyperTerminal window (see Figure 45). 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 46):

- 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 45: Antenna Data Scrolling in Window

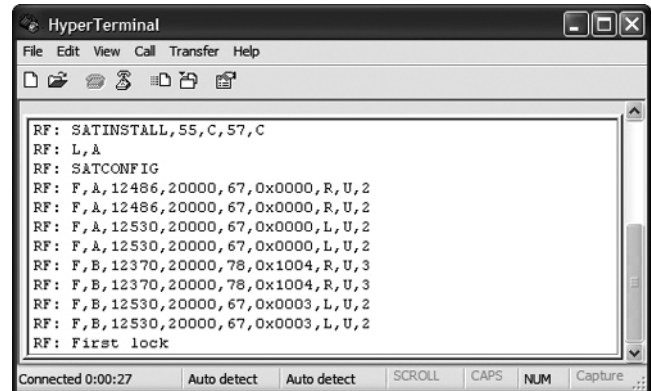
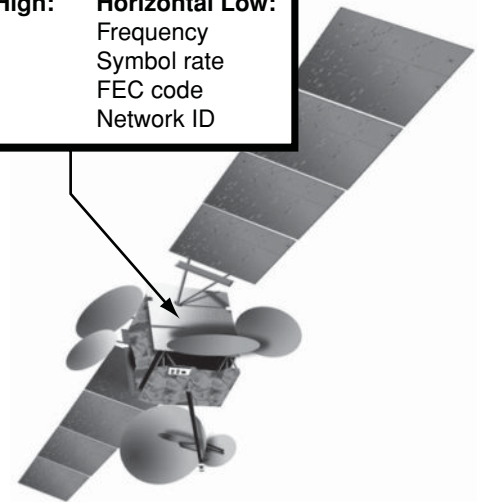


Figure 46: Identifying a Linear Satellite

Name	
Longitude	
Decoder type	
Vertical High:	Vertical Low:
Frequency	Frequency
Symbol rate	Symbol rate
FEC code	FEC code
Network ID	Network ID
Horizontal High:	Horizontal Low:
Frequency	Frequency
Symbol rate	Symbol rate
FEC code	FEC code
Network ID	Network ID



C 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 47 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 48 for definitions).

@SATCONFIG,F,G,H,I,J,K,L,M,N →

6. Repeat Step C5 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 instructions in Step 14 on page 17 to select your new USER 1 or USER 2 satellite.

Figure 47: **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 48: **@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)

C 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

```

D Connecting External Equipment

Appendix

In addition to TracVision and GPS connections, the ADCU rear panel includes four optional compass outputs of the following formats:

- **One** sine/cosine output
- **One** Furuno® AD10S output
- **Two** serial outputs (each configurable for NMEA 0183, KVH RS-422, or Cetrek)

These compass outputs allow you to supply the GyroTrac sensor's heading data to other electronic devices, such as autopilots, radars, remote displays, plotters, and computers onboard the vessel.

***NOTE:** KVH offers a rotating card display (KVH part #19-0120) for presenting sensor heading information (see Figure 49). This device, powered by 11-40 VDC, connects to any one of the ADCU's serial outputs, configured for NMEA.*

***NOTE:** If you wish to connect a ship's gyro to the system, connect the gyro to the ADCU's GPS input terminals (see Step 11g on page 14).*

Before you connect an external device, consider the following guidelines:

- The device must comply with NMEA Standard 2.2
- Data conductor wires should be minimum 18 AWG (0.75 mm²), twisted-pair, stranded, tinned marine cable
- Do not use cables with wire diameters larger than 12 AWG (4 mm²), since this is the largest gauge the ADCU can accept
- Always follow the manufacturer's wiring guidelines in the device's manual

This appendix explains how to wire and configure each type of compass output from the ADCU.

Figure 49: Optional Rotating Card Display (Part #19-0120)



D Continued...

Sine/Cosine Output

The sine/cosine output can be configured for a 3-wire or 4-wire sine/cosine output, commonly used with ComNav®, Robertson®, and other autopilot systems.

Before you connect the external device, consider the following important notes:

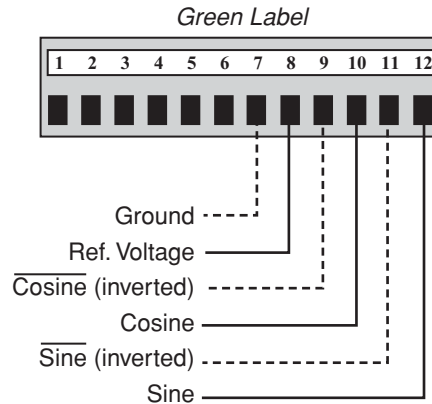
- The ADCU's sine/cosine reference voltage is an output, not an input. Do not connect this terminal (#8) to the reference output of the external device.
- If the device has its own internal reference, do not connect the device to the ADCU's reference terminal (#8).
- Before you connect the device's internal ground wire to the ADCU, use a low-impedance voltmeter to verify there is no DC voltage present between the two terminals. A DC surge could damage the electronics.
- The maximum current draw from the ADCU sine/cosine output is 10 mA.
- The B&G 4-wire sine/cosine output (also known as "differential sine/cosine") is a substitute of the Halcyon® compass.

Sine/Cosine Output Wiring

In most cases, wire the device to the sine/cosine output as noted below (see Figure 50).

External Device Wire:	Connect to Green ADCU Terminal:
Sine	12
Cosine	10
Internal power ground (not chassis ground)	7
Reference (input)	8 (KVH output)

Figure 50: Sine/Cosine ADCU Wiring



D Continued...

Sine/Cosine Output Configuration

Once you have finished the system installation, configure the ADCU's sine/cosine output for the desired heading format and the correct voltages for the external device.

1. Press the center **MENU** button on the ADCU to access the onscreen menu (see Figure 51).
2. At "Setup display type?", press **NEXT** until the display shows "Setup data outputs?" Then press **YES**.
3. At "Set sine-cos levels?", press **YES**.
4. Now you need to select the desired heading format. At "Sine cosine is", press **MAG** to select magnetic heading, or press **TRUE** to select true heading. Then press **ENTER**.

IMPORTANT!

If you did not connect a GPS to the system, only magnetic heading is available. If you connected a ship's gyro to the system, only true heading is available.

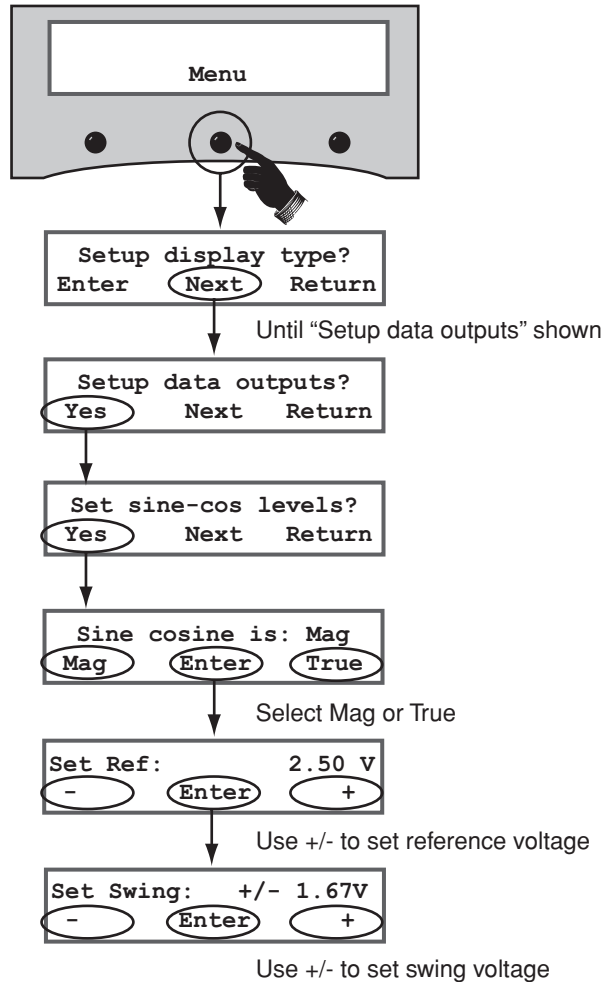
5. At "Set Ref", use the - and + buttons to set the reference voltage (0 - 6.5 volts). Then press **ENTER**.

TIP: If you do not know the correct reference voltage for the external device, connect a voltmeter between the ADCU's reference terminal (#8) and the reference terminal on the external device. Then simply adjust the reference voltage on the ADCU until the voltmeter indicates zero volts (0 VDC).

NOTE: If you are using a B&G 4-wire sine/cosine output as a substitute for a Halcyon compass, set the reference voltage to 3.5 volts.

6. At "Set Swing", use the - and + buttons to set the swing voltage (± 0 - 6.5 volts). Then press **ENTER**.

Figure 51: Sine/Cosine Output Configuration Menus on ADCU



D Continued...

Serial Outputs

The two serial outputs (#1 and #2) can be individually configured for any of the following output types:

Type	Description
NMEA	<ul style="list-style-type: none"> Conforms to NMEA 0183 version 2.20 standard Selectable formats: BWC, GGA, GLL, HDG, HDM, HDT, VTG, and XTE KVH rotating card display requires this output type
KVH RS-422	<ul style="list-style-type: none"> Supplies stabilized pitch, roll, and yaw data Serial port #1 at 4800 baud; Serial port #2 at 4800 or 9600 baud Usable in any device that can receive this data rate
Cetrek	<ul style="list-style-type: none"> Proprietary format Supplies stabilized heading data to a Cetrek autopilot device

Serial Output Wiring

Connect the external device(s) to the desired ADCU serial output(s), as shown in Figure 52 and Figure 53.

NOTE: The ADCU also provides a pass-through duplicate of serial port #1 (see Figure 54).

IMPORTANT!

The ADCU's third serial output is disabled when the sensor is connected to a TracVision system. Serial port #3 is only used in a standalone GyroTrac installation.

Figure 52: Serial Port #1 ADCU Wiring

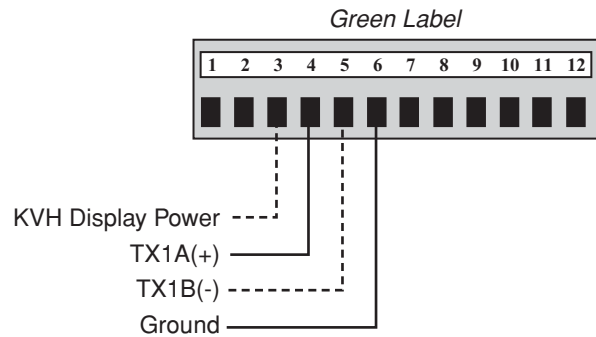


Figure 53: Serial Port #2 ADCU Wiring

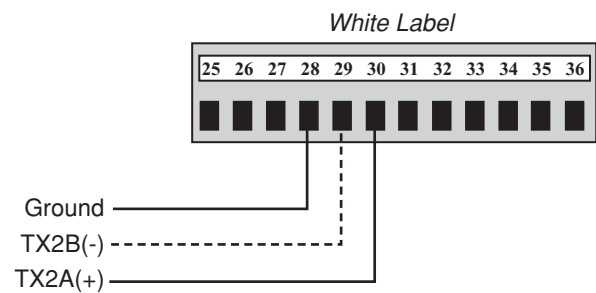
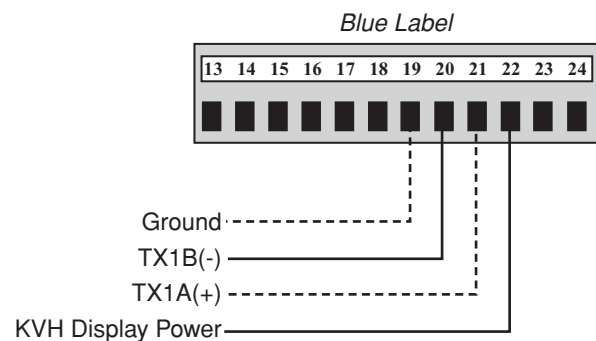


Figure 54: Duplicate Serial Port #1 ADCU Wiring



D Continued...

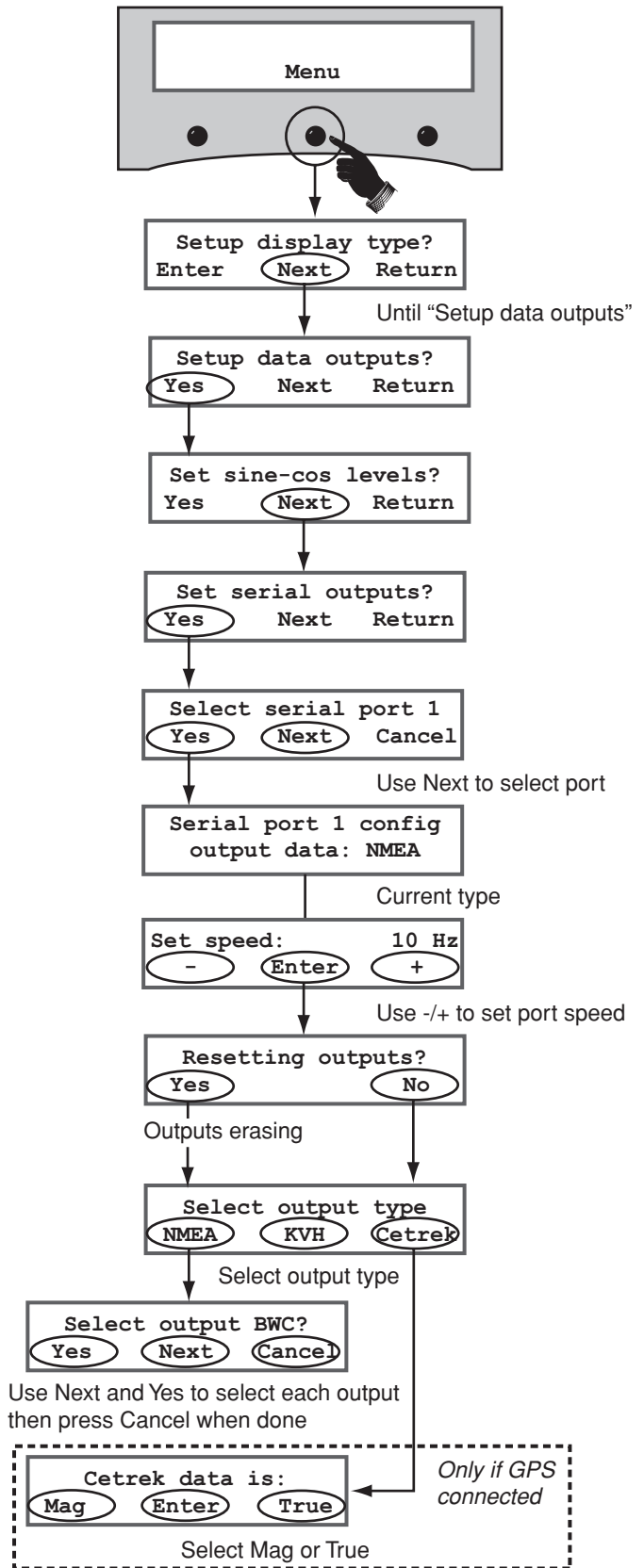
Serial Output Configuration

Once you have finished the system installation, configure the ADCU's serial outputs for the desired port speed and output type.

1. Press the center **MENU** button on the ADCU to access the onscreen menu (see Figure 55).
2. At "Setup display type?", press **NEXT** until the display shows "Setup data outputs?" Then press **YES**.
3. At "Set sine-cos levels?", press **NEXT** until the display shows "Set serial outputs?" Then press **YES**.
4. At "Select serial port", press **NEXT** until the display shows the serial port number you want to configure (1 or 2). Then press **YES**.
5. At "Set Speed", use the - and + buttons to set the speed of the serial port (1 Hz - 20 Hz). Then press **ENTER**.
6. At "Resetting outputs?", press **YES**.
7. Now you need to set the output type for the selected serial port. At "Select output type", press **NMEA**, **KVH**, or **CETREK** to select the corresponding output type.
8. If you selected NMEA, select the desired NMEA message format(s). At "Select output", press **NEXT** until the display shows the desired format (BWC, GGA, GLL, HDG, HDM, HDT, VTG, or XTE). Then press **YES**. You may select as many messages as you wish. When you are done, press **CANCEL**.
9. If you selected Cetrek, and a GPS is connected, select the desired heading format. At "Cetrek data is", press **MAG** to select magnetic heading, or press **TRUE** to select true heading. Then press **ENTER**.

NOTE: The baud rate for serial port #1 is always set to 4800 baud. The baud rate for serial port #2 is automatically set to 4800 baud (NMEA or Cetrek) or 9600 baud (KVH RS-422).

Figure 55: Serial Port Configuration Menus on ADCU



D Continued...

Serial Output Message Formats

This section shows various serial message formats for easy reference.

NMEA1 Magnetic Heading (HDM) Format

Communication: 4800 baud, 1 start bit, 8 data bits, 1 stop bit, no parity

Update rate: 1-20 Hz, selectable

Sentence type: \$HCHDM,XXX.X,M,*hh<cr><lf>

HCHDM	NMEA talker and sentence ID
XXX.X	Stabilized magnetic heading in degrees and tenths
M	Mag. heading, ASCII hex 0x4D
*	ASCII hex 0x2A
hh	Checksum
<cr>	Carriage return, ASCII hex 0x0D
<lf>	Line feed, ASCII hex 0x0A

NMEA2 Magnetic Heading (HDG) Format

Communication: 4800 baud, 1 start bit, 8 data bits, 1 stop bit, no parity

Update rate: 1-20 Hz, selectable

Sentence type: \$HCHDG,XXX.X,*hh<cr><lf>

HCHDG	NMEA talker and sentence ID
XXX.X	Stabilized magnetic heading in degrees and tenths
*	ASCII hex 0x2A
hh	Checksum
<cr>	Carriage return, ASCII hex 0x0D
<lf>	Line feed, ASCII hex 0x0A

NMEA3 True Heading (HDT) Format

Communication: 4800 baud, 1 start bit, 8 data bits, 1 stop bit, no parity

Update rate: 1-20 Hz, selectable

Sentence type: \$HCHDT,XXX.X,T,*hh<cr><lf>

HCHDT	NMEA talker and sentence ID
XXX.X	Stabilized true heading in degrees and tenths
T	True heading, ASCII hex 0x54
*	ASCII hex 0x2A
hh	Checksum
<cr>	Carriage return, ASCII hex 0x0D
<lf>	Line feed, ASCII hex 0x0A

KVH Special RS-422 Format (Set at factory only)

Communication: 9600 baud, 1 start bit, 8 data bits, 1 stop bit, no parity

Update rate: 1-20 Hz, selectable

Sentence type: %AAAA,BBBB,CCCC<cr><lf>

%	Sentence ID
AAAA	Stabilized pitch attitude in tenths of degrees
BBBB	Stabilized roll attitude in tenths of degrees
CCCC	Stabilized magnetic azimuth in tenths of degrees
<cr>	Carriage return, ASCII hex 0x0D
<lf>	Line feed, ASCII hex 0x0A

D Continued...

Cetrek Format

Communication: 4800 baud, 1 start bit, 8 data bits, 1 stop bit, no parity

Update rate: 1-20 Hz, selectable

Sentence type: \$\$MSB LSB B C Status D<cr><lf>

MSB LSB	Binary value 0-1023, equal to 0.0-359.6 degrees stabilized magnetic heading
B	ASCII hex 0x00
C	ASCII hex 0x00
Status	ASCII hex 0x43
D	ASCII hex 0xAA
<cr>	Carriage return, ASCII hex 0x0D
<lf>	Line feed, ASCII hex 0x0A

Furuno Output

The Furuno output is a proprietary AD10S format commonly used with Furuno and other brands of radars and autopilots. This output can be configured for a 25 millisecond (40 Hz) or 200 millisecond (5 Hz) data rate.

NOTE: If you need to connect a second Furuno radar, you can install an optional stepper interface unit (KVH part #19-0078) (see Figure 56). This device connects to any NMEA serial port (configured for an HDM or HDT message) and generates a stepper output of 3, 6, 12, and 24 steps/degree with a 5V reference voltage. An in-line voltage converter (KVH part #19-0089) is also available to provide a 30-70V reference instead of the unit's standard 5V.

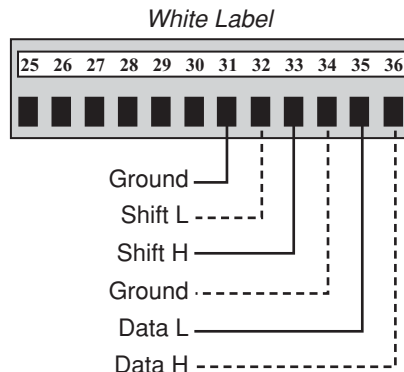
Furuno Output Wiring

Connect the external device to the Furuno output, as shown in Figure 57.

Figure 56: Optional Stepper Interface Unit (Part #19-0078)



Figure 57: Furuno Output ADCU Wiring



D Continued...

Furuno Output Configuration

Once you have finished the system installation, configure the ADCU's Furuno output for the desired heading format and data rate.

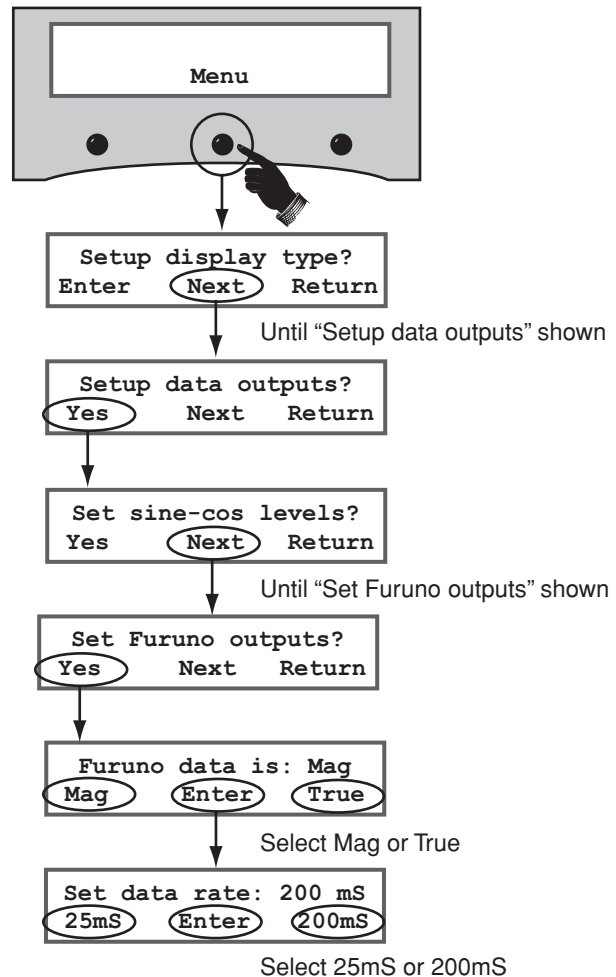
1. Press the center **MENU** button on the ADCU to access the onscreen menu (see Figure 58).
2. At "Setup display type?", press **NEXT** until the display shows "Setup data outputs?" Then press **YES**.
3. At "Set sine-cos levels?", press **NEXT** until the display shows "Set Furuno outputs?" Then press **YES**.
4. Now you need to select the desired heading format. At "Furuno data is", press **MAG** to select magnetic heading, or press **TRUE** to select true heading. Then press **ENTER**.

IMPORTANT!

If you did not connect a GPS to the system, only magnetic heading is available. If you connected a ship's gyro to the system, only true heading is available.

5. Now select the data rate. At "Set data rate", press **25mS** to select 25 milliseconds, or press **200mS** to select 200 milliseconds. Then press **ENTER**.

Figure 58: Furuno Output Configuration Menus on ADCU



E Entering Sensor Offset Values

The GyroTrac sensor must be located as close to level in pitch and roll as possible, with its long axis parallel to the vessel's centerline (see Step 9 on page 11). If you are unable to mount the sensor according to these guidelines, follow these steps to set offset values to compensate for minor variances in the sensor's pitch, roll, and yaw.

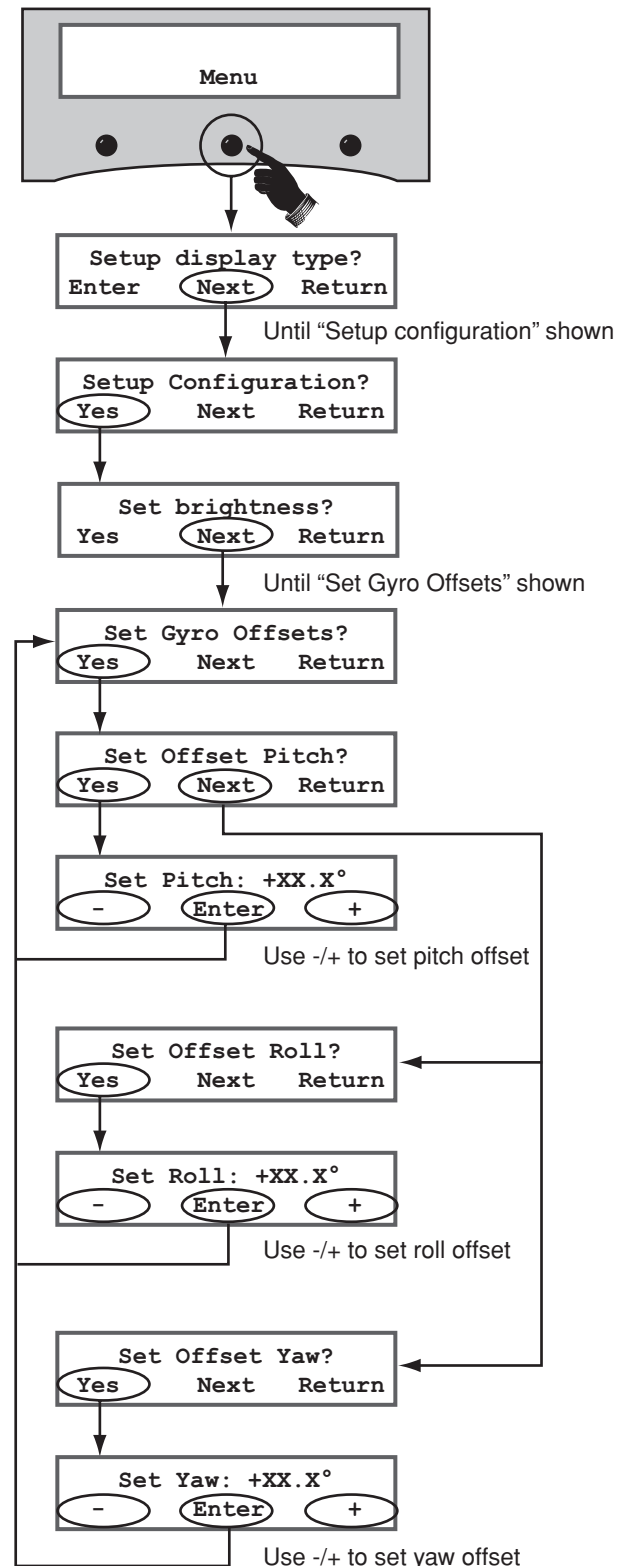
NOTE: The maximum offset for pitch and roll is $\pm 45^\circ$. The maximum offset for yaw is $\pm 180^\circ$.

IMPORTANT!

This procedure must be performed while the vessel is stopped in calm water.

1. First you need to note the sensor's reported pitch and roll. Press the center **MENU** button on the ADCU to access the onscreen menu.
2. At "Setup display type?", press **ENTER**.
3. At "Compass?", press **NEXT** until the display shows "Pitch, Roll & Yaw." Then press **YES**.
4. Write down the reported pitch and roll, but reverse the sign (for example, a positive number becomes negative). These are the offsets you need to enter for pitch and roll.
5. Now you need to enter the gyro offsets. Press the center **MENU** button on the ADCU to access the onscreen menu (see Figure 59).
6. At "Setup display type?", press **NEXT** until the display shows "Setup Configuration?" Then press **YES**.
7. At "Set brightness?", press **NEXT** until the display shows "Set Gyro Offsets?"
8. At "Set Gyro Offsets?", press **YES**.
9. At "Set Offset Pitch?", press **YES** to go to the Pitch screen. (Later, you will press **NEXT** to go to the Roll or Yaw screen instead.)
10. At "Set Pitch", use the - and + buttons to set the pitch offset value. Then press **ENTER**.
11. Repeat steps 8 through 10 to set the roll and yaw offset values.

Figure 59: Gyro Offset Menus on ADCU



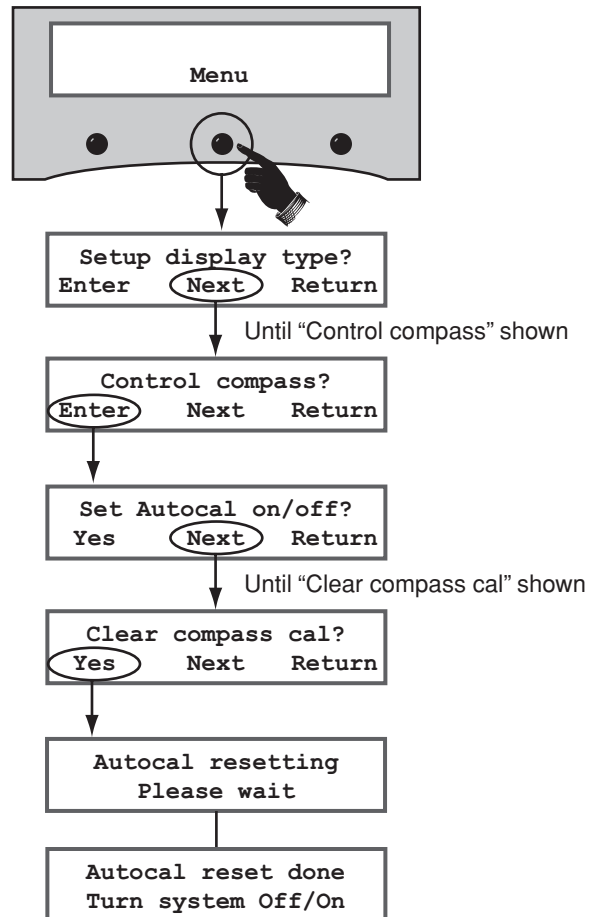
F Clearing the Calibration Score

Appendix

If you needed to relocate the sensor after performing an initial calibration, follow these steps to clear the calibration score. You need to clear the system's stored calibration data before you can calibrate the sensor for a new location.

1. Press the center **MENU** button on the ADCU to access the onscreen menu (see Figure 60).
2. At "Setup display type?", press **NEXT** until the display shows "Control compass?" Then press **ENTER**.
3. At "Set Autocal on/off?", press **NEXT** until the display shows "Clear compass cal?" Then press **YES**.
4. Wait a few seconds while the Autocalibration function resets.
5. When the display shows "Autocal reset done", turn off the TracVision system.
6. Wait 10 seconds, then turn on the TracVision system.

Figure 60: Clear Compass Cal Menus on ADCU



G Wiring Diagrams

This appendix provides the following system wiring diagrams:

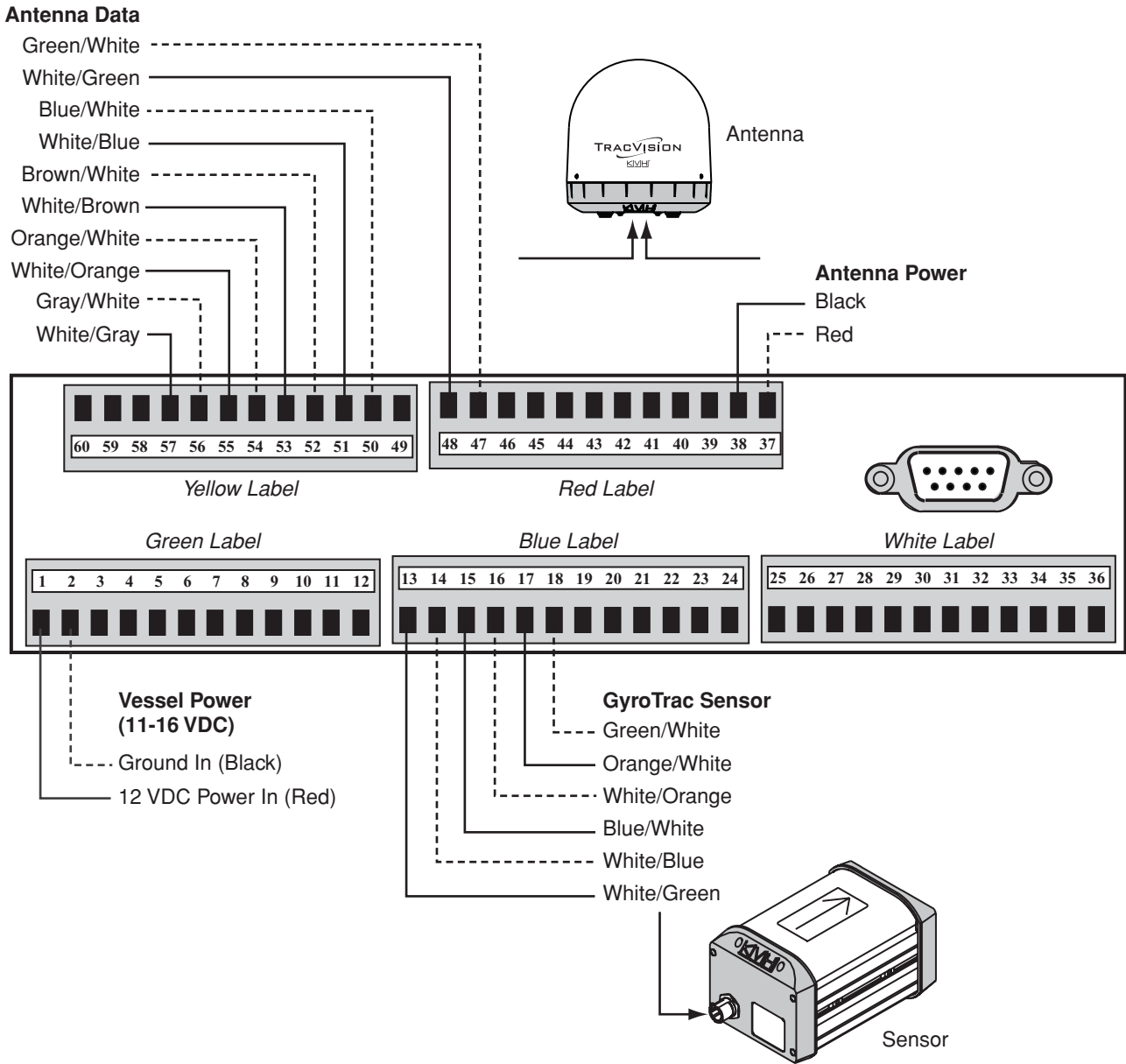
- ADCU Wiring - Required Connections
- ADCU Wiring - Optional Connections
- Wiring One or Two Receivers
- Wiring Three or More Receivers (Circular)
- Wiring Three or More Receivers (Linear Quad)

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.

G Continued...

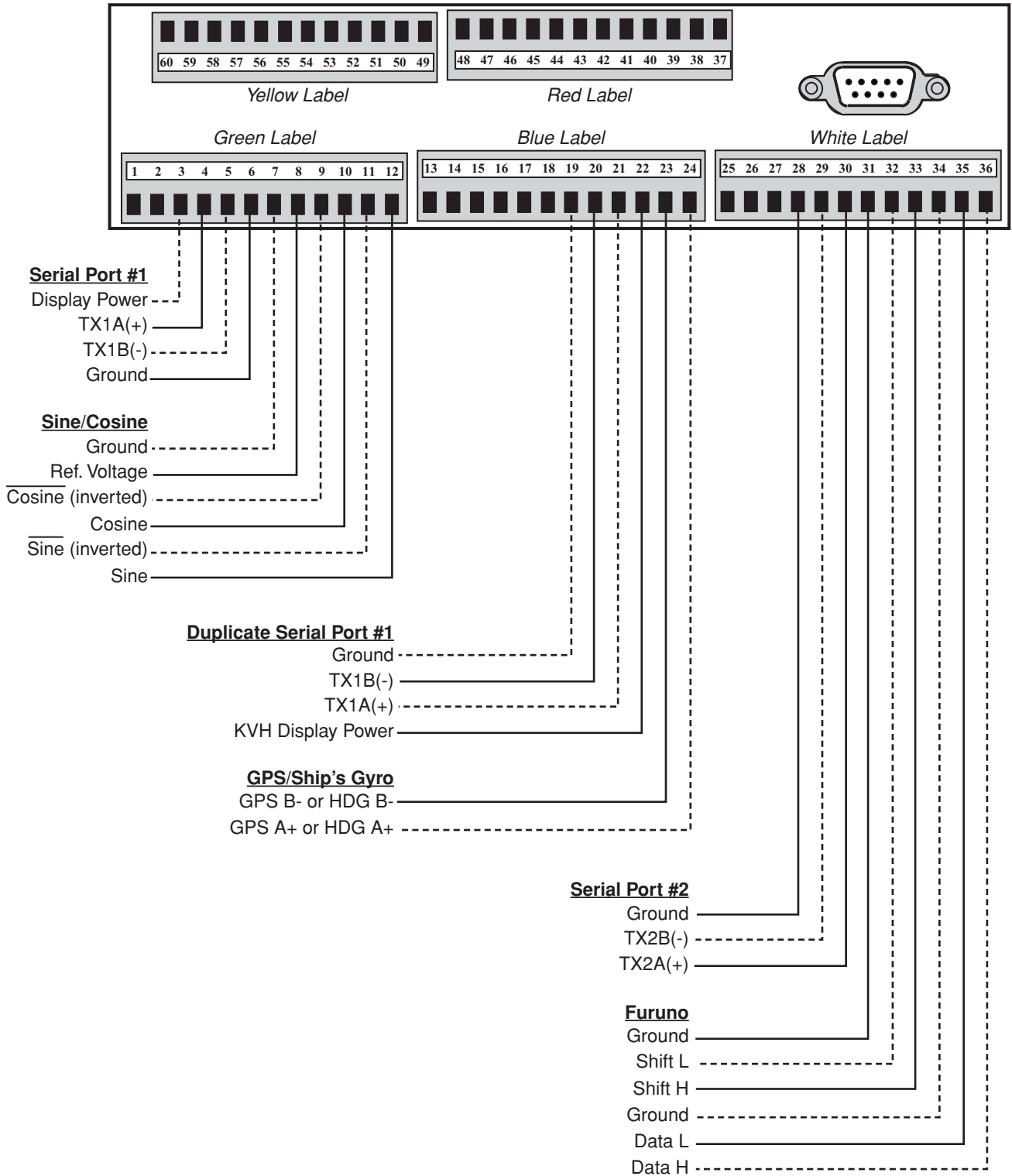
ADCU Wiring - Required Connections



NOTE: The diagrams refer to wires by **body color/stripe color**. For example, "Blue/White" means the blue wire with white stripe.

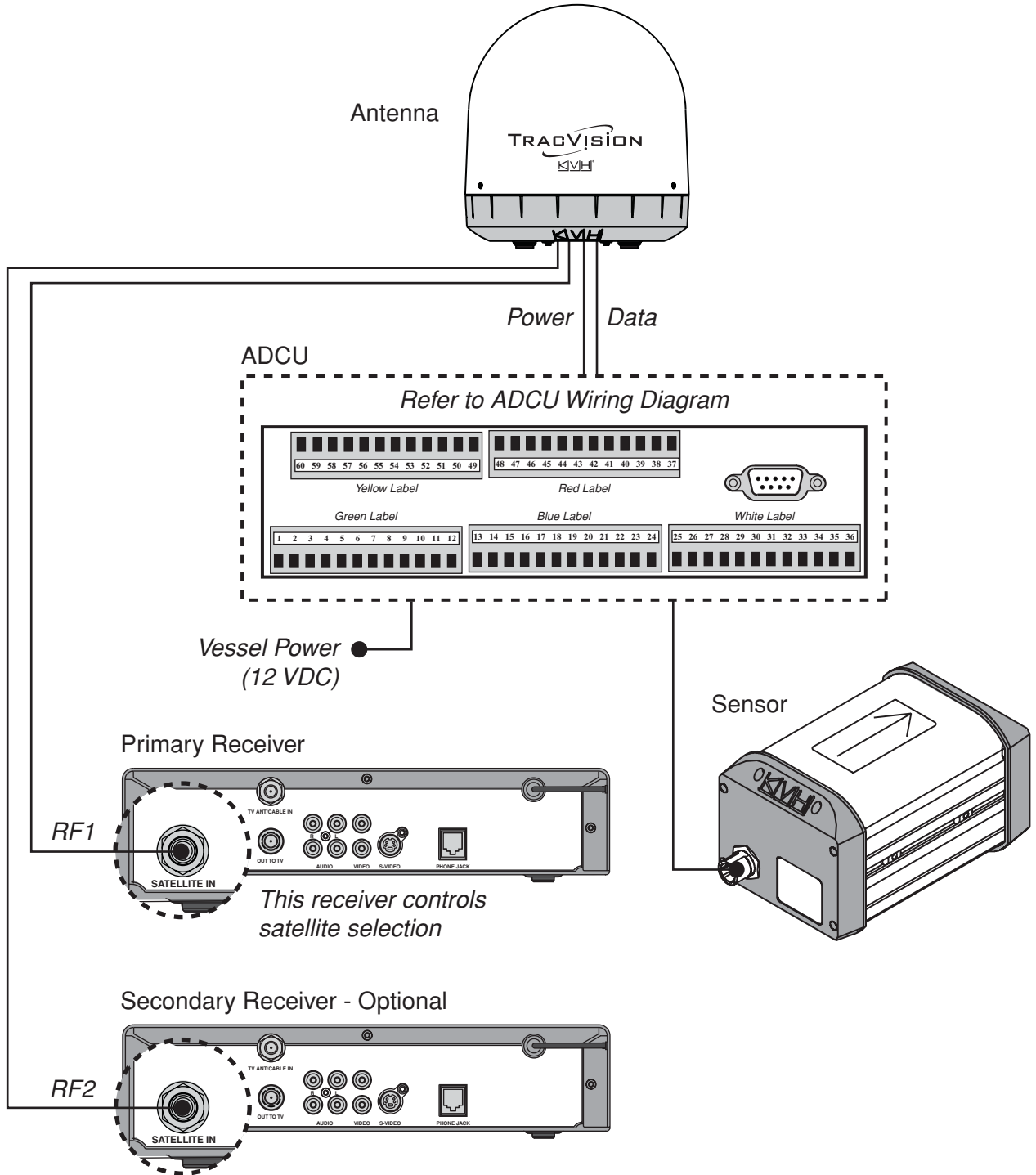
G Continued...

ADCU Wiring - Optional Connections



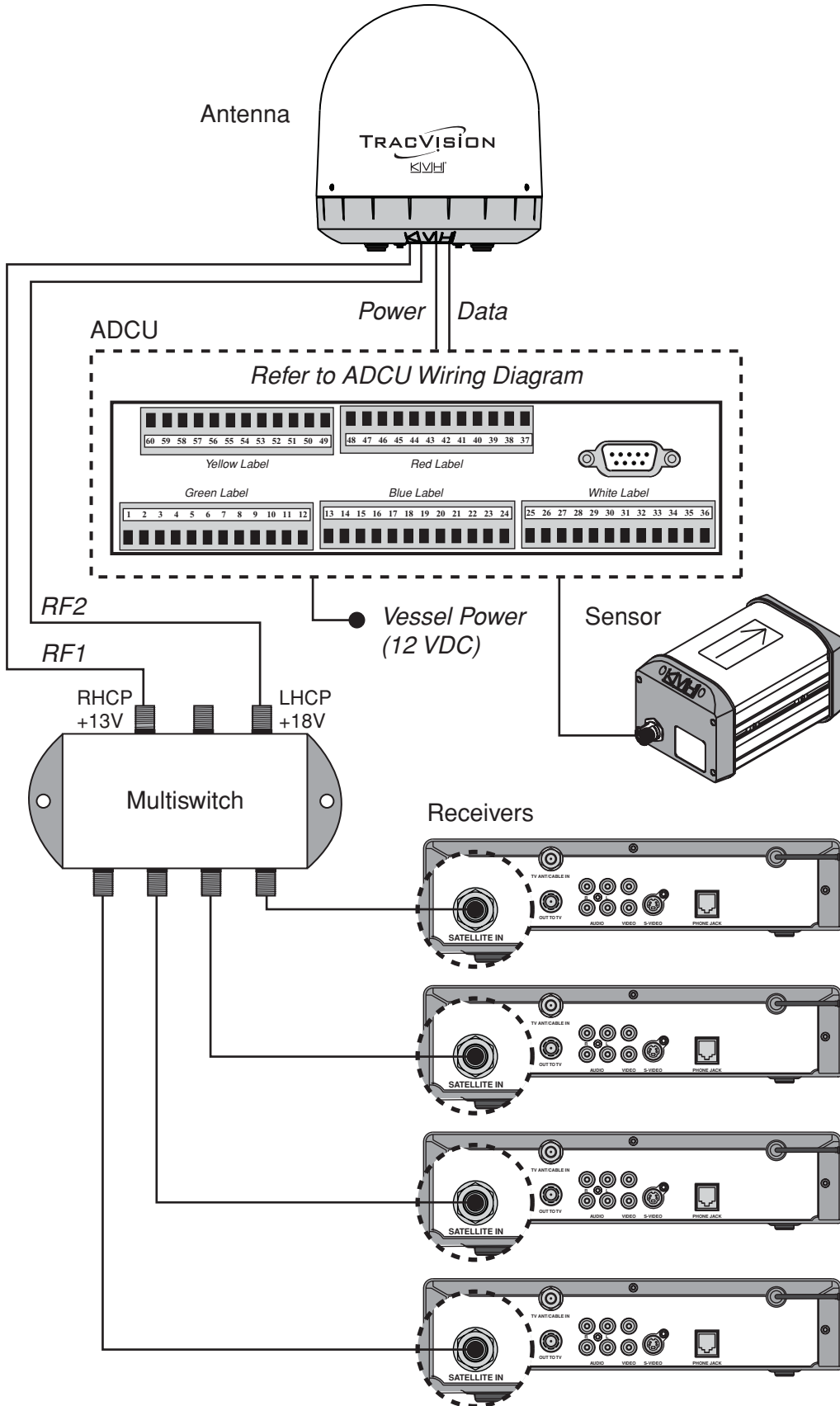
G Continued...

Wiring One or Two Receivers



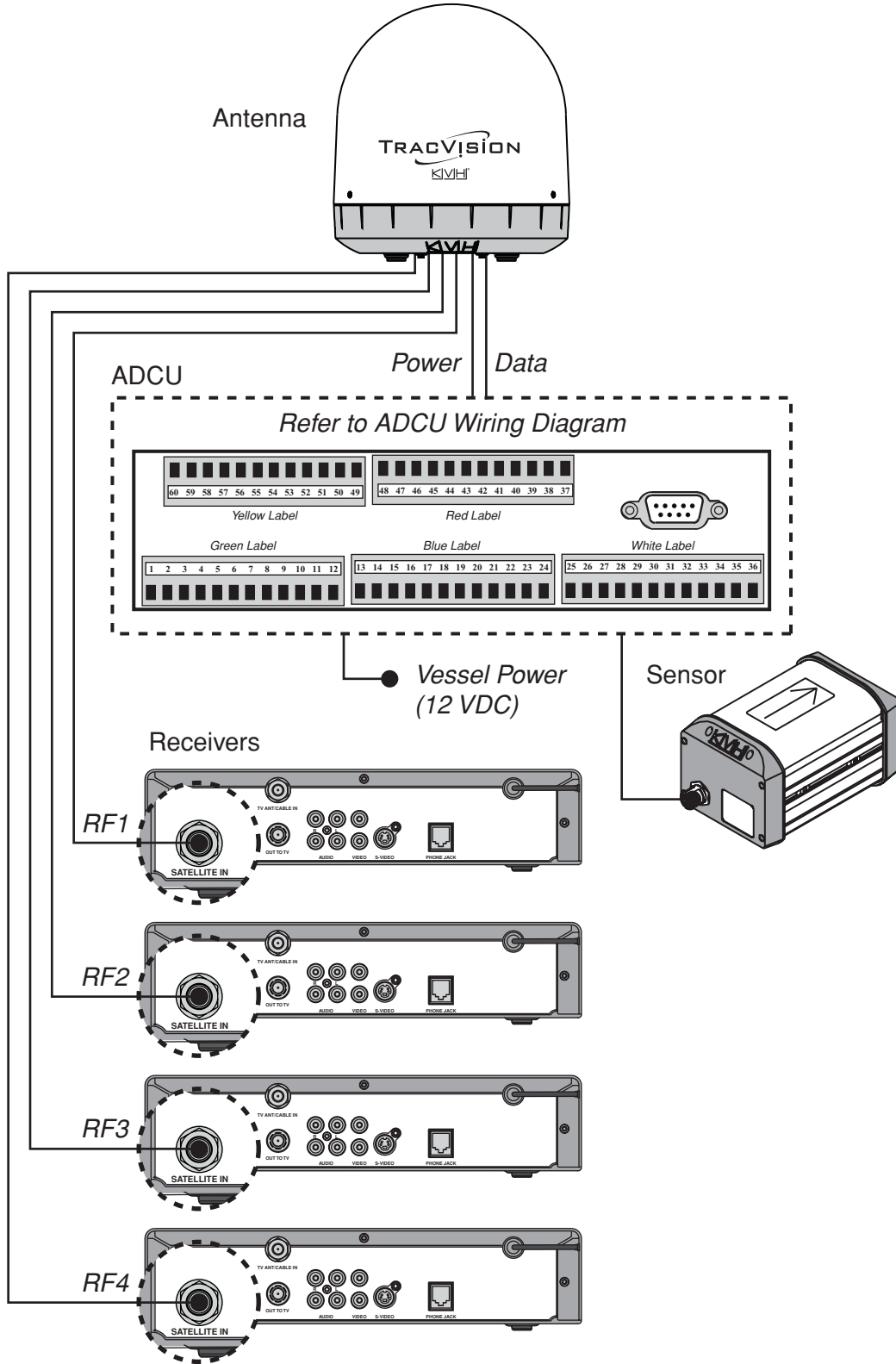
G Continued...

Wiring Three or More Receivers (Circular only)

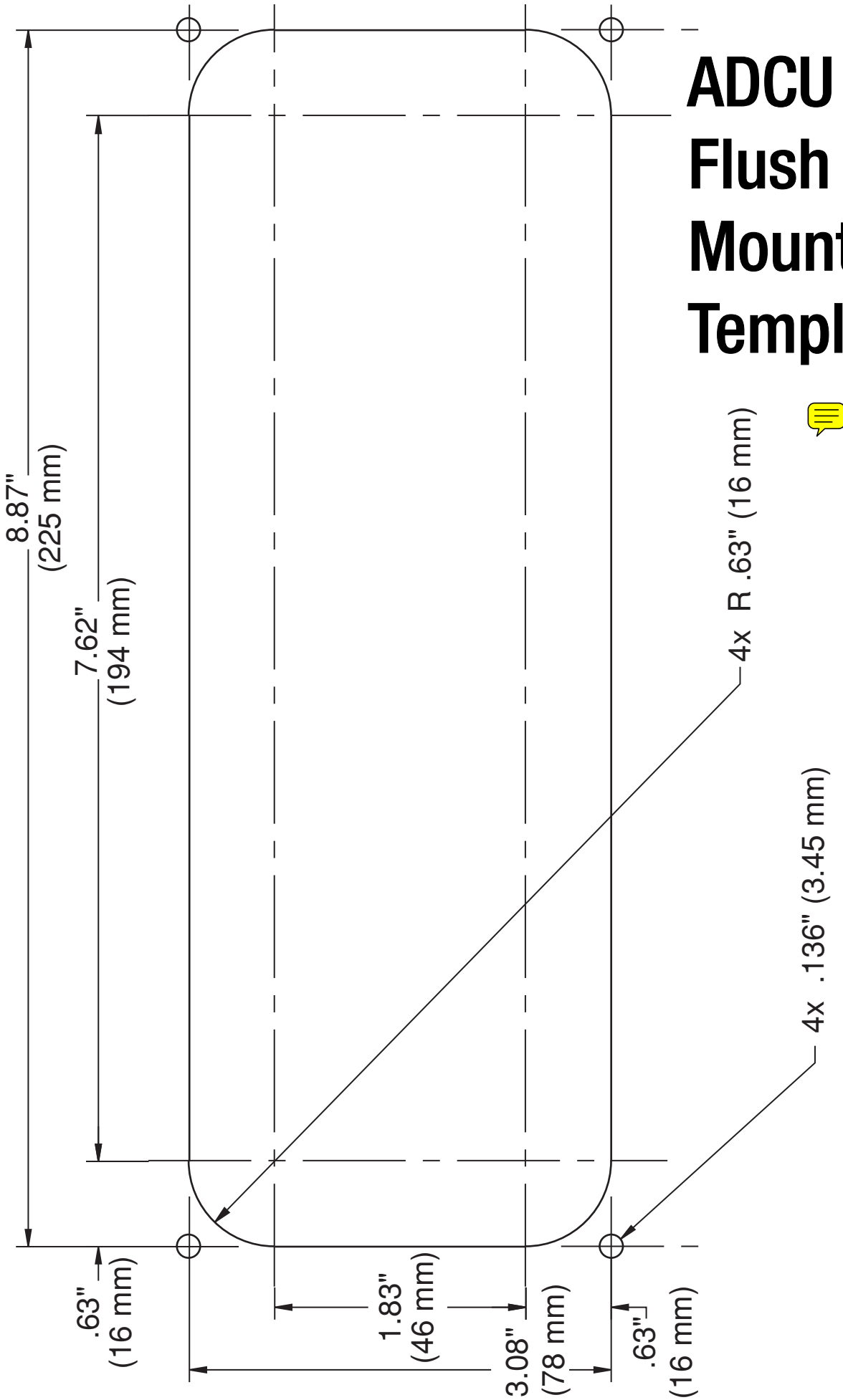


G Continued...

Wiring Three or More Receivers (Linear Quad only)



ADCU Flush Mounting Template





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