

KVH Industries, Inc.

TracVision® HD11



Installation Guide

TracVision® HD11 Installation Guide

These instructions explain how to install the TracVision HD11 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?

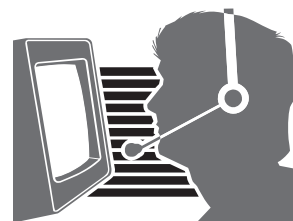
To ensure a safe and effective installation, KVH requires that a KVH-certified marine technician install the TracVision antenna. KVH-certified technicians have the tools and electronics expertise necessary to install the system. To find a technician near you, visit www.kvh.com/wheretogetservice.

Technical Support

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

Europe, Middle East, Africa, Asia
Phone: +45 45 160 180
Email: support@emea.kvh.com
(Mon.-Fri., 8 am-4:30 pm, +1 GMT)

North/South America, Australia, New Zealand
Phone: +1 401 847-3327
Email: support@kvh.com
(Mon.-Fri., 9 am-6 pm ET, -5 GMT)
(Sat., 9 am-2 pm ET, -5 GMT)



1 Inspect & Record Parts Information

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 in Figure 1 and on the Kitpack Contents Lists.

NOTE: A SmartSwitch Service/System Selector is required for dual-antenna installations, while it is optional for single-antenna installations. It is referred to as the "SmartSwitch" throughout this manual.

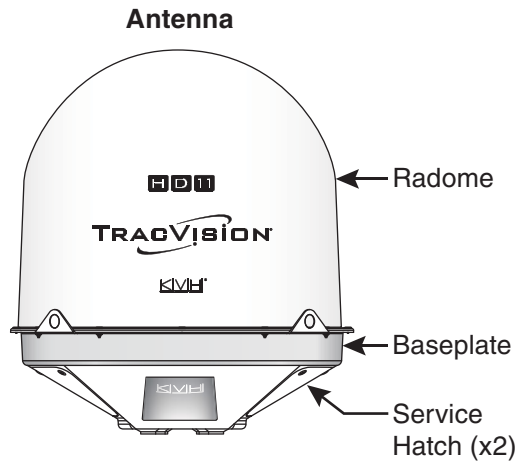
TIP: If possible, save the crate and packaging for future use in case you need to ship the system later.

- b. Carefully examine all of the supplied parts to ensure nothing was damaged in shipment.
- c. Record the system serial numbers in the Installation Worksheet (supplied in the Customer Welcome Kit) (see Figure 2). Refer to the Installation Worksheet for serial number locations.

IMPORTANT!

Keep the Installation Worksheet handy to help you plan the installation and record important information needed later for system setup. To enable activation of the TracVision HD11's GPRS modem, you will need to send the completed worksheet to KVH.

Figure 1 Primary Components



Antenna Control Unit (ACU)



SmartSwitch Service/System Selector (if equipped)



Figure 2 Installation Worksheet

KVH TracVision® HD11 Installation Worksheet

IMPORTANT! Completed Worksheets Must be Sent to KVH for GPRS Modem Activation!

Complete each page of this installation worksheet to plan and record important information you will need for system setup. To activate the system's GPRS modem, send the completed worksheet to KVH. Refer to the TracVision HD11 Installation Guide for complete installation instructions.

Please send completed forms to KVH
E-mail: techs@kvh.com Fax: +1 401 845-8152

Installer, Vessel, and Owner Information

Installer and Dealer/Ship Builder		Vessel Information	
Technician Name _____	Company Name _____	Vessel Name _____	Vessel IMO _____
Address1 _____	Address2 _____	Date Installed _____	
State/Province _____	Country _____		
Phone _____	E-mail _____		
		Owner Information (if known)	
		Owner Name _____	Address1 _____
		Address2 _____	State/Province _____
		Country _____	Phone _____
		E-mail _____	

Installer's Notes

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2 Gather Tools

Gather all of the following tools and materials. You will need these tools to complete the installation.

- Adhesive tape
- Eye protection
- Pencil
- Scriber
- Light hammer
- Center punch
- 3.75" (95 mm) hole saw
- Electric drill
- 5/8" (16 mm) drill bit
- File
- 75Ω RG-6 and/or RG-11 RF coax cables and F-connector installation tools (see "Cable Requirements" on page 11)
- Snap-N-Seal[®] F-connectors (or equivalent)
- Silicone sealant (or equivalent)
- Heat shrink gun
- Wire strippers
- Wire crimpers
- #1 Phillips screwdriver
- 5/32" hex key
- 7/16" open-end torque wrench set to 20 in-lbs (2.25 N-m) of torque
- 7/16" socket/ratchet or nut driver
- 1/2" open-end wrench
- 3/4" socket/ratchet or wrench
- 3/4" socket/torque ratchet capable of settings between 35 and 40 ft-lbs (47 and 54 N-m) of torque
- Voltmeter
- Isolation transformer, if required (see "AC Power Requirements" on page 12)
- PC or mobile device (preferably with Internet access)
- X-ACTO[®] knife
- Needle-nose cutting pliers
- Ruler or tape measure
- NMEA interface cable (for heading input)

3 Plan the Antenna Installation

Select the antenna mounting site(s) based on the guidelines within this section. Guidelines are organized into the following categories:

- Mounting Surface
- Power/Data Cable Length
- Blockage
- Pedestal Structure Requirements
- Antenna Orientation
- Radar/High-Power Radio Transmitters

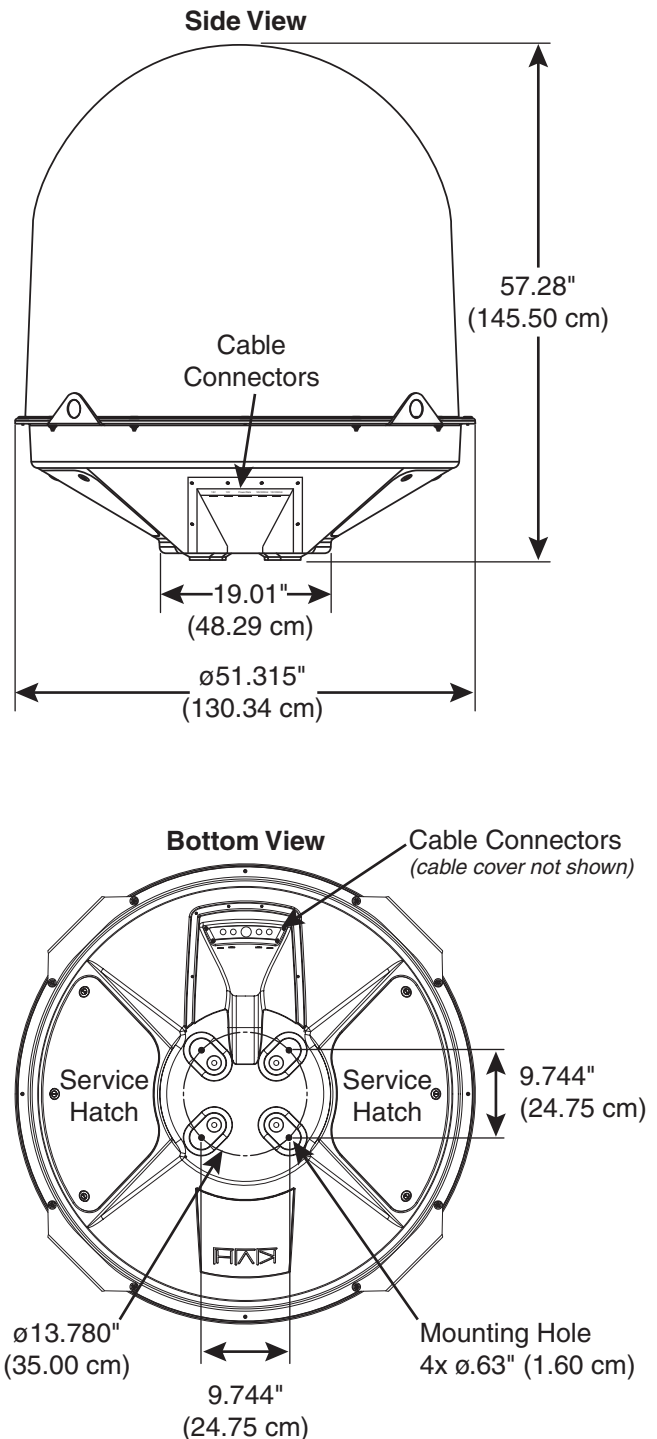
Mounting Surface

- If available, install the antenna on a platform or pedestal, rather than on a deck. Both service hatches should be fully accessible for installation and service.
- Make sure the mounting surface is wide enough to accommodate the antenna's base (see Figure 3). Also make sure it is flat, level (within $\pm 1^\circ$), strong enough to support the antenna's weight (200 lbs (90 kg)), and rigid enough to withstand vibration.
- Choose a mounting surface as close as possible to the intersection of the vessel's centerline and midships.

Power/Data Cable Length

If you wish to use the supplied power/data cable, the antenna must be mounted within 100 ft (30 m) of its ACU. However, you can order a longer cable if needed – contact KVH for details.

Figure 3 Antenna Dimensions



3

Continued Plan the Antenna Installation

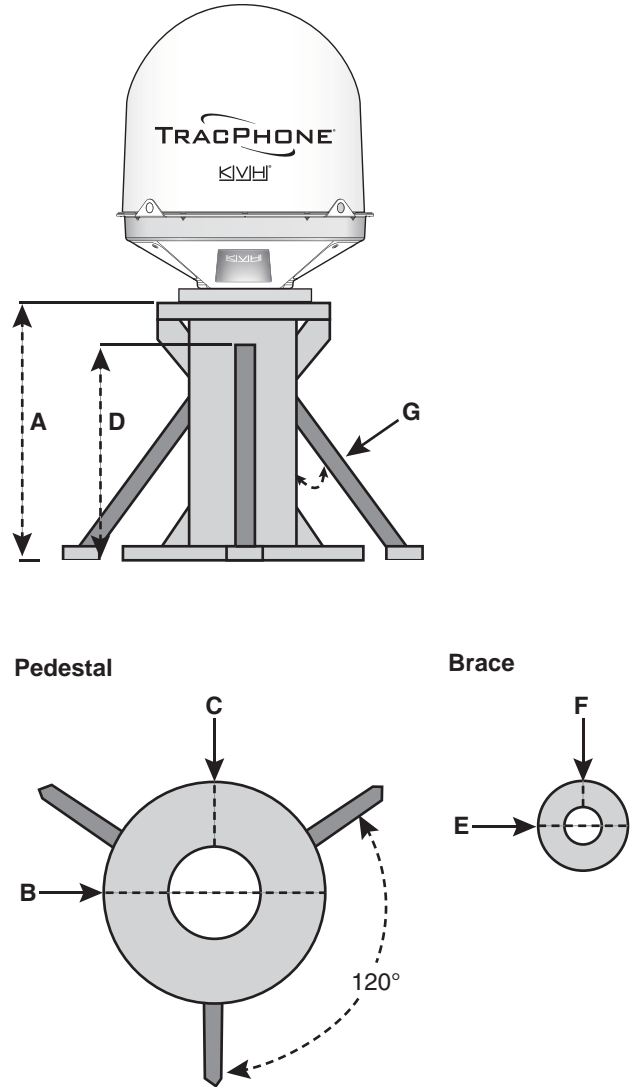
Pedestal Structure Requirements

If a pedestal is going to be used, it must meet the following minimum requirements. Refer to Figure 3.

Pedestal Height (A)	3.28 ft 1 m	6.56 ft 2 m	9.84 ft 3 m
Tube OD (B)	9.0" 230 mm	8.0" 203.2 mm	10" 254 mm
Tube Wall Thickness (C)	0.5" 12.7 mm	0.5" 12.7 mm	0.5" 12.7 mm
Brace Height (D)	N/A	5.56 ft 1.7 m	7.34 ft 2.24 m
Brace OD (E)	N/A	3.0" 76.2 mm	6.0" 152.4 mm
Brace Thickness (F)	N/A	0.25" 6.35 mm	0.5" 12.7 mm
Brace Angle (G)	N/A	30°	25°

NOTE: If the pedestal exceeds 3.28 ft (1 m), braces must be placed at 120° intervals. Sizing is based on Structural Steel Tubing 60,000 psi (415 MPa) minimum yield.

Figure 4 Pedestal and Brace Dimensions



3

Continued Plan the Antenna Installation

Blockage

The antenna requires a clear view of the sky to track satellites. Be sure to choose a location that does not block the antenna's -24° to $+119^\circ$ elevation range (see Figure 5).

Antenna Orientation

- You may mount the antenna so that the front of the antenna (opposite the cable connectors) is facing the vessel's bow, stern, port, or starboard (see Figure 6).
- If you are installing two TracVision HD11 antennas, mount the antennas facing in opposite directions (180° offset).

Radar/High-Power Radio Transmitters

Many variables determine the exact minimum distance required between the antenna and radar/high-power radio transmitters, including transmitter beam properties and the reflective properties of nearby surfaces. However, consider the following general guidelines when selecting a safe antenna location:

IMPORTANT!

RF emission from radars and high-power radio transmitters might damage the antenna or impair system performance. Be sure to consider the following guidelines when selecting an antenna location.

- Mount the antenna as far away as possible from the radar and high-power radio transmitters.
- Do not mount the antenna at the same level as the radar. Most radar transmitters emit RF energy within an elevation range of -15° to $+15^\circ$ (see Figure 7). Most RF energy can be avoided by mounting the antenna outside this elevation range – as long as the antenna is at least 10 ft (3 m) away from the transmitter. For best results, KVH recommends maintaining as much vertical separation as possible between the antenna and any radar/high-power radio transmitter.

Figure 5 Antenna Blockage

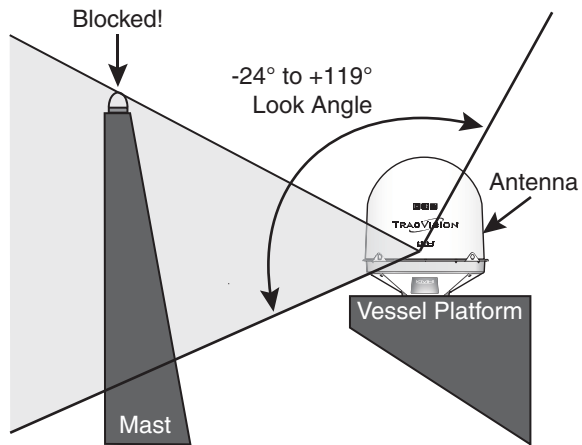


Figure 6 Antenna Forward

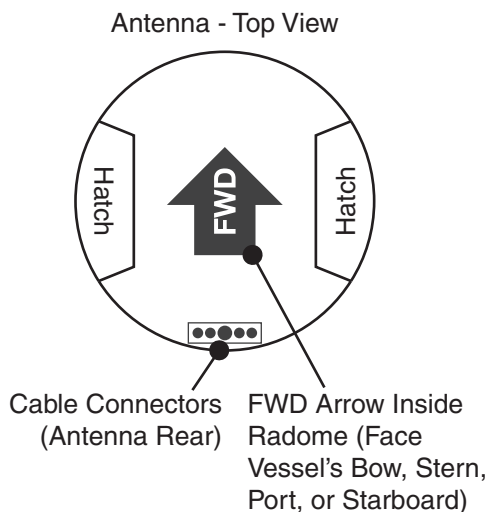
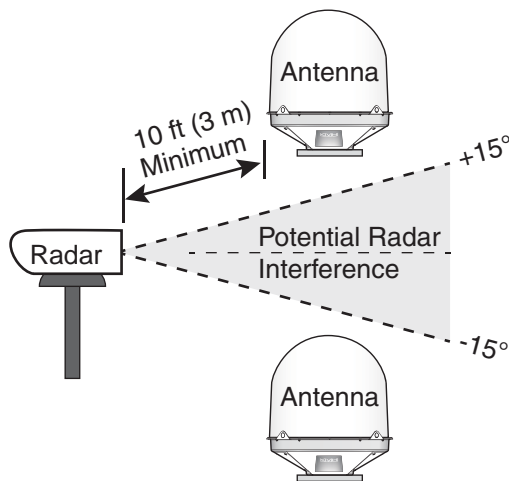


Figure 7 Radar/High-Power Radio Transmitter Interference



4 Plan the Belowdecks Installation

Plan the installation of the belowdecks equipment by using the Installation Worksheet (supplied in the Welcome Kit) and following the requirements in this section:

- Multiswitch Requirements
- Installation Location Requirements
- Mounting Options
- SmartSwitch Requirements (if equipped)
- Cable Requirements
- AC Power Requirements
- Grounding Requirements

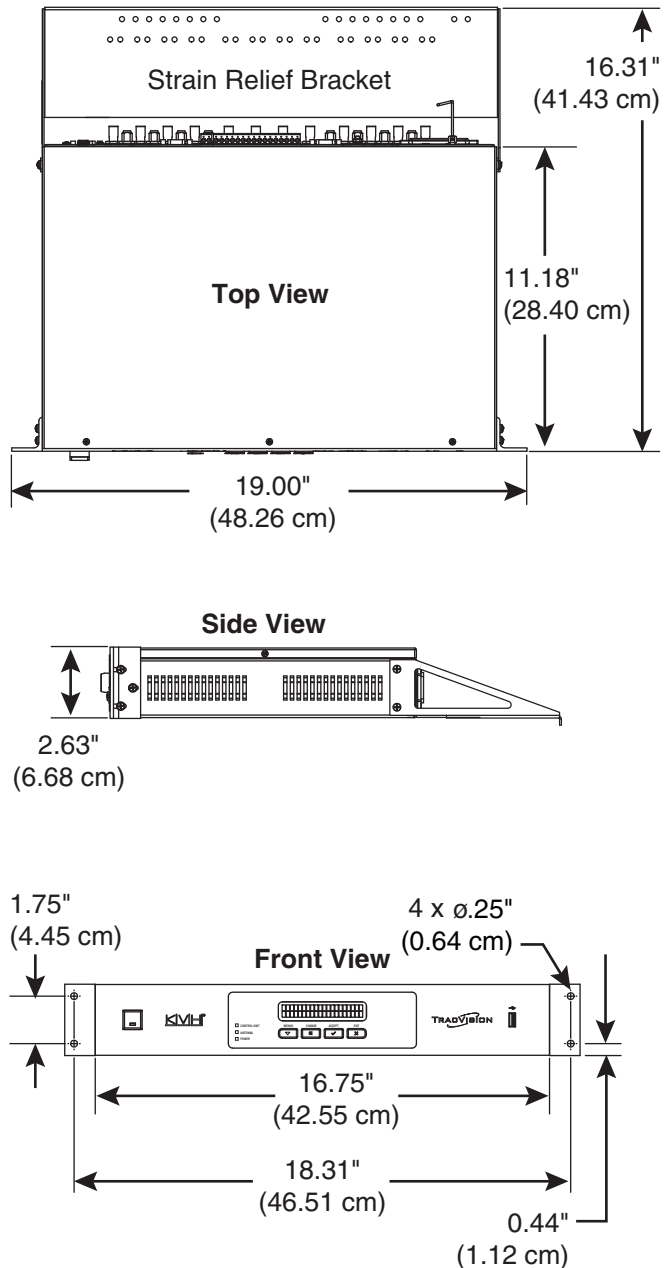
Multiswitch Requirements

Using the Installation Worksheet, plan and record multiswitch requirements based on the number of tuners needed. Refer to the Installation Worksheet for details.

Installation Location Requirements

- Choose belowdecks installation locations that are dry, well-ventilated, and away from any heat sources or salt spray.
- In order to use the supplied power/data cable, the antenna must be mounted within 100 ft (30 m) of its ACU. However, you can order a longer cable if needed – contact KVH for details.
- If you are installing a SmartSwitch and you wish to use the supplied PC data cable, ACU A must be installed within 3 feet (1 m) of the SmartSwitch. However, longer cabling may be used to a maximum of 25 feet (7.6 m) – contact KVH for details.

Figure 8 ACU Dimensions



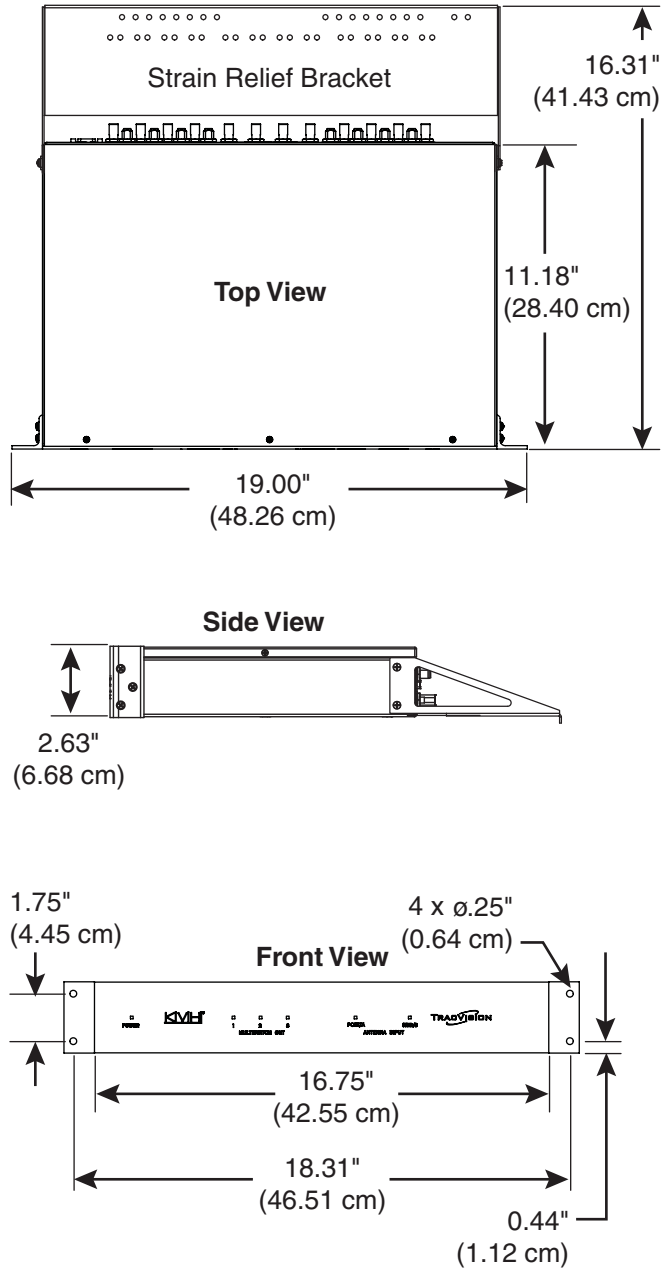
4

Continued Plan the Belowdecks Installation

- Using the Installation Worksheet, plan and record the installation locations of the multiswitches, ACU(s), and SmartSwitch (if equipped). Refer to the Installation Worksheet for details.

NOTE: ACU dimensions are shown in Figure 8 on page 8. For SmartSwitch dimensions, see Figure 9.

Figure 9 SmartSwitch Dimensions



4

Continued Plan the Belowdecks Installation

Mounting Options

Select a mounting option for the ACU(s) and the SmartSwitch (if equipped).

You can mount the ACU(s) and the SmartSwitch in a standard 19" (48.26 cm) equipment rack, together or separately (see Figure 10). The ACU and SmartSwitch are 1.5U in height each.

Alternatively, you can mount the equipment to a horizontal surface; the L-shaped mounting brackets can attach to either the top or bottom of the ACU(s) and SmartSwitch (see Figure 10).

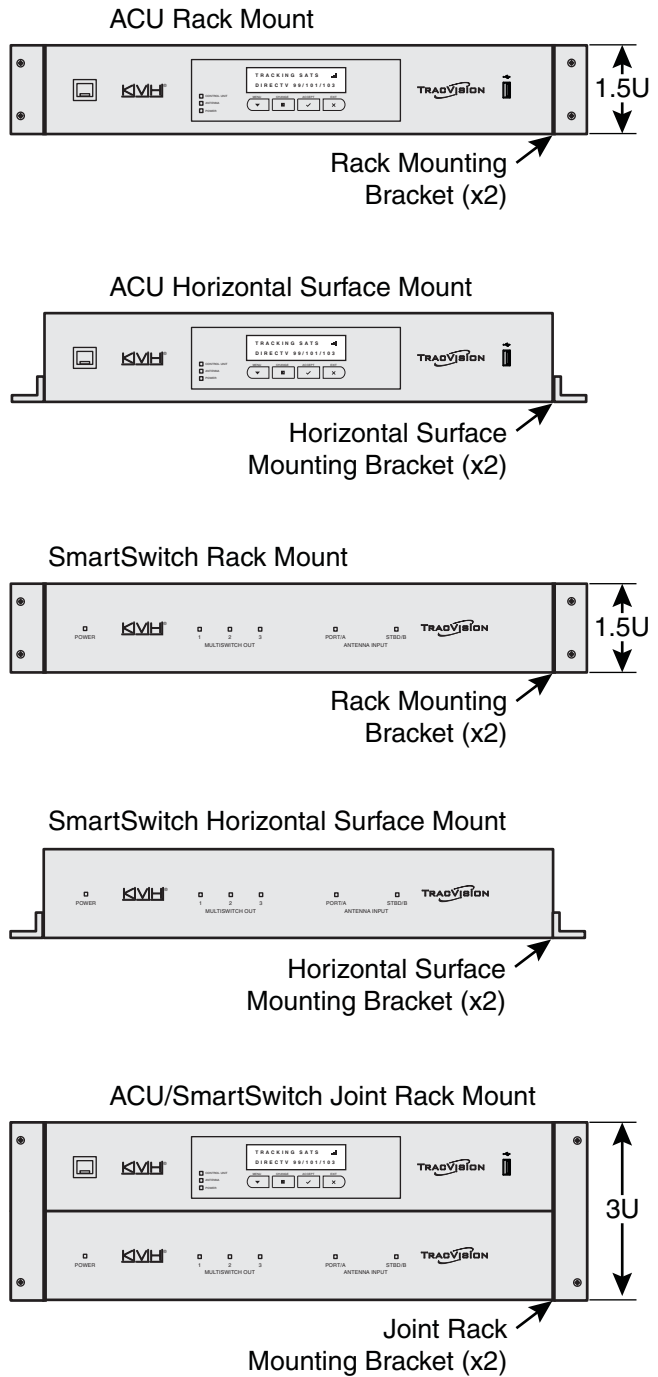
SmartSwitch Requirements (if equipped)

Using the Installation Worksheet, plan and record important information for each receiver/DVR group. Refer to the Installation Worksheet for details.

Wireless Router Requirements (optional)

Select a mounting location in a dry, well-ventilated area belowdecks away from any heat sources or salt spray. Also be sure the location provides adequate Wi-Fi reception. Do not install it in an area surrounded by metal or near any electrical devices that emit RF noise.

Figure 10 ACU/SmartSwitch Mounting Options



4

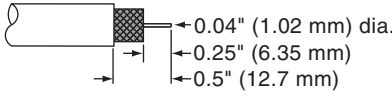
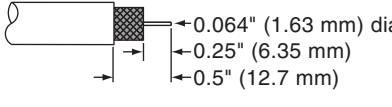
Continued Plan the Belowdecks Installation

Cable Requirements

IMPORTANT!

- RF cables must be rated for 75Ω, not 50Ω.
 - Low-quality, poorly terminated, or improperly installed RF cables are the most common cause of system problems. Terminate all RF cables with high-quality “F” connectors using the proper stripping/crimping tools, exactly to the manufacturer’s specifications.
 - When determining cable lengths, be sure to account for an adequate service loop, approximately 8" (20 cm) at both ends of each cable.
- a. Using the Installation Worksheet, plan and record the type, quantity, and approximate lengths of the cables required.
 - b. Ensure you have the appropriate connector installation tool and cable connectors needed to complete the installation (see Figure 11).

Figure 11 Cable Types, Connectors, and Tools

Up to 100 ft (30 m) Cable Run	
Cable	RG-6 (KVH part #32-0417-100)
Connector	Belden SNS1P6 (KVH part #23-0170)
Tools	Augat IT1000 (KVH part #19-0242)
Strip Lengths	
Up to 200 ft (60 m) Cable Run	
Cable	RG-11 (KVH part #32-1272-200)
Connector	Belden SNS11AS (KVH part #23-0213)
Tools	Belden CST596711, L3011B (KVH part #72-0493)
Strip Lengths	

4

Continued Plan the Belowdecks Installation

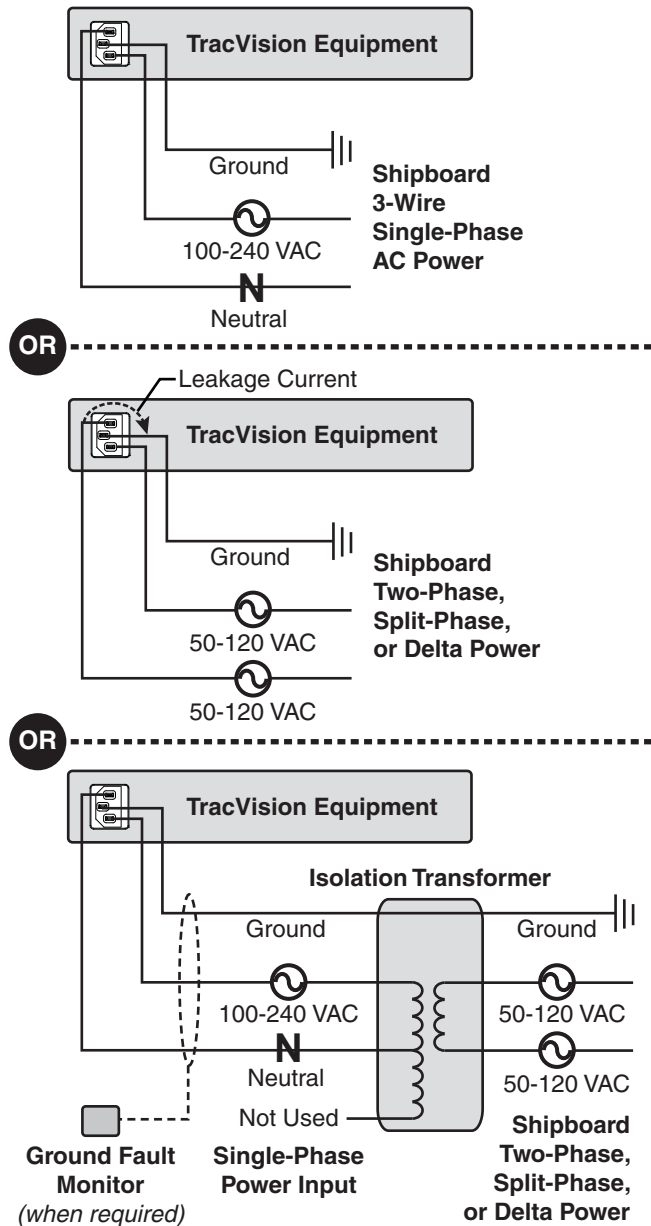
AC Power Requirements

The TracVision system is designed to run on 3-wire single-phase AC power (hot, neutral, and ground). Voltage between hot-neutral and hot-ground should each measure between 100-240 VAC.

Many large ships use two-phase, split-phase, or delta power instead (3 wires: hot, hot, and ground; no neutral). In this case, voltage between hot-hot measures the proper voltage (100-240 VAC); while hot-ground measures only half the voltage (50-120 VAC). Although the TracVision system can operate on this type of power, the excess voltage present on the second phase will cause a small amount of current to leak onto ship's ground. This leakage current might be unacceptable on some vessels, so check with the customer or ship's electrician and get permission before you run the system on two-phase power. Also be sure to ground the system, as explained in "Grounding Requirements" on page 13.

If two-phase power is the only available power source onboard, and if leakage current is unacceptable, KVH recommends that you install a suitable isolation transformer to supply single-phase power to the antenna system and run a ground wire from the transformer to ship's ground. In addition, since ground fault protection devices cannot detect faults behind a transformer, you will also need to install a ground fault monitoring device between the isolation transformer and the antenna system if ground fault protection is required on the vessel.

Figure 12 Power Requirements



4

Continued Plan the Belowdecks Installation

Grounding Requirements

Proper grounding of the TracVision system to ship's ground is critically important, as it protects the equipment from lightning and electrostatic discharges (ESD). Failure to ground the chassis of the ACU risks damage to the antenna and electric shock.

In a standard installation with a connection to single-phase AC power, the antenna system is normally connected to ship's ground through the ground wire of the ACU's power plug. As an alternative, you may run a separate ground wire from the TracVision equipment's chassis to ship's ground, or mount the equipment within a grounded equipment rack.



WARNING

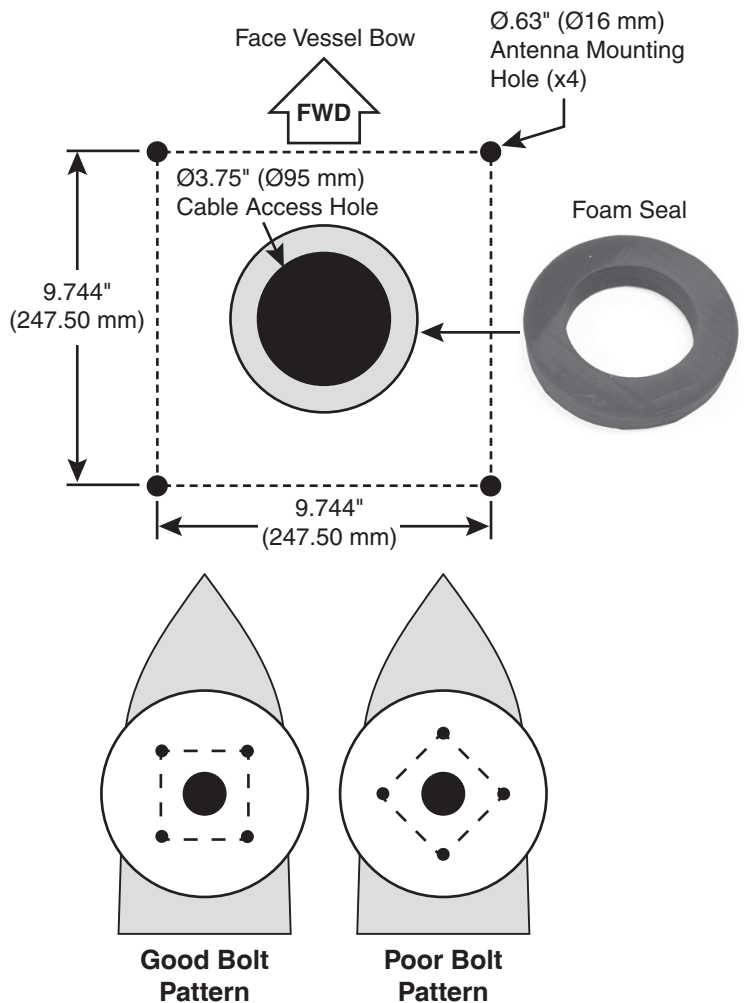
Failure to ground the TracVision system properly to ship's ground will cause an unsafe floating ground condition, risking damage to the antenna and electric shock, potentially resulting in DEATH. In a floating ground condition, the difference between the equipment's chassis ground and the ship's ground can measure well over 100 volts, when it normally should not exceed 25 volts. Therefore, always measure the difference in potential between chassis ground and ship's ground to make certain that there is no dangerous floating ground condition, even if the ground pin of the vessel's AC power plug appears to be intact.

5 Prepare the Antenna Site

Follow the steps below to prepare the antenna mounting site(s).

- a. Unfold the antenna mounting template (supplied in the Customer Welcome Kit) and place it onto the mounting surface.
- b. Orient the mounting template so that the "FWD" (forward) arrow on the template points toward the vessel's bow and is parallel to the vessel's centerline (see Figure 13).
- c. Secure the mounting template in place using adhesive tape, or equivalent.
- d. Using a light hammer and center punch, mark the cable access hole and mounting holes on the mounting surface in the locations indicated on the template.
- e. Using an electric drill with a 5/8" (16 mm) bit, drill the four antenna mounting holes at the locations you marked in the previous step.
- f. Cut out the 3.75" (95 mm) cable access hole at the location you marked earlier.
- g. Using a file, smooth the edges of the cable access hole to protect the cables. Later, you will route the power/data and RF cables through this hole and into the vessel.
- h. Clean and dry the mounting surface.
- i. Peel off the paper backing from one of the supplied foam seals 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 13).
- j. If you are installing two antennas, repeat the steps above to prepare the second antenna mounting site.

Figure 13 Mounting Holes/Cable Access Hole/Foam Seal



6 Prepare/Route Cables

Follow the steps below to prepare and route cables from the antenna mounting site(s) to the belowdecks equipment locations.

IMPORTANT!

- Be sure to maintain the appropriate minimum cable bend radius to ensure cable integrity. RG-6 cables require a bend radius of at least 3" (7.6 cm). RG-11 cables require a bend radius of at least 4.5" (11.5 cm).
- Be sure to leave an adequate service loop, approximately 8" (20 cm) at both ends of each cable.

Figure 14 Cable Labels

Label Text	Label Text	Label Text	Label Text	Label Text	Label Text	Label Text
Label Text	Label Text	Label Text	Label Text	Label Text	Label Text	Label Text
Label Text	Label Text	Label Text	Label Text	Label Text	Label Text	Label Text

- Apply the "Antenna A" cable labels (supplied in the antenna kitpack) to both ends of the appropriate cables at the antenna mounting site (Antenna A) (see Figure 14 and Figure 15).
- Route the cables through the cable access hole to the belowdecks equipment location(s) you determined earlier.
- If you are installing two antennas, repeat the steps above to prepare the cables at the second antenna's mounting site (Antenna B) (see Figure 16).

Figure 15 Antenna A Cable Labels/Routing

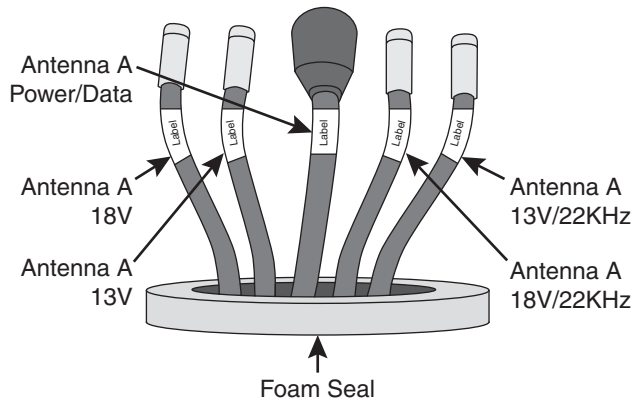
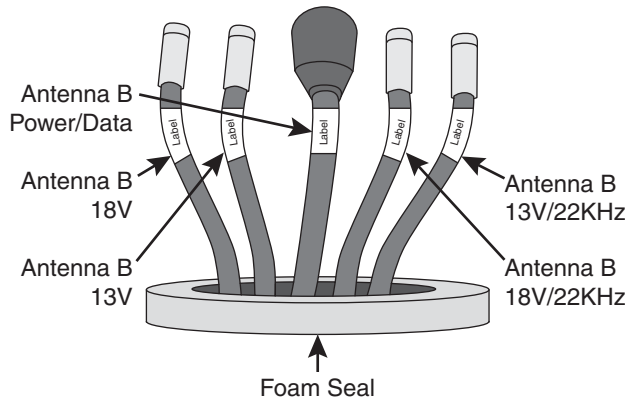


Figure 16 Antenna B Cable Labels/Routing (if equipped)



7 Rig/Hoist the Antenna(s)

Follow the steps below to remove the shipping bolts securing the antenna to the pallet and safely rig each antenna for crane hoisting.

IMPORTANT!

The antenna's radome and baseplate have painted surfaces. Be sure to take protective measures to avoid gouging or scratching the antenna during the rigging operation.

NOTE: If you are installing two antennas, verify antenna serial numbers prior to hoisting to ensure the antennas are moved to their correct mounting locations.

- a. Using a 7/16" socket/ratchet or nut driver, unlock the three hex latches securing each of the antenna's service hatches (see Figure 17). Then gently lower the hatches. Now you can access the four shipping bolts securing the antenna's baseplate to the pallet.
- b. Using a 3/4" socket/ratchet or wrench, remove the four 1/2"-13 bolts securing the antenna to the pallet. Then set the bolts aside.

TIP: You will use the new mounting bolts supplied in the kitpack when mounting the antenna later. However, you might wish to keep these bolts in case you need to ship the antenna later.

- c. Reinstall both antenna service hatches. Secure each service hatch using the three hex latches.
- d. Secure crane rigging appropriate for lifting the 200-lb (90 kg) antenna to each of the antenna's four lift brackets (see Figure 19).
- e. If you are installing two antennas, repeat these steps to rig and hoist the second antenna.

Figure 17 Service Hatch/Hardware

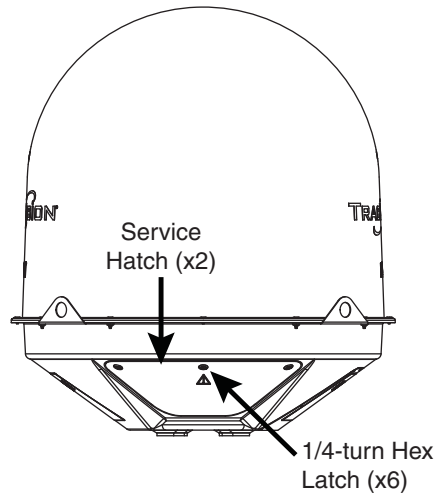


Figure 18 Shipping Bolts (Antenna Bottom View)

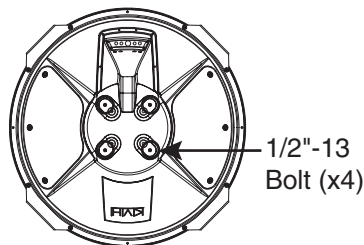
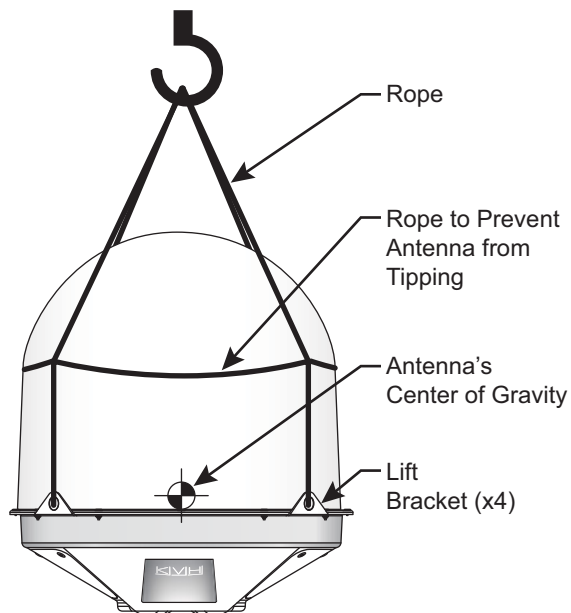


Figure 19 Antenna Crane Rigging (example)



8 Wire the Antenna(s)

Follow the steps below to wire the antenna(s) and attach the antenna's foam seal.

- Clean and dry the bottom of the antenna baseplate (see Figure 20).
- Peel off the paper backing from one of the supplied foam seals to expose the adhesive. Align the foam seal so it is centered on the antenna (see Figure 20). Then press the foam seal firmly onto the underside of the antenna.
- Connect the power/data cable to the antenna's power/data connector (see Figure 21). Hand-tighten until the connector locks in place; do not use excessive force.
- Connect the power/data cable's ground strap to the ground point on the antenna's connector plate (see Figure 21). Be sure to secure the ground strap's ring terminal between the star washer and the nut.
- Fill half of the inner body of the "18V," "13V," "18V/22KHz," and "13V/22KHz" cables' connectors with the supplied silicone grease to prevent moisture and corrosion (see Figure 21).

IMPORTANT!

Refer to the cable and connector labels to ensure the antenna is wired exactly as shown in Figure 21.

- Connect and slowly hand-tighten the RF cables to the corresponding antenna connectors, allowing the grease to diffuse and settle into the entire space within the connector (see Figure 21).
- Using a 7/16" open-end torque wrench set to 20 in-lbs (2.25 N-m), tighten each of the RF cable connections.
- Using silicone sealant (or equivalent), create a weather-tight seal over each antenna connection.
- Using a #1 Phillips screwdriver, install the cable cover (supplied in the kitpack) onto the antenna and secure in place with the six #6-32 captive screws and washers (see Figure 22).
- If you are installing two antennas, repeat these steps to wire the second antenna.

Figure 20 Foam Seal

Antenna Baseplate (Bottom View)

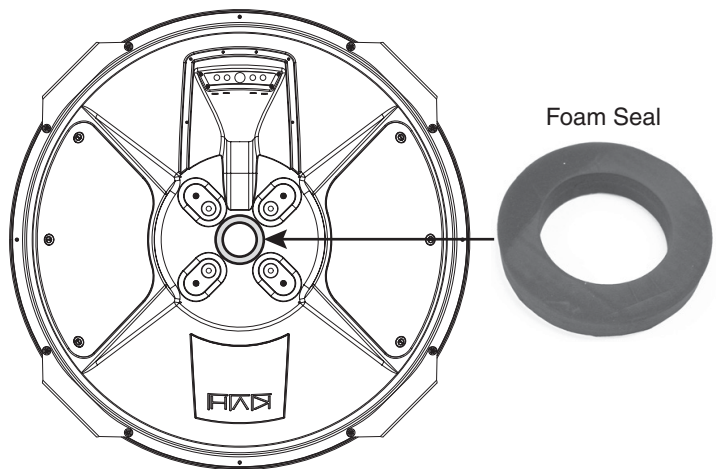


Figure 21 Cable Connections

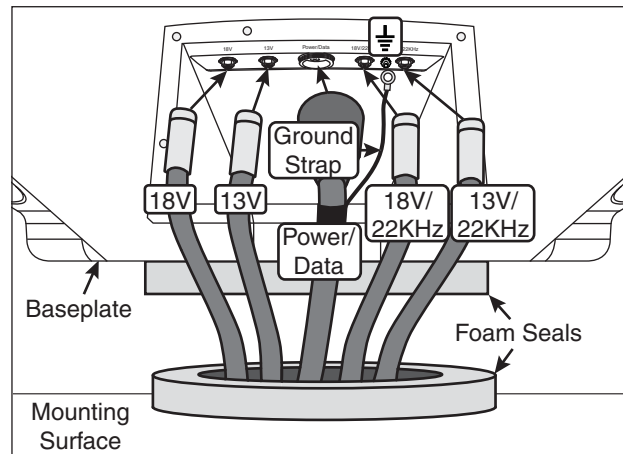
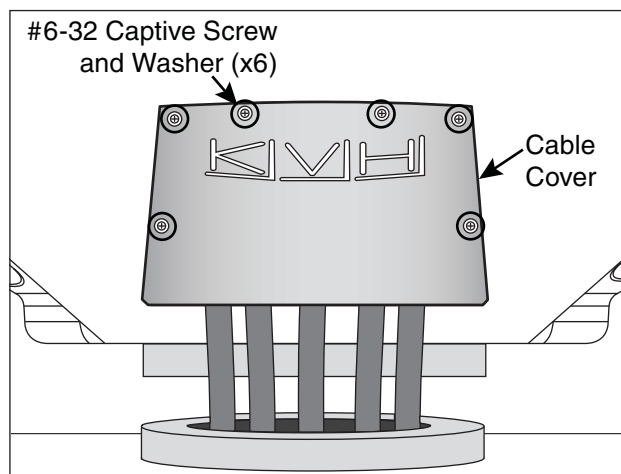


Figure 22 Cable Cover/Screws/Washers



9 Mount the Antenna(s)

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

- Using a 7/16" socket/ratchet or nut driver, unlock the three hex latches securing each of the antenna's service hatches (see Figure 17 on page 16). Then gently lower the hatches.
- Orient the antenna so the antenna forward arrow is facing the bow, stern, port, or starboard (see Figure 23).
- Using the Installation Worksheet, record the antenna's mounting orientation.

NOTE: If you are installing two antennas, mount the antennas facing opposite directions (180° offset).

- Carefully lower the antenna using the foam seals and mounting holes as guides. While lowering the antenna, adjust the cables as necessary to maintain an adequate service loop, approximately 8" (20 cm) of slack.

IMPORTANT!

To prevent damage to the foam seal, do not reposition the antenna laterally once the antenna's foam seal has made contact. If you need to reposition the antenna, lift the antenna vertically first.

- Guide the antenna downward and ensure the mounting holes and foam seals are aligned.



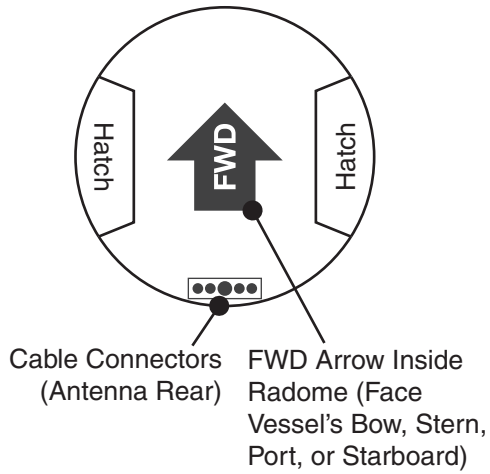
WARNING

Observe the safety warnings printed on the supplied tube of Loctite® anti-seize lubricant: "Contains mineral oil, calcium hydroxide, and copper. May cause skin, eye, and respiratory irritation. Wear eye protection and gloves. **First aid:** In case of eye or skin contact, flush with water. Obtain medical attention for any eye or internal contact."

- Apply a thin layer of anti-seize lubricant to the threads of the four supplied 1/2"-13 mounting bolts to prevent galling.

Figure 23 Antenna Forward

Antenna - Top View



9 Continued Mount the Antenna(s)

- g. At each of the four antenna mounting holes, place a 1/2" flat washer on a 1/2"-13 bolt and insert the bolt into the hole from above (see Figure 24).
- h. Secure each mounting bolt to the mounting surface using a 1/2" flat washer and a 1/2"-13 lock nut from below (see Figure 24).
- i. Tighten the mounting bolts in a cross pattern until the four rubber feet on the baseplate are bottomed against the mounting surface. KVH recommends that you tighten the nuts to between 35 and 40 ft-lbs (47 and 54 N-m) of torque.
- j. Disconnect the crane rigging.
- k. Using a 5/32" hex key and 1/2" open-end wrench, remove the eight screws, flat washers, and lock nuts securing the four lift brackets to the antenna (see Figure 25). Remove the brackets and hardware and set them aside in a safe place.

TIP: Be sure to save the brackets and bracket hardware in case you need to relocate the antenna later.

- l. Install eight 1/4"-20 screws and washers (supplied in the kitpack) in place of the longer mounting bracket screws you removed in the previous step.
- m. Reinstall both antenna service hatches. Secure each service hatch using the three hex latches.
- n. If you are installing two antennas, repeat these steps to mount the second antenna.

Figure 24 Mounting the Antenna (Side View)

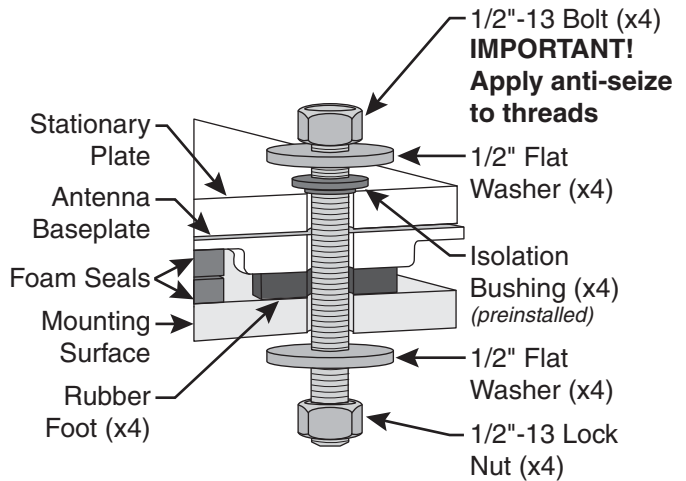


Figure 25 Lift Bracket Removal

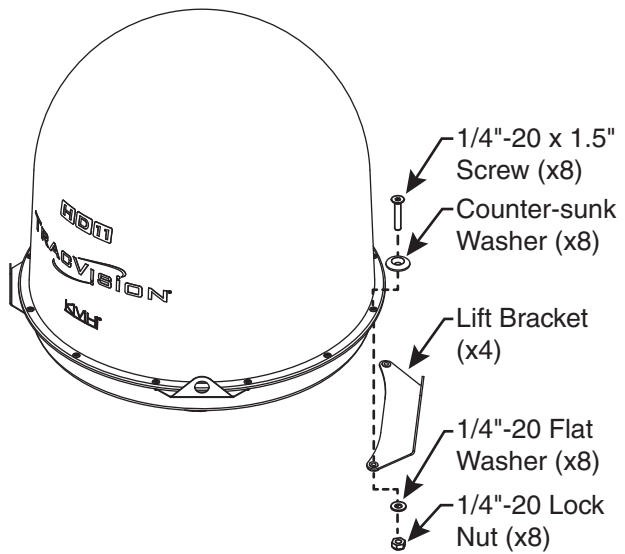
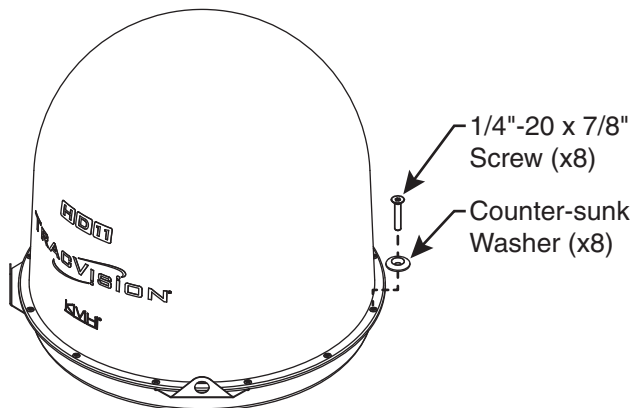


Figure 26 Radome Hardware



10 Mount Belowdecks Equipment

Follow the steps below to mount the ACU(s) and SmartSwitch (if equipped).

ACU Rack Mounting

- Attach the strain-relief bracket to the ACU, as shown in Figure 27. Using a #1 Phillips screwdriver, secure the bracket in place using four #6-32 screws and #6 washers (supplied in the kitpack).
- Secure the ACU to the rack using four M6 screws and washers (see Figure 28).

ACU Horizontal Mounting

- Using a #1 Phillips screwdriver, remove the six #6-32 screws securing the rack mounting brackets to the ACU (see Figure 29).
- Using a #1 Phillips screwdriver, attach the two horizontal mounting brackets to the sides of the ACU using four supplied #6-32 screws and #6 washers (see Figure 30). You can attach the brackets to either the top or bottom of the ACU, depending on your desired mounting location.
- If you are mounting the ACU to the underside of a shelf, attach the strain-relief bracket to the ACU, as shown in Figure 27. Using a #1 Phillips screwdriver, secure the bracket in place using four #6-32 screws and #6 washers (supplied in the kitpack).

NOTE: The ACU does not require a strain-relief bracket when mounted to the top of a horizontal surface.

- Using fasteners appropriate for the mounting surface, secure the ACU to the mounting surface using the four mounting bracket holes.

Figure 27 ACU Strain Relief Bracket

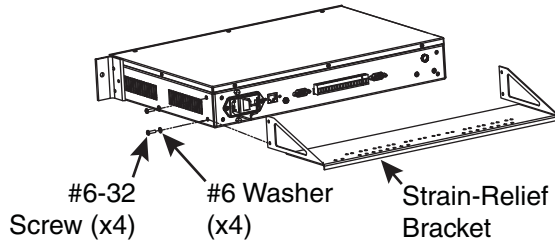


Figure 28 ACU Rack Mounting

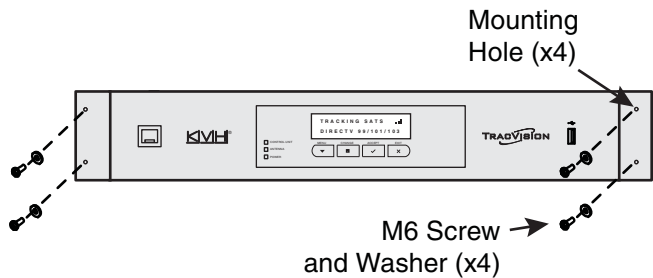


Figure 29 ACU Rack Mounting Bracket Removal

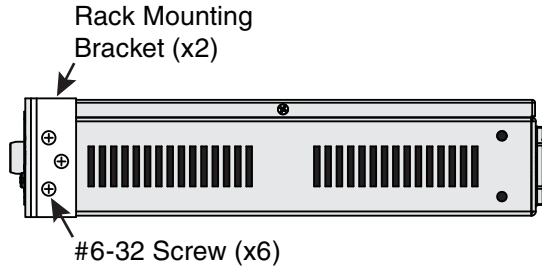
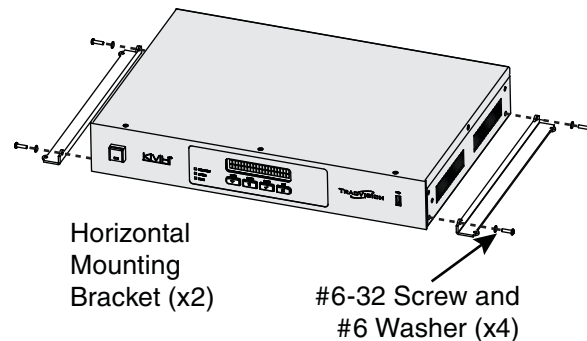


Figure 30 Horizontal Mounting Brackets



10

Continued Mount the Belowdecks Equipment

Joint ACU/SmartSwitch Rack Mounting

- Using a #1 Phillips screwdriver, remove the six #6-32 screws securing the rack mounting brackets to the ACU (see Figure 29 on page 20).
- Remove the six #6-32 screws securing the rack mounting brackets to the SmartSwitch (see Figure 31).
- Attach the joint rack mounting brackets to the ACU and SmartSwitch, as shown in Figure 32. Secure the brackets in place using twelve #6-32 screws and #6 washers (supplied in the kitpacks).
- Attach the strain relief bracket and retaining straps, as shown in Figure 32. Secure them in place using eight #6-32 screws and #6 washers (supplied in the kitpacks).

NOTE: Only the SmartSwitch strain-relief bracket must be installed. The ACU does not require a strain-relief bracket when jointly mounted with the SmartSwitch.

- Secure the joint assembly to the rack using four M6 screws and washers.

SmartSwitch Mounting, Separately

Follow the identical steps for the ACU on the previous page to mount the SmartSwitch to a rack or horizontal surface.

Figure 31 SmartSwitch Rack Mounting Bracket Removal

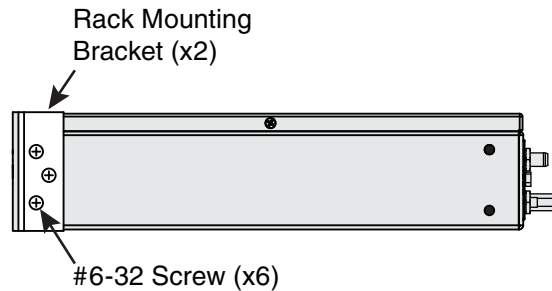


Figure 32 ACU/SmartSwitch Joint Assembly

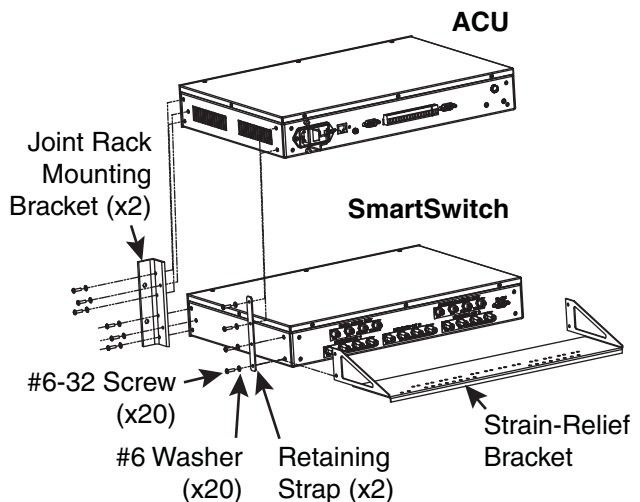


Figure 33 Cable Jacket Removal



11

Wire Belowdecks Equipment

Follow the steps below to wire the belowdecks equipment.

Power/Data Cable Preparation

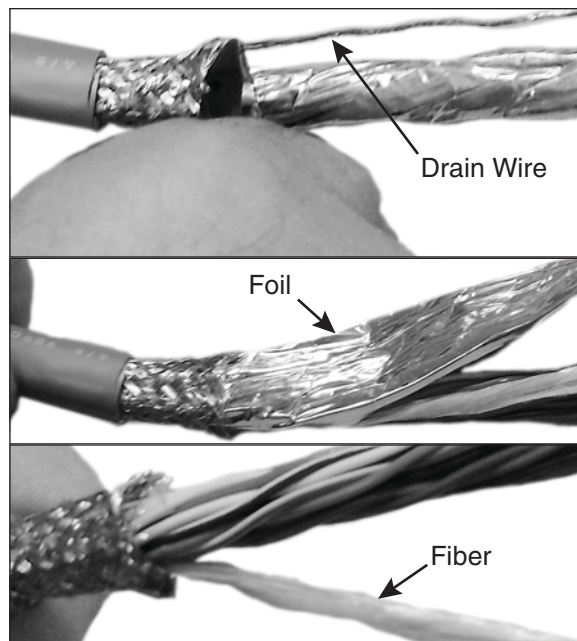
Follow the steps below to prepare the power/data cable for connection to the ACU.

- a. Cut the end of the cable to the desired length.
- b. Using a ruler, measure 7.5" (19 cm) back from the end of the cable. Then, using an X-ACTO knife to carefully cut in a rocking motion, sever only the cable's plastic jacket (outermost layer) (see Figure 33). Then twist off the severed length of the plastic jacket.
- c. Measure 6" (15 cm) back from the end of the cable. Then carefully pinch the cable braid to create a bulge 6" (15 cm) from the cable end. Using needle-nose cutting pliers, cut the braid along the center of the bulge (see Figure 34).
- d. Cut the cable's drain wire, foil insulation, and fiber to the same length so that their ends are flush with the end of the cable braid (see Figure 35).

Figure 34 Cable Braid Bulge/Cutting



Figure 35 Drain Wire/Foil/Fiber Removal



11

Continued Wire Belowdecks Equipment

- e. Thread the power/data cable through the supplied grounding sleeve. Position the grounding sleeve by aligning the end of its ground wire with the ends of the other wires in the cable (see Figure 36).
- f. Using a heat shrink gun, begin evenly heating the grounding sleeve at the end farthest from the end of the cable to create a seal with the cable's plastic jacket (see Figure 37).
- g. Slowly begin applying heat evenly to the grounding sleeve moving toward the far end of the grounding sleeve until you reach the grounding sleeve's solder ring. Continue applying heat evenly to the ring until the ring's solder begins to wick into the cable braid. Then continue applying heat while working toward the grounding sleeve's remaining length (see Figure 37).
- h. Thread the power/data cable through the heat shrink tubing (supplied in the kitpack). Align the tubing so that the grounding sleeve protrudes slightly and is barely visible (see Figure 38).
- i. Begin heating the tubing to create a seal by applying heat and working from one end of the tubing, in the same direction you heated the grounding sleeve.
- j. Strip a 1/4" (6 mm) length from the end of the grounding sleeve's ground wire. Then insert the wire into the supplied ring terminal and crimp it into place (see Figure 39).
- k. Dress the power/data cable wires.
- l. Strip a 1/4" (6 mm) length from each of the power/data cable's wires. Gently twist each wire to ensure a good electrical connection.
- m. If you are installing two antennas, repeat the steps above to prepare the power/data cable connecting the second antenna and ACU.

Figure 36 Grounding Sleeve Alignment

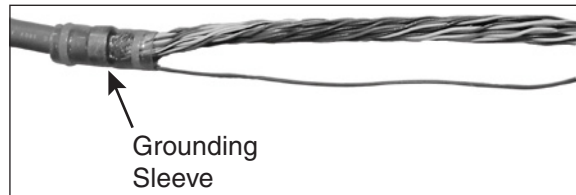


Figure 37 Completed Grounding Sleeve Installation

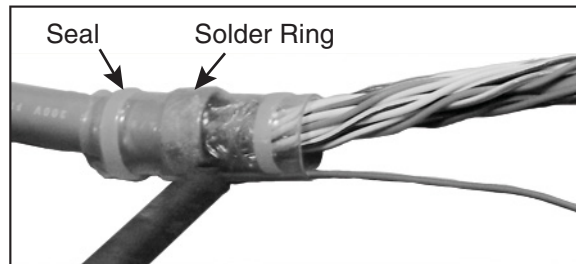


Figure 38 Heat Shrink Tubing

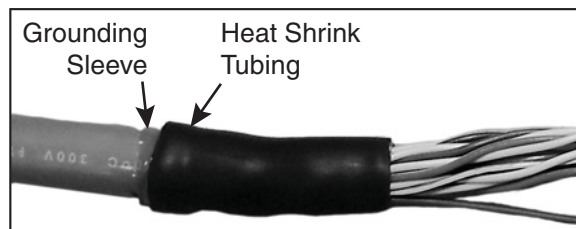


Figure 39 Ring Terminal



11

Continued Wire Belowdecks Equipment

Connect the Power/Data Cable

Follow the steps below to connect the antenna's power/data cable to the ACU.

- a. Connect the power/data cable wires to the large terminal strip connector (supplied in the kitpack), as shown in Figure 40.

IMPORTANT!

The diagram refers to wires by **body color/ stripe color**. For example, "Brown/White" means the brown wire with the white stripe.

- b. Plug the terminal strip connector into the base of the supplied cable shroud as shown in Figure 41.
- c. Secure the end of the power/data cable to the base of the shroud using the supplied clamp. This clamp will help relieve stress on the cable. Secure the clamp in place with the two screws.
- d. Carefully fit all of the cable's wires within the base of the shroud.
- e. Snap the shroud's cover onto the base. Be sure not to pinch any wires between the cover and the base.
- f. Connect the ring terminal of the grounding sleeve's ground wire to the grounding screw on the rear of the ACU (see Figure 40).
- g. If you are installing two antennas, repeat the steps above to connect the second antenna's power/data cable.

Connect NMEA Input

Follow the steps below to connect the NMEA input to the ACU.

- a. Connect the vessel's NMEA 0183 Talker wires to the small terminal strip connector (supplied in the kitpack), as shown in Figure 40. Make sure the device is configured to transmit \$-HDT messages at 4800 baud to provide true heading to the system.

NOTE: The antenna requires a NMEA 0183 input; it is not compatible with the NMEA 2000 standard.

- 24 b. Plug the terminal strip connector into the rear of the ACU (see Figure 40).

Figure 40 Power/Data Cable Wiring

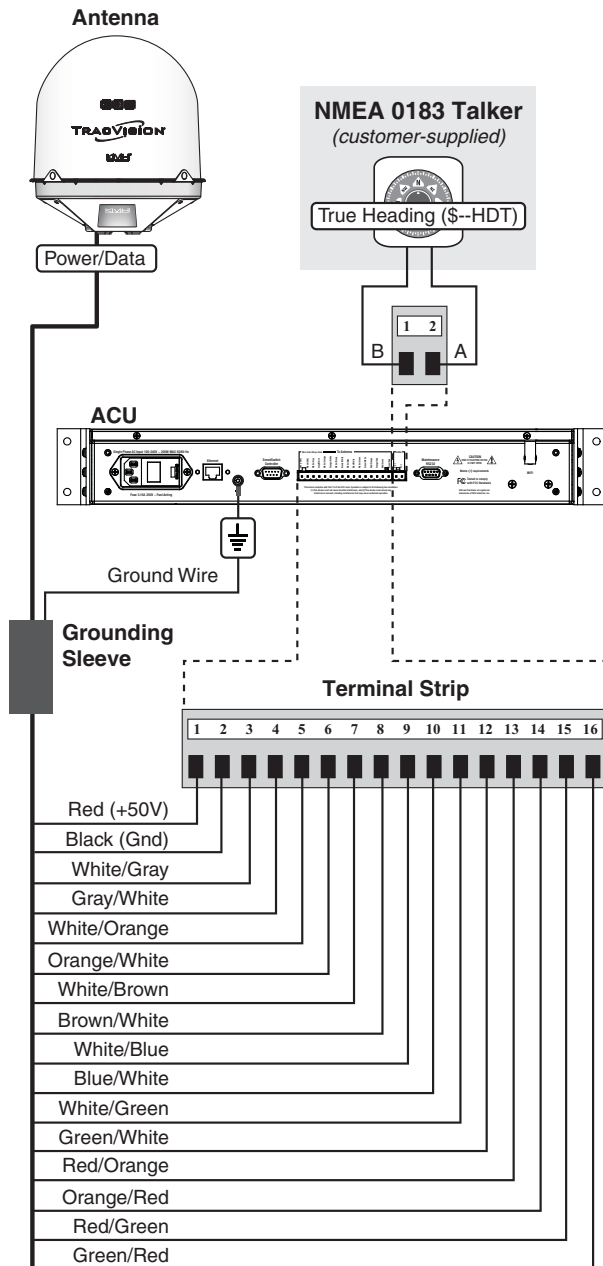
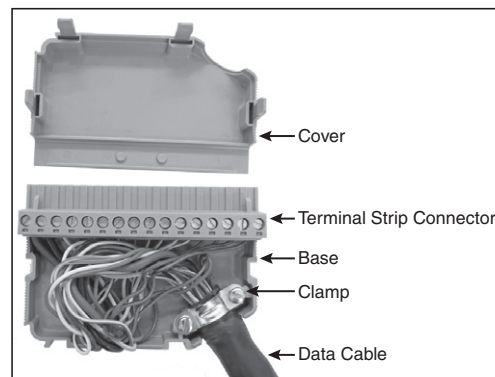


Figure 41 Data Cable Shroud



11

Continued Wire Belowdecks Equipment

Connect Power, RF Cables, and Other Hardware

IMPORTANT!

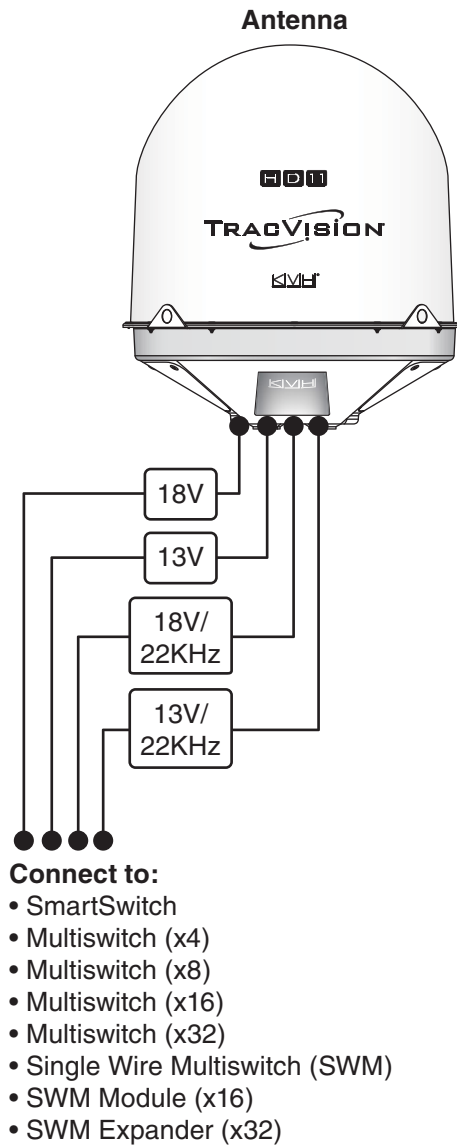
Be sure to connect power according to the guidelines provided in “AC Power Requirements” on page 12, and ground the system according to the guidelines provided in “Grounding Requirements” on page 13.

Wiring instructions vary according to the customer’s specific system configuration and hardware. Refer to the Installation Worksheet’s planning section, which you completed earlier, and the wiring diagrams provided in “Wiring Diagrams” on page 33 to connect the antenna’s RF cables as required.

IMPORTANT!

To prevent damage, always tighten RF cable connectors finger tight. Then turn no more than 1/8-turn using a 7/16" wrench (do not exceed 15 in-lbs of force).

Figure 42 RF Cable Wiring Overview



12 Connect to An Onboard Network

Follow these steps to either connect the TracVision system to an existing onboard network or install the supplied wireless router to set up and connect to a new onboard network.

IMPORTANT!

If you have a dual-antenna system, before continuing, decide which ACU will be the Master and which will be the Slave. Perform the following steps using the Master ACU, first, and then repeat the steps with the Slave ACU, setting the Slave ACU's IP address to another number outside of your router's DHCP range.

- a. To connect to an existing network, connect an Ethernet cable from the network to the "Ethernet" port on the ACU (see Figure 44). Then continue to step f on [page 27](#).

To create and connect to a new network, continue to step b.

NOTE: Alternatively, you can connect directly to the ACU's Ethernet port with a PC configured for DHCP. Then open the web browser and enter the default IP address <http://169.254.253.1> to access the web interface and configure the ACU.

- b. Connect an Ethernet cable from one of the four numbered "Ethernet" ports on the wireless router to the "Ethernet" port on the ACU (see Figure 44).
- c. Connect a PC or mobile device to the wireless router's default SSID network name (Linksys<last 5 digits of the router's serial number>).
- d. Open the web browser and enter <http://192.168.1.1>.

Figure 43 ACU Power Button

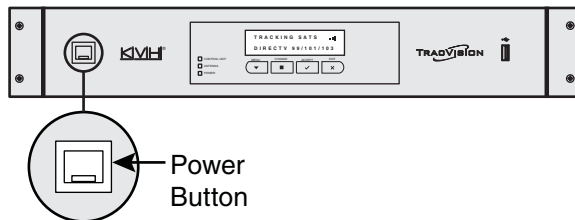
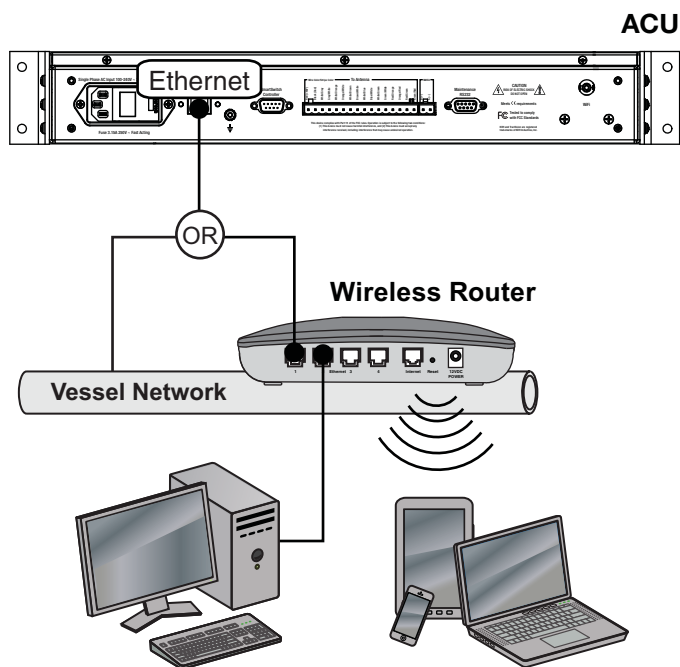


Figure 44 Network Connection Options



12

Continued Connect to An Onboard Network

- e. Follow the router's setup wizard to complete installation.

IMPORTANT!

When setting up a wireless network, KVH recommends applying security settings, such as encryption, to protect your network from outside intrusion. If your network is not secure, outsiders within range of your wireless network will be able to use your wireless connection without your knowledge.

To make changes to the router's default Wi-Fi network settings, connect a PC or mobile device to the router's default SSID network name (**Linksys<last 5 digits of the router's serial number>**), enter **192.168.1.1** into the web browser's address bar, and login to the wireless router's web interface. Refer to the router's documentation for details.

- f. Press the power button on the front of the ACU to apply power to the TracVision system (see Figure 43). Then wait up to 5 minutes for system startup.
- g. On the front panel of the ACU, navigate to **System Settings > Ethernet Settings** and configure the parameters as follows:

- Set **State** to "**Static.**"
- Set the **IP Address** to an available IP address outside of your router's DHCP range (*refer to your router's user manual for details*).

For example, if the router assigns IP addresses ranging from 192.168.1.100 to 192.168.1.139, you could set the Master ACU's IP address to 192.168.1.150.

- Set the Subnet Mask (**Mask**) and Gateway (**Gway**) parameters, as directed by your router's user manual.

13 Access the Web Interface

The ACU offers a local web interface that can be used to check system status, update software, and configure all aspects of the system. Follow the steps below to access the ACU's web interface and complete the Setup Wizard.

- a. Connect your PC or mobile device to the ACU using one of the following options:
 - Connect directly to the ACU's Ethernet port (see Figure 45).

NOTE: Direct connection to the ACU is only available in single-ACU configurations.

- Connect via the vessel network (refer to ["Connect to An Onboard Network"](#) on page 26).

NOTE: You can find the IP address assigned to the ACU in the View Enet Settings menu on the front of the ACU (refer to ["ACU Menu Overview"](#) on page 43).

- b. Open the web browser and enter the ACU's IP address.

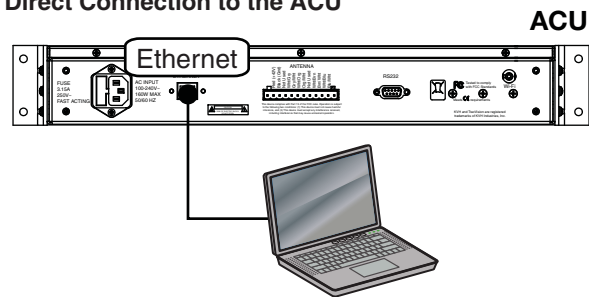
For example, if the ACU's IP address was set to 192.168.1.150, you would enter the following into the browser's address bar:

http://192.168.1.150

- c. Log in to the web interface using the username and password below.

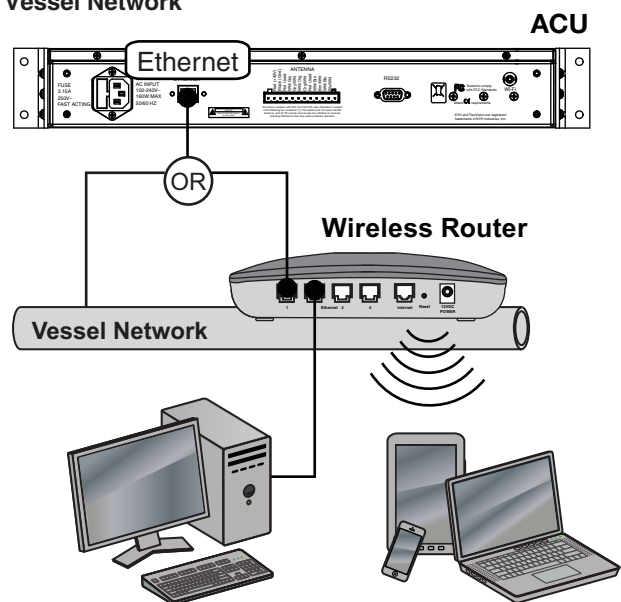
username: **admin**
password: **password**

Figure 45 Connection Options
Direct Connection to the ACU



OR

Vessel Network



13 Continued Access the Web Interface

- d. Select *Settings* > *General Settings*. Then select the **Launch** button to launch the Setup Wizard (see Figure 46).
- e. Follow the Setup Wizard's onscreen instructions to reconfigure certain system settings (see Figure 47).

Figure 46 Launch Setup Wizard Button

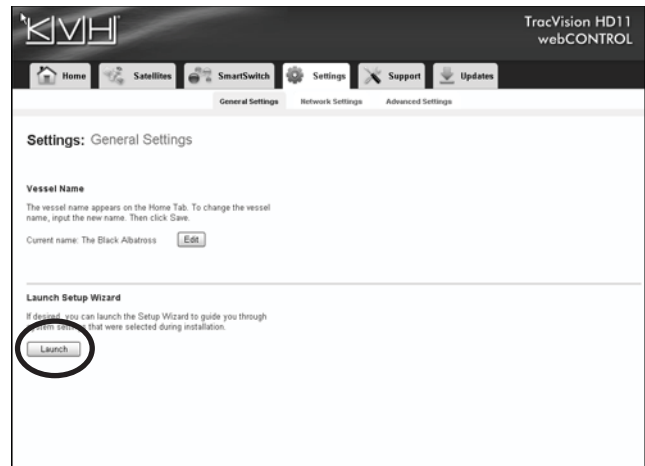


Figure 47 Setup Wizard



14

Turn Off Search Modes

Dual Antenna Only

If you have installed two antennas with a SmartSwitch, follow the steps below to turn off Search Modes 1 and 2 on each antenna:

- Open the web browser on a PC or mobile device connected to the same network as the HD11 antennas. Open two web browser windows or tabs. In the first web browser window/tab, enter the IP address of the "A" (Master) antenna's ACU. In the second window/tab, enter the IP address of the "B" (Slave) antenna's ACU.

NOTE: You can view an ACU's IP address on the ACU's front panel under its "About System" menu.

- Log into the HD11 web interface for each antenna:

Username: **admin**
Password: **password**

- At the web interface for each antenna, select the **Support** tab. Then select **Command Line** (see Figure 48).
- Look for the **+HDT** (true heading) message in each antenna's data stream (see Figure 49). Make sure that both antennas report the same heading. If they don't, make sure the ACU for each antenna is connected to the same heading source (NMEA 0183 talker), and the device is configured to transmit the \$--HDT message.

IMPORTANT!

Do not proceed with the rest of this procedure until both antennas are reporting the same heading.

- Return to the **Support: Home** page and make sure that both antennas are tracking the same satellite (see Figure 50). If they are, complete the remaining steps in this section at the web interface for each antenna.

Figure 48 HD11 Command Line

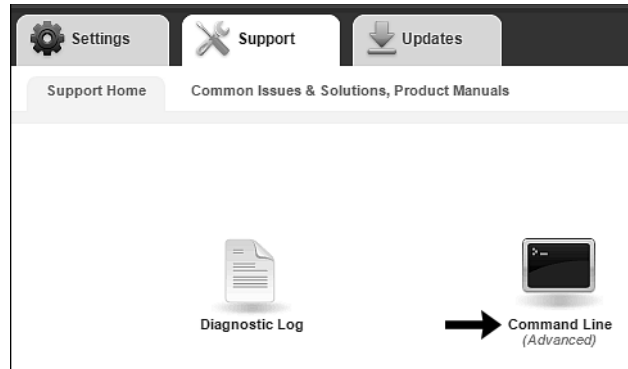


Figure 49 +HDT (True Heading) Message

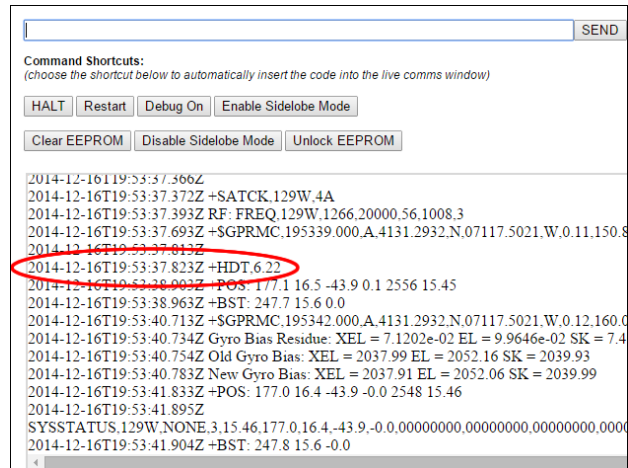
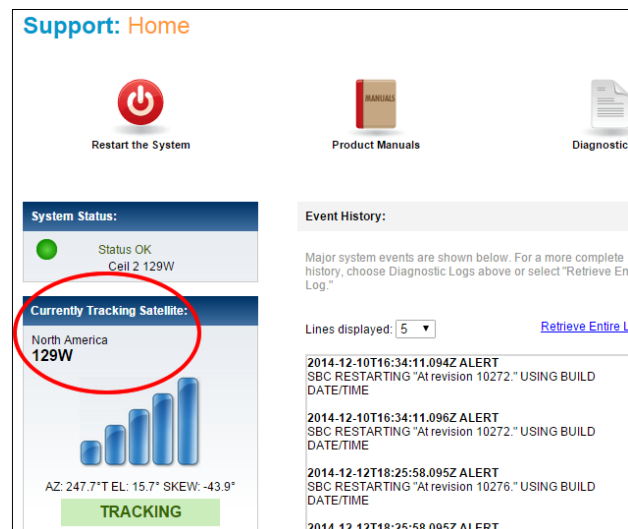


Figure 50 Tracked Satellite



14

Continued Turn Off Search Modes

NOTE: If both antennas cannot track the same satellite due to a blockage condition, first select a satellite that the "A" (Master) antenna can track and follow all of the remaining steps for just the "A" (Master) antenna. When you have completed the entire procedure for the "A" (Master) antenna, switch to a satellite that the "B" (Slave) antenna can track then repeat all of the steps for the "B" (Slave) antenna.

IMPORTANT!

To complete the remaining steps of this procedure, the antenna must be tracking a satellite.

- f. Select **Command Line**.
- g. In the Command box, enter **AZOFFSET**. Then click **Send**. Verify that an "AZOFFSET" value is reported along with a "V" as shown in Figure 51 (indicating a valid azimuth offset value). It might take up to 30 minutes if the antenna was just installed.
- h. In the Command box, enter **SM1,OFF** as shown in Figure 52. Then click **Send**. Verify that "SM1,OFF" appears in the data stream (indicating Search Mode 1 is turned off).
- i. In the Command box, enter **SM2,OFF** as shown in Figure 52. Then click **Send**. Verify that "SM2,OFF" appears in the data stream (indicating Search Mode 2 is turned off).
- j. If both antennas could not track the same satellite at the same time, switch to a satellite that the "B" (Slave) antenna can track and repeat steps **f-i** for the "B" (Slave) antenna while it is tracking a satellite.

Figure 51 AZOFFSET Value

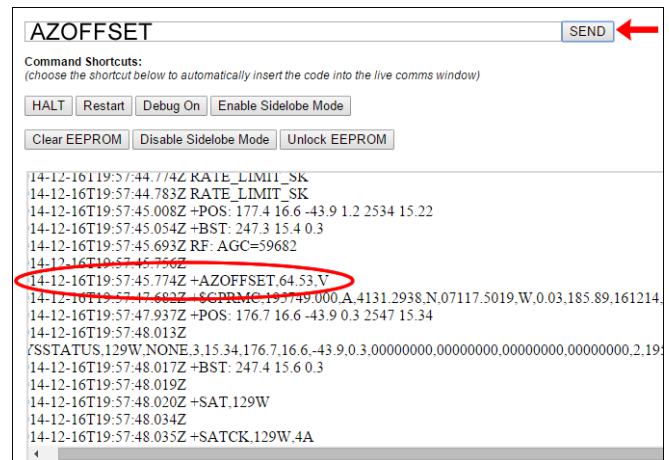
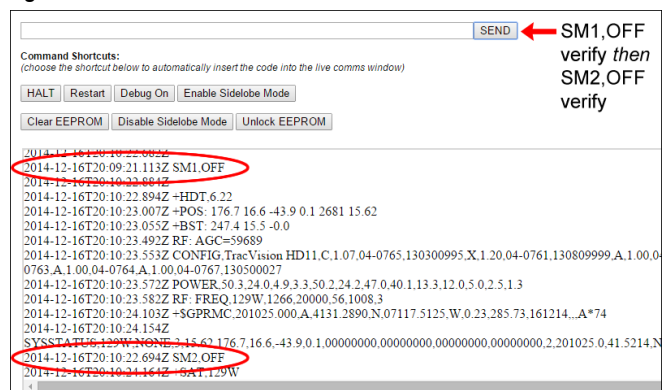


Figure 52 Turn Off Search Modes



15 Educate the Customer

Before you leave the vessel, test the system to ensure the antenna works properly. Then give the Customer Welcome Kit to the customer and explain how to use the system. Ensure 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.
- The antenna must have a clear view of the sky to receive satellite TV. Common causes of blockage include bridges and masts (see Figure 53).
- Heavy rain or snow might temporarily interrupt reception.
- Clean the radome regularly. Dirt buildup can affect reception.
- The vessel must be located within the selected satellite's coverage area to receive satellite TV signals. To view satellite coverage information, visit www.kvh.com/footprint.
- KVH recommends leaving the antenna system powered on while the vessel is underway.
- 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 any connected receivers/DVRs for the desired satellite TV service before you can watch television. KVH can help activate a DIRECTV® or DISH Network® receiver/DVR; just call KVH's Activation Department at +1 866 551-8004 for DIRECTV or +1 866 399-8509 for DISH Network.
- Refer to the supplied User's Guide for operation and troubleshooting information.
- You can use the TracVision HD11 iPhone®/iPod touch® app or the TracVision HD11 iPad® app to communicate with the system (see Figure 54). You can download these apps for free at the Apple iTunes® store.

Figure 53 Example of Blockage

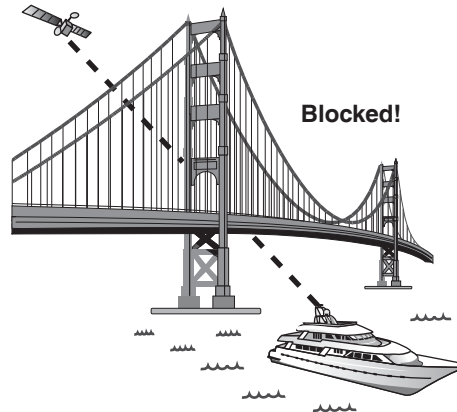


Figure 54 KVH TracVision HD11 iPhone/iPad/iPod touch Apps



A Wiring Diagrams

The wiring diagrams in this section support a variety of configurations and hardware. Refer to the applicable wiring diagrams for your installation.

Wiring SWM and Non-SWM Hardware

Connect your receivers/DVRs according to the diagram for your particular configuration.

NOTE: Only DIRECTV programming in North America supports SWM-compatible receivers and DVRs. All linear receivers/DVRs and other circular receivers/DVRs are not SWM-compatible.

Basic Diagram

Wiring One Antenna/ACU with up to 32 Tuners (see page 34)

SmartSwitch Input Wiring Diagrams

- One Antenna/ACU (see page 35)
- Two Antennas/ACUs (see page 36)

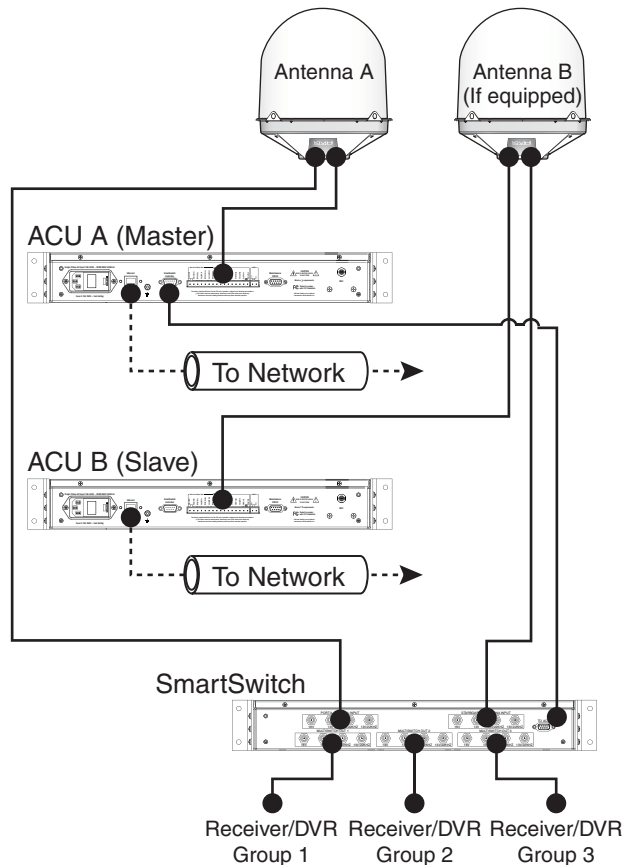
SmartSwitch Output Wiring Diagrams

- Overview (see page 37)
- 32 Non-SWM-compatible Tuners (see page 38)
- 16 SWM-compatible Tuners and 32 Non-SWM-compatible Tuners (see page 39)
- 32 SWM-compatible Tuners and 32 Non-SWM-compatible Tuners (see page 40)

DIRECTV Latin America (95WX Only)

- Without a SmartSwitch (see page 41)
- With a SmartSwitch (see page 42)

Figure 55 Wiring Overview

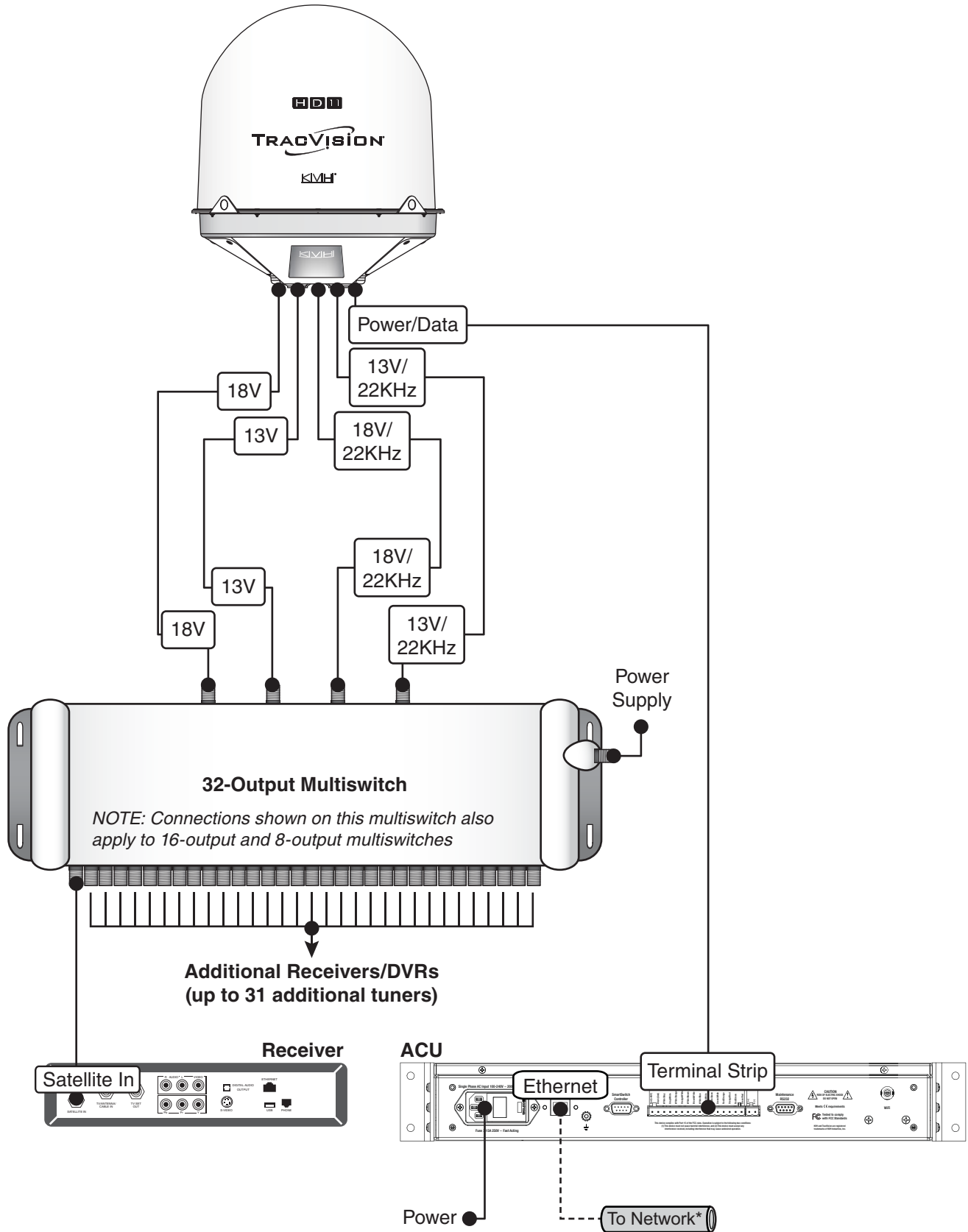


IMPORTANT! Both ACUs must be connected to each other via either a dedicated router or wired through the existing onboard network. If you do not have a network, install a router or router and switch.

A

Continued Wiring Diagrams

Wiring One Antenna/ACU with up to 32 Tuners

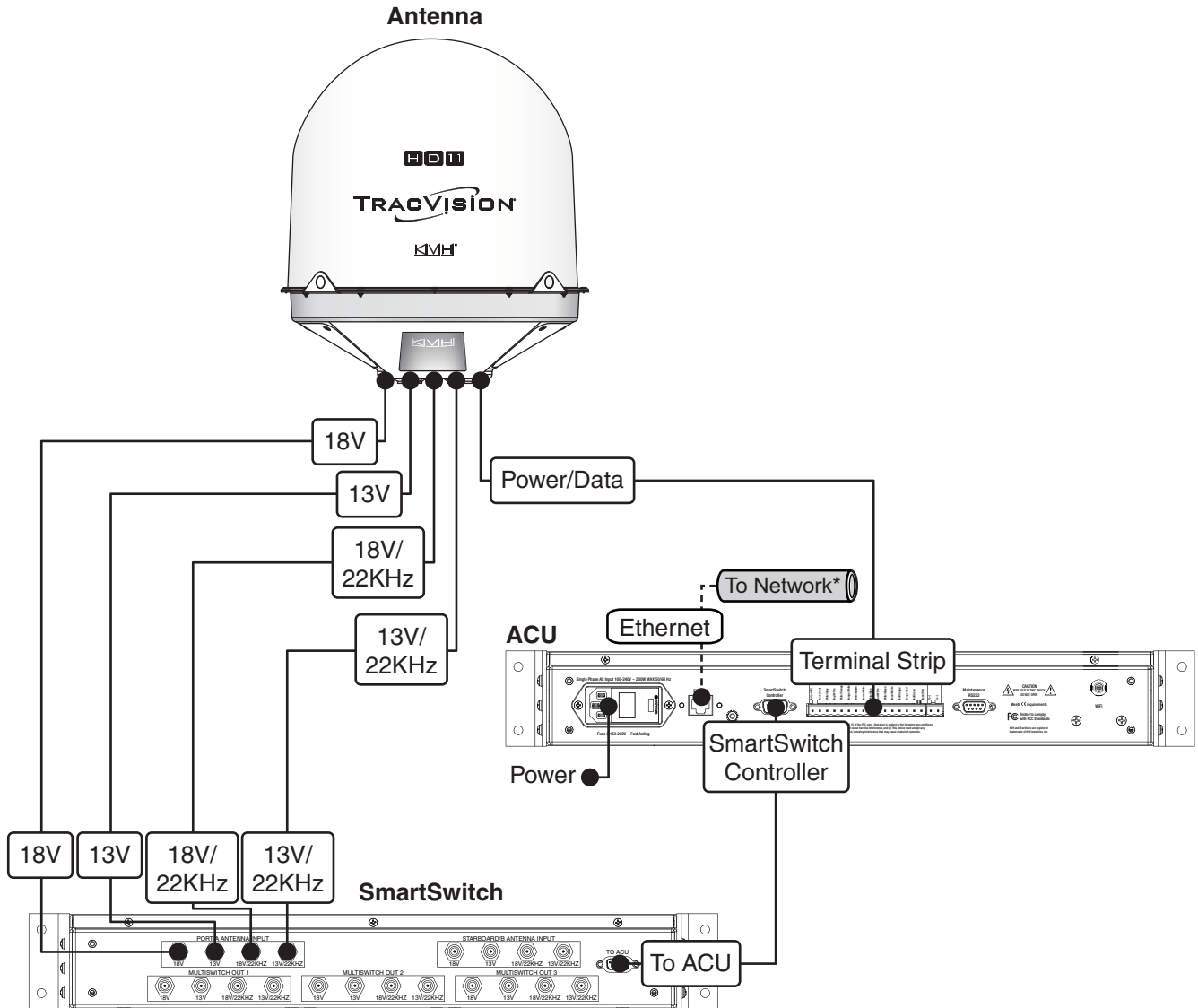


34 *A network connection is optional to provide easy access to the ACU's web interface.

A

Continued Wiring Diagrams

Wiring SmartSwitch Input: One Antenna/ACU

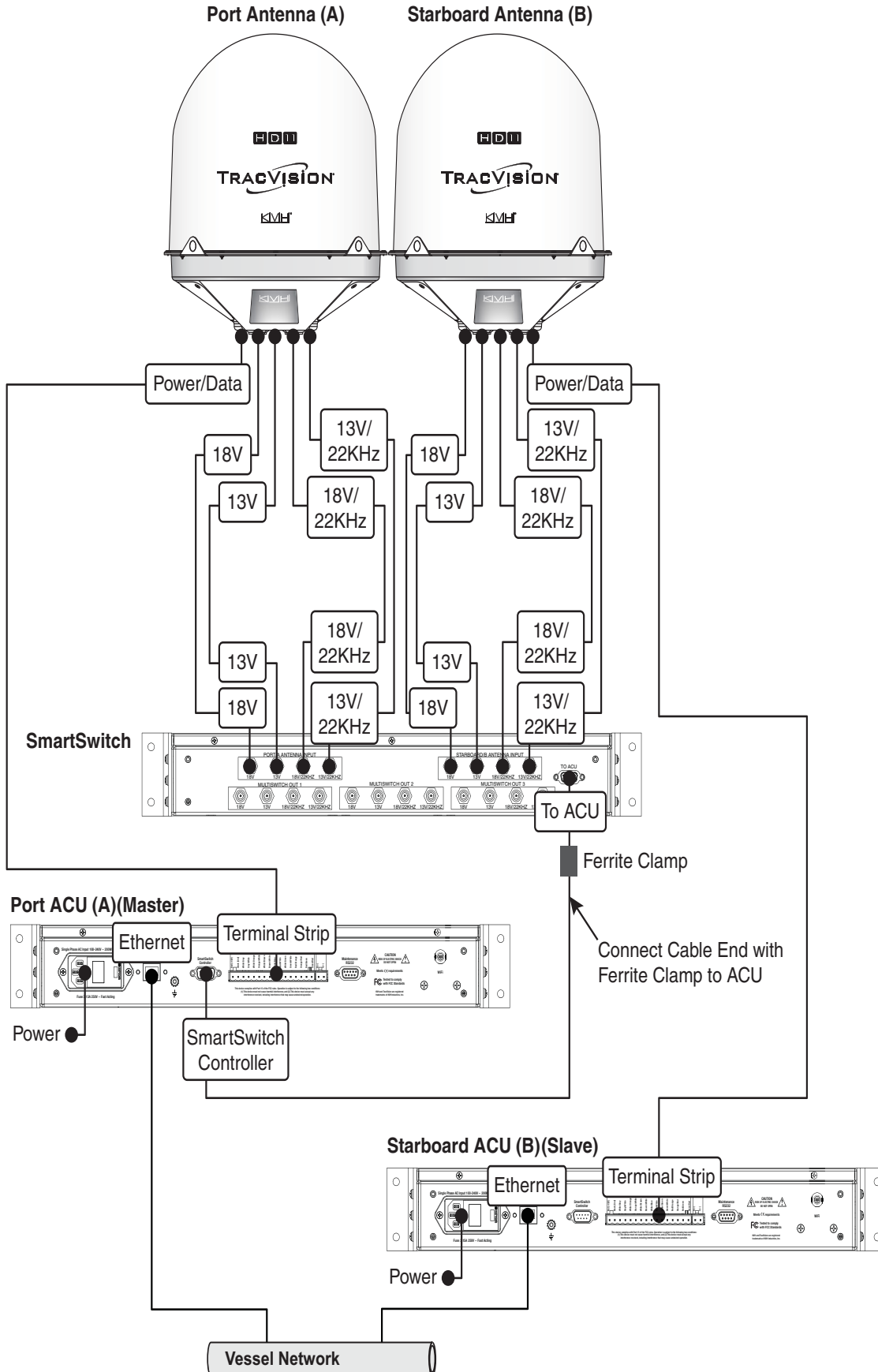


*A network connection is optional to provide easy access to the ACU's web interface.

A

Continued Wiring Diagrams

Wiring SmartSwitch Input: Two Antennas/ACUs

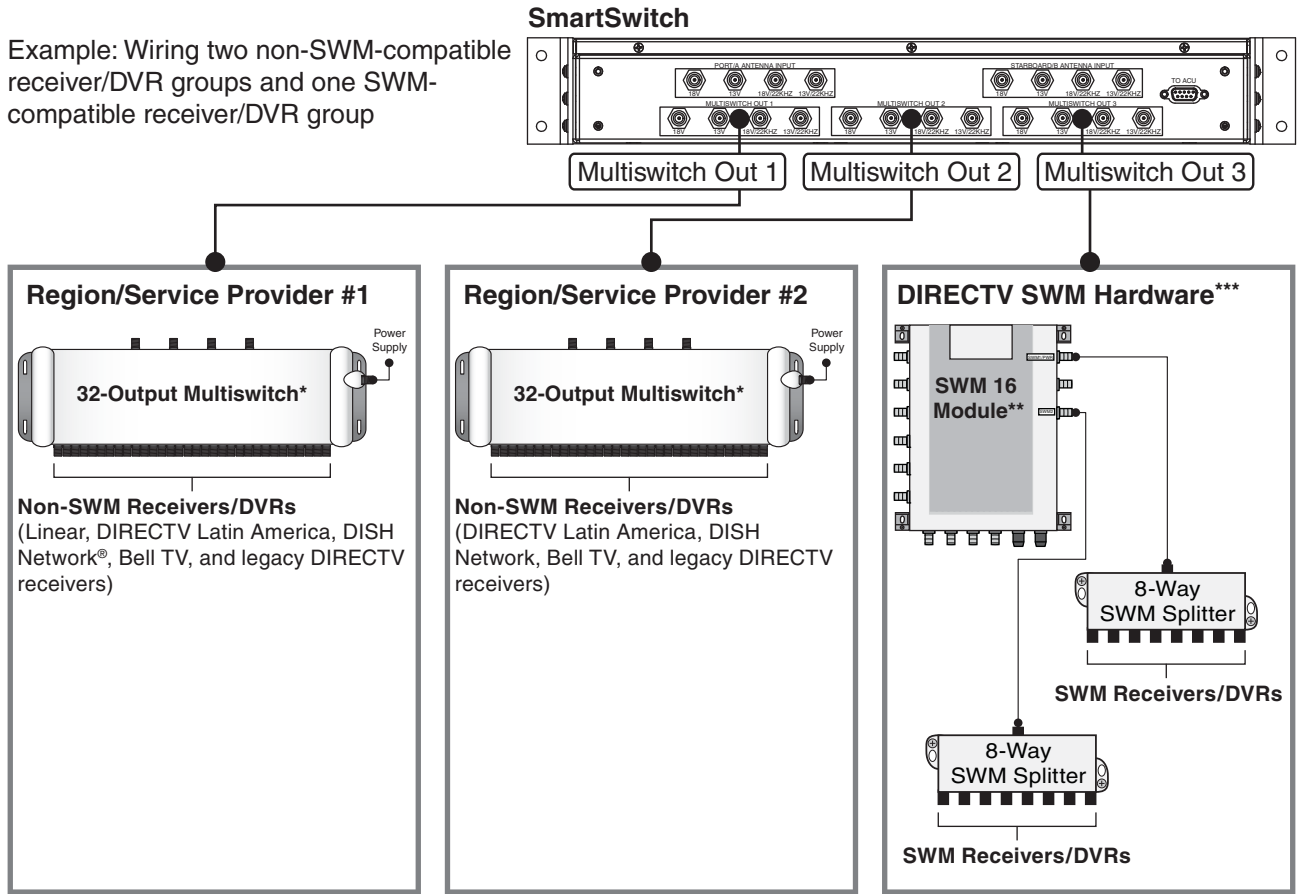


A

Continued Wiring Diagrams

Wiring SmartSwitch Output: Overview

Example: Wiring two non-SWM-compatible receiver/DVR groups and one SWM-compatible receiver/DVR group



*NOTE: Similar connections apply to 16-output and 8-output multiswitches

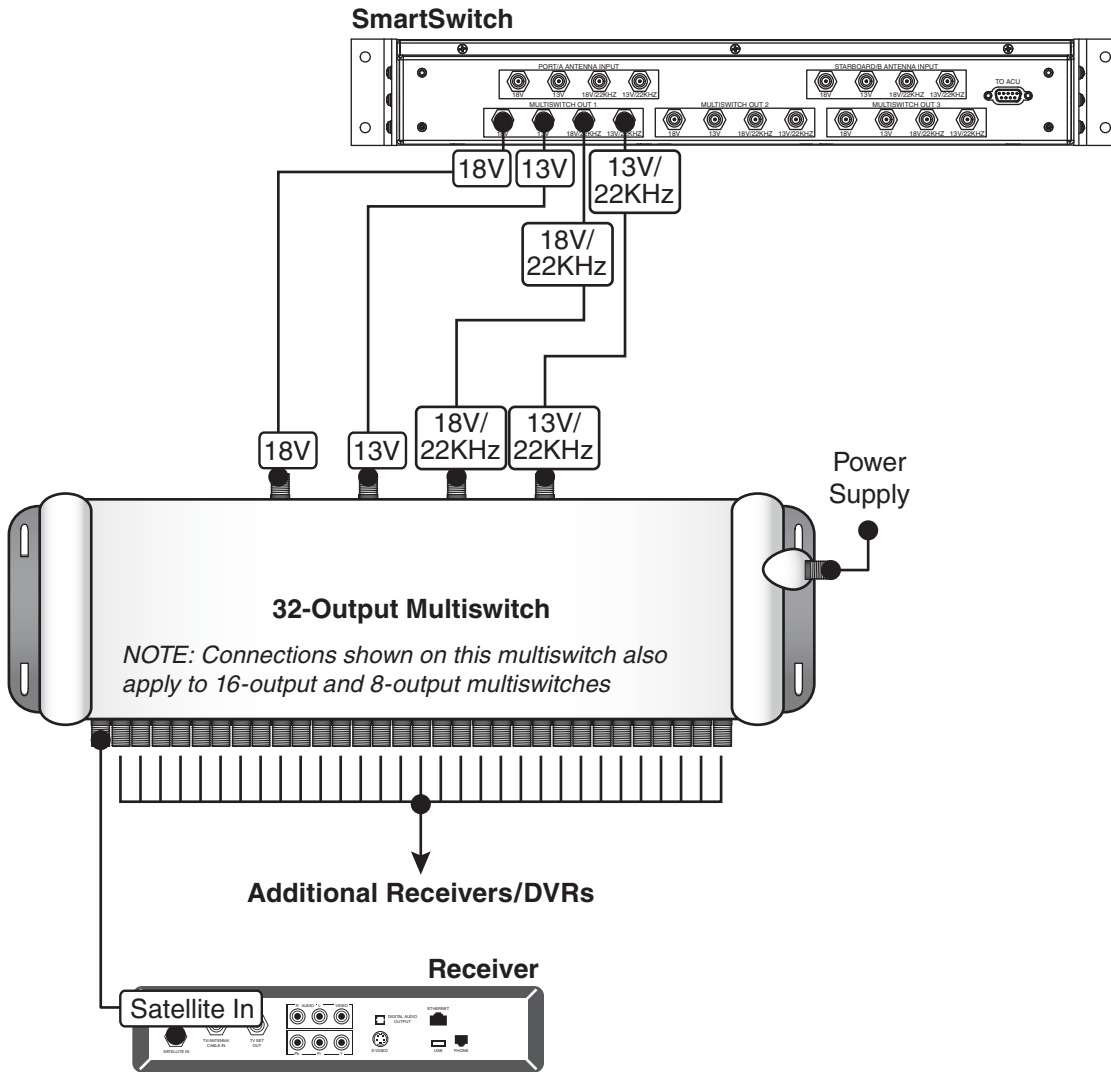
**NOTE: Similar connections apply to 32-tuner SWM expanders

***NOTE: Refer to the SWM 16 Module Kit instructions for complete wiring information

A

Continued Wiring Diagrams

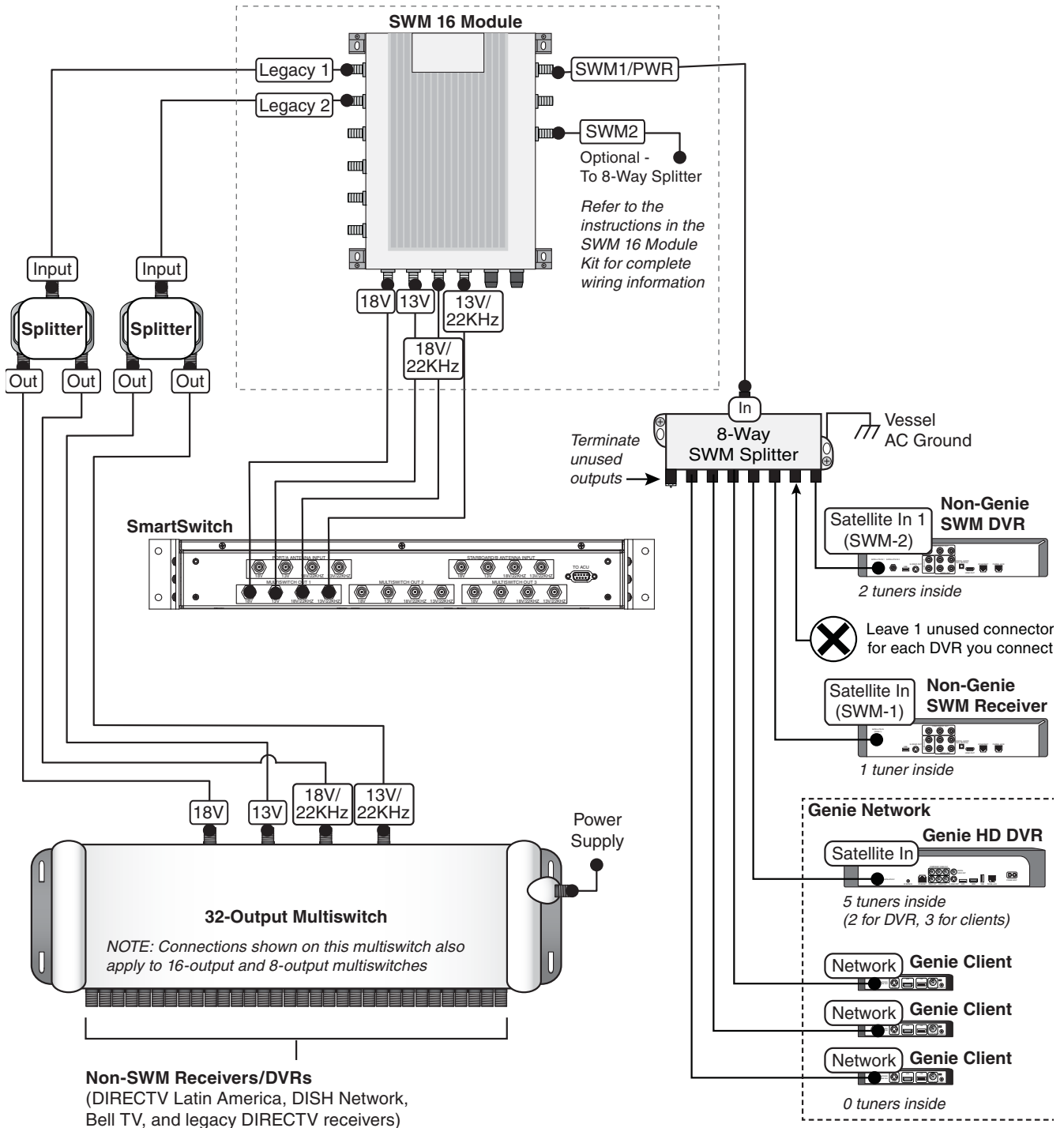
Wiring SmartSwitch Output: 32 Non-SWM-compatible Tuners



A

Continued Wiring Diagrams

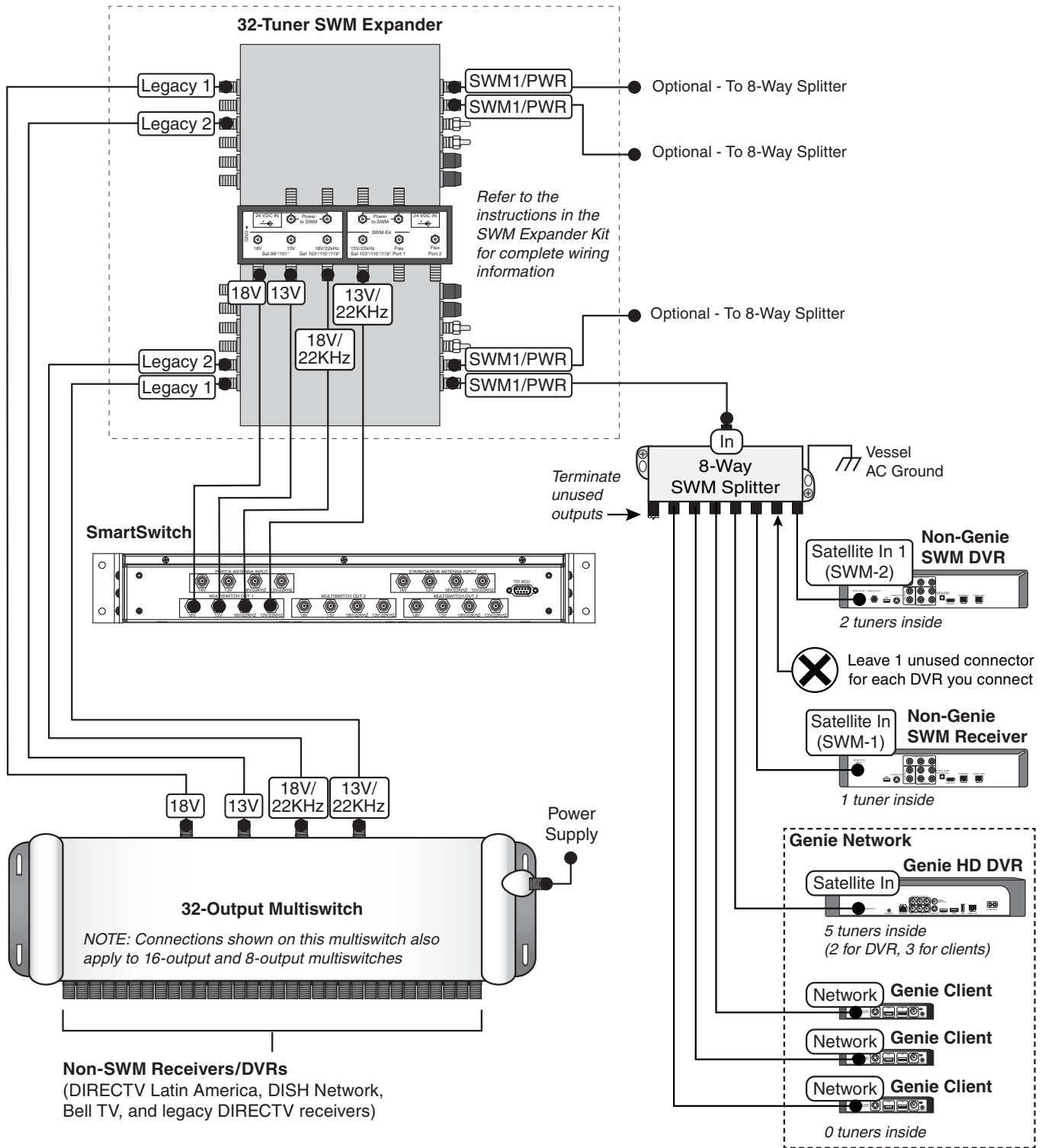
Wiring SmartSwitch Output: 16 SWM-compatible Tuners and 32 Non-SWM-compatible Tuners



A

Continued Wiring Diagrams

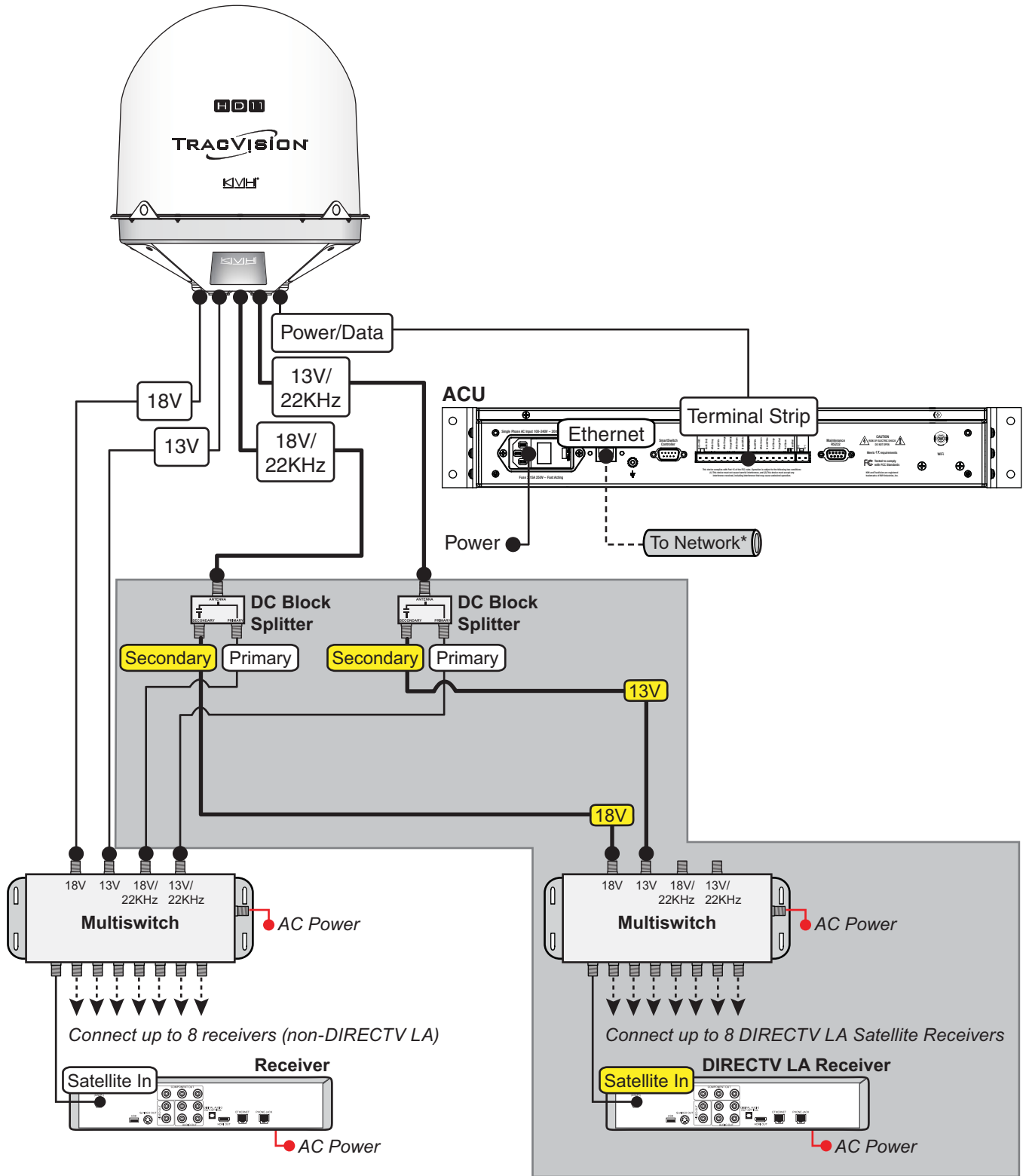
Wiring SmartSwitch Output: 32 SWM-compatible Tuners and 32 Non-SWM-compatible Tuners



A

Continued Wiring Diagrams

Wiring for DIRECTV Latin America Wide Beam without a SmartSwitch (95WX Satellite Only)



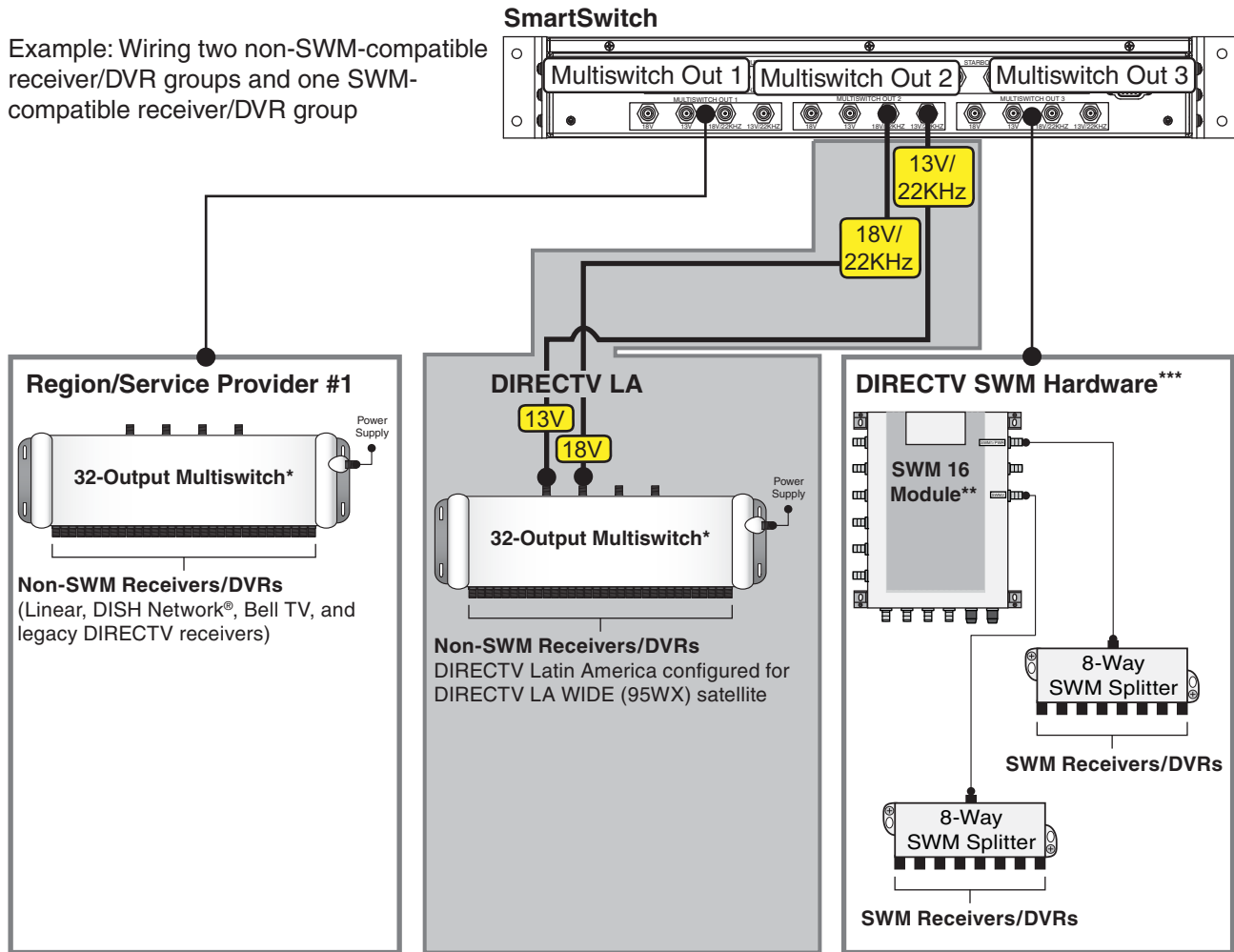
*A network connection is optional to provide easy access to the ACU's web interface.

A

Continued Wiring Diagrams

Wiring for DIRECTV Latin America Wide Beam with a SmartSwitch (95WX Satellite Only)

Example: Wiring two non-SWM-compatible receiver/DVR groups and one SWM-compatible receiver/DVR group

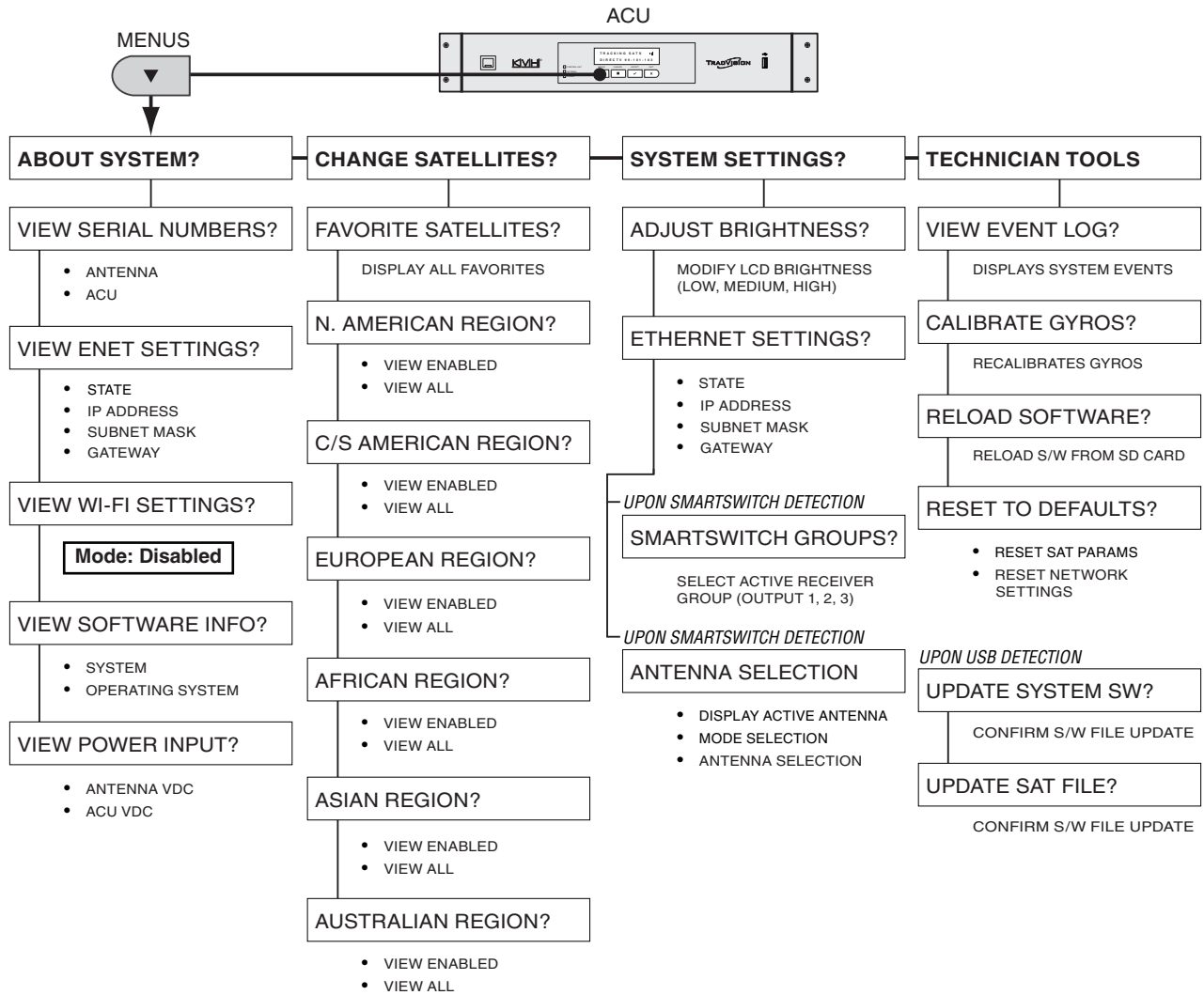


*NOTE: Similar connections apply to 16-output and 8-output multiswitches

**NOTE: Similar connections apply to 32-tuner SWM expanders

***NOTE: Refer to the SWM 16 Module Kit instructions for complete wiring information

B ACU Menu Overview





REGULATORY COMPLIANCE

European Union Compliance

Hereby, KVH Industries, Inc. declares that the radio equipment type TracVision HD11 is in compliance with EMC Directive 2014/53/EU. For the full text of the EU Declaration of Conformity, go to www.kvh.com/euconformity.

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