KVH Industries, Inc.

TracVision® HD11

HD 11

TRACVISION®

KVH®

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

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.
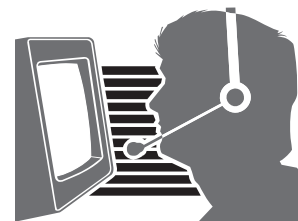
Technical Support

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

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

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

KVH

CE Declaration of Conformity

The undersigned of this letter declares that the following equipment complies with the specifications of The European Union Low Voltage Directive 2006/95/EC, and EMC Directive 2004/108/EC

Equipment included in this declaration

KVH TracVision® HD11, including all variants

Equipment applicability

Maritime Satellite High Definition Television

Declaration and Certification

The KVH TracVision® HD11 complies with the specified Directives by meeting the requirements of the following standards:

IEC 60950-1:2005 2 Ed +A1:2009   (Low Voltage Directive 2006/95/EC)
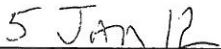
EN60945:2002   (EMC Directive 2004/108/EC)

Manufacturer

KVH Industries, Inc.
50 Enterprise Center
Middletown, RI 02842-5279
USA

Rick Jones _____   _5 Jan 12_ _____

Rick Jones, Director of Corporate Quality   Date

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

Radome

Baseplate

Service Hatch (x2)

Antenna Control Unit (ACU)
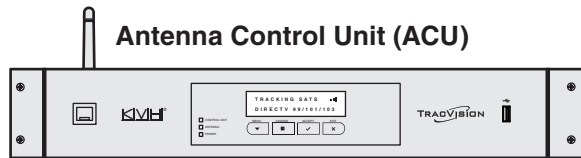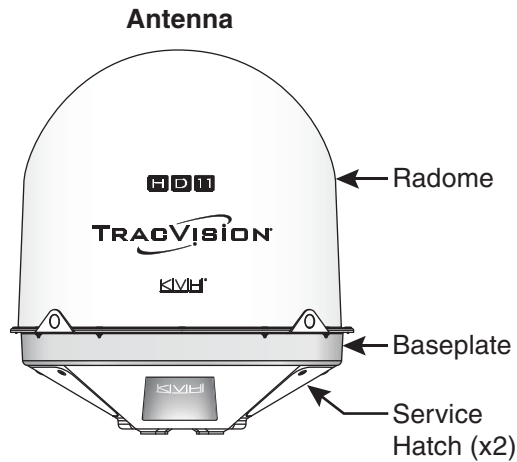
SmartSwitch Service/System Selector (if equipped)

Figure 2 Installation Worksheet

❷ 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 10)

- 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 11)

- PC (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
- 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 ±1°), 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

Side View

Cable Connectors

57.28"
(145.50 cm)

19.01"
(48.29 cm)

ø51.315"
(130.34 cm)

Bottom View Cable Connectors
(cable cover not shown)

Service Hatch

Service Hatch

9.744"
(24.75 cm)

ø13.780"
(35.00 cm)

9.744"
(24.75 cm)

Mounting Hole
4x ø.63" (1.60 cm)

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° elevation range (see Figure 4).

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 5).

- 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° (see Figure 6). 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 4 Antenna Blockage
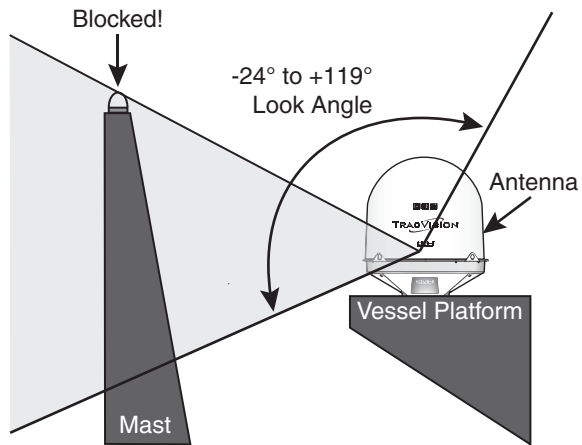
Figure 5 Antenna Forward
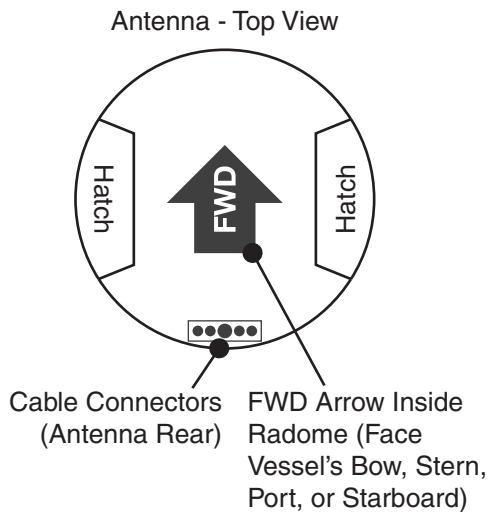
Figure 6 Radar/High-Power Radio Transmitter Interference
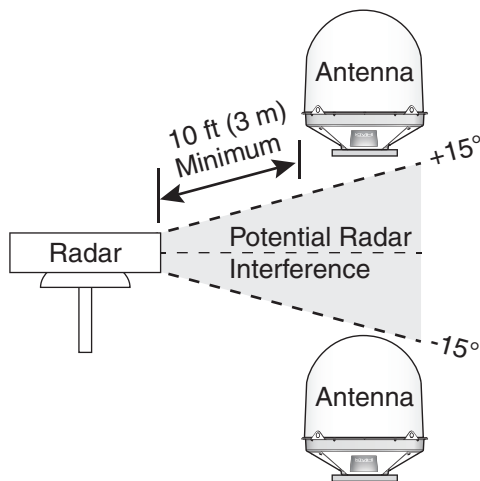
④ Plan the Belowdecks Installation

Plan the installation of the belowdecks equipment by using the Installation Worksheet 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.

- Ensure the ACU mounting location(s) provide adequate Wi-Fi reception. Do not install in an area surrounded by metal or near any electrical devices that emit RF noise.

- 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 – contact KVH for details.

Figure 7 ACU Dimensions

- 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 7 on page 7. For SmartSwitch dimensions, see Figure 8.

Figure 8 SmartSwitch Dimensions

Strain Relief Bracket

Top View

16.31"
(41.43 cm)

11.18"
(28.40 cm)

19.00"
(48.26 cm)

Side View

2.63"
(6.68 cm)

1.75"
(4.45 cm)

4 x ø.25"
(0.64 cm)

Front View

16.75"
(42.55 cm)

18.31"
(46.51 cm)

0.44"
(1.12 cm)
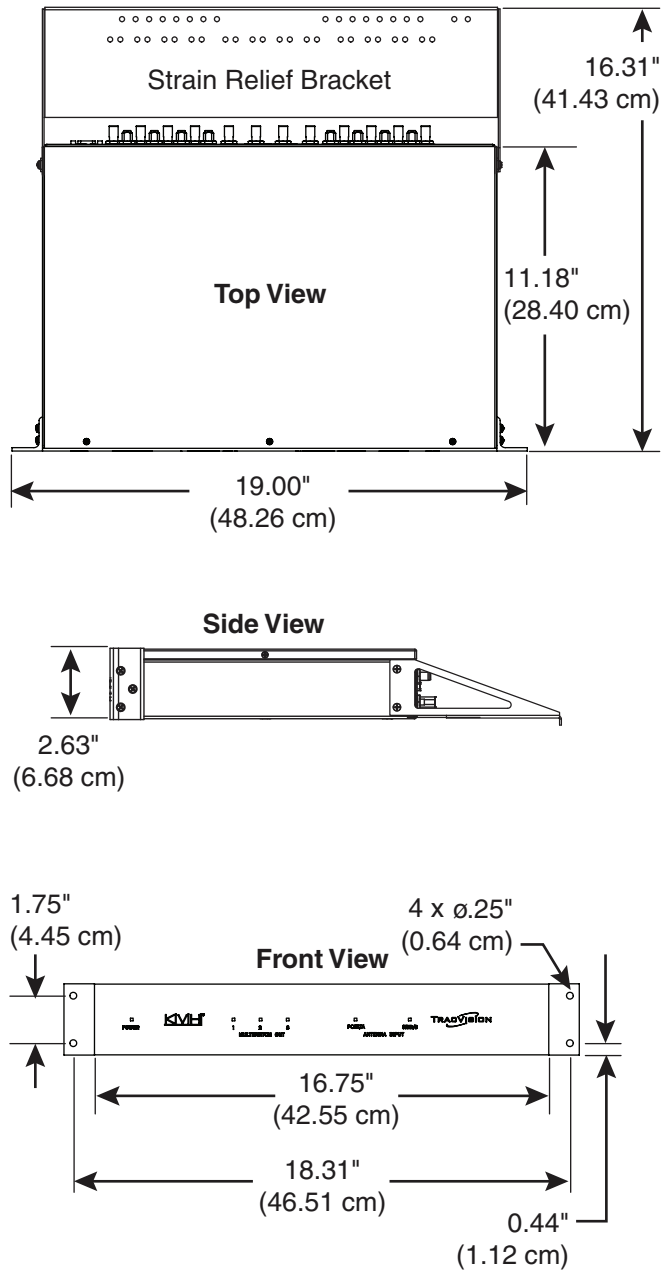
Mounting Options

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 9). 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 9).

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.

Figure 9 ACU/SmartSwitch Mounting Options

ACU Rack Mount

1.5U

Rack Mounting
Bracket (x2)

ACU Horizontal Surface Mount

Horizontal Surface
Mounting Bracket (x2)

SmartSwitch Rack Mount

1.5U

Rack Mounting
Bracket (x2)

SmartSwitch Horizontal Surface Mount

Horizontal Surface
Mounting Bracket (x2)

ACU/SmartSwitch Joint Rack Mount

3U

Joint Rack
Mounting Bracket (x2)
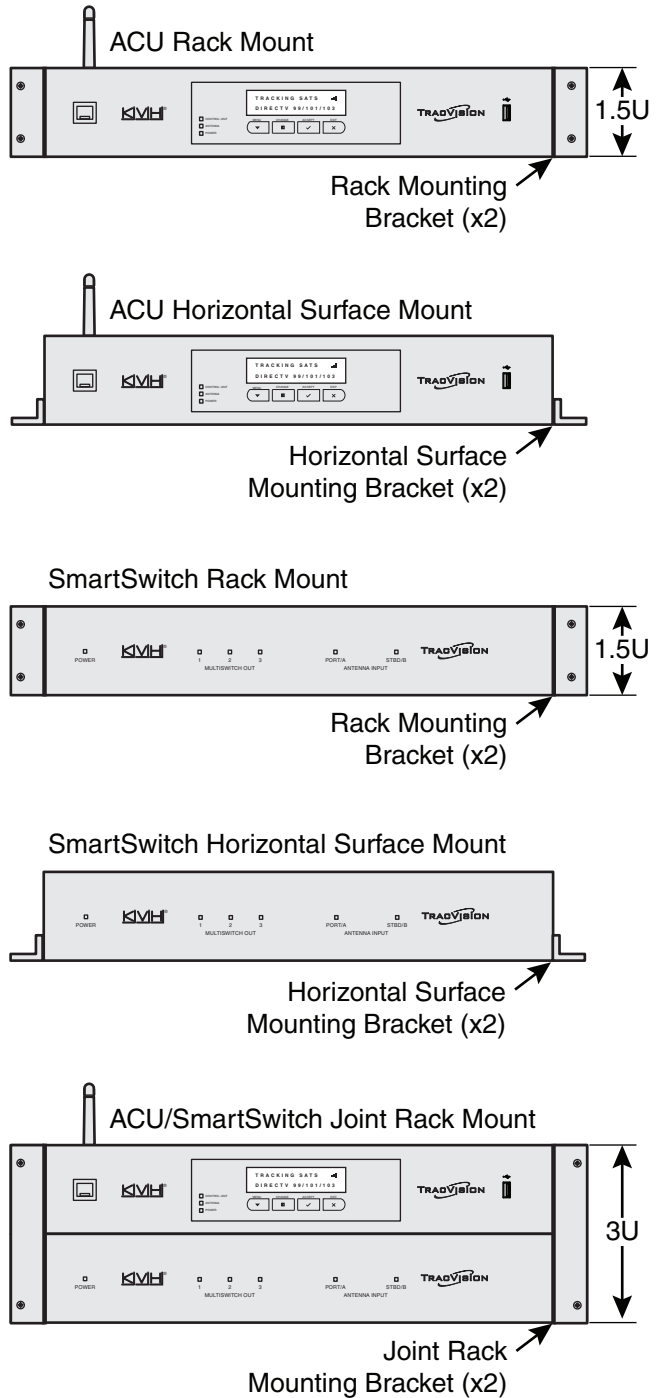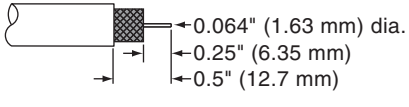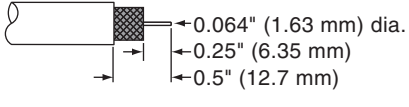
Cable Requirements

> **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 10).

Figure 10 Cable Types, Connectors, and Tools

Up to 100 ft (30 m) Cable Run	
Cable	RG-6 (KVH part #32-0417-100)
Connector	Thomas & Betts SNS1P6 (KVH part #23-0170)
Tools	Augat IT1000 (KVH part #19-0242)
Strip Lengths	0.064" (1.63 mm) dia. 0.25" (6.35 mm) 0.5" (12.7 mm)

Up to 200 ft (60 m) Cable Run	
Cable	RG-11 (KVH part #32-0566-100)
Connector	Thomas & Betts SNS11AS (KVH part #23-0213)
Tools	Thomas & Betts CST596711, L3011B (KVH part #72-0493)
Strip Lengths	0.064" (1.63 mm) dia. 0.25" (6.35 mm) 0.5" (12.7 mm)

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 12.

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 11 Power Requirements
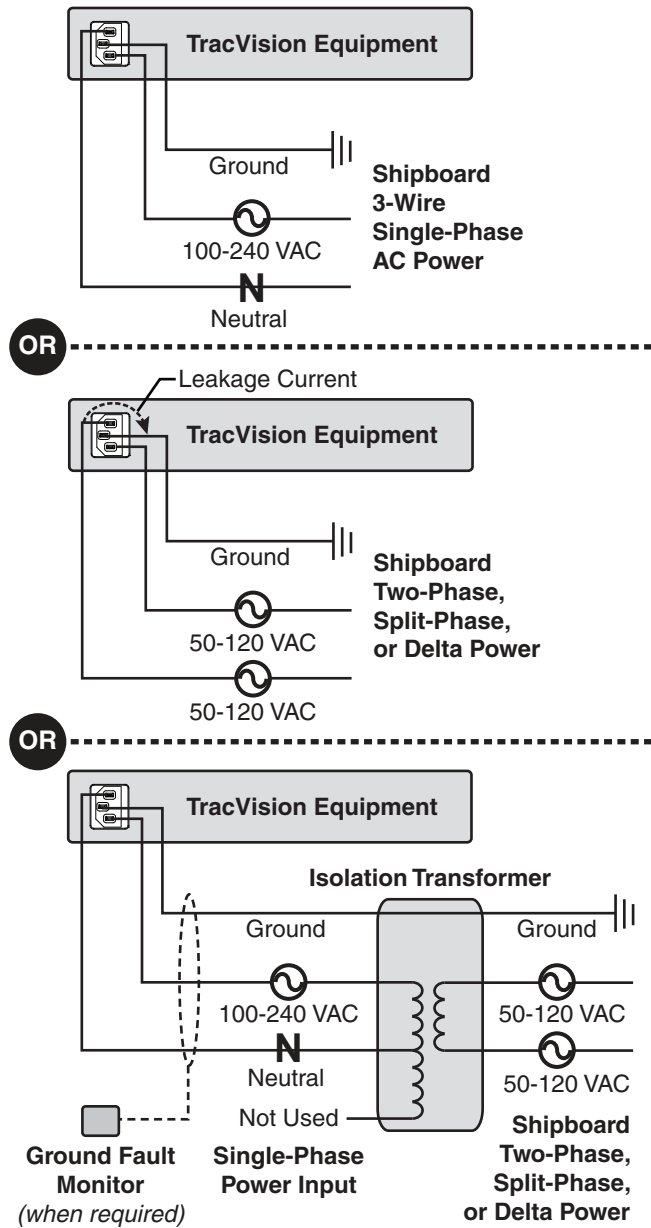
Grounding Requirements

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 12).

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 12).

j. If you are installing two antennas, repeat the steps above to prepare the second antenna mounting site.

Figure 12 Mounting Holes/Cable Access Hole/Foam Seal

13
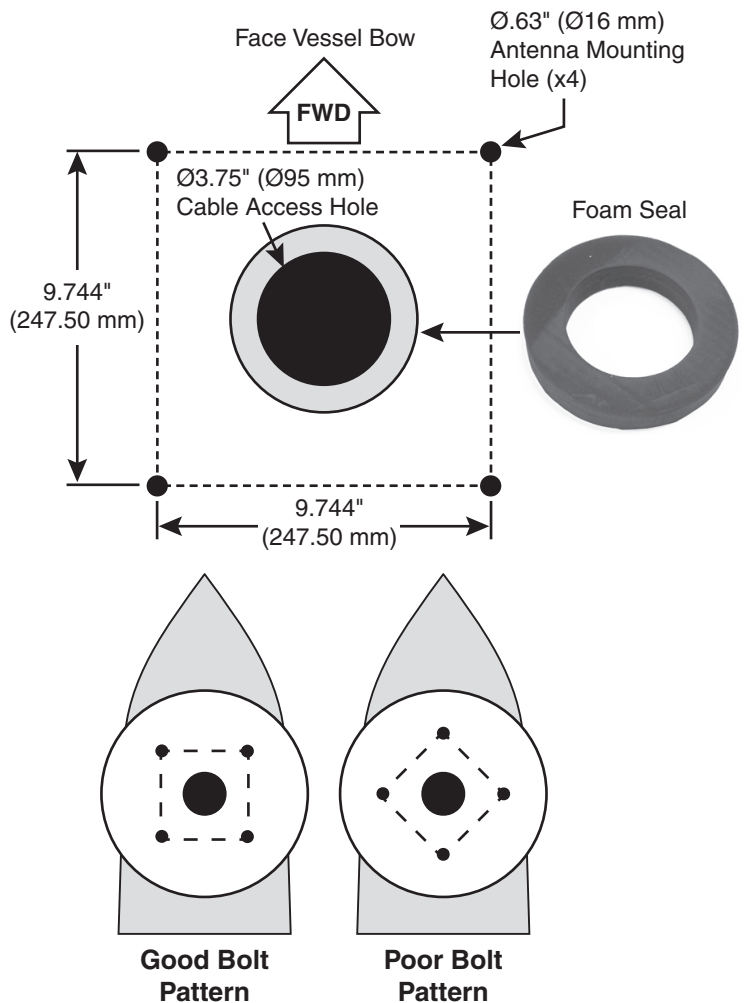
⑥ Prepare/Route Cables

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.

a. 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 13 and Figure 14).

b. Route the cables through the cable access hole to the belowdecks equipment location(s) you determined earlier.

c. 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 15).

Figure 13 Cable Labels

Figure 14 Antenna A Cable Labels/Routing
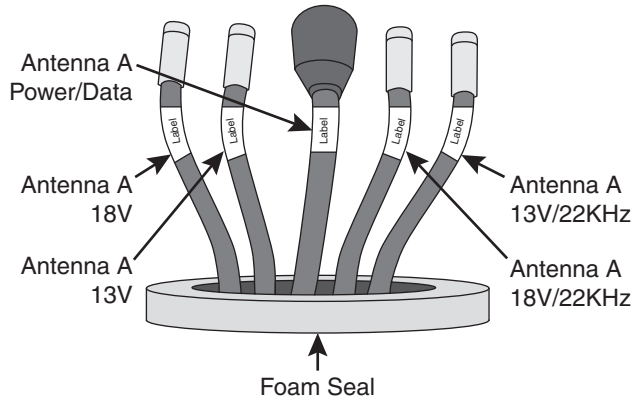
Figure 15 Antenna B Cable Labels/Routing (if equipped)
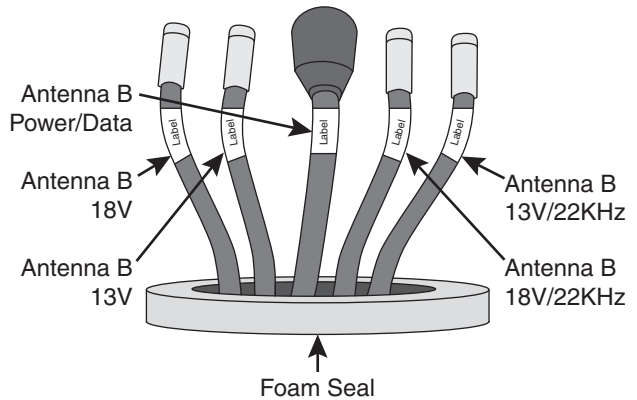
7 Rig/Hoist the Antenna(s)

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 16). 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 18).

e. If you are installing two antennas, repeat these steps to rig and hoist the second antenna.

Figure 16 Service Hatch/Hardware

Service Hatch (x2)

1/4-turn Hex Latch (x6)
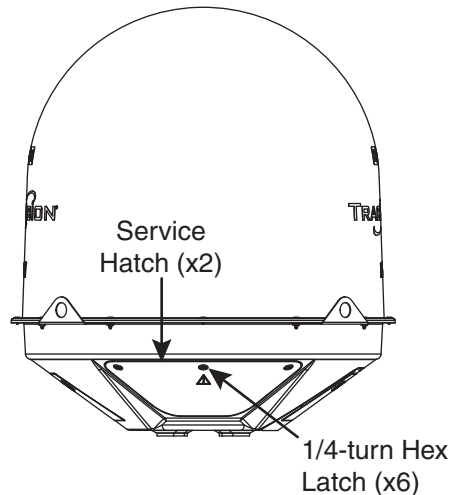
Figure 17 Shipping Bolts (Antenna Bottom View)

1/2"-13 Bolt (x4)
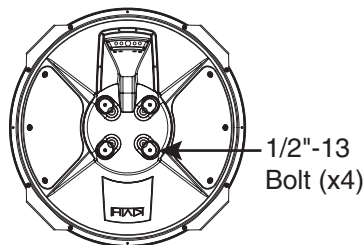
Figure 18 Antenna Crane Rigging (example)

Rope

Rope to Prevent Antenna from Tipping

Antenna's Center of Gravity

Lift Bracket (x4)
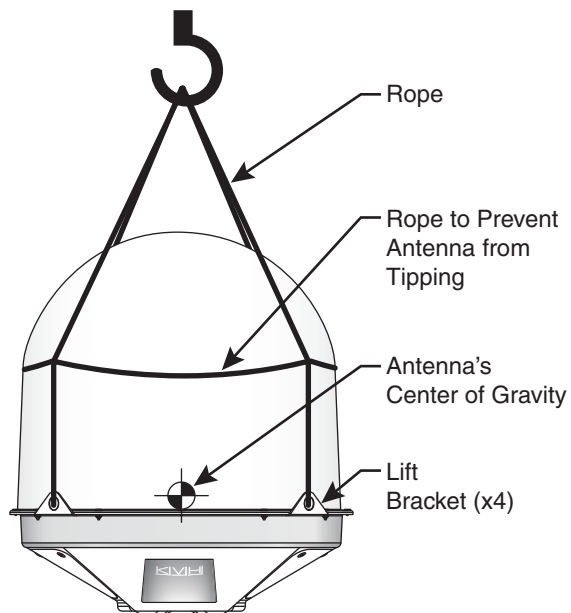
8 Wire the Antenna(s)

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

a. Clean and dry the bottom of the antenna baseplate (see Figure 19).

b. 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 19). Then press the foam seal firmly onto the underside of the antenna.

c. Connect the power/data cable to the antenna's power/data connector (see Figure 20). Hand-tighten until the connector locks in place; do not use excessive force.

d. 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 20).

IMPORTANT!

Refer to the cable and connector labels to ensure the antenna is wired exactly as shown in Figure 20.

---

e. 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 20).

f. Using a 7/16" open-end torque wrench set to 20 in-lbs (2.25 N-m), tighten each of the RF cable connections.

g. Using silicone sealant (or equivalent), create a weather-tight seal over each antenna connection.

h. 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 21).

i. If you are installing two antennas, repeat these steps to wire the second antenna.

Figure 19 Foam Seal

Antenna Baseplate (Bottom View)

Foam Seal
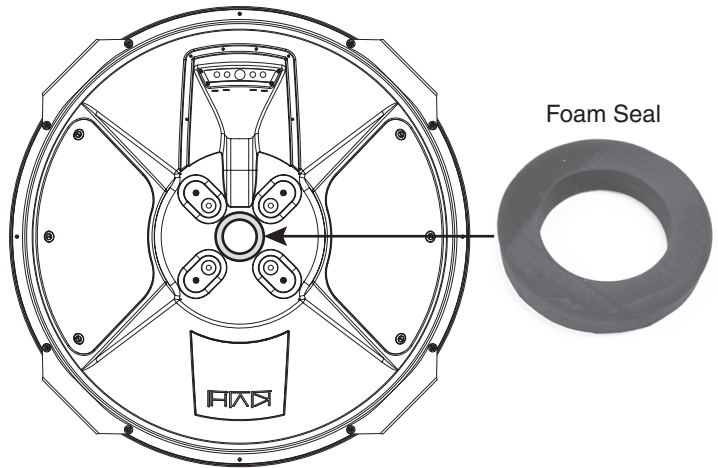
Figure 20 Cable Connections

18V | 13V | Power/Data | 18V/22KHz | 13V/22KHz

Baseplate

Foam Seals
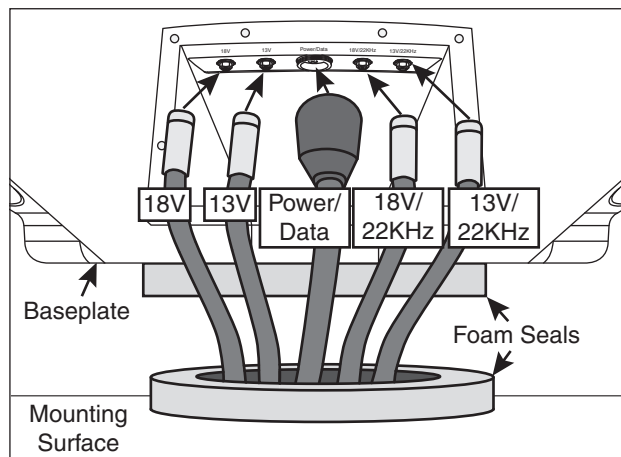
Mounting Surface

Figure 21 Cable Cover/Screws/Washers

#6-32 Captive Screw and Washer (x6)

Cable Cover
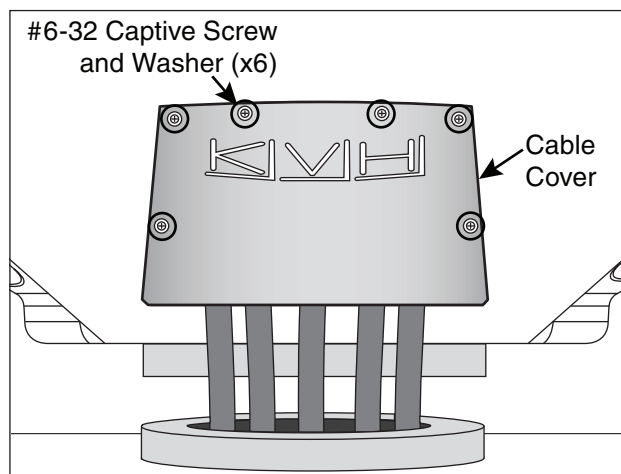
⑨ Mount the Antenna(s)

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

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 16 on page 15). Then gently lower the hatches.

b. Orient the antenna so the antenna forward arrow is facing the bow, stern, port, or starboard (see Figure 22).

c. 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).

d. 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.

e. 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."

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

Figure 22 Antenna Forward

Antenna - Top View

Cable Connectors (Antenna Rear)

FWD Arrow Inside Radome (Face Vessel's Bow, Stern, Port, or Starboard)
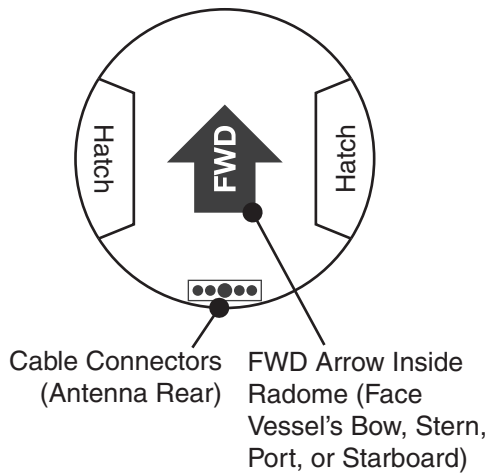
g. At each of the four antenna mounting holes, place a 1/2" flat washer on a 1/2"-13 bolt and insert the bolt into the hole from above (see Figure 23).

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 23).

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 24). 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 23 Mounting the Antenna (Side View)

1/2"-13 Bolt (x4)
IMPORTANT! Apply anti-seize to threads
Stationary Plate
1/2" Flat Washer (x4)
Antenna Baseplate
Isolation Bushing (x4) *(preinstalled)*
Foam Seals
Mounting Surface
1/2" Flat Washer (x4)
Rubber Foot (x4)
1/2"-13 Lock Nut (x4)
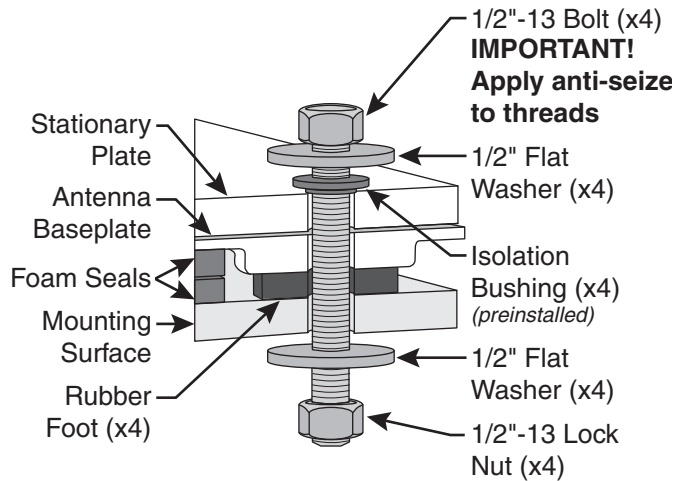
Figure 24 Lift Bracket Removal

1/4"-20 x 1.5" Screw (x8)
Counter-sunk Washer (x8)
Lift Bracket (x4)
1/4"-20 Flat Washer (x8)
1/4"-20 Lock Nut (x8)
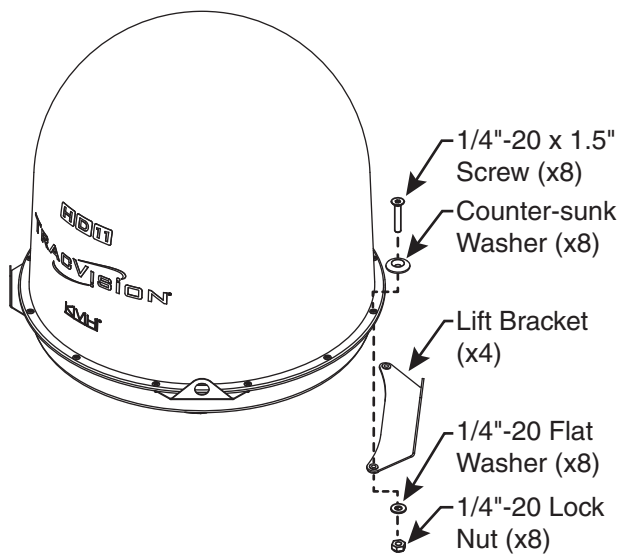
Figure 25 Radome Hardware

1/4"-20 x 7/8" Screw (x8)
Counter-sunk Washer (x8)
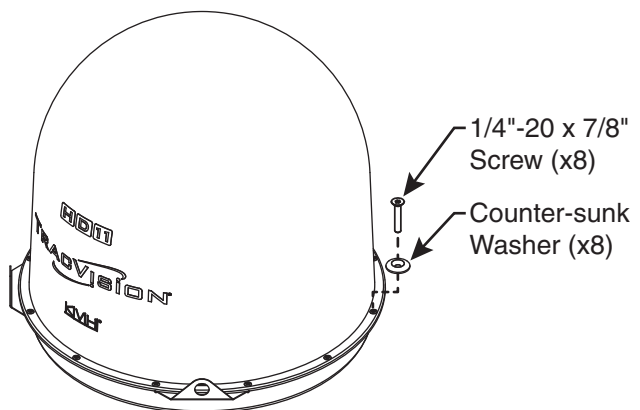
⑩ Mount Belowdecks Equipment

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

ACU Rack Mounting

a. Attach the strain-relief bracket to the ACU, as shown in Figure 26. Using a #1 Phillips screwdriver, secure the bracket in place using four #6-32 screws and #6 washers (supplied in the kitpack).

b. Secure the ACU to the rack using four M6 screws and washers (see Figure 27).

ACU Horizontal Mounting

a. Using a #1 Phillips screwdriver, remove the six #6-32 screws securing the rack mounting brackets to the ACU (see Figure 28).

b. 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 29). You can attach the brackets to either the top or bottom of the ACU, depending on your desired mounting location.

c. If you are mounting the ACU to the underside of a shelf, attach the strain-relief bracket to the ACU, as shown in Figure 26. 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.

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

Figure 26 ACU Strain Relief Bracket

#6-32 Screw (x4)   #6 Washer (x4)   Strain-Relief Bracket
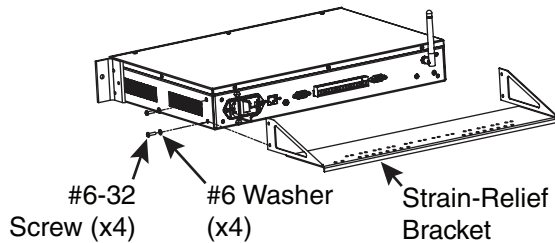
Figure 27 ACU Rack Mounting

Mounting Hole (x4)

M6 Screw and Washer (x4)
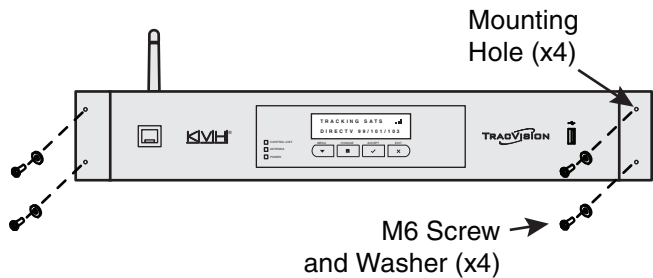
Figure 28 ACU Rack Mounting Bracket Removal

Rack Mounting Bracket (x2)
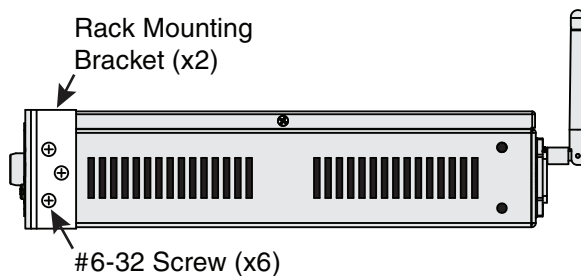
#6-32 Screw (x6)

Figure 29 Horizontal Mounting Brackets

Horizontal Mounting Bracket (x2)

#6-32 Screw and #6 Washer (x4)
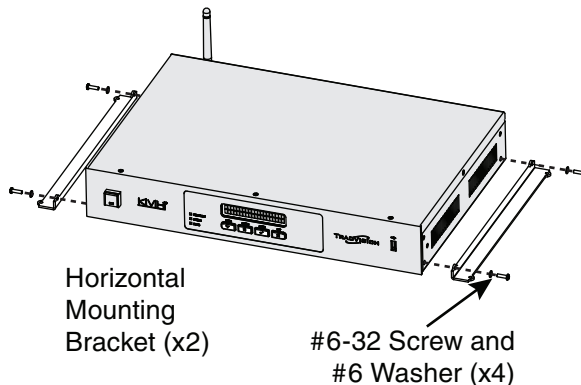
⑩ Continued Mount the Belowdecks Equipment

Joint ACU/SmartSwitch Rack Mounting

a. Using a #1 Phillips screwdriver, remove the six #6-32 screws securing the rack mounting brackets to the ACU (see Figure 28 on page 19).

b. Remove the six #6-32 screws securing the rack mounting brackets to the SmartSwitch (see Figure 30).

c. Attach the joint rack mounting brackets to the ACU and SmartSwitch, as shown in Figure 31. Secure the brackets in place using twelve #6-32 screws and #6 washers (supplied in the kitpacks).

d. Attach the strain relief bracket and retaining straps, as shown in Figure 31. 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.

e. 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 30 SmartSwitch Rack Mounting Bracket Removal
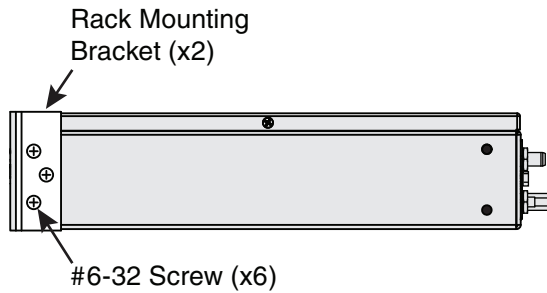
Figure 31 ACU/SmartSwitch Joint Assembly
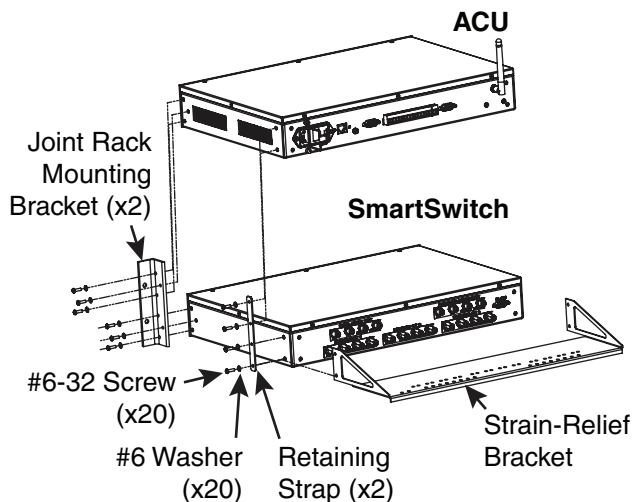
⑪ Wire Belowdecks Equipment

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 32). 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 33).

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 34).

Figure 32 Cable Jacket Removal

Figure 33 Cable Braid Bulge/Cutting

Figure 34 Drain Wire/Foil/Fiber Removal

Drain Wire

Foil

Fiber
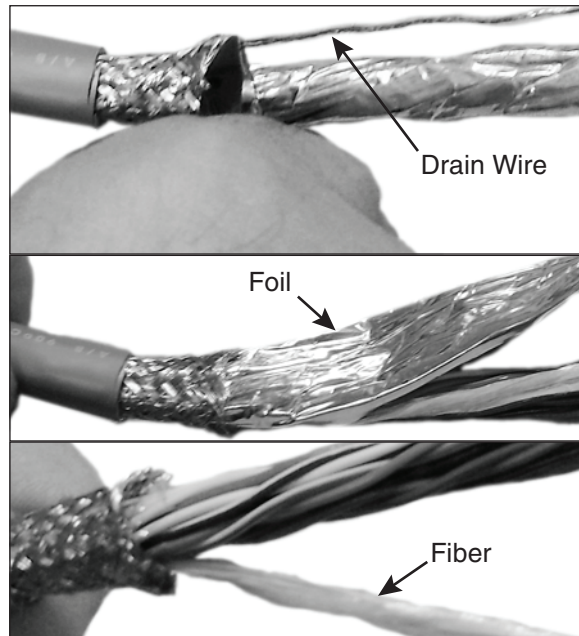
e. Thread the power/data cable through the supplied grounding sleeve. Position the grounding sleeve by aligning the end of its ground wire with the ends of the other wires in the cable (see Figure 35).

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 36).

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 36).

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 37).

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 38).

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 35 Grounding Sleeve Alignment
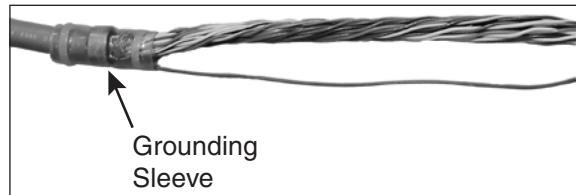
Grounding Sleeve

Figure 36 Completed Grounding Sleeve Installation

Seal   Solder Ring
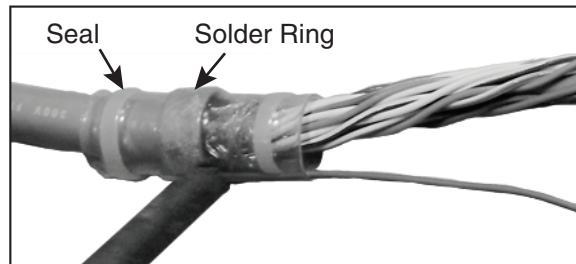
Figure 37 Heat Shrink Tubing
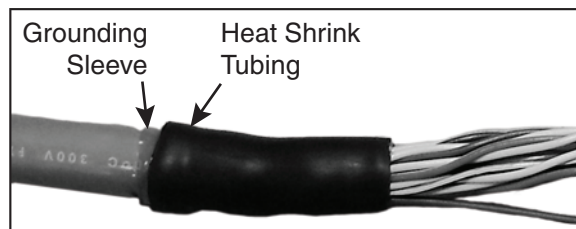
Grounding   Heat Shrink
Sleeve   Tubing

Figure 38 Ring Terminal

Ring
Terminal

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 39.

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 rear of the ACU (see Figure 39).

c. Connect the ring terminal of the grounding sleeve's ground wire to the grounding screw on the rear of the ACU (see Figure 39).

d. 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 39. 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.

b. Plug the terminal strip connector into the rear of the ACU (see Figure 39).

Figure 39 Power/Data Cable Wiring
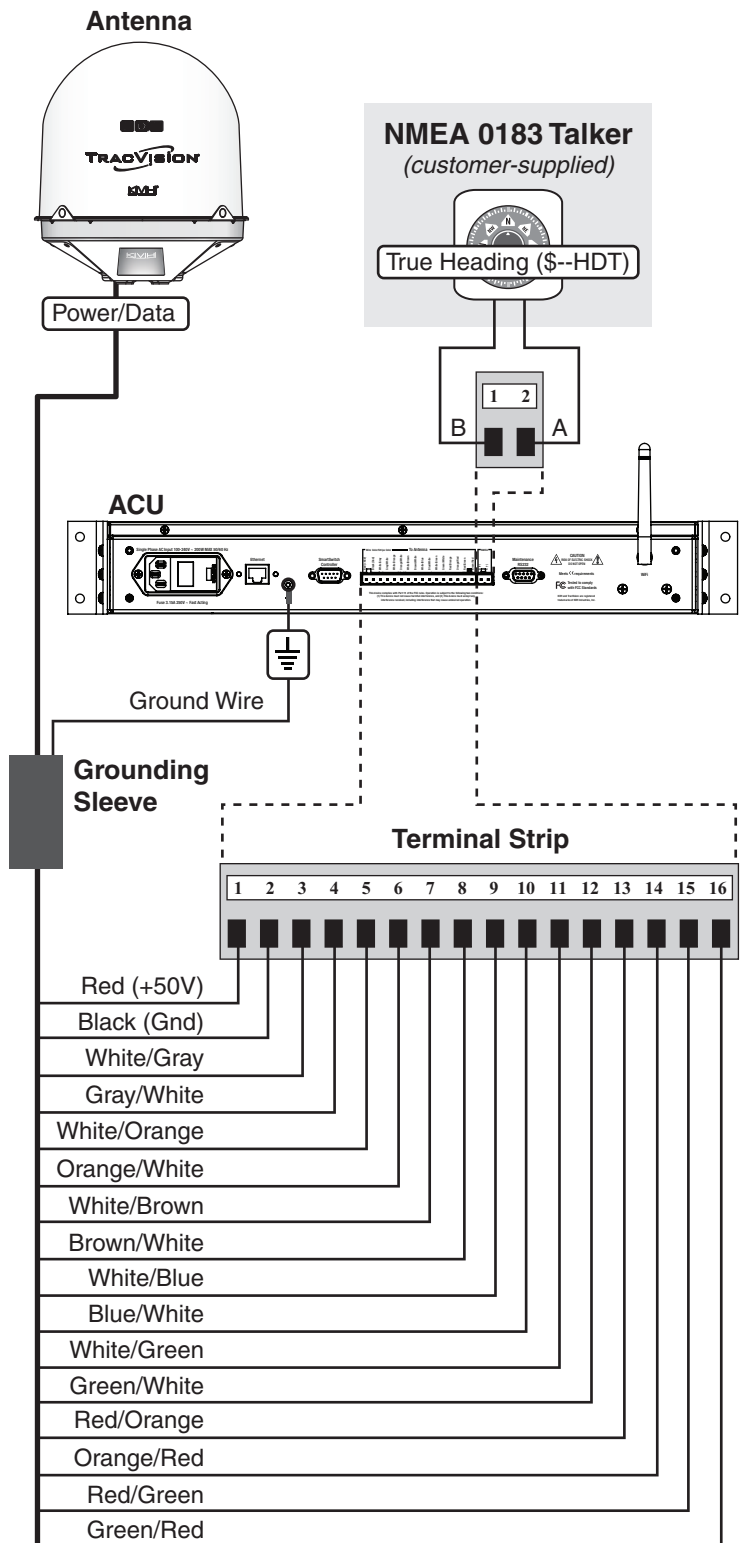
Connect Power, RF Cables, and Other Hardware

> **IMPORTANT!**
>
> Be sure to connect power according to the guidelines provided in "AC Power Requirements" on page 11, and ground the system according to the guidelines provided in "Grounding Requirements" on page 12.

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 Appendix A on page 29 to connect the antenna's RF cables as required**.

Figure 40 RF Cable Wiring Overview

Antenna

18V

13V

18V/ 22KHz

13V/ 22KHz
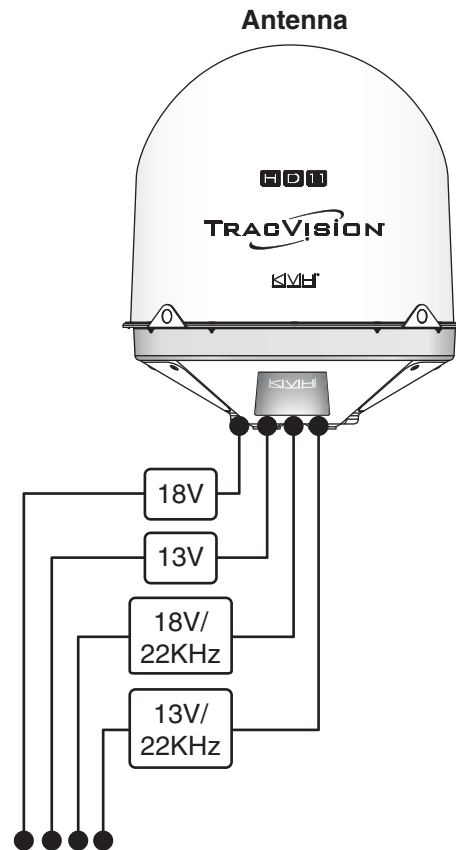
Connect to:
• SmartSwitch
• Multiswitch (x4)
• Multiswitch (x8)
• Multiswitch (x16)
• Multiswitch (x32)
• Single Wire Multiswitch (SWM)
• SWM Expander (x16)
• SWM Expander (x32)

⑫ Launch the Setup Wizard

Follow the steps below to connect each ACU to the vessel's onboard network and launch the TracVision HD11 Setup Wizard.

Connect the ACU(s) to the Network

Connect to the vessel's onboard network using the ACU's Ethernet port located on the rear of the ACU (see Figure 41).

NOTE: Alternatively, you can connect to the network using a wireless connection.

NOTE: When setting up a wireless network, be sure to apply security settings, such as encryption, to protect the network from outside intrusion. If the network is not secure, outsiders within range of the wireless network might use the wireless connection without your knowledge.

Launch the Setup Wizard

Follow the steps below to log into each ACU and configure the system using the Setup Wizard.

> **IMPORTANT!**
>
> If you are installing two antennas, launch the Setup Wizard while logged into ACU B (the ACU connected to Antenna B) first. Be sure to configure ACU B to use a static IP address.

a. Press the power button on the front of the ACU to apply power to the TracVision system. Then wait 1 minute for system startup.

b. Open the web browser on a PC connected to the same network. Then type the ACU's serial number (recorded in the Installation Worksheet) into the browser's address bar, as shown below:

http://hd11-<ACU serial number>.local

NOTE: For example, if the serial number was 123456789, you would enter the following into the browser's address bar: http://hd11-123456789.local

Figure 41 ACU Network Connection Options
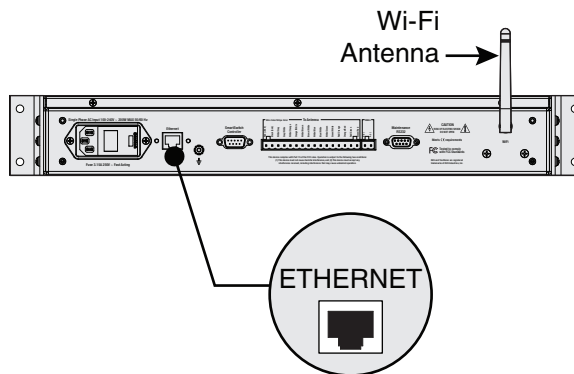
Figure 42 ACU Power Button
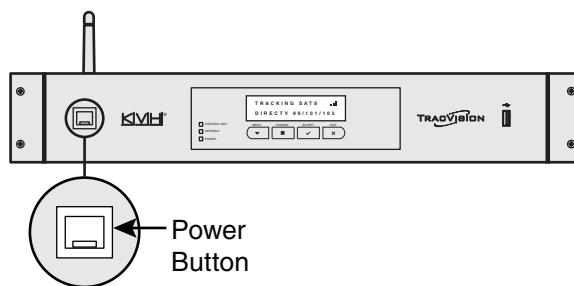
c. Log into the web interface:

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

d. Follow the Setup Wizard's onscreen instructions to configure system settings. Be sure to record required information in the Installation Worksheet as you proceed through the Setup Wizard.

e. If you are installing two antennas, repeat these steps to log into and configure ACU A.

Figure 43 Setup Wizard

⑬ 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 boat masts.

- 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.

- 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 instructions and troubleshooting information.

- You can use the TracVision HD11 iPhone®/iPod touch® app or the TracVision HD11 iPad® app to communicate with the TracVision system (see Figure 45). You can download these apps for free at the Apple iTunes® store.

Figure 44 Example of Blockage
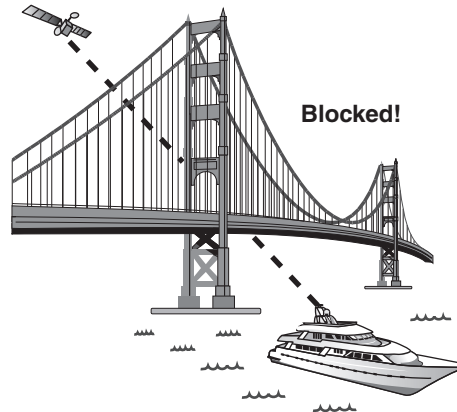
Figure 45 KVH TracVision HD11 iPhone/iPad/iPod touch Apps

Ⓐ Wiring Diagrams

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

> **IMPORTANT!**
>
> Unless specified otherwise, receivers/DVRs in the following wiring diagrams are not SWM-compatible.

Wiring SWM and Non-SWM Hardware

Only DIRECTV programming in North America supports SWM-compatible receivers and DVRs (see Figure 46). All linear receivers/DVRs and other circular receivers/DVRs are not SWM-compatible.

NOTE: Additional SWM-compatible receivers/DVRs might become available at any time. If your receiver or DVR model is not listed here, check its manual to see if it is SWM-compatible.

Basic Diagram

Wiring One Antenna/ACU with up to 32 Tuners (see page 30)

SmartSwitch Input Wiring Diagrams

- One Antenna/ACU (see page 31)

- Two Antennas/ACUs (see page 32)

SmartSwitch Output Wiring Diagrams

- Overview (see page 33)

- 32 Non-SWM-compatible Tuners (see page 34)

- 16 SWM-compatible Tuners and 32 Non-SWM-compatible Tuners (see page 35)

- 32 SWM-compatible Tuners and 32 Non-SWM-compatible Tuners (see page 36)

Figure 46 SWM-Compatible Receivers/DVRs

Receivers	DVRs
H20	HR21, HR21 Pro
H21	HR22
H22	HR23
H23	HR24
H24	HR34/HMC*
H25	R16
D12	R20
D13	R22

*NOTE: Unlike other DVRs, the HR34 Home Media Center uses five tuners. Therefore, if you connect this DVR, be sure to reserve five tuners instead of two. Refer to the DVR's manual for complete wiring details.

Wiring One Antenna/ACU with up to 32 Tuners

Power/Data

13V/22KHz

18V

18V/22KHz

13V

18V/22KHz

13V

13V/22KHz

18V

Power Supply

32-Output Multiswitch

NOTE: Connections shown on this multiswitch also apply to 16-output and 8-output multiswitches

**Additional Receivers/DVRs
(up to 31 additional tuners)**

Receiver

Satellite In

ACU

Terminal Strip

Power

Network
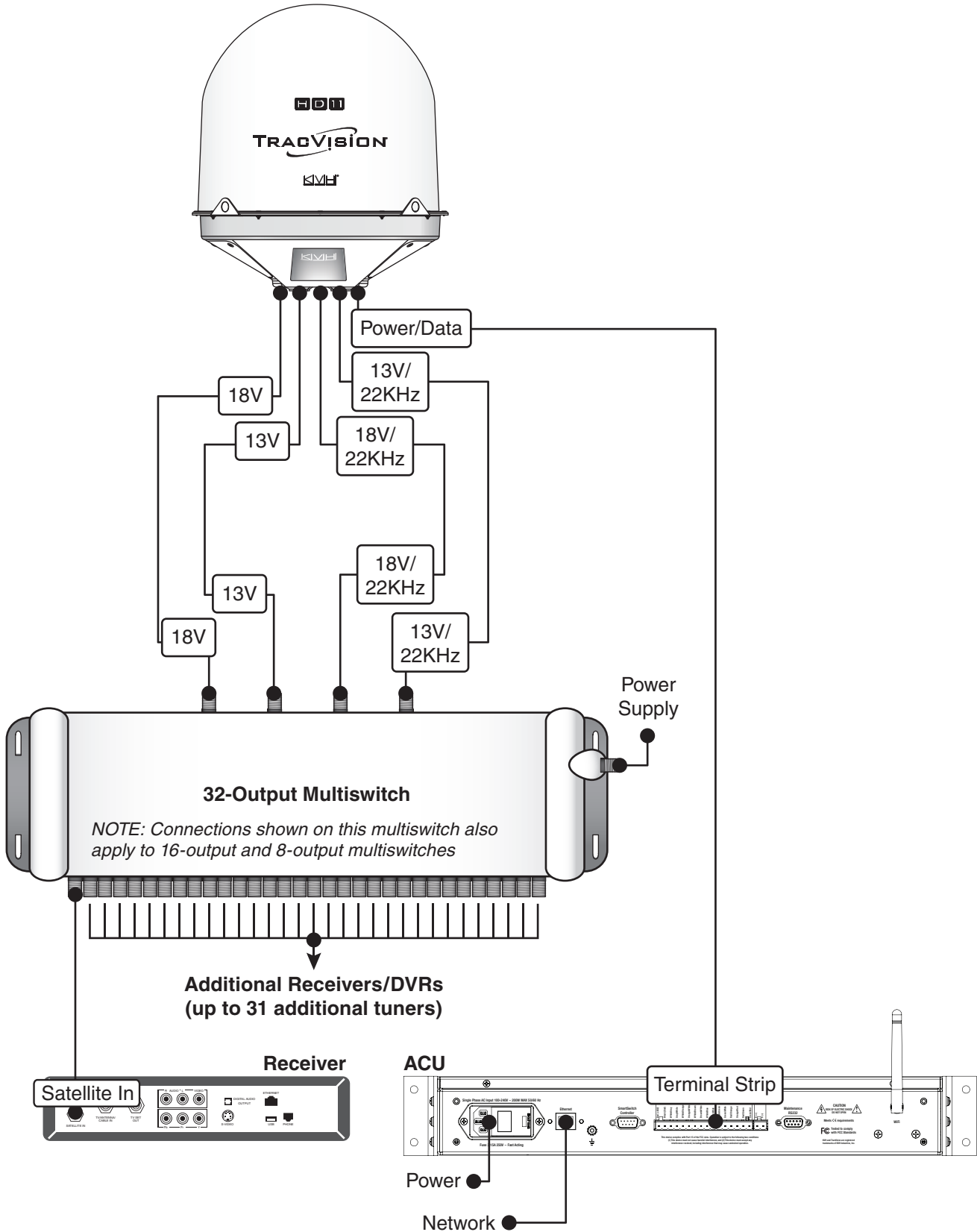
Wiring SmartSwitch Input: One Antenna/ACU

Antenna

18V

13V

18V/22KHz

13V/22KHz

Power/Data

Network

ACU

Terminal Strip

Power

SmartSwitch Controller

Ferrite Clamp

Connect Cable End with Ferrite Clamp to ACU

18V 13V 18V/22KHz 13V/22KHz

SmartSwitch

PORT/A ANTENNA INPUT
18V 13V 18V/22KHZ 13V/22KHZ

STARBOARD/B ANTENNA INPUT
18V 13V 18V/22KHZ 13V/22KHZ

TO ACU

MULTISWITCH OUT 1
18V 13V 18V/22KHZ 13V/22KHZ

MULTISWITCH OUT 2
18V 13V 18V/22KHZ 13V/22KHZ

MULTISWITCH OUT 3
18V 13V 18V/22KHZ 13V/22KHZ

To ACU

A Continued Wiring Diagrams

Wiring SmartSwitch Input: Two Antennas/ACUs
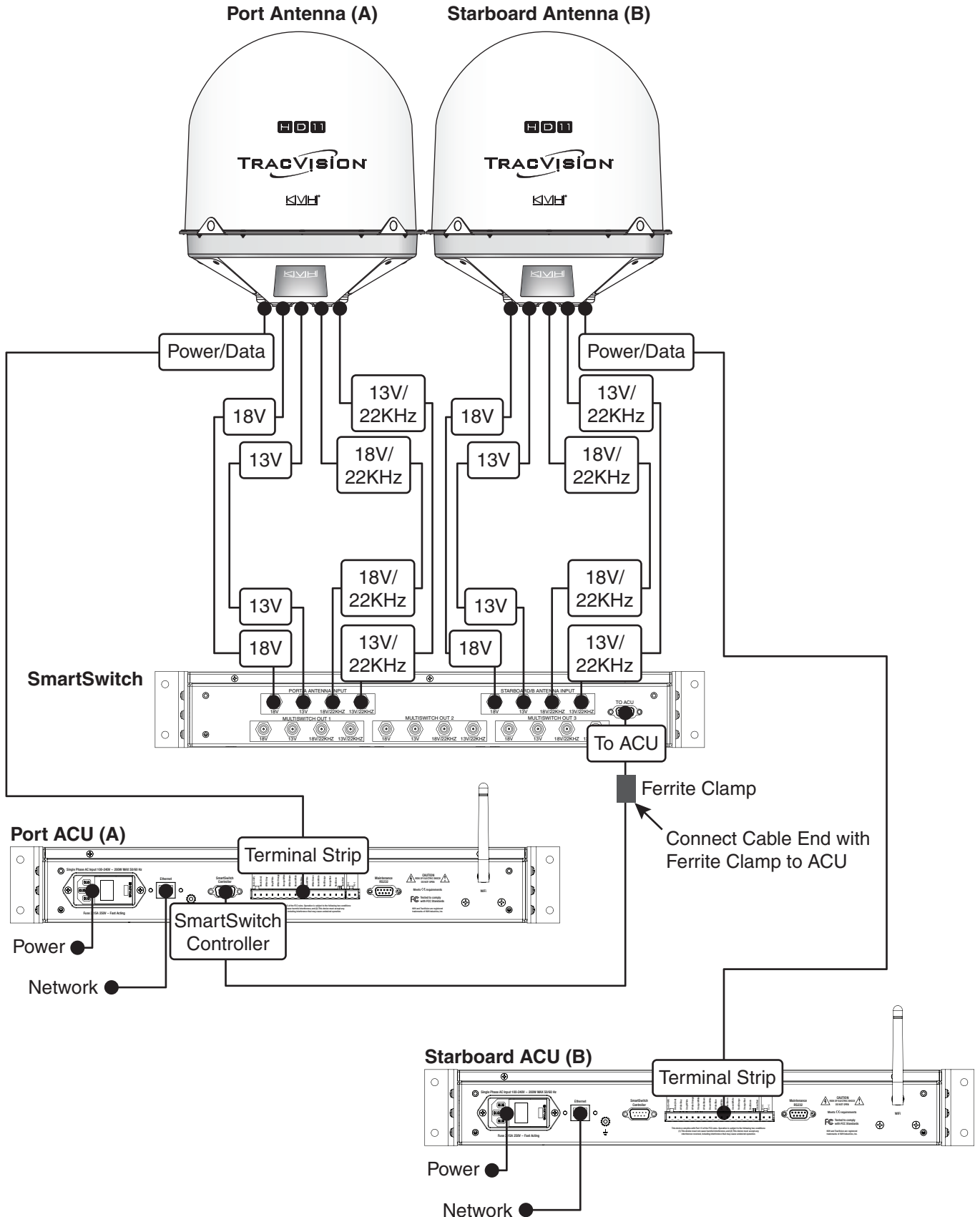
A Continued Wiring Diagrams

Wiring SmartSwitch Output: Overview

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

SmartSwitch

Multiswitch Out 1   Multiswitch Out 2   Multiswitch Out 3

Region/Service Provider #1

32-Output Multiswitch*

Power Supply

Non-SWM Receivers/DVRs
(Linear, DIRECTV Latin America, DISH Network, Bell TV, and legacy DIRECTV receivers)

Region/Service Provider #2

32-Output Multiswitch*

Power Supply

Non-SWM Receivers/DVRs
(Linear, DIRECTV Latin America, DISH Network, Bell TV, and legacy DIRECTV receivers)

DIRECTV SWM Hardware

16-Tuner SWM Expander**

SWM Power Inserter

SWM Power Inserter

8-Way Splitter

8-Way Splitter

SWM Receivers/DVRs

SWM Receivers/DVRs

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

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

33

Wiring SmartSwitch Output: 32 Non-SWM-compatible Tuners

SmartSwitch

PORT/A ANTENNA INPUT

STARBOARD/B ANTENNA INPUT

18V 13V 18V/22KHZ 13V/22KHZ

TO ACU

MULTISWITCH OUT 1

MULTISWITCH OUT 2

MULTISWITCH OUT 3

18V 13V 18V/22KHZ 13V/22KHZ

18V 13V 18V/22KHZ 13V/22KHZ

18V 13V 18V/22KHZ 13V/22KHZ

18V 13V

13V/
22KHz

18V/
22KHz

18V 13V

18V/
22KHz

13V/
22KHz

Power
Supply

32-Output Multiswitch

NOTE: Connections shown on this multiswitch also apply to 16-output and 8-output multiswitches

Additional Receivers/DVRs

Receiver

Satellite In

L AUDIO R VIDEO

DIGITAL AUDIO OUTPUT

ETHERNET

SATELLITE IN

TV/ANTENNA/ CABLE IN

TV SET OUT

S-VIDEO

USB PHONE

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

16-Tuner SWM Expander

Legacy 1

Legacy 2

SWM1/PWR

SWM1/PWR

Optional - To SWM Power Inserter/8-Way Splitter

Refer to the instructions in the SWM Expander Kit for complete wiring information

24 VDC IN — Power to SWM

18V — Sat 99°/101° | 13V | 18V/22KHz Sat 103°/110°/119° | SWM-E2 | 13V/22KHz Sat 103°/110°/119° | Flex Port 1 | Flex Port 2

Input | Input

Splitter | **Splitter**

Out | Out | Out | Out

18V | 13V | 13V/ 22KHz

18V/ 22KHz

SmartSwitch

PORT/A ANTENNA INPUT | STARBOARD/B ANTENNA INPUT | TO ACU
18V | 13V | 18V/22KHz | 13V/22KHz | 18V | 13V | 18V/22KHz | 13V/22KHz
MULTISWITCH OUT 1 | MULTISWITCH OUT 2 | MULTISWITCH OUT 3

18V | 13V/ 22KHz

13V | 18V/ 22KHz

SWM | IRD

18V | 13V | 18V/ 22KHz | 13V/ 22KHz

Power Supply

SWM Power Inserter

Vessel AC Power

32-Output Multiswitch

NOTE: Connections shown on this multiswitch also apply to 16-output and 8-output multiswitches

8-Way Splitter

Satellite In (SWM-1) | **DIRECTV SWM Receiver**

Non-SWM Receivers/DVRs
(Linear, DIRECTV Latin America, DISH Network, Bell TV, and legacy DIRECTV receivers)

✓

Supports up to 7 Additional Tuners
Each SWM Receiver = 1 Tuner
Each DVR = 2 Tuners

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

32-Tuner SWM Expander

Legacy 1

Legacy 2

SWM1/PWR

SWM1/PWR

Optional - To SWM Power
Inserter/8-Way Splitter

Optional - To SWM Power
Inserter/8-Way Splitter

*Refer to the
instructions in the
SWM Expander Kit
for complete wiring
information*

18V 13V 13V/22KHz

18V/22KHz

Legacy 2

Legacy 1

SWM1/PWR

SWM1/PWR

Optional - To SWM Power
Inserter/8-Way Splitter

SmartSwitch

18V

13V/22KHz

13V 18V/22KHz

SWM   IRD

18V 13V 18V/22KHz 13V/22KHz

Power
Supply

**SWM
Power
Inserter**

Vessel
AC Power

32-Output Multiswitch

*NOTE: Connections shown on this multiswitch also
apply to 16-output and 8-output multiswitches*

8-Way Splitter

Satellite In
(SWM-1)

**DIRECTV
SWM Receiver**

Non-SWM Receivers/DVRs
(Linear, DIRECTV Latin America, DISH Network,
Bell TV, and legacy DIRECTV receivers)

✓

Supports up to 7 Additional Tuners
Each SWM Receiver = 1 Tuner
Each DVR = 2 Tuners

Ⓑ ACU Menu Overview

ACU

MENUS
▼

ABOUT SYSTEM?	CHANGE SATELLITES?	SYSTEM SETTINGS?	TECHNICIAN TOOLS

ABOUT SYSTEM?

VIEW SERIAL NUMBERS?
- ANTENNA
- ACU

VIEW ENET SETTINGS?
- STATE
- IP ADDRESS
- SUBNET MASK
- GATEWAY

VIEW WI-FI SETTINGS?
- MODE
- STATE
- SSID
- IP ADDRESS
- SUBNET MASK
- GATEWAY
- SECURITY
- KEY/PASSWORD

VIEW SOFTWARE INFO?
- SYSTEM
- OPERATING SYSTEM

VIEW POWER INPUT?
- ANTENNA VDC
- ACU VDC

CHANGE SATELLITES?

FAVORITE SATELLITES?

DISPLAY ALL FAVORITES

N. AMERICAN REGION?
- VIEW ENABLED
- VIEW ALL

C/S AMERICAN REGION?
- VIEW ENABLED
- VIEW ALL

EUROPEAN REGION?
- VIEW ENABLED
- VIEW ALL

AFRICAN REGION?
- VIEW ENABLED
- VIEW ALL

ASIAN REGION?
- VIEW ENABLED
- VIEW ALL

AUSTRALIAN REGION?
- VIEW ENABLED
- VIEW ALL

SYSTEM SETTINGS?

ADJUST BRIGHTNESS?

MODIFY LCD BRIGHTNESS
(LOW, MEDIUM, HIGH)

ETHERNET SETTINGS?
- STATE
- IP ADDRESS
- SUBNET MASK
- GATEWAY

WI-FI SETTINGS?
- MODE
- STATE
- IP ADDRESS
- SUBNET MASK
- GATEWAY
- SECURITY
- KEY/PASSWORD

UPON SMARTSWITCH DETECTION

SMARTSWITCH GROUPS?

SELECT ACTIVE RECEIVER
GROUP (OUTPUT 1, 2, 3)

UPON SMARTSWITCH DETECTION

ANTENNA SELECTION
- DISPLAY ACTIVE ANTENNA
- MODE SELECTION
- ANTENNA SELECTION

TECHNICIAN TOOLS

VIEW EVENT LOG?

DISPLAYS SYSTEM EVENTS

CALIBRATE GYROS?

RECALIBRATES GYROS

RELOAD SOFTWARE?

RELOAD S/W FROM SD CARD

RESET TO DEFAULTS?
- RESET SAT PARAMS
- RESET NETWORK SETTINGS

UPON USB DETECTION

UPDATE SYSTEM SW?

CONFIRM S/W FILE UPDATE

UPDATE SAT FILE?

CONFIRM S/W FILE UPDATE

KVH