

KVH Industries, Inc.

TracVision® TV3



Installation Guide

TracVision TV3 Installation Guide

This guide explains how to install the TracVision TV3 satellite TV antenna system on a vessel. Operation instructions are provided in the Quick Start Guide.

Installation Steps

1. Inspect Parts and Get Tools	3	11. Wire the Receivers.....	13
2. Plan the Antenna Installation.....	4	12. Connect a NMEA Device	18
3. Plan the TV-Hub Installation.....	5	13. Connect to a Network.....	19
4. Prepare the Antenna Site.....	6	14. Secure the Wi-Fi Connection	20
5. Prepare the RF Cables.....	7	15. Connect Power.....	21
6. Wire the Antenna	8	16. Turn On the System	23
7. Remove the Shipping Restraint.....	9	17. Set Up the System.....	24
8. Mount the Antenna.....	10	18. Set the LNB Skew Angle	28
9. Mount the TV-Hub.....	11	19. Educate the Customer.....	29
10. Wire the TV-Hub.....	12		

Appendices

A. Wiring Diagrams.....	30	B. Connecting IP AutoSwitches.....	35
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Who Should Install the System?

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

Technical Support

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

Europe, Middle East, Africa, Asia-Pacific

Phone: +45 45 160 180

E-mail: support@emea.kvh.com

(Mon.-Thu., 8 am-4:30 pm, +1 GMT)

(Fri., 8 am-2 pm, +1 GMT)

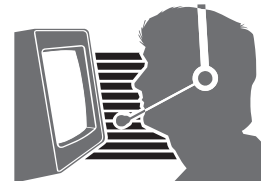
North/South America, Australasia

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(Sat., 9 am-2 pm ET, -5 GMT)



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Important Safety Information



This icon indicates a danger, warning, or caution notice. Be sure to read these carefully to avoid injury.



WARNING

Risk of Electric Shock

To avoid electric shock, do not open the TV-Hub chassis enclosure. There are no user-serviceable parts inside.



WARNING

Risk of Electric Shock

If any component of the TracVision system becomes damaged and/or no longer functions normally, disconnect it from vessel power, secure it from unintended operation, and contact KVH Technical Support (see [“Technical Support” on page 1](#)). All repairs or modifications must be performed by a trained, KVH-certified technician. If you are a KVH-certified technician, you still must contact KVH Technical Support prior to conducting any repairs or modifications to the equipment.



WARNING

Risk of Explosion

Do not operate the TV-Hub (or any other electrical device) in an environment where flammable gases, vapors, or dusts are present. In addition, do not operate the TV-Hub in an environment with a temperature outside its 5° F to 131° F (-15° C to 55° C) temperature range.



WARNING

Risk of Electric Shock

Failure to ground the TracVision system properly to ship's ground will cause an unsafe floating ground condition, risking potentially lethal electric shock. See [“Connect Power” on page 21](#) for details on the proper grounding of the equipment.

1 Inspect Parts and Get Tools

Before you begin, follow the steps below to ensure you have everything needed to complete the installation.

IMPORTANT!

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

- a. Unpack the box and ensure it contains everything shown on the Kitpack Contents List. Save the packaging for future use.
- b. Carefully examine all of the supplied parts to ensure nothing was damaged in shipment.
- c. Gather the tools and materials listed below. You will need these items to complete the installation.
 - Flat-head and Phillips-head screwdrivers
 - Electric drill and 5/16" (8 mm) and 1/8" (3 mm) drill bits
 - 3" (80 mm) hole saw
 - 10 mm socket wrench
 - 7/16" open-end torque wrench set to 20 in.-lbs (2.25 N-m)
 - 7/16" open-end torque wrench set to 15 in.-lbs (1.7 N-m)
 - Torque wrench and 2 mm Allen hex key
 - Light hammer and center punch, adhesive tape, and scribe or pencil
 - RG-6 or RG-11 RF coax cable(s), with "F" connectors, and termination tools (see [page 7](#))
 - Silicone sealant or equivalent
 - Satellite TV receiver(s)/DVRs for your desired service (see Figure 2)
 - Wi-Fi-enabled laptop PC with the latest TracVision software and satellite library downloaded from the KVH Partner portal (www.kvh.com/partners), or iPhone®/iPad® with the latest downloads through the TracVision TV/RV App

Figure 1: TracVision TV3 System Components

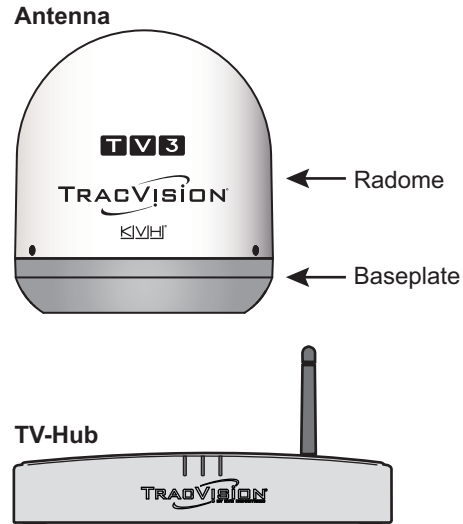


Figure 2: KVH-Validated Receivers

Linear	
For information on the recommended receivers for linear service, contact your local KVH dealer/distributor. Go to www.kvh.com/wheretogetservice to find a dealer/distributor near you.	
DIRECTV*	DISH Network*
H20	311
H21	211
H22	211k
H23	211z
H24	
H25	Bell TV*
HR21, HR21 Pro	6100
HH22	6131
HR23	6400
HR24	
HR34	
HR44	

* List is subject to change. For information on connecting different receiver models, contact KVH Technical Support.

2 Plan the Antenna Installation

Before you begin, consider the following antenna installation guidelines.

IMPORTANT!

Be sure to follow the guidelines below. Damage caused by an improper installation is not covered under KVH warranty.

- Minimize blockage. The antenna requires a clear view of the sky to receive satellite TV (see Figure 3). The fewer obstructions, the better the system will perform.
- KVH requires that you do not mount the antenna on the same level as the radar, because the radar's energy may damage the LNB. Ideally, you should mount the antenna 3 ft (1 m) away from and above or below the 15° radar beam path (see Figure 4).
- Make sure the mounting surface is wide enough to accommodate the antenna's base (see Figure 5). Also make sure it is flat, level (within $\pm 1^\circ$), strong enough to support the antenna's weight, and rigid enough to prevent antenna vibration.
- Select a location that is as close as possible to the intersection of the vessel's fore-and-aft centerline and midships.
- Be sure to mount the antenna near enough to the TV-Hub to allow you to connect the 50 ft (15 m) coax cable between them, while still maintaining sufficient slack in the cable.

NOTE: If you need to use a longer cable, use an RG-6 (75 Ω) cable that does not exceed 100 ft (30 m) in length, or an RG11 (75 Ω) cable that does not exceed 200 ft (60 m) in length (see "Prepare the RF Cables" on page 7).

Figure 3: Blockage from Obstruction

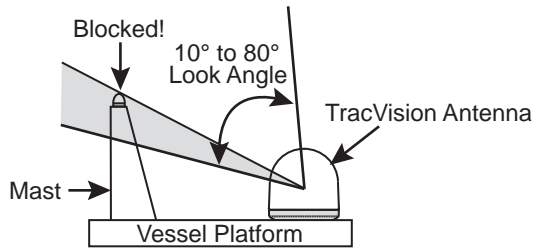


Figure 4: Distance from Radar

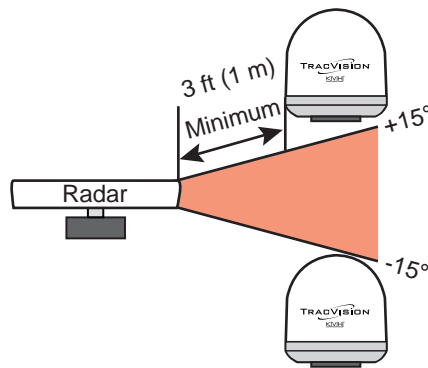
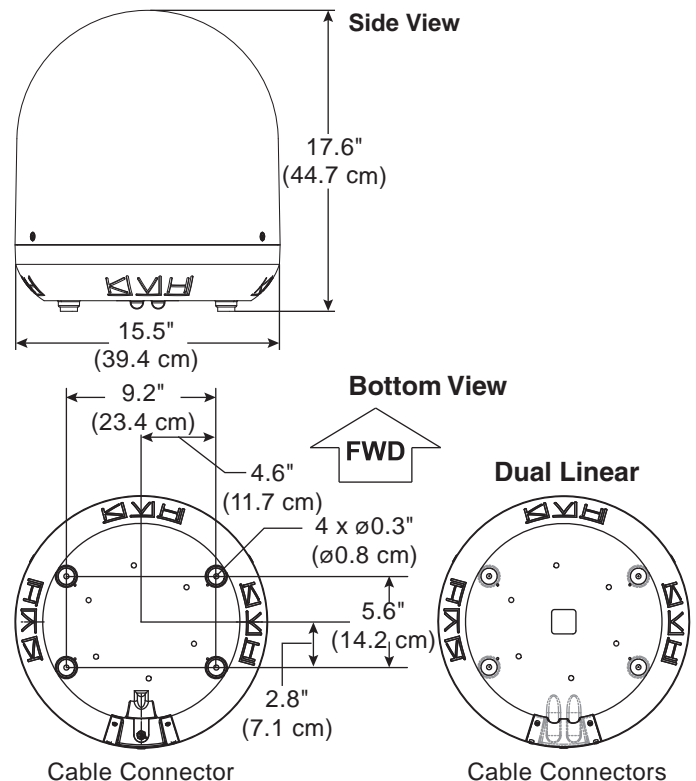


Figure 5: Antenna Dimensions



3 Plan the TV-Hub Installation

Consider the following TV-Hub installation guidelines.

- Select a mounting location in a dry, well-ventilated area belowdecks away from any heat sources or salt spray.
- Do not install the TV-Hub in an area surrounded by metal or near any electrical devices that emit RF noise.
- The TV-Hub can be mounted horizontally or vertically on a flat surface (see Figure 6 and Figure 7). This includes mounting on a ceiling or in a rack.
- Ideally, the TV-Hub LED lights will be easily visible to the user.
- Select a location that will provide adequate clearance for the TV-Hub dimensions (see Figure 6 and Figure 7).
- Leave enough room behind the rear panel (horizontal mount) or below the rear panel (vertical mount) to accommodate connecting the cables and making service loops within the proper bend radius.
- If you plan to use the TV-Hub's Wi-Fi connection, ensure the TV-Hub mounting location provides adequate Wi-Fi reception.
- If you plan to connect the TV-Hub to the vessel LAN, choose a location that takes Ethernet connection into consideration.

NOTE: A template showing the exact locations of the TV-Hub mounting holes and the dimensions between them is provided in the Welcome Kit. Installation details are provided in ["Mount the TV-Hub" on page 11](#).

Figure 6: TV-Hub Dimensions - Horizontal Orientation

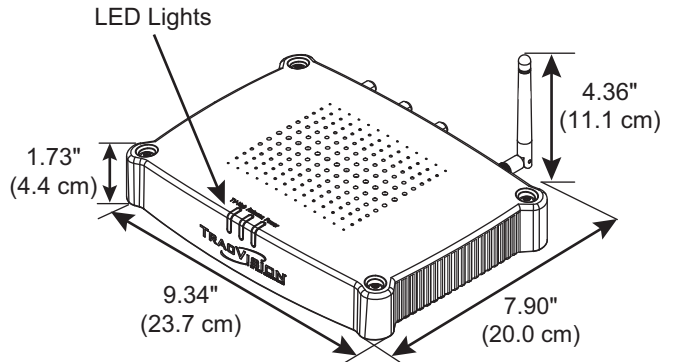
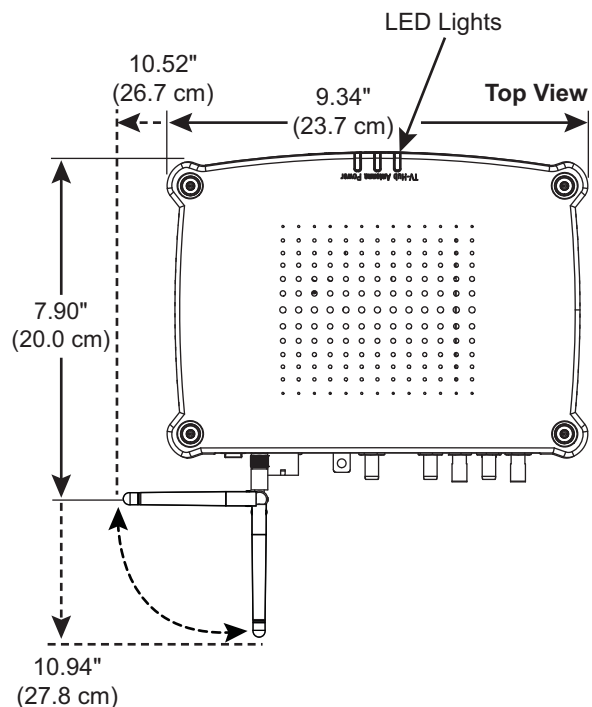


Figure 7: TV-Hub Dimensions - Vertical Orientation



4

Prepare the Antenna Site

Once you have identified a suitable antenna mounting site, according to the guidelines provided on [page 4](#), follow these steps to drill the mounting holes and cable access hole to prepare the site for installation.

- Unfold the antenna mounting template (supplied in the Customer Welcome Kit) and place it onto the mounting surface. Make sure the "FWD" (forward) arrow points toward the bow and is **parallel** to the vessel's centerline (see Figure 8). Tape in place.

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

- Using the template and a light hammer and center punch, mark the locations for the four mounting holes.
- Drill a 5/16" (8 mm) hole at the four mounting hole locations you marked in Step b. Later, you will insert four 1/4"-20 bolts through these holes to secure the antenna to the mounting surface.
- Mark a location for the cable access hole, either in the center of the antenna mounting hole pattern or in an area aft of the antenna. Later, you will route the antenna cable through this hole and into the vessel.
- Using a hole saw, drill the cable access hole in the location you marked in Step d. Be sure to size the hole approximately to maintain a cable bend radius of at least 3" (75 mm). If the hole location is in the center of the antenna mounting hole pattern, the diameter of the cable access hole must not exceed 3.5" (88 mm). Smooth the edges of the hole to protect the cables. Later, you will route the RF cable(s) through this hole and into the vessel.
- Clean and dry the antenna mounting surface.
- Peel off the paper backing from the supplied foam seal to expose the adhesive. Then press the foam seal down firmly onto the mounting surface, centered between the antenna mounting holes (see Figure 9).

Figure 8: Antenna Mounting Holes Layout

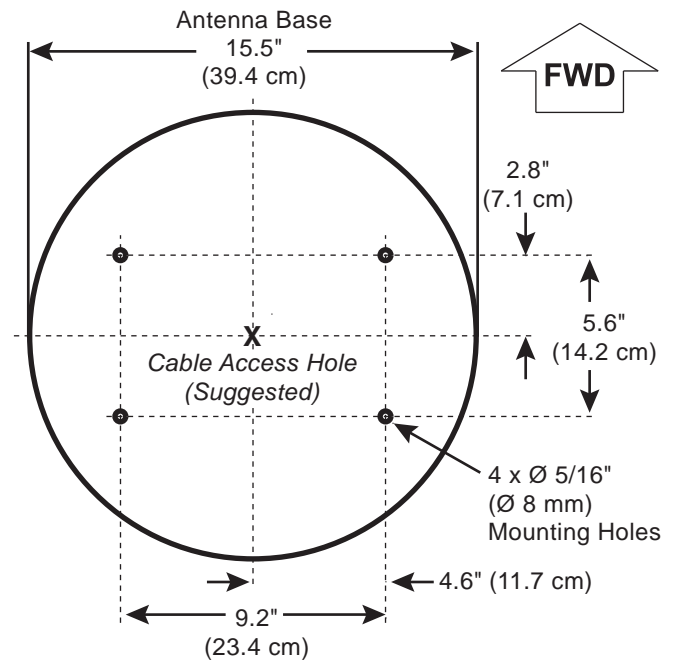


Figure 9: Foam Seal



5 Prepare the RF Cables

Follow the steps below before you begin wiring the antenna.

- a. Determine the number of RF coax cables you need to connect to the antenna for your particular installation (see Figure 10).

NOTE: A system with a dual linear LNB requires an additional 50 ft (15 m) RG-6 RF cable with a sealing boot (KVH part no. 32-0819-50). Spare right-angle connectors and right-angle boot extensions are supplied in the kit.

- b. Determine the type of RF cable(s) and connectors required for any RF cables required in addition to what is supplied in the antenna kit (see Figure 11). Then follow the guidelines below to select and prepare the antenna's RF cable(s).

IMPORTANT!

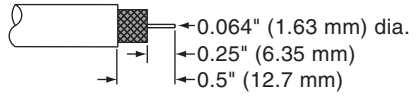
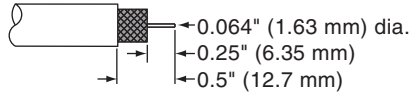
- RF cables must be rated for 75Ω, not 50Ω.
- Use of any cables not specified in Figure 11 will void the warranty.
- Low-quality, poorly terminated, or improperly installed RF cables are the most common cause of system problems. Terminate all RF cables with high-quality "F" connectors using the proper 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.

Figure 10: Number of RF Coax Cables to Connect to Antenna

Connecting to:	RF Cables
<i>System with Circular LNB</i>	
1 receiver	1
2 or more receivers	1*
<i>System with Single Linear LNB</i>	
1 receiver	1
<i>System with Dual Linear LNB</i>	
2 receivers	2

* Multiswitch may be required.

Figure 11: RF Cable Requirements

Up to 100 ft (30 m) Cable Run	
Cable	RG-6 (KVH part no. 32-0417-0100)
Connector	Thomas & Betts SNS1P6 (KVH part no. 23-0170)
Tools	Augat IT1000 (KVH part no. 19-0242)
Strip Lengths	
Up to 200 ft (60 m) Cable Run	
Cable	RG-11 (KVH part no. 32-0566-0200)
Connector	Thomas & Betts SNS11AS (KVH part no. 23-0213)
Tools	Thomas & Betts CST596711, L3011B (KVH part no. 72-0493)
Strip Lengths	

Note: LMR-400-75 is a suitable substitute.

6 Wire the Antenna

Follow the steps below to wire the antenna.

- a. Using the supplied 3 mm Allen hex key, remove the connector cover from the antenna's base (see Figure 12). Save the cover and the four M4 cap screws for later use.
- b. Route the antenna cable belowdecks through the cable access hole, keeping the end of the cable with the rubber sealing boot, shown in Figure 13, at the antenna site. Leave an adequate service loop, approximately 8" (20 cm) of slack, in the cables for serviceability.

NOTE: If you are routing the cable underneath the antenna, add a right angle connector and a right-angle boot extension onto the cable as shown in Figure 13.

- c. Clean and dry the connectors on the RF cable(s) and the underside of the antenna.
- d. Fill half of the inner body of an RF cable's connector with the supplied silicone grease.
- e. Connect and **SLOWLY** hand-tighten the RF cable to the "RF1" connector on the bottom of the antenna (for a dual linear TV3, see Figure 14 for the RF1 connector location), allowing the grease to diffuse and settle into the entire space within the connector.
- f. Make sure the RF cable is tightened all the way into the connector. Then tighten it with a 7/16" torque wrench set to 20 in-lbs, or a 7/16" wrench for 1/4 turn.
- g. Wipe off any excess grease from the outside of the connector.
- h. Mate the boot to the RF connector or boot extension covering the right-angle connector.
- i. If the antenna is a dual linear TV3, label both ends of each cable and repeat steps **b** through **h** to connect the second RF cable to the antenna's "RF2" connector.
- j. Seal the RF cable connections with silicone sealant or equivalent.
- k. Weatherproof and seal the cable access hole as required.
- l. Reinstall the connector cover.

Figure 12: Removing the Connector Cover

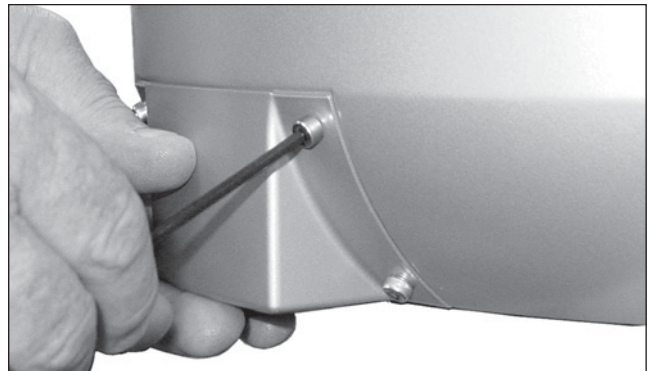


Figure 13: Rubber Boot Extension for Right-Angle Connector

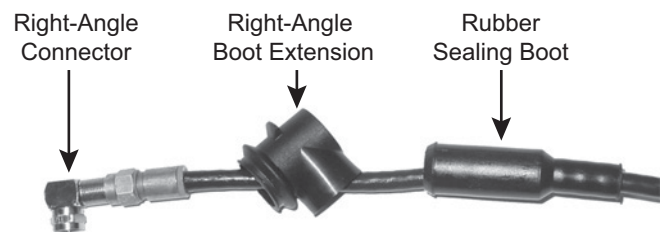
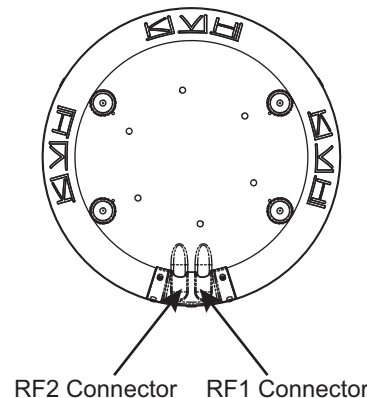


Figure 14: Connectors on Bottom of Dual Linear Antenna



7

Remove the Shipping Restraint

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

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

TIP: If you keep the radome topside, secure it with a lanyard to prevent it from falling overboard. Also, do not place the radome on a hot steel deck – the heat may warp the radome.

- b. Using a 10 mm socket wrench, remove the bolt, washer, tag, and spacer securing the antenna assembly to the baseplate (see Figure 16). Save this hardware for future use.

IMPORTANT!

Once you have removed the restraint, keep the antenna level as much as possible and handle the antenna very carefully. Prevent the internal antenna assembly from rotating freely within the baseplate to avoid damaging the limit switch.

Figure 15: Removing the Radome

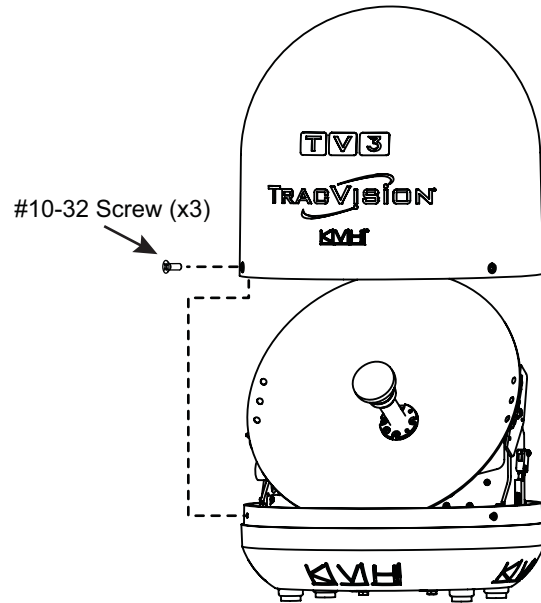
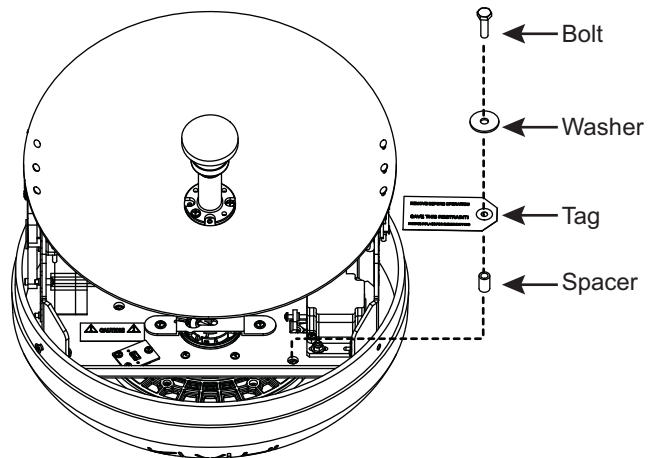


Figure 16: Shipping Restraint Hardware



8 Mount the Antenna

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

- a. Place the antenna baseplate over the holes drilled in the mounting surface. Ensure the "Forward" arrow inside the baseplate points toward the bow and is **parallel** to the vessel's centerline (see Figure 17). The antenna's base should rest squarely atop the foam seal.

IMPORTANT!

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

- b. Apply a thin layer of the supplied anti-seize lubricant to the threads of the four 1/4"-20 mounting bolts.



CAUTION

Observe the safety warnings printed on the 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."

- c. Secure the antenna's base to the mounting surface using four 1/4"-20 bolts, 5/8" washers, 1" washers, and 1/4"-20 lock nuts (see Figure 18).
- d. Tighten all four bolts until the four rubber feet on the baseplate are bottomed against the mounting surface and the foam seal is fully compressed.
- e. Reinstall the radome onto the antenna. Secure in place with the three #10-32 screws you removed on [page 9](#).
- f. Install a protective plastic screw cap (supplied in the kitpack) over each radome screw.

Figure 17: Forward Arrow in Antenna Baseplate

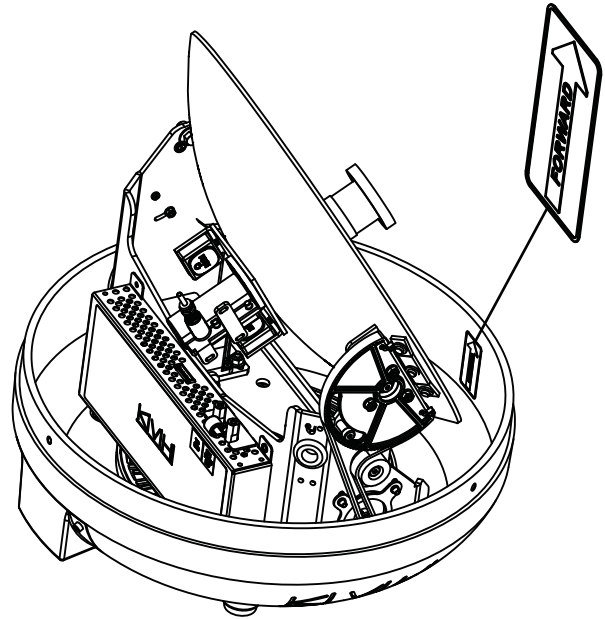
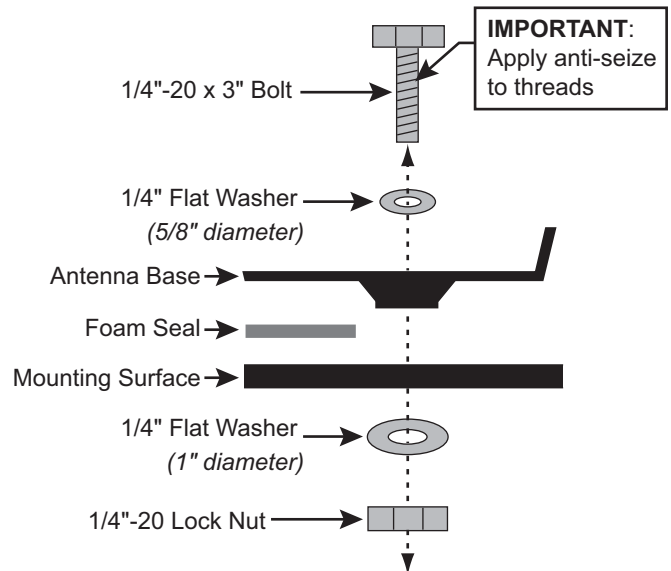


Figure 18: Mounting the Antenna (Side View)



9 Mount the TV-Hub

Follow these steps to install the TV-Hub inside the vessel:

- a. Tape the mounting template in the location selected for the TV-Hub. Punch holes at each of the two keyhole locations and at the mounting tab location.
- b. Remove the template.
- c. Drill a 1/8" (3 mm) hole at the three hole locations you marked in Step a.
- d. Install a #8 Phillips thread-forming screw partway into one of the keyhole holes leaving a small gap for hooking the TV-Hub onto it. Use the thickness (2.5 mm) of the M10 washer supplied in the kit as a gauge for the size gap to leave.
- e. Repeat step d for the other keyhole.
- f. Peel off the backing on the adhesive-backed washer (supplied in the kit) and place it over the mounting tab hole (see Figure 19).
- g. Align the wide part of the TV-Hub's keyholes, as shown in Figure 20, over the screws, then slide downwards to secure the screws into the narrow part of the keyholes.
- h. Press the rear mounting tab of the TV-Hub onto the adhesive washer and install the third #8 Phillips thread-forming screw in the mounting tab hole.

Figure 19: TV-Hub Mounting Template

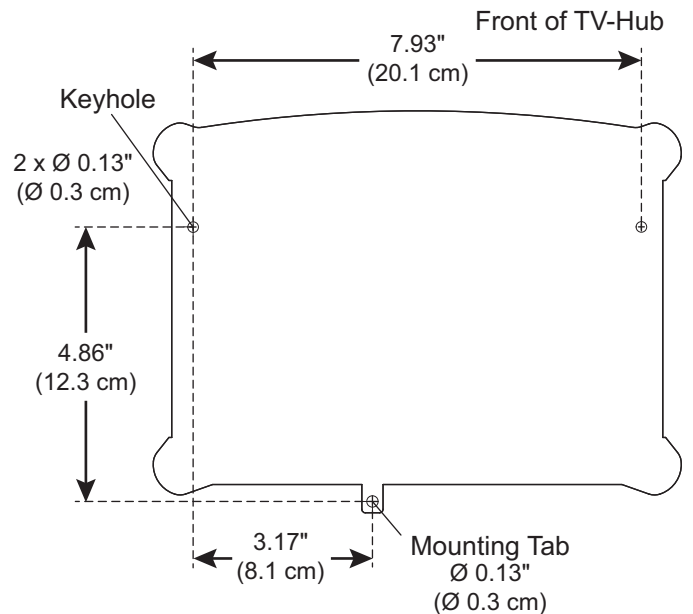
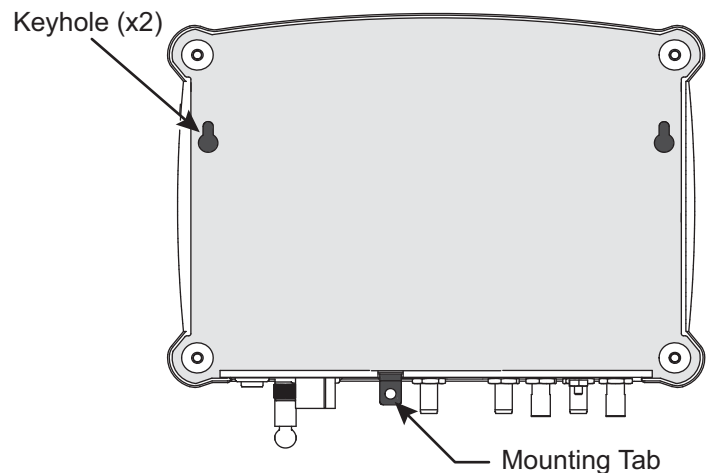


Figure 20: TV-Hub Keyholes and Mounting Tab



10 Wire the TV-Hub

Follow these steps to wire the TV-Hub.

Antenna

- a. Connect the RF1 cable from the antenna to the “Antenna” jack on the TV-Hub (see Figure 21).

IMPORTANT!

Do not connect anything other than the antenna to the “Antenna” jack. The “Antenna” jack has 42 VDC on it which will damage other devices such as multiswitches, DVRs, etc.

- b. Hand-tighten the RF cable until it is all the way into the “Antenna” jack. Then tighten it with a 7/16" torque wrench to 15 in-lbs, or a 7/16" wrench for 1/8 turn.

The wiring of any additional RF cables in the configuration is covered in the receiver wiring section (see [page 13](#)).

Receiver(s)

Connecting the TV-Hub to the system receiver(s), and setting up the receivers according to the system configuration depends upon the satellite television service being used (see Figure 22 and Figure 23). Detailed instructions are provided in the next section.

NOTE: The wiring for other optional system components follows this section. Proper grounding and power wiring is described in [“Connect Power” on page 21](#).

Figure 21: TV-Hub Antenna Connection

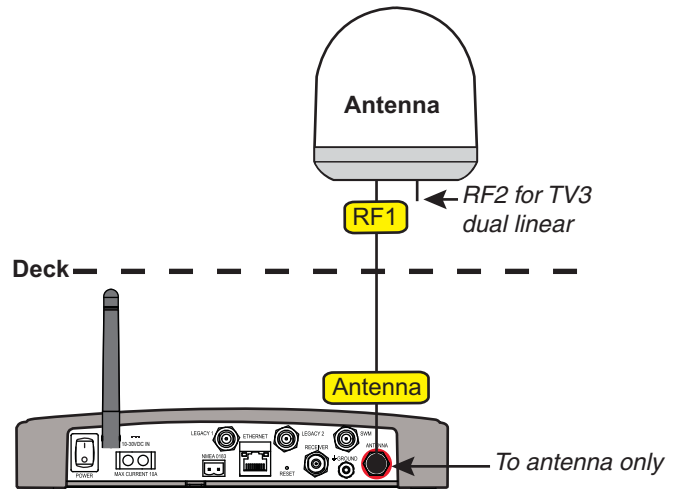


Figure 22: TV-Hub A Receiver Connections

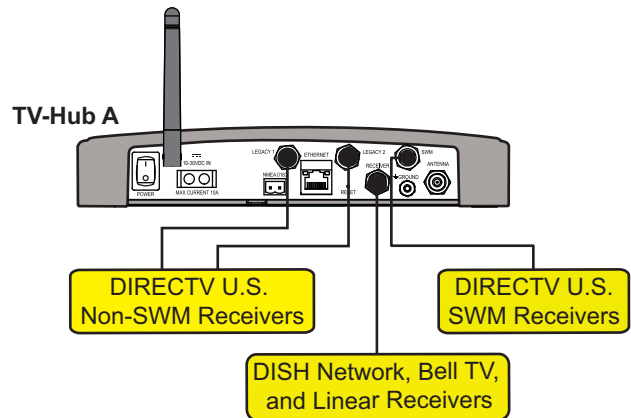
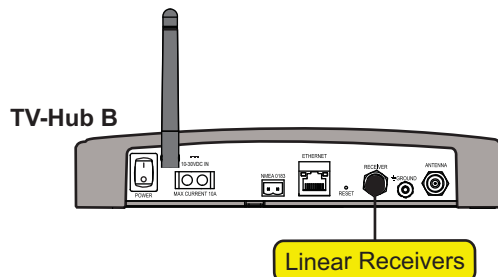


Figure 23: TV-Hub B Receiver Connections



11 Wire the Receivers

Follow these steps to wire the receivers for the associated satellite service, then connect the receiver(s) to the customer's television(s).

- Linear..... page 13
- DIRECTV..... page 14
- DISH Network/Bell TV page 17

Linear Configuration Wiring

Follow the steps below to wire the receivers in a linear configuration.

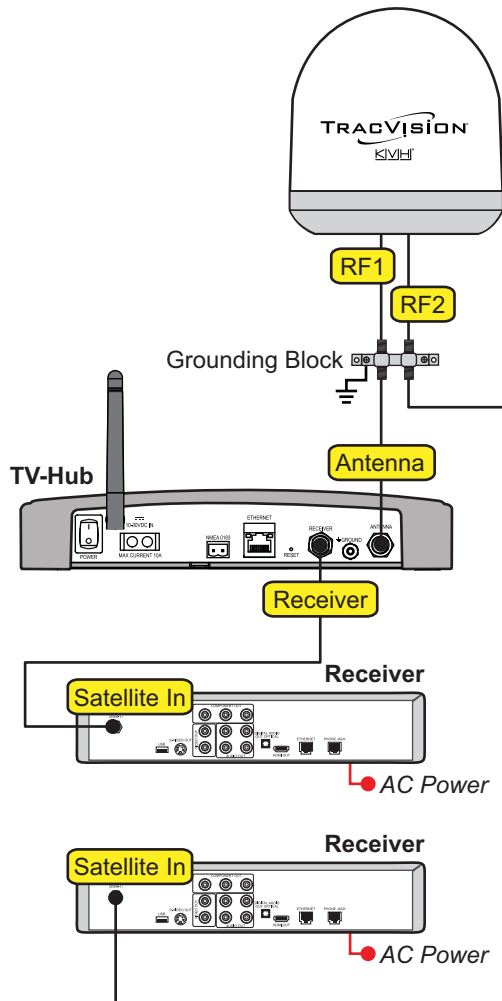
Connecting 1 Receiver

Connect an RF cable from the "Receiver" jack on the back of the TV-Hub to the "Satellite In" connector of the receiver.

Connecting 2 Receivers (TV3 Dual Linear)

- a. Connect each RF cable coming from the antenna to a grounding block belowdecks (see "Grounding Requirements" on page 21).
- b. Connect an RF cable from the RF1 grounding block position to the "Antenna" jack on the TV-Hub.
- c. Connect an RF cable from the "Receiver" jack on the back of the TV-Hub to the "Satellite In" connector of the first receiver.
- d. Connect an RF cable from the RF2 grounding block position to the "Satellite In" connector of the second receiver (see Figure 24).

Figure 24: Wiring a 2-Receiver Linear Configuration



IMPORTANT!

If you want to enable the second receiver to control satellite selection, install an optional IP AutoSwitch (KVH part no. 72-0634) inline with the RF input to the receiver. Refer to Appendix B, page 35 for details.

11 Continued Wire the Receivers

DIRECTV – SWM Wiring

Follow the steps below to wire a DIRECTV system that includes SWM receivers.

Connecting 1 Receiver

Connect an RF cable from the “SWM” jack on the TV-Hub to the “Satellite In” jack on the receiver/DVR as shown in Figure 25.

Connecting 2-8 Receivers

Configurations for connecting multiple receivers include a SWM splitter that supports up to 8 tuners.

Refer to Figure 26 to determine the tuners consumed by each type of SWM component.

Refer to wiring diagrams in Appendix A for connecting multiple SWM receivers and connecting a network for autoswitching (see [page 30](#)), and wiring for Genie devices (see [page 31](#)).

Wire the system as follows:

- a. Connect an RF cable from the “SWM” jack on the back of the TV-Hub to the “SWM” port on the SWM splitter.
- b. Connect an RF cable to each port of the SWM splitter required by the configuration, and connect its other end to the “Satellite In” connector on the receiver/DVR, or “Network” port when connecting a Genie client.
- c. Terminate any unused connectors on the splitter with a supplied 75Ω terminator.
- d. Connect the TV-Hub and each receiver you want to control satellite selection to the vessel’s network. If a network is not available, manual switching with a mobile device is an alternative.

Figure 25: DIRECTV SWM Wiring for 1 Receiver

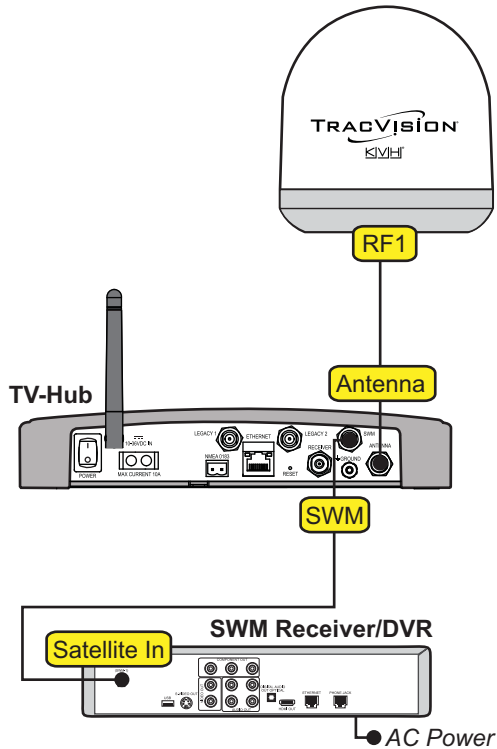


Figure 26: Tuners per DIRECTV SWM Device

Device	Tuners
Non-Genie SWM receiver	1
Non-Genie SWM DVR	2
Genie™ DVR	5 (2 for its DVR, 3 shared with clients)
Genie client*	None

* Genie clients cannot switch satellites. Clients can view programming carried on the satellite currently selected by the current master receiver.

11 Continued Wire the Receivers

DIRECTV – Non-SWM Wiring

Follow the steps below to wire a DIRECTV system that includes non-SWM receivers.

Connecting 1-2 Receivers

- Connect an RF cable from the “Legacy 1” jack on the back of the TV-Hub to the “Satellite In” jack on the receiver.
- When installing 2 receivers, repeat step a connect an RF cable from the “Legacy 2” jack on the back of the TV-Hub to the “Satellite In” jack on the second receiver (see Figure 27).

Connecting 2-8 Receivers

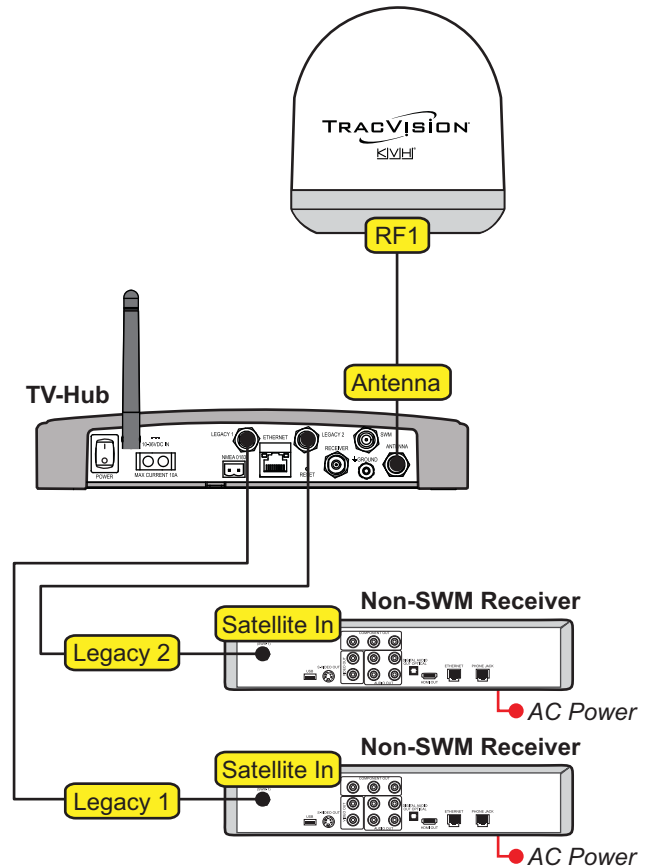
Configurations for connecting multiple non-SWM receivers include two DC block splitters and require a 4 x 8 multiswitch (customer-supplied or KVH part no 19-0573). See Appendix A, [page 32](#), for a wiring diagram for this configuration.

Wire the system as follows:

- Connect an RF cable from the “Legacy 1” jack on the back of the TV-Hub to the “Antenna” port on one of the DC block splitters.
- Connect the “Primary” connector on the DC block splitter to the “18V” connector on the multiswitch, and connect the “Secondary” connector on the splitter to the “18V/22KHz” connector.
- Repeat steps a and b with “Legacy 2” and the second DC block splitter using the “13V” and “13V/22KHz” connectors on the multiswitch.
- Connect the multiswitch outputs to the “Satellite In” jacks on the non-SWM receivers.
- Terminate any unused connectors on the splitter with a supplied 75Ω terminator.

NOTE: Non-SWM receivers are limited to manual switching. See Appendix A, [page 32](#), for the wiring diagram for this configuration.

Figure 27: DIRECTV Non-SWM Wiring for 1 or 2 Receivers



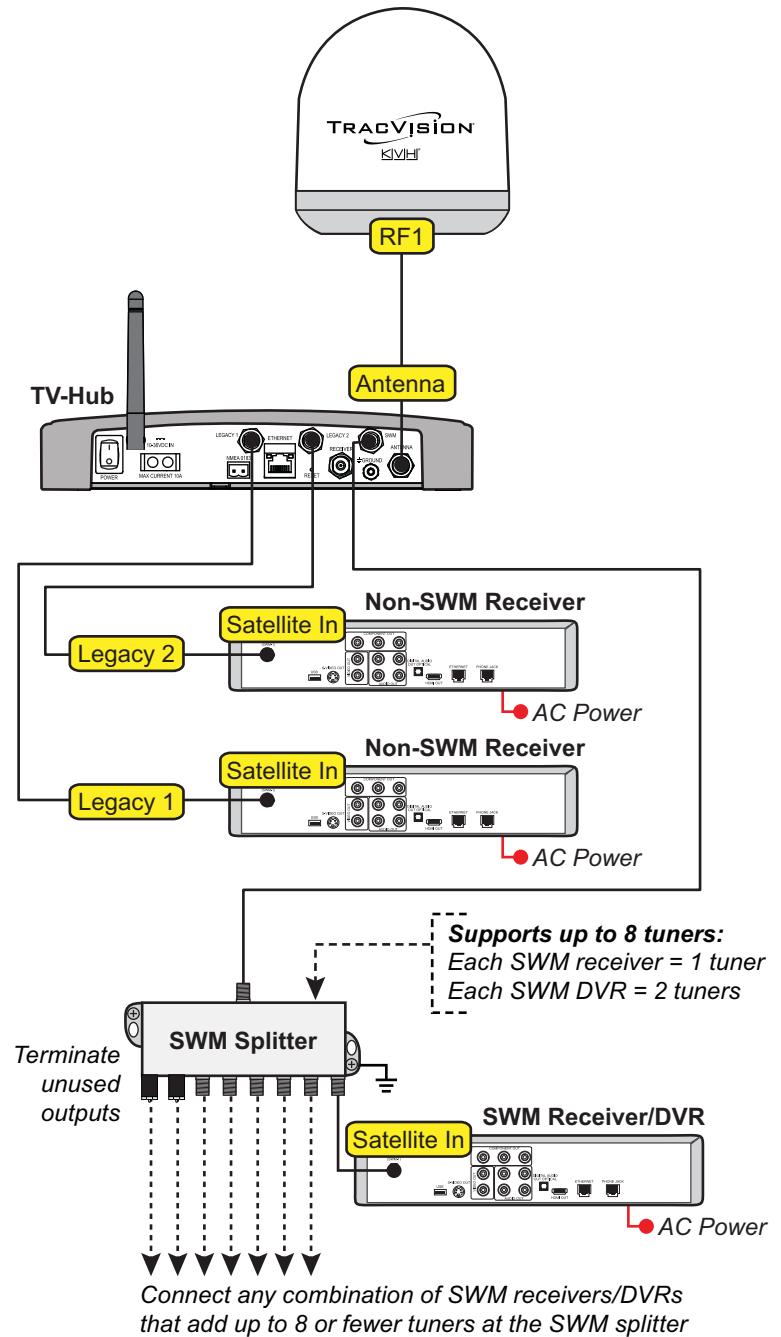
11 Continued Wire the Receivers

DIRECTV – SWM and Non-SWM Wiring

To wire a DIRECTV system that includes both SWM and non-SWM receivers, refer to the diagram shown in Figure 28 and the individual SWM and non-SWM instructions provided on the previous pages.

NOTE: See "DIRECTV SWM and Non-SWM Configuration" on page 33 for another example wiring diagram for a SWM, Genie clients, and Non-SWM DIRECTV configuration.

Figure 28: DIRECTV SWM and Non-SWM Wiring



11 Continued Wire the Receivers

DISH Network and Bell TV Wiring

Follow these steps to wire a DISH Network or Bell TV configuration.

IMPORTANT!

Receivers must be DISH Pro-compatible. Look for the DISH Pro logo on the box.

Connecting 1 Receiver

Connect an RF cable from the “Receiver” jack on the back of the TV-Hub to the “Satellite In” connector of the receiver.

Connecting 2 or More Receivers

Configurations for connecting 2-8 receivers require a DC block splitter, configurations with 3-4 receivers can use a 3 x 4 passive multiswitch, and configurations with 3-8 receivers require a 4 x 8 multiswitch (customer-supplied or KVH part no 19-0573).

Wire the system as follows:

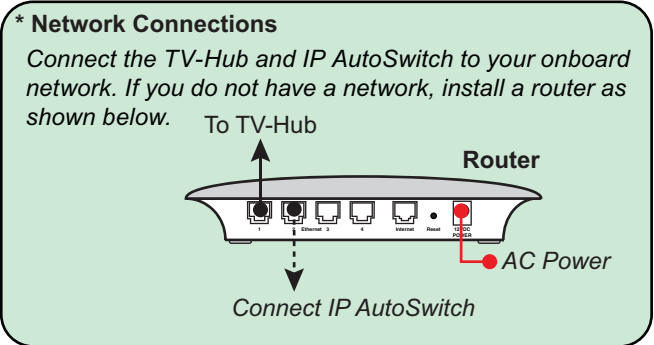
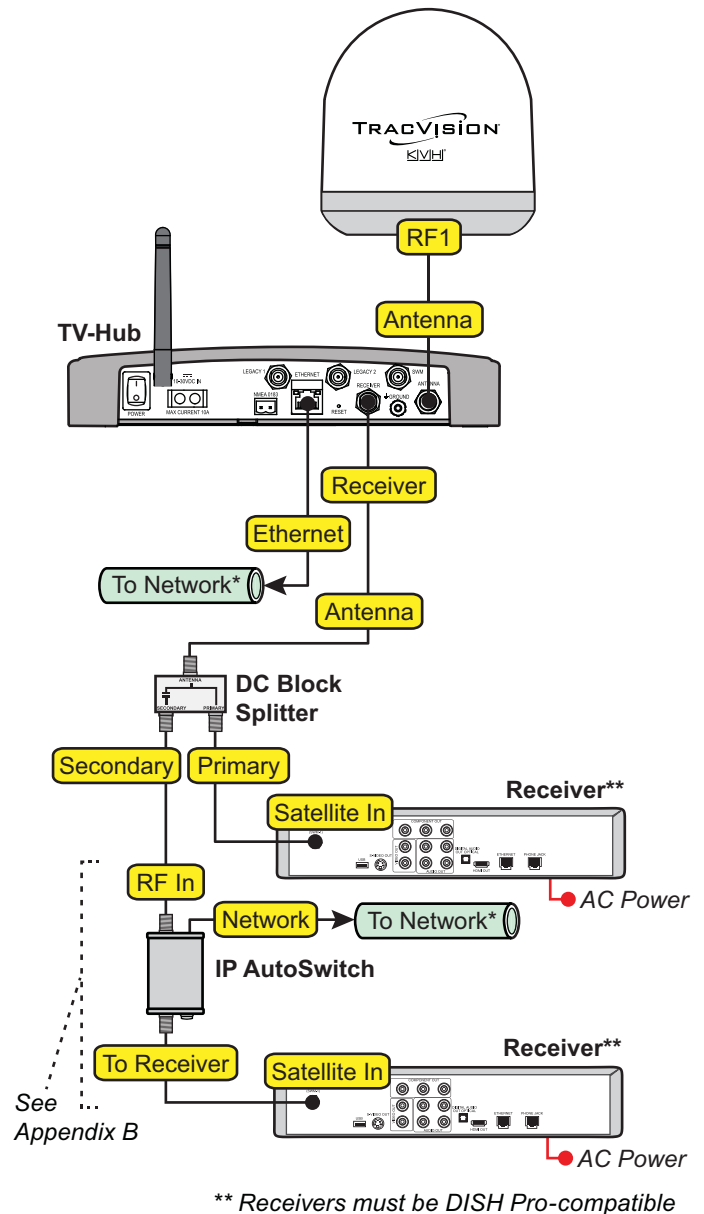
IMPORTANT!

If you want to enable any of the additional receivers to control satellite selection, install an optional IP AutoSwitch (KVH part no. 72-0634) inline with the RF input to each desired receiver. Refer to Appendix B on [page 35](#) for details.

- Connect an RF cable from the “Receiver” jack on the back of the TV-Hub to the “Antenna” jack on the DC block splitter.
- Connect the “Primary” connector on the DC block splitter to the “Satellite In” connector on the first receiver, and connect the “Secondary” connector on the splitter to the “Satellite In” on the second receiver, or, if connecting more than two receivers, connect it to the “18V” port on the multiswitch (see Figure 29).
- When using a multiswitch, connect the multiswitch outputs to the “Satellite In” jacks on the associated receivers.

NOTE: See [page 34](#) for an example wiring diagram for connecting a multiswitch.

Figure 29: DISH/Bell Receiver Wiring



12 Connect a NMEA Device

Optional

If an optional NMEA device is connected to the TV-Hub, the antenna can use its GNSS position and heading data to speed up satellite acquisition. The current position and heading will also be displayed on the Home page of the web interface.

If the customer would like to connect a NMEA device to the TV-Hub, make the connection **after** the RF cabling is complete as follows:

- a. Wire and connect the 2-position terminal strip connector (supplied in the kit) as shown in Figure 30.
- b. Configure the NMEA device to transmit one or more of the NMEA 0183 messages at 4800 baud (see Figure 31).

Later, you will select the NMEA source at the TracVision Setup Wizard (see [“Set Up the System”](#) on page 24).

Figure 30: TV-Hub NMEA Connections

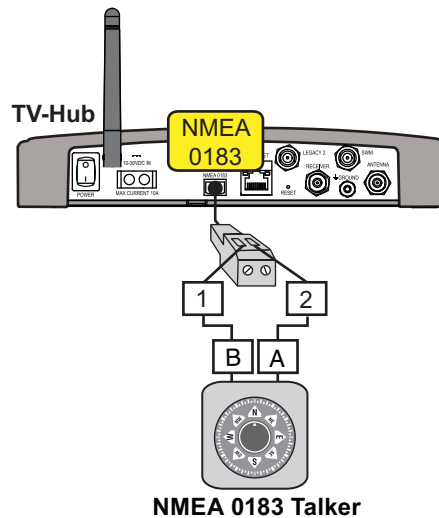


Figure 31: Supported NMEA Messages

NMEA 0183 \$--xxx	Description
HDG	Heading, Deviation & Variation
HDM	Heading, Magnetic
HDT	Heading, True
OSD	Own Ship Data
THS	True Heading & Status
VHW	Water Speed and Heading
RMC	GNSS Position Data

13 Connect to a Network

Optional

Connecting the TV-Hub to an onboard local area network (LAN) is required if any of the following apply:

- One or more IP AutoSwitches are installed to enable automatic satellite switching (*Linear/DISH Network/Bell TV only*)
- One or more DIRECTV SWM-compatible receivers are connected to the system and customer requires automatic switching between the 101W and 119W satellites
- Customer wants to have the ability to access the TV-Hub's web interface using any device connected to the network (see Figure 32)

NOTE: Connecting the TV-Hub to the onboard network using its Wi-Fi rather than a cable is not recommended. Although possible, once the TV-Hub's wireless settings are changed from Access Point mode to Infrastructure mode, the ability to connect directly to the TV-Hub using a mobile device is lost – connection will always have to be made via the network.

Wired LAN Connection

IMPORTANT!

For DIRECTV systems set up for automatic satellite switching, make sure the receiver(s) are connected to the same subnet as the TV-Hub.

For systems with IP AutoSwitch(es), make sure they are on the same local LAN segment as the TV-Hub.

- Connect the TV-Hub Ethernet port to the network using the supplied Ethernet cable.

By default, the TV-Hub's Ethernet port is configured as a DHCP client, and the network's router automatically assigns it an IP address.
- In **Dynamic** (DHCP) mode, the TV-Hub could get assigned a different IP address whenever it is turned on. Therefore, it is recommended that the TV-Hub is configured for **Static** mode. This is done by entering a static IP address through the Settings page of the web interface (see Figure 33).

Figure 32: TV-Hub Ethernet Connection

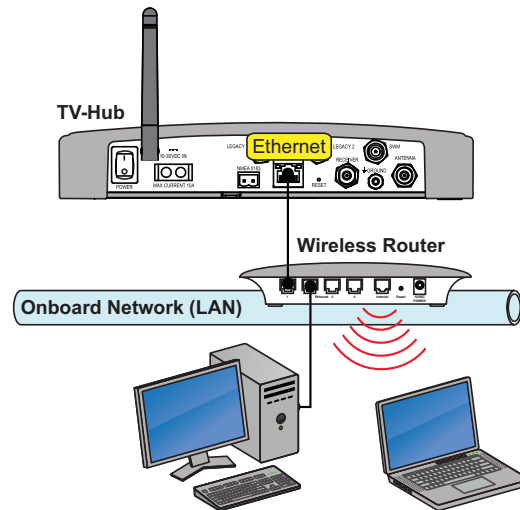


Figure 33: Web Interface Ethernet Settings

Ethernet Settings	
Mode	STATIC
IP Address	172.16.223.92
Subnet	255.255.255.0
Gateway	172.16.223.1
Broadcast	172.16.223.255

14 Secure the Wi-Fi Connection

By default, the TV-Hub's wireless settings are configured for the following:

- Wireless Mode: AP (Access Point)
- SSID: TV-Hub-<TV-Hub serial number>
- IP Address: 172.16.0.1
- Security Mode: Off

After the system is turned on (see [page 23](#)) and set up (see [page 24](#)), KVH strongly advises that you select the **WPA_PSK** security mode as shown in Figure 34 and assign a unique password to prevent unauthorized access to the TV-Hub. If you keep the default settings, you're allowing anyone to access the TV-Hub with their mobile device.

IMPORTANT!

If you select Infrastructure (IF) mode to connect the TV-Hub to your onboard network, you will no longer be able to access the TV-Hub's web interface directly.

Figure 34: TV-Hub Security and Password Setting

Wireless Settings	
Wireless Mode	AP (Access Point) ▼
SSID	TVHub-140311659
IP Address	172.16.0.1
Subnet	255.255.255.0
Gateway	172.16.0.1
Broadcast	172.16.0.1
Security Mode	WPA_PSK ▼
Password	240300659

15 Connect Power

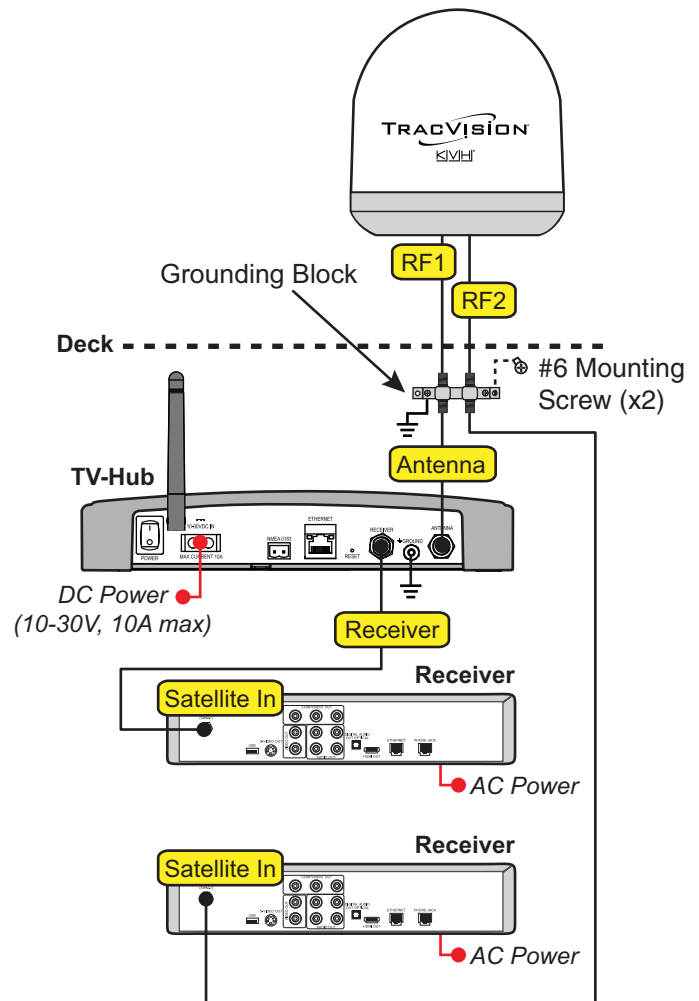
Before connecting power, be sure the vessel is properly grounded in accordance with marine standards.

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). Follow these steps to ground the system.

- Single-cable systems are grounded by the TV-Hub grounding wire. Connect the hoop of the grounding wire (supplied in the kit) to the "Ground" screw on the rear of the TV-Hub.
- Connect the other end of the grounding wire to ship's ground.
- For the dual linear LNB system, connect the two RF cables to a grounding block (supplied in the kit). Attach the supplied ground wire to ship's ground, and, using the two #6 screws supplied with the grounding block, mount the block inside the vessel (see Figure 35).

Figure 35: Grounding Block Example



WARNING

Failure to ground the TracVision system properly to the vessel'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 vessel'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 the vessel'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.

15 Continued Connect Power

Connect Power to the System

NOTE: When powering up a SWM configuration, apply power to all other system components before powering up the receivers and DVRs (tuners are assigned channels during startup).

Follow the steps below to connect power to the TracVision system (see Figure 36).

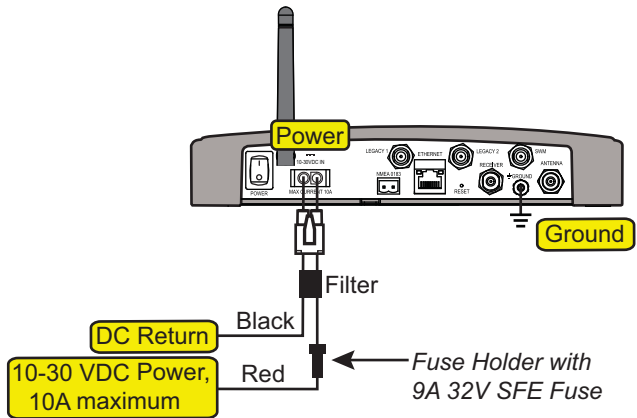
IMPORTANT!

All power connections must be hard wired.

- Make sure that the ground wire from the TV-Hub has been connected as described on the previous page.
- Connect the TV-Hub power cable (supplied in the kit) to the 10-30 VDC power input on the rear of the TV-Hub.
- Connect the black wire on the TV-Hub power cable to ship's ground.
- Connect the red wire of the TV-Hub power cable to the vessel's 10-30 VDC power source.

NOTE: An optional power supply is available from KVH, part no. 72-0669.

Figure 36: TracVision System Power



16 Turn On the System

Follow these steps to turn on the system for the first time.

- a. Ensure the antenna has a clear, unobstructed view of the sky.
- b. Press the power switch on the rear of the TV-Hub to apply power to the TracVision system (see Figure 37).
- c. Within a few minutes, the TV-Hub and Power lights should be lit green, and the Antenna light should be lit or flashing green (see Figure 38).
- d. Plug in and turn on any connected receivers, DVRs, Genie clients, and televisions.
- e. Follow the steps in the next section to access the web interface and set up the TracVision system for the customer's service provider.

Figure 37: TV-Hub Power Switch

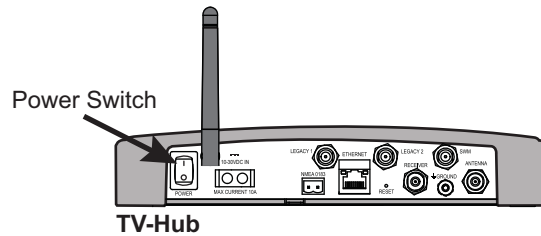
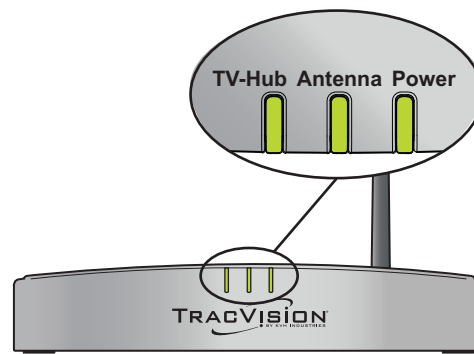


Figure 38: TV-Hub Status Lights



17 Set Up the System

Before you begin to set up the system:

- Know the service provider and associated satellite(s)
- Check the latest software version (described below)
- Verify all system components are connected

Access the Web Interface – Wireless

To access the web interface from any Wi-Fi-enabled mobile device:

- a. Select the **TVHub-<TV-Hub serial number>** network from your device's Wi-Fi settings to connect to the TV-Hub.
- b. Start a browser and enter **http://tvhub.kvh**.

The Setup Wizard's home page appears upon initial startup to step you through system configuration (see Figure 39).

Alternate Interface Access Options

Other options for connecting to the TV-Hub web interface include:

- Connect a PC configured for DHCP directly to the Ethernet port on the back of the TV-Hub (see Figure 40).

Once you have connected the PC, enter **http://169.254.253.1** into your web browser.

- When connected to a vessel's onboard network (see [“Connect to a Network” on page 19](#)), enter the IP Address (dynamic or static) assigned to the TV-Hub.

NOTE: The TV-Hub is Bonjour[®]-enabled. You can use Bonjour to connect to the TV-Hub using a computer on the same network without using the IP address if Bonjour is installed and enabled.

Figure 39: Setup Wizard

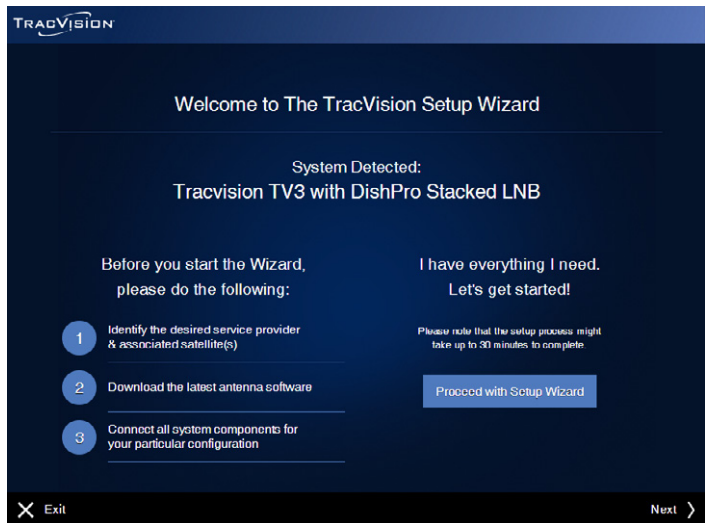
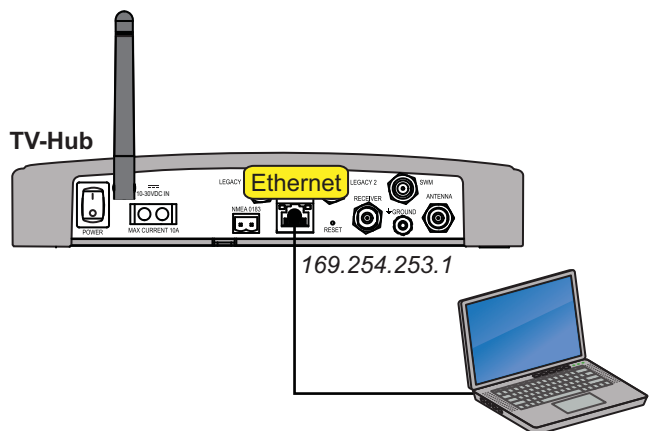


Figure 40: Wired Connection



17 Continued Set Up the System

Update Software and Satellite Library

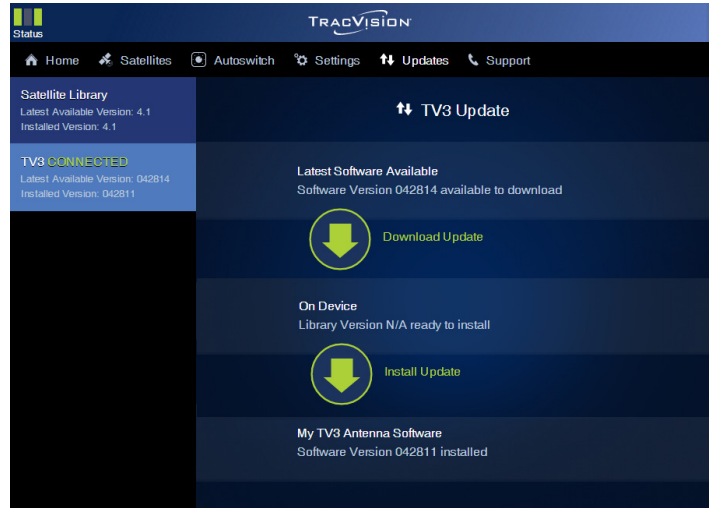
Before you start the Setup Wizard, update the system software and satellite library with the latest versions from the portal (see last item on page 3).

- a. Select **Exit** in the Setup Wizard page. The web interface appears.
- b. At the **Updates** page, select the antenna. Then select **Install Update** (see Figure 41). Find the `<software version>.kvh` file in your downloads folder, then double-click to install.
- c. Wait for the update to complete. It may take up to 45 minutes. The TV-Hub's lights will alternate orange while the update is in progress. Once complete, the web interface will report that the latest version is installed.
- d. When the software update is complete, select the Satellite Library in the left pane, and select **Install Update**. Find the `.xml` file you had downloaded, and double-click to install.
- e. Select **Settings** then select **Setup Wizard**.

NOTE: Whenever you close the web interface before completing the Setup Wizard, the Setup Wizard will automatically reappear when you re-enter <http://tvhub.kvh>.

- f. Select **Proceed with Setup Wizard** on the Setup Wizard home page.

Figure 41: Software Updates Page



17 Continued Set Up the System

Setup Wizard

System configuration continues by prompting you to enter information or perform specific tasks as needed. For example:

- Enter installer and vessel information
- Select a GPS source or enter vessel location
- Select a source for heading data (if NMEA device is connected)
- Select the satellite TV service
- Select satellite(s) to track (single, or preset groups listed in Figure 42), or create user-defined satellites
- Select a configuration
- Set up automatic switching, if applicable
- Activate the receivers

Additional Setup Information

Once the Setup Wizard has been completed, perform follow-up tasks such as:

- Setting the skew angle (linear only)
- Setting up receivers to operate with the system (as instructed by the Wizard)
- Activating the receivers (as instructed by the Wizard)

Figure 42: Preset Satellite Groups

Service	Satellites (A-B-C-D)
DIRECTV U.S.	DIRECTV Dual: 101W and 119W
DISH Network	Western Arc: 110W, 119W, 129W Eastern Arc: 61W, 72W, 77W Legacy East Arc: 61W, 110W, 119W DISH 500: 110W, 119W
Bell TV	Bell TV Dual: 82W and 91W
Linear	<i>If multiple satellites are needed, filter the list by region and create a custom group of satellites known to work for the system configuration.</i>

Note: List is subject to change.

17 Continued Set Up the System

Linear Receiver Setup for Automatic Switching

For automatic switching to work properly using the DiSEqC communications protocol, set up linear receivers for the same satellites installed in the TracVision system. Set up the satellites in the receiver in the exact same order as they were set up in the antenna. The specific setup process varies among receiver models – refer to the receiver’s manual for details. Use the table below and Figure 43 as a guide.

Satellites in Antenna	Matching Satellites in Receiver
Slot A	Port/Switch/LNB/DiSEqC 1 or A
Slot B	Port/Switch/LNB/DiSEqC 2 or B
Slot C	Port/Switch/LNB/DiSEqC 3 or C
Slot D	Port/Switch/LNB/DiSEqC 4 or D

Figure 43: Example Linear Receiver DiSEqC Settings

The figure shows a screenshot of the TV-Hub Web Interface divided into two main sections: 'TV-Hub Web Interface' and 'Receiver Setup'.

TV-Hub Web Interface:

- Satellite Group Name:** MyEuropeGroup
- Slot A:** Hotbird 6,7,8 Europe - 13E
- Slot B:** Astra 1 - 19E
- Slot C:** Sirius-4 - 5E
- Slot D:** Eutelsat W3A - 7E

Receiver Setup:

- Ku_HOTBIRD 6,7A,8:** LNB Type: 09750/10600, LNB Power: 13/18V, 22KHz: Auto, Toneburst: None, DiSEqC1.0: LNB1, DiSEqC1.1: None, Motor: None.
- Ku_ASTRAL 1H,1KR,1L,1M:** LNB Type: 09750/10600, LNB Power: 13/18V, 22KHz: Auto, Toneburst: None, DiSEqC1.0: LNB2, DiSEqC1.1: None, Motor: None.
- Ku_Sirius 4.8E:** LNB Type: 09750/10600, LNB Power: 13/18V, 22KHz: Auto, Toneburst: None, DiSEqC1.0: LNB3, DiSEqC1.1: None, Motor: None.
- Ku_Eutelsat 7E:** LNB Type: 09750/10600, LNB Power: 13/18V, 22KHz: Auto, Toneburst: None, DiSEqC1.0: LNB4, DiSEqC1.1: None, Motor: None.

18 Set the LNB Skew Angle

Linear Systems Only

Follow the steps below to set the antenna's LNB to the skew angle supplied by the Setup Wizard. A dual linear LNB is shown in this procedure.

- a. Turn off and unplug your satellite TV receiver.
- b. Press the TV-Hub power switch off and verify the Power LED light goes out.



CAUTION

Disconnect power from the antenna before you remove the radome. The antenna has moving parts that can cause injury.

- c. Remove the antenna's radome as described on [page 9](#).

TIP: If you keep the radome topside, secure it with a lanyard to prevent it from falling overboard. Also, do not place the radome on a hot steel deck – the heat may warp the radome.

- d. Locate the LNB on the back of the antenna's reflector (see [Figure 44](#)).
- e. Using a 2 mm Allen hex key, loosen the two M4 set screws securing the LNB to the choke feed (see [Figure 45](#)).
- f. Adjust the LNB, clockwise or counter-clockwise, until the skew arrow on the LNB points to the correct skew angle you noted when running the Setup Wizard (see [Figure 45](#)).

IMPORTANT!

Make sure the LNB is fully inserted into the choke feed to ensure optimum performance.

- g. Tighten the two M4 socket set screws to secure the LNB in place. Apply 9-in-lbs (1 N-m) of torque, if possible.
- h. Reinstall the antenna's radome and protective caps as described at the end of [page 10](#).

Figure 44: Location of LNB on Back of Antenna Reflector

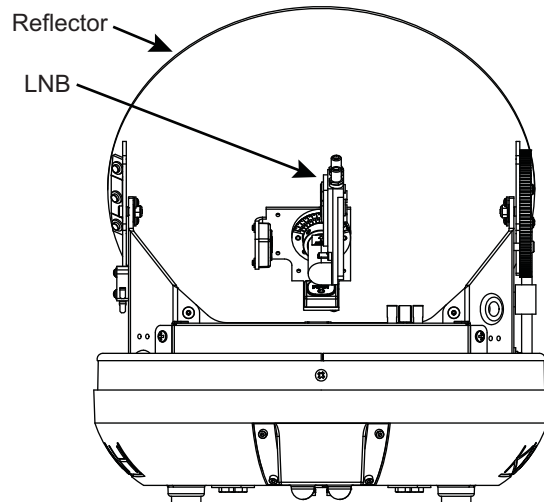
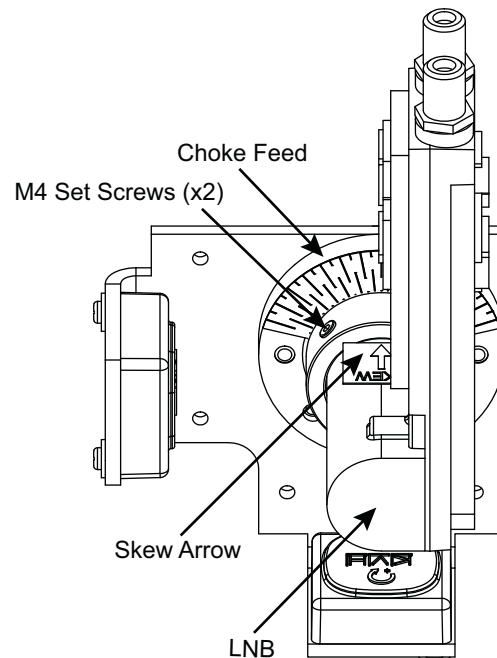


Figure 45: Dual LNB Set Screws and Skew Angle Adjustment




19 Educate the Customer

Before you leave the vessel, test the system to ensure the antenna works properly. Fill out the Installation Checklist (provided in the Welcome Kit) and return it to KVH. Refer to the instructions on the form.

Give the Customer Welcome Kit to the customer, provide any passwords you set up, and explain how to use the system. Ensure the customer understands the following.

- How to:
 - Turn on the system
 - Access the web interface
 - Switch satellites (see Figure 46)
 - Select a master receiver (see Figure 47)
 - Interpret TV-Hub status
 - Download software and satellite library updates (using web interface and/or iPhone or iPad App)
 - Perform general troubleshooting
- Keep the radome installed on the antenna at all times. The radome protects the antenna's moving parts from wind, rain, and debris.

	CAUTION
In the unlikely event that you need to remove the radome, remove power from the antenna first because the antenna's moving parts can cause injury.	

- The antenna must have a clear view of the sky to receive satellite TV. Common causes of blockage include trees, buildings, bridges, and onboard equipment (see Figure 48). Heavy rain or snow may also temporarily interrupt reception.
- Clean the antenna regularly. Dirt buildup on the radome can affect satellite TV reception.
- The vessel must be located within the satellites' coverage area to receive satellite TV signals. To view 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 for details.

Figure 46: Satellite Switching Selection on Home Page

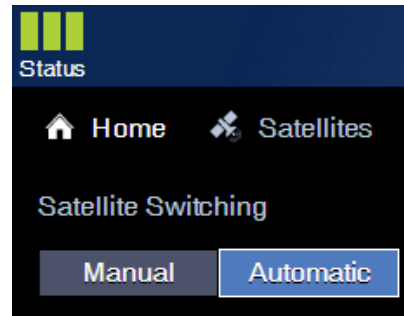


Figure 47: Master Receiver Selection

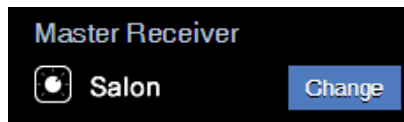
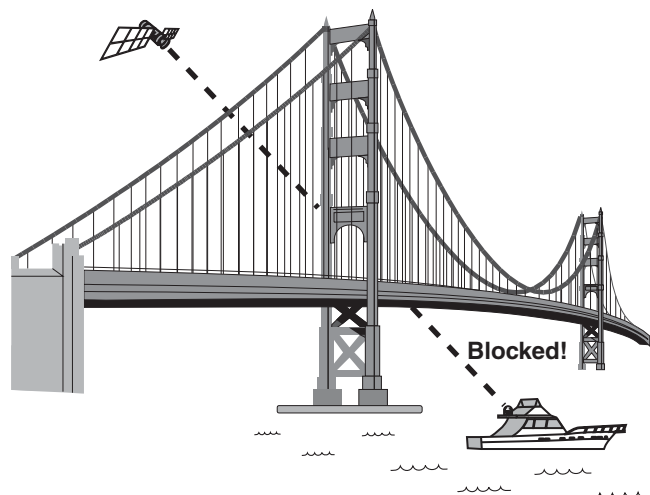


Figure 48: Blockage Example



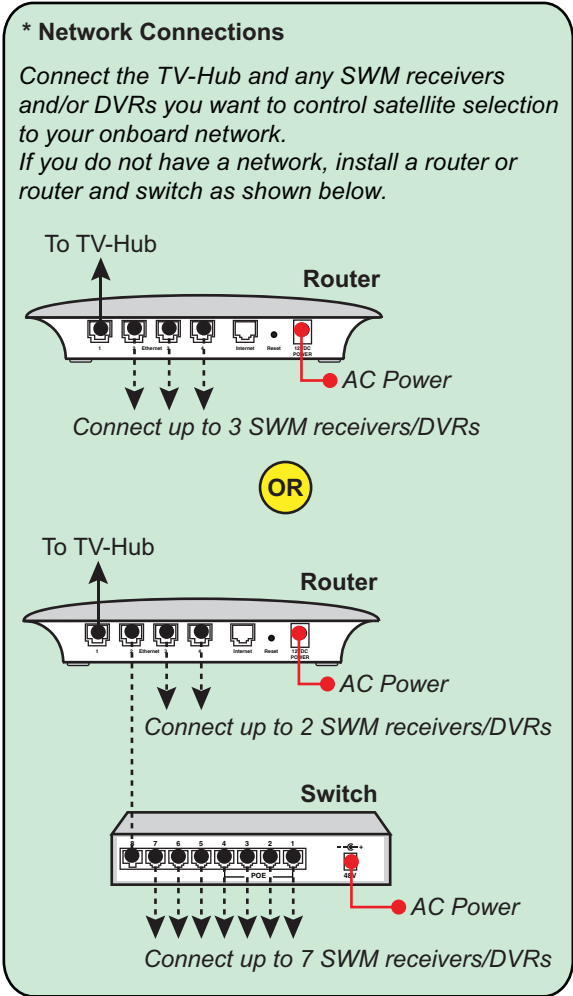
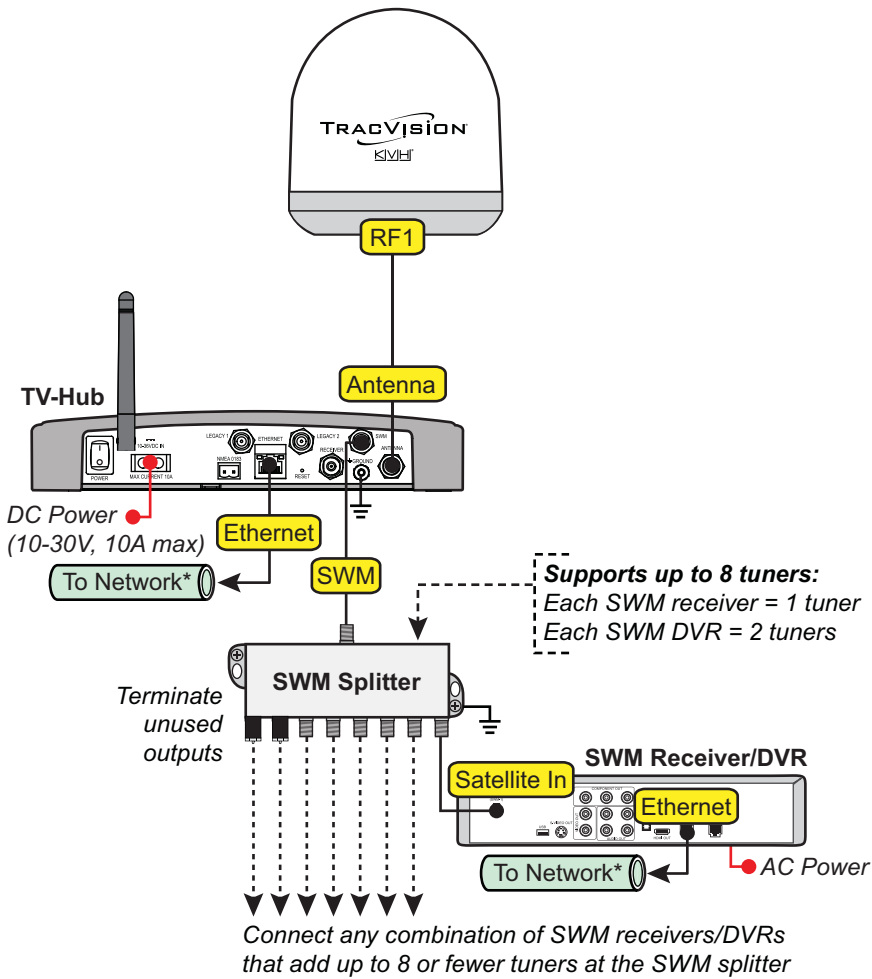
A Wiring Diagrams

DIRECTV - SWM

The wiring diagrams that follow supplement the basic wiring diagrams provided in [“Wire the Receivers”](#) on page 13.

DIRECTV Configuration - up to 8 SWM Tuners

The diagram below shows the wiring for a DIRECTV configuration with up to 8 SWM tuners.



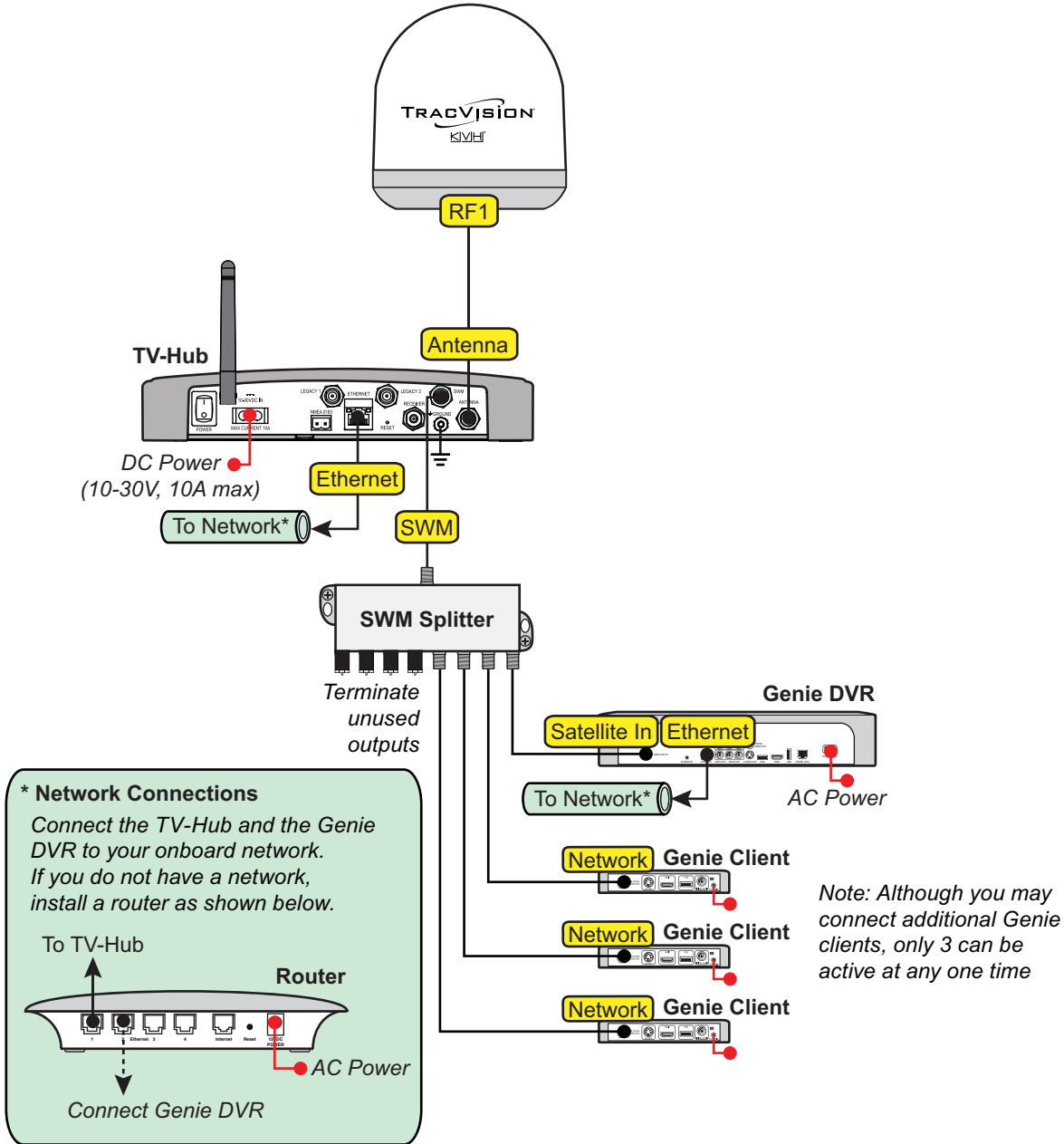
A Continued Wiring Diagrams

DIRECTV - Genie Only

DIRECTV Genie Configuration

The diagram below shows the wiring for a DIRECTV configuration with Genie DVR and clients.

All DIRECTV configurations can include a Genie network.

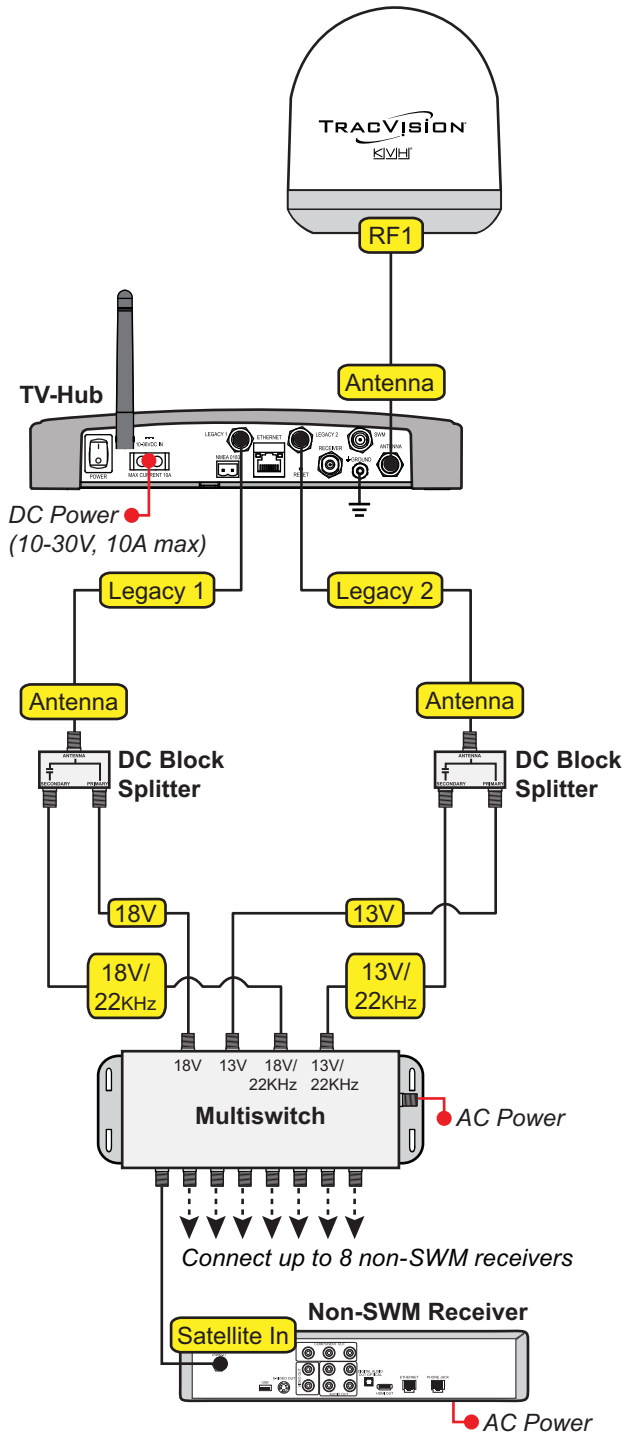


A Continued Wiring Diagrams

DIRECTV - Non-SWM

DIRECTV Non-SWM Configuration

The diagram below shows the wiring for a non-SWM configuration with 3-8 receivers.

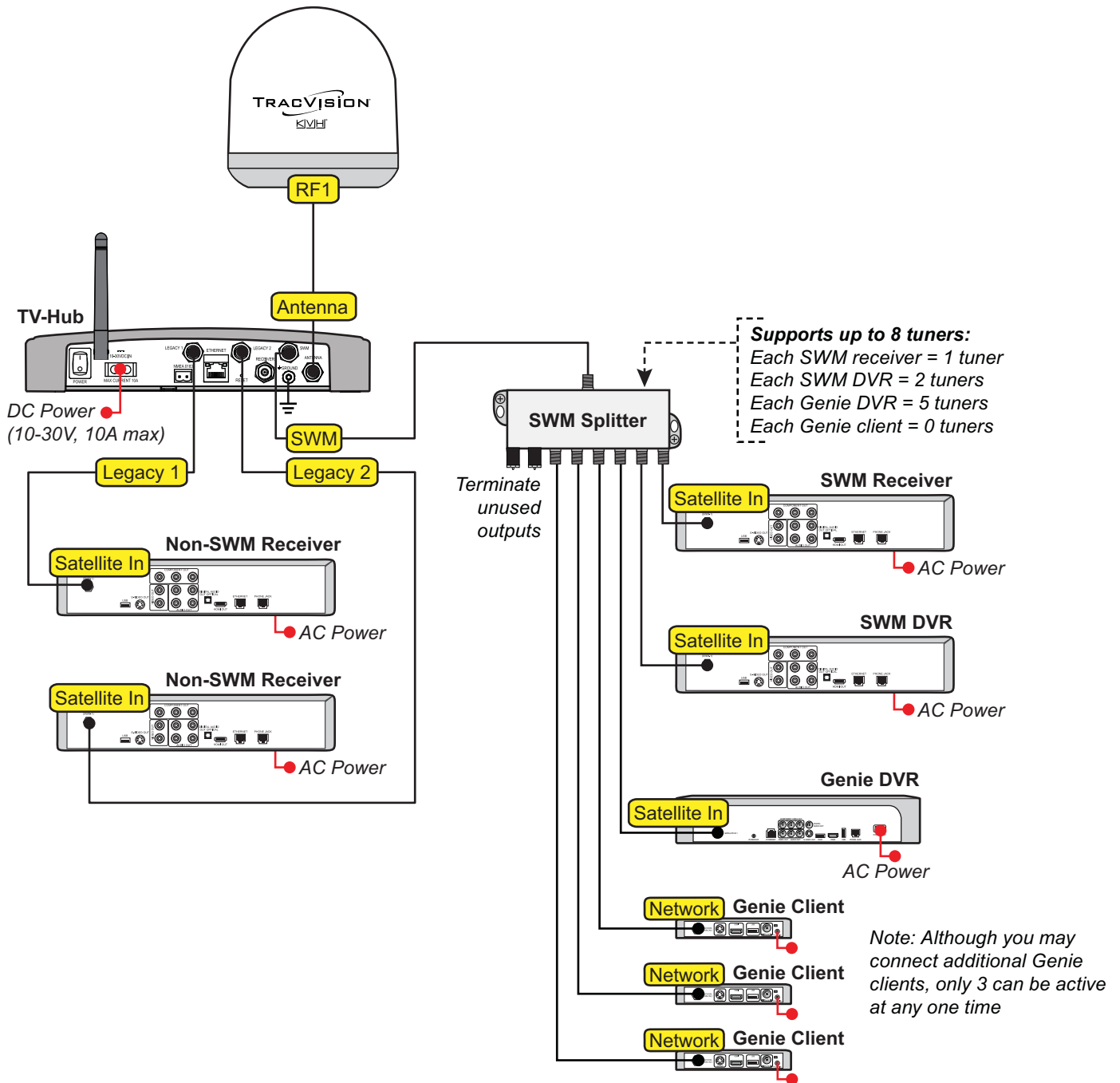


A Continued Wiring Diagrams

DIRECTV - SWM and Non-SWM

DIRECTV SWM and Non-SWM Configuration

The diagram below shows the wiring for a DIRECTV configuration with both SWM tuners (including Genie clients) and non-SWM receivers.

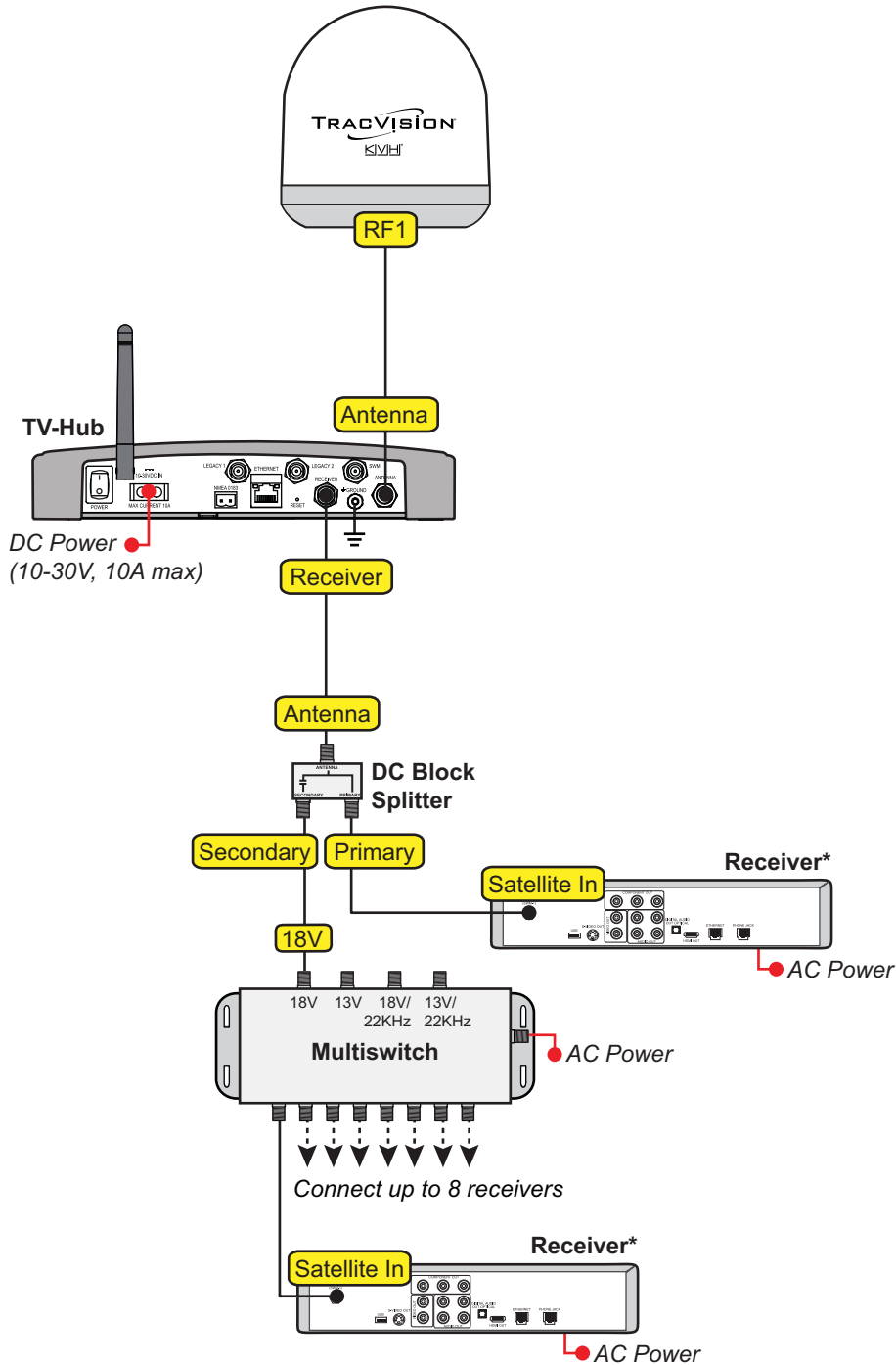


A Continued Wiring Diagrams

DISH Network and Bell TV

DISH Network and Bell TV Configurations

The diagram below shows the wiring for either a DISH Network or Bell TV configuration with 3 - 8 DISH Pro-compatible receivers.



* Receivers must be DISH Pro-compatible

B Connecting IP AutoSwitches

Follow the steps below to add IP AutoSwitches (KVH part no. 72-0634) to DISH Network, Bell TV, or linear configurations.

Inspect Parts

Follow these steps to inspect the kit contents.

- Unpack the box and ensure it contains one each of the following items:
 - 3 ft (1 m) Ethernet cable
 - 2 ft (60 cm) RF cable
 - Adhesive-backed Velcro strip
- Carefully examine all of the supplied parts to ensure nothing was damaged in shipment.
- Locate the serial number on the bottom of the IP AutoSwitch (see Figure 50) and record it in the space below. You will need this number later.

S/N _____

NOTE: Record all IP AutoSwitch serial numbers on the Installation Checklist supplied in the Welcome Kit.

Choose a Mounting Location

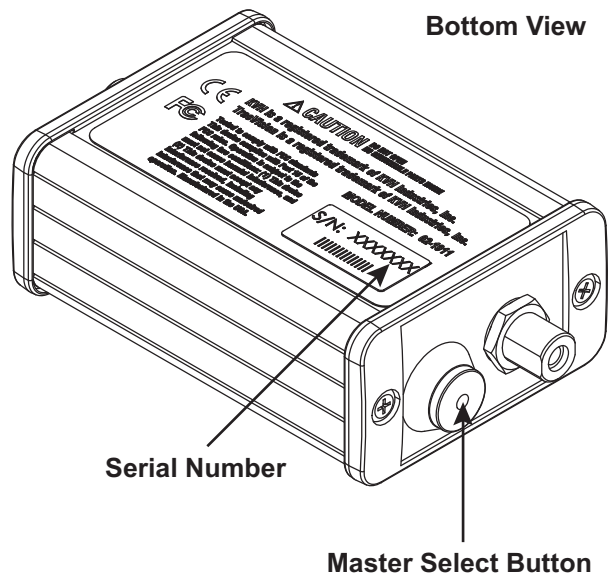
Choose a mounting location that meets the following requirements:

- Dry, well-ventilated, and away from heat sources
- Provides a clear view of and easy access to the Master Select button (see Figure 50)
- Provides adequate clearance for running the cables and allows for service loops and strain relief
- Within 2 ft (60 cm) of the associated receiver in order to use the supplied cable
- Either a horizontal or vertical surface

Figure 49: IP AutoSwitch



Figure 50: Serial Number and Master Select Button



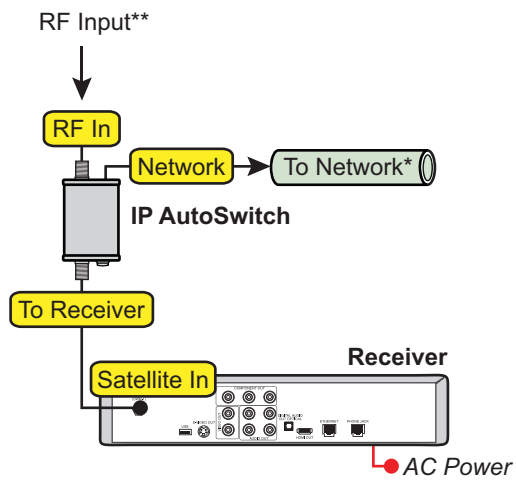
B Continued Connecting IP AutoSwitches

Wire the IP AutoSwitch

The wiring of the IP AutoSwitch depends on the specific configuration. Refer to the wiring diagrams provided in this guide, while following the general wiring steps below:

- Disconnect the RF input cable from the receiver and connect it to the **RF In** jack on the IP AutoSwitch. Then tighten the hex nut to 15 in.-lbs of torque.
- Connect the supplied 2 ft (60 cm) RF cable from the **To Receiver** port on the IP AutoSwitch to the receiver's satellite input and tighten the hex nut to 15 in.-lbs of torque.
- Using the supplied Ethernet cable, connect the Network port of the IP AutoSwitch to the onboard network. If a network is not available, install a router as shown in Figure 51.
- If not already connected, connect the TV-Hub to the onboard network (see Figure 51).
- Using the supplied Velcro strip, secure the IP AutoSwitch to the mounting surface.

Figure 51: IP AutoSwitch Connections

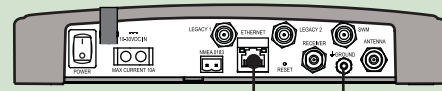


** Varies depending on your system configuration

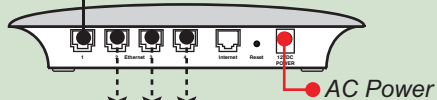
* Network Connections

Connect the TV-Hub and IP AutoSwitches to your onboard network. If you do not have a network, install a router or router and switch as shown below.

TV-Hub

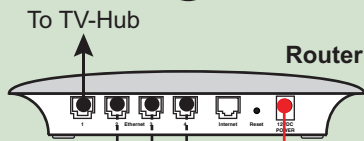


Router



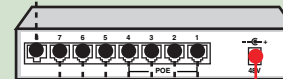
Connect up to 3 IP AutoSwitches

OR



Connect up to 2 IP AutoSwitches

Switch



Connect up to 7 IP AutoSwitches

B Continued Connecting IP AutoSwitches

Configure the IP AutoSwitch

When performing system setup (see “Set Up the System” on page 24), follow these instructions to configure the IP AutoSwitch.

NOTE: KVH recommends that you run the Setup Wizard in the web interface whenever you change your system’s configuration by adding or removing devices.

- At the AutoSwitch page of the web interface, select **Add IP AutoSwitch** (Figure 1).
- Enter the serial number and choose a friendly name for the IP AutoSwitch (for example, “Salon”).
- Select **Save** to save changes.

Select a Master Receiver

Any receiver connected to an IP AutoSwitch can become the master receiver for the system. The master receiver controls satellite selection.

Important!

The TV-Hub has a built-in IP AutoSwitch. Any receiver connected directly to the TV-Hub can therefore be selected as a master receiver through the web interface.

- To choose a master receiver, select it on the home page of the web interface, or press the Master Select button on the associated IP AutoSwitch.
- Verify that the LED in the Master Select button on the IP AutoSwitch is lit green (see Figure 2). The LEDs for any other IP AutoSwitches should be lit orange.

Figure 1: Add IP AutoSwitch Screen

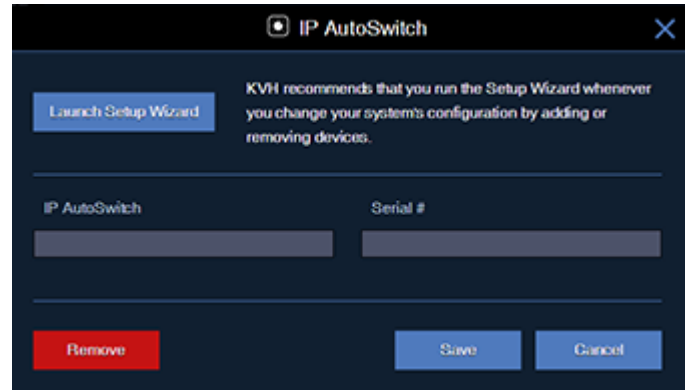


Figure 2: IP AutoSwitch LED Status Indications

LED Color	Indication
Orange	Registered with the system but not currently the master
Orange, flashing	Initializing
Red	Error: <ul style="list-style-type: none">unable to communicate with the system,network is not detected, orunable to register
Green	Registered with the system and currently the master



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