TracVision® BY KVH INDUSTRIES

TracVision M5
Control Panel Configuration

TracVision M5 Installation Guide

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MultiSat Control Panel (MCP) Configuration

These instructions explain how to install the TracVision M5 satellite TV antenna system on a vessel. Complete instructions on how to use the system are provided in the *User's Guide*.

Installation Steps

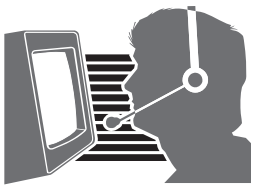
Who Should Install the System?

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

Linear vs. Circular Systems

The installation process differs slightly depending on the type of LNB (low noise block) that is installed in the antenna (linear or circular). These differences are noted throughout this manual. Appendix B on page 31 notes the satellites available for each LNB type and geographic region.

Technical Support



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

North/South America, Australia:
Phone: +1 401 847-3327
E-mail: techs@kvh.com

Europe, Middle East, Asia:
Phone: +45 45 160 180
E-mail: support@kvh.dk

1 Inspect Parts and Get Tools

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

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

IMPORTANT!

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

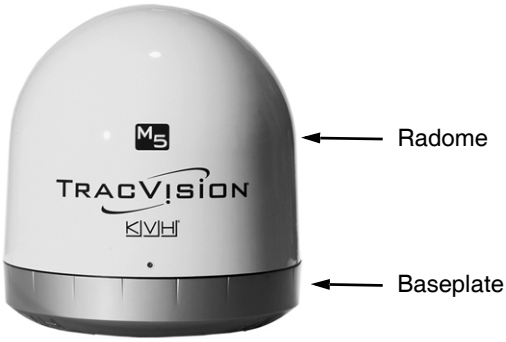
b. Carefully examine all of the supplied parts to ensure nothing was damaged in shipment.

c. Gather all of the tools and materials listed below. You will need these items to complete the installation.

- Flat-head and Phillips-head screwdrivers
- Electric drill and 3/8" (10 mm), 5/32" (4 mm), 3/32" (2.25 mm), and #29 bits
- 3" (80 mm) hole saw
- Socket wrenches
- 7/16" open-end wrench
- Torque wrench *(Linear systems only)*
- Light hammer and center punch
- Adhesive tape and scriber or pencil
- Wire strippers and terminal lug crimper
- 2 mm allen hex key *(Linear systems only)*
- RG-6 or RG-11 RF coax cable(s) with Snap-N-Seal® F-connectors; see Step 7a on page 9 for quantity and type required
- Augat IT1000 connector installation tool (KVH part #19-0242)
- Power cables for connecting power to the switchplate and MCP (see Figure 2)
- Satellite TV receiver and TV *(see Figure 3 for a list of validated U.S./Canadian receivers)*

Figure 1: TracVision M5 System Components

Antenna



Switchplate

MCP (MultiSat Control Panel)

Figure 2: Guidelines for Power Cables

Cable Length	Use Cable Gauge
< 40 ft (12 m)	14AWG (2.5mm^2)
40-70 ft (12-21 m)	12AWG (4mm^2)

Figure 3: KVH-Validated U.S./Canadian Receivers

Standard-Definition Models		
DIRECTV	DISH Network	ExpressVu
D12 D11 D10	311	4100 3100
High-Definition (HD) Models		
DIRECTV	DISH Network	ExpressVu
H21* H20*	211k 211	6100

* For compatibility with a Tri-Sat AutoSwitch Kit (KVH part #72-0301-07), use model H21-200 or H20-600.

2 Plan the Antenna Installation

Consider the following antenna installation guidelines:

- Minimize blockage. The antenna requires a clear view of the sky to receive satellite TV (see Figure 4). The fewer obstructions, the better the system will perform.
- Make sure the mounting surface is wide enough to accommodate the antenna's base (see Figure 5). Also make sure it is flat, level (within ±1°), strong enough to support the antenna's weight (30 lbs, 13.6 kg), and rigid enough to withstand vibration.
- Select a location that is as close as possible to the intersection of the vessel's fore-and-aft centerline and midships.
- Do not mount the antenna at the same level as the radar because the radar's energy might overload the antenna. Ideally, you should mount the antenna 4 ft (1.2 m) above the radar, outside the beam path of the radar.

Figure 4: Blockage from Obstruction

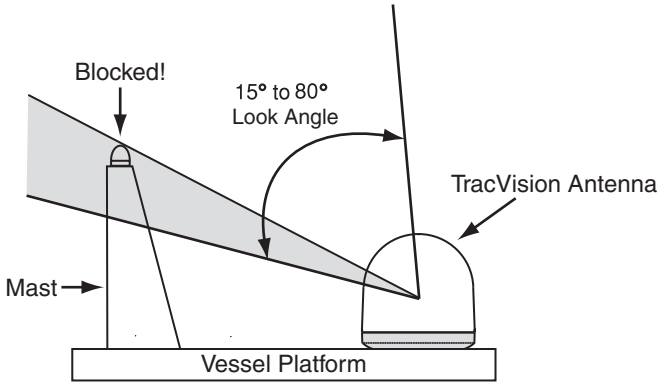
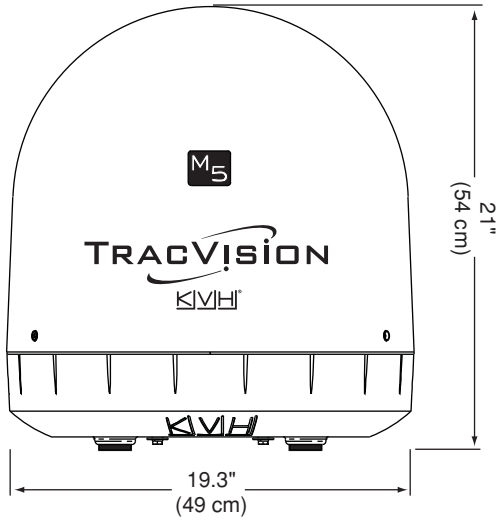
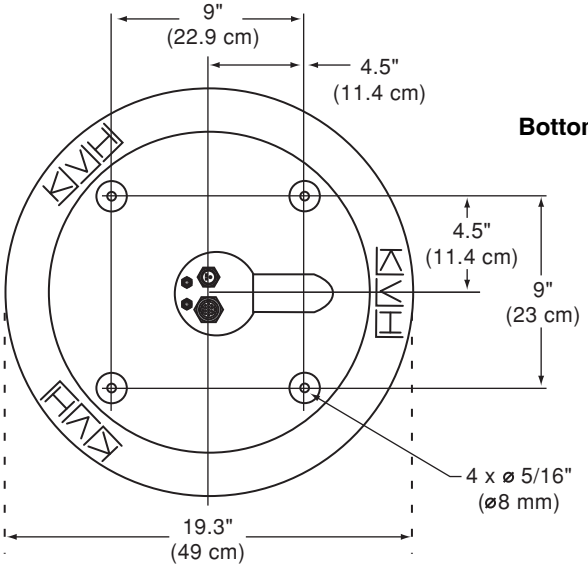


Figure 5: Antenna Dimensions



Side View



Bottom View

3 Plan the Belowdecks Installation

Consider the following belowdecks equipment installation guidelines.

Switchplate

- Select a switchplate mounting location in a dry, well-ventilated area belowdecks away from any heat sources or salt spray.
- Be sure to leave enough room at the switchplate's front and rear panels for connecting the cables and maintaining a service loop (see Figure 6 for switchplate dimensions). *One cable connects to the front.*
- The supplied data cable is 50 ft (15 m) long. Be sure to locate the switchplate close enough to the antenna for the cable to reach, while allowing adequate slack for a service loop.
- **(Circular and Sky Mexico only)** The grounding block should be located within 45 ft (13 m) of the antenna, within 5 ft (1.5 m) of the primary receiver, and within 25 ft (7.6 m) of a suitable vessel AC ground.
- The switchplate mounting template at the end of this manual shows the size of the hole required for a flush-mount installation.

MCP

- Select an MCP mounting location in a dry, well-ventilated area belowdecks away from any heat sources or salt spray.
- Be sure the MCP's front panel will be easily accessible to the user.
- Be sure to leave enough room at the MCP's rear panel for connecting the cables (see Figure 7 for MCP dimensions).
- Since the supplied main control cable and RF control cable are 25 ft (7.6 m) long, the MCP must be located within 25 ft (7.6 m) of the switchplate. Later, you will connect the MCP to the switchplate using these special cables.
- The kitpack contains parts for mounting the MCP either to a horizontal surface (using Velcro) or to a vertical surface (using the supplied flush mount bracket). The MCP mounting template at the end of this manual shows the size of the hole required for a flush-mount installation.

Figure 6: Switchplate Dimensions

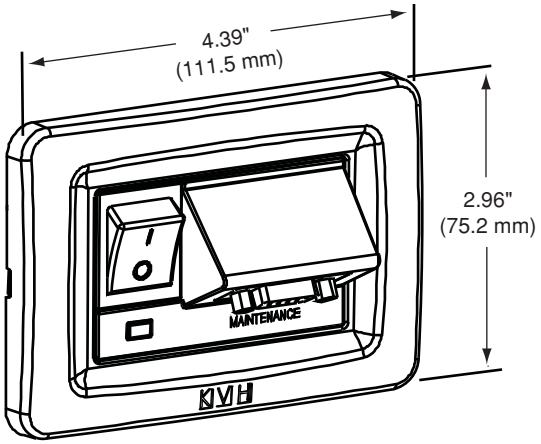
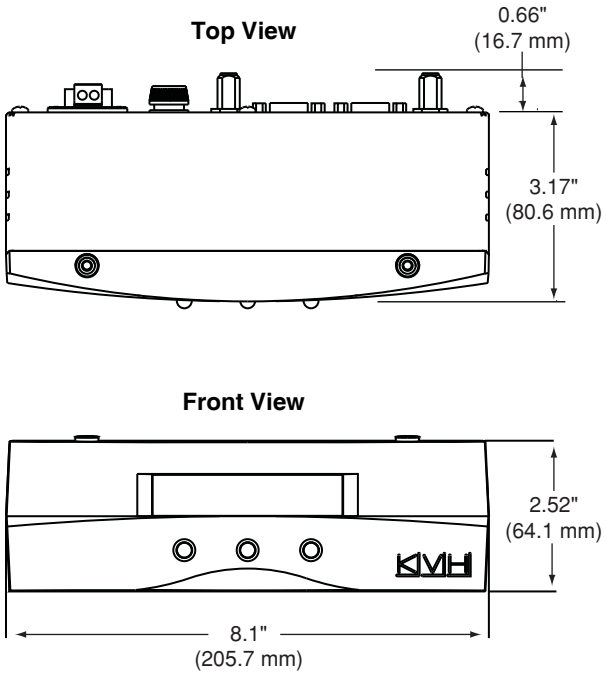


Figure 7: MCP Dimensions



4 Prepare the Belowdecks Sites

Once you have identified suitable mounting sites for the switchplate and MCP, follow these steps to prepare the sites for installation.

Switchplate

a. Using the switchplate mounting template provided at the end of this manual, mark and cut out a hole in the mounting surface to accommodate the switchplate (see Figure 8).

b. Using the same template, mark the locations for the four switchplate mounting holes.

c. Drill a 3/32" (2.25 mm) hole at the four mounting hole locations. Later, you will mount the switchplate using four #6 screws.

MCP (Flush Mount only)

NOTE: Skip this step if you plan to mount the MCP to a horizontal surface instead; proceed to page 7.

a. Attach the supplied flush mount bracket to the MCP now, before you connect any cables. Simply slide the bracket onto the MCP from behind and position the front edge of the bracket over the seam line between the front bezel and the chassis. Secure the bracket in place using two #6-32 screws and washers (see Figure 9).

b. Using the MCP flush mounting template provided at the end of this manual, mark and cut out a hole in the mounting surface to accommodate the flush mount bracket (see Figure 10).

c. Using the same template, mark the locations for the four MCP mounting holes.

d. Using a #29 drill bit, drill a 0.136" (3.45 mm) hole at the four mounting hole locations. Later, you will mount the MCP using four #8 screws.

Figure 8: Switchplate Mounting Holes Layout

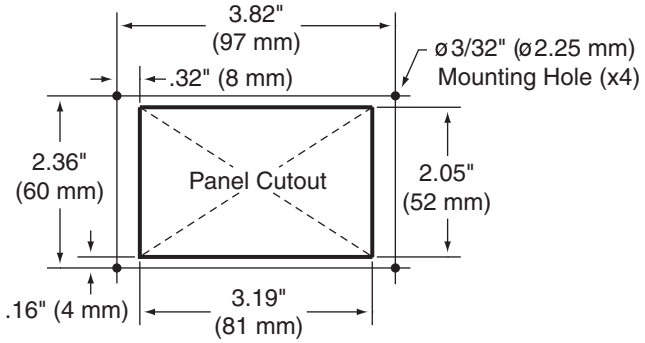


Figure 9: MCP Flush Mount Bracket

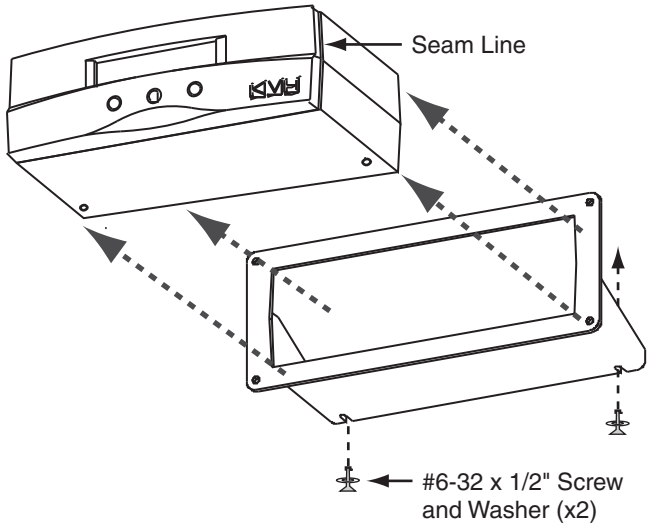
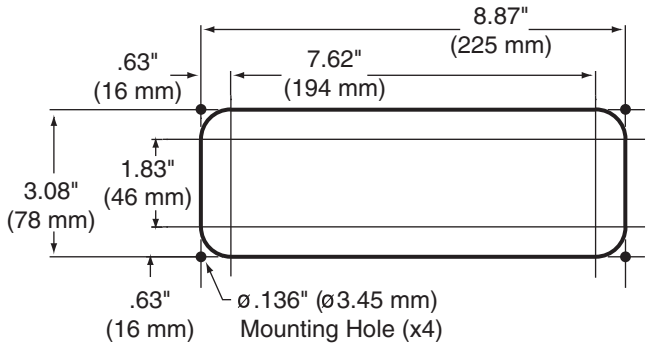


Figure 10: MCP Mounting Holes Layout



5 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.

a. Unfold the antenna mounting template (supplied in the Customer Welcome Kit) and place it onto the mounting surface. Make sure the "FWD" (forward) arrow points toward the bow and is parallel to the vessel's centerline (see Figure 11).

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.*

b. Using a light hammer and center punch, mark the locations for the four mounting holes and cable access hole on the mounting surface in the locations indicated on the template.

c. Drill a 3/8" (10 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.

d. Cut out the 3" (80 mm) cable access hole in the location you marked in Step b. Smooth the edges of the hole to protect the cables. Later, you will route the data, power, and RF cables through this hole and into the vessel.

e. Clean and dry the antenna mounting surface.

f. Peel off the paper backing from the supplied foam seal to expose the adhesive. Then press the foam seal down firmly onto the mounting surface, ensuring the narrow end points toward the bow and the hole in the foam seal aligns with the cable access hole in the mounting surface (see Figure 12).

NOTE: *Apply the foam seal to the vessel mounting surface, not to the antenna's baseplate. You will have difficulty connecting the cables to the antenna if the foam seal is attached to the baseplate.*

Figure 11: Antenna Mounting Holes Layout

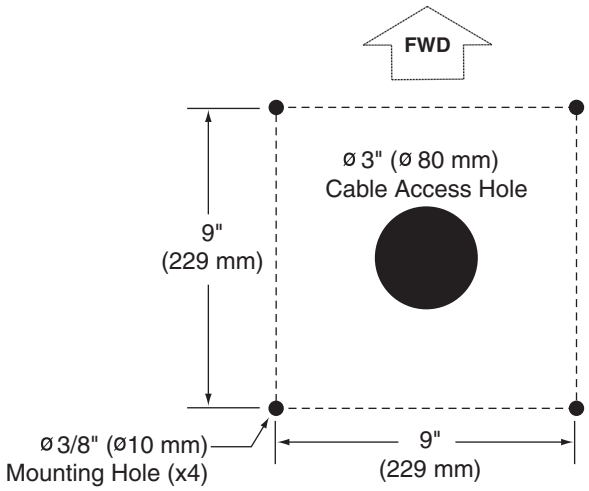


Figure 12: Foam Seal

6 Remove the Restraints

Inside the antenna, a foam block and two bolts prevent the antenna assembly from moving during shipment. Follow these steps to remove these shipping restraints.

a. Remove the three #10-24 Phillips screws securing the radome to the baseplate. Carefully lift the radome straight up until clear of the antenna assembly and set it aside in a safe place.

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

b. Remove the foam block that is wedged beneath the antenna's reflector (see Figure 13). Save this restraint for future use; the customer will need to reinstall it if he/she needs to relocate or reship the antenna.

c. Using a 10 mm socket wrench, remove the two bolts, washers, and spacers securing the antenna assembly to the baseplate (see Figure 14 and Figure 15). Save these restraints for future use.

IMPORTANT!

Once you have removed the restraints, 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 13: Foam Block Shipping Restraint

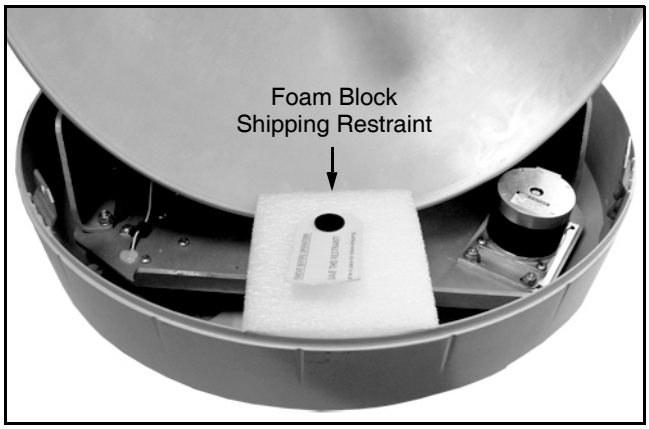


Figure 14: Shipping Restraint Hardware

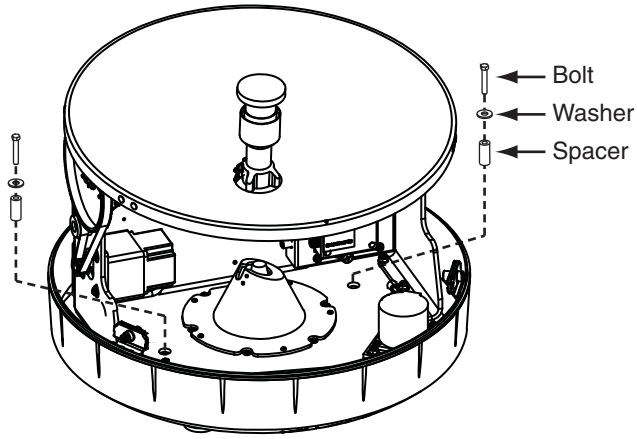
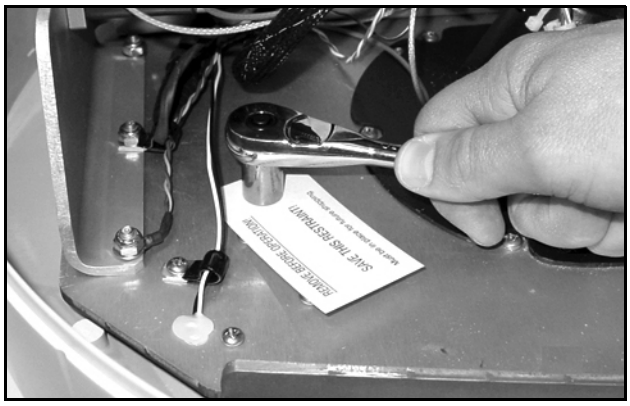


Figure 15: Removing the Shipping Restraint Bolts



7 Wire the Antenna

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

a. First determine the number of RF coax cables you need to connect to the antenna for your particular installation. If you wish to connect just one satellite TV receiver to the TracVision system, you need to connect just one RF cable to the antenna. If you wish to connect two or more receivers to the system, you will need to connect two RF cables. (See Figure 16 to determine the type of cable required.)

b. Route the data, power, and RF cables belowdecks through the 3" (80 mm) cable access hole. Leave an adequate service loop, approximately 8" (20 cm) of slack, in the cables for easy serviceability. Later, you will connect the data and power cables to the switchplate and the RF cable(s) to the receiver(s).

c. Connect the data cable to the "Data" connector on the bottom of the antenna (see Figure 17 and Figure 18). Hand-tighten until the cable locks in place; do not use excessive force.

d. Connect the power cable to the "Power" connector on the bottom of the antenna. Hand-tighten until the cable locks in place; do not use excessive force.

e. Connect an RF coax cable to the "RF1" connector on the bottom of the antenna. Hand-tighten, then tighten with a 7/16" wrench for 1/4 turn to ensure an electrical and weather-proof connection.

f. If you wish to connect two or more receivers, connect a second RF coax cable to the "RF2" connector on the bottom of the antenna. Label both RF cables to match the antenna connectors so that you can easily identify the cables later.

Figure 16: RF Cable Guidelines

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

Figure 17: Connectors on Bottom of Antenna

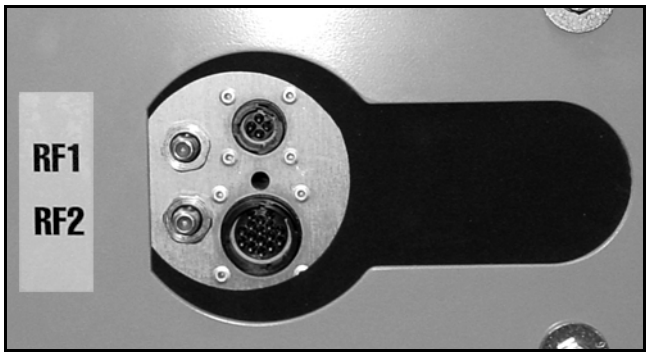
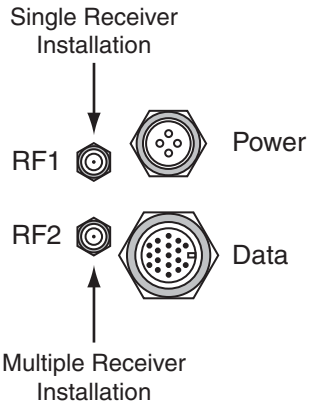


Figure 18: Antenna Cable Connections



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 19).

b. Make sure the four holes in the baseplate line up with the four holes in the mounting surface.

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

c. At each of the four baseplate mounting holes, place a 1/4" flat washer on a 1/4"-20 bolt and insert the bolt into the hole from above (see Figure 20).

d. Secure each mounting bolt to the mounting surface using a 1/4" flat washer and a 1/4"-20 lock nut from below. 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.

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

e. Reinstall the radome onto the antenna. Secure in place with the three #10-24 screws you removed in Step 6a (see Figure 21).

f. Install a protective plastic screw cap (supplied in the kitpack) over each radome screw.

Figure 19: "Forward" Arrow in Antenna Baseplate

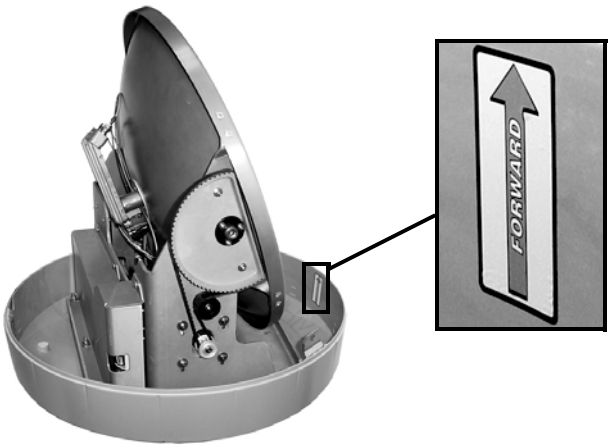


Figure 20: Mounting the Antenna (Side View)

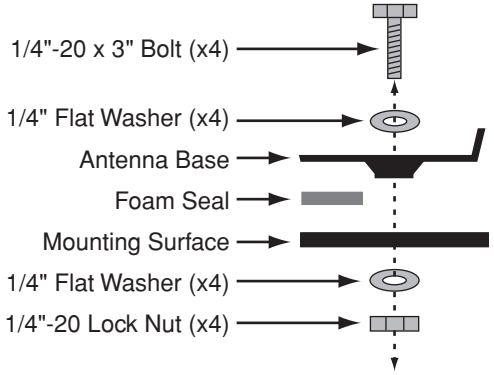
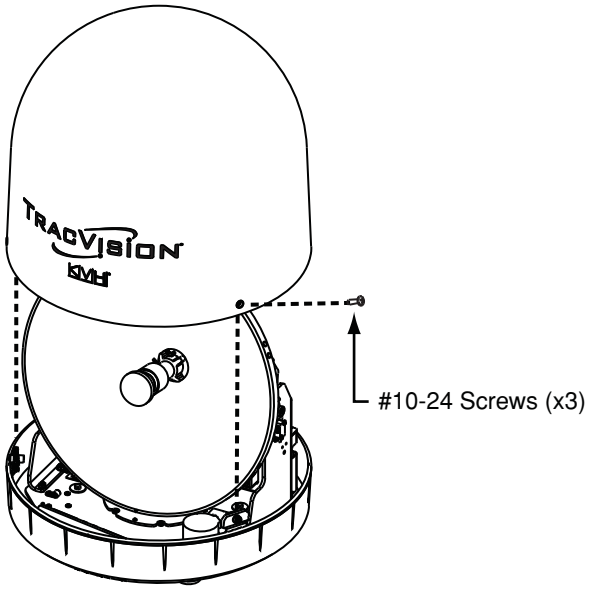


Figure 21: Installing the Radome



9 Wire the Switchplate

Follow these steps to connect the switchplate to the antenna.

a. First dress the data and power cables from the antenna. Strip back the insulation of each wire approximately 1/4" (6 mm) and gently twist each wire to ensure a good electrical connection.

b. Connect the data cable from the antenna to the terminal board on the back of the switchplate (see Figure 22). Be sure to match the wire colors with the terminal board label. Tighten the terminal screws to secure all wires in place.

IMPORTANT!

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

IMPORTANT!

Do not connect the data cable's drain wire (shield) to anything. You can simply snip it from the cable.

c. Connect the power cable from the antenna to the switchplate's power output terminals (see Figure 23). Later, you will also connect a power cable from these terminals to the MCP.

Figure 22: Switchplate Wiring - Antenna Data Cable

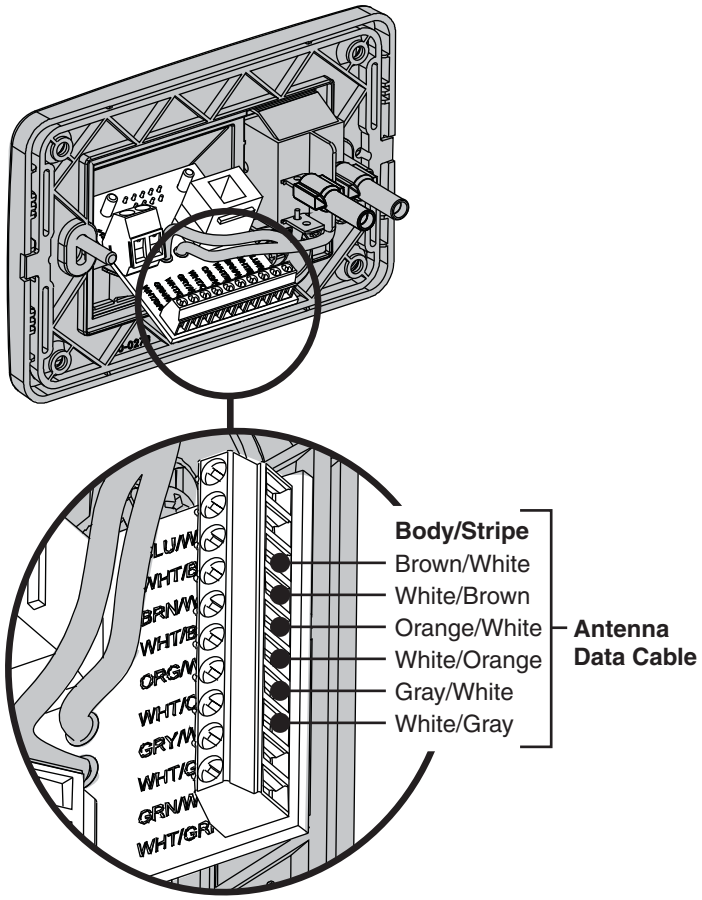
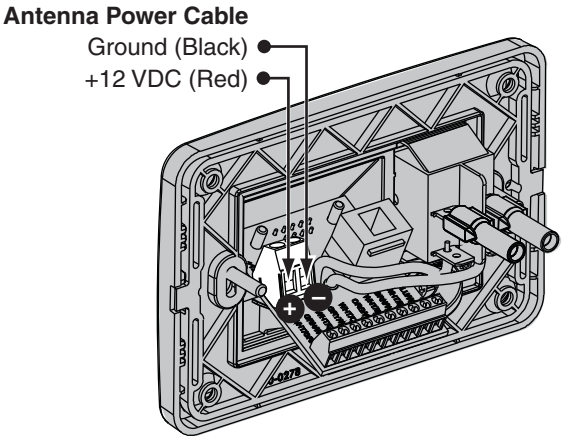


Figure 23: Switchplate Wiring - Antenna Power Cable



10 Wire the MCP and Receivers

Circular and Sky Mexico Systems

If you are installing a **circular** system, or a linear system for **Sky Mexico**, follow these steps to connect the switchplate to the MCP and the antenna to the receiver(s).

TIP: *For DIRECTV Ku-band Tri-Sat service, you will need to install the KVH Tri-Sat AutoSwitch Kit (KVH part #72-0301-07).*

a. Connect the main control cable (DB9-male to DB9-male) from the "Maintenance" port on the front of the switchplate to the "Antenna Unit" connector on the MCP (see Figure 24).

b. Connect the RF control cable (RJ22 to DB9-female) from the RJ22 jack on the back of the switchplate to the "RF Port" connector on the MCP.

c. Connect the RF1 cable from the antenna to the grounding block, as shown in Figure 24. Label this grounding block connector "RF1."

d. If you are connecting multiple receivers, connect the RF2 cable from the antenna to the grounding block. Label this connector "RF2."

e. Attach the supplied ground wire to either ground screw on the grounding block. Connect the other end of the wire to a suitable vessel AC ground.

f. Using the two #6 screws supplied with the grounding block, mount the grounding block inside the vessel.

IMPORTANT!

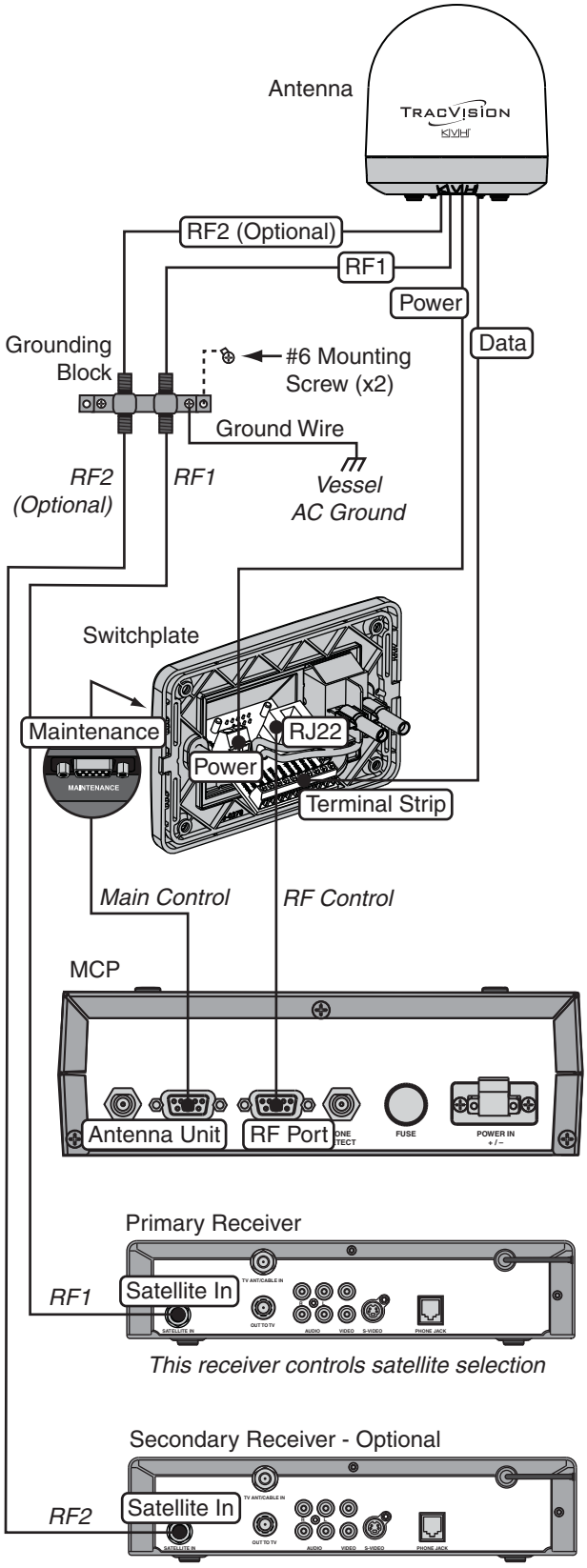
If you wish to connect **three or more** receivers to the antenna, see Appendix A on page 29 (circular) or page 30 (Sky Mexico).

g. Connect the supplied 5-ft RF cable from the "RF1" connector on the grounding block to the "Satellite In" connector on the primary receiver.

h. If you are connecting two receivers, connect an RF cable from the "RF2" connector on the grounding block to the "Satellite In" connector on the secondary receiver.

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

Figure 24: MCP and Receiver Wiring



10 Wire the MCP and Receivers

Linear Systems

If you are installing a **linear** system (with the exception of Sky Mexico), follow these steps to connect the switchplate to the MCP and the antenna to the receiver(s).

a. Connect the main control cable (DB9-male to DB9-male) from the "Maintenance" port on the front of the switchplate to the "Antenna Unit" connector on the MCP (see Figure 25).

b. Connect the RF control cable (RJ22 to DB9-female) from the RJ22 jack on the back of the switchplate to the "RF Port" connector on the MCP.

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

NOTE: *The secondary receiver will be able to select channels carried on the satellite that is currently selected by the primary receiver.*

d. Connect the RF1 cable from the antenna to the "Satellite In" connector on the primary receiver.

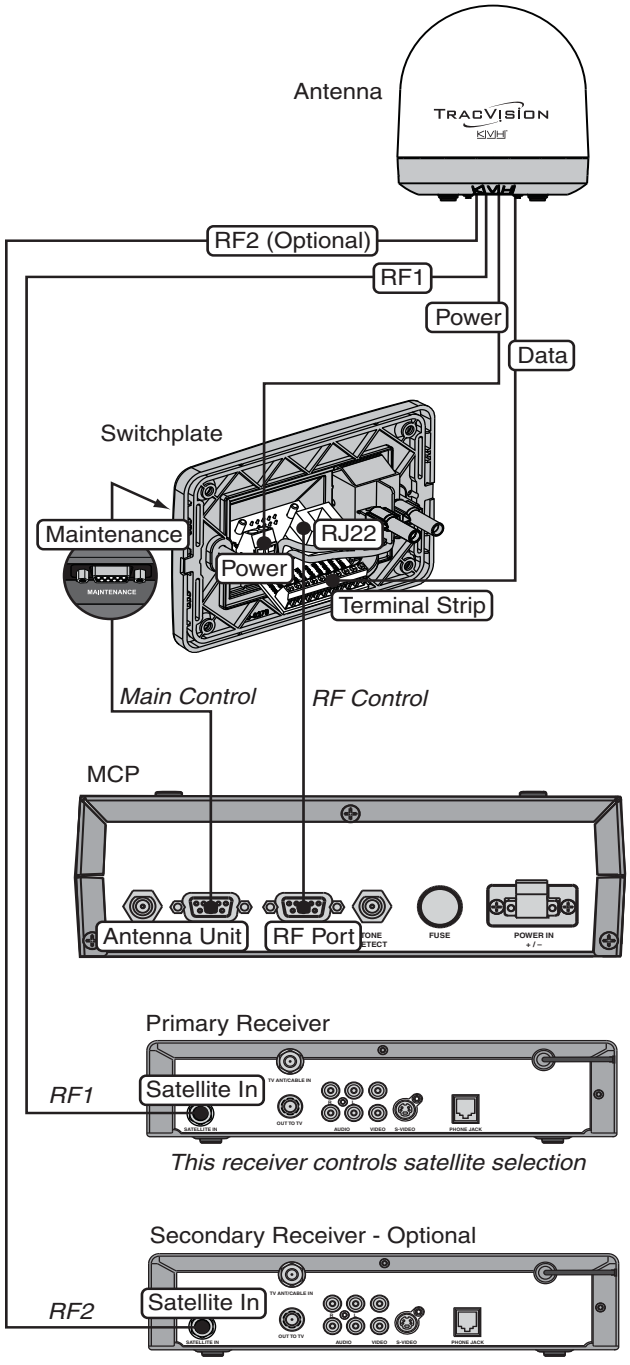
e. If you are connecting two receivers, connect the RF2 cable from the antenna to the "Satellite In" connector on the secondary receiver.

IMPORTANT!

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

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

Figure 25: MCP and Receiver Wiring



11 Connect Power

Follow these steps to connect power. The switchplate supplies power to both the antenna and the MCP.

a. Before you begin, disconnect vessel power.

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

b. Route a set of power wires from the switchplate's power output terminals to the MCP (for cable specifications, see Figure 2 on page 3). Connect the wires to the plastic power plug supplied in the kitpack (see Figure 26).

NOTE: *You should now have two wires connected to each power output terminal on the switchplate: one set of wires to power the antenna and one set to power the MCP.*

c. Tighten the terminal screws on the switchplate to secure all wires in place.

d. Plug the MCP power plug into the "Power In" jack on the MCP (see Figure 27). Secure in place with the retaining screws.

e. Connect a power cable to 12 VDC (4 amps continuous) vessel power (for cable specifications, see Figure 2 on page 3). Route the other end to the switchplate.

> ***IMPORTANT!***
>
> Power supplied to the antenna must not fall below 12 VDC or exceed 16 VDC.

f. Detach the two terminal connectors from the back of the switchplate and crimp them onto the power cable's wires.

g. Connect the power cable wires to the power (+) and ground (-) input terminals on the switchplate (see Figure 28).

Figure 26: MCP Power Plug

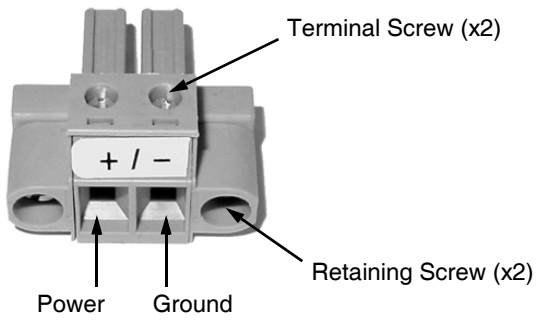


Figure 27: MCP Power Wiring

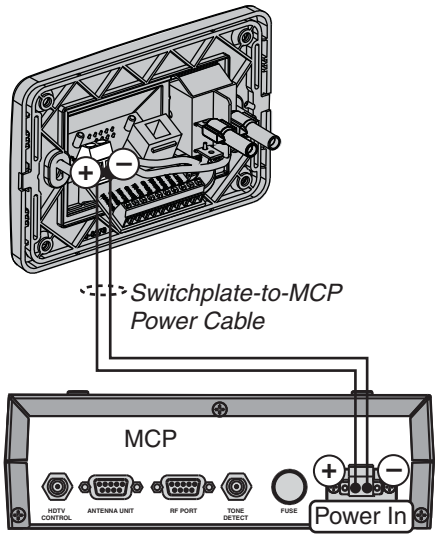
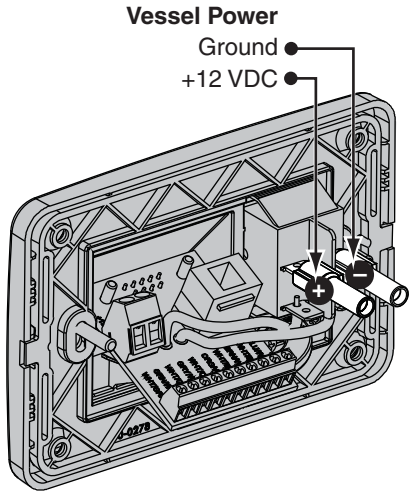


Figure 28: Switchplate Wiring - Vessel Power Cable



12 Mount the Switchplate & MCP

In Step 4, you prepared the mounting sites for the switchplate and MCP. Now follow these steps to mount them.

Switchplate

NOTE: *As an alternative, the switchplate includes two additional mounting holes for installing within an electrical panel. If you chose this option, simply use two of the #6 screws to mount the switchplate to the panel.*

a. Align the four mounting holes in the switchplate with the holes in the mounting surface (see Figure 29).

b. Mount the switchplate to the mounting surface using four #6 screws.

c. Gently snap the front cover onto the switchplate to conceal the mounting screws.

MCP - Velcro Mount Option

a. Clean and dry the bottom of the MCP and the mounting surface (use a mild detergent).

b. Peel the backing from the two supplied Velcro fabric squares and stick them to the bottom of the MCP (see Figure 30).

c. Position the two Velcro hook disks onto the mounting surface. Drill screw holes for the disks and secure in place with #4-24 screws.

d. Press the MCP firmly into place so that the fabric's loop material engages the hook disks.

MCP- Flush Mount Option

a. Make sure the flush mount bracket is attached to the MCP. If it is not attached, disconnect all of the cables from the MCP, attach the bracket as explained in Step 4 on page 6, then reconnect the cables.

b. Insert the MCP and bracket assembly into the mounting hole and secure in place with four #8 screws and washers (see Figure 31).

Figure 29: Mounting the Switchplate

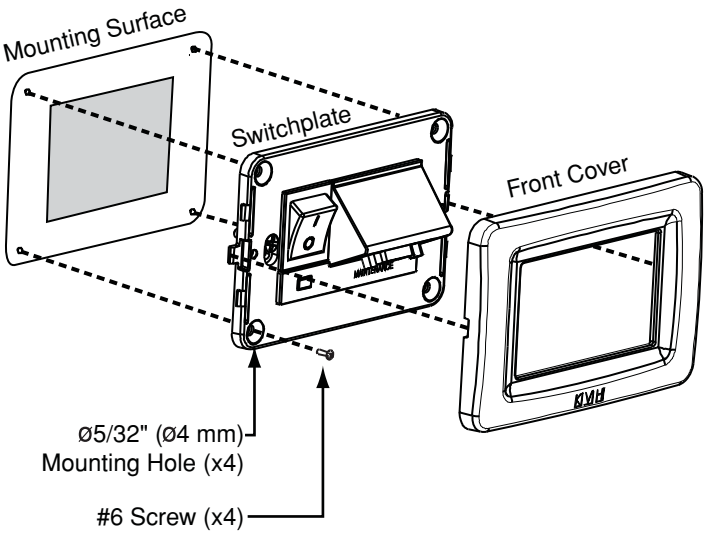


Figure 30: Velcro Mounting the MCP to a Horizontal Surface

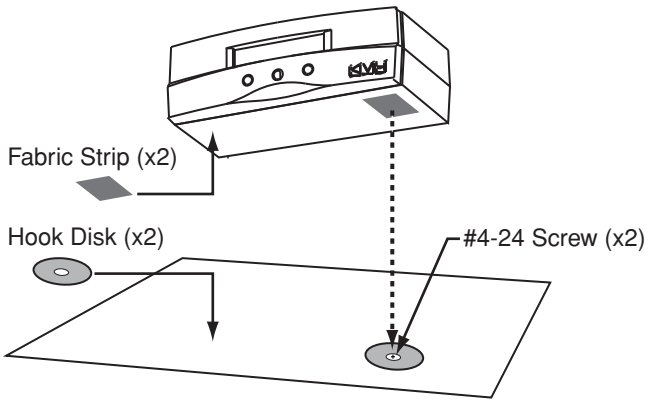
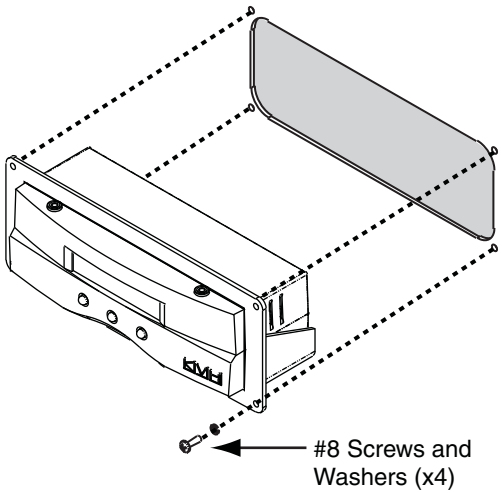


Figure 31: Flush Mounting the MCP to a Vertical Surface



13 Turn On the System

Follow these steps to turn on the TracVision system.

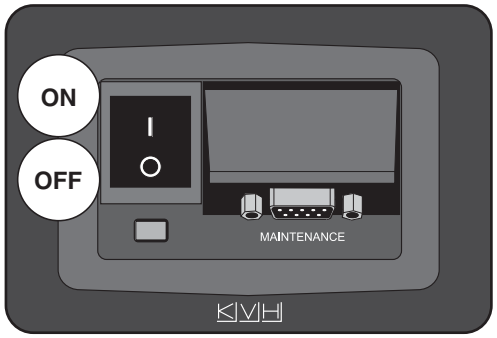
a. Ensure the antenna has a clear, unobstructed view of the sky so it can receive satellite signals.

b. Apply power to the satellite TV receiver(s) and TV(s).

c. Set the switchplate's power switch to the "on" position to apply power to the TracVision system (see Figure 32).

d. Wait one minute for system startup. When the MCP display shows "Set up satellite(s)," proceed to the next step.

Figure 32: Switchplate Power Switch



14 Choose an Operating Mode

Circular Systems Only

If you are installing a **circular** system, choose the appropriate operating mode for your customer's satellite TV service provider and satellite preferences (see Figure 33). You will select this mode in the next step.

DIRECTV

Dual-Sat:
Select this mode for DIRECTV service if you have not installed a Tri-Sat AutoSwitch.

Tri-Sat:
Select this mode if you have a Tri-Sat AutoSwitch installed for DIRECTV Tri-Sat service. Refer to the instructions that came with the kit for additional setup details.

Tri-Sat Pairs:
Do not use for a new installation. This mode is only provided for compatibility with older DIRECTV Tri-Sat configurations that required an HDTV converter instead of a Tri-Sat AutoSwitch.

DISH Network

DISH 1000/61 or DISH 1000/129:
Select one of these modes for DISH Network's three-satellite service (DISH 1000). Use the map in Figure 34 to determine the appropriate mode for your geographic area.

DISH 500:
Select this mode if you wish to receive programming from the 119 and 110 satellites for DISH 500 service.

ExpressVu

Select the ExpressVu service to receive ExpressVu programming from the 91 and 82 satellites.

Custom

If none of the above modes meets your customer's needs, you may select any two satellites from the antenna's built-in library using the Custom service mode.

Figure 33: Satellites Tracked in Each Operating Mode

DIRECTV

Mode	Satellites Tracked
Dual-Sat	101 and 119
Tri-Sat	101, 110, and 119
Tri-Sat Pairs *(Not used)*	101, 110, and 119

DISH Network

Mode	Satellites Tracked
DISH 1000/61	119, 110, and 61
DISH 1000/129	119, 110, and 129
DISH 500	119 and 110

ExpressVu

Mode	Satellites Tracked
ExpressVu	91 and 82

Figure 34: Recommended Areas for DISH 1000 Satellites

15 Select Satellites

Circular Systems - DIRECTV

Follow these steps and refer to the flowchart in Figure 35 to set up the system for a DIRECTV mode (see Step 14 on page 17 for a description of each mode).

a. At "Set up satellite(s)," press the **YES** button on the MCP's front panel.

b. At "Circular or Linear?," press **CIR**.

c. At "Service=DIRECTV," press **YES**.

d. At "Mode=Dual-Sat?," press **NEXT** until the display shows the desired DIRECTV mode. Then press **YES**.

e. At "Set Sat Switch Type," press **AUTO** for automatic satellite switching or **MANUAL** for manual switching. Manual switching is only required if a multiswitch is installed.

NOTE: *Tri-Sat Pairs mode is limited to automatic satellite switching. If you have an HDTV converter installed and want to manually switch satellites, select the Tri-Sat mode and Manual Sat Switch Type.*

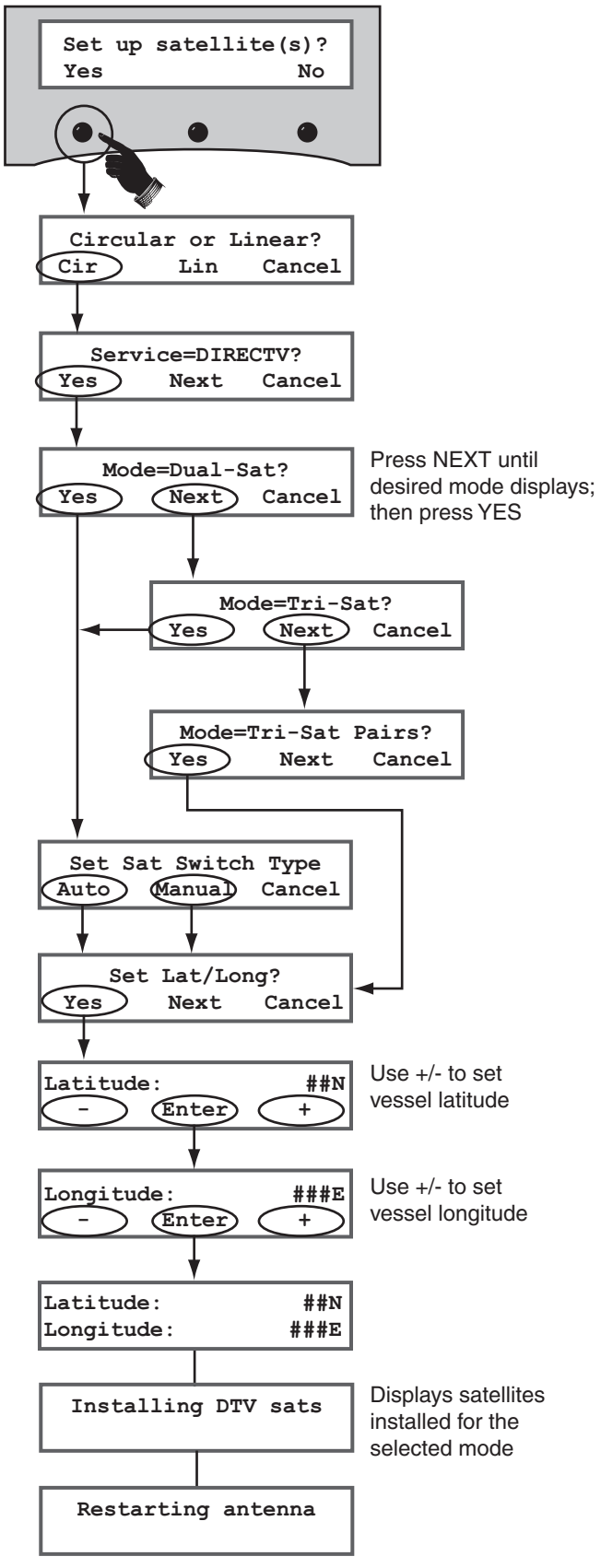
f. At "Set Lat/Long?," press **YES**.

TIP: *You can determine your approximate latitude and longitude in North America from the position grids provided in Appendix C on page 32.*

g. At "Latitude," use the **-** and **+** buttons to set each digit of the vessel's latitude. Press **Enter** to accept each digit.

h. At "Longitude," set the vessel's longitude.

Figure 35: DIRECTV Satellite Selection Menus on MCP



15 Select Satellites

Circular Systems - DISH Network

Follow these steps and refer to the flowchart in Figure 36 to set up the system for a DISH Network mode (see Step 14 on page 17 for a description of each mode).

a. At "Set up satellite(s)," press the **YES** button on the MCP's front panel.

b. At "Circular or Linear?," press **CIR**.

c. At "Service=DIRECTV," press **NEXT** until the display shows "Service=DISH." Then press **YES**.

d. At "Mode=DISH 1000/61?," press **NEXT** until the display shows the desired DISH mode. Then press **YES**.

e. At "Set Sat Switch Type," press **AUTO** for automatic satellite switching or **MANUAL** for manual switching. Manual switching is only required if a multiswitch is installed.

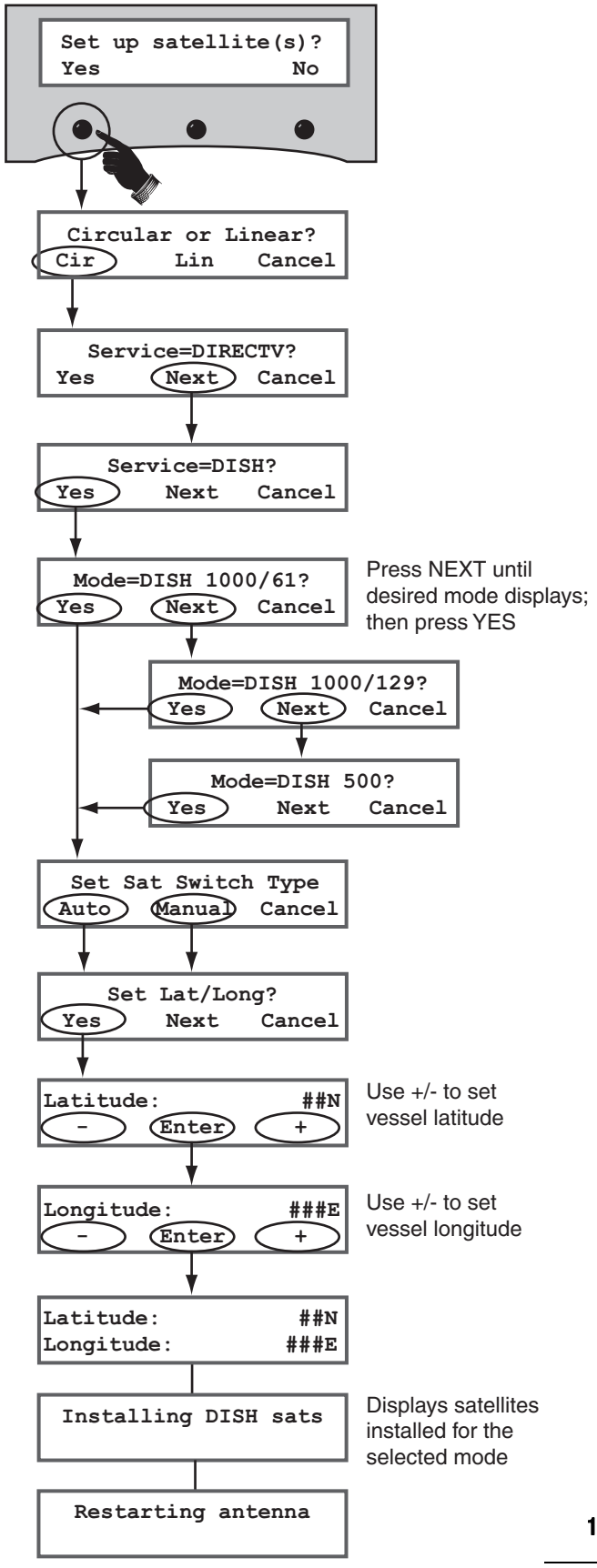
f. At "Set Lat/Long?," press **YES**.

TIP: *You can determine your approximate latitude and longitude in North America from the position grids provided in Appendix C on page 32.*

g. At "Latitude," use the **-** and **+** buttons to set each digit of the vessel's latitude. Press **Enter** to accept each digit.

h. At "Longitude," set the vessel's longitude.

Figure 36: DISH Satellite Selection Menus on MCP



15 Select Satellites

Circular Systems - ExpressVu

Follow these steps and refer to the flowchart in Figure 37 to set up the system for ExpressVu. The antenna will track ExpressVu's 91 and 82 satellites.

a. At "Set up satellite(s)," press the **YES** button on the MCP's front panel.

b. At "Circular or Linear?," press **CIR**.

c. At "Service=DIRECTV," press **NEXT** until the display shows "Service=ExpressVu." Then press **YES**.

d. At "Set Sat Switch Type," press **AUTO** for automatic satellite switching or **MANUAL** for manual switching. Manual switching is only required if a multiswitch is installed.

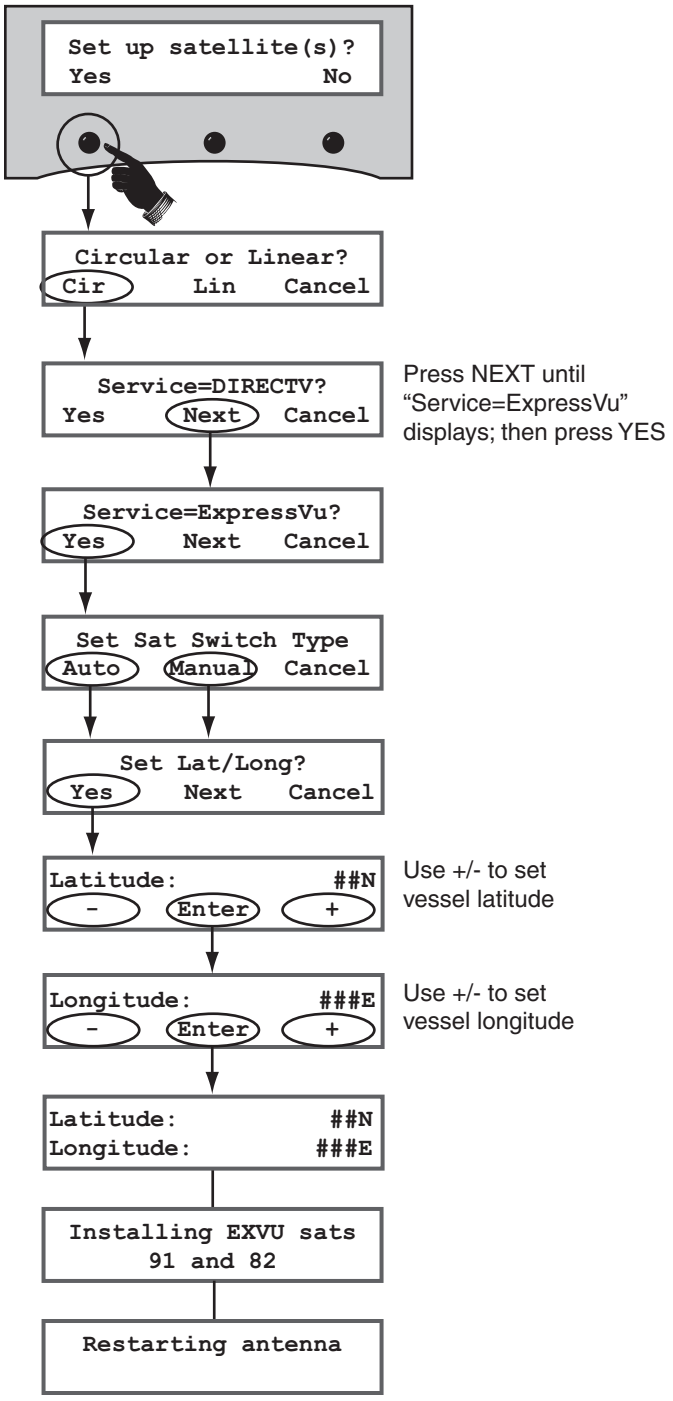
e. At "Set Lat/Long?," press **YES**.

TIP: *You can determine your approximate latitude and longitude in North America from the position grids provided in Appendix C on page 32.*

f. At "Latitude," use the **-** and **+** buttons to set each digit of the vessel's latitude. Press **Enter** to accept each digit.

g. At "Longitude," set the vessel's longitude.

Figure 37: ExpressVu Satellite Selection Menus on MCP



15 Select Satellites

Circular Systems - Custom Pair

Follow these steps and refer to the flowchart in Figure 38 to set up the system for a custom pair of satellites from the antenna's library.

a. At "Set up satellite(s)," press the **YES** button on the MCP's front panel.

b. At "Circular or Linear," press **CIR**.

c. At "Service=DIRECTV," press **NEXT** until the display shows "Service=Custom." Then press **YES**.

d. At "Install A <SAT NAME>", press **NEXT** until the display shows the first (primary) satellite you want to select. Then press **YES**. (See Appendix B on page 31 for a list of available satellites.)

NOTE: *If you don't find the satellite you want, you can set up user-defined satellites. Refer to the associated Application Note on the KVH Partner Portal (KVH-authorized technicians only).*

e. Repeat Step d to select the second satellite. If you want to set up the antenna to track just one satellite, select "None" instead.

f. At "Set Lat/Long?," press **YES**.

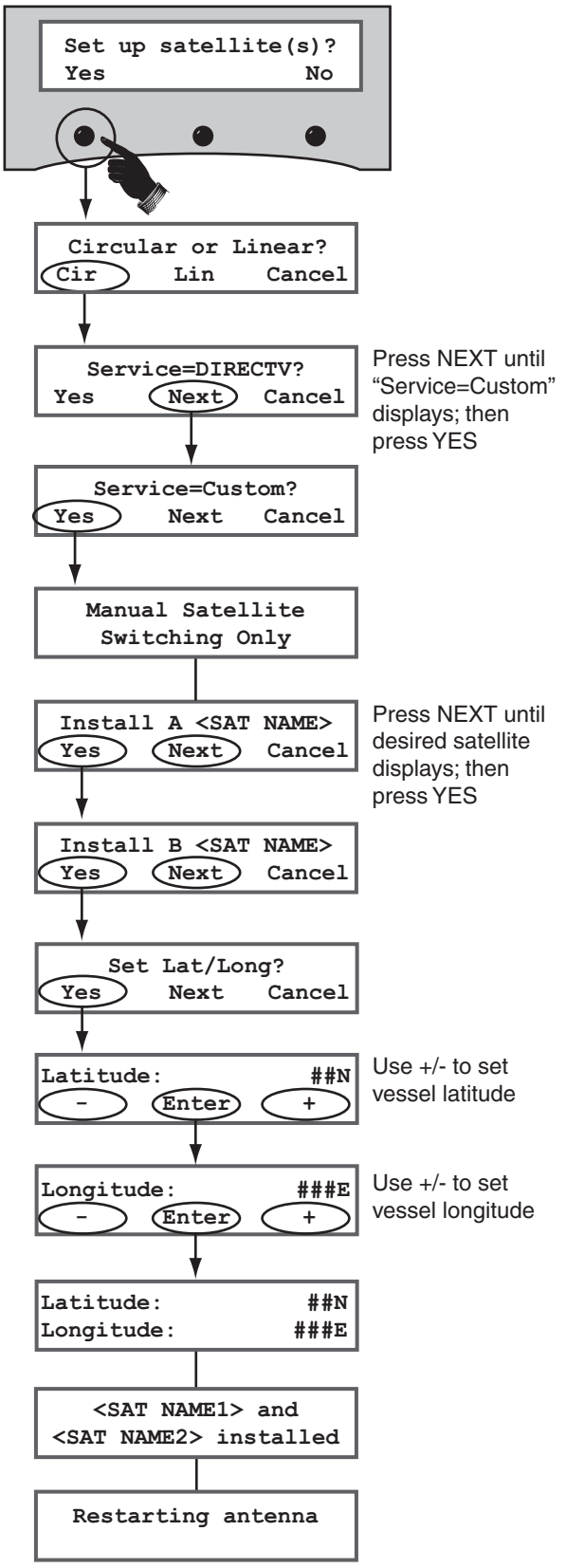
TIP: *You can determine your approximate latitude and longitude in North America from the position grids provided in Appendix C on page 32.*

g. At "Latitude," use the **-** and **+** buttons to set each digit of the vessel's latitude. Press **Enter** to accept each digit.

h. At "Longitude," set the vessel's longitude.

NOTE: *The customer will need to use the buttons on the MCP's front panel to manually switch between satellites.*

Figure 38: Custom Pair Satellite Selection Menus on MCP



15 Select Satellites

Linear Systems - Tri-Sat Group

Follow these steps and refer to the flowchart in Figure 39 to set up the system for one of the following European Trisat groups:

Group	Satellites		
	Sat. A	Sat. B	Sat. C
Europe WB	HotbirdWB	Astra1	Astra2S
Europe	Hotbird	Astra1	Astra2S
Scandinavia	HotbirdWB	Sirius	Thor

a. At "Set up satellite(s)," press the **YES** button on the MCP's front panel.

b. At "Circular or Linear?," press **LIN**.

c. At "Trisat Mode?," press **YES**.

d. At "Install Europe WB?," press **NEXT** until the display shows the Tri-Sat group you want to select. Then press **YES**.

e. At "Set Sat Switch Type," press **AUTO** for automatic satellite switching *(recommended)* or **MANUAL** for manual switching.

f. At "Set Lat/Long?," press **YES**.

TIP: *You can determine approximate latitude and longitude in Europe from the position grids provided in Appendix C on page 32.*

g. At "Latitude," use the **-** and **+** buttons to set each digit of the vessel's latitude. Press **Enter** to accept each digit.

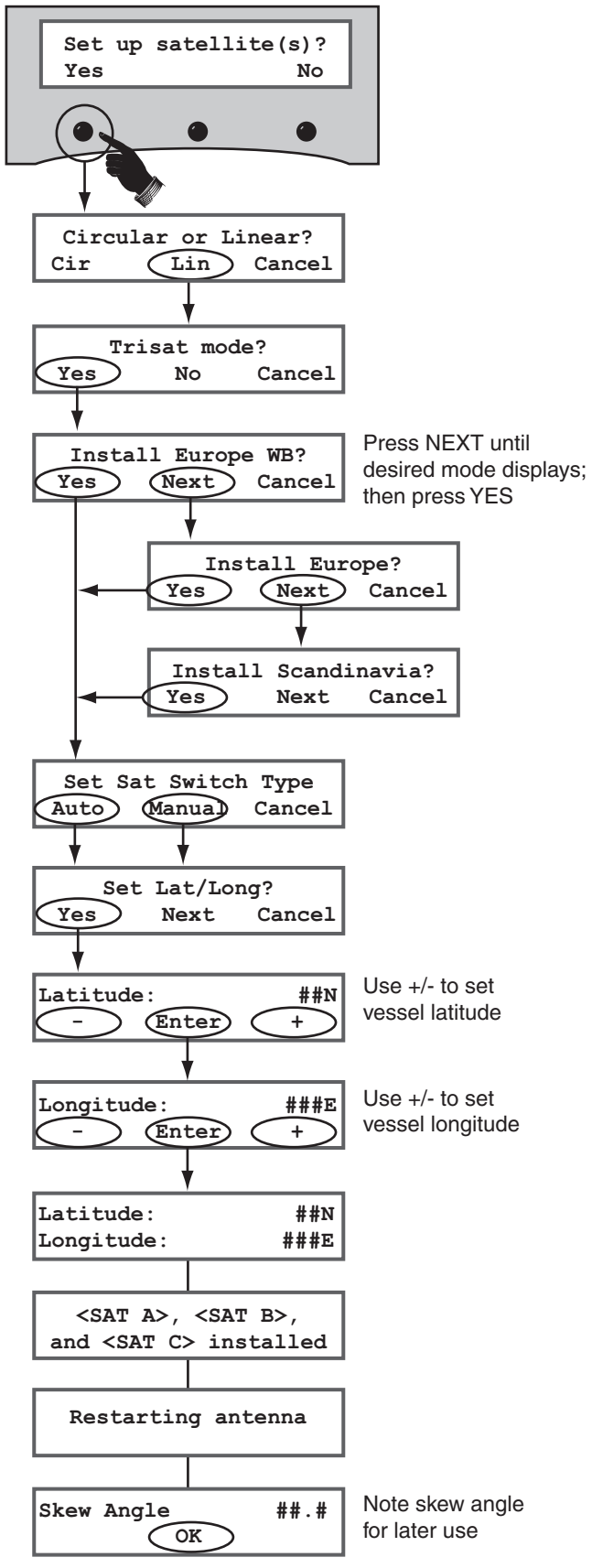
h. At "Longitude," set the vessel's longitude.

i. After the antenna restarts, at "Skew Angle," note the reported skew angle for future reference. Then press **OK**. You will set the LNB to this skew angle later.

j. Set up the receiver(s) for the same satellites, and in the same order, as the antenna:

Antenna	Receiver	DiSEqC
Sat. A	Alternative 1 or A	DiSEqC 1
Sat. B	Alternative 2 or B	DiSEqC 2
Sat. C	Alternative 3 or C	DiSEqC 3

Figure 39: European Trisat Group Selection Menus on MCP



15 Select Satellites

Linear Systems - Custom Pair

Follow these steps and refer to the flowchart in Figure 40 to set up the system for a custom pair of satellites from the antenna's library.

a. At "Set up satellite(s)," press the **YES** button on the MCP's front panel.

b. At "Circular or Linear," press **LIN**.

c. At "Trisat Mode?," press **NO**.

d. At "Install A <SAT NAME>," press **NEXT** until the display shows the first (primary) satellite you want to select. Then press **YES**. (See Appendix B on page 31 for a list of available satellites.)

NOTE: *If you don't find the satellite you want, you can set up user-defined satellites. Refer to the associated Application Note on the KVH Partner Portal (KVH-authorized technicians only).*

e. Repeat Step d to select the second satellite. If you want to set up the antenna to track just one satellite, select "None" instead.

f. At "Set Sat Switch Type," press **AUTO** for automatic satellite switching *(recommended)* or **MANUAL** for manual switching.

g. At "Set Lat/Long?," press **YES**.

TIP: *You can determine approximate latitude and longitude in Europe from the position grids provided in Appendix C on page 32.*

h. At "Latitude," use the **-** and **+** buttons to set each digit of the vessel's latitude. Press **Enter** to accept each digit.

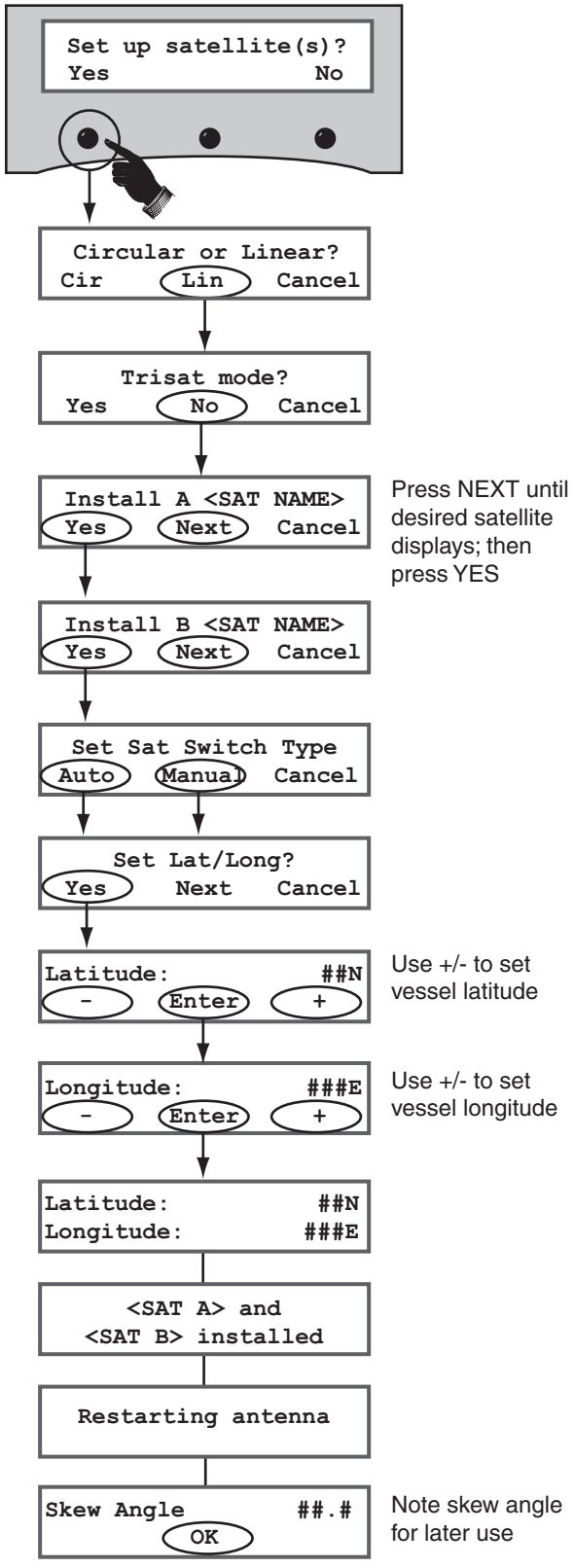
i. At "Longitude," set the vessel's longitude.

j. After the antenna restarts, at "Skew Angle," note the reported skew angle for future reference. Then press **OK**. You will set the LNB to this skew angle later.

k. Set up the receiver(s) for the same satellites, and in the same order, that you set them up in the antenna:

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

Figure 40: Custom Pair Satellite Selection Menus on MCP



16 Set the LNB Skew Angle

Linear Systems Only

Follow these steps to set the antenna's linear LNB to the skew angle you noted earlier.

a. Turn off and unplug the receiver(s).

b. Disconnect antenna power at the switchplate.

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

c. Remove the antenna's radome, if you reinstalled it earlier in Step 8e.

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

d. Locate the LNB on the back of the antenna's reflector (see Figure 41).

e. Using a 2 mm allen hex key, loosen the two M4 socket set screws securing the LNB to the reflector (see Figure 42).

f. Adjust the LNB clockwise or counter-clockwise until the skew arrow on the LNB points to the skew angle you noted earlier (see Figure 43). If the skew angle is greater than +15°, subtract 180 to get the equivalent negative skew angle and set the LNB to that angle instead (for example, +35 = -145).

> ***IMPORTANT!***
>
> Be sure to keep the LNB 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 Nm) of torque, if possible.

h. Reinstall the radome (as explained in Steps 8e-f on page 10).

Figure 41: LNB Location on Back of Antenna's Reflector

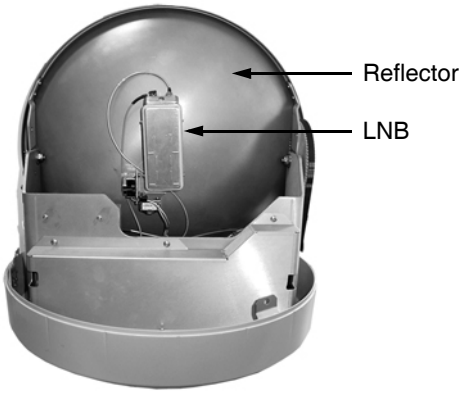


Figure 42: Set Screws Securing the LNB to the Reflector

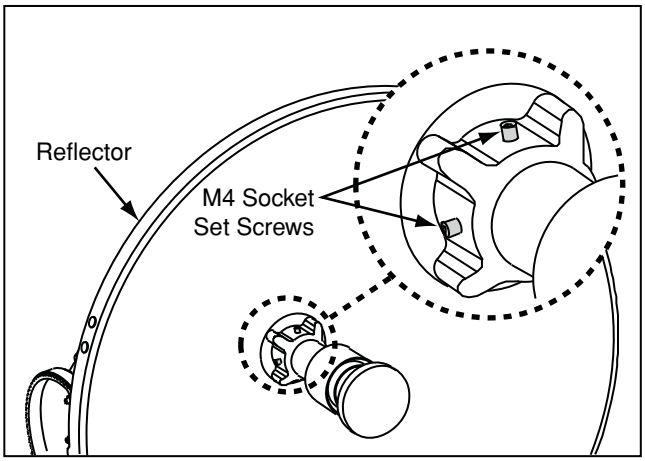
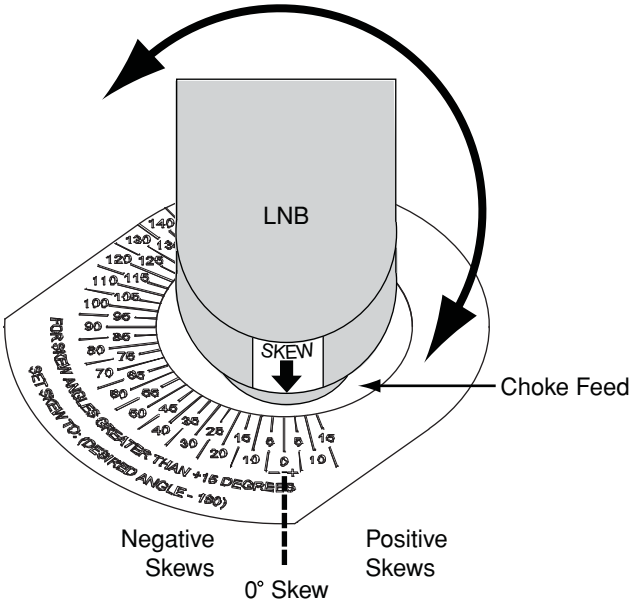


Figure 43: LNB Skew Angle Adjustment



17 Run a Check Switch Test

DISH Network or ExpressVu Only

If you set up the system for **DISH Network** or **ExpressVu**, follow these steps to run the receiver's Check Switch test to configure the receiver for the desired satellites.

IMPORTANT!

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

NOTE: *If you are connecting multiple receivers, repeat this process for each additional receiver. You will need to connect each receiver, one at a time, to the "RF1" cable and perform the steps below. Then, once you have completed this process for each receiver, you can reconnect them as desired.*

a. Dock the vessel and ensure the antenna has an unobstructed view of the sky.

b. Ensure the receiver is connected to the "RF1" cable (see Figure 24 on page 12 (circular/Sky Mexico) or Figure 25 on page 13 (linear)).

c. Apply power to the TV and receiver. (If the antenna is turned off, turn it back on and wait until the MCP shows "Tracking.")

d. Using the receiver remote, go to the "Point Dish/Signal Strength" screen (press MENU, 6, 1, 1 on most models).

e. Choose **Check Switch**, then press SELECT.

f. Choose **Test**, then press SELECT.

IMPORTANT!

Please be patient. The Check Switch test takes approximately 15 minutes to complete. Disregard any messages on the TV; they do not correctly indicate the status of the test.

g. When the MCP no longer shows "Check Switch Running," refer to the tables in Figure 44 to verify the values displayed on your TV match those required for your selected service. **If your values do not match:** Turn off the antenna, then turn it back on and repeat Steps d-f. When the MCP shows "Please Run Check Switch," repeat Steps d-f again to run a second Check Switch.

h. Exit the menu and allow the receiver to download the program guide.

Figure 44: Expected Check Switch Results Displayed on TV

DISH 1000/129 Results

Port	**1**	**2**	**3**
Satellite	119	110	129
Trans	OK	OK	OK
Status	Reception Verified		
Switch	SW64		

DISH 1000/61 Results

Port	**1**	**2**	**3**
Satellite	119	110	61
Trans	OK	OK	OK
Status	Reception Verified		
Switch	SW64		

DISH 500 Results

Input	**1**	**1**	**2**	**2**
Satellite	119	119	110	110
Polarity	Odd	Even	Odd	Even
Status	Reception Verified			
Switch	SW42			

ExpressVu Results*

Input	**1**	**1**	**2**	**2**
Satellite	91	91	82	82
Polarity	Odd	Even	Odd	Even
Status	Reception Verified			
Switch	SW21			

* If you installed just one ExpressVu satellite, the TV will show an error message instead. This is normal.

18 Educate the Customer

The installation process is complete! Before you leave the vessel, test the system to verify the antenna works properly. Then give the Customer Welcome Kit to the customer and explain how to use the system. Also be sure the customer understands the following:

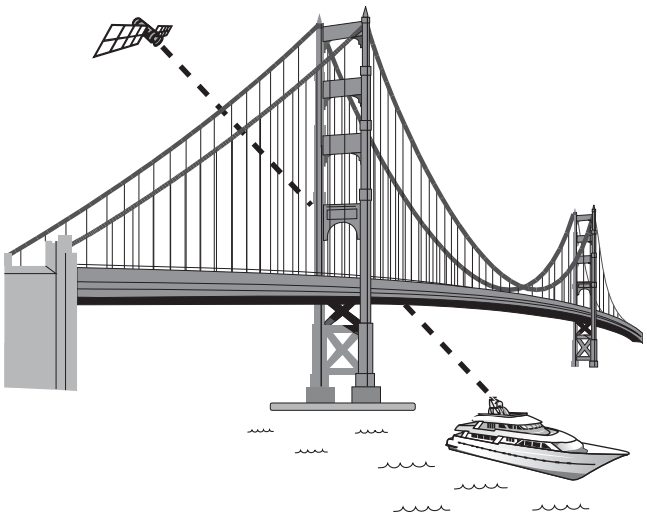
- Keep the radome installed on the antenna at all times. The radome protects the antenna's moving parts from wind, rain, and debris.

WARNING

It is dangerous to watch TV while piloting a vessel. While under way, the system is intended for passenger entertainment only.

- The antenna must have a clear view of the sky to receive satellite TV. Common causes of blockage include trees, buildings, bridges, and onboard equipment (see Figure 45).
- Heavy rain or snow may temporarily interrupt reception.
- Clean the antenna regularly. Dirt buildup on the radome can affect reception.
- The vessel must be located within the selected satellite's coverage area to receive its satellite TV signals. To view satellite coverage maps, visit ***www.kvh.com/footprint***.
- **(DISH 1000 only)** You may need to change the operating mode when traveling between regions. Refer to the *User's Guide* for details.
- Please register the system with KVH. The registration process is quick, easy, online, and ensures the best possible service from KVH. Visit ***www.kvh.com/register*** or refer to the Product Registration Form for details.
- You need to activate the receiver for the desired satellite TV service before the receiver can decode satellite signals. KVH can help activate a DIRECTV or DISH receiver; just call KVH's Activation Department at **1-866-551-8004** for DIRECTV or **1-866-399-8509** for DISH
- Refer to the *User's Guide* for complete operation and troubleshooting information.

Figure 45: Example of Satellite Blockage



Appendices

This section provides supplemental instructions for wiring multiple receivers. It also provides a list of available satellites, a system wiring diagram, and mounting templates for the belowdecks equipment.

Contents

A Wiring 3+ Receivers

Circular Systems

IMPORTANT!

Only circular and Sky Mexico systems can support more than two receivers.

To connect three or more receivers to a **circular** system, follow these steps to install an Eagle Aspen multiswitch (KVH part #72-0310) between the grounding block and the receivers, as shown in Figure 46.

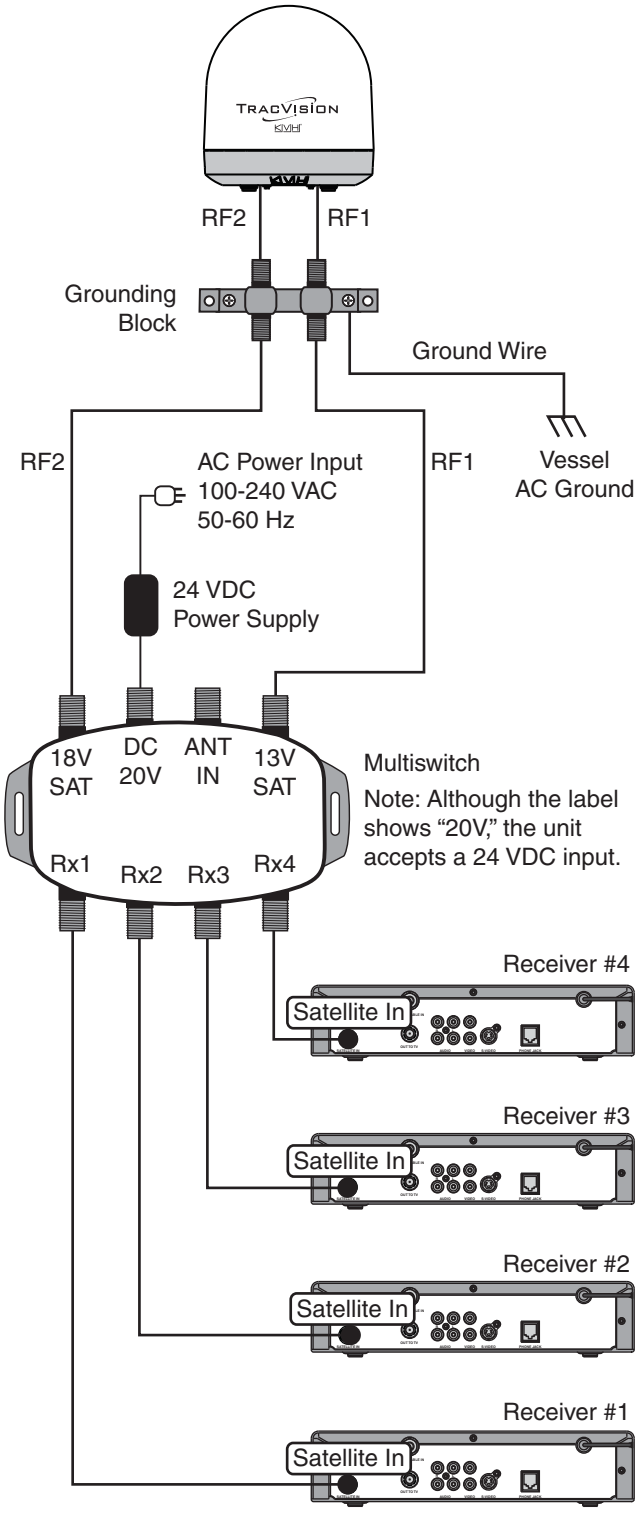
1. Connect an RF cable from the "RF1" connector on the grounding block to the "13V" connector on the multiswitch.
2. Connect an RF cable from the "RF2" connector on the grounding block to the "18V" connector on the multiswitch.
3. Connect the receivers to the individual outputs of the multiswitch.
4. Connect the receivers to the customer'sTVs.

The use of a multiswitch interrupts satellite switching communications between the receiver and antenna. As a result, you will need to use one of the following methods for satellite switching:

Automatic Switching for DIRECTV Ku-band Tri-Sat: To switch automatically between three satellites using a DIRECTV H21-200 or H20-600 receiver, you will need to install the KVH Tri-Sat AutoSwitch Kit (KVH part #72-0301-07).

Manual Switching (Tri-Sat or Dual-Sat): To manually switch between two or three selected satellites, use the buttons on the MCP's front panel (see the *User's Guide* for details).

Figure 46: Multiswitch Wiring - Antenna with Circular Dual LNB



A Wiring 3+ Receivers

Sky Mexico Systems

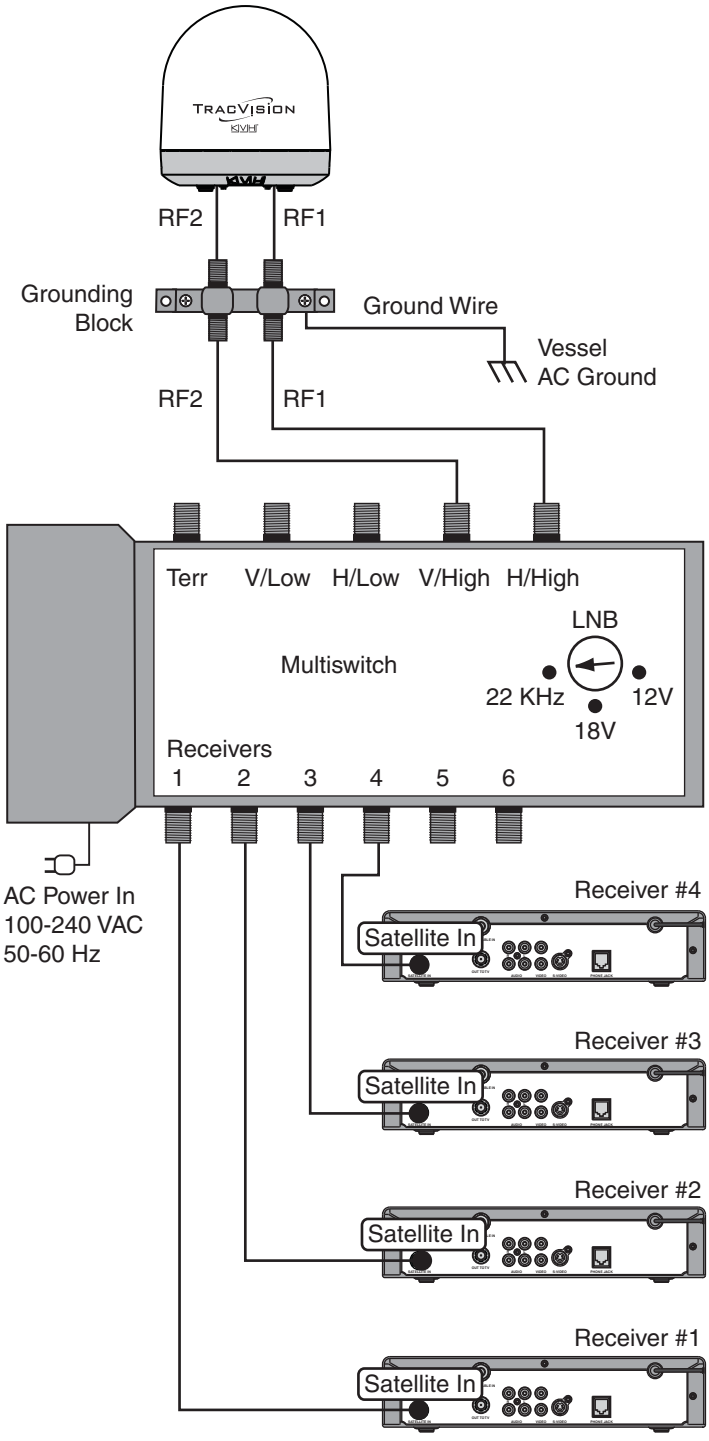
IMPORTANT!

Only circular and Sky Mexico systems can support more than two receivers.

To connect three or more receivers to a system configured for **Sky Mexico**, follow these steps to install a Spaun model SMS 5602 NF multiswitch (KVH part #19-0413) between the grounding block and the receivers, as shown in Figure 47.

1. Connect an RF cable from the "RF1" connector on the grounding block to the "H/High" (Horizontal High) connector on the multiswitch.
2. Connect an RF cable from the "RF2" connector on the grounding block to the "V/High" (Vertical High) connector on the multiswitch.
3. Set the multiswitch's LNB knob to "22 KHz." *At this setting, the multiswitch will provide a constant 22 KHz tone to the antenna's LNB.*
4. Connect the receivers to the individual outputs of the multiswitch.
5. Connect the receivers to the customer'sTVs.

Figure 47: Multiswitch Wiring - Sky Mexico



B Satellite Library

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

North America

Circular LNB Required

Satellite, Longitude	Name in Library
DIRECTV, 72°W	DSS_72
DIRECTV, 101°W	DSS_101
DIRECTV, 110°W	DSS_110
DIRECTV, 119°W	DSS_119
EchoStar, 61°W	ECHO_61
EchoStar, 110°W	ECHO_110
EchoStar, 119°W	ECHO_119
EchoStar, 129°W	ECHO_129
ExpressVu, 82°W	EXPRESSVU
ExpressVu, 91°W	EXPRESSTV

Asia

Circular LNB Required

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

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

Latin America

Galaxy Circular LNB Required

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

Europe

Linear LNB Required

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

Mexico

Linear LNB Required

Satellite	Name in Library
PAS 9, 58°W	PAS_9

Australia & New Zealand

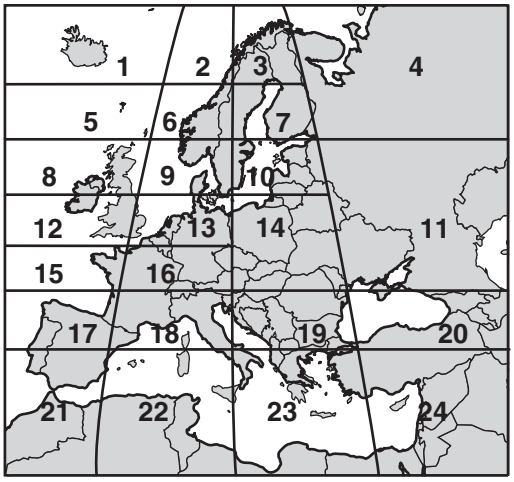
Linear LNB Required

Satellite	Name in Library
Optus D1, 160°E	OPTUS_D1
Optus C1, 156°E	OPTUS_C1

C Position Grids

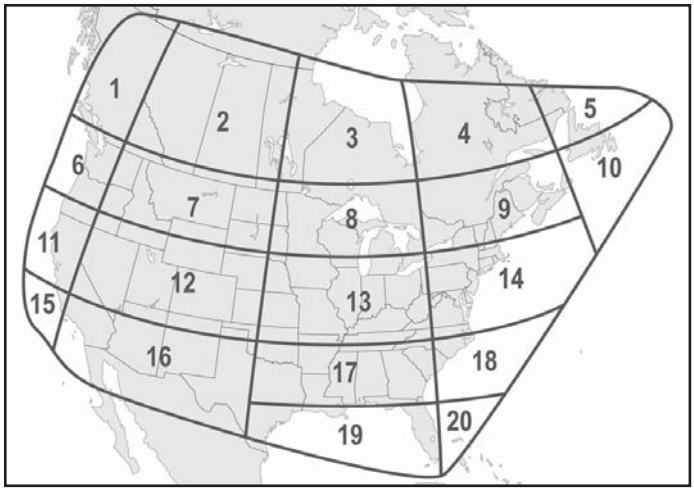
If the vessel is located in Europe or North America, you may use the appropriate grid and table below to determine your approximate latitude and longitude.

Europe



Grid #	Latitude	Longitude
1	67° N	7° W
2	67° N	7° E
3	67° N	22° E
4	65° N	45° E
5	63° N	7° W
6	63° N	7° E
7	63° N	22° E
8	57° N	7° W
9	57° N	7° E
10	57° N	22° E
11	55° N	40° E
12	53° N	7° W
13	53° N	7° E
14	50° N	22° E
15	47° N	7° W
16	47° N	7° E
17	43° N	7° W
18	43° N	7° E
19	43° N	22° E
20	43° N	37° E
21	36° N	7° W
22	36° N	7° E
23	36° N	22° E
24	36° N	37° E

North America

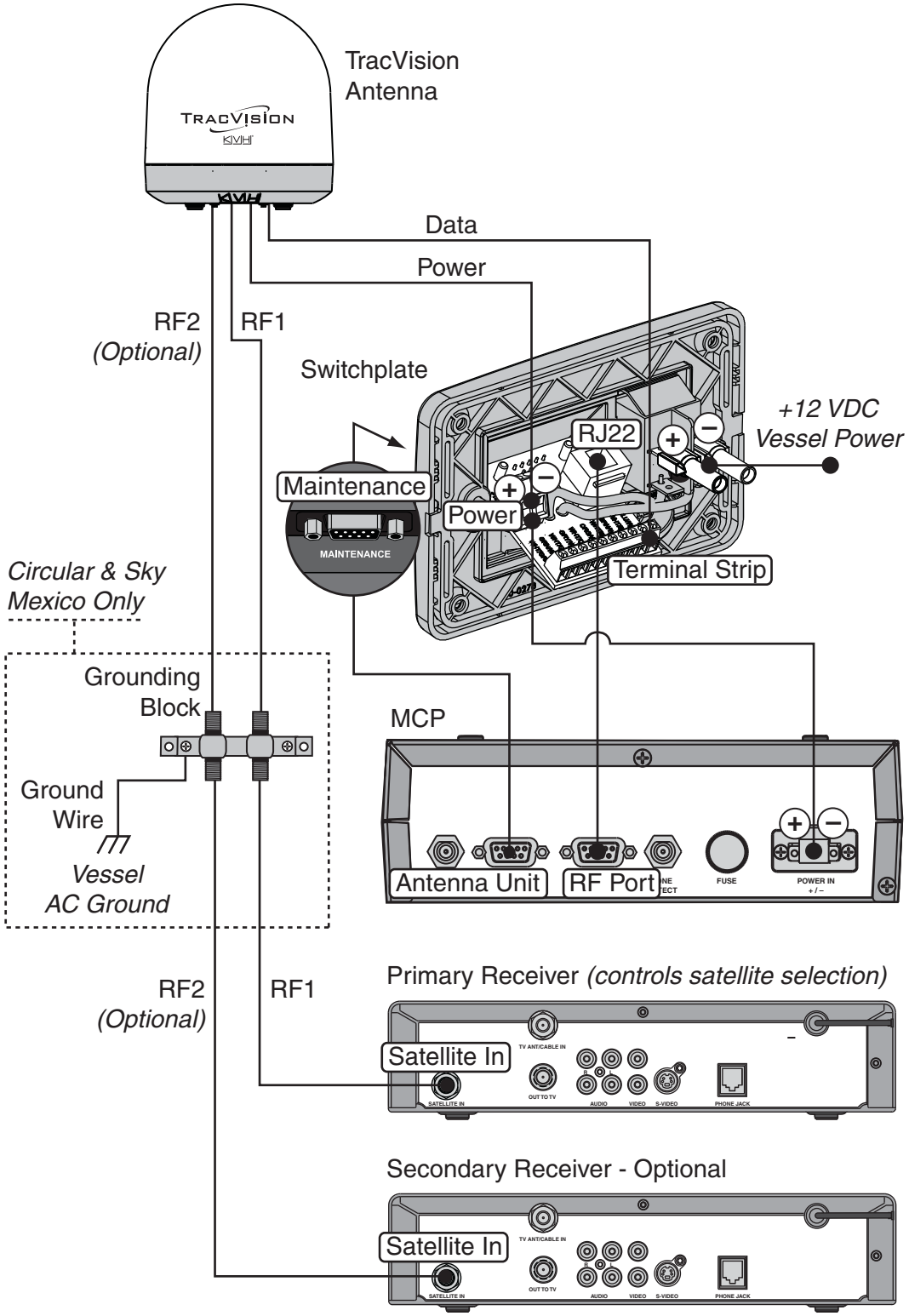


Grid #	Latitude	Longitude
1	55° N	125° W
2	55° N	110° W
3	55° N	90° W
4	55° N	70° W
5	55° N	55° W
6	45° N	125° W
7	45° N	110° W
8	45° N	90° W
9	45° N	70° W
10	45° N	50° W
11	40° N	125° W
12	40° N	110° W
13	40° N	90° W
14	40° N	70° W
15	32° N	125° W
16	32° N	110° W
17	32° N	90° W
18	32° N	75° W
19	27° N	83° W
20	27° N	78° W

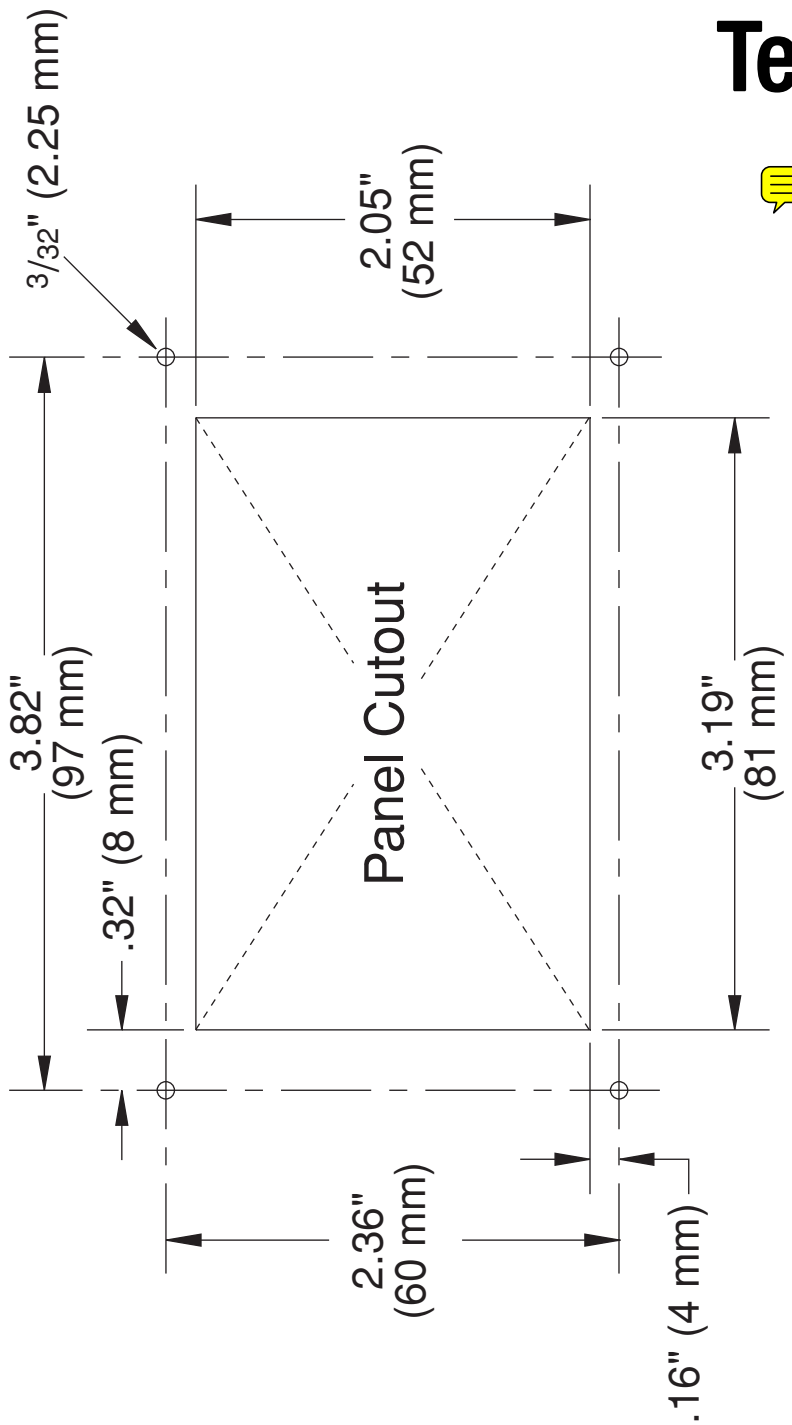
D Basic System Wiring Diagram

This wiring diagram shows a basic system configuration of one or two receivers.

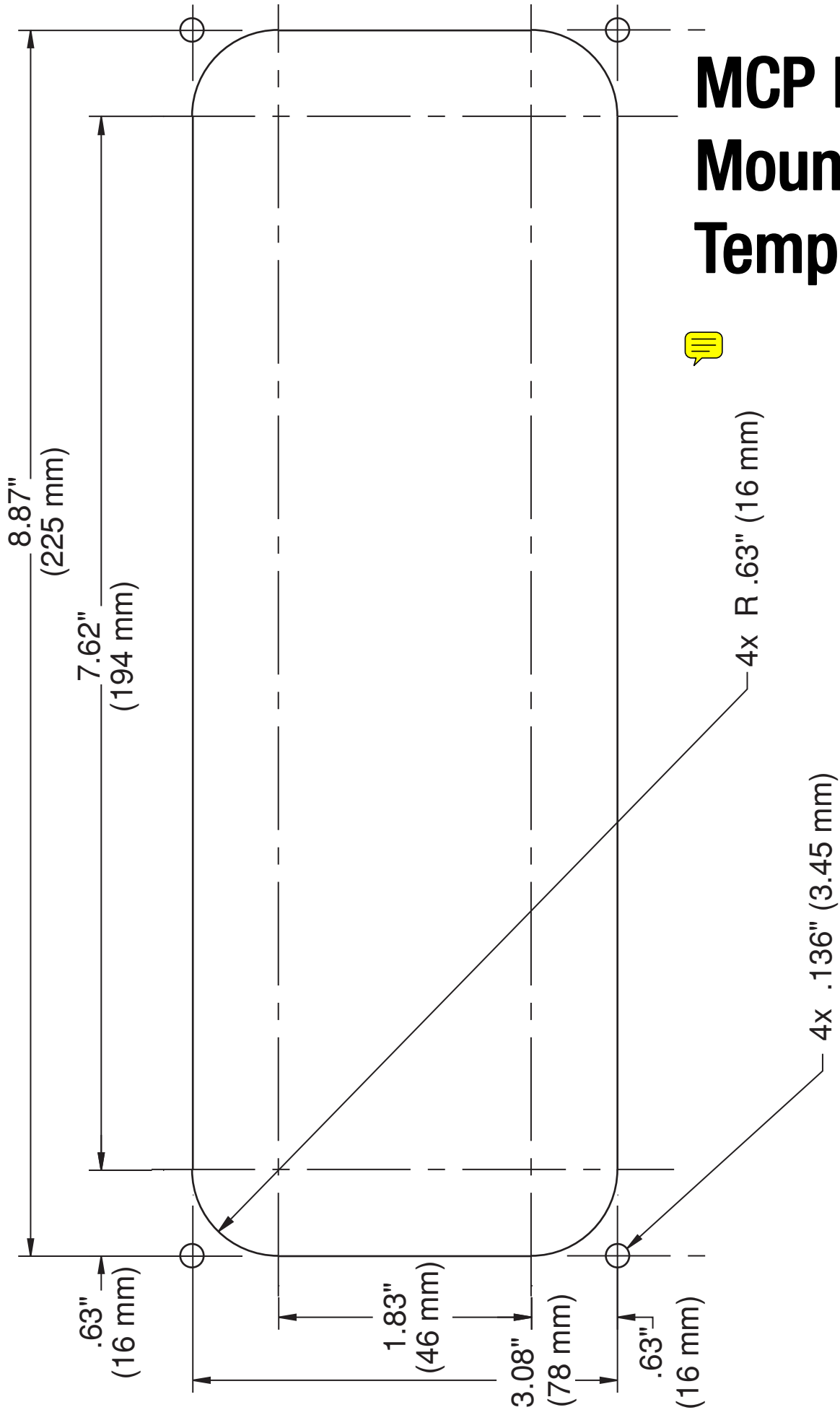
NOTE: *If you are installing a Tri-Sat AutoSwitch Kit for DIRECTV Ku-band Tri-Sat service, refer to the wiring instructions that came with the kit.*



Switchplate Mounting Template



MCP Flush Mounting Template



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