

**DiRECTWAY**<sup>®</sup>

**Universal DIRECTV Upgrade  
Kit Installation Guide**

*Multi-satellite*

1035629-0001  
Revision 3  
09/02/04

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# Important safety information

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For your safety and protection, read this entire manual before you attempt to install the Universal DIRECTV® Upgrade Kit for Multi-satellite. In particular, read this safety section carefully. Keep this safety information where you can refer to it if necessary.

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## Types of warnings used in this manual

This section introduces the various types of warnings used in this manual to alert you to possible safety hazards.

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### **DANGER**



Indicates an imminent electric shock hazard, which, if not avoided, will result in death or serious injury.

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### **WARNING**



Indicates a potential electric shock hazard, which, if not avoided, could result in death or serious injury.

---

### **DANGER**



Indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.

---

### **WARNING**



Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

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 **CAUTION**



Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury.

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**CAUTION**

Indicates a situation or practice that might result in property damage.

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Note: A note provides useful information.

# About this document

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## Scope and audience

The Universal DIRECTV Upgrade Kit (for multisatellite) is installed by professional telecommunications installers. This product cannot be installed by the end user.

There are four primary audiences:

- HNS Installers – only HNS or HNS-certified installers will install this product.
- Installer trainers, who prepare separate instructions for the installers.
- Call center operators, who respond to installer's calls.
- Call center trainers, who train call center operators.

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## Organization

This manual is divided into two chapters:

Chapter 1 – *Introduction*, on page 1, describes the function and purpose of the kit.

Chapter 2 – *Installing the kit*, on page 5, includes instructions on how to install the kit, including how to install the LNBS.

Chapter 3 – *Installing the combiner and multiswitch*, on page 15, describes how to install a combiner and multiswitch.

An appendix provides wiring diagrams.

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## Related publications

- ***DIRECWAY Satellite Dish Installation Guide DW4000-Ku Two-Way Ku-band Antenna Model AN4-074*** (HNS 1035567-0001)
- ***DIRECWAY Satellite Dish Installation Guide DW4000 Ku Antenna for Enterprise Mounts Model AN6-074*** (HNS 1035566-0001)

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## Revision record

Revision	Date of issue	Scope
1	07/30/04	Initial release
2.01	08/18/04	Update parts and illustrations, incorrect revision number
3	09/02/04	Issued to correct revision number

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# Chapter 1

## Introduction

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The Universal DIRECTV Upgrade Kit for Multisatellite is used to install *off-axis* LNBs for DIRECTV satellites at 101, 110, and 119 degrees on a satellite antenna pointed at an *on-axis* DIRECWAY® satellite at 99 or 116.8 degrees.

Use this kit to add LNBs for the DIRECTV satellites *only*. Do not attempt to capture signals from other satellites.

A *two-degree feed* LNB captures signals from the 101° satellite for a DIRECWAY system pointed at 99°. It captures signals from the 119° satellite for a system pointed at 116.8°.

The other LNBs capture signals from the satellites at 101°, 110°, or 119°, depending on whether the DIRECWAY satellite is located at 99° or 116.8°. These LNBs are placed in *feed clamps* and installed on a *rail*, which is attached to the antenna feed arm. The LNBs are positioned on the rail at the point where the satellite signal is captured.

The 110° LNB does not need to be installed if signals from the satellite at 110° are not desired.

The kit contains two *mounting pads*, pad A and pad B. The kit is shipped with pad B attached to the rail, so that the rail can be attached to the left side of the feed arm (the left side as you are facing the reflector, also known as the dish). To attach the rail to the right side of the feed arm, remove pad B and attach pad A.

Choosing the correct pad and side of the feed arm for installation is fully explained in Chapter 2 – *Installing the kit*, on page 5.

You must always install a multiswitch with this kit, whether the 110° LNB is used or not. If you install the 110° LNB, you must install both a multiswitch and a *combiner*. **The kit does not include a multiswitch**, but does contain a combiner. Installing a multiswitch and combiner is explained and illustrated in Chapter 3 – *Installing the combiner and multiswitch*, on page 15.

If you do not install the 110° LNB, you will need four lengths of cable to connect the LNBs to the multiswitch. If you install the 110° LNB, you will need six lengths of cable, as shown in Table 2 on page 4. **Cables are not provided.**

## Parts List

The Upgrade Kit for Multisat part number is 1035736-0001.



Note: If you use an LNB other than the ones packed in the kit (for example, as part of a repair), ensure the LNB has the same base PN 1029271. Doing so will avoid potential transmit interference.

Table 1: Universal LNB Installation Kit parts list

Part	Quantity
Rail with attached mounting pad B	1
Mounting pad A	1
LNB PN 1029271-0010 (the dual LNBF)	1
LNB PN 1029271-0011 (the 110° LNBF)	1
LNB PN 1029271-0012 (the two-degree feed)	1
Feed clamp	2
Spacer	2
Locking plate	2
Phillips-head flathead screws (for 2° feed)	4
Phillips-head pan screws	7
Combiner PN 9010601-0001 or -0002	1

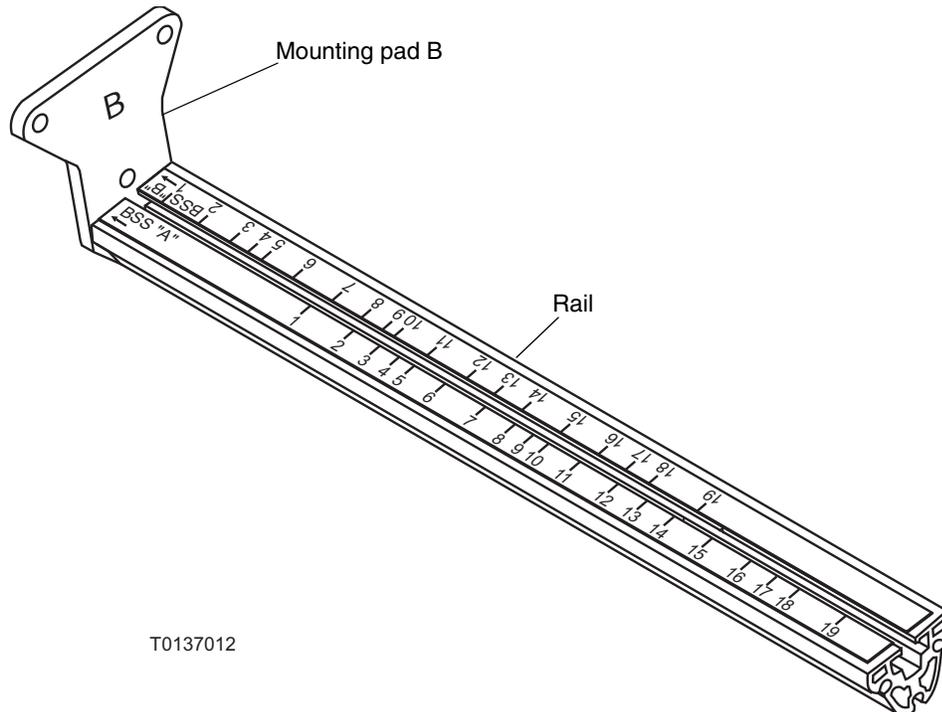


Figure 1: Rail assembly

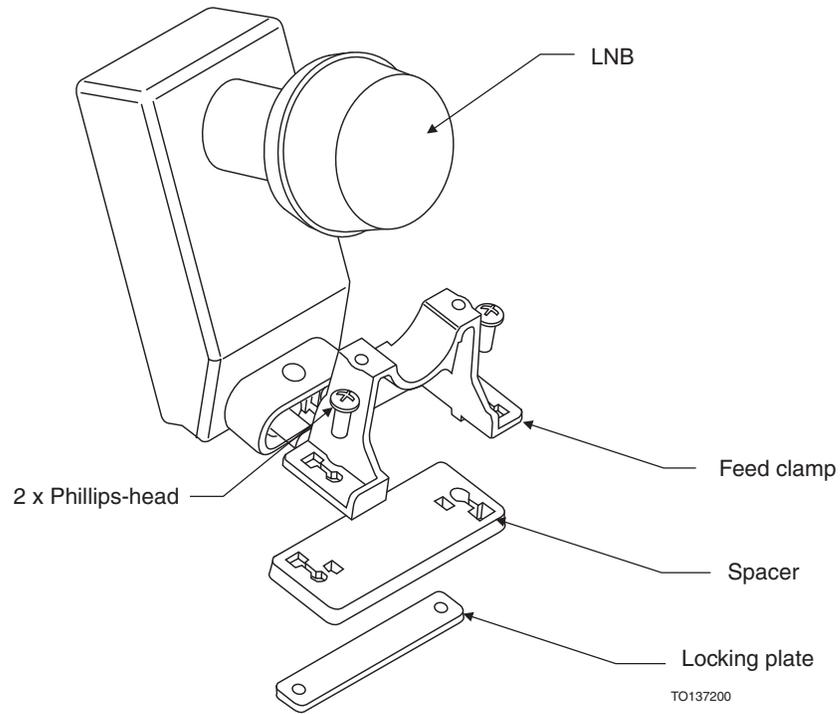


Figure 2: LNB, feed clamp, spacer, locking plate

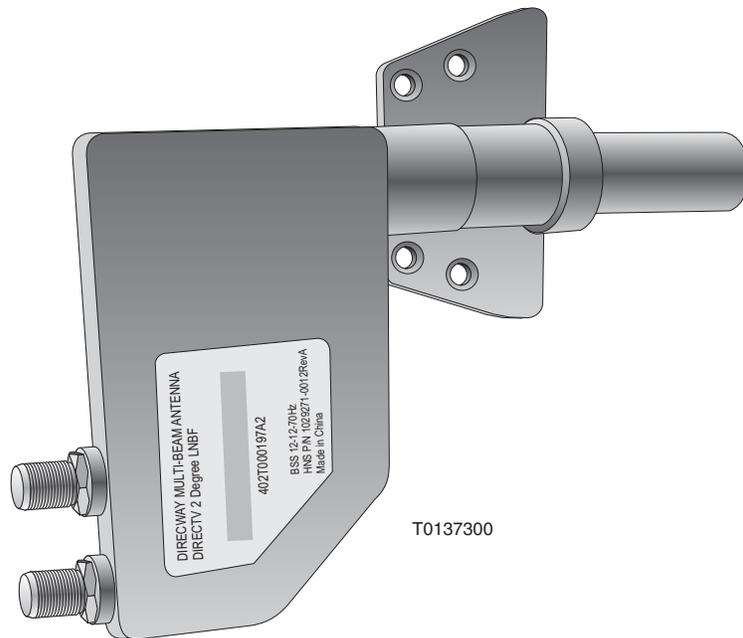


Figure 3: Two-degree feed LNB

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## Cables required

Table 2: Six cables required when installing 110° LNB

LNB	Cables required if DIRECWAY from 116.8°	Cables required if DIRECWAY from 99°
2° feed	One from LNB to multiswitch Sat B In 13v port One from LNB to combiner Sat B In port	Two to multiswitch Sat A In ports
110° LNB	One from LNB to combiner Sat C In port	One from LNB to combiner Sat C In port
Remaining DIRECTV LNB	Two to multiswitch Sat A In ports	One to multiswitch Sat B In 13v port One from LNB to combiner Sat B In port
Combiner	One from combiner Out to Multiswitch port to multiswitch Sat B In 18v port	One from combiner Out to Multiswitch port to multiswitch Sat B In 18v port

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## Tools and items required

- 7/16-inch wrench
- 3mm Allen wrench
- #2 Phillips-head screwdriver
- Pliers
- Ground wire to ground multiswitch (8AWG aluminum; 14AWG copper if wire runs within 12 inches of masonry or soil)

## Chapter 2

# Installing the kit

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### Safety considerations

Before you start, review the safety alerts below. Remember to read and follow any other safety alerts in this chapter.

If you are installing the kit as part of a DIRECWAY initial installation, attach the kit to the satellite antenna feed arm before installing the antenna assembly on the mount.

If you are adding the kit to an existing installation, consider which is safer, installing the kit on the satellite feed arm as the arm is currently attached, or detaching the feed arm and performing the kit installation on the ground.

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#### DANGER



- Do not touch overhead power lines, or allow the satellite antenna to contact power lines.
- Touching or contacting power lines in any way will cause death or serious injury.

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#### WARNING



- Observe all ladder and roof safety precautions.
- Failing to observe ladder and roof safety precautions may cause death or serious injury.

---

#### CAUTION



- The satellite antenna assembly can only be installed and serviced by a certified professional installer.
  - This device emits radio frequency energy when in the transmit mode.
  - To avoid injury, do not place head or other body parts between feed horn and the satellite reflector when system is operational.
  - Unplug indoor power connection before performing maintenance or adding upgrades to any satellite reflector components.
-

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## Grounding requirement



### **WARNING**

The RG6 coaxial cable must be connected to a ground block. The ground block should be located at the point the coaxial cable enters the building. The ground wire must be connected to the ground block and routed to the earth ground.

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## Summary of kit installation procedure

The major steps of the kit installation procedure are listed below.

1. Check that there are no line-of-sight problems for the DIRECTV LNBS.
2. Decide on the safest method for installing the kit.
3. Use Table 3 to determine which side of the feed arm to attach the rail assembly to, and which mark defines the position of the LNBS on the rail assembly.
4. Install the kit.
5. Install the cables, using a multiswitch and, if necessary, a combiner. Run the cable from the multiswitch to the indoor unit (IDU) in the same manner as the DIRECWAY cable.
6. If a fresh installation, peak the DIRECTV signal after peaking DIRECWAY. (The DIRECTV signal is also known as the broadcast satellite service signal, or BSS. That is why BSS appears on the rail.) If upgrading an installation, peak the DIRECTV signal while ensuring DIRECWAY remains peaked.
7. Proceed to complete any other aspects of the installation, such as commissioning, confirming service, or site cleanup.

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## Installation site check

Whether you are performing a new satellite antenna installation, or are installing the kit on an existing installation, check that the kit LNBS will not have line-of-sight problems. If it will, eliminate them or consider moving the satellite antenna to a new location.

If you are adding the kit to an existing installation, consider whether it would be safer to install the kit on the ground. Detach the feed arm and perform the installation on the ground if it is safer to do so.

## The 2° feed, rail assembly location, and LNB marks

Which DIRECTV satellite is captured by the 2° feed, and which side of the feed arm the rail assembly is attached to, is determined by which satellite the DIRECWAY LNB is pointed at.

The 2° feed is always installed as described in *Installing the 2° feed* on page 8. It is always installed on the right side of the feedhorn when facing the reflector.

Before installing the rail, determine which side of the feed arm it will be attached to. The DIRECTV LNB is then positioned on the rail by locating the number that corresponds to the 110° and/or 119° satellite. Use Table 3 to determine which side of the feed arm to install the rail assembly, and which marks to use to position the LNB.

Remember, the feed arm side is determined while facing the reflector. Thus, mounting pad A is used on the right side of the feed arm. Mounting pad B is used on the left side. See Figure 4.

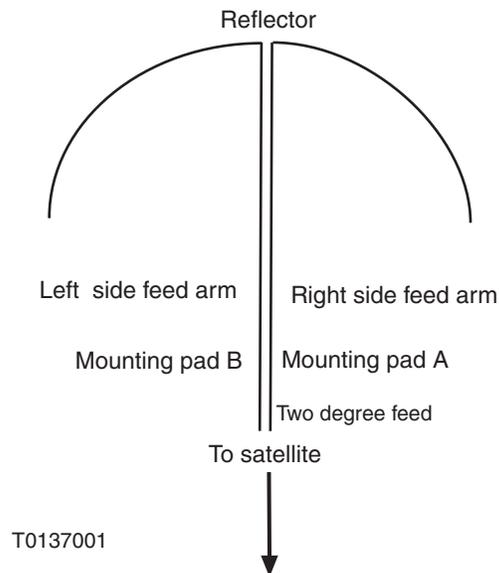


Figure 4: Feed arm side, facing the satellite reflector

Table 3: Rail assembly installation side and LNB marks

On-axis satellite	Mounting pad and feed arm side	Mark for 101° LNB	Mark for 110° LNB	Mark for 119° LNB
99	A/Right	Use 2° feed	8	18
116.8	B/Left	14	2	Use 2° feed

## Installing the 2° feed

To install the 2° feed as part of an upgrade, you will do the following. If necessary, refer to the antenna installation guide for the version of the antenna you are upgrading.

- Remove the shroud.
- Remove the feedhorn clamp bracket.
- Attach the 2° feed.
- Attach the cables to the two connectors.
- Re-install the feedhorn clamp bracket.
- Re-install the shroud.



Note: If you are adding the 2° feed as part of an initial installation and the antenna was shipped with the radio/TRIA assembly not attached to the feed arm, attach the 2° feed before attaching the radio/TRIA assembly to the feedarm. Remember that the shroud is not present at this point.

1. If upgrading an existing installation, use a #2 Phillips-head screwdriver to remove the shroud screws.
2. Remove the shroud from the feedhorn grooves and set it aside.
3. Use a 3/16-inch Allen wrench to remove the two top clamp bracket Allen screws and any washers. See Figure 5.

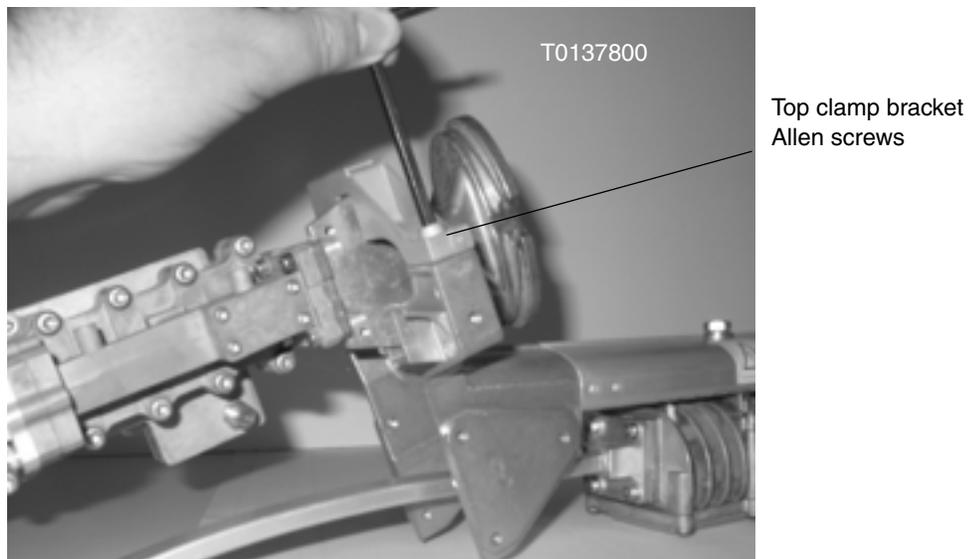


Figure 5: Remove top clamp bracket

4. Remove the top clamp bracket.
5. Locate the screw holes on the feedhorn. See Figure 6.
6. Align the 2° feed screw holes with the holes in the feedhorn.
7. Use a #2 Phillips-head screwdriver to install the three Phillips-head screws. See Figure 7. You cannot reach the fourth screw hole, so do not bother with the fourth screw.
8. Replace the feedhorn in the feedhorn slot.
9. Reinstall the top clamp bracket and the screws and washers.
10. Use a 7/16-inch wrench to attach cables to the two LNB connectors.
11. If an upgrade, replace the shroud in the feedhorn groove.
12. Replace the shroud screws.

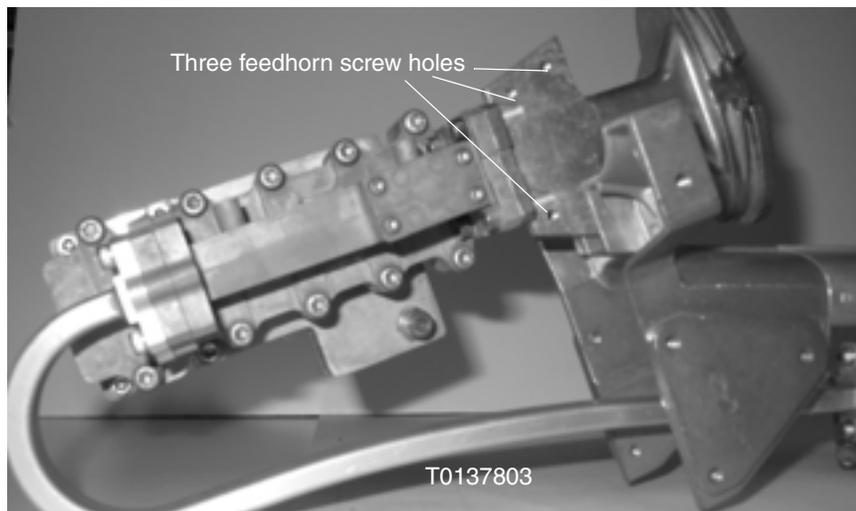


Figure 6: Locate feedhorn screw holes

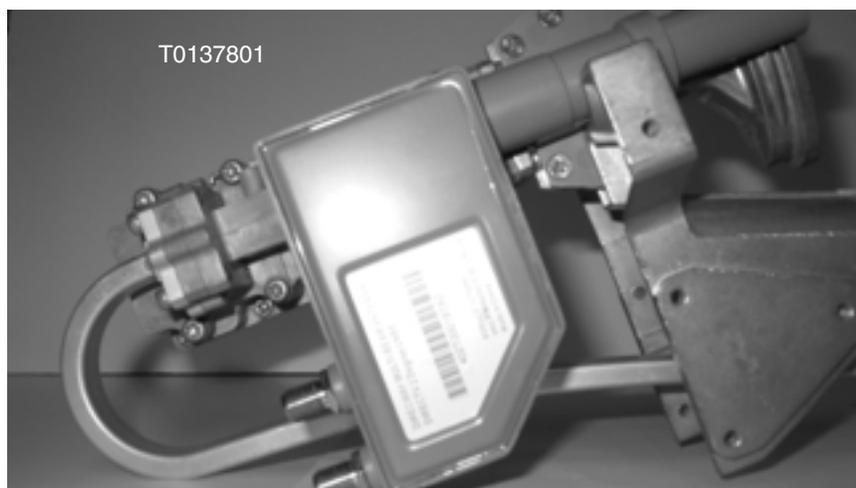


Figure 7: Install three screws

## Installing the rail and LNBS on the feed arm

1. Refer to Table 3 on page 7 to determine which side of the feed arm to install the rail.
2. If you are installing the rail on the left side of the feed arm (left as you are facing the satellite reflector), orient the rail so that the **BSS “B”** is right side up. See Figure 8.  
If you are installing the rail on the right side of the feed arm, replace pad B with pad A (make sure you attach pad A at the rail end marked with “BSS” and arrows), and orient the rail so that the BSS “A” is right side up. See Figure 9.

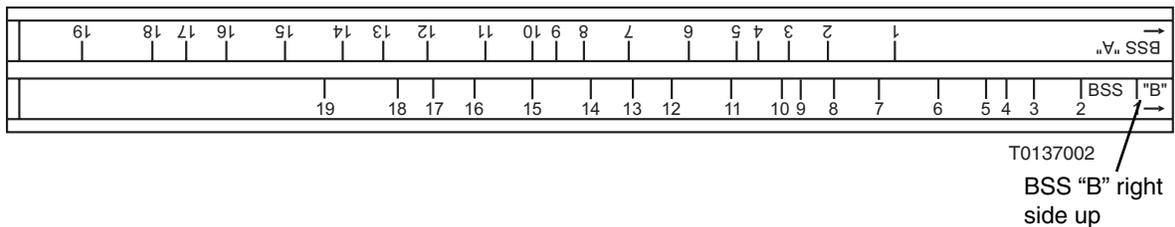


Figure 8: Rail orientation facing reflector, side B

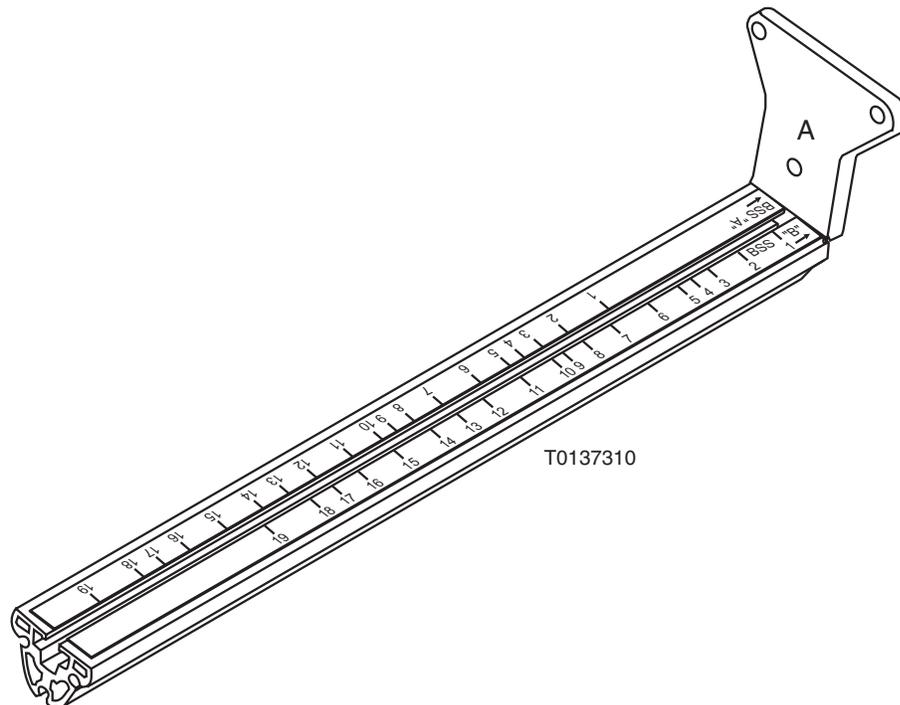


Figure 9: Proper orientation of mounting pad A

3. If you are installing the 110° LNB, insert it into a feed clamp. See Figure 10.
4. Align the feed clamp, spacer, and locking plate screw holes with the clamp screw holes.
5. Use a #2 Phillips-head screwdriver to install the two Phillips pan head clamp screws into the aligned holes. Do not tighten the screws.
6. Use a 7/16-inch wrench to install the coaxial cable on the LNB connector. **Install the cable now** because doing so after the rail is installed on the feed arm is awkward.

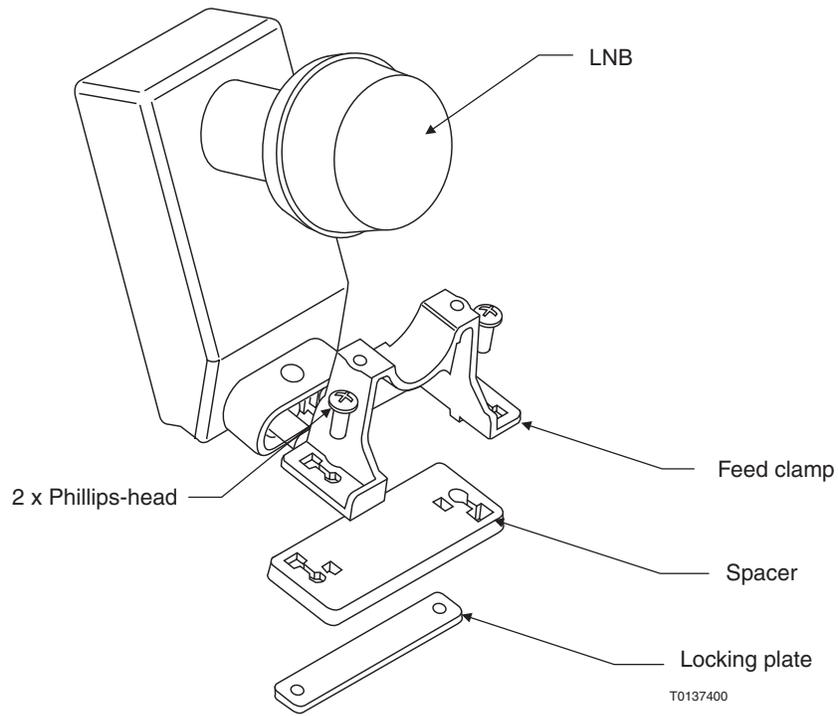
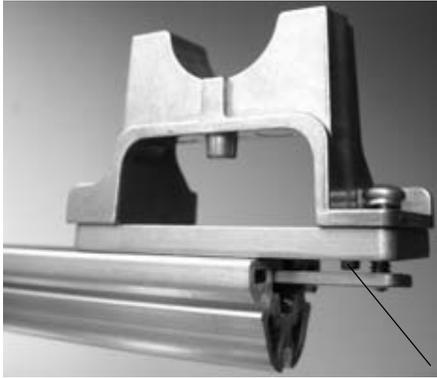


Figure 10: Assembling LNB onto feed clamp assembly

7. Slide the assembly onto the rail so that the locking plate goes inside the rail T-slot. See Figure 11.
8. Position the LNB so that it is over the satellite alignment mark. The mark number can be read through the holes in the feed clamp. See Figure 12.
9. Repeat the procedure for the other LNB.



Locking plate into T-slot

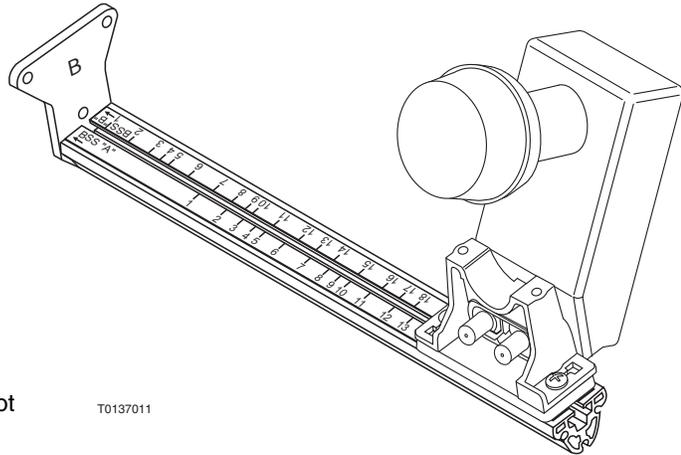
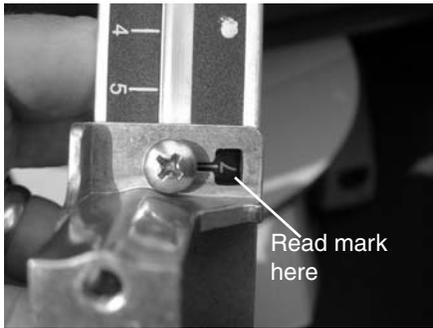


Figure 11: Slide clamp assembly onto rail; insert locking plate into T-slot



Read mark here

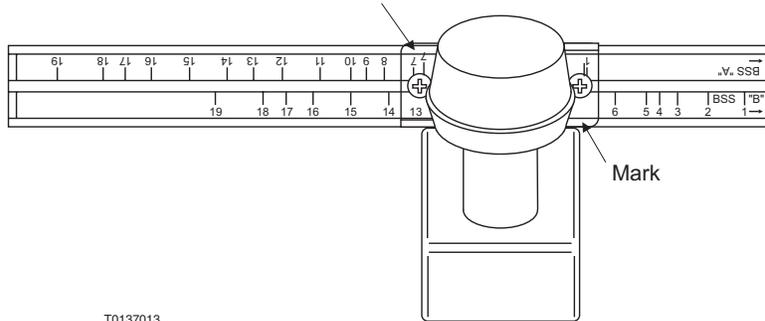
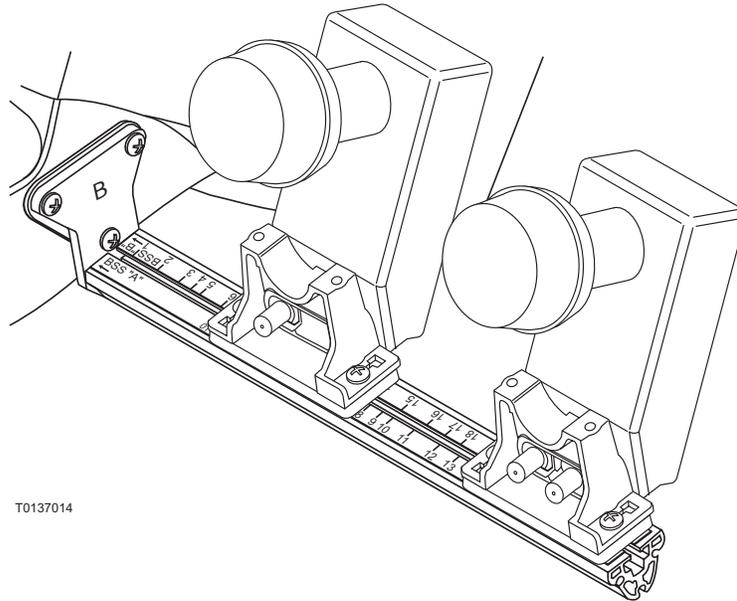


Figure 12: Position LNB over satellite alignment mark

10. Align the three mounting pad screw holes with the three holes on the feed arm. See Figure 13.
11. Use a #2 Phillips-head screwdriver to install the three Phillips pan head screws in the feed arm holes. A complete installation looks like Figure 14.

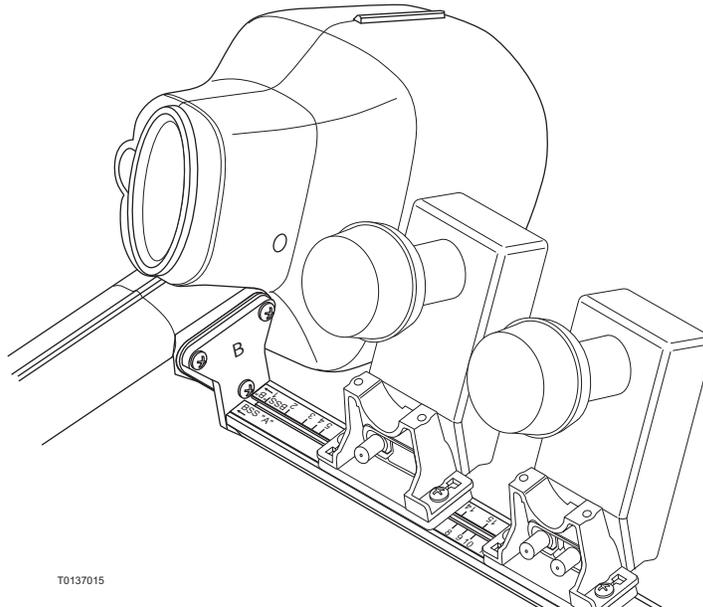


Note: Do not tighten the clamp screws now. Tighten them after the satellite signal is peaked.



T0137014

Figure 13: Install rail assembly on feed arm



T0137015

Figure 14: Complete installation



# Installing the combiner and multiswitch

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After installing the LNBS, you must install the combiner and multiswitch. After these are installed you can run cable to the indoor unit (IDU) in the same manner as you run the DIRECWAY cable.

**A multiswitch is not included in this kit.**

The illustrations in the chapter show just one way to locate the combiner and multiswitch. For example, you can locate the combiner at the back of the satellite reflector, or at some other location along the feed arm. You may prefer to mount the multiswitch inside the house, rather than on the back of the reflector.

Decide at this time where you will install the combiner and multiswitch. You need to determine this first to ensure that the cable that will connect the combiner and multiswitch will be long enough.

Regardless of where you place the combiner and multiswitch, follow the instructions regarding connections and grounding exactly as they are written. Use 14AWG grounding wire if the wire comes within 12 inches of masonry or soil. Use 8AWG aluminum grounding wire in all other cases.

Wiring diagrams have been provided in the appendix in the back of this manual.

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## CAUTION



- **Coaxial cable can corrode if exposed to moisture.**
  - **Use weatherproof connectors.**
  - **Do not use push-on connectors.**
-

## Installing the combiner

This section describes how to install the combiner. The combiner takes the signals from the 110° and one of the other LNBs and combines them into one signal. That signal is routed into the multiswitch via a short coaxial cable you install onto the combiner and multiswitch after you install the multiswitch.

If you are not installing the 110° LNB, skip to *Installing the multiswitch* on page 17

The 110° LNB cable is always connected to the combiner.

If the satellite at 99° provides DIRECWAY, one cable from the remaining LNB on the rail is connected to the combiner.

If the satellite at 116.8° provides DIRECWAY, one cable from the 2° feed is connected to the combiner.

1. Locate the 110° LNB cable.
2. Use a 7/16-inch wrench to connect the cable to the “Sat C In” combiner port. See Figure 15.
3. If the satellite at 99° provides DIRECWAY, connect one cable from the remaining LNB on the rail to the combiner “Sat B In” port. See Figure 15.

If the satellite at 116.8° provides DIRECWAY, connect one cable from the 2° feed to the combiner “Sat B In” port.

4. Connect a cable to the combiner “Out to Multiswitch” port. See Figure 15. This cable must be long enough to reach the multiswitch “Sat B In 18v” port.
5. Proceed to *Installing the multiswitch* on page 17.

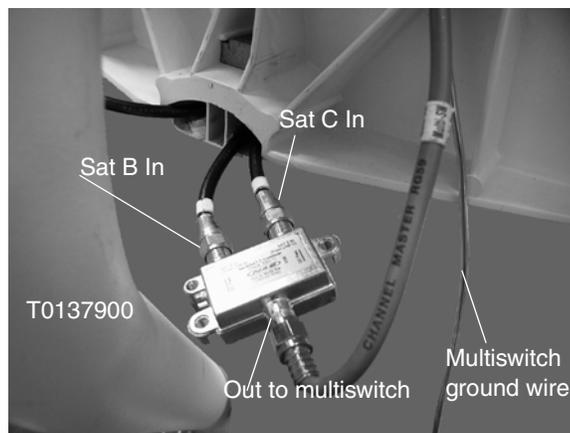


Figure 15: Combiner connections

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## Installing the multiswitch

If you did not install the combiner, simply connect a length of cable between each LNB port and multiswitch Sat In port, as shown in Figure 16. Also follow the grounding instructions.

The instructions below assume the combiner was installed. A cable is always run from the combiner Out to Multiswitch port to the multiswitch Sat B In 18v port.

If the satellite at 99° provides DIRECWAY, the remaining cable from the remaining LNB on the rail is connected to the multiswitch Sat B In 13v port. Both cables from the 2° feed are connected to the multiswitch Sat A In ports.

If the satellite at 116.8° provides DIRECWAY, the remaining cable from the 2° feed is connected to the multiswitch Sat B in 13v port. Both cables from the remaining LNB on the rail are connected to the multiswitch Sat A In ports.

1. Connect the cable attached to the combiner Out to Multisatellite port to the multiswitch Sat B In 18v port. See Figure 16.
2. If the satellite at 99° provides DIRECWAY, connect the remaining cable from the remaining LNB on the rail to the multiswitch Sat B In 13v port. See Figure 16.  
If the satellite at 116.8° provides DIRECWAY, connect the remaining cable from the 2° feed to the multiswitch Sat B In 13v port.
3. If the satellite at 99° provides DIRECWAY, connect the 2° feed cables to the multiswitch “Sat A In” ports. It does not matter which cable you connect to the ports. See Figure 16.  
If the satellite at 116.8° provides DIRECWAY, connect the cables from the remaining LNB on the rail to the multiswitch “Sat A In” ports. It does not matter which cable you connect to the ports.

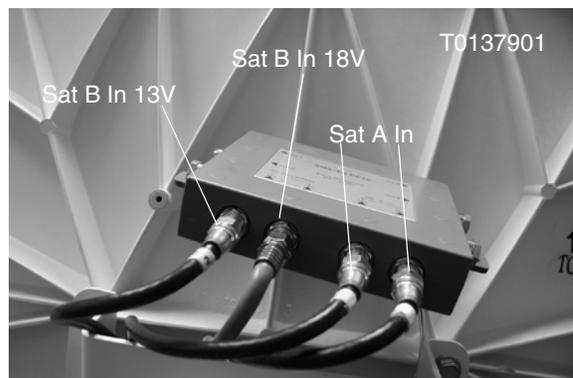


Figure 16: Multiswitch ports

4. Locate the multiswitch GND (ground).
5. Loosen the GND screw. (Some grounds use a bolt and a nut.)
6. Attach one end of the grounding wire to the GND screw.
7. Tighten the GND screw.
8. Run the ground wire down the back of the AZ/EL cap to the antenna mast base plate.
9. Loosen the nut holding the 1/4-20 x 1/2-inch hex-head bolt installed in the grounding hole on the base plate. See Figure 17.
10. Withdraw the bolt from the hole enough so that you can wrap the ground wire around it.
11. Wrap the ground wire around the bolt between the star washer and the 1/4-inch washer. Then tighten the nut. You may need to supply the 1/4-inch washer.



Note: If you install the multiswitch in some location other than the back of the antenna reflector, ground it to a ground block that is connected to the building ground. You can also ground the multiswitch directly to the building ground.

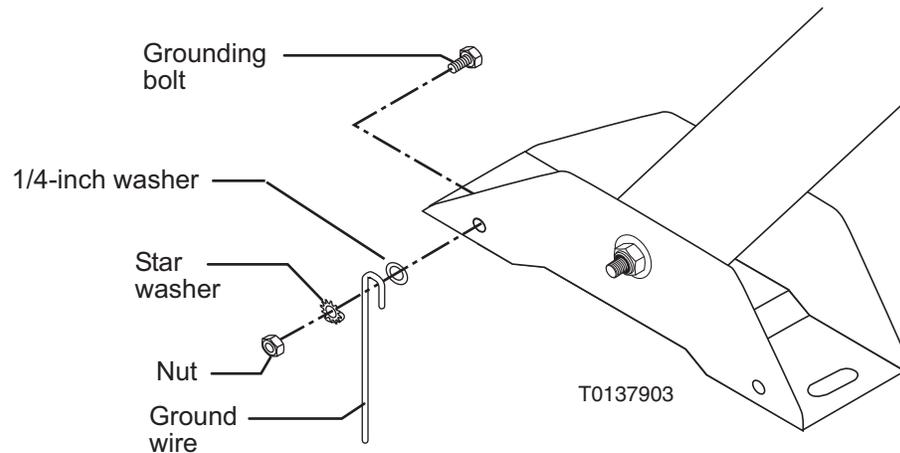


Figure 17: Grounding the multiswitch

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## Install cable, peak satellite signal, finish installation

Install and run the coaxial cable for the Universal DIRECTV Upgrade Kit in the same manner as for the cable installed for the DIRECWAY satellite LNB.

Peak the DIRECTV signal as per the installation manual or instructions for the indoor unit (IDU) you are installing.

Instead of moving the satellite reflector to peak the DIRECTV signal, you can make small adjustments to the location of the LNB on the rail. **However, remember that you must not place your head or other body parts between the feed horn and satellite reflector while the DIRECWAY system is operational. If necessary, deactivate the DIRECWAY system before peaking the DIRECTV signal.**

After peaking the signal and any other activities necessary to activate service, clean up the site and perform any other final installation activities.

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### CAUTION



**To avoid injury, do not place head or other body parts between feed horn and the satellite reflector when system is operational.**

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## Appendix A

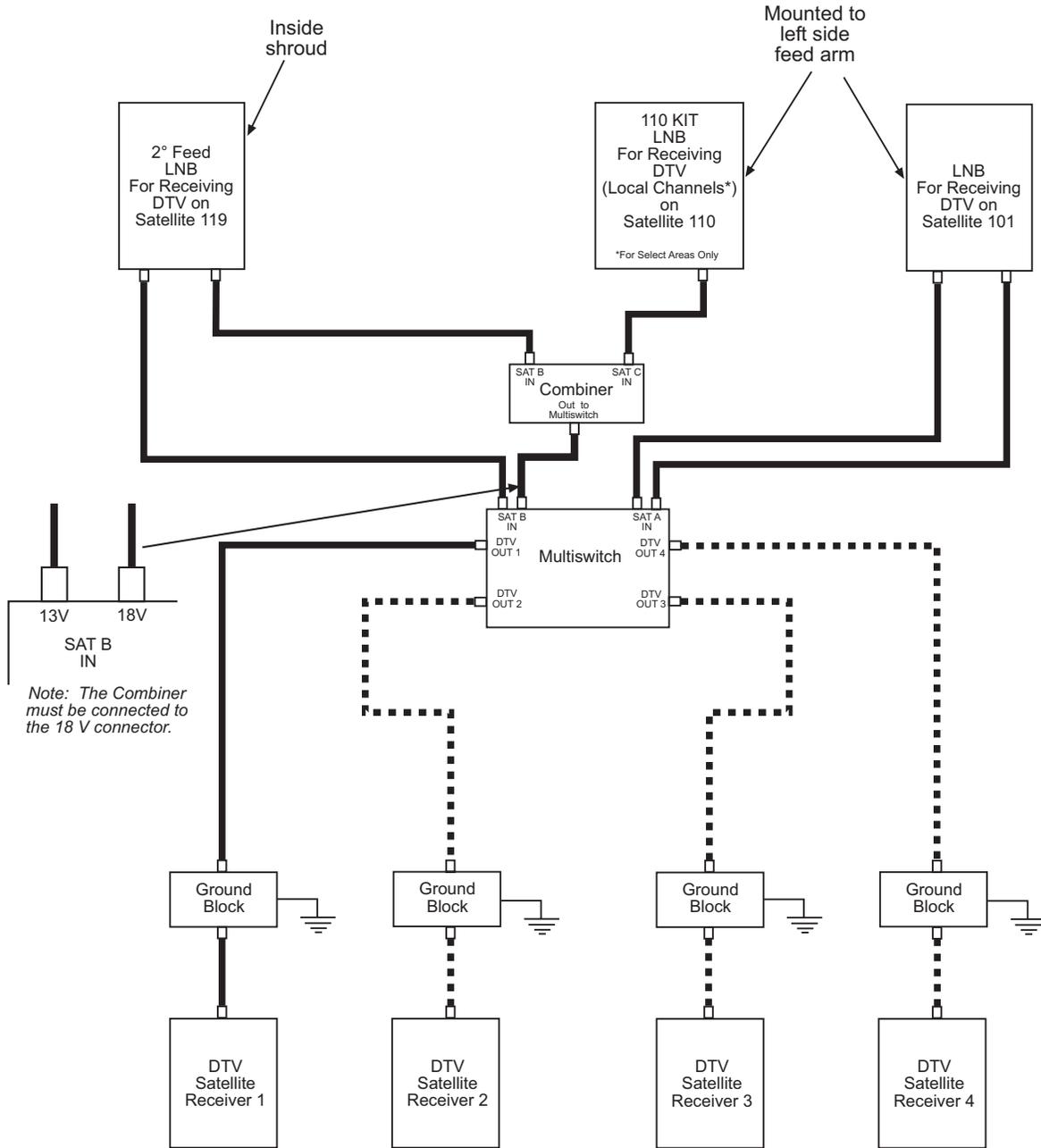
# Wiring diagrams

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This appendix contains wiring diagrams for the following configurations:

- **116.8° DIRECWAY: 2° Feed, DTV/101°, and 110°.** See Figure 18 on page 22.
- **116.8° DIRECWAY: 2° Feed and DTV/101°.** See Figure 19 on page 23.
- **116.8° DIRECWAY: 2° Feed, one or two receivers.** See Figure 20 on page 24.
- **116.8° DIRECWAY: 2° Feed, four or more receivers.** See Figure 21 on page 25.
- **99° DIRECWAY: 2° Feed, DTV/119°, and 110°.** See Figure 22 on page 26.
- **99° DIRECWAY: 2° Feed and DTV/119°.** See Figure 23 on page 27.
- **99° DIRECWAY: 2° Feed, one or two receivers.** See Figure 24 on page 28.
- **99° DIRECWAY: 2° Feed up to four receivers.** See Figure 25 on page 29.

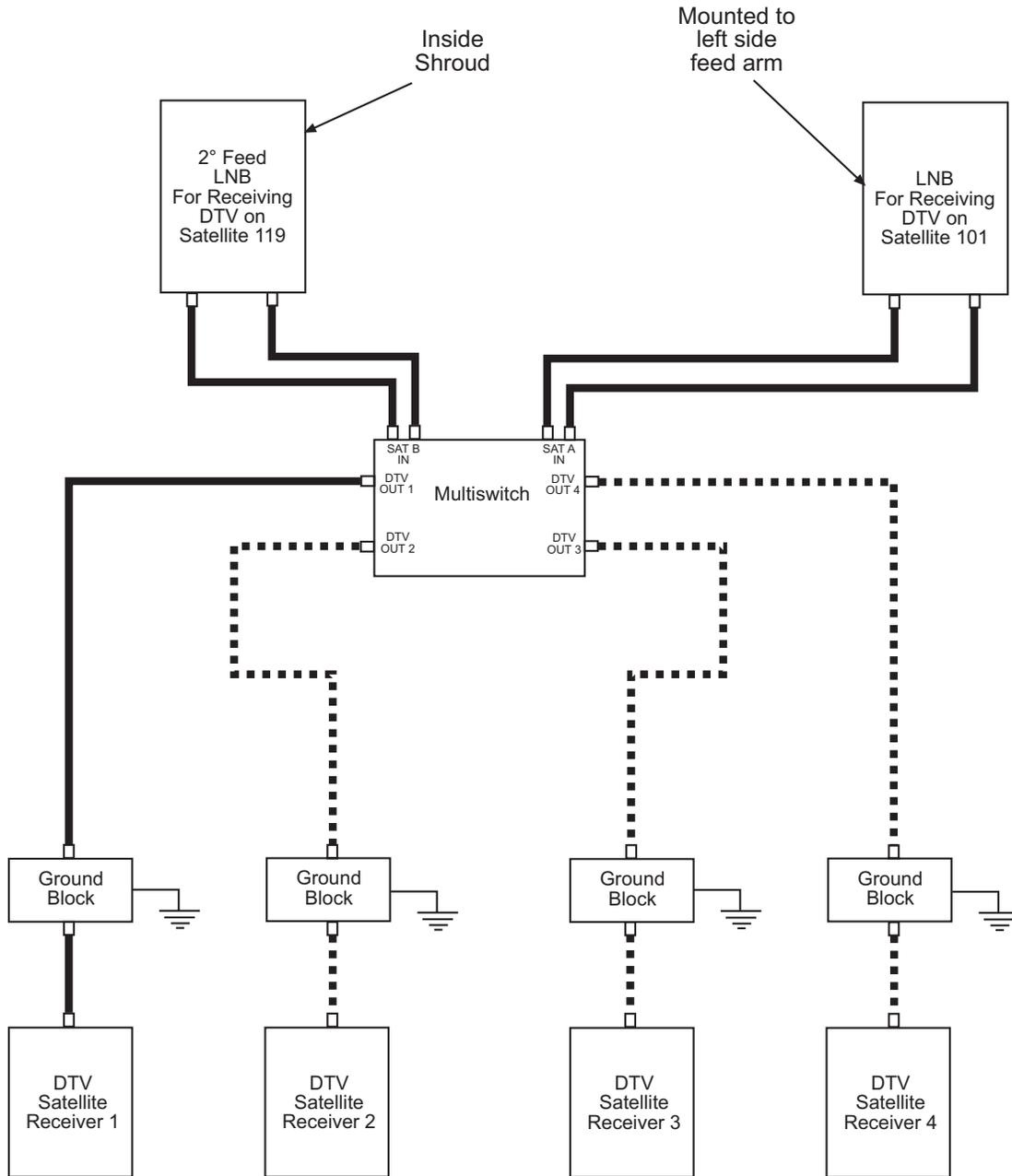
# Wiring Diagram for 2° Feed, DTV/101°, and 110° Receiving DIRECWAY on Satellite SATMEX5 at 116.8° West Longitude



This configuration allows you to receive DIRECTV programming, high definition TV, Paratodos programming, and local channels in select markets on up to four receivers. T0137003

Figure 18: 116.8° DIRECWAY: 2° Feed, DTV/101°, and 110°

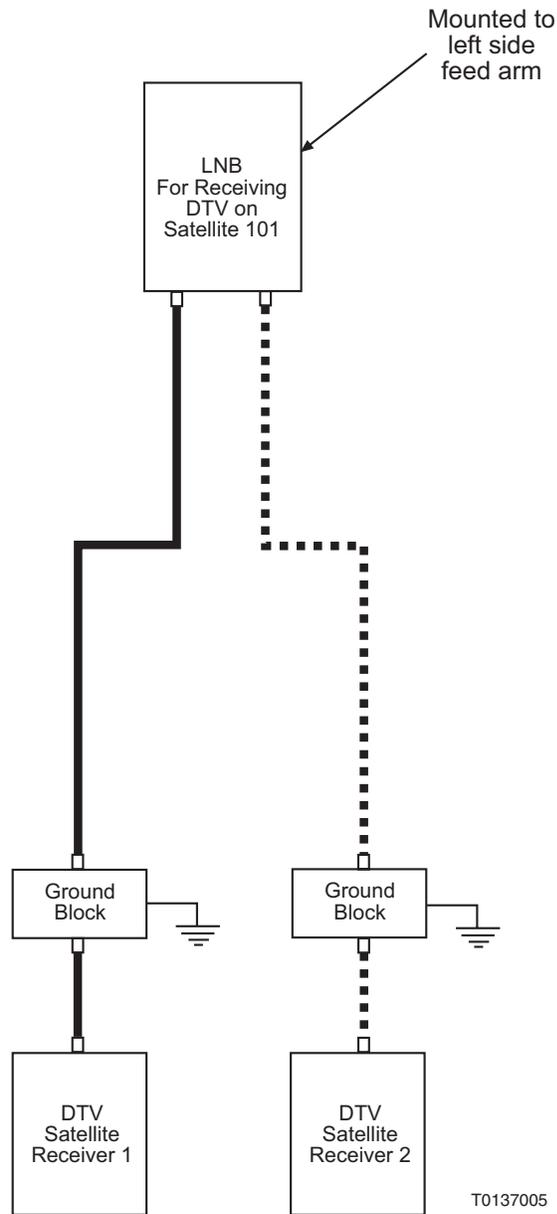
## Wiring Diagram for 2° Feed and DTV/101° Receiving DWAY from Satellite SATMEX5 at 116.8° West Longitude



This configuration allows you to receive DIRECTV programming, high definition TV, and Paratodos programming on up to four receivers. T0137004

Figure 19: DIRECWAY 116.8°: 2° Feed and DTV/101°

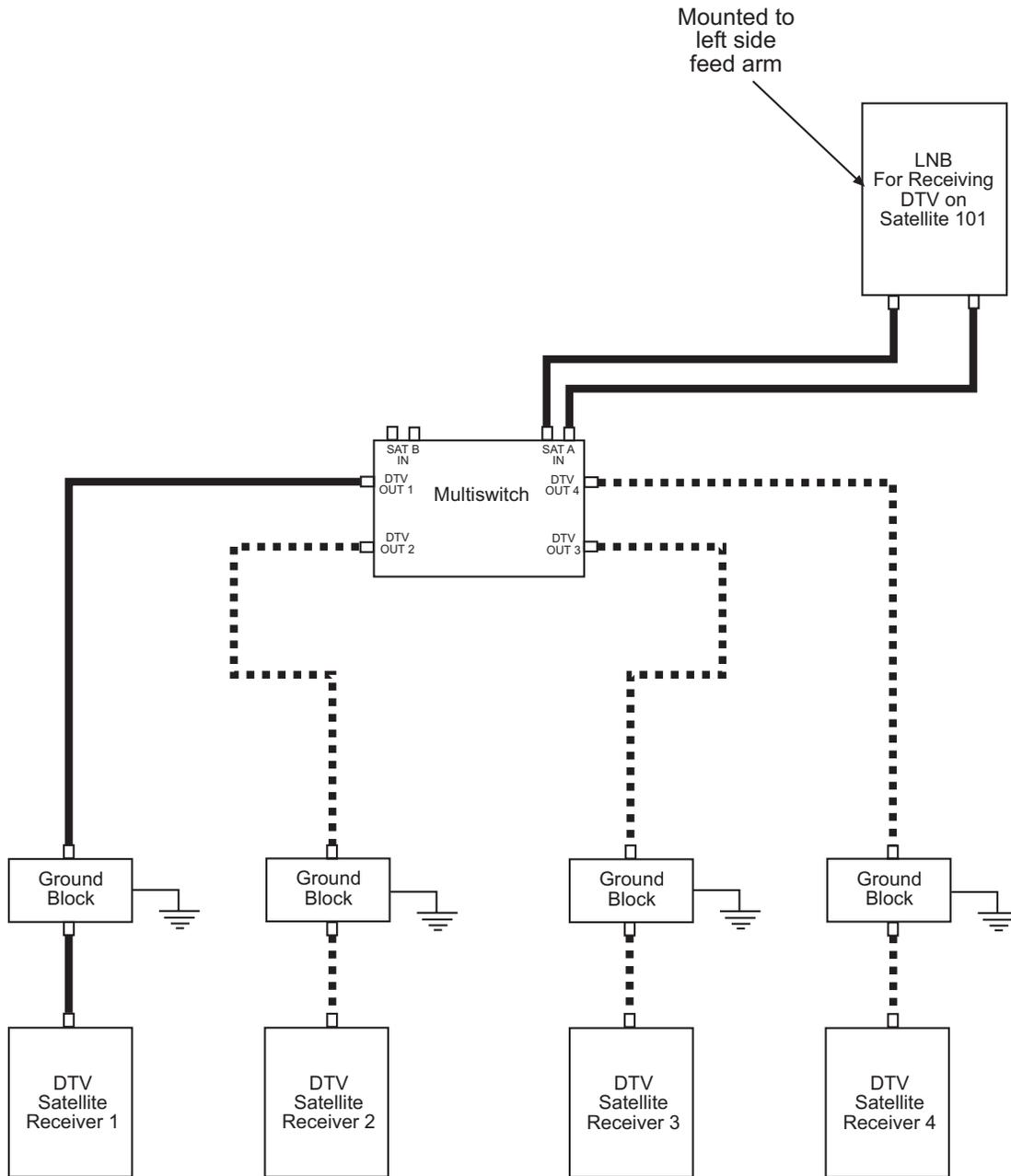
# Wiring Diagram for DTV 101° Receiving DIRECWAY from Satellite SATMEX5 at 116.8° West Longitude



This configuration allows you to receive DIRECTV programming on up to two receivers.

Figure 20: 116.8° DIRECWAY: DTV 101°, one or two receivers

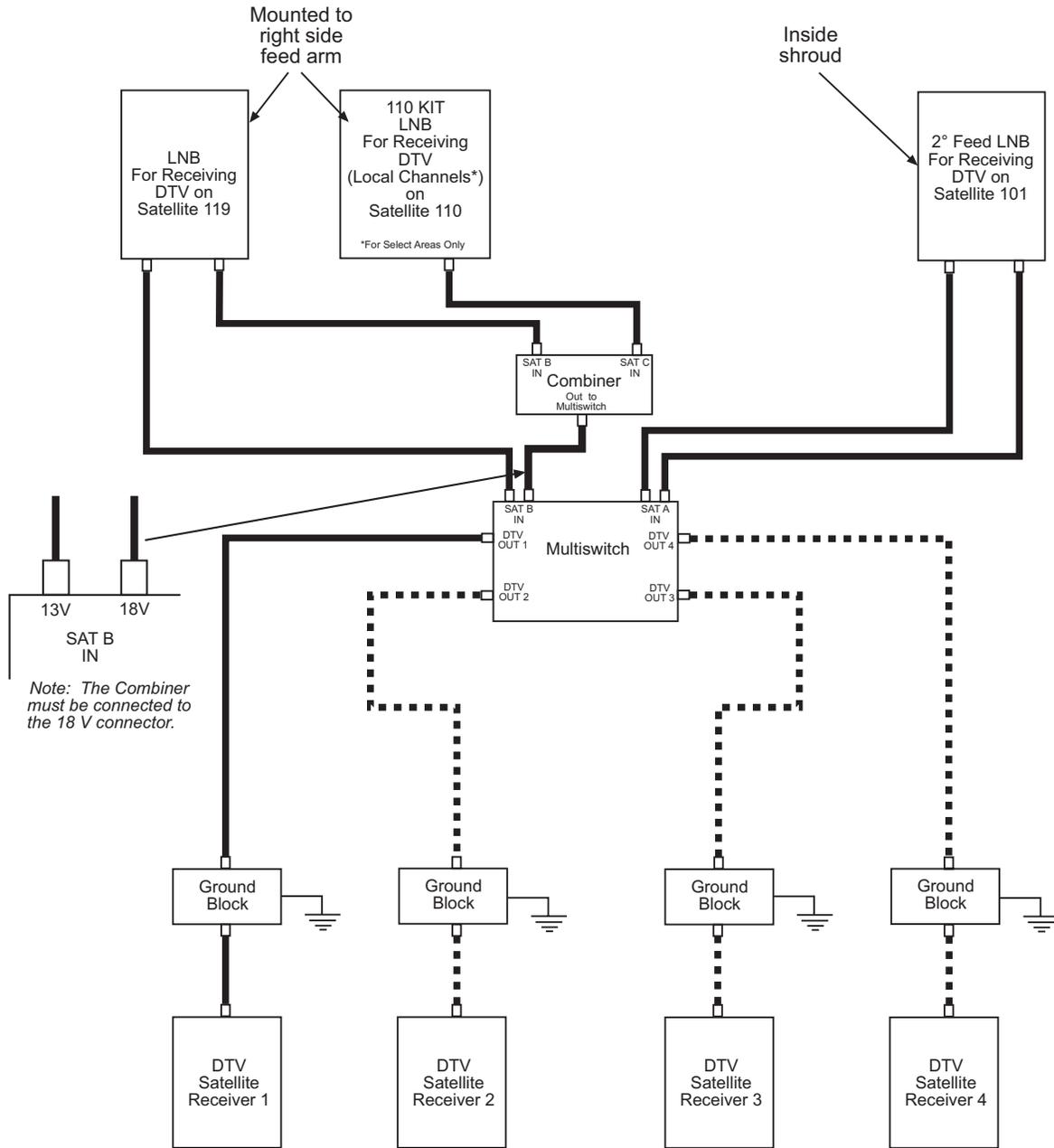
# Wiring Diagram for DTV 101° Receiving DIRECWAY from Satellite SATMEX5 at 116.8° West Longitude



This configuration allows you to receive DIRECTV programming on up to four receivers. T0137006

Figure 21: 116.8° DIRECWAY: DTV 101°, up to four receivers

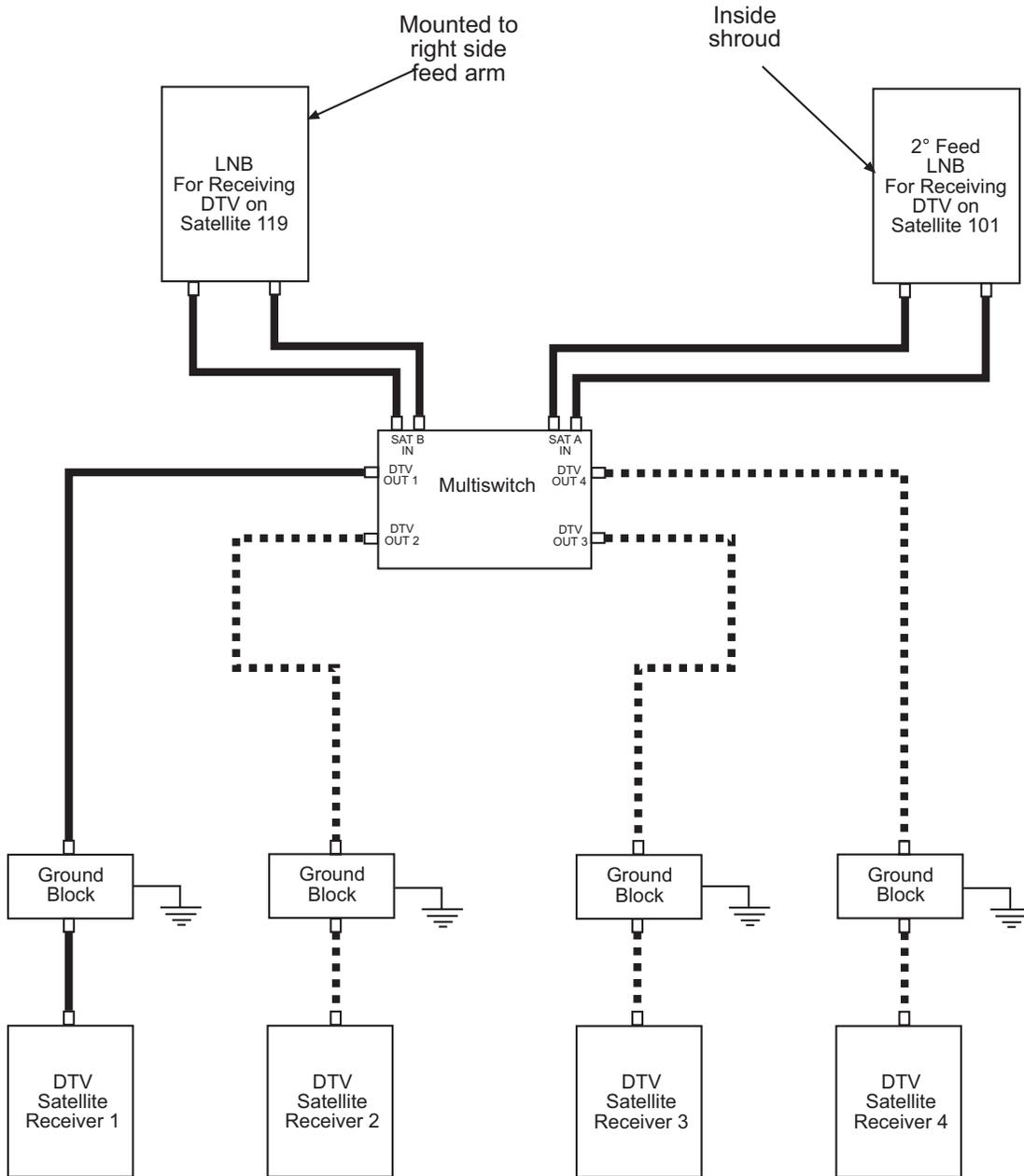
# Wiring Diagram for 2° feed, DTV/119°, and 110° Receiving DIRECWAY from Satellite G4R at 99° West Longitude



This configuration allows you to receive DIRECTV programming, high definition TV, Paratodos programming, and local channels in select markets on up to four receivers. T0137007

Figure 22: 99° DIRECWAY: 2° Feed, DTV/119°, and 110°

# Wiring Diagram for 2° Feed and DTV/119° Receiving DIRECWAY from Satellite G4R at 99° West Longitude

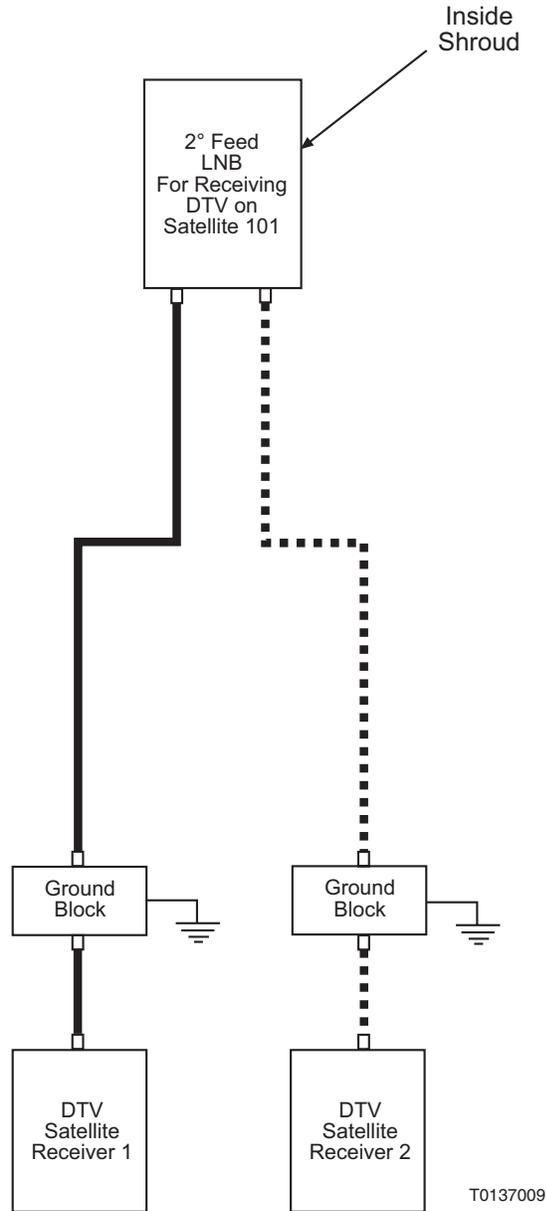


This configuration allows you to receive DIRECTV programming, high definition TV, and Paratodos programming on up to four receivers.

T0137008

Figure 23: 99° DIRECWAY: 2° feed and DTV/119°

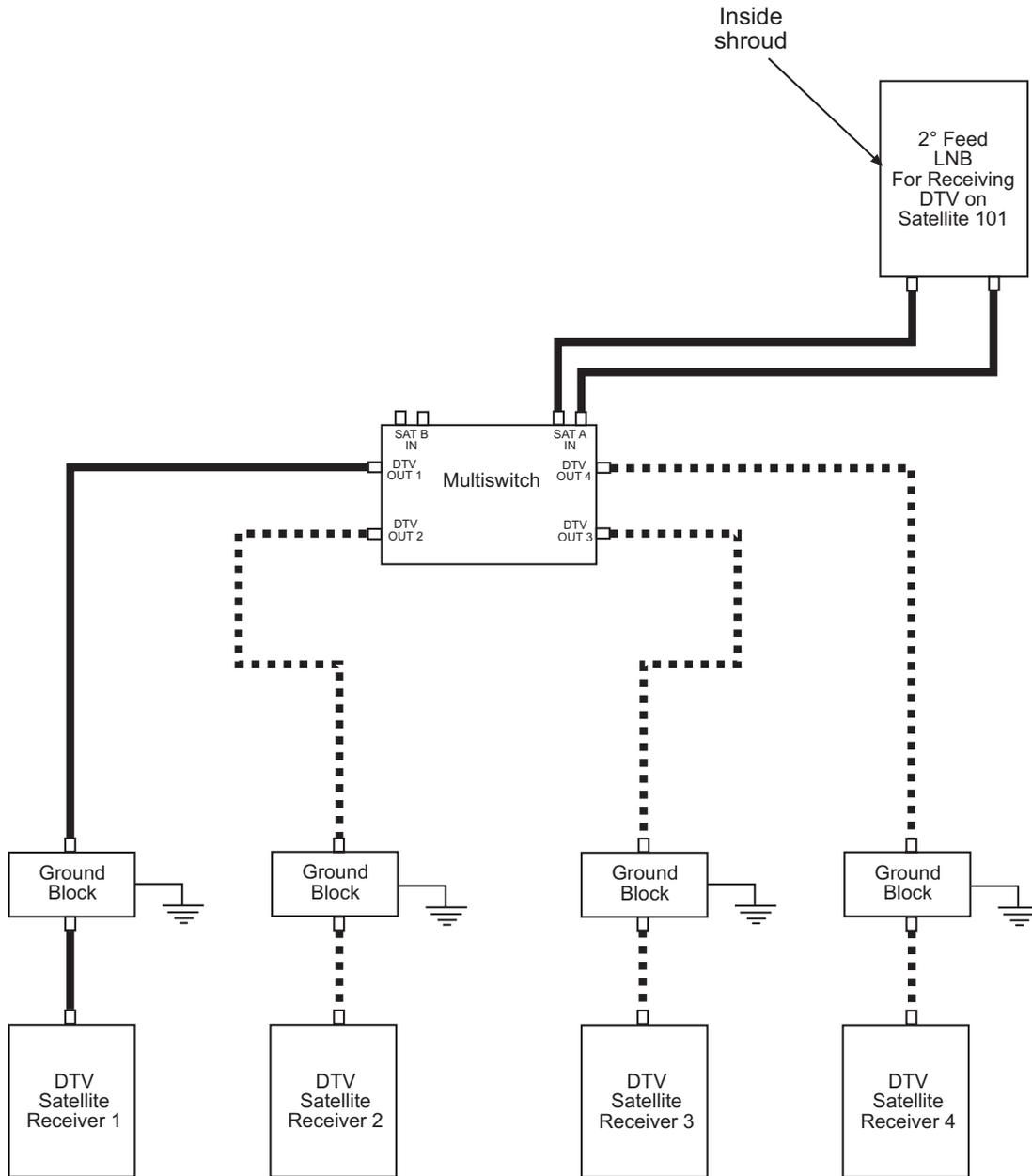
# Wiring Diagram for 2° Feed Receiving DIRECWAY from Satellite G4R at 99° West Longitude



This configuration allows you to receive DIRECTV programming on up to two receivers.

Figure 24: 99° DIRECWAY: 2° Feed, one or two receivers

## Wiring Diagram for 2° Feed Receiving Service on Satellite G4R at 99° West Longitude



This configuration allows you to receive DIRECTV programming on up to four receivers. T0137010

Figure 25: 99° DIRECWAY: 2° feed, up to four receivers

