

# Application Note

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## Installing a DIRECTV SL5 KaKu system with the AI Turbo S2 satellite meter

**Connections:** Coax cable connected from an output port of DIRECTV SL5 LNBF to ODU / LNB port of AI Turbo S2 meter

### Meter set-up

Press the **SYST** System soft-key (located near top left corner of LCD screen) to enter the System Setup menu. Then select the following:

- REGION your geographic region
- SERVICE **DIRECTV**
- SYSTEM **SL5 LNB**
- LNB MODEL defaults to **SL5 LNB** (but user may change to other menu options for LNB model if going through a 6x8 multi-switch and/or if using a wing dish aimed at the 95 satellite)
- SWITCH TYPE defaults to **22 kHz** (or may default to DTV6x8 if user has indicated that he is passing signal through 6x8 multi-switch before entering meter)

*To make selections, arrow up or down to the item to change and press **Enter**, then arrow up or down to the desired option and press **Enter**. Press **EXIT** or **DONE** to return to Run Mode*

### Antenna Pointing

Install the mast plumb, preset the antenna vertical angle, mount to mast, and grossly align azimuth. You may want to use the AZ/EL zip code look-up feature to obtain rough antenna settings (magnetic compass heading, elevation, and tilt/skew).

After completing the System Setup:

- 1) Press DONE or EXIT to return to the main Run screen.
- 2) Adjust the tilt or skew of the dish based on the parameters provided by the AI Turbo S2's zip code lookup feature (AZ/EL soft-key near lower left corner of main Run screen).
- 3) Connect a coax jumper cable from the ODU / LNB port of your AI Turbo S2 meter to an LNBF output port.

### **Rough Alignment of Azimuth and Elevation of dish on 101°W Satellite**

#### **To find the 101° satellite:**

- Press the LNB soft-key (located on middle right side of LCD screen) to apply power to the LNB. LNB1 is for the 101° satellite.
- Adjust the azimuth and elevation of the dish to optimize the alignment by maximizing the signal level (left bar graph), signal quality (right bar graph), and obtaining a LOCK on the 101 satellite. Align antenna until strongest signal level and quality have been reached.
- After you see LOCK, press ID soft-key (located on middle left side of LCD screen) and verify that the 101 satellite has been found.



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## ***Rough Alignment of Tilt / Skew of dish on 119°W Satellite***

### ***To check the status of the 119° satellite:***

- Press the LNB soft-key again to switch to LNB2 (22 kHz). LNB2 is for the 110° & 119° satellites.
- Adjust the tilt / skew of the dish (rotate dish about a point) to optimize the alignment by maximizing the signal level (left bar graph), signal quality (right bar graph), and obtaining a LOCK on the 119° satellite. Align antenna until strongest signal level and quality have been reached.
- After you see LOCK, press ID soft-key (located on middle left side of LCD screen) and verify that the 119 satellite has been found.

Note: Transponders 22 through 32 of the 110/119 Combo come from the 119 satellite. Transponders 8, 10, 12 come from the 110 satellite.

## ***Dithering (Fine-Tuning) of Azimuth/Elevation of dish on 101°W Satellite***

Complete the dithering/fine tuning process to ensure that you're aimed at the center of the beam, adjusting the azimuth and elevation of the dish using the fine adjustment screws while looking at the 101 satellite, as directed by DIRECTV. This should ensure good signal reception from all five satellites (99, 101, 103, 110, 119) if your mast/pole is plumb.

Dithering (Fine-Tuning) steps:

- 1) Press the LNB power soft-key six times to return to LNB1 (the 101 satellite).
- 2) Using the Azimuth fine-tuning screw bolt, turn clockwise and counter-clockwise until you get the highest signal level (meter's left bar graph) and signal quality (right bar graph) on the 101 satellite.
- 3) Using the Elevation fine-tuning screw bolt, turn clockwise and counter-clockwise until you get the highest signal level (meter's left bar graph) and signal quality (right bar graph) on the 101 satellite.
- 4) Record the signal level (i.e. with pen and paper) that is displayed on meter's left bar graph for 101 satellite.
- 5) Set the Elevation plastic dial to zero.
- 6) Using the Elevation screw bolt, turn 4 full turns counter-clockwise, record the signal level (displayed on meter's left bar graph).
- 7) Rotate the bolt clockwise counting the number of turns until the same signal level is reached.
- 8) Divide this number of turns by 2.
- 9) Turn the Elevation plastic dial to zero.
- 10) Rotate the Elevation screw counter-clockwise by the divided number of turns
- 11) Tighten the Elevation bolts down. The signal level should be the same or higher than with your rough alignment.
- 12) Record the signal level (i.e. with pen and paper) that is displayed on meter's left bar graph for 101 satellite.
- 13) Set the Azimuth plastic dial to zero.
- 14) Using the Azimuth screw bolt, turn 4 full turns counter-clockwise, record the signal level.
- 15) Rotate the fine-tuning bolt clockwise counting the number of turns until the same signal level is reached.
- 16) Divide this number of turns by 2.
- 17) Turn the Azimuth plastic dial to zero.
- 18) Rotate the Azimuth screw counter-clockwise by the divided number of turns
- 19) Tighten the Azimuth bolts down. The signal level should be the same or higher than with your rough alignment.



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DIRECTV has strictly stated that they do NOT want the technicians modifying the alignment of the dish while looking only at the Ka signal level (dBm) because if they improve signal reception from the 103 satellite, they will likely be hurting the alignment on the 99 satellite at the same time. DIRECTV recommends adjusting the azimuth and elevation of the dish while looking at the 101 satellite, adjusting the tilt/skew of the dish while looking at the 119 satellite, and then performing their fine-tuning/dithering process while looking at the 101 satellite. Please refer to DIRECTV's official instructions regarding their dithering/fine-tuning process for more information. The AI Turbo S2 satellite meter cannot identify and get a LOCK on the DIRECTV 99 & 103 Ka satellites. The AI Turbo S2 can display signal level (dBm) instantly on your left bar graph and after about a 7 second delay you will see the estimated signal quality on your right bar graph for the DIRECTV 99 & 103 Ka satellite transponders. The meter will NOT indicate a lock status since the AI Turbo S2 meter isn't able to demodulate or obtain a lock on the DIRECTV Ka signals due to the DVB-S2 modulation type and level of encryption. The DIRECTV IRD/satellite receiver can show you the signal quality of the 99 & 103 Ka satellites signals because the receiver is compatible with the signal type and encryption type found on the Ka satellites.

### ***Secure dish and verify adequate signal level and quality:***

- Check all nuts and bolts and make sure they are tightened to specification. Pay close attention to the LNB lock down bolts. They must be installed wrench tight to prevent LNB movement.
- Check for passing scores (green check marks) on the TV screen that's connected to the powered DIRECTV receiver for the 99, 101, 103, 110, and 119 satellite transponders. If the satellite receiver doesn't pass, then the technician should not leave the site and must improve dish alignment to reach a passing score.

### ***To check the RF signal level (dBm), signal quality, and lock status of the 110° satellite, if desired:***

- Press the LNB power soft-key (middle right side of LCD screen) to toggle to LNB2 (110/119 combo), use your Up/Down arrow keys to scroll to transponders 8, 10, or 12 of the 110/119 Combo
  - Check to make sure you have a LOCK status and a good signal level and C/N value
  - Press ID and verify that the 110 satellite has been found
- Note: Transponders 8, 10, and 12 of the 110/119 Combo come from the 110 satellite

### ***To check the RF signal level (dBm) of Ka High Band Transponders on 99° satellite, if desired:***

- Press the LNB soft-key (located on middle right side of LCD screen) to toggle to LNB3 (99° satellite)
- Press your up/down arrow keys to scroll through transponders, as desired
- Pay attention to the signal level (dBm) on your left bar graph. After about 6 seconds of delay, the right bar graph will display an estimated signal quality (C/N), but the AI Turbo S2 meter isn't able to demodulate or obtain a LOCK on the DIRECTV Ka signal.

### ***To check the RF signal level (dBm) of Ka Low (B-Band) Transponders on 99° satellite, if desired:***

- Press the LNB soft-key (located on middle right side of LCD screen) to toggle to LNB4 (99° satellite)
- Press your up/down arrow keys to scroll through transponders, as desired
- Pay attention to the signal level (dBm) on your left bar graph. After about 6 seconds of delay, the right bar graph will display an estimated signal quality (C/N), but the AI Turbo S2 meter isn't able to demodulate or obtain a LOCK on the DIRECTV Ka signal.



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## ***To check the RF signal level (dBm) of Ka High Band Transponders on 103° satellite, if desired:***

- Press the LNB soft-key (located on middle right side of LCD screen) to toggle to LNB5 (103° satellite)
- Press your up/down arrow keys to scroll through transponders
- Pay attention to the signal level (dBm) on your left bar graph. After about 6 seconds of delay, the right bar graph will display an estimated signal quality (C/N), but the AI Turbo S2 meter isn't able to demodulate or obtain a LOCK on the DIRECTV Ka signal.

## ***To check the RF signal level (dBm) of Ka Low (B-Band) Transponders on 103° satellite, if desired:***

- Press the LNB soft-key (located on middle right side of LCD screen) to toggle to LNB6 (103° satellite)
- Press your up/down arrow keys to scroll through transponders
- Pay attention to the signal level (dBm) on your left bar graph. After about 6 seconds of delay, the right bar graph will display an estimated signal quality (C/N), but the AI Turbo S2 meter isn't able to demodulate or obtain a LOCK on the DIRECTV Ka signal.

