

Application Note

Installing and Testing DIRECTV MFH2 with a Super Buddy™ Satellite Meter

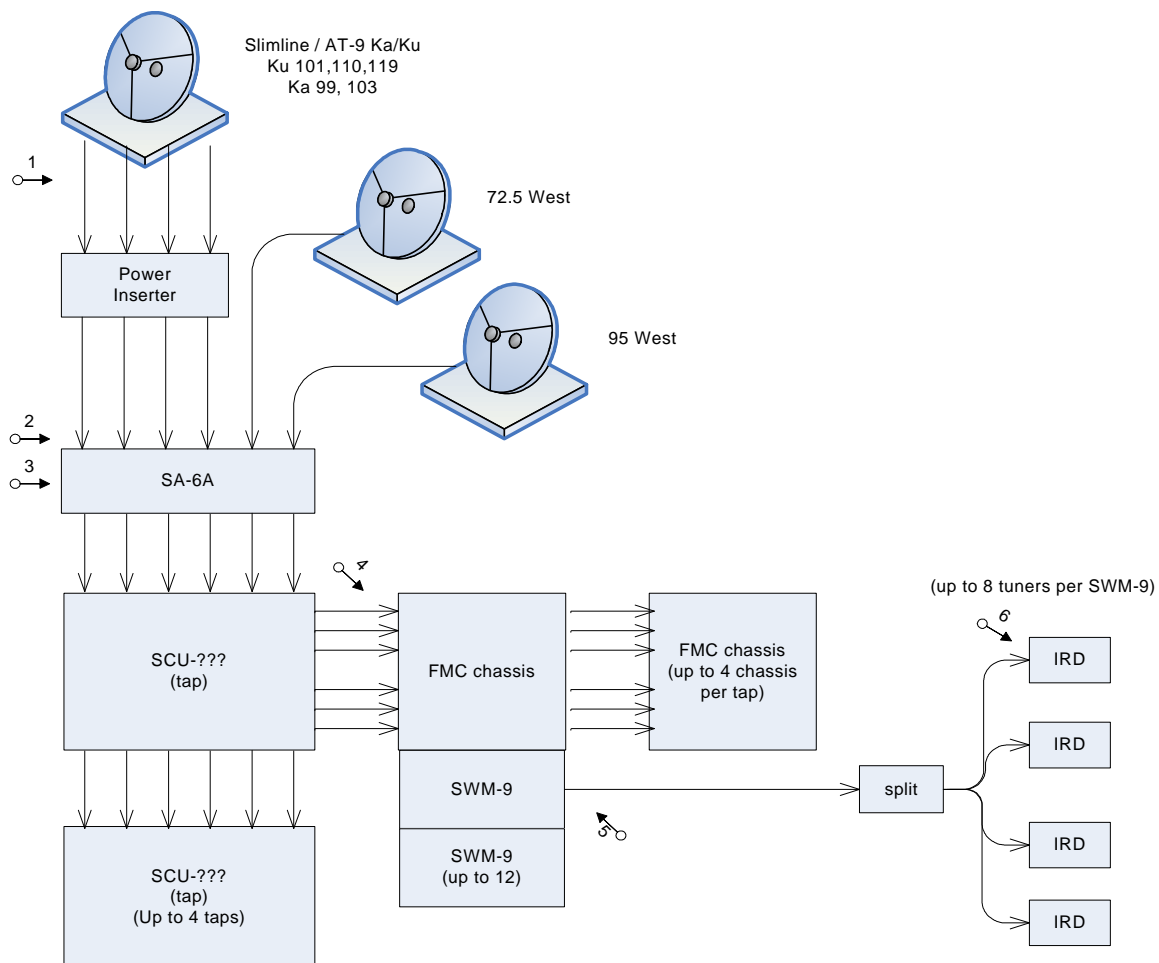
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The DIRECTV MFH2 Distribution System utilizes three dishes, a riser system, and a single cable home run distribution system.

The three dishes are:

- Slimline/AT9 for 101, 110, 119 West DBS and 99, 103 West Ka satellites (“SlimLine”)
- DBS dish for 72.5 West satellite (“Single Sat 72.5”)
- FSS dish for 95 West satellite (“International 95”)

The distribution system looks something like this:



General Procedure

Testing the system should include the following steps. The test locations are denoted by numbers on the diagram above.

- 1) Install and point the antennas. Use the Proof of Performance test to record the performance of each dish. Note the signal quality or C/N measurement; you will want to verify that this quality is maintained as the signal is distributed through the system.
- 2) Verify the signal levels and quality at the input to the SA-6A. The levels must be in the correct range for the SA-6A to work properly. The signal levels from the Slimline are frequently too high and must be padded down before the SA-6A or before the power inserter. Verify that the correct satellite feed is present on each cable input to the SA-6A.
- 3) Adjust the SA-6A to ensure the correct levels reach the SCU-??? tap units. Follow the DIRECTV approved procedure.
- 4) Verify the input levels and signal quality at the input to each FMC chassis. Compare the signal quality (or C/N) to the values obtained directly from the dish. If degradation has occurred, backtrack and determine where the degradation was introduced. Overdriving the components is a common way of degrading the C/N.
- 5) Verify the output of each SWM-8 module. When the SWM-8 is first powered up, it goes into a test mode where certain transponders are transmitted on all 8 output frequencies. Compare the signal quality (C/N) for each of these to the quality of the signal input to the FMC chassis.
- 6) Verify each customer drop. With the SWM-8 still in the power-up test mode, repeat the test at each drop to be sure the signal quality is maintained and signal level is adequate for the receivers.

Proof of Performance Test

The Super Buddy's "Proof of Performance" function may be used to record the measurements of all transponders for future transfer to a PC where they may be printed or archived. The general procedure for using the Proof of Performance (PoP Scan) is:

- Verify that a signal lock is obtained.
- Press ID to verify the correct satellite has been obtained.
- Press MENU and select PoP Scan to start collecting data.

The meter will now scan through all the transponders and collect the data for each. When it finishes a summary screen will show the minimum and maximum level and signal quality.

- Press SAVE
- Enter the date
- Enter the location
- Enter your name
- Enter any other comments about the installation (the port number may be useful)
- Press SAVE
- Enter a unique file name (location and port are suggested)
- Press SAVE or ENTER

The meter will save the file in flash storage and reboot.

Use the SatTransfer program to transfer the files to a PC for viewing, printing and archival. This program is described in the Operation Manual.

DIRECTV SL5 KaKu Slimline / Phase 4 AT9 & AU9 Antenna Pointing

DIRECTV KaKu Slimline / Phase 4 AT9 & AU9 Antenna Pointing (LNB model SL5)

Connections: DIRECTV SL5 LNBF Cluster (99°, 101°, 103°, 110°, 119°) connected to top (SIGNAL IN) port of Super Buddy satellite meter with single coax cable.

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 72.5 or 95 satellites)
- SWITCH TYPE defaults to **22 kHz** (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 ZIP 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 Super Buddy's zip code lookup feature (ZIP soft-key in lower left corner of main Run screen).
- 3) Connect a coax jumper cable from the top (Signal-In) port of your Super Buddy meter to a LNBF output port.

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) and signal quality (right bar graph) on the 101 satellite. Align antenna until a LOCK status is obtained.
- 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.

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 to optimize the alignment by maximizing the signal level (left bar graph) and signal quality (right bar graph) on the 119° satellite. Align antenna until a LOCK status is obtained.
- 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

To check the status of the 110° satellite:

- While still selected on LNB2, 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

Now press the LNB power soft-key four times to return to LNB1 (the 101 satellite). Complete the dithering/fine tuning process, adjusting the azimuth and elevation of the dish while looking at the 101 satellite, as directed by DIRECTV. This will ensure good signal reception from all five satellites (99, 101, 103, 110, 119) if your mast/pole is plumb.

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 Super Buddy satellite meter cannot identify and get a LOCK on the DIRECTV 99 & 103 Ka satellites. The Super Buddy can only display signal level (dBm) on your left bar graph for the non-SWM DIRECTV 99 & 103 Ka satellites. The right bar graph (signal quality) will be empty and the meter will NOT indicate a lock status since the Super Buddy 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. Only the DIRECTV IRD/satellite receiver can show you the signal quality of the 99 & 103 Ka satellites signals because the receiver has been authorized and cuts through the layer of encryption found on the Ka satellites.

To check the Ka High Transponders on 99° Spaceway 2

- Press the LNB soft-key (located on middle right side of LCD screen) multiple times to toggle to LNB3 (99° satellite)
- Press your up/down arrow keys to scroll through transponders 1-6
- Pay attention to the signal level (dBm) on your left bar graph. You can ignore the right bar graph (C/N) since the Super Buddy meter isn't able to demodulate or obtain a LOCK on the DIRECTV Ka signal.

To check the Ka High Transponders on 103° Spaceway 1

- Press the LNB soft-key (located on middle right side of LCD screen) multiple times to toggle to LNB4 (103° satellite)
- Press your up/down arrow keys to scroll through transponders 1-6
- Pay attention to the signal level (dBm) on your left bar graph. You can ignore the right bar graph (C/N) since the Super Buddy meter isn't able to demodulate or obtain a LOCK on the DIRECTV Ka signal.

Note: the Super Buddy is not able to check the signal level of the Ka Low transponders on either 99 or 103 unless you have a B-Band converter in-line because they are not in the frequency range of the meter. If you have the B-Band converter in-line, you'll need to choose "SL5 w/B-Band" as your System type in the System Setup software menu.

You may choose to use the PoP Scan function of the meter to record the measurements.

Please refer to the operations manual for more info and instructions related to the Proof of Performance scan feature.

Other Notes:

-It is NOT recommended to keep Super Buddy meter in line while checking receiver status due to attenuation from our circuitry.

Please ensure that you have the latest versions of North American Field Guide, Software, and USA Zip Codes loaded into your meter. If your meter has older versions loaded, please use the FlashUpdate program to update your meter, as described in the [Operations Manual](#).

Single Sat 72.5 Antenna Pointing

Preset the antenna and mast hardware per the directions of DIRECTV.

Connections: Circular LNBF (possibly Eagle Aspen model DTV32+) connected to top (Signal In) port of Super Buddy meter with coax cable

Meter Set-Up:

Push the **SYST** System soft-key to select the following:

- REGION your geographic region
- SERVICE **DIRECTV**
- SYSTEM **Single Sats**
- LNB MODEL **Single Sat 72.5**
- SWITCH TYPE none

*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 ZIP zip code look-up feature to obtain rough antenna settings (magnetic compass heading and elevation).

- Ensure that you have selected the 72.5W satellite. Use left / right arrow keys to select the desired satellite (orbital position displayed in upper left).
- Press the **ZIP** zip code soft-key (located in bottom left of LCD screen), type in the local zip code, and press **ENTER**. Approximate antenna settings will be displayed. Press **EXIT** soft-key to return to the main Run screen.

Run Mode

- Press **LNB** soft-key (located on middle right side of LCD screen) to power the LNB.

After selecting the satellite and pressing the **LNB** soft-key to power the LNB:

- Adjust antenna azimuth and elevation to obtain maximum signal level (left bar graph), signal quality (right bar graph), and LOCK status.
- Press the **ID** soft-key to verify the satellite. "ID VERIFIED" means you are pointed correctly.
- If "ID FAILED" is displayed, press **SCAN** soft-key and Super Buddy will find which satellite you are aimed at.
- If desired, you may also use Up/Down arrow keys to scroll through other transponders to check for proper RF signal level and quality.

Use the PoP Scan function to record the measurements.

International 95 Antenna Pointing

Preset the antenna and mast hardware per the directions of DIRECTV.

Connections: Linear LNBF (possibly Eagle Aspen model P170KU) connected to top (SIGNAL IN) port of Super Buddy meter with coax cable.

Meter Set-Up:

Push the **SYST** System soft-key to select the following:

- REGION your geographic region
- SERVICE **DIRECTV**
- SYSTEM **Single Sats**
- LNB MODEL **Intl 95**

- SWITCH TYPE none

*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 ZIP zip code look-up feature to obtain rough antenna settings (magnetic compass heading, elevation, and polarization offset).

- Ensure that you have selected the 95W Galaxy 3C satellite. Use left / right arrow keys to select the desired satellite (orbital position displayed in upper left).
- Press the **ZIP** zip code soft-key (located in bottom left of LCD screen), type in the local zip code, and press **ENTER**. Approximate antenna settings will be displayed. Press **EXIT** soft-key to return to the main Run screen.

Run Mode

- Press **LNB** soft-key (located on middle right side of LCD screen) to power the LNB.

After selecting the satellite and pressing the **LNB** soft-key to power the LNB:

- Adjust antenna azimuth and elevation to obtain maximum signal level (left bar graph), signal quality (right bar graph), and LOCK status.
- Rotate the LNB and feed horn assembly (adjusting the polarity offset) to maximize signal level and quality.
- Press the **ID** soft-key to verify the satellite. "ID VERIFIED" means you are pointed correctly.
- If "ID FAILED" is displayed, press **SCAN** soft-key and Super Buddy will find which satellite you are aimed at.
- If desired, you may also use Up/Down arrow keys to scroll through other transponders to check for proper level and quality.

Riser / Trunk Verification

When the antennas are properly aligned, verify and document the quality of the signals at the input to the riser system and distribution chassis using the procedure below.

This test is performed at the input to the riser system components, specifically at the end of the cables that connect to the SA-6A amplifier and to the FMC distribution chassis.

Equipment Setup:

- Disconnect one input cable at a time and connect it to the Super Buddy “Signal In” LNB port (input port on top of Super Buddy meter).

Meter Set-Up:

Push the **SYST** System soft-key to select the following:

- REGION your geographic region
- SERVICE **DIRECTV**
- SYSTEM **MFH-2 Riser**
- LNB MODEL choose the appropriate port (**Port 1 – 101 even, Port 1 – 99A even, Port 2 – 101 odd, Port 2 – 99A odd, Port 3 – 119 even, Port 3 – 103A even, Port 4 – 119 odd, Port 4 – 103A odd, Port 5 – 72.5W, or Port 6 – 95W**)
- SWITCH TYPE **none**

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

Verify Port 1

- Disconnect the cable from the device Port 1 and connect it to the Super Buddy “Signal In”.
- Select LNB1 on the meter by pressing the LNB soft-key.

This will set the Super Buddy to use the even transponders from the 101 satellite (labelled Tr 2 through Tr 32) which should be present on this cable.

- Verify that a signal lock is obtained.
- Press ID to verify the correct satellite has been obtained.
- Check some transponder levels and C/N to be sure the signal integrity has been maintained.
- Press MENU and use the PoP Scan to collect and record the data.

Also on this same cable should be the 99 West Spaceway 2 satellite even transponders (labelled Tr 2 through Tr 6). Verify that the signal levels are in the proper range. The signal quality or C/N for the Ka band signals cannot be verified because the meter cannot lock onto the signal format used. The signal level readings however, are still valid.

Verify Other Ports

Using this same method, verify that the signals on all ports are valid and good.

Device Port	Meter Setting	Satellite	Transponders	ID	C/N Quality
1	101 even	101	even	yes	yes
1	99A even	99	even	no	no
2	101 odd	101	odd	yes	yes
2	99A odd	99	odd	no	no
3	119 even	110,119	even	yes	yes
3	103A even	103	even	no	no
4	119 odd	119	odd	yes	yes
4	103A odd	103	odd	no	no
5	72.5W	72.5	even	yes	yes
6	95W	95	even/odd	yes	yes

Use the PoP Scan function to record the measurements.

Customer Drop / SWM Verification

This test is performed at the customer drop location, or at points in the single-wire portion of the distribution system between the SWM and the receivers.

The SWM module allocates one channel or frequency to each receiver that is connected to it. The receiver requests a specific transponder and the SWM switches that transponder onto the allocated channel. Therefore, only the transponders actually being used are on the output cable and they are not at the normal frequencies.

When a SWM is active, some channels may be in use, others vacant, depending on how many receivers are active on the line. To test this system, it is best to use the SWM diagnostic mode which is enabled when the SWM is powered up. In this mode, the SWM outputs a signal on all channels which the meter can measure to assess the resulting signal quality.

Equipment Setup:

- Power the SWM in question off and then on to put it into the test mode.
- No other receivers should be active at this time.
- Connect a cable from the SWM module to the Super Buddy LNB port. Splitters may be located between the SWM and the Super Buddy.

Meter Set-Up:

Push the **SYST** System soft-key to select the following:

- REGION your geographic region
- SERVICE **DIRECTV**
- SYSTEM **MFH-2 SWM**
- LNB MODEL **SWM-5 or SWM-8**
- SWITCH TYPE **none**

Verify Signal

- Scroll through the 9 channels and compare the signal level and signal quality (C/N) to the values previously measured at the input to the FMC chassis.
- If the signal level is below -65 dBm or the C/N has dropped by more than 1 dB, there is likely a problem upstream from the test point. If you are measuring directly at the output from the SWM, the problem is probably in the SWM module itself.
- If the level and C/N looks good, you may document the performance with the PoP Scan.

Other Notes:

-It is NOT recommended to keep Super Buddy meter in line while checking receiver status due to attenuation from our circuitry.

Please ensure that you have the latest versions of North American Field Guide, Software, and USA Zip Codes loaded into your meter. If your meter has older versions loaded, please use the FlashUpdate program to update your meter, as described in the [Operations Manual](#).