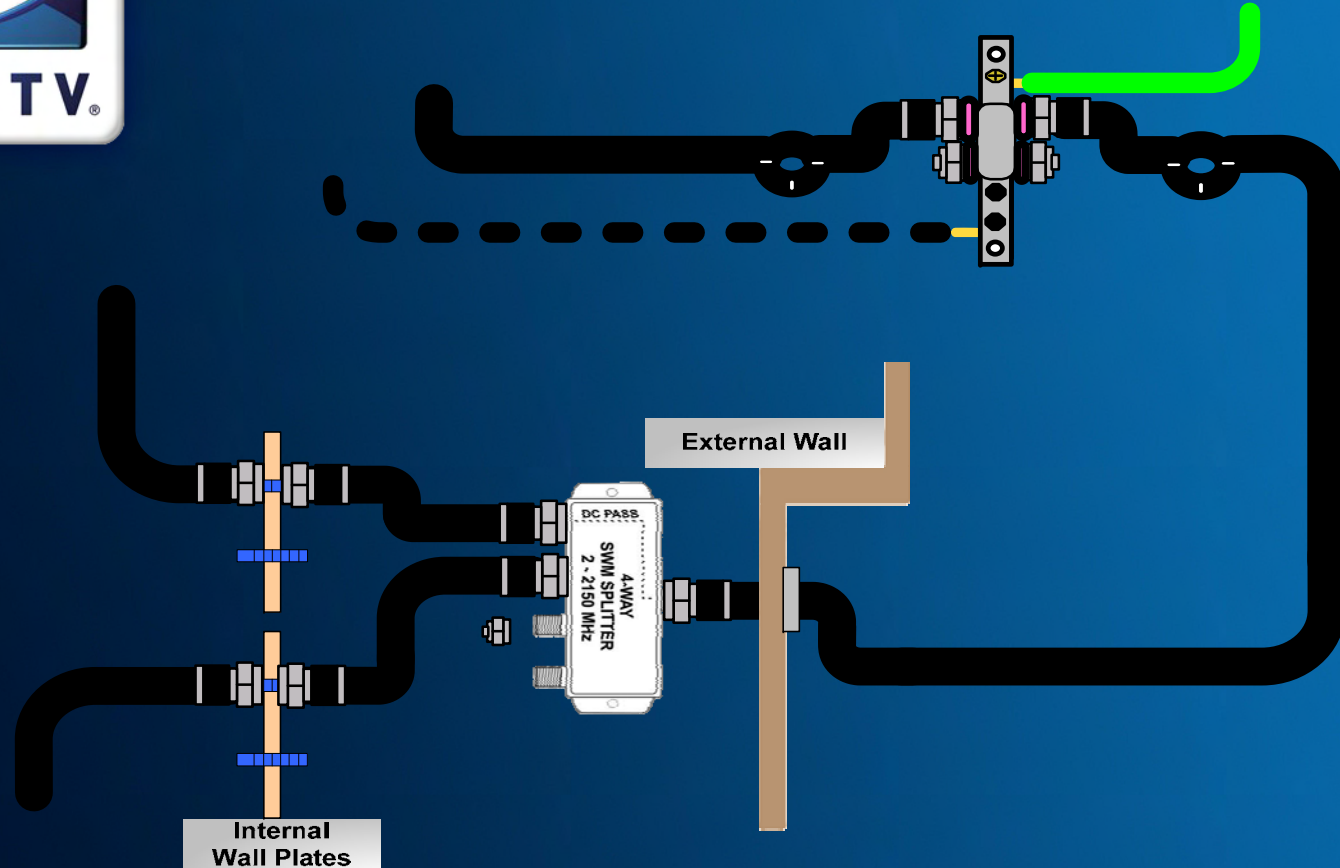


SWM

Single Wire Multiswitch



Overview



● Sections at a Glance

- What is SWM
- How Does the SWM work
- SWM Frequencies
- SWM Hardware
- SWM Supporting Hardware
- SWM Facts
- Compatible IRD's
- IRD's SWM-1 Port
- Installation Diagrams
- Peaking Procedures
- SWM Meter Use Procedures

Technician Handouts



● Each Technician will receive the following

- SWM Integrated ODU Meter Peaking Procedures
 - SWM Integrated ODU signal peaking
- SWM Meter Use Procedures
 - SWM meter home run cable channel verification
- SWM LNB & SWM Module Diagrams
 - Installation Diagrams

What is SWM ?



- **Single Wire Multiswitch** products are designed to provide DIRECTV® programming from all current and future KaKu satellites via a single RG-6 coaxial cable home run to a set of multiple IRD's connected using one or more Splitters within a customer's home.
- SWM products allocate channels (frequency blocks) for viewer selected programming to the SWM compatible IRD's.
 - These channels (frequencies) contain the programming guide data and user selected programming channels

How Does the SWM work



- SWM works with the connected IRD's to provide only the specific content the IRD's tuner is requesting.
- The designated channel for each tuner contains the specific programming each tuner is requesting
- Tuners are assigned their individual channel during the IRD's programming guide acquisition phase
- The SWM equipment requires power insertion
- BBC's are not needed for MPEG 4 IRD tuners

SWM Frequencies



● SWM equipment uses the frequency range

- 974MHz to 1790MHz for programming guide and content to the IRD tuner
- 2.3MHz for communications between SWM equipment
- SWM assigns frequencies as specific channel's to each tuner
 - Up to a maximum of 8 channels are available
 - SWM LNB & 8 CH SWM module - only
 - A SWM channel's frequency is 100MHz wide
 - Each tuner on an IRD requires one channel
 - An HD DVR IRD would require 2 channels

<u>5 Channel SWM</u>	<u>Frequency</u>	<u>Assignment</u>
Channel 1	1076MHz	Program Content
Channel 2	1178MHz	Program Content
Channel 3	1280MHz	Program Content
Channel 4	1382MHz	Program Content
Channel 5	1484MHz	Program Content

Programming Guide Data is modulated to each IRD / Tuner connected using the 974MHz frequency range this could present its self as additional SWM channel on the IRD's signal screen

<u>8 Channel SWM</u>	<u>Frequency</u>	<u>Assignment</u>
Channel 1	1076MHz	Program Content
Channel 2	1178MHz	Program Content
Channel 3	1280MHz	Program Content
Channel 4	1382MHz	Program Content
Channel 5	1484MHz	Program Content
Channel 6	1586MHz	Program Content
Channel 7	1688MHz	Program Content
Channel 8	1790MHz	Program Content

SWM Channel VS Programming Channel

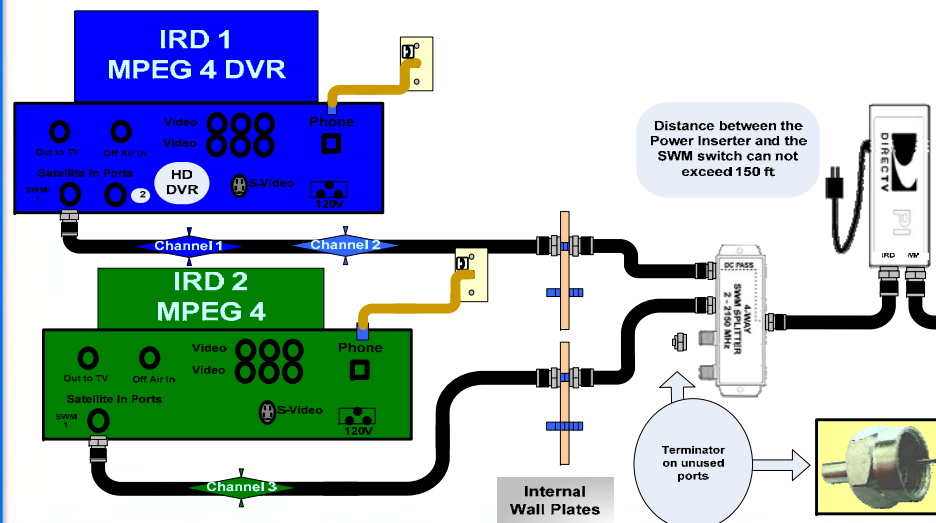


For illustration purposes only

8 Channel SWM	Frequency	Assignment
Channel 1	1076MHz	Program Content
Channel 2	1178MHz	Program Content
Channel 3	1280MHz	Program Content
Channel 4	1382MHz	Program Content
Channel 5	1484MHz	Program Content
Channel 6	1586MHz	Program Content
Channel 7	1688MHz	Program Content
Channel 8	1790MHz	Program Content

Programming Guide Data is modulated to each IRD / Tuner connected using the 974MHz frequency range this could present its self as another SWM channel on the IRD's signal screen

See Slide 23 of the SWM LNB & SWM Module power point for more information regarding SWM Channels



SWM Channel vs Programming Channel

The following is only an example, actual SWM channel assignments are unknown to the user or to the technician.

Channel Assignment Examples

- IRD 1, Tuner 1 – is assigned SWM Channel 1
- IRD 1, Tuner 2 – is assigned SWM Channel 2
- IRD 2 Tuner 1 – is assigned SWM Channel 3

Programming Selections Example

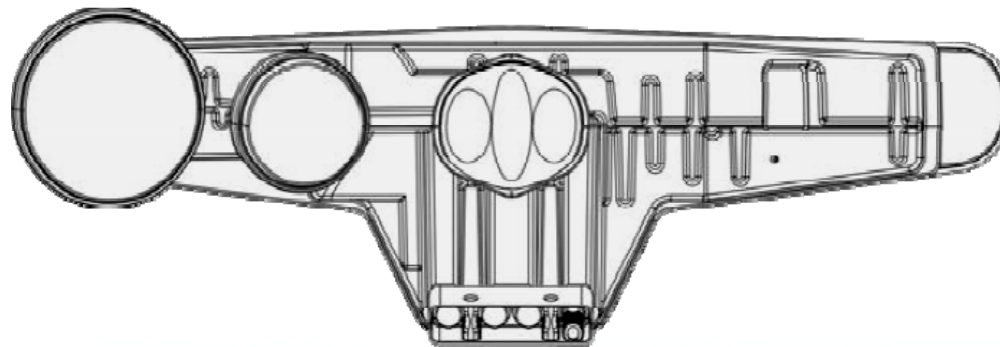
- IRD 1, Tuner 1 requests programming channel 201 (DIRECTV Basics), the SWM LNB takes orbital location 101° transponder 20 and modulates the programming onto **SWM channel 1**
- IRD 1, Tuner 2 requests programming channel 294 (Discovery Kids), the SWM LNB takes orbital location 101° transponder 4 and modulates the programming onto **SWM channel 2**
- IRD 2, Tuner requests programming channel 285 (Discovery Times), the SWM LNB takes orbital location 101° transponder 18 and modulates the programming onto **SWM channel 3**

SWM Hardware



● SWM Integrated LNB

- Will be launched nation wide
 - Built in multiswitch
 - Five orbital slots (119°/110°/103°/101°/99°) – part number SL5S
 - Provides a maximum of 8 Channels
 - Can not be connected to a SWM Module
 - Three orbital slots (103°/101°/99°) – Part number SL3S
 - TBD on release date
- The SWM ODU is powered by a separate 21 volt DC power inserter.
Initially only the 29 volt power inserter will be available, reference slides 9 & 12 for further installation guidelines

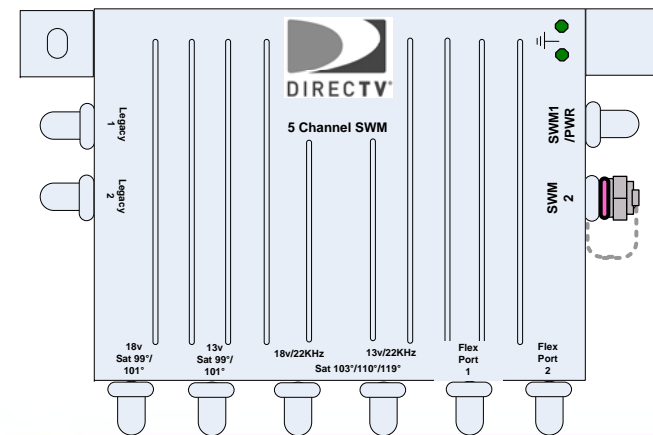
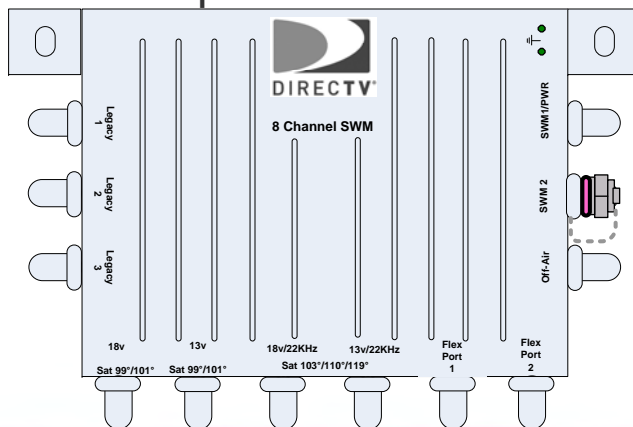


SWM Hardware



SWM Module's

- Will not be used in all markets, has been tested in a select few areas
- 8 Channel – Two SWM output ports, Three Legacy output ports
 - Will support up to 8 tuners. Example, Four HD DVR IRD's
- 5 Channel – Two SWM output ports, Two Legacy output ports
 - Will Support up to 5 tuners. Example, Two HD DVR Tuners and One HD non DVR Tuner
- SWM 2 port must be terminated if not used
 - Terminator included
- The SWM Module is powered by a separate 29 volt DC power inserter, included with each SWM Module and must be connected to the Module's SWM 1 port



SWM Supporting Hardware



- **SWM uses distinct types of supporting hardware**

- **SWM Splitters (2, 4, or 8 Port versions)**

- Single Port power passing
- Rated from 2MHz to 2150MHz

- **SWM Port Expander**

- Only used with SWM Module's, allows combining multiple SWM Module's or adding legacy 6x8 / 6x16 switch's to the installation

- **Legacy Four Port Multiswitch**

- Only used with SWM Module's, expands the number of legacy IRD's in an installation

- **SWM Power Inserter's**

- SWM **Module** requires a **29vdc** power inserter
- SWM Integrated **LNB** requires a **21vdc** power inserter

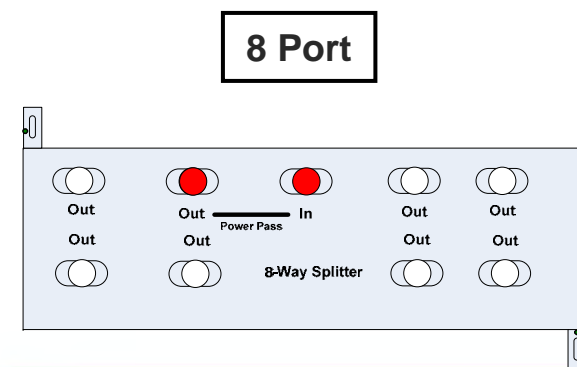
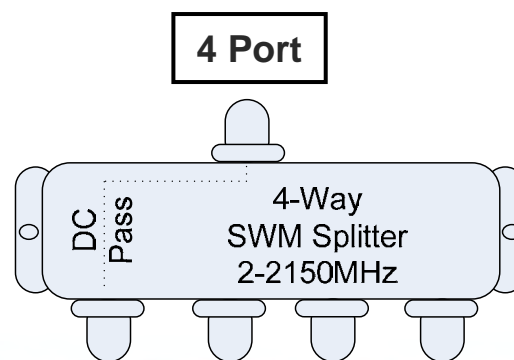
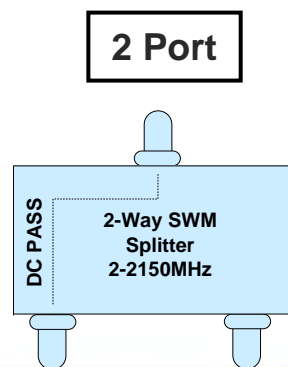
- **Note: Some SWM equipment/documents may still have the former name on them. If you see FTM on any documents or equipment, consider it SWM.**

SWM Supporting Hardware



● SWM Splitters

- Must be “**SINGLE PORT DC POWER PASSING**”
 - Page 37 contains procedures to verify pre-existing splitters
- Must pass frequencies from 2MHz to 2150MHz
- This will ensure that the power supply is **only** powering the SWM LNB or Module
- Supplying excess voltage to an IRD can damage the IRD Tuner
- 2, 4, or 8 Port versions are available
- Ports marked in **RED** indicate “**POWER PASSING**”
- Ports that are not in use must be “**TERMINATED**”

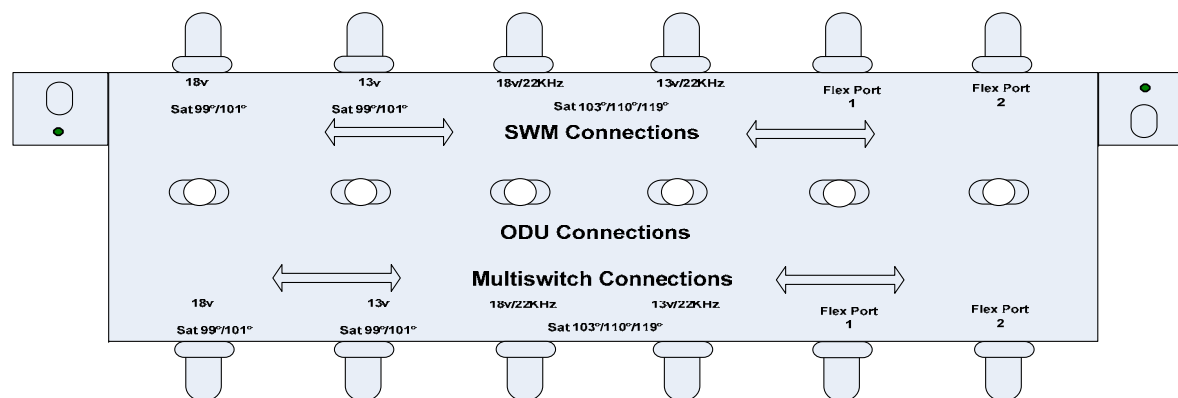


SWM Supporting Hardware



● SWM Expander

- For use with the SWM Module only
- This is a specially designed 6 port power passing splitter which will allow for Two separate Multiswitches to be connected from the KaKu or SlimLine ODU
- These can be 2 separate SWM's or 1 SWM and 1 standard 6x8 or 6x16 Multiswitch
- Removes the need for using separate power passing splitters from each of the lines from the ODU to each Multiswitch



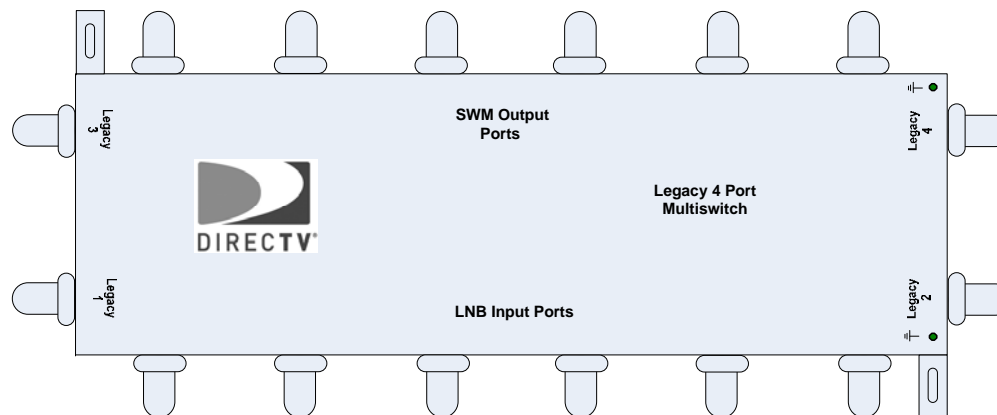
SWM Supporting Hardware



- **Legacy port expander**

- For use with the SWM Module only

- Used to split the inbound lines from the ODU and provide 4 additional legacy ports for Non-Compliant IRD's
 - This will allow the hook up of up to 7 legacy IRD tuners in addition to the 5 or 8 available from the SWM



SWM Supporting Hardware



● Power Inserter

- Used to power the SWM integrated LNB and SWM Module's
- SWM Integrated LNB uses the 21vdc version
 - Initially only the 29 volt power inserter will be available and can be used as long as power is not supplied to the IRD's tuner
- SWM Module's use the 29vdc version
- IRD port of the power inserter is only to be connected to an IRD, if an IRD is not connected then this port must be **"TERMINATED"**
- SWM port of the power inserter is only used to supply voltage to SWM LNB's and SWM Module's, this port is marked in **"RED"**



SWM Supporting Hardware



● Power Inserter cont

- Distance from power inserter to SWM LNB or SWM Module's can not exceed 150ft of distance
- Power inserter must be installed indoors only, do not connect to a power strip
- Do not plug the Power inserter into a switched electrical outlet as this will cause all IRD's connected to the SWM equipment to loose signal



Part Numbers



● **Power inserter**

- SWM Module (Switch) = part number - PI-28
- SWM Integrated ODU = part number - PI-21

● **Splitters** (rated @ 2MHz to 2150MHz)

- 4 way single port power passing = part number SWS-4
- 8 way single port power passing = part number SWS-8

● **SWM Integrated LNB**

- 5 orbital (99, 101, 103, 110, 119) SL5S
- 3 orbital (99, 101, 103) SL3S

SWM Facts



● SWM Installation information

- Power inserter must be located inside the customer's home
- BBC's must not be connected to any IRD using the SWM frequencies
 - If the BBC's are installed the IRD will not operate correctly
- SWM Module Legacy ports **do not** provide Ka frequencies (99°/103°)
- SWM Module Legacy ports **do provide** Ku frequencies when connected to the following orbital locations 72.5°/95°/101°/110°/119° - Bottom line – No HD will be available on the Legacy ports!
- IRD's do auto-detect the SWM or SWM Module
 - This occurs automatically at startup
- IRD's should not be powered up until fully connected (all AV connections, telephone, and coax)

SWM Facts - continued



● SWM Installation information

- SWM Module connection to SWM supported IRD is always Satellite in #1 or SWM -1
 - HD-DVR will be assigned 2 SWM channels from a single input
 - IRD's are assigned their channels (frequencies) at power up
- SWM will work correctly with up to 150' of RG-6 from SWM port to last IRD in line
- SWM may be used as the grounding point for the system if local and state electrical codes allow for this use
- Multiple SWM's may be used, but must remain as separate systems beyond the ODU
 - The SWM outputs cannot be combined for increased SWM frequencies
 - Individual power inserters must be used for each SWM (LNB or Module)

SWM Facts - continued



● SWM Installation information

- OTA channels **cannot** be diplexed down the SWM cable
 - 8 channel has a built-in diplexer on the Module for use on the Legacy output ports only
- SWM Module port # 2 can be used in addition to, or by itself for signal output
 - SWM Module port # 1 must always receive voltage from the power inserter
- SWM equipment should be powered up before IRD's are powered up
 - If any IRD is powered up before the SWM, a reset will be required

SWM Facts - continued



● SWM Installation information

- If the power inserter is used to only power the SWM Module or SWM LNB, then the IRD port on the power inserter must be **terminated**, this will reduce the possibility of adjacent frequency interference
- If SWM Module port # 2 is not used, it must be terminated using the attached terminator
- When connecting a single orbital location such as 95° or 72.5° to the SWM Module use flex port #1, and weather cap flex port #2 (do not terminate).
- Phone lines need to be connected to all IRD's

Compatible IRD's



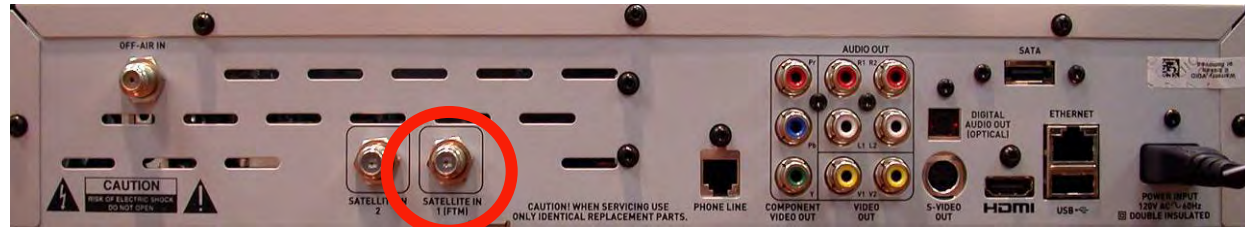
● Current compatible IRD's

- HR20 -100, 700 (With current software download)
- H20 -100, 600 (With current software download)
- D12-100/300/500 (With current software download)
- H21 - 100, 200 (With current software download)
- HR21 (With current software download)
- HR21 Pro (With current software download)
- HR22, HR23 (2008 release)
- H23 (Release TBD)
- R16 (With current software download)
- R22 (Early 2008 release)

IRD's – SWM 1 Input Port



● HR20 SWM 1 Port



● HR21 SWM1 Port



● H-21 SWM 1 Port

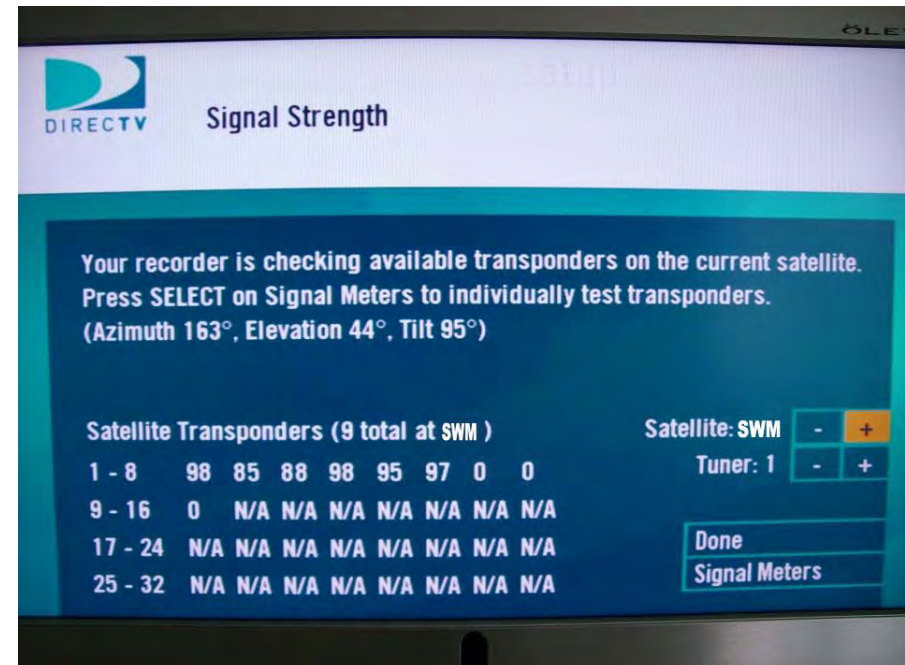


IRD's



● New IRD signal menu

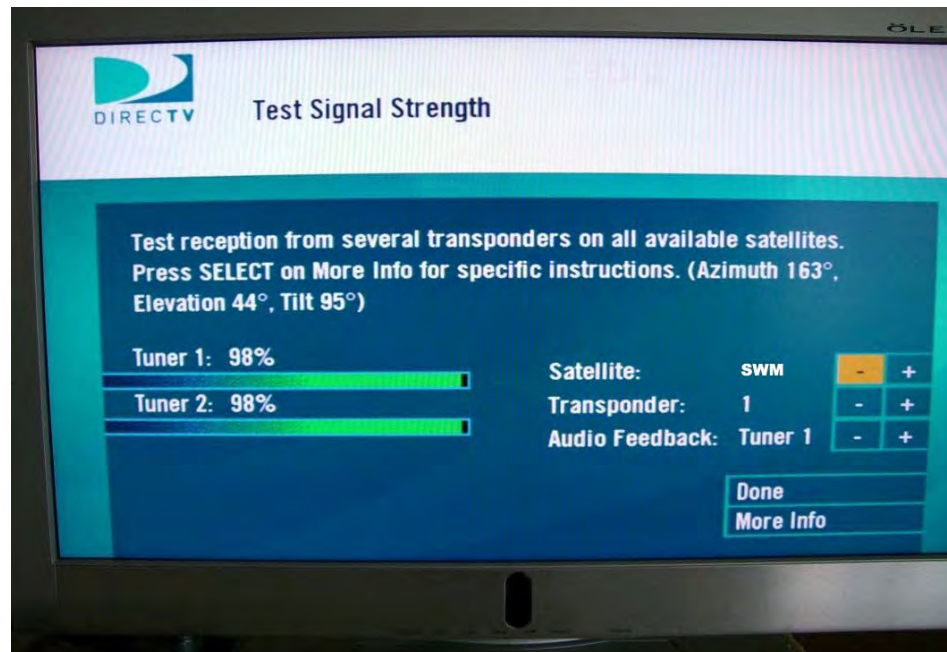
- Able to see all Satellites as before
- Able to see SWM signal strength for all channels in the signal strength menu
 - If the IRD is connected to a 5 channel SWM you will have zero for signal on the last 3 channels
 - SWM Signal is available using the (-) from the 101 satellite





● New IRD signal menu

- SWM individual channels are also available from the signal meter
 - SWM Signal is available using the (-) from the 101 satellite



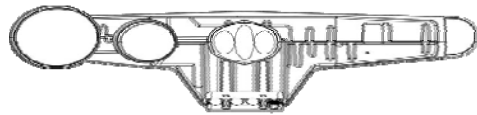
Installation Diagrams



● Installation Diagrams

- The following pages show installation scenarios, these may not be applicable in every installation, however they provide a visual aid to understand how a proper installation should be performed
- A complete Installation Diagram list can be found on Satinstalltraining.com

Installation Diagrams



All Outdoor F-Connectors must be tightened to no less than 30 inch lbs to include LNB's

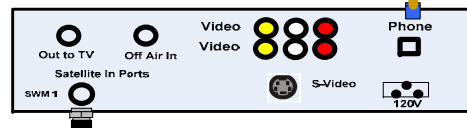
SWM Integrated LNB Installation
KaKu -
HD DVR SWM compatible IRD
Single tuner SWM compatible IRD
4 way single port DC power passing
splitter rated from 2-2150MHz
BBC's are not required in this scenario

Black Ground Wire
Indicates # 17ga
CCS Bond



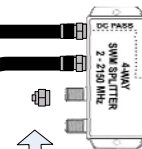
Green Bonding
Wire Indicates #
10ga Solid Copper

Distance between
the Power Inserter
and the SWM
switch can not
exceed 150 ft



Internal
Wall Plates

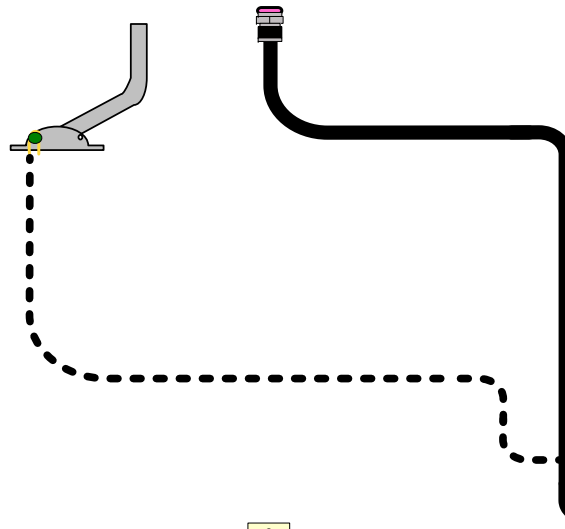
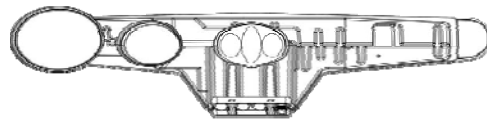
External Wall



Bonding

"The following grounding diagrams illustrate only a few examples of ways to bond a DIRECTV system and may not meet bonding requirements in every municipality within the United States. It is the responsibility of the professional performing the installation to know and follow all local, state and federal grounding regulations within the area he or she is working."

Installation Diagrams

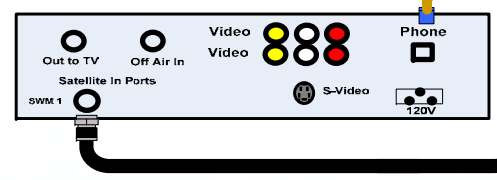
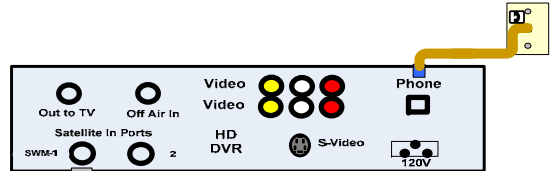


All Outdoor F-Connectors must be tightened to no less than 30 inch lbs to include LNB's

SWM Integrated LNB Installation
KaKu -
HD DVR SWM compatible IRD
Single tuner SWM compatible IRD
4 way single port DC power passing splitter rated from 2-2150MHz
BBC's are not required in this scenario

Black Ground Wire Indicates # 17ga CCS Bond

Green Bonding Wire Indicates # 10ga Solid Copper



Distance between the Power Inserter and the SWM switch can not exceed 150 ft



External Wall



Internal Wall Plates

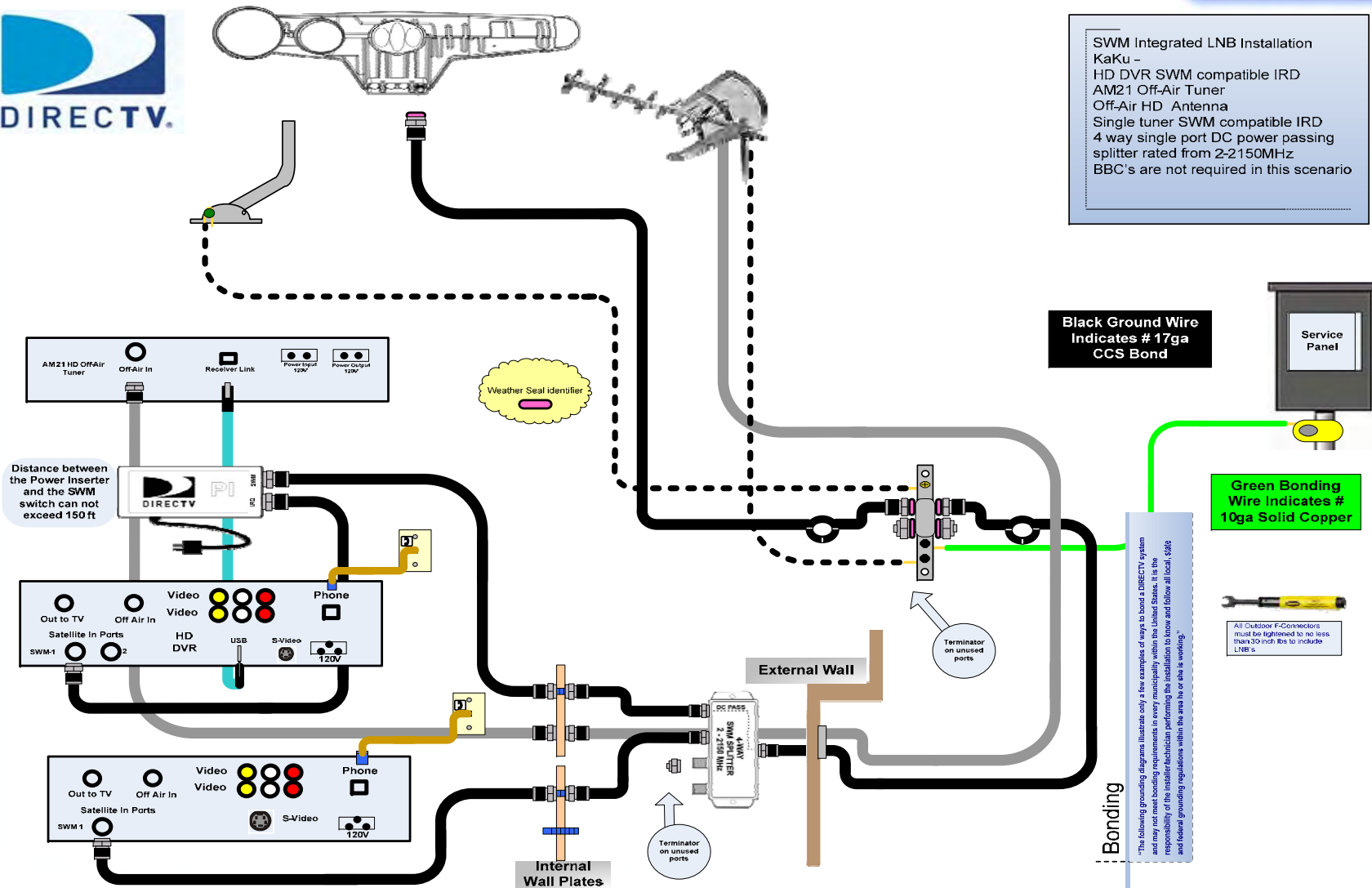
Bonding

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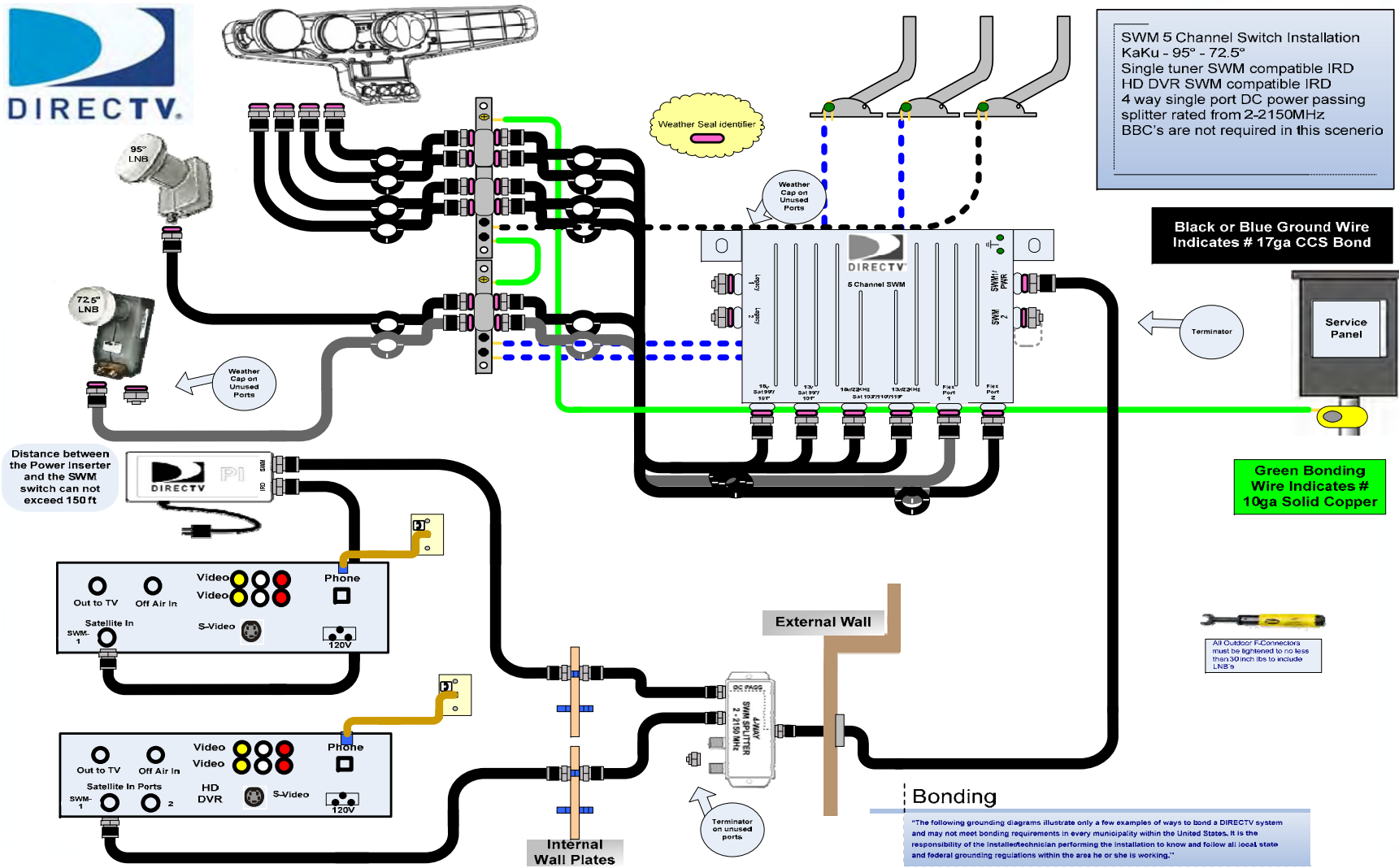
Installation Diagrams



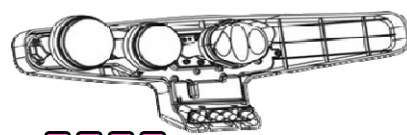
SWM Integrated LNB Installation
 KaKu -
 HD DVR SWM compatible IRD
 AM21 Off-Air Tuner
 Off-Air HD Antenna
 Single tuner SWM compatible IRD
 4 way single port DC power passing
 splitter rated from 2-2150MHz
 BBC's are not required in this scenario



Installation Diagrams

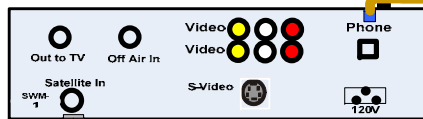


Installation Diagrams



All Outdoor F-Connectors must be tightened to no less than 30 inch lbs to include LNB's

Distance between the Power Inserter and the SWM switch can not exceed 150 ft



Internal Wall Plates

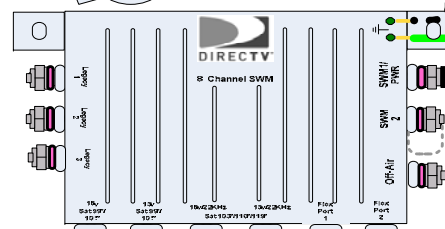


Terminator on unused ports

External Wall

Weather Seal Identifier

Weather Cap on Unused Ports



Weather Cap on Unused Ports

SWM 8 Channel Switch Installation
 KaKu
 Single tuner SWM compatible IRD
 HD DVR SWM compatible IRD
 4 way single port DC power passing splitter rated from 2-2150MHz
 BBC's are not required in this scenario

Black Ground Wire Indicates # 17ga CCS Bond



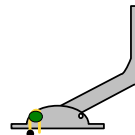
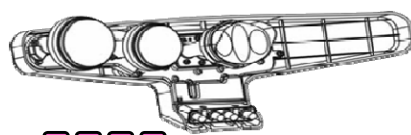
Terminator

Green Bonding Wire Indicates # 10ga Solid Copper

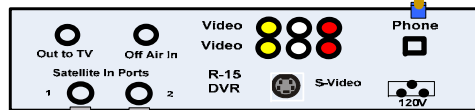
The following grounding diagrams illustrate only a few examples of ways to bond a DIRECTV system and may not be bonding requirements in every jurisdiction within the United States. It is the responsibility of the installer/technician performing this work to know and follow all local, state and federal grounding regulations within the area to or site is working.

Bonding

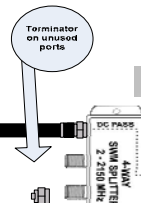
Installation Diagrams



Distance between the Power Inserter and the SWM switch can not exceed 150 ft



Internal Wall Plates



External Wall

SWM 8 Channel Switch Installation
 KaKu -
 HD DVR SWM compatible IRD
 R-15 DVR IRD using SWM Legacy ports
 4 way single port DC power passing splitter rated from 2-2150MHz
 BBC's are not required in this scenario

Black Ground Wire Indicates # 17ga CCS Bond



Green Bonding Wire Indicates # 10ga Solid Copper

Bonding

"The following grounding diagrams illustrate only a few examples of ways to bond a DIRECTV system and may not meet bonding requirements in every municipality within the United States. It is the responsibility of the installer/technician performing the installation to know and follow all local, state and federal grounding regulations within the area he or she is working."

SWM Integrated LNB Peaking



SWM Integrated LNB Meter Peaking Overview

The SWM LNB requires additional steps to be performed during the peaking process.

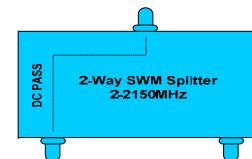
An ASL (Alignment Signal Locator) is required to be used during the peaking process to ensure that the 101° and 119° satellites are located and peaked for maximum signal strength.

The SWM integrated LNB is connected to the ASL (SWM IN port). This connection then allows the 101° and 119° satellite locations to be split into separate unique signals as seen below.

The BirDog, Supper Buddy, Acutrac Pro 22 and Acutrac III meter have been tested and verified to work with the ASL.



If an ASL is not available then a single port power passing two way splitter (rated @ 2MHz - 2150MHz) can be used **ONLY** with the BirDog and Super Buddy meters.



The following pages describe the proper peaking procedures using both methods. These procedures do not exclude or eliminate the need to dither the KaKu dish.

Peaking must be performed using the SWM LNB

Peaking Procedures



Super Buddy Meter ASL Peaking

SWM Integrated LNB Peaking:

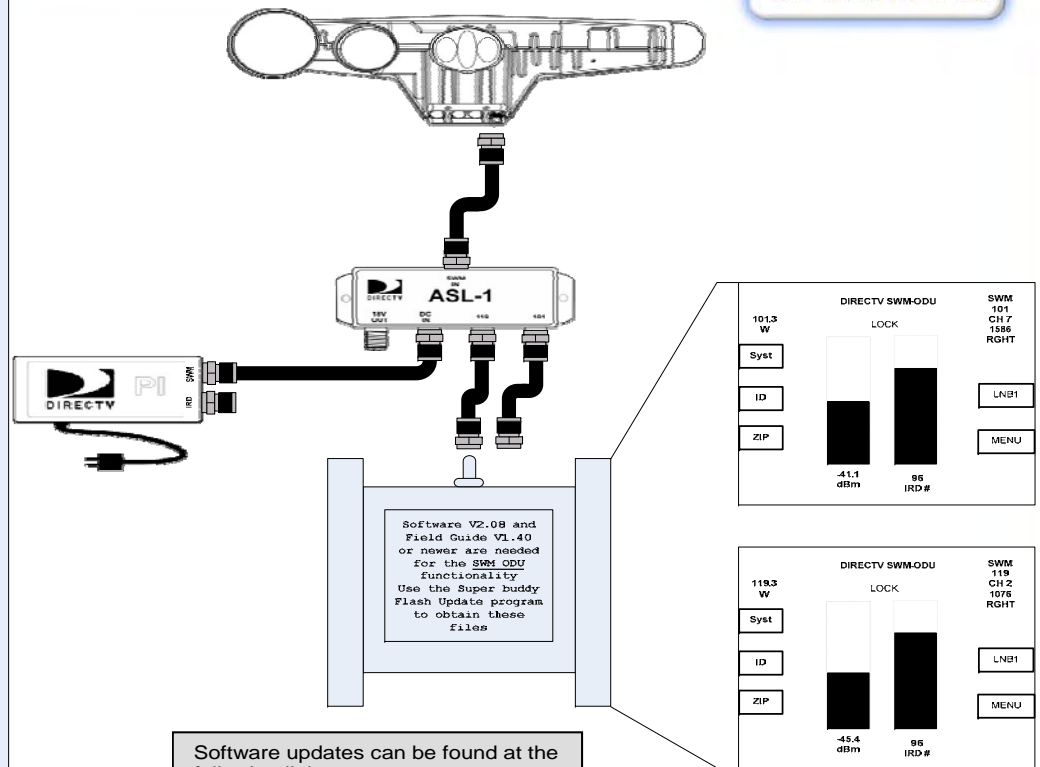
Note: Use instructions in the Meter Setup section for peaking of the SWM-ODU

DO NOT CONNECT ANY IRD to the SWM Integrated LNB BEFORE OR DURING THE PEAKING PROCESS

- 1) Be sure the mast is plumb and the foot plate is secure to an approved mounting surface.
 - 2) Obtain the azimuth, elevation and tilt settings from the DIRECTV receiver or the Super Buddy zip code screen.
 - 3) Preset the antenna tilt and elevation to the settings obtained.
 - 4) Apply power to the SWM LNB using the power inserter as the diagram outlines. **(When power is applied, and before any receivers are connected, the SWM Integrated LNB will enter a diagnostic mode that is required for the alignment procedure.)**
 - 5) Connect the Super Buddy to the 101 port of the ASL unit. Press the LNB button once to select LNB1 and the 101 West satellite. The Super Buddy will tune to a SWM Integrated LNB 101 west channel.
 - 6) Adjust the antenna's azimuth to obtain a signal lock and peak the signal level on your left bar graph. If you cannot obtain a lock, just peak the signal level and try to obtain the lock in the next step.
 - 7) Now adjust the elevation to obtain the peak signal level and a signal lock.
 - 8) At this point, you should be ROUGHLY aligned to 101 West. The SWM Integrated LNB is not compatible with the Super Buddy's satellite ID feature, but the signal lock status indicates that you are pointed at 101.
- Note:** Use the LNB button on the main screen to turn on LNB 1 (101° west) or LNB 2 (119° west) during the peaking process.

You can now follow the KaKu dithering process as outlined in the **KaKu Dithering procedures**

Note: You will have to disconnect the cable from the 101° port on the ASL and connect to the 119° port on the ASL during the tilt adjustment step of the dithering process



Meter set-up:
 Push the SYST System soft-key to select the following:
 REGION your geographic region
 SERVICE DIRECTV
 SYSTEM SWM-ODU
 LNB MODEL N/A
 SWITCH TYPE Manual (the default for the SWM-ODU)

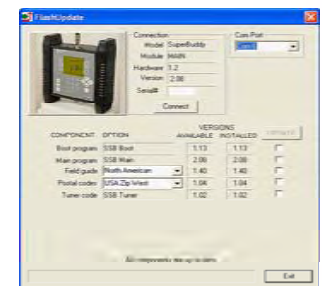
System Setup

SERVICE
DIRECTV

System
SWM-ODU

LNB MODEL
(N/A)

SWITCH TYPE
Manual



Peaking Procedures



Super Buddy Meter Splitter Peaking

SWM Integrated LNB Peaking:

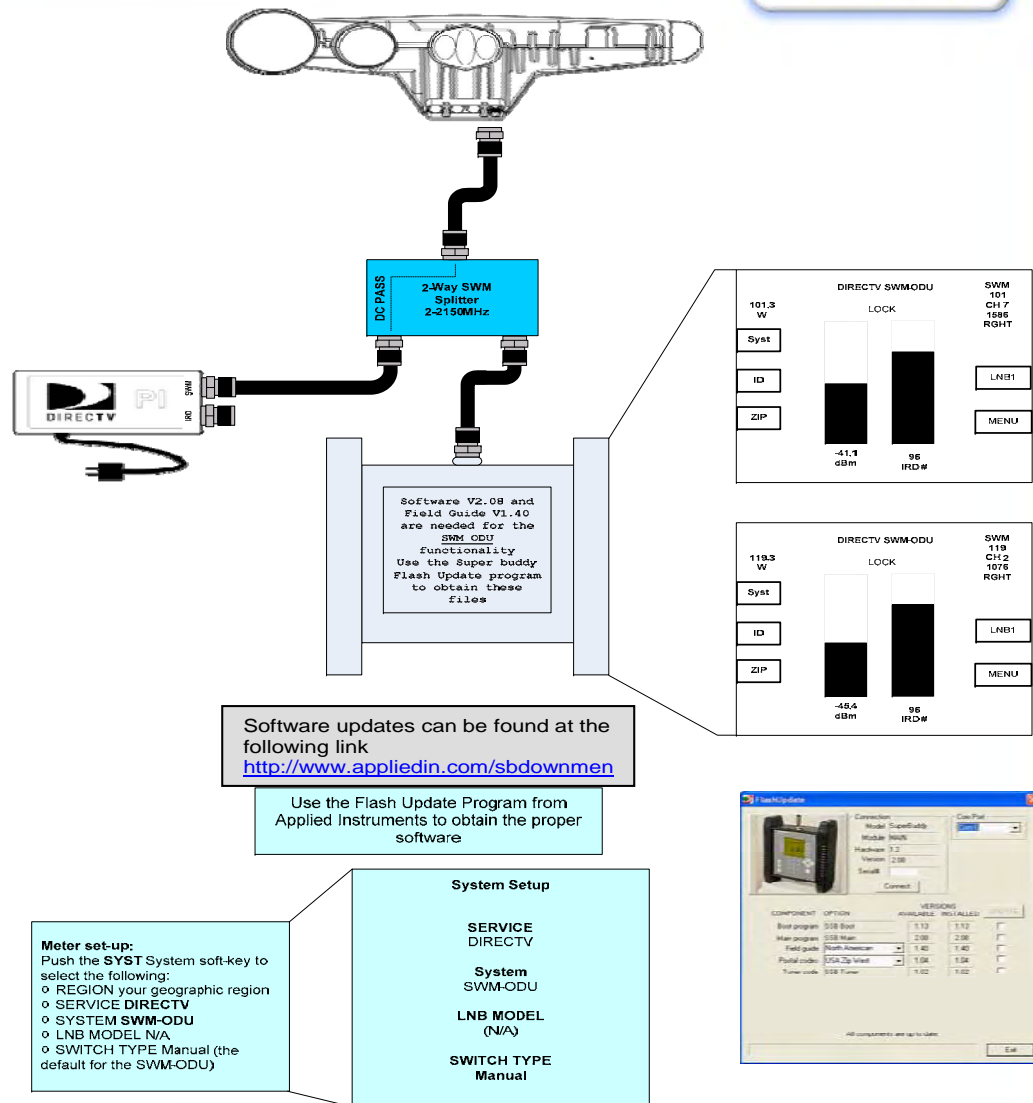
Note: Use instructions in the Meter Setup section for peaking of the SWM-ODU

DO NOT CONNECT ANY IRD to the SWM Integrated LNB BEFORE OR DURING THE PEAKING PROCESS

- 1) Be sure the mast is plumb and the foot plate is secure to an approved mounting surface.
- 2) Obtain the azimuth, elevation and tilt settings from the DIRECTV receiver or the Super Buddy zip code screen.
- 3) Preset the antenna tilt and elevation to the settings obtained.
- 4) Apply power to the SWM Integrated LNB using the power inserter as the diagram outlines. **(When power is applied, and before any receivers are connected, the SWM Integrated LNB will enter a diagnostic mode that is required for the alignment procedure.)**
- 5) Connect the Super Buddy to the 2nd port of the splitter. Press the LNB button once to select LNB1 and the 101 West satellite. The Super Buddy will tune to a SWM Integrated LNB 101 west channel.
- 6) Adjust the antenna's azimuth to obtain a signal lock and peak the signal level on your left bar graph. If you cannot obtain a lock, just peak the signal level and try to obtain the lock in the next step.
- 7) Now adjust the elevation to obtain the peak signal level and a signal lock.
- 8) At this point, you should be ROUGHLY aligned to 101 West. The SWM Integrated LNB is not compatible with the Super Buddy's satellite ID feature, but the signal lock status indicates that you are pointed either at 101.

Note: Use the LNB button on the main screen to turn on LNB 1 (101° west) or LNB 2 (119° west) during the peaking process.

You can now follow the KaKu dithering process as outlined in the KaKu Dithering procedures



Peaking Procedures



BirDog Meter ASL Peaking

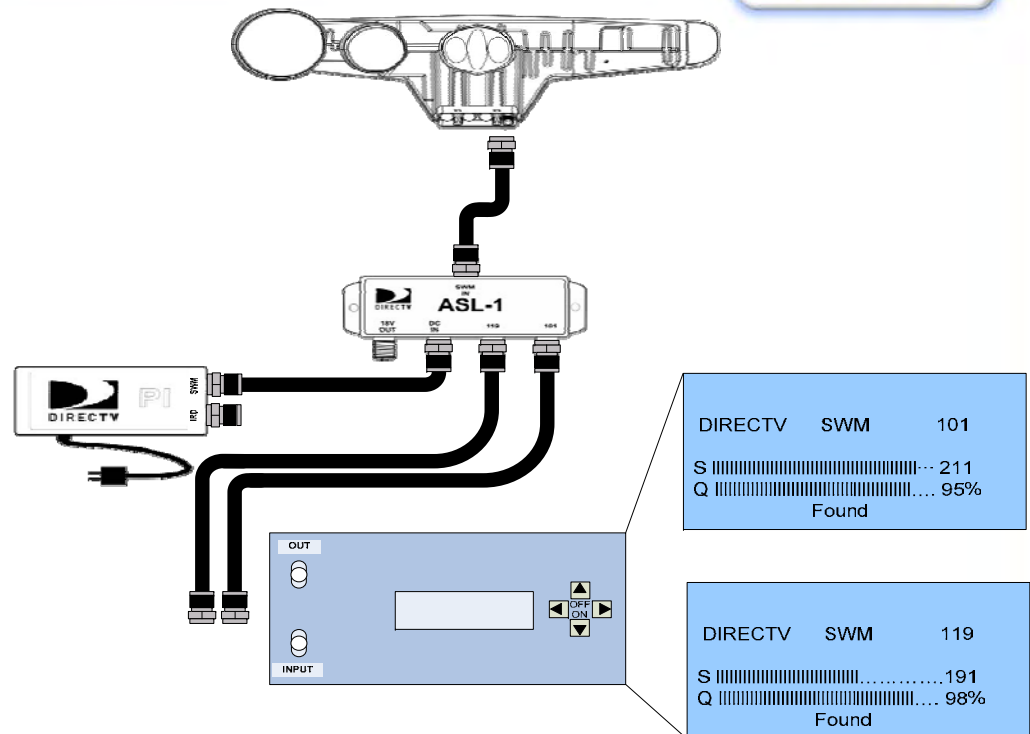
SWM Integrated LNB Peaking:

DO NOT CONNECT ANY IRD to the SWM Integrated LNB BEFORE OR DURING THE PEAKING PROCESS

- 1) Be sure the mast is plumb and the foot plate is secure to an approved mounting surface.
- 2) Obtain the azimuth, elevation and tilt settings from the DIRECTV receiver.
- 3) Preset the antenna tilt and elevation to the settings obtained.
- 4) Apply power to the SWM Integrated LNB using the power inserter as the diagram outlines. **(When power is applied, and before any receivers are connected, the SWM Integrated LNB will enter a diagnostic mode that is required for the alignment procedure.)**
- 5) Connect the Birdog meter to the 101 port of the ASL unit. Press the arrow button to select **DIRECTV SWM 101**
- 6) Adjust the antenna's azimuth to obtain a signal lock and peak the signal level on your bar graph. If you cannot obtain a lock, just peak the signal level and try to obtain the lock in the next step.
- 7) Now adjust the elevation to obtain the peak signal level and a signal lock.
- 8) At this point, you should be ROUGHLY aligned to 101 West.

You can now follow the KaKu dithering process as outlined in the KaKu Dithering procedures

Note: You will have to disconnect the cable from the 101* port on the ASL and connect to the 119* port on the ASL during the tilt adjustment step of the dithering process



Software updates can be found at the following link
<http://www.birdog.tv/>

Download the following files
DIRECTV SWM 101
DIRECTV SWM 119
DTV Ka/Ku 3g 119 west
DTV Ka/Ku 3g 101 west

Peaking Procedures



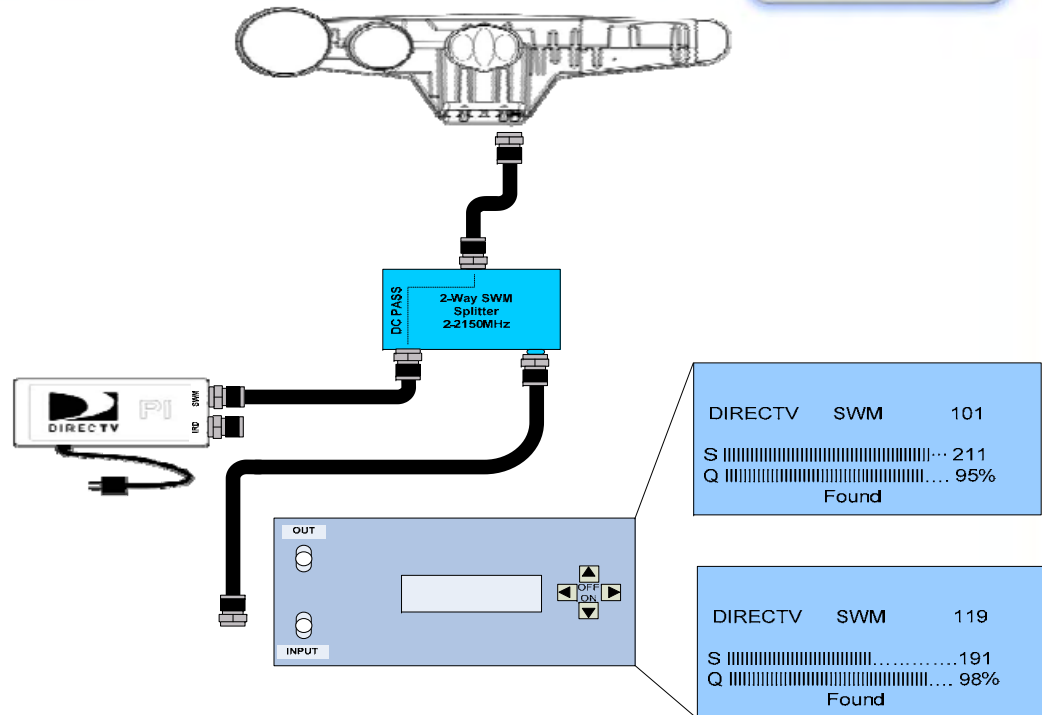
BirDog Meter Splitter Peaking

SWM Integrated LNB Peaking:

DO NOT CONNECT ANY IRD to the SWM Integrated LNB BEFORE OR DURING THE PEAKING PROCESS

- 1) Be sure the mast is plumb and the foot plate is secure to an approved mounting surface.
- 2) Obtain the azimuth, elevation and tilt settings from the DIRECTV receiver.
- 3) Preset the antenna tilt and elevation to the settings obtained.
- 4) Apply power to the SWM Integrated LNB using the power inserter as the diagram outlines. **(When power is applied, and before any receivers are connected, the SWM Integrated LNB will enter a diagnostic mode that is required for the alignment procedure.)**
- 5) Connect the Birdog meter to the 2nd port of the splitter. Press the arrow button to select **DIRECTV SWM 101**
- 6) Adjust the antenna's azimuth to obtain a signal lock and peak the signal level on your bar graph. If you cannot obtain a lock, just peak the signal level and try to obtain the lock in the next step.
- 7) Now adjust the elevation to obtain the peak signal level and a signal lock.
- 8) At this point, you should be ROUGHLY aligned to 101 West.

You can now follow the KaKu dithering process as outlined in the KaKu Dithering procedures



Software updates can be found at the following link
<http://www.birdog.tv/>

Download the following files
DIRECTV SWM 101
DIRECTV SWM 119
DTV Ka/Ku 3g 119 west
DTV Ka/Ku 3g 101 west

Peaking Procedures



Accutrac Pro Meter ASL Peaking

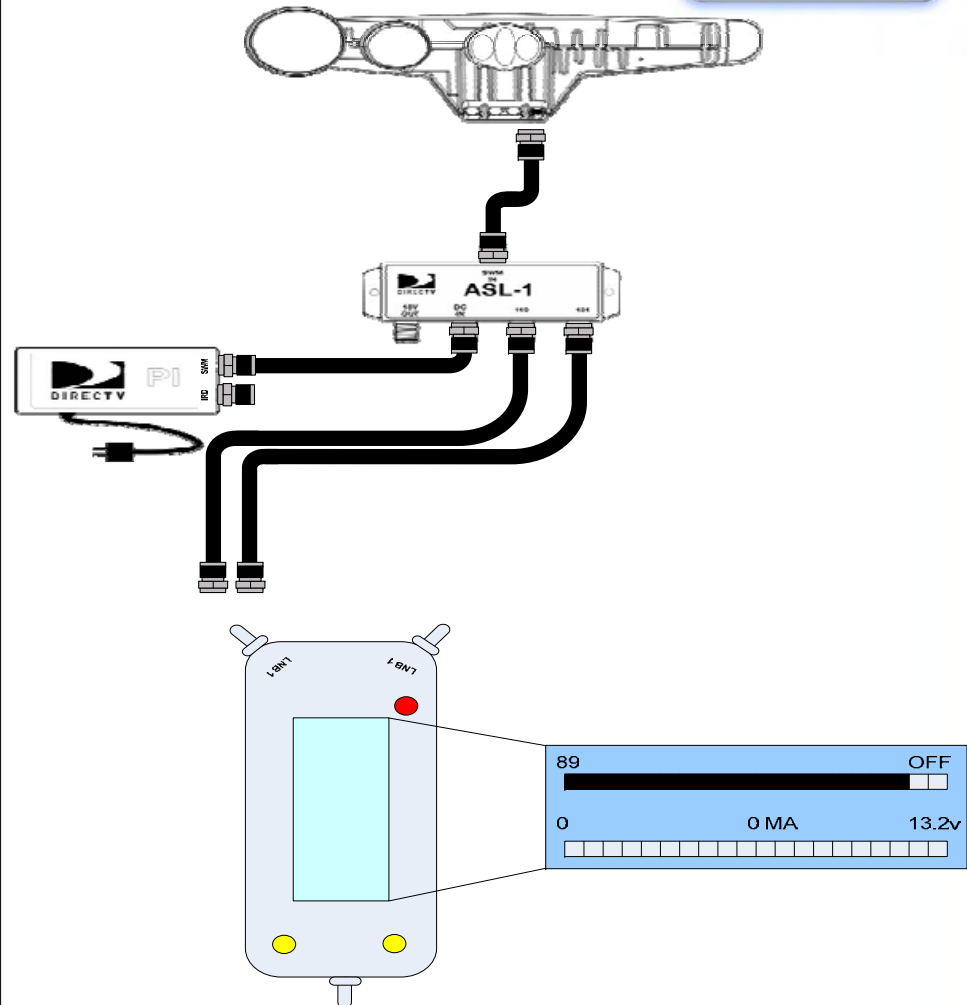
SWM Integrated LNB Peaking:

DO NOT CONNECT ANY IRD to the SWM Integrated LNB BEFORE OR DURING THE PEAKING PROCESS

- 1) Be sure the mast is plumb and the foot plate is secure to an approved mounting surface.
- 2) Obtain the azimuth, elevation and tilt settings from the DIRECTV receiver.
- 3) Preset the antenna tilt and elevation to the settings obtained.
- 4) Apply power to the SWM Integrated LNB using the power inserter as the diagram outlines. **(When power is applied, and before any receivers are connected, the SWM Integrated LNB will enter a diagnostic mode that is required for the alignment procedure.)**
- 5) Connect the Accutrac Pro meter LNB 1 to the 101° port of the ASL unit. Press the on /menu button.
- 6) Adjust the antenna's azimuth to obtain a signal lock and peak the signal level on your bar graph. If you cannot obtain a lock, just peak the signal level and try to obtain the lock in the next step.
- 7) Now adjust the elevation to obtain the peak signal level and a signal lock.
- 8) At this point, you should be ROUGHLY aligned to 101° West.

You can now follow the KaKu dithering process as outlined in the KaKu Dithering procedures

Note: You will have to disconnect the cable from the 101° port on the ASL and connect to the 119° port on the ASL during the tilt adjustment step of the dithering process



Peaking Procedures



Digisat III Meter ASL Peaking

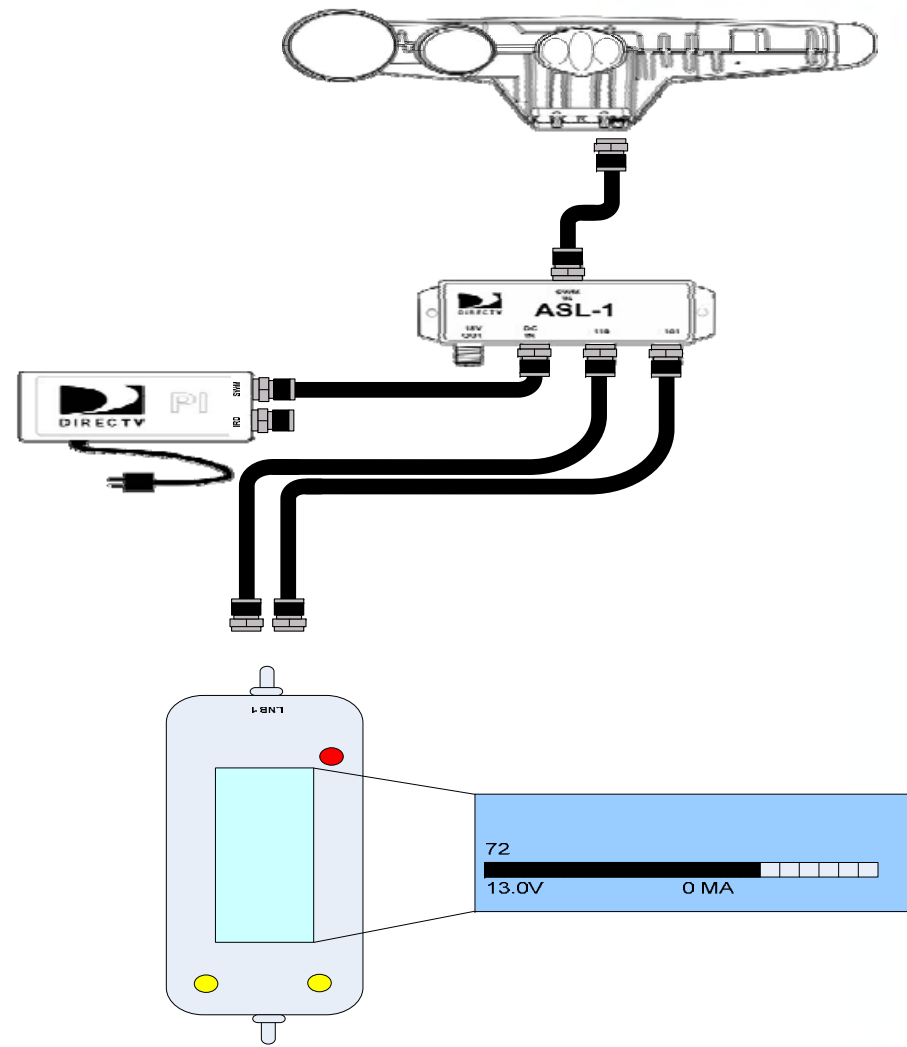
SWM Integrated LNB Peaking:

DO NOT CONNECT ANY IRD to the SWM Integrated LNB BEFORE OR DURING THE PEAKING PROCESS

- 1) Be sure the mast is plumb and the foot plate is secure to an approved mounting surface.
- 2) Obtain the azimuth, elevation and tilt settings from the DIRECTV receiver.
- 3) Preset the antenna tilt and elevation to the settings obtained.
- 4) Apply power to the SWM Integrated LNB using the power inserter as the diagram outlines. **(When power is applied, and before any receivers are connected, the SWM Integrated LNB will enter a diagnostic mode that is required for the alignment procedure.)**
- 5) Connect the Digisat meter LNB port to the 101 port of the ASL unit. Press the on /menu button.
- 6) Adjust the antenna's azimuth to obtain a signal lock and peak the signal level on your bar graph. If you cannot obtain a lock, just peak the signal level and try to obtain the lock in the next step.
- 7) Now adjust the elevation to obtain the peak signal level and a signal lock.
- 8) At this point, you should be ROUGHLY aligned to 101 West.

You can now follow the KaKu dithering process as outlined in the KaKu Dithering procedures

Note: You will have to disconnect the cable from the 101* port on the ASL and connect to the 119* port on the ASL during the tilt adjustment step of the dithering process



Peaking Procedures



Accutrac III Meter ASL Peaking

SWM Integrated LNB Peaking:

DO NOT CONNECT ANY IRD to the SWM Integrated LNB BEFORE OR DURING THE PEAKING PROCESS

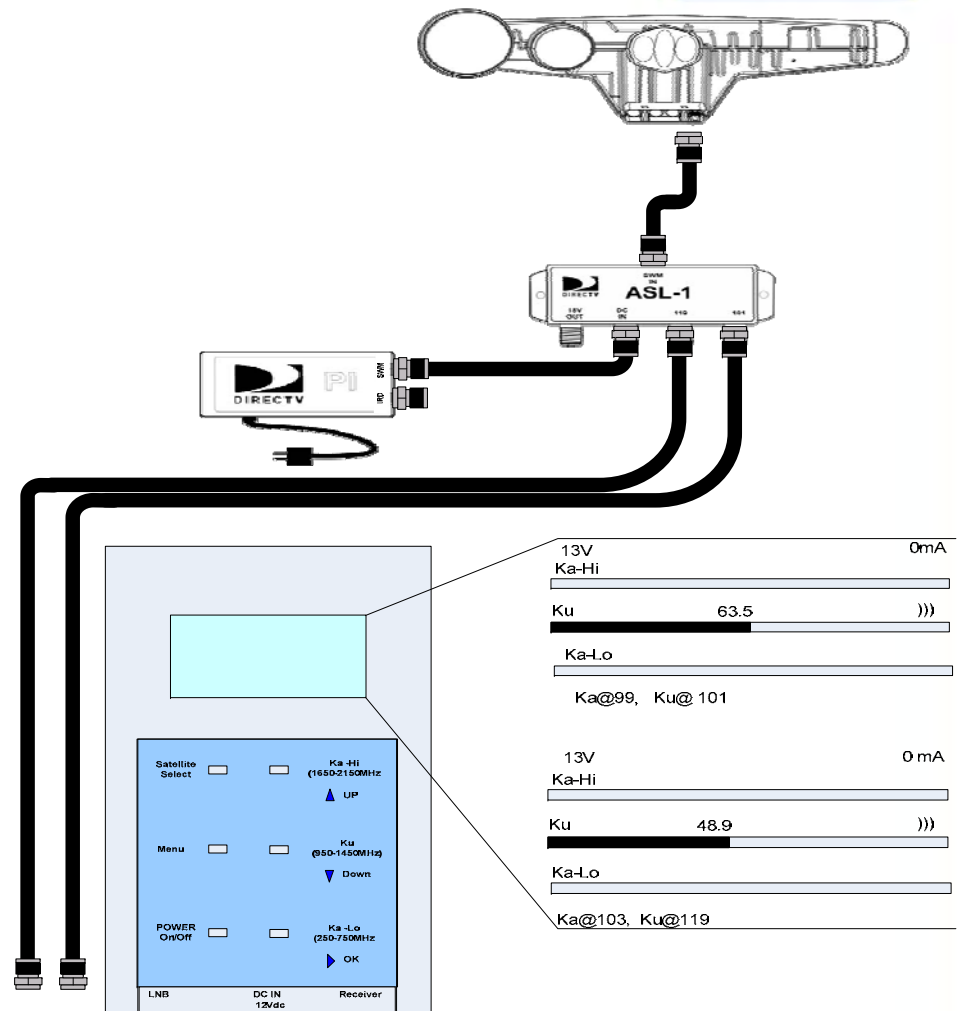
- 1) Be sure the mast is plumb and the foot plate is secure to an approved mounting surface.
- 2) Obtain the azimuth, elevation and tilt settings from the DIRECTV receiver.
- 3) Preset the antenna tilt and elevation to the settings obtained.
- 4) Apply power to the SWM LNB using the power inserter as the diagram outlines. **(When power is applied, and before any receivers are connected, the SWM Integrated LNB will enter a diagnostic mode that is required for the alignment procedure.)**
- 5) Connect the Accutrac III meter LNB port to the 101 port of the ASL unit. Press the power on/off button. Then select the 101 location by using the satellite select button.

You will be viewing the KU bar for signal strength.

- 6) Adjust the antenna's azimuth to obtain a signal lock and peak the signal level on your bar graph.
- 7) Now adjust the elevation to obtain the peak signal level and a signal lock.
- 8) At this point, you should be ROUGHLY aligned to 101 West.

You can now follow the KaKu dithering process as outlined in the KaKu Dithering procedures

Note: You will have to disconnect the cable from the 101° port on the ASL and connect to the 119° port on the ASL during the tilt adjustment step of the dithering process



Peaking Procedures



Part 1: Course Elevation Adjustment/Fine Tune Tilt

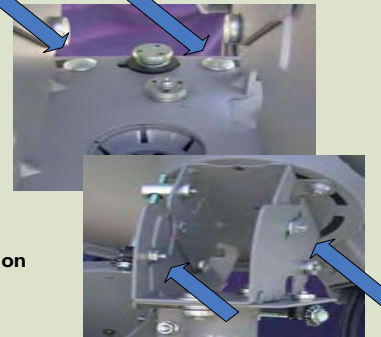
Start Peaking Process

(1) With Azimuth, elevation and tilt roughly set according to the customers specific zip code and signal on your signal meter for the 101° west location proceed to step 2.

(2) Ensure that the following bolts are loose.

Leave Azimuth bolts loose

Leave these Elevation bolts loose



(3) Align and peak the 101 satellite to the highest signal level possible.

(4) Tighten the mast collar bolts. Then using the Azimuth screw turn **clock wise** and then **counter clockwise** until the maximum signal is obtained from the 101° location.

(5) Using a ½" nut driver, coarse align the elevation by turning the elevation screw **clock wise** and then **counter clockwise** until the maximum signal is obtained from the 101° location.

Elevation Screw



(6) To fine tune the tilt,

if connected to an ASL – connect the 119 port cable to the meter then continue on with the instructions.

if connected to a SWM splitter continue on with the instructions.

set the meter to 119 degrees by selecting,

Super Buddy = LNB 2

Birdog = DIRECTV SWM 119

Accutrac Pro Specific Setting (LNB 1, 13v w/o 22KHz).

Accutrac III – Satellite Select Ka @103, Ku @ 119

Digisat III Specific Setting (13v w/o 22KHz)

(7) Slowly rotate the dish (left/right) around the tilt axis to peak the signal to 119°.

(8) Tighten the Tilt Lock Nuts.

Go to Part 2: Fine Tune Elevation

Peaking Procedures



Part 2: Fine Tune Elevation

Complete Part 1 before
Fine Tuning Elevation

(1) if ASL is used, reconnect the 101 port cable back to the meter.
Set Meter back to 101° -
Super Buddy LNB 1

BirDog DIRECTV SWM 101

Accutrac Pro Specific
(LNB 1, 13v w/o 22KHz).

Accutrac III – Satellite Select
Ka @99, Ku @ 101

Digitas III
(13v w/o 22KHz)

(2) Write down the signal level number.

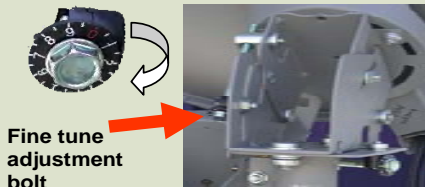
(3) Set the plastic dial to zero (0) by hand.

(4) Using the nut driver, rotate the fine tune adjustment bolt two (2) full turns “counter clockwise.”



(5) Record the signal level.

(6) Rotate the bolt “clockwise” counting turns as well as the fractions until the same signal level is achieved.
Note: This may require 5 to 7 turns.

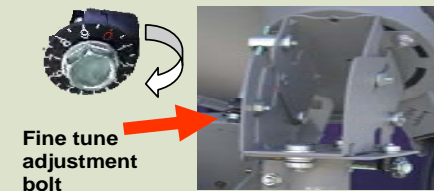


(7) Divide the number by two (2). **Note:** You can use the division chart below.

	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45
Total Turns	1.000	1.025	1.050	1.075	1.100	1.125	1.150	1.175	1.200	1.225
Half	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95
Total Turns	1.250	1.275	1.300	1.325	1.350	1.375	1.400	1.425	1.450	1.475
Half	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45
Total Turns	1.500	1.525	1.550	1.575	1.600	1.625	1.650	1.675	1.700	1.725
Total Turns	3.50	3.55	3.60	3.65	3.70	3.75	3.80	3.85	3.90	3.95
Half	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975
Total Turns	4.00	4.05	4.10	4.15	4.20	4.25	4.30	4.35	4.40	4.45
Half	2.000	2.025	2.050	2.075	2.100	2.125	2.150	2.175	2.200	2.225
Total Turns	4.50	4.55	4.60	4.65	4.70	4.75	4.80	4.85	4.90	4.95
Half	2.250	2.275	2.300	2.325	2.350	2.375	2.400	2.425	2.450	2.475
Total Turns	5.00	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.40	5.45
Half	2.500	2.525	2.550	2.575	2.600	2.625	2.650	2.675	2.700	2.725
Total Turns	5.50	5.55	5.60	5.65	5.70	5.75	5.80	5.85	5.90	5.95
Half	2.750	2.775	2.800	2.825	2.850	2.875	2.900	2.925	2.950	2.975
Total Turns	6.00	6.05	6.10	6.15	6.20	6.25	6.30	6.35	6.40	6.45
Half	3.000	3.025	3.050	3.075	3.100	3.125	3.150	3.175	3.200	3.225
Total Turns	6.50	6.55	6.60	6.65	6.70	6.75	6.80	6.85	6.90	6.95
Half	3.250	3.275	3.300	3.325	3.350	3.375	3.400	3.425	3.450	3.475
Total Turns	7.00	7.05	7.10	7.15	7.20	7.25	7.30	7.35	7.40	7.45
Half	3.500	3.525	3.550	3.575	3.600	3.625	3.650	3.675	3.700	3.725
Total Turns	7.50	7.55	7.60	7.65	7.70	7.75	7.80	7.85	7.90	7.95
Half	3.750	3.775	3.800	3.825	3.850	3.875	3.900	3.925	3.950	3.975
Total Turns	8.00	8.05	8.10	8.15	8.20	8.25	8.30	8.35	8.40	8.45
Half	4.000	4.025	4.050	4.075	4.100	4.125	4.150	4.175	4.200	4.225

(8) Turn the dial, not the screw back to zero.

(9) Rotate the screw “counter clock wise” by the divided amount of turns.



(10) Tighten the Elevation bolts

Go to Part 3:
Fine Tune
Azimuth

Peaking Procedures



Part 3: Fine Tune Azimuth

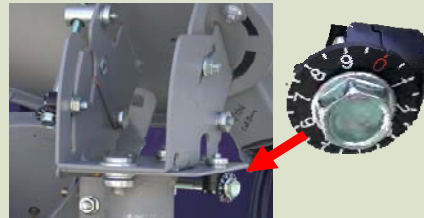


Complete Part 2 before
Fine Tuning Azimuth

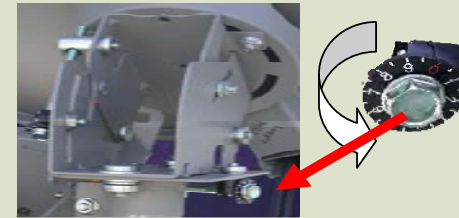
(1) Set Meter to 101° -
Super Buddy LNB 1,
BirDog DIRECTV SWM 101
Accutrac Specific
(LNB 1, 13v w/o 22KHz)
Accutrac III – Satellite Select
Ka @99, Ku @ 101
Digisat III Specific
(13v w/o 22KHz)

(2) Record the
signal level

(3) Set the plastic dial to zero (0) by hand.



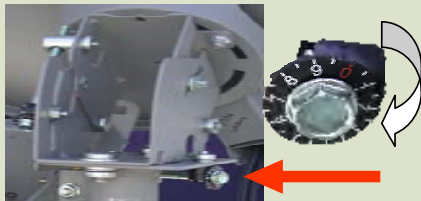
(4) Using a ½ inch nut driver, rotate the
fine tune adjustment bolt 2 full turns
“counter clockwise.”



(5) Record the signal
level

(6) Rotate the bolt “clockwise” counting
turns as well as the fractions until the
same signal level is achieved.

Note: This may require 5 to 7 turns.

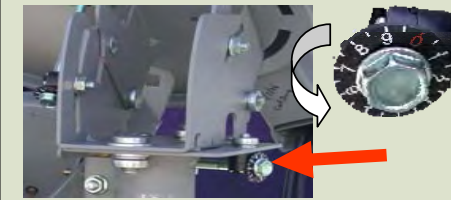


(7) Divide the number by two (2). **Note:** You can
use the division chart below.

Total Turns	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45
Half	1.000	1.025	1.050	1.075	1.100	1.125	1.150	1.175	1.200	1.225
Total Turns	1.250	1.275	1.300	1.325	1.350	1.375	1.400	1.425	1.450	1.475
Half	1.500	1.525	1.550	1.575	1.600	1.625	1.650	1.675	1.700	1.725
Total Turns	1.750	1.775	1.800	1.825	1.850	1.875	1.900	1.925	1.950	1.975
Half	2.000	2.025	2.050	2.075	2.100	2.125	2.150	2.175	2.200	2.225
Total Turns	2.250	2.275	2.300	2.325	2.350	2.375	2.400	2.425	2.450	2.475
Half	2.500	2.525	2.550	2.575	2.600	2.625	2.650	2.675	2.700	2.725
Total Turns	2.750	2.775	2.800	2.825	2.850	2.875	2.900	2.925	2.950	2.975
Half	3.000	3.025	3.050	3.075	3.100	3.125	3.150	3.175	3.200	3.225
Total Turns	3.250	3.275	3.300	3.325	3.350	3.375	3.400	3.425	3.450	3.475
Half	3.500	3.525	3.550	3.575	3.600	3.625	3.650	3.675	3.700	3.725
Total Turns	3.750	3.775	3.800	3.825	3.850	3.875	3.900	3.925	3.950	3.975
Half	4.000	4.025	4.050	4.075	4.100	4.125	4.150	4.175	4.200	4.225

(8) Turn the dial, not the
screw back to zero.

(9) Rotate the screw “counter clock
wise” by the divided amount of turns.





(10) Tighten down the Azimuth bolts and verify signal via the IRD
(Make sure that the the SWM Integrated LNB screws are installed)

If good signal
from the IRD, the
Peaking Process
is complete

SWM Meter Instructions



SWM Installation Meter Steps

- # 1 – Install the SWM ODU (SWM Integrated LNB) to a secure stable surface, ensure that the mast is plumb and level
- # 2 – Rough peak the SWM ODU using the Azimuth, Elevation and Tilt obtained using the customers specific zip code coordinates
- # 3 – Install an ASL or Single port power passing splitter, Install cabling from the KaKu ODU to an applicable ground block.
- # 4 – Continue with cable run to the penetration point of the structure and inside the structure
- # 5 – Install a SWM Splitter
- # 6 – Connect all internal cable runs to the SWM Splitter
- # 7 – Connect the cable run from the SWM Integrated LNB to the SWM port of the SWM Power Inserter
- # 8 – Connect the SWM power inserter to an electrical outlet
- # 9 – Peak the KaKu ODU using the peaking meter specific steps.
- # 9a, Once the peaking and dithering process is complete remove the ASL or the Single port power passing splitter from the SWM Integrated LNB.
- # 10 – Connect the SWM – 1 port of the IRD  to the IRD port of the SWM power inserter 

Step # 11 to # 14 is required for SWM Meter use only with the SWM-ODU. Skip if you are using a standalone SWM switch.

11 – Connect an IRD to an electrical power outlet. Models (D-12+, R-16+, H-20+, HR-20+) This IRD needs to be SWM enabled, so D12's and H20's with certain native NDS software running will need to be force upgraded.

DO NOT UNPLUG SWM POWER INSERTER FROM THE SWM AT ANYTIME PAST THIS STEP WHEN USING THE SWM INSTALLATION METER.

12 – Power on the IRD and complete the guided setup and/or the APG download. Verify that you see video after the APG download. Go to Step # 14. If you cannot get to this point, go to step # 13.

13 – Check the IRD cable run, and redo if needed. Repeat step # 12.

14 – Remove the IRD from the cable run. *Once you are done with the SWM meter diagnosis of all the cable runs described in the following steps, plug in the cable to this first IRD. There is no need to redo the setup or reacquire guide.

15 – Connect the SWM meter to any cable run that is connected to the SWM splitter

16 – Press and hold the SWM meter yellow button for 2 seconds, all LED's should be lit

17 – Refer to Figure 1 – 4 for test results (SWM meter trouble shooting chart page)

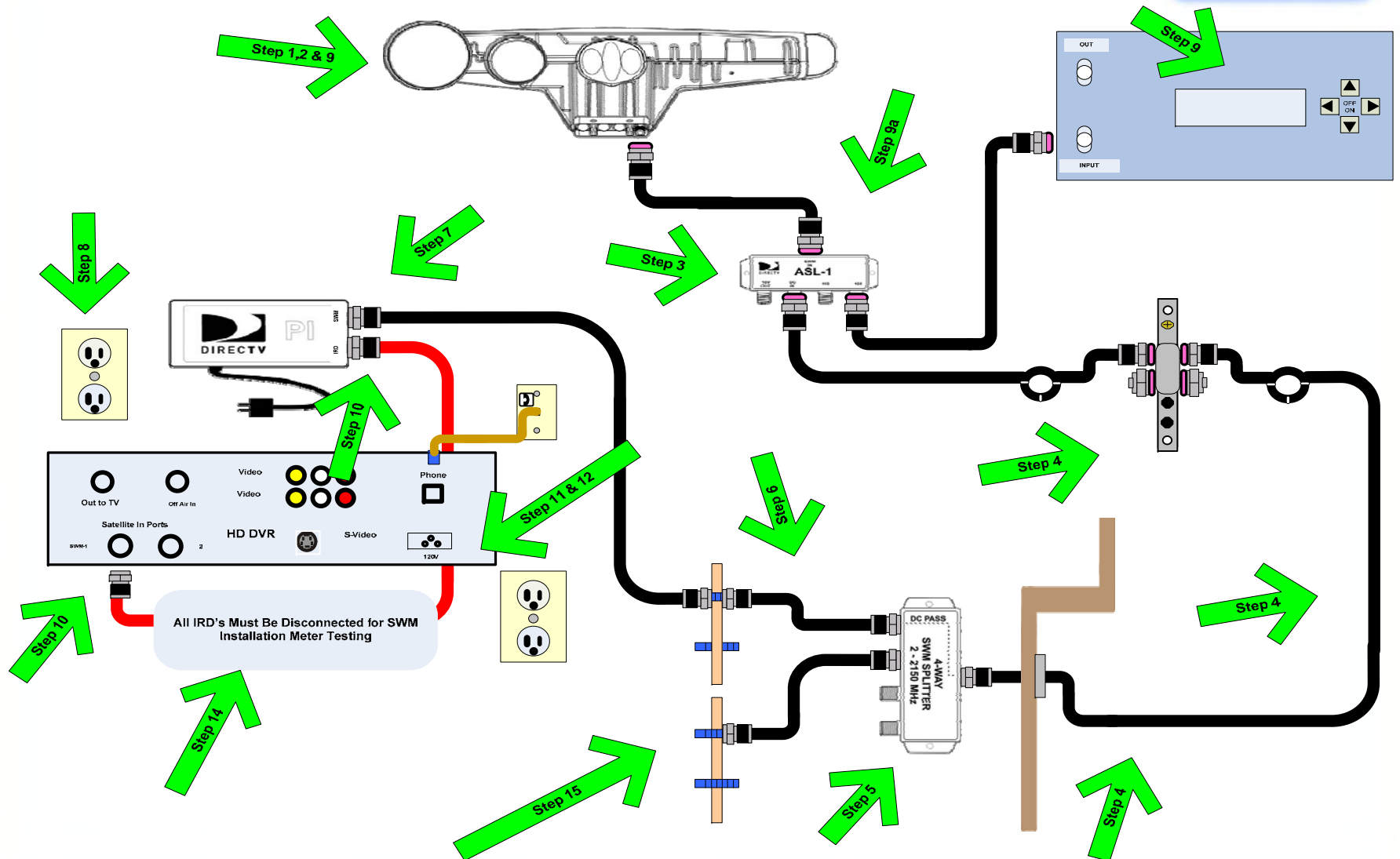
18 – Repeat test two times per cable run to verify same results

19 – Continue with installation – remember to reconnect any IRD that was disconnected after the registration process

Complete a phone line installation to each IRD. Don't forget to complete all paper work and complete the customer education portion of the installation

SWM Meter Installation Diagram

(use with previous instructions)



SWM Meter Trouble Shooting Chart



Danger: if the voltage light is off, an over voltage condition exists. DO NOT connect an IRD to this cable until this is corrected.

The SWM power inserter may be installed incorrectly or another device is supplying voltage to the system.

Trouble Diagnosis for SWM Meter:

There are several scenarios you will run into when using the SWM meter.

1. Voltage Light Error – Check to make sure Power Inserter SWM power connector and IRD connector are not reversed.
2. LF Light Error + 5 or 8 ch good, problem with inline splitters. Low Pass not good enough.
3. LF Light Good + 5 ch error and 8 ch error, or 5 ch good, 8 ch error, problem with inline splitters. Low Pass characteristics good enough but not rated to 2150MHz for 8 channel SWM-ODU.
4. LF error + 5 and 8 ch error, bad cable run.
5. LF error + 5 and 8 ch error + Voltage error, check to make sure power inserter is properly powering the SWM-ODU.

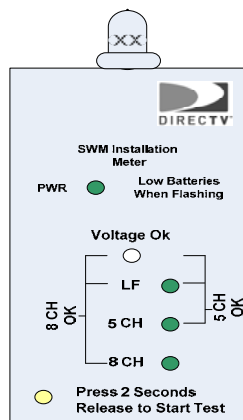


Figure 1
Conditions Are

PWR On	Green
Voltage Ok	Off
LF	On or Off
5 ch	On or Off
8 ch	On or Off

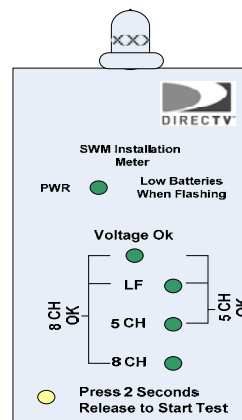


Figure 2
8 ch SWM Operation

PWR On	Green
Voltage Ok	Green
LF	Green
5 ch	Green
8 ch	Green

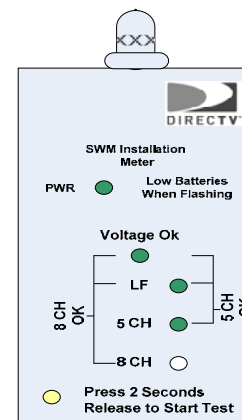


Figure 3
5 ch SWM Operation

PWR On	Green
Voltage Ok	Green
LF	Green
5 ch	Green
8 ch	Off

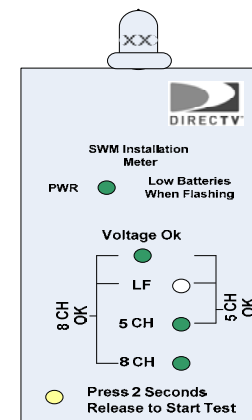


Figure 4
If the LF LED is off, the cable run will not support SWM operations

PWR On	Green
Voltage Ok	Green
LF	Off
5 ch	On or Off
8 ch	On or Off

Review & Testing



● Review

- Any questions over the material covered
- Any points of clarification needed

● SWM Integrated LNB & Module Test



GOODTV. BETTERTV. DIRECTV.