

SITUATION

DBS devices require DC voltages on the coax input or output connector and the RF signals must pass through the power inserter.

SOLUTION

Sonora power inserters couple regulated DC voltage on coax cables while allowing the DBS signal to pass through the inserter. DC Power originates from switching, short circuit protected transformers.

RELATED CONSIDERATIONS

DBS devices operate at a range of voltages and currents. Power supplies consist of a power transformer and a power inserter. DC can be inserted in one direction (HRFPI) or both directions (HRFPIB) on the coax. To power a SL5 LNB use model HRPID1422A.

FEATURES

- *DBS compatibility*..... DBS Ka/Ku
- *Frequency Response* 2 MHz to 2400 MHz
- *Indoor/Outdoor Case*: Die cast RF shielded
- *Switching Power Supply*: short circuit protected
..... Regulated Output Voltage

APPLICATION NOTES

HRFPI.....	2 -2400 MHz
.....(1) "Polarity" single direction inserter	
HRFPIB.....	2 -2400 MHz
.....(1) "Polarity" bi-directional inserter	
4SPI	2 -2400 MHz
.....(4) "Polarity" single directional inserter	
PS1x6.....	DC Splitter
....."F" DC IN to (6) "F" DC OUT	
PS2x8.....	DC Splitter
.....(2) "F" DC INPUTS to (8) "F" DC OUT	
PS12200.....	12 V, 0.2 Amp
.....switching regulated "F" connector transformer	
PS121000.....	12 V, 1.0 Amp
.....switching regulated "F" connector transformer	



DESCRIPTION

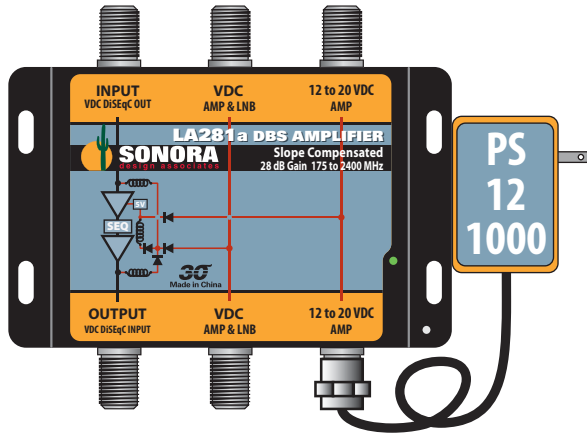
Power inserters couple DC power on coax cables to DBS LNBs, line amplifiers and switches.

Choose the power inserter model and the power supply voltage and current you need. Pre-configured power supply and inserter models are also available.

PS201200.....	20 V, 1.2 Amp
.....switching regulated "F" connector transformer	
PS242000.....	24 V, 2.0 Amp
.....switching regulated "F" connector transformer	
4SPI-201200	20 V, 1.2 Amp
.....& 4SPI (4) polarity inserter	
HRPIR20	20 V, 1.2 Amp
.....& HRPI single direction inserter	
HRPIR20B.....	20 V, 1.2 Amp
.....& HRPB bidirectional inserter	
HRPIR242	24 V, 2.0 Amp
.....& HRPI single direction inserter	
HRPIR242B.....	24 V, 2.0 Amp
.....& HRPB bidirectional inserter	
PS6-242000	24 V, 2.0 Amp
.....& PS1x6 DC splitter	
PS8-242000	(1) 24 V, 2.0 Amp
.....& PS2x8 DC splitter	
PS8-244000	(2) 24 V, 2.0 Amp Supplies
.....& PS2x8 DC splitter	

AMPLIFIER POWERING

SONORA amplifiers are designed to operate over a range of input voltages. The minimum and maximum voltage is noted on the product label.



Amplifiers may be ordered with or without power transformers. Model LA281a-T above includes a 12V 1000 mA transformer.

The lower voltage provides the coolest operation and uses less power. When you put your hand on a SONORA amplifier it is warm. You can compare the heat to that of a light bulb in a box.

Model LA281a draws 100 mA of current. The wattage at 12 volts is (12 V x 0.1 Amp) 1.2 watts.

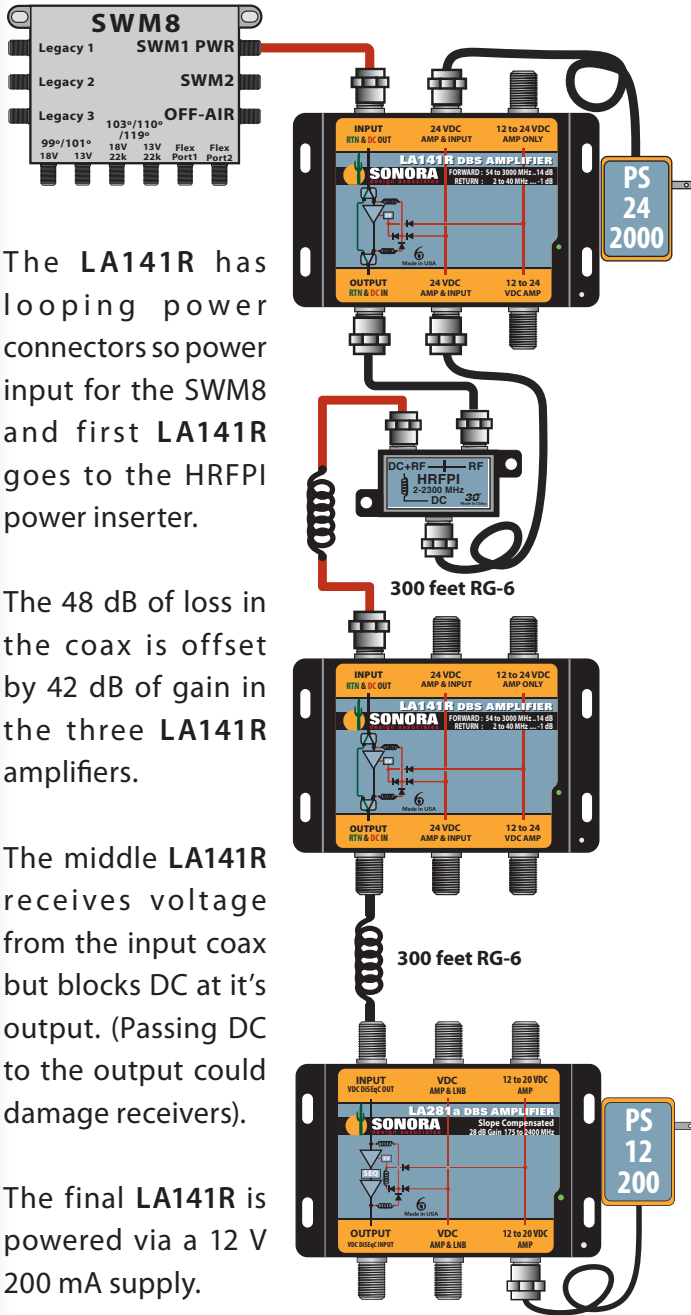
- 12 V = 1.2 watts
- 20 V = 2 watts
- 24 V = 2.4 watts

Model LA285a draws 500 mA of current. The wattage at 12 volts is (12 V x 0.5 Amp) 6 watts.

- 12 V = 6 watts
- 20 V = 10 watts
- 24 V = 12 watts (**HOT: not recommended**)

AMPLIFIER POWERING

A 600 foot run of RG-6 coax separates the SWM8 switch from the receiver.



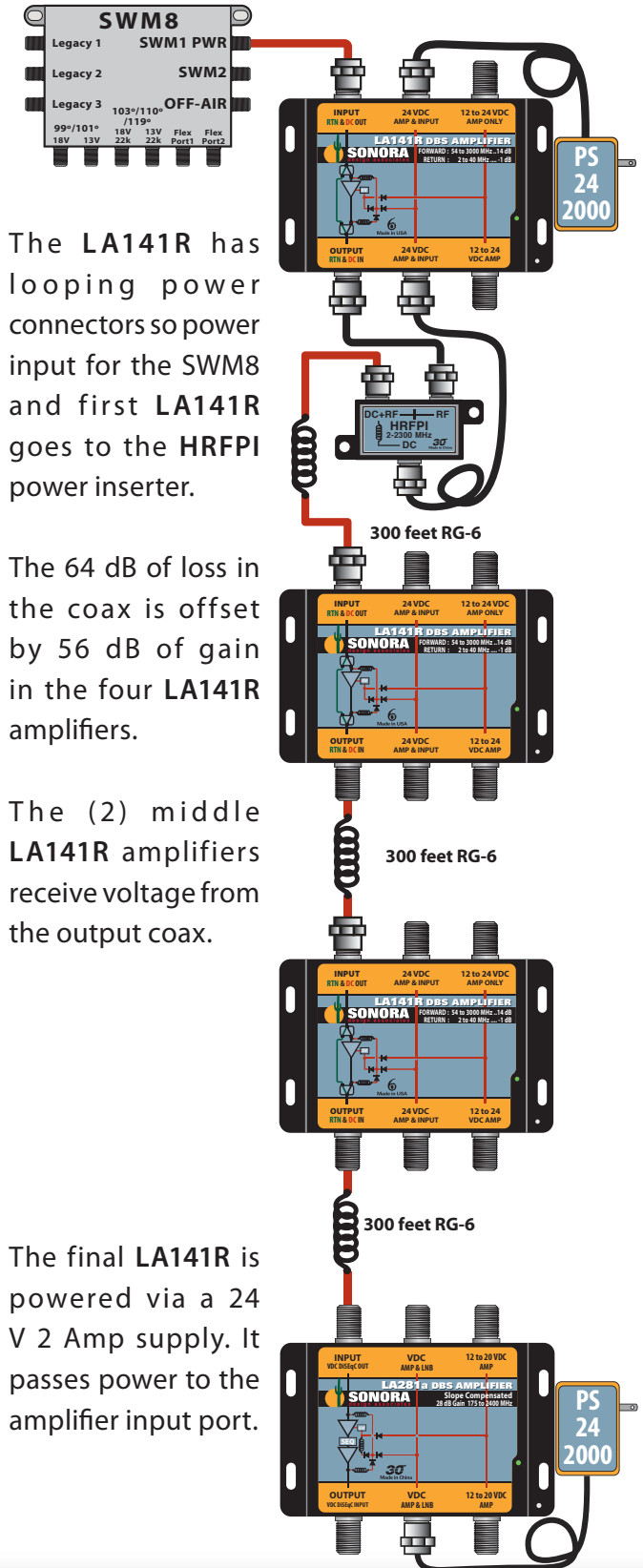
The LA141R has looping power connectors so power input for the SWM8 and first LA141R goes to the HRFPI power inserter.

The 48 dB of loss in the coax is offset by 42 dB of gain in the three LA141R amplifiers.

The middle LA141R receives voltage from the input coax but blocks DC at its output. (Passing DC to the output could damage receivers).

The final LA141R is powered via a 12 V 200 mA supply.

A 800 foot run of RG-6 coax separates the SWM8 switch from the receiver.



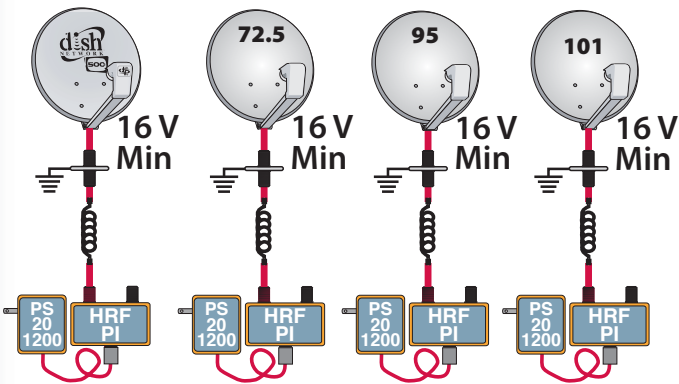
The LA141R has looping power connectors so power input for the SWM8 and first LA141R goes to the HRFPI power inserter.

The 64 dB of loss in the coax is offset by 56 dB of gain in the four LA141R amplifiers.

The (2) middle LA141R amplifiers receive voltage from the output coax.

The final LA141R is powered via a 24 V 2 Amp supply. It passes power to the amplifier input port.

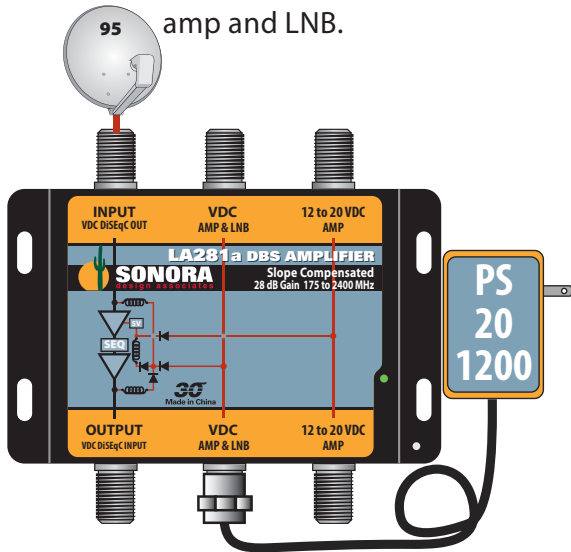
LNB POWERING



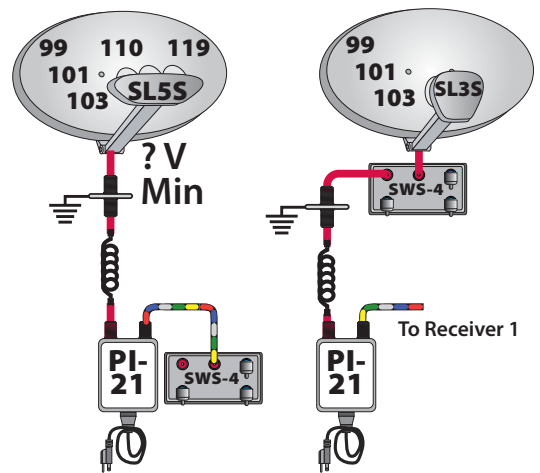
A stacked polarity LNB or even polarity LNB requires a minimum of 16 volts at its input. Model **HRFPI** power inserters include model **HRFPI** and model **PS201200** power supply.

LNB current is typically less than 200 mA. Using solid copper RG-6 coax with a loop resistance of 4 ohms per 100, the maximum cable length can be calculated.
 $(20\text{ V} - 16\text{ V}) / (4\text{ ohms} \times 0.2\text{ Amp}) = 500\text{ feet.}$

The LNB requires powering. The “**VDC AMP & LNB**” input connectors couple the DC to the amplifier and to the **INPUT** connector. Order model **LA281a** and **PS201200** connected as shown to power both the amp and LNB.



Model **LA281a** draws **100 mA** of current and the LNB requires 200 mA. The wattage dissipated in the amplifier at 20 volts is $(20\text{ V} \times 0.3\text{ Amp})$ 6 watts.

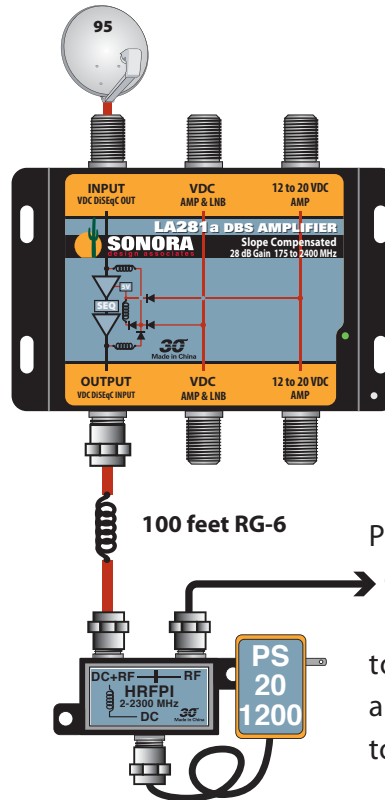


A **SWM** stacked **SL5S** or **SL3S** LNB uses model **SPI-21** power inserter connected either directly to the LNB or through model **SWS-4** DBS splitter.

LNB current appears to dependent on the number of tuners connected to the dish.

$$(20\text{ V} - 16\text{ V}) / (4\text{ ohms} \times 0.2\text{ Amp}) = 500\text{ feet.}$$

AC Power may not be available at the location of the amplifier.



Power may be inserted on the output coax using model **HRFPI** to send power to the amplifier and through to the LNB.

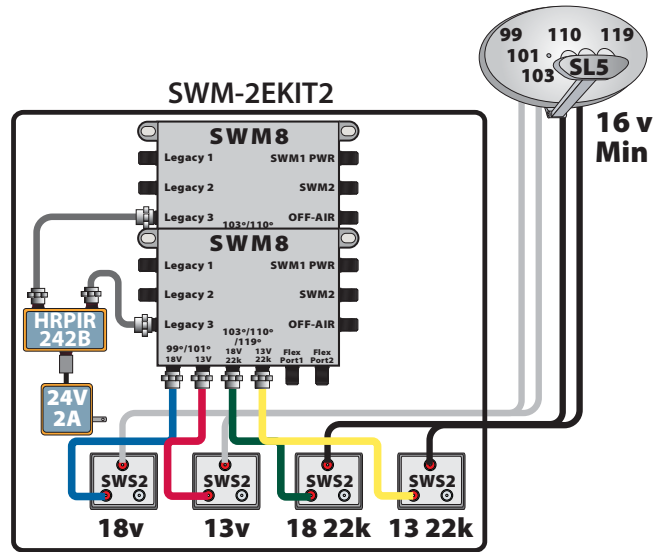
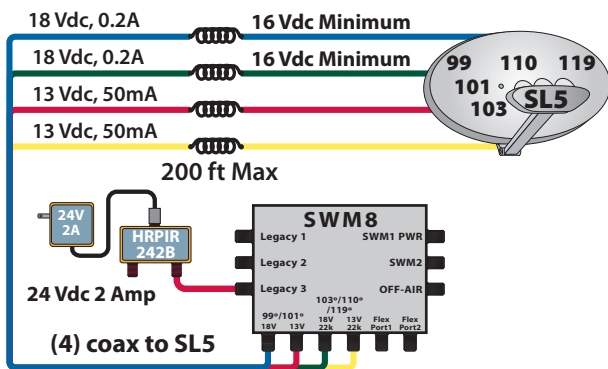
SWM8 POWERING

Model SWM8 can be powered via Legacy Port 3. The current draw was measured at three voltages:

- 29 V = 324 mA = 9.40 watts
- 24 V = 385 mA = 9.24 watts
- 20V = 460 mA = 9.20 watts

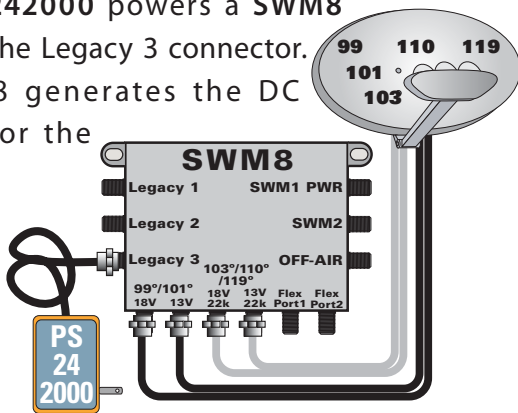
Model SL5 LNBs employ current management to minimize the current carried per coax. (500 mA total)
 18 V = 200 mA, 18V 22kHz = 200 mA, 13V = 50 mA,
 13V 22kHz = 50 mA.

SWM8 Powering of SL5

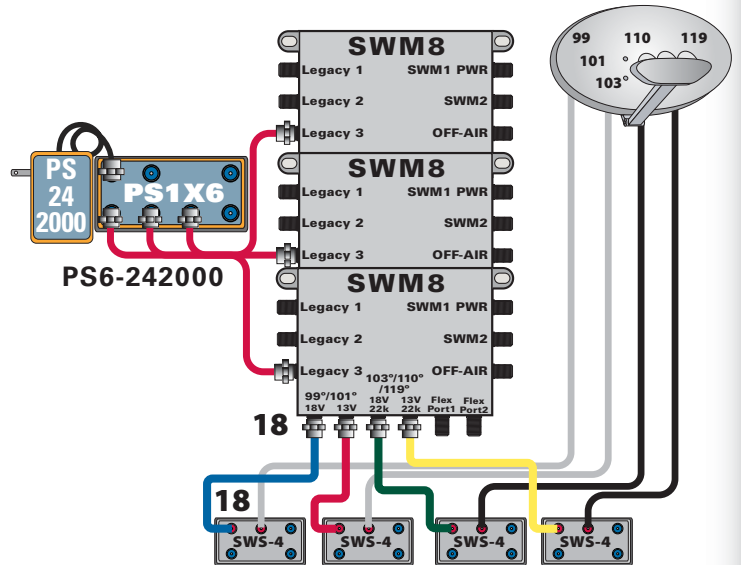
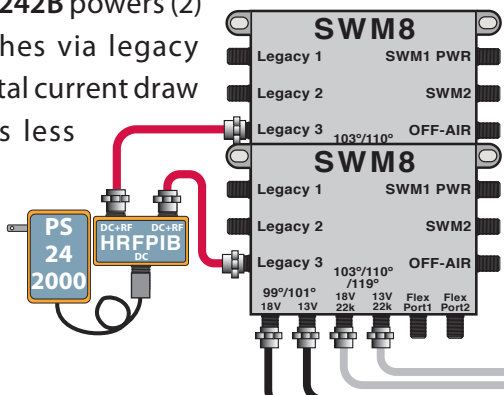


Model HRPiR242B powers (2) SWM8 switches via the Legacy 3 connector. One SWM8 generates the DC voltages for the LNB. Model SWS-2 splitter pass DC from only one output so a single SWM8 talks to the dish.

Model PS242000 powers a SWM8 switch via the Legacy 3 connector. The SWM8 generates the DC voltages for the LNB.



Model HRPiR242B powers (2) SWM8 switches via legacy port 3. The total current draw at 24 volts is less than 800 mA.



Model PS6-242000 powers (3) SWM8 switches via their legacy port 3 connector. One SWM8 switch sends 500 mA of power to the SL5 LNB. The total current draw is 1.67 Amps.

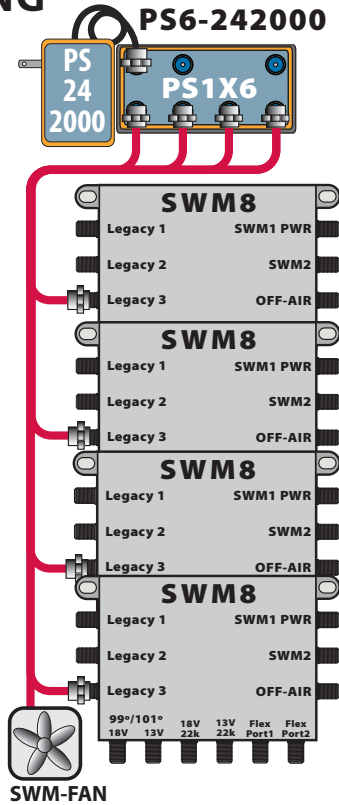
SWM8 POWERING

Model PS6-242000 provides 24 volts at 2 amps of current to up to (6) outputs.

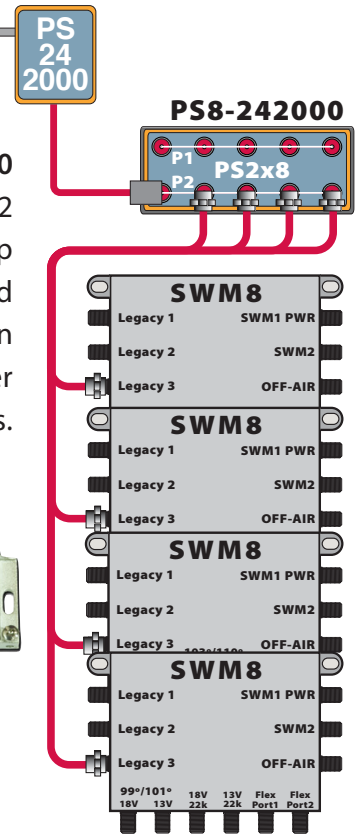
Powering (4) SWM8 switches uses (4) x 385 mA = 1.54 Amps.

One of the other DC output ports can be used to power model SWM-FAN. (105 mA)

NO SL5 powering is allowed with this configuration.



Model PS8-242000 provides 24 volts at 2 amps of current to up to (4) outputs. A second PS24-2000 supply can be added later to power additional SW8 switches.



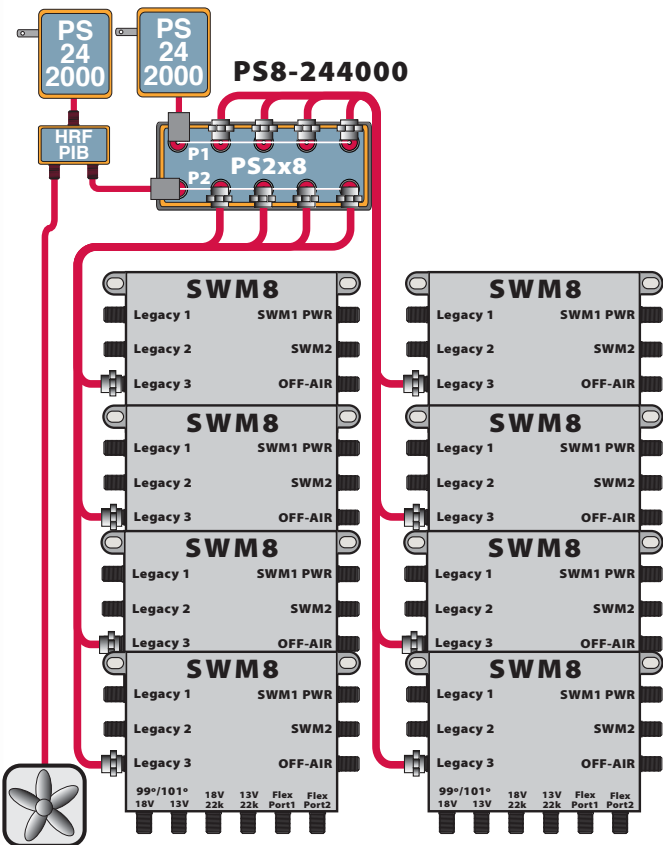
Model PS8-244000 provides 24 volts at 4 amps of current to up to (8) outputs. Powering (4) SWM8 switches is provided by power supply 1.



The second power supply powers the other (4) SWM8 switches. The current use per supply is (4) x 385 mA = 1.54 Amps. NO SL5 powering is allowed with this configuration.

Put 4 in a box and you have the heat of a 40 watt light bulb. Put (8) in a box and the heat is like a 75 watt bulb. Model SWM-FAN provides airflow for lockboxes housing SWM8 switches.

Model HRFPIB is used to split the DC of one supply to power model SWM-FAN. (105 mA)



SWM8 to SL5 Communication

System operators have reported they often find no AC power available at the SWM lockbox.

Some have used the illustrated configuration of HRvS4 diode steered splitters so any SWM8 powered by an in-apartment PI-28 can power the SL5.

Advantage: no single apartment can disable the system by un-plugging their PI-28.

Issue 1: The PI28 voltage to the SWM8 drops to 20volts after 150 feet of solid copper RG-6.

Issue 2: The 18 volts leaving the SWM8 is decreased by 0.6 volts in the splitters. The SL5 needs at least 16 volts to polarity lock. The current for the LA144a plus the LNB current is 275 mA per 18v line. Using solid copper RG-6, the voltage at 100 feet is **16.3** volts

Issue 3 : Too many SWM8's talking to the SL5. What is the affect of combining the multiple SWM LNB power and 22 kHz tones?

- Some strange field problems can be attributed to 22 kHz phasing. Multiple 22 kHz signals when combined can create constructive and destructive interference.
- 180° out of phase combining will reduce the 22 kHz signal to zero!
- the following web location has a live demonstration on the affects.
<http://www.kettering.edu/~drussell/Demos/superposition/superposition.html>

Solution: Model HRPID1422A is a polarity locker that generates a fresh set of voltages and 22 kHz tones while blocking the 22 kHz signals generated by multiple switchvhes.

