Unique Broadband Systems Ltd.

Chapter 4

Commissioning

Contents

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4 Commissioning

4.1 Introduction

This section describes the power-on, configuration and RF test procedures for the DRU-200.

4.2 Test Equipment

Please refer to Table 4-1 for a list of required test equipment. Operating instructions for test equipment are not included in this manual. Only precautionary notes or special test equipment settings required for measurement accuracy are included.

Table 4-1 Test Equipment

Type
PC/Laptop

4.3 Installation Verification

Please check the following before turning on the DRU-200:

- Verify that no equipment was damaged during the installation.
- Verify that there are no sign of water or debris in the cabinet.
- Verify that the ground conductor has been connected to the repeater cabinet ground stud.
- Verify that the main AC power cable has been connected to the repeater cabinet PDU correctly.
- Verify that the electronics compartment components (assemblies), which were packaged separately, have been installed correctly.
  - Verify that the components are in the correct locations.
  - Verify that the ground, communications, RF and power wires/cables have been connected correctly.
- Verify that all HPA compartment components (assemblies), which were packaged separately, have been installed correctly.
- Verify that all external input signals have been connected to the correct interfaces.
- Verify that the PTSN phone line cord has been connected to the surge protector correctly (where applicable).
- Verify that any external alarm contacts/sensors have been connected to the external alarm terminal block correctly (where applicable).
- Verify that the broadcast antenna(s) and transmission line(s) have been swept and connected to the correct RF output port.

4.4 Commissioning Procedure

During the commissioning (initial turn-on) procedure, the operator will be required to perform the following tasks:

1. Power-on the repeater
2. Configure the repeater
3. Place the repeater in broadcast mode

4.4.1 Repeater AC/DC Power-on

The repeater AC/DC power should be turned on in the following sequence:

1. Switch ON the repeater cabinet circuit breaker, located in the building/site electrical service panel.
2. Switch ON the AC disconnect device, located on or near the repeater pedestal (where applicable).
3. Switch ON the MAIN PDU circuit breaker.
4. Switch ON the HE circuit breaker (CB 5), located on the PDU.
   - The air-to-air heat exchanger/heater will not turn on if the DRU is at room temperature. Once the electronics compartment doors are closed, and the compartment temperature increases, the air-to-air heat exchanger/heater fans will turn on.
5. Switch ON the BMS circuit breaker (CB 6), located on the PDU.
   - Ensure that the 12 VDC rectifier LEDs are illuminated green and that the internal fans are rotating continuously.
   - Ensure that the BMS mounting shelf CTR LED is illuminated green.
6. Switch ON the 12 VDC battery circuit breaker (BAT CB), located on the BMS rear panel.
7. Switch ON the HBE rear panel power switch.
8. Switch ON the LBE rear panel power switch.
9. Switch ON the TRMS rear panel power switch and close the electronics compartment rear door.
10. Switch ON the SERVICE AC circuit breaker (CB 7), located on the PDU.
11. Switch ON the TRMS circuit breaker (CB 8), located on the PDU front panel.
    - Ensure that the TRMS Power LED is illuminated green.
12. Switch ON the FAN 1 (CB 9) and FAN 2 (CB10) circuit breakers, located on the PDU.
    - Ensure that the HPA compartment fans are rotating continuously (fans can be heard) and that the PDU FAN 1 and 2 LEDs are illuminated red to indicate current draw.

13. Switch ON the LBE 25A circuit breaker, located on the BMS front panel.
    - Ensure that the LBE Power LED is illuminated green and that the internal fan is rotating continuously. Note: Fan operation will be halted momentarily during the boot-up process, but will continue to operate continuously.
14. Switch ON the HBE 10A circuit breaker, located on the BMS front panel.
    - Ensure that the HBE Power LED is illuminated green and that the internal fan is rotating continuously.
15. Switch ON the HPA-L 5A circuit breaker, located on the BMS front panel.
    - Ensure that the LB HPA LED flashes red and green alternately.
16. Switch ON the HPA-H 5A circuit breaker, located on the BMS front panel.
    - Ensure that the HB HPA LED flashes red and green alternately.
17. Switch ON the SPARE 2.5A circuit breaker, located on the BMS front panel.
    - Ensure that the BMS alarm LEDs are no longer illuminated red; only the CTR LED should be illuminated green.
18. Switch ON the LB HPA PSU circuit breaker (CB2), located on the PDU.
    - Ensure that the LB HPA PSU (PS 2) Norm LED is illuminated green.
    - Ensure that the LB HPA front panel LED is illuminated blue.
19. Switch ON the HB HPA PSU circuit breaker (CB1), located on the PDU.
    - Ensure that the HB HPA PSU (PS 1) Norm LED is illuminated green.
    - Ensure that the HB HPA front panel LED is illuminated blue.

4.4.2 Repeater Configuration

Repeater configuration involves verifying, changing, and/or setting parameter values that allow the repeater to operate from its assigned location. The operator will be required to configure the following:

- Low Band Exciter (LBE)
- High Band Exciter (HBE)
- Terrestrial Repeater Monitoring System (TRMS)

4.4.2.1 Low Band Exciter (LBE) Configuration

Please refer to SiriusXM instructions as well as the LBE Operating Manual to configure the exciter with specific settings for its assigned location.

4.4.2.2 High Band Exciter (HBE) Configuration

Please refer to SiriusXM instructions as well as the HBE Operating Manual to configure the exciter with specific settings for its assigned location.

4.4.2.3 Terrestrial Repeater Monitoring System (TRMS) Configuration

Please refer to SiriusXM instructions as well as the TRMS Operating Manual to configure the TRMS with specific settings for its assigned location.

4.4.3 Placing a Combined DRU in Broadcast Mode

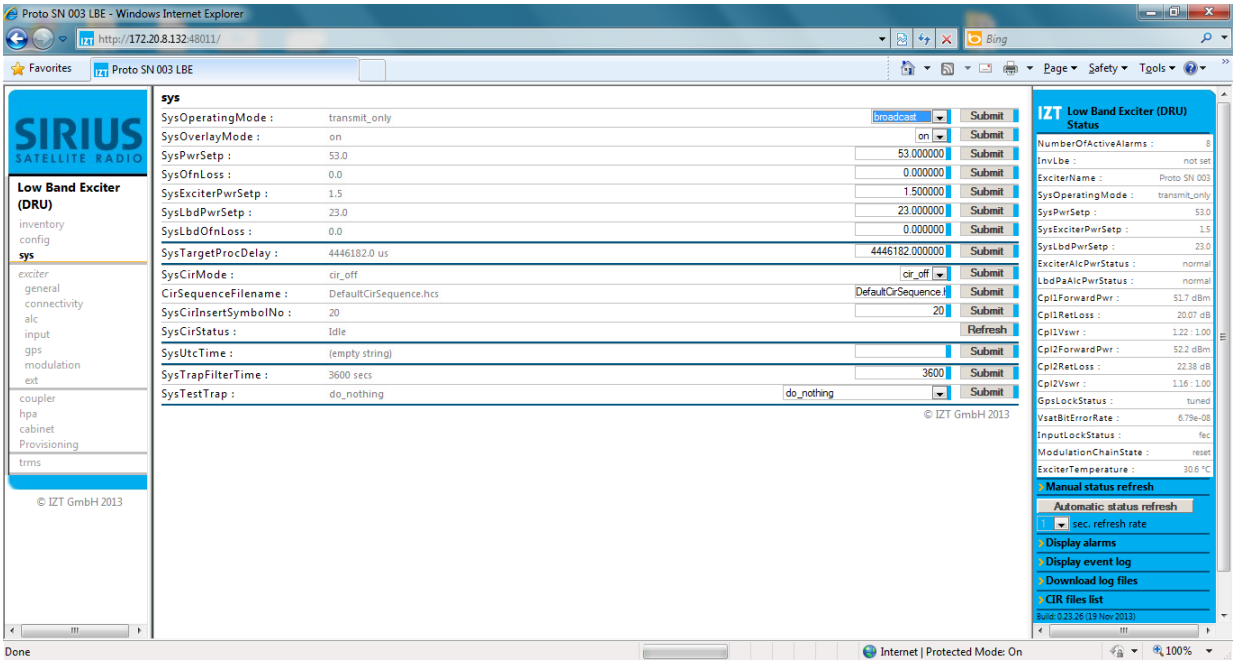
As the repeater is divided into LB and HB sub-systems, each sub-system must be placed in broadcast mode, independent of the other. It is recommended that the LB sub-system is placed in broadcast mode before the HB sub-system is placed in broadcast mode.

4.4.3.1 Low Band Sub-system

Once the LBE is powered up and all LBE alarms have cleared, the operator can place the LB sub-system in broadcast mode using the LBE GUI as follows:

1. Set SysPowerSetp to the site specific power level (max. 53.0 dBm) – see Figure 4-1, config window line 3. SysPowerSetp is used to set the power level for the LB Main RF signal.
2. Set SysLbdPowerSetp to the site specific power level (typical value is 27 dB below SysPowerSetp) – see Figure 4-1, config window line 6. SysLbdPowerSetp is used to set the power level for the LB Diversity RF signal, which is normally 27 dB below the LB Main RF signal.
3. Ensure that SysOfnLoss is set to 0.0 dBm – see Figure 4-1, config window line 4.
4. Set SysOperatingMode to transmit_only – see Figure 4-1, config window line 1. SysOperatingMode is used to set the LB sub-system operating mode.
   - The LB HPA LED will flash green and blue alternately as the HPA ramps up to the SysPowerSetp target.
   - Once the SysPowerSetp target is reached, the HPA LED will be illuminated green. It should take less than TBD minutes for the LB sub-system to ramp up to full power.
5. Ensure that the SysPowerSetp target is reached by viewing the Cpl1ForwardPwr – see Figure 4-1, status window line 13.
6. Ensure that the TRMS LB Status LED is illuminated green.
   - The TRMS should scan through the channels at a slow rate of approximately 20 seconds per channel.

Figure 4-1 LBE GUI sys Page

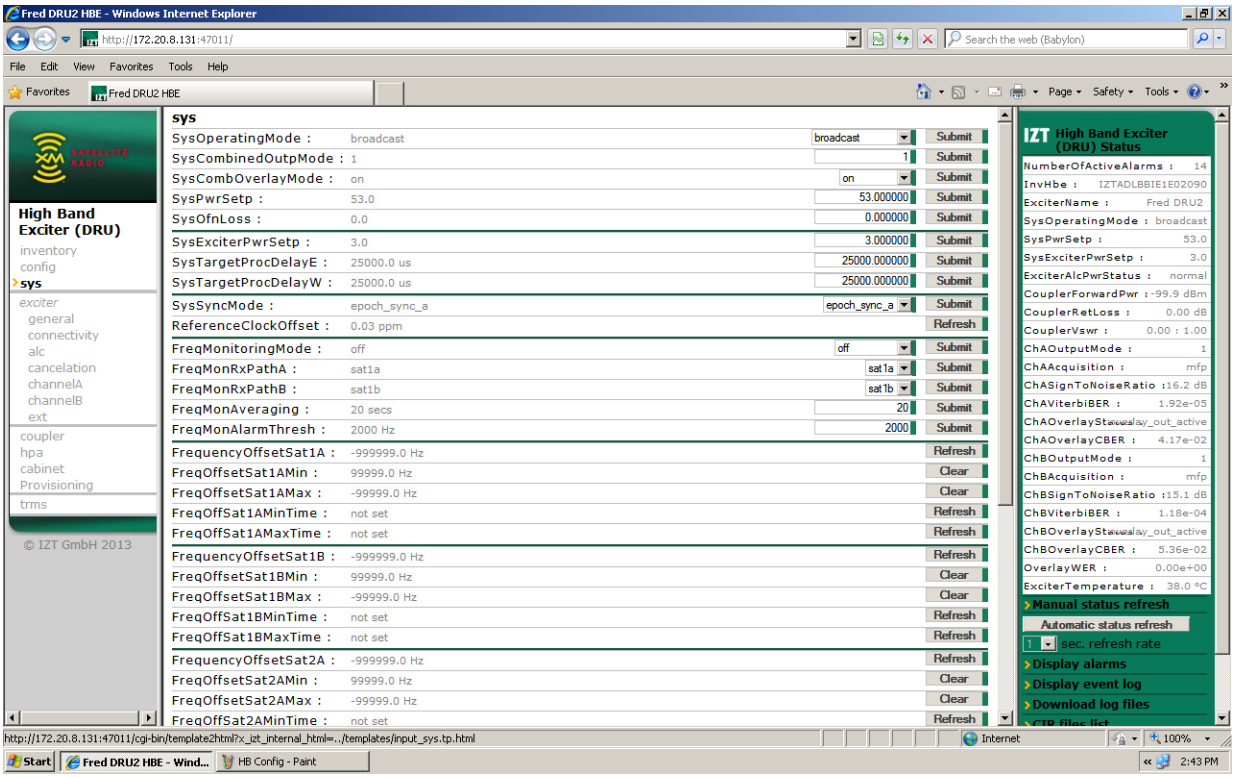


4.4.3.2 High Band Sub-system

Once the HBE is powered up and all alarms have cleared, the operator can place the HB repeater in broadcast mode as follows:

1. Set SysPowerSetp to the site specific power level (max. 53.0 dBm) – see Figure 4-2, config window line 4. SysPowerSetp is used to set the power level for the HB RF signal.
2. Ensure that SysOfnLoss is set to 0.0 dBm – see Figure 4-2, config window line 5.
3. Set SysOperatingMode to broadcast – see Figure 4-2, config window line 1. SysOperatingMode is used to set the HB sub-system operating mode.
   - o Ensure that the LNA LED is illuminated green.
   - o The HB HPA LED will flash green and blue alternately as the HPA ramps up to the SysPowerSetp target.
   - o Once the SysPowerSetp target is reached, the HPA LED will be illuminated green. It should take less than 2 minutes for the HB sub-system to ramp up to full power.
4. Ensure that the SysPowerSetp target is reached by viewing the Cpl1ForwardPwr – see Figure 4-1, status window line 10.
   - o Note: The HBE GUI does not provide any coupler measurements. The combined (coupler 1) coupler measurements are provided by the LBE GUI.
5. Ensure that the TRMS HB Status LED is illuminated green.
   - o The TRMS should scan through the channels at a fast rate of approximately 2 seconds per channel.

Figure 4-2 HBE GUI sys Page



4.4.4 Placing an Independent DRU in Broadcast Mode

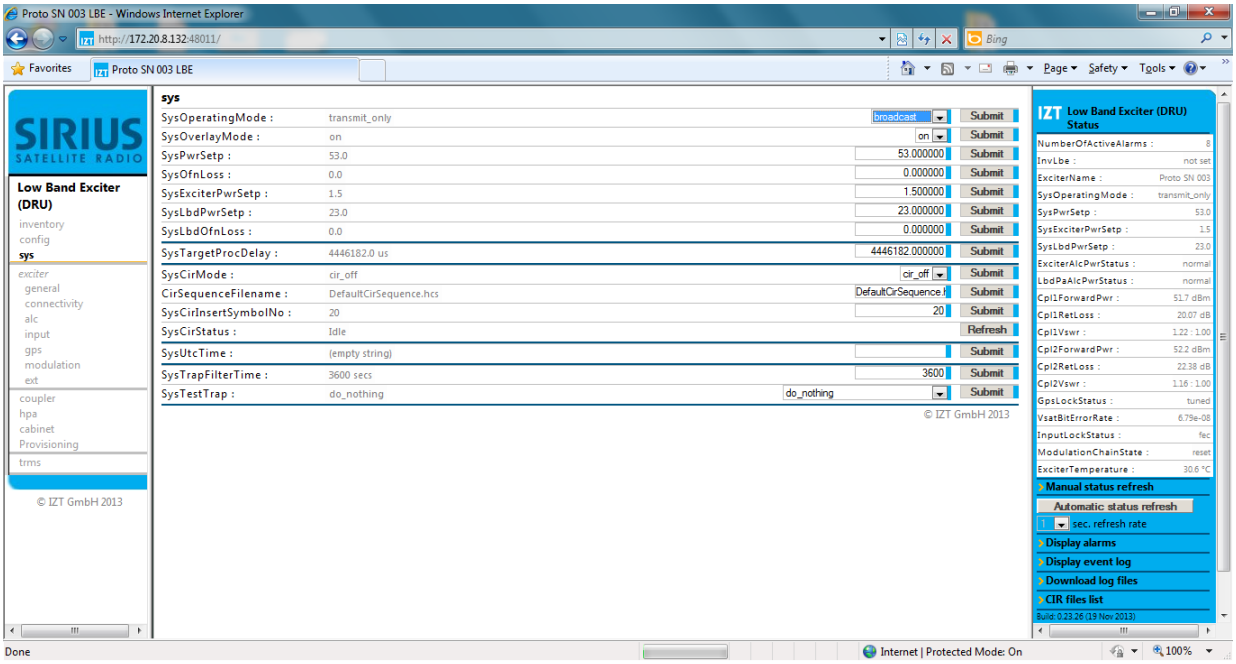
As the repeater is divided into LB and HB sub-systems, each sub-system must be placed in broadcast mode, independent of the other. It is recommended that the LB sub-system is placed in broadcast mode before the HB sub-system is placed in broadcast mode.

4.4.4.1 Low Band Sub-system

Once the LBE is powered up and all LBE alarms have cleared, the operator can place the LB sub-system in broadcast mode using the LBE GUI as follows:

1. Set SysPowerSetp to the site specific power level (max. 53.0 dBm) – see Figure 4-1, config window line 3. SysPowerSetp is used to set the power level for the LB Main RF signal.
2. Set SysLbdPowerSetp to the site specific power level (typical value is 27 dB below SysPowerSetp) – see Figure 4-1, config window line 6. SysLbdPowerSetp is used to set the power level for the LB Diversity RF signal, which is normally 27 dB below the LB Main RF signal.
3. Ensure that SysOfnLoss is set to 0.0 dBm – see Figure 4-1, config window line 4.
4. Set SysOperatingMode to transmit_only – see Figure 4-1, config window line 1. SysOperatingMode is used to set the LB sub-system operating mode.
   - The LB HPA LED will flash green and blue alternately as the HPA ramps up to the SysPowerSetp target.
   - Once the SysPowerSetp target is reached, the HPA LED will be illuminated green. It should take less than TBD minutes for the LB sub-system to ramp up to full power.
5. Ensure that the SysPowerSetp target is reached by viewing the Cpl2ForwardPwr – see Figure 4-1, status window line 13.
6. Ensure that the TRMS LB Status LED is illuminated green.
   - The TRMS should scan through the channels at a slow rate of approximately 20 seconds per channel.

Figure 4-3 LBE GUI sys Page

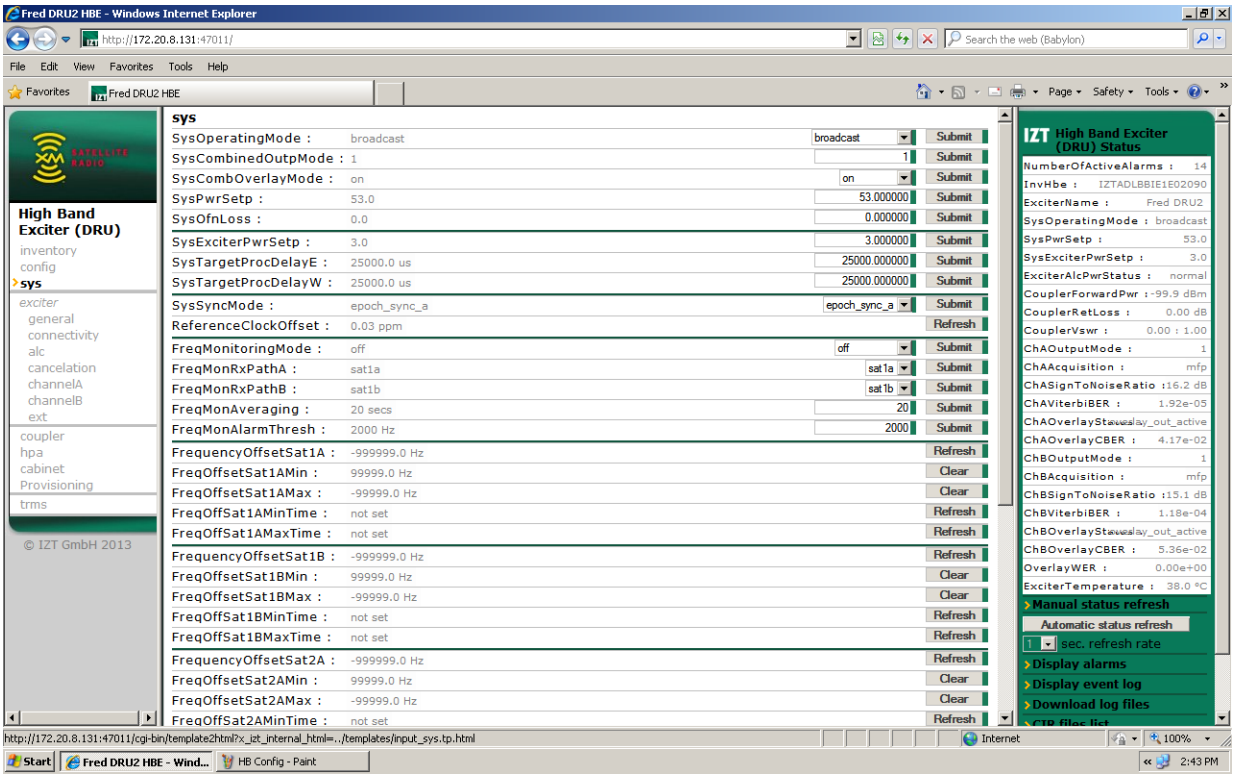


4.4.4.2 High Band Sub-system

Once the HBE is powered up and all alarms have cleared, the operator can place the HB repeater in broadcast mode as follows:

6. Set SysPowerSetp to the site specific power level (max. 53.0 dBm) – see Figure 4-2, config window line 4. SysPowerSetp is used to set the power level for the HB RF signal.
7. Ensure that SysOfnLoss is set to 0.0 dBm – see Figure 4-2, config window line 5.
8. Set SysOperatingMode to broadcast – see Figure 4-2, config window line 1. SysOperatingMode is used to set the HB sub-system operating mode.
   - o Ensure that the LNA LED is illuminated green.
   - o The HB HPA LED will flash green and blue alternately as the HPA ramps up to the SysPowerSetp target.
   - o Once the SysPowerSetp target is reached, the HPA LED will be illuminated green. It should take less than 2 minutes for the HB sub-system to ramp up to full power.
9. Ensure that the SysPowerSetp target is reached by viewing the Cpl1ForwardPwr – see Figure 4-1, status window line 10.
   - o Note: The HBE GUI does not provide any coupler measurements. The combined (coupler 1) and independent (coupler 2) coupler measurements are provided by the LBE GUI.
10. Ensure that the TRMS HB Status LED is illuminated green.
    - o The TRMS should scan through the channels at a fast rate of approximately 2 seconds per channel.

Figure 4-4 HBE GUI sys Page



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Chapter 5

Operation

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5 Operation

5.1 Introduction

This section addresses the control and operation of the DRU-200 and provides descriptions of indicators and controls.

5.2 Control and Communication

The DRU-200 can be controlled locally (on-site) or remotely from a Network Management System (NMS).

5.2.1 Control and Communication Interfaces

There is one (1) “cabinet” interface port provided for control and communication:

- TEL (Screw Terminal) – used for remote control of the HBE, LBE and TRMS via dial-up modem and LBE.

The HBE and LBE also include a front panel RJ-45 Ethernet port for local control of the corresponding exciter.

Please refer to the corresponding Operating Manual for detailed information on configuring the HBE, LBE and TRMS interface ports for local or remote control.

5.2.2 User Interfaces

The HBE, LBE and TRMS include their own user interface(s), permitting an operator to control the device locally or remotely. Please refer to the corresponding Operating Manual for detailed information on the HBE, LBE and TRMS user interfaces.

5.3 Modes of Operation

5.3.1 High Band Sub-system

Please refer to the HBE Operating Manual for detailed information on the HB sub-system operating modes.

5.3.2 Low Band Sub-system

Please refer to the LBE Operating Manual for detailed information on the LB sub-system operating modes.

5.3.3 Terrestrial Repeater Monitoring System (TRMS)

Please refer to the TRMS Operating Manual for detailed information on the TRMS operating modes.

5.4 Indicators and Controls

The DRU-200 main components (assemblies) have individual indicators and controls used in normal operation.

5.4.1 High Band Exciter (HBE)

Please refer to the HBE Operating Manual for detailed information on the HBE indicators and controls.

5.4.2 Low Band Exciter (LBE)

Please refer to the LBE Operating Manual for detailed information on the LBE indicators and controls.

5.4.3 Terrestrial Repeater Monitoring System (TRMS)

Please refer to the TRMS Operating Manual for detailed information on the TRMS indicators and controls.

5.4.4 Cellular Modem

Please refer to the Cellular Modem Operating Manual for detailed information on the Cellular Modem indicators and controls.

5.4.5 Dial-up Modem

Please refer to the Dial-up Modem Operating Manual for detailed information on the Dial-up Modem indicators and controls.

5.4.6 Power Distribution Unit (PDU)

The PDU front panel includes two (2) LEDs to indicate that the cabinet fans are operational. The PDU front panel also includes nine (9) circuit breakers to turn on/off the cabinet AC power.

Figure 5-1 PDU

1) Fan Status LED Indicators

Table 5-1 PDU Fan Status LED Indicator

LED	Color	Description
1	Red	Fan 1 powered on.
	OFF	Fan 1 powered off.
2	Red	Fan 2 powered on.
	OFF	Fan 2 powered off.

Table 5-2 PDU Circuit Breakers

Name	Rating	Circuit Breaker For
MAIN L2	50A, 2-pole	AC input from building/site electrical service panel or AC disconnect device
CB 1	15A, 120/240V, 2-pole	HPA PS 1
CB 2	15A, 120/240V, 2-pole	HPA PS 2
CB 5	5A, 120/240V, 2-pole	Air-to-Air heat exchanger/heater
CB 6	10A, 120/240V, 2-pole	BMS
CB 7	5A, 240V, 2-pole	Provides 120 VAC to GFI outlet
CB 8	5A, 120V, Single-pole	TRMS
CB 9	5A, 120V, Single-pole	Fan box fan 1
CB 10	5A, 120V, Single-pole	Fan box fan 2

5.4.7 Battery Management System (BMS)

The BMS rectifier front panel includes an LED to indicate that the rectifier has been power on. The BMS mounting shelf front panel controller includes seven (7) status LEDs to indicate BMS operation and alarm conditions. The BMS mounting shelf front panel also includes five (5) circuit breakers to turn on/off the BMS 12 VDC output.

Figure 5-2 BMS

1) Rectifier Power LED Indicator
2) BMS Controller Status LED Indicators

Table 5-3 Rectifier LED Indicator

LED	Color	Description
	Green	Rectifier is powered on.
	OFF	Rectifier is powered off.

Table 5-4 BMS Controller Status LED Indicators

LED	Color	Description
CTR	Green	BMS is powered on and is operating under normal, no fault conditions.
	OFF	BMS is powered off.
MAJA	Red	“Major” (immediate response) alarm is present.
	OFF	Normal, no fault operation (when CTR LED is Green).
MINA	Red	“Minor” (scheduled response) alarm is present.
	OFF	Normal, no fault operation (when CTR LED is Green).
ACFA	Red	AC supply failure.
	OFF	Normal, no fault operation (when CTR LED is Green).
OTA	Red	One or more of the monitored temperatures is too high.
	OFF	Normal, no fault operation (when CTR LED is Green).
RFA	Red	Rectifier failure.
	OFF	Normal, no fault operation (when CTR LED is Green).
OVA	Red	System BUS Voltage is too high.
	OFF	Normal, no fault operation (when CTR LED is Green).

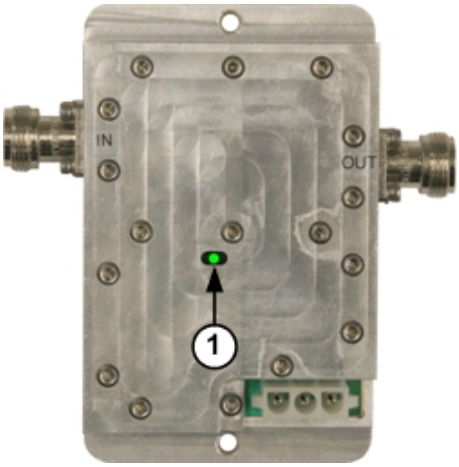
Table 5-5 BMS Circuit Breakers

Name	Rating	Circuit Breaker For
BAT CB	100A	Battery (rear panel)
SPARE	2.5A	Spare
HPA-H	5A	HB HPA
HPA-L	5A	LB HPA
HBE	10A	HBE
LBE	25A	LBE

5.4.8 High Band Low Noise Amplifier (LNA)

The LNA includes an LED, which is visible through the top cover, to indicate that the LNA has been powered on.

Figure 5-3 LNA



1) LNA Power LED Indicator

Table 5-6 LNA Power LED Indicator

LED	Color	Description
	Green	LNA is powered on.
	OFF	LNA is powered off.

5.4.9 High Power Amplifier Power Supply Unit (HPA PSU)

The HPA PSU rectifier front panel includes three (3) status LEDs to indicate rectifier operation and alarm conditions.

Figure 5-4 HPA PSU Rectifier

1) HPA PSU Rectifier Status LED Indicators

Table 5-7 HPA PSU Rectifier Status LED Indicators

LED	Color	Description
Norm	Green	Rectifier is powered on and is operating under normal conditions. Note: Comm Fault is possible.
	Green Blink	Rectifier output is inhibited, preparing to deliver power, ramping up or in standby.
	Amber	Rectifier output is limited to less than fully rated output power.
	OFF	Rectifier is powered off. ACF or Fail alarm is active.
ACF	Amber	AC input is out of range and the rectifier output is powered off.
	OFF	Normal, no fault operation (when Norm LED is Green).
Fail	Red	Rectifier failure or shutdown.
	Red Blink	Communication failure with controller.
	Red Wink	Fan failure.
	OFF	Normal, no fault operation (when Norm LED is Green).

- Blink Timing shall be approximately 0.5 seconds ON and 0.5 seconds OFF.
- Wink Timing shall be approximately 0.2 seconds ON and 2 seconds OFF.

5.4.10 High Power Amplifier (HPA)

The HPA front panel includes one (1) status LED to indicate HPA operation and alarm conditions.

Figure 5-5 HPA

1) HPA Status LED Indicator

Table 5-8 HPA Status LED Indicator

LED	Color	Description
	Green	HPA is in broadcast mode and the output target has been reached.
	Green/Blue Blink	HPA is in broadcast mode and is ramping up to full power.
	Blue	HPA is in standby mode with the 30 VDC source enabled.
	Green/Red Blink	HPA is in standby mode with the 30 VDC source disabled.
	Red	HPA is in broadcast mode and alarm is present.
	OFF	HPA controller is powered off.

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Chapter 6

Maintenance

Contents

6 Maintenance

6.1 Introduction

This section describes the procedures for removal and replacement of the DRU-200 components.

6.2 Test Equipment

The only test equipment required to perform the replacement procedures in the manual is a PC/laptop. Operating instructions for test equipment are not included in this manual.

6.3 Required Tools

The following tools may be needed to perform maintenance on the repeater:

Table 6-1 Required Tools

Tool	Type	Size
Screwdriver	Phillips	#3
Screwdriver	Phillips	#2
Screwdriver	Phillips	#0
Screwdriver	Slotted	1/4”
Screwdriver	Slotted	3/16”
Screwdriver	Slotted	1/8”
Screwdriver	Slotted	3/32”
Hex Driver		3/16”
Hex Driver		5/32”
Hex Driver		9/64”
Security Hex Driver		3/16”
Open End Wrench		7/16”
Open End Wrench		11/32”
Open End Wrench		5/16”
Torque Wrench		5/16”
Socket		7/16”
Cable Tie	PLT.7M-M	18lb, 3.1" x 0.090"
Cable Tie Mount	ABM1M-A-C	
Step Ladder		

6.4 Preventative Maintenance

The only required preventative maintenance is for the HPA compartment air intake filters and the air-to-air heat exchanger/heater exterior coils.

As a general rule, it is recommended that the air filters and exterior coils be cleaned every 6 months under normal conditions, or every 3 months in dusty environments. UBS would recommend that the filters and exterior coils be inspected more frequently and cleaning intervals be adjusted as deemed necessary by the operator.

6.5 Replacement Procedures

The following repeater components can be replaced:

Table 6-2 Replaceable Components

Name	Part Number
PDU Circuit Breaker	N/A
PDU Current Sensor	N/A
BMS Mounting Shelf w/Controller	SX03-50310-01
BMS 12 VDC Rectifier Module	SX03-50320-01
BMS 12 VDC Battery	SX03-50330-01
Low Noise Amplifier (LNA)	SX03-50100-01
Dual Band Pass Filter (DBPF)	SX03-50200-01
HBE	N/A
LBE	N/A
TRMS	N/A
Air-to-Air Heat Exchanger/Heater	SX03-50400-01
High Power Amplifier (HPA)	SX03-40000-01
HPA PSU Mounting Shelf	SX03-51710-01
HPA PSU 30 VDC Rectifier Module	SX03-51720-01
DR Filter Box	SX03-10700-03
7/8” Short U-link/Coupler	SX03-10402-01
7/8” Long U-link/Coupler	SX03-10403-01
7/8” Combined Output Coupler/RF Detector	SX03-51430-01
7/8” Independent Output Coupler/RF Detector	SX03-51450-01
Fan (Blower) Box	SX03-50500-01
Air Intake Filter	N/A

6.5.1 Combined DRU Shutdown

6.5.1.1 Full System Shutdown

A Combined DRU should be shut down in the following sequence:

1. Using the HBE GUI, set SysOperatingMode to standby.
   - The LBE GUI Cpl1ForwardPwr reading will decrease by 3 dBm (assuming both HB and LB sub-systems are operating with equal output power levels).
   - The HB HPA LED will be illuminated blue.
   - The LNA LED will be extinguished.
   - The TRMS HB Status LED will be extinguished.
2. Using the LBE GUI, set SysOperatingMode to standby.
   - The LBE GUI Cpl1ForwardPwr reading will be 0 dBm.
   - The LB HPA LED will be illuminated blue.
   - The TRMS LB Status LED will be extinguished.
3. Switch OFF the HB HPA PSU circuit breaker (CB1), located on the PDU.
   - The HB HPA PSU (PS 1) Norm LED will be extinguished.
   - The HB HPA front panel LED will flash green and red alternately.
4. Switch OFF the LB HPA PSU circuit breaker (CB2), located on the PDU.
   - The LB HPA PSU (PS 2) Norm LED will be extinguished.
   - The LB HPA front panel LED will flash green and red alternately.
5. Switch OFF the SPARE 2.5A circuit breaker, located on the BMS front panel.
   - The BMS alarm LEDs will be illuminated red.
6. Switch OFF the HPA-H 5A circuit breaker, located on the BMS front panel.
   - The HB HPA LED will be extinguished.
7. Switch OFF the HPA-L 5A circuit breaker, located on the BMS front panel.
   - The LB HPA LED will be extinguished.
8. Switch OFF the HBE 10A circuit breaker, located on the BMS front panel.
   - The HBE Power LED will be extinguished and the internal fan will turn off.
9. Switch OFF the LBE 25A circuit breaker, located on the BMS front panel.
   - The LBE Power LED will be extinguished and the internal fan will turn off.
10. Switch OFF the FAN 1 (CB 9) and FAN 2 (CB10) circuit breakers, located on the PDU.
    - The HPA compartment fans will turn off (fans cannot be heard) and that the PDU FAN 1 and 2 LEDs will be extinguished.
11. Switch OFF the TRMS circuit breaker (CB 8), located on the PDU front panel.
    - The TRMS Power LED will be extinguished.
12. Switch OFF the SERVICE AC circuit breaker (CB 7), located on the PDU.
13. Switch OFF the 12 VDC battery circuit breaker (BAT CB), located on the BMS rear panel.
14. Switch OFF the BMS circuit breaker (CB 6), located on the PDU.

- The 12 VDC rectifier LEDs will be extinguished.
- The BMS mounting shelf LEDs will be extinguished.

15. Switch OFF the HE circuit breaker (CB 5), located on the PDU.
16. Switch OFF the MAIN PDU circuit breaker.
17. Switch OFF the AC disconnect device, located on or near the repeater pedestal (where applicable).
18. Switch OFF the repeater cabinet circuit breaker, located in the building/site electrical service panel.

6.5.1.2 Combined DRU Low Band Sub-system Shutdown

The Combined DRU LB sub-system should be shut down in the following sequence:

1. Using the LBE GUI, set SysOperatingMode to standby.
   - The LBE GUI Cpl1ForwardPwr reading should decrease by 3 dB.
   - The LB HPA LED will be illuminated blue.
   - The TRMS LB Status LED will be extinguished.
2. Switch OFF the LB HPA PSU circuit breaker (CB2), located on the PDU.
   - The LB HPA PSU (PS 2) Norm LED will be extinguished.
   - The LB HPA front panel LED will flash green and red alternately.
3. Switch OFF the HPA-L 5A circuit breaker, located on the BMS front panel.
   - The LB HPA LED will be extinguished.
4. Switch OFF the LBE 25A circuit breaker, located on the BMS front panel.
   - The LBE Power LED will be extinguished and the internal fan will turn off.

6.5.1.3 Combined DRU High Band Sub-system Shutdown

The Combined DRU HB sub-system should be shut down in the following sequence:

1. Using the HBE GUI, set SysOperatingMode to standby.
   - The HBE GUI Cpl1ForwardPwr reading should decrease by 3 dB.
   - The HB HPA LED will be illuminated blue.
   - The LNA LED will be extinguished.
   - The TRMS HB Status LED will be extinguished.
2. Switch OFF the HB HPA PSU circuit breaker (CB1), located on the PDU.
   - The HB HPA PSU (PS 1) Norm LED will be extinguished.
   - The HB HPA front panel LED will flash green and red alternately.
3. Switch OFF the HPA-H 5A circuit breaker, located on the BMS front panel.
   - The HB HPA LED will be extinguished.
4. Switch OFF the HBE 10A circuit breaker, located on the BMS front panel.
   - The HBE Power LED will be extinguished and the internal fan will turn off.

6.5.2 Independent DRU-200 Shutdown

6.5.2.1 Full System Shutdown

The Independent DRU should be shut down in the following sequence:

1. Using the HBE GUI, set SysOperatingMode to standby.
   - The HBE GUI Cpl1ForwardPwr reading will be 0 dBm.
   - The HB HPA LED will be illuminated blue.
   - The LNA LED will be extinguished.
   - The TRMS HB Status LED will be extinguished.
2. Using the LBE GUI, set SysOperatingMode to standby.
   - The LBE GUI Cpl2ForwardPwr reading will be 0 dBm.
   - The LB HPA LED will be illuminated blue.
   - The TRMS LB Status LED will be extinguished.
3. Switch OFF the HB HPA PSU circuit breaker (CB1), located on the PDU.
   - The HB HPA PSU (PS 1) Norm LED will be extinguished.
   - The HB HPA front panel LED will flash green and red alternately.
4. Switch OFF the LB HPA PSU circuit breaker (CB2), located on the PDU.
   - The LB HPA PSU (PS 2) Norm LED will be extinguished.
   - The LB HPA front panel LED will flash green and red alternately.
5. Switch OFF the SPARE 2.5A circuit breaker, located on the BMS front panel.
   - The BMS alarm LEDs will be illuminated red.
6. Switch OFF the HPA-H 5A circuit breaker, located on the BMS front panel.
   - The HB HPA LED will be extinguished.
7. Switch OFF the HPA-L 5A circuit breaker, located on the BMS front panel.
   - The LB HPA LED will be extinguished.
8. Switch OFF the HBE 10A circuit breaker, located on the BMS front panel.
   - The HBE Power LED will be extinguished and the internal fan will turn off.
9. Switch OFF the LBE 25A circuit breaker, located on the BMS front panel.
   - The LBE Power LED will be extinguished and the internal fan will turn off.
10. Switch OFF the FAN 1 (CB 9) and FAN 2 (CB10) circuit breakers, located on the PDU.
    - The HPA compartment fans will turn off (fans cannot be heard) and that the PDU FAN 1 and 2 LEDs will be extinguished.
11. Switch OFF the TRMS circuit breaker (CB 8), located on the PDU front panel.
    - The TRMS Power LED will be extinguished.
12. Switch OFF the SERVICE AC circuit breaker (CB 7), located on the PDU.
13. Switch OFF the 12 VDC battery circuit breaker (BAT CB), located on the BMS rear panel.
14. Switch OFF the BMS circuit breaker (CB 6), located on the PDU.
    - The 12 VDC rectifier LEDs will be extinguished.

- The BMS mounting shelf LEDs will be extinguished.

15. Switch OFF the HE circuit breaker (CB 5), located on the PDU.
16. Switch OFF the MAIN PDU circuit breaker.
17. Switch OFF the AC disconnect device, located on or near the repeater pedestal (where applicable).
18. Switch OFF the repeater cabinet circuit breaker, located in the building/site electrical service panel.

6.5.2.2 Low Band Sub-system Shutdown

The LB sub-system should be shut down in the following sequence:

1. Using the LBE GUI, set SysOperatingMode to standby.
   - The LBE GUI Cpl2ForwardPwr reading will be 0 dBm.
   - The LB HPA LED will be illuminated blue.
   - The TRMS LB Status LED will be extinguished.
2. Switch OFF the LB HPA PSU circuit breaker (CB2), located on the PDU.
   - The LB HPA PSU (PS 2) Norm LED will be extinguished.
   - The LB HPA front panel LED will flash green and red alternately.
3. Switch OFF the HPA-L 5A circuit breaker, located on the BMS front panel.
   - The LB HPA LED will be extinguished.
4. Switch OFF the LBE 25A circuit breaker, located on the BMS front panel.
   - The LBE Power LED will be extinguished and the internal fan will turn off.

6.5.2.3 High Band Sub-system Shutdown

The HB sub-system should be shut down in the following sequence:

1. Using the HBE GUI, set SysOperatingMode to standby.
   - The HBE GUI Cpl1ForwardPwr reading will be 0 dBm.
   - The HB HPA LED will be illuminated blue.
   - The LNA LED will be extinguished.
   - The TRMS HB Status LED will be extinguished.
2. Switch OFF the HB HPA PSU circuit breaker (CB1), located on the PDU.
   - The HB HPA PSU (PS 1) Norm LED will be extinguished.
   - The HB HPA front panel LED will flash green and red alternately.
3. Switch OFF the HPA-H 5A circuit breaker, located on the BMS front panel.
   - The HB HPA LED will be extinguished.
4. Switch OFF the HBE 10A circuit breaker, located on the BMS front panel.
   - The HBE Power LED will be extinguished and the internal fan will turn off.

6.5.3 High Band Exciter (HBE) Replacement

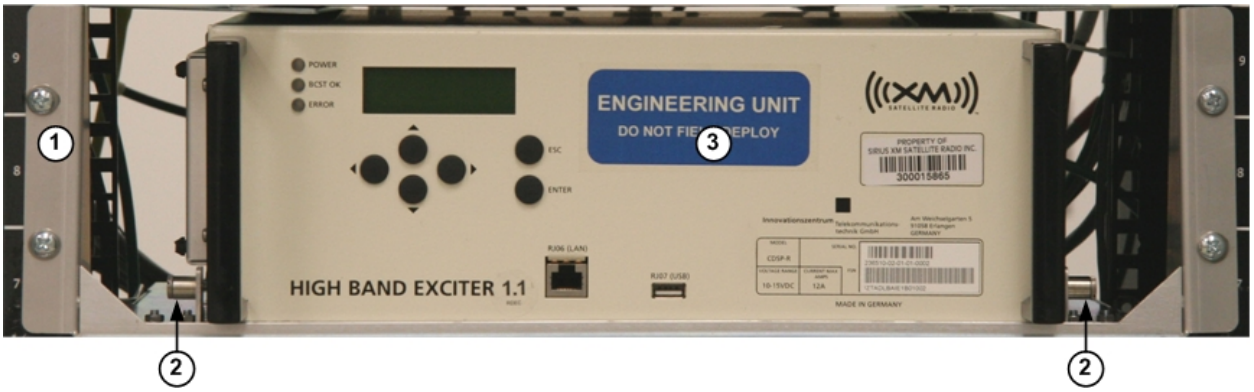
	Always ensure that the DC power to the HBE has been switched OFF prior to removing the HBE. This will prevent injury caused by electric shock and prevent damage to equipment.

6.5.3.1 HBE Removal

The HBE should be removed in the following sequence:

1. Open the electronics compartment front and rear doors.
2. Using the HBE GUI, place the HB sub-system in standby mode.
3. Switch OFF the HB HPA PSU circuit breaker (CB1), located on the PDU.
4. Switch OFF the HPA-H 5A circuit breaker, located on the BMS front panel.
5. Switch OFF the HBE 10A circuit breaker, located on the BMS front panel.
6. Switch OFF the HBE rear panel power switch.
7. Disconnect the wires/cables connected to the HBE rear panel.
8. Loosen the four (4) knurled screws which secure the HBE to the mounting brackets – see Figure 6-1.
9. Remove the HBE from the electronics compartment and set it aside.

Figure 6-1 HBE Mounting Brackets with HBE



1) HBE Mounting Bracket
2) Knurled Screw
3) HBE

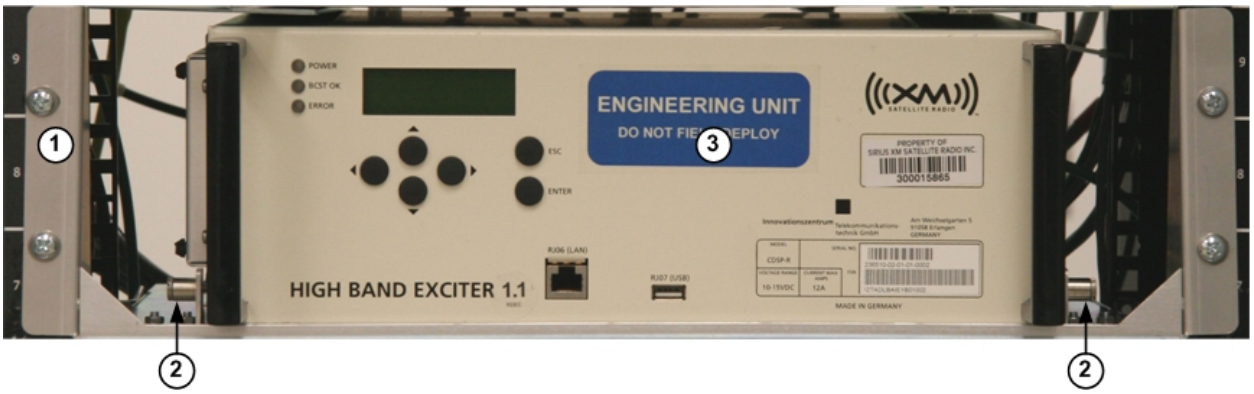
6.5.3.2 HBE Installation

	Any RF cable, which is terminated with a SMA connector, should be tightened with a 5/16" torque wrench to avoid over tightening and damaging the cable connector or mating connector.

The replacement HBE should be installed in the following sequence:

1. Slide the replacement HBE onto the mounting brackets in the electronics compartment above the HBE – see Figure 6-2.
2. Tighten the four (4) knurled screws which secure the HBE to the mounting brackets – see Figure 6-1.
3. Re-connect the wires/cables to the HBE rear panel in the order that they appear in Table 6-3.
4. Switch ON the HBE rear panel power switch.
5. Switch ON the HBE 10A circuit breaker, located on the BMS front panel.
6. Switch ON the HPA-H 5A circuit breaker, located on the BMS front panel.
7. Switch ON the HB HPA PSU circuit breaker (CB1), located on the PDU.
8. Please refer to SiriusXM instructions as well as the HBE Operating Manual to configure the HBE with specific settings for its assigned location.
9. Using the HBE GUI, place the HB sub-system in broadcast mode.
10. Close the electronics compartment front and rear doors.

Figure 6-2 HBE Mounting Brackets



1) HBE Mounting Bracket
2) Knurled Screw

Figure 6-3 HBE Rear Panel

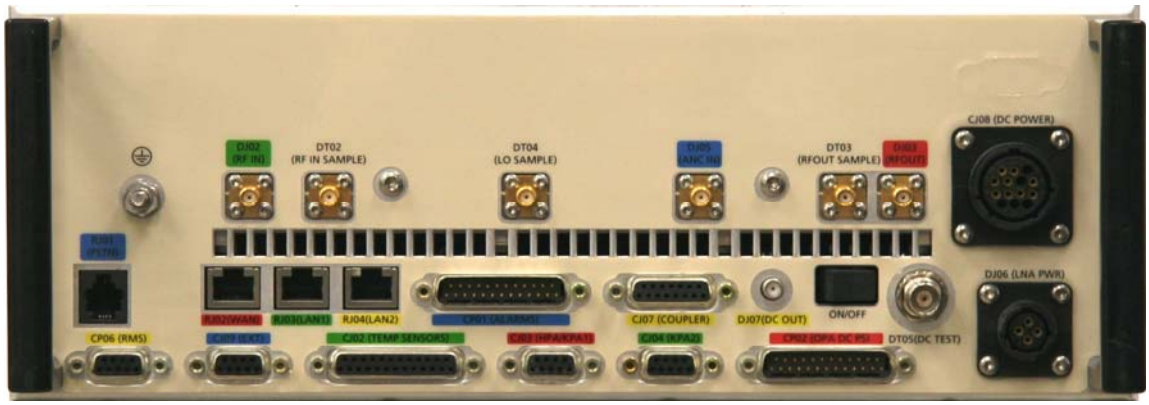


Table 6-3 HBE Rear Panel Connections

HBE Port	Name	Type	Cable Number
N/A	N/A	Ground Post	SX03-10926-05
CJ03	HPA/KPA1	DB-9 (F)	SX03-10924-02
CP02	OPA DC PS	DB-25 (M)	SX03-10919-01
RJ02	WAN	RJ-45	SX03-10905-02
RJ03	LAN	RJ-45	SX03-10905-03
DJ06	LNA PWR	4-pos CPC	SX03-10902-01
CJ08	DC POWER	14-pos CPC	SX03-10903-01
DJ02	RF IN	SMA (F), 50 ohm	SX03-10909-02
DJ05	ANC IN	SMA (F), 50 ohm	SX03-10908-04
DJ03	RF OUT	SMA (F), 50 ohm	SX03-10908-03

6.5.4 Low Band Exciter (LBE) Replacement

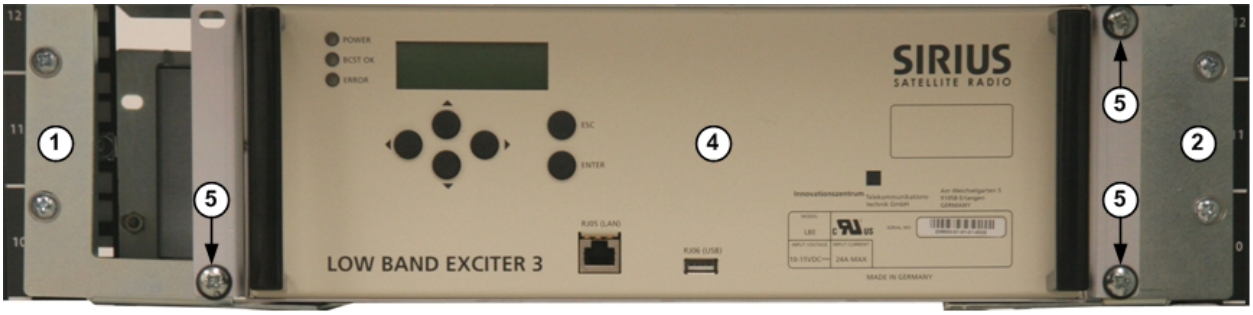
	Always ensure that the DC power to the LBE has been switched OFF prior to removing the LBE. This will prevent injury caused by electric shock and prevent damage to equipment.

6.5.4.1 LBE Removal

The LBE should be removed in the following sequence:

1. Open the electronics compartment front and rear doors.
2. Using the LBE GUI, place the LB sub-system in standby mode.
3. Switch OFF the LB HPA PSU circuit breaker (CB2), located on the PDU.
4. Switch OFF the HPA-L 5A circuit breaker, located on the BMS front panel.
5. Switch OFF the LBE 25A circuit breaker, located on the BMS front panel.
6. Switch OFF the LBE rear panel power switch.
7. Disconnect the wires/cables connected to the LBE rear panel.
8. Remove the two (2) Phillips pan head screws which secure the LBE to the mounting brackets – see Figure 6-4.
9. Remove the LBE from the electronics compartment and set it aside.

Figure 6-4 LBE Mounting Brackets with LBE



1) LBE Mounting Bracket (left side)
2) LBE Mounting Bracket (right side)
3) Mounting Screw Hole
4) LBE
5) XXX Screw

6.5.4.2 LBE Installation

	Any RF cable, which is terminated with a SMA connector, should be tightened with a 5/16" torque wrench to avoid over tightening and damaging the cable connector or mating connector.

The replacement LBE should be installed in the following sequence:

1. Slide the replacement LBE onto the mounting brackets in the electronics compartment above the HBE – see Figure 6-5.
2. Replace the two (2) Phillips pan head screws which secure the LBE to the mounting brackets – see Figure 6-4.
3. Re-connect the wires/cables to the LBE rear panel in the order that they appear in Table 6-4.
4. Switch ON the LBE rear panel power switch.
5. Switch ON the LBE 25A circuit breaker, located on the BMS front panel.
6. Switch ON the HPA-L 5A circuit breaker, located on the BMS front panel.
7. Switch ON the LB HPA PSU circuit breaker (CB2), located on the PDU.
8. Please refer to SiriusXM instructions as well as the LBE Operating Manual to configure the LBE with specific settings for its assigned location.
9. Using the LBE GUI, place the LB sub-system in transmit_only mode.
10. Close the electronics compartment front and rear doors.

Figure 6-5 LBE Mounting Brackets

1) LBE Mounting Bracket (left side)
2) LBE Mounting Bracket (right side)
3) Mounting Screw Hole

Figure 6-6 LBE Rear Panel

Table 6-4 LBE Rear Panel Connections

LBE Port	Name	Type	Cable Number
N/A	N/A	Ground Post	SX03-10926-06
CJ02	OC1	DB-15 (F)	SX03-10904-02
CJ06	TEMP SENSORS	DB-25 (F)	SX03-10901-01
CJ01	HPA M&C	DB-9 (F)	SX03-10924-01
CP04	OPA-FAN-PS	DB-15 (M)	SX03-10920-01
CJ05	OC2	DB-15 (F)	SX03-10904-01
RJ02	WAN	RJ-45	SX03-10905-04
RJ03	LAN	RJ-45	SX03-10905-02
RJ04	LAN	RJ-45	SX03-10905-01
CP07	ALARMS	DB-25 (M)	SX03-10922-01
DJ07	SW DC OUT	2.5 mm Locking DC Power Jack	SX03-10927-01
DJ06	DC POWER IN	Combination Sub-D	SX03-10907-01
DJ01	VSAT IN	F (F), 75 ohm	SX03-10910-02
DJ02	GPS IN	SMA (F), 50 ohm	SX03-10909-03
DJ05	DIV RF2 OUT	N (F), 50 ohm	SX03-10909-01
DJ04	RF HPA FB IN	SMA (F), 50 ohm	SX03-10908-02
DJ03	RF1 OUT	SMA (F), 50 ohm	SX03-10908-01
RJ01	TBD	DB-9	N/A

6.5.5 Terrestrial Repeater Monitoring System (TRMS) Replacement

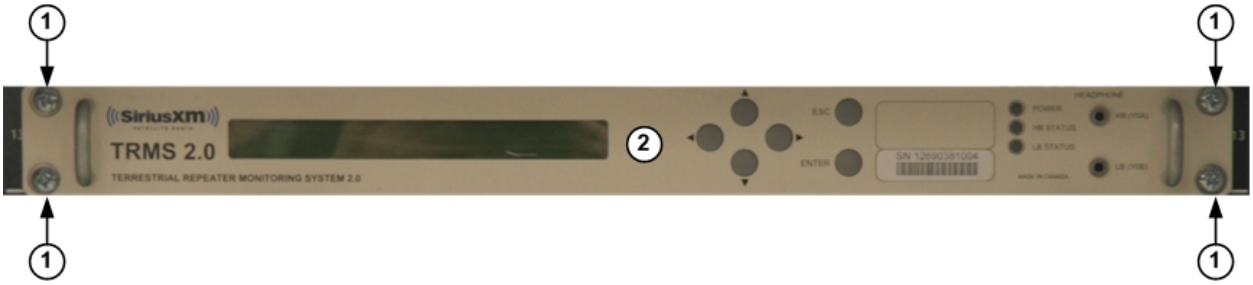
	Always ensure that the AC power to the TRMS has been switched OFF prior to removing the TRMS. This will prevent injury caused by electric shock and prevent damage to equipment.

6.5.5.1 TRMS Removal

The TRMS should be removed in the following sequence:

1. Open the electronics compartment front and rear doors.
2. Switch OFF the TRMS rear panel power switch.
3. Switch OFF the TRMS circuit breaker (CB 8), located on the PDU front panel.
4. Disconnect the wires/cables connected to the TRMS rear panel.
5. Remove the four (4) Phillips pan head screws which secure the TRMS to the mounting rails – see Figure 6-7.
6. Remove the TRMS from the electronics compartment and set it aside.

Figure 6-7 TRMS in Rack



1) XXX Screw
2) TRMS

6.5.5.2 TRMS Installation

	Any RF cable, which is terminated with a SMA connector, should be tightened with a 5/16" torque wrench to avoid over tightening and damaging the cable connector or mating connector.

The replacement TRMS should be installed in the following sequence:

1. Slide the replacement TRMS into the open slot in the electronics compartment above the LBE.
2. Replace the four (4) Phillips pan head screws which secure the TRMS to the mounting rails – see Figure 6-7.
3. Re-connect the wires/cables to the TRMS rear panel in the order that they appear in Table 6-5.
4. Switch ON the TRMS circuit breaker (CB 8), located on the PDU front panel.
5. Switch ON the TRMS rear panel power switch.
6. Please refer to SiriusXM instructions as well as the TRMS Operating Manual to configure the TRMS with specific settings for its assigned location.
7. Close the electronics compartment front and rear doors.

Figure 6-8 TRMS Rear Panel

Table 6-5 TRMS Rear Panel Connections

TRMS Port	Name	Type	Cable Number
N/A	N/A	Ground Post	SX03-10926-07
Y1B	RF-IN	SMA (F), 50 ohm	SX03-10908-07
Y2B	RF IN	SMA (F), 50 ohm	SX03-10908-05
Y9B	LAN	RJ-45	SX03-10905-03
Y10A	WAN	RJ-45	SX03-10905-01
Y12	N/A (AC Input)	NEMA Socket Polarized Type IEC 603	SX03-10913-01

6.5.6 Air-to-Air Heat Exchanger/Heater Replacement

	Always ensure that the AC power to the air-to-air heat exchanger/heater has been switched OFF prior to removing the air-to-air heat exchanger/heater. This will prevent injury caused by electric shock and prevent damage to equipment.

	Always remove/install the air-to-air heat exchanger/heater with the aid of a second handler. The air-to-air heat exchanger/heater weighs approximately 50 lbs.

6.5.6.1 Air-to-Air Heat Exchanger/Heater Removal

The air-to-air heat exchanger/heater should be removed in the following sequence:

1. Open the electronics compartment front and rear doors.
2. Switch OFF the HE circuit breaker (CB 5), located on the PDU.
3. Disconnect the 8-pin pluggable AC/communications terminal block from the air-to-air heat exchanger/heater inside panel – see Figure 6-9. The pluggable terminal block can be removed from the air-to-air heat exchanger/heater inside panel by loosening the two (2) slotted screws. Do not remove the individual wires from the pluggable terminal block.
4. Cut the cable ties which secure the two (2) temperature sensor cable assemblies (ELECTR COMP AIR INTAKE and ELECTR COMP AIR EXH) to the air-to-air heat exchanger/heater inside panel – see Figure 6-9.
5. Remove the twelve (12) 1/4-20 security socket head cap screws (with 1/4" flat washers and gaskets) which secure the air-to-air heat exchanger/heater to the cabinet – see Figure 6-10.
6. Using two handlers, one located on each side of the air-to-air heat exchanger/heater, carefully lift the air-to-air heat exchanger/heater from the side of the cabinet and set it aside. Ensure that the weatherproof gasket is not stuck to the side of the air-to-air heat exchanger/heater.

Figure 6-9 Air-to-Air Heat Exchanger/Heater Inside Panel

Picture TBD

1) Terminal Block
2) Cable Tie

Figure 6-10 Air-to-Air Heat Exchanger/Heater

Picture TBD

1) 1/4-20 Security Socket Head Cap Screw with Flat Washer and Gasket
2) Weatherproof Gasket

Figure 6-11 Air-to-Air Heat Exchanger/Heater Weatherproof Gasket

Picture TBD

6.5.6.2 Air-to-Air Heat Exchanger/Heater Installation

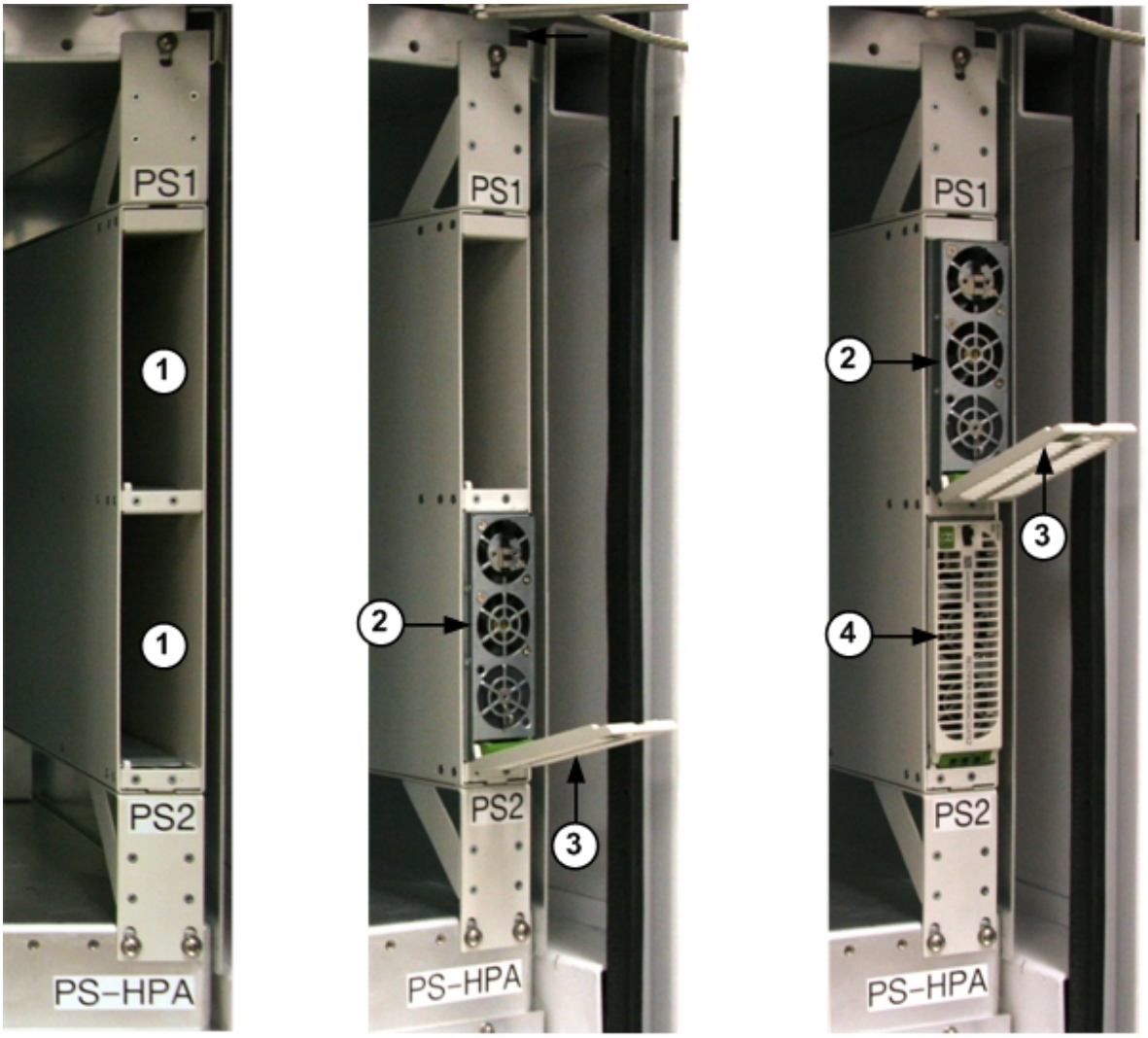
The replacement air-to-air heat exchanger/heater should be installed in the following sequence:

1. Before the replacement air-to-air heat exchanger/heater is installed, ensure that the weatherproof gasket is placed on the side of the air-to-air heat exchanger/heater that will rest against the side of the cabinet – see Figure 6-11.
2. Using two handlers, one located on each side of the air-to-air heat exchanger/heater, carefully lift the air-to-air heat exchanger/heater and place it in the opening in the side of the cabinet.
3. Replace the twelve (12) 1/4-20 socket head cap screws (with 1/4" flat washers and gaskets) which secure the air-to-air heat exchanger/heater to the cabinet – see Figure 6-10. A torque rating of 45.6 Inch Lbs. must be used to tighten the screws.
4. Install four (4) cable tie mounts on the air-to-air heat exchanger/heater inside panel – see Figure 6-9.
5. Secure the two (2) temperature sensor cable assemblies (ELECTR COMP AIR INTAKE and ELECTR COMP AIR EXH) to the cable tie mounts located on the air-to-air heat exchanger/heater inside panel – see Figure 6-9.
6. Re-connect the 8-pin pluggable terminal block to the air-to-air heat exchanger/heater inside panel 8-pin terminal block receptacle – see Figure 6-9.
7. Switch ON the HE circuit breaker (CB 5), located on the PDU.
8. Close the electronics compartment front and rear doors.

6.5.7 HPA PSU 30 VDC Rectifier Module Replacement

	Always ensure that the AC power to the 30 VDC rectifier module has been switched OFF prior to removing the rectifier module. This will prevent injury caused by electric shock and prevent damage to equipment.

Figure 6-12 HPA PSU Shelf with Rectifier Modules



1) 10-32 Socket Head Cap Screw with Flat Washer and Lock Washer
2) HB HPA PS 1 (30 VDC Rectifier Module)
3) LB HPA PS 2 (30 VDC Rectifier Module)
4) Front Grill Cover Release Button
5) Disengaged Rectifier Module with Open Grill Cover

Figure 6-13 HPA PSU 30 VDC Rectifier Module

1) Front Grill/Cover
2) Front Grill/Cover Release Button

6.5.7.1 HB HPA PS1 (30 VDC Rectifier Module) Removal

The HB HPA PS 1 should be removed in the following sequence:

1. Open the electronics compartment front door.
2. Open the HPA compartment front door.
3. Using the HBE GUI, place the HB sub-system in standby mode.
4. Switch OFF the HB HPA PSU circuit breaker (CB1), located on the PDU.
5. Slide the black release button on the rectifier module front grill/cover cover down to release the grill/cover from the front of the rectifier module – see Figure 6-12.
6. Pull down on the rectifier module front grill/cover cover to disengage the rectifier module from the HPA PSU mounting shelf rear panel – see Figure 6-12.
7. Pull the rectifier module from the HPA PSU mounting shelf and set it aside.

6.5.7.2 HB HPA PA 1 (30 VDC Rectifier Module) Installation

The replacement HB HPA PS 1 should be installed in the following sequence:

1. Slide the black release button on the rectifier module front grill/cover cover to the right to release the grill/cover from the front of the rectifier module – see Figure 6-13.
2. Position the rectifier module so that the open grill cover is facing down.
3. Slide the rectifier module into the empty slot on the HPA PSU mounting shelf until it stops – see Figure 6-12.
4. To secure the rectifier module in place, lift the grill cover up and push it towards the rectifier module until it clicks in place. As the grill cover is pushed in place, the rectifier module will slide all the way into the slot – see Figure 6-12.
5. Switch ON the HB HPA PSU circuit breaker (CB1), located on the PDU.
6. Using the HBE GUI, place the HB sub-system in broadcast mode.
7. Close the HPA compartment front door and the electronics compartment front door.

6.5.7.3 LB HPA PS 1 (30 VDC Rectifier Module) Removal

The LB HPA PS2 should be removed in the following sequence:

1. Open the electronics compartment front door.
2. Open the HPA compartment front door.
3. Using the LBE GUI, place the LB sub-system in standby mode.
4. Switch OFF the LB HPA PSU circuit breaker (CB2), located on the PDU.
5. Slide the black release button on the rectifier module front grill/cover cover down to release the grill/cover from the front of the rectifier module – see Figure 6-12.
6. Pull down on the rectifier module front grill/cover cover to disengage the rectifier module from the HPA PSU mounting shelf rear panel – see Figure 6-12.
7. Pull the rectifier module from the HPA PSU mounting shelf and set it aside.

6.5.7.4 LB HPA PS 2 (30 VDC Rectifier Module) Installation

The replacement LB HPA PS 2 should be installed in the following sequence:

1. Slide the black release button on the rectifier module front grill/cover cover to the right to release the grill/cover from the front of the rectifier module – see Figure 6-13.
2. Position the rectifier module so that the open grill cover is facing down.
3. Slide the rectifier module into the empty slot on the HPA PSU mounting shelf until it stops – see Figure 6-12.
4. To secure the rectifier module in place, lift the grill cover up and push it towards the rectifier module until it clicks in place. As the grill cover is pushed in place, the rectifier module will slide all the way into the slot – see Figure 6-12.
5. Switch ON the LB HPA PSU circuit breaker (CB2), located on the PDU.
6. Using the LBE GUI, place the LB sub-system in transmit_only mode.
7. Close the HPA compartment front door and the electronics compartment front door.

6.5.8 HPA PSU Mounting Shelf Replacement

	Always ensure that the AC power to the HPA PSU mounting shelf has been switched OFF prior to removing the shelf. This will prevent injury caused by electric shock and prevent damage to equipment.

6.5.8.1 HPA PSU Mounting Shelf Removal

The HPA PSU mounting shelf should be removed in the following sequence:

1. Open the electronics compartment front door.
2. Open the HPA compartment front and rear doors.
3. Using the HBE GUI, place the HB sub-system in standby mode.
4. Using the LBE GUI, place the LB sub-system in standby mode.
5. Switch OFF the HB HPA PSU circuit breaker (CB1), located on the PDU.
6. Switch OFF the LB HPA PSU circuit breaker (CB2), located on the PDU.
7. Remove the HB HPA PS 1 (30 VDC rectifier module) - see section 6.5.7.1.
8. Remove the LB HPA PS 2 (30 VDC rectifier module) - see section 6.5.7.3.
9. Disconnect the 6-pin pluggable AC terminal block from the HPA PSU mounting shelf rear panel – see Figure 6-14. The pluggable terminal block can be removed from the HPA PSU mounting shelf rear panel by loosening the two (2) screws. Do not remove the individual wires from the pluggable terminal block.
10. Disconnect the serial cables (SX03-10924-02 and SX03-10924-01) from the HPA PSU mounting shelf rear panel serial connectors J1 and J2 respectively – see Figure 6-14.
11. Remove the plastic cover, which shields the POS and RTN DC output terminals – see Figure 6-14.
12. Disconnect the two (2) positive conductors from the HPA PSU mounting shelf rear panel 1/4-20 POS terminals – see Figure 6-14.
13. Disconnect the two (2) return conductors from the HPA PSU mounting shelf rear panel 1/4-20 RTN terminals – see Figure 6-14.
14. Disconnect the ground conductor from the HPA PSU mounting shelf rear panel 1/4-20 GND terminal – see Figure 6-14.
15. Remove the three (3) 10-32 socket head cap screws (with #10 lock washers and flat washers) which secure the HPA PSU mounting shelf to the HPA compartment frame – see Figure 6-12.
16. Remove the HPA PSU mounting shelf from the HPA compartment frame and set it aside.

Figure 6-14 HPA PSU Mounting Shelf Rear Panel

Picture TBD

1) 6-pin Terminal Block
2) Serial Connector J1
3) Serial Connector J2
4) Plastic Cover
5) Positive Conductor
6) Return Conductor
7) Ground Conductor

6.5.8.2 HPA PSU Mounting Shelf Installation

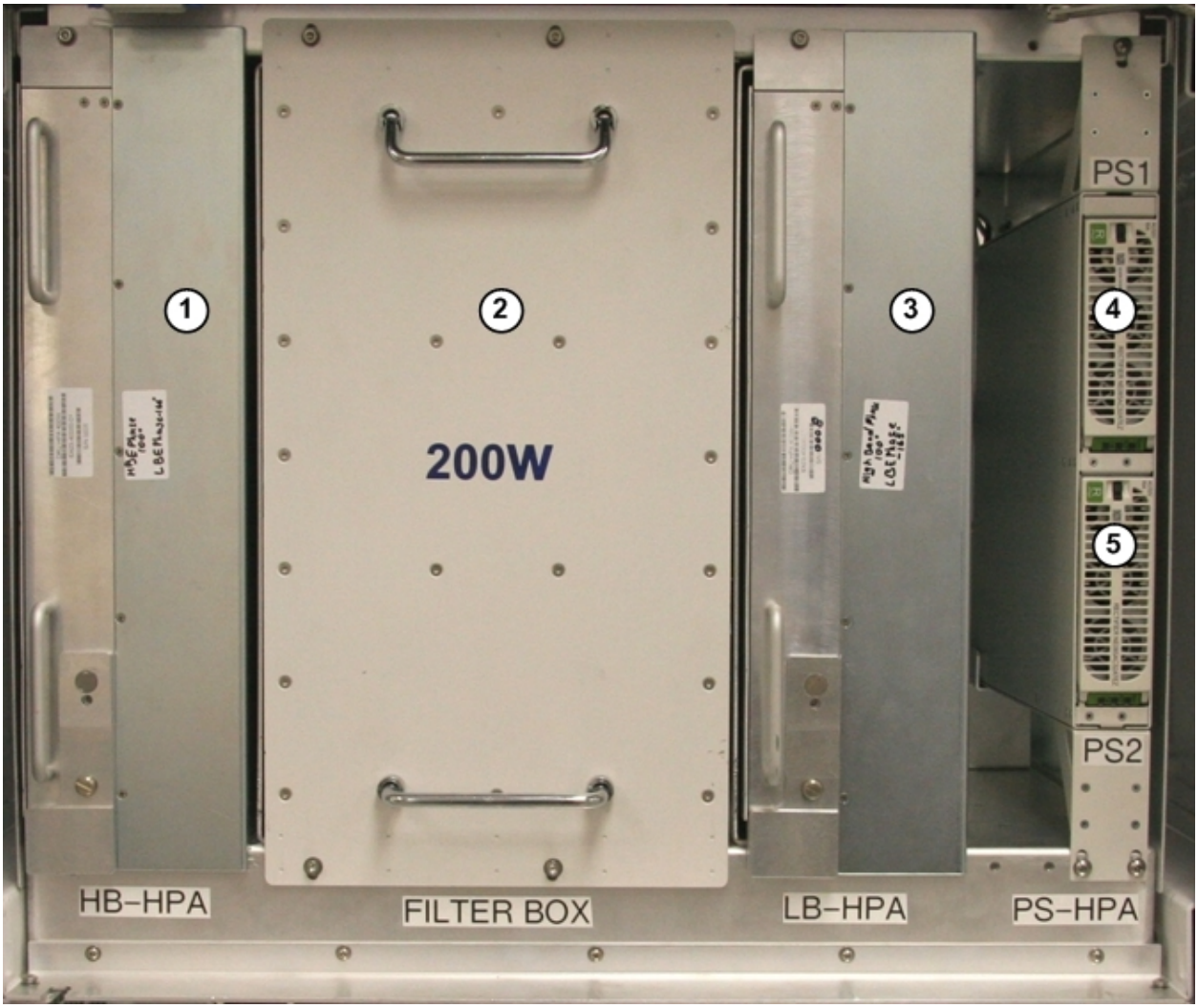
The replacement HPA PSU mounting shelf should be installed in the following sequence:

1. Slide the replacement HPA PSU mounting shelf into the open slot on the right side of the HPA compartment frame.
2. Replace the three (3) 10-32 socket head cap screws (with #10 lock washers and flat washers) which secure the HPA PSU mounting shelf to the HPA compartment frame – see Figure 6-12. A torque rating of 19.2 Inch Lbs. must be used to tighten the screws.
3. Re-connect the ground conductor to the HPA PSU mounting shelf rear panel 1/4-20 GND terminal – see Figure 6-14.
4. Re-connect the two (2) return conductors to the HPA PSU mounting shelf rear panel 1/4-20 RTN terminals – see Figure 6-14.
5. Re-connect the two (2) positive conductors to the HPA PSU mounting shelf rear panel 1/4-20 POS terminals – see Figure 6-14.
6. Replace the plastic cover, which shields the POS and RTN DC output terminals – see Figure 6-14.
7. Re-connect the serial cables (SX03-10924-02 and SX03-10924-01) to the HPA PSU mounting shelf rear panel serial connectors J1 and J2 respectively – see Figure 6-14.
8. Re-connect the 6-pin pluggable AC terminal block to the HPA PSU mounting shelf rear panel 6-pin AC terminal block receptacle – see Figure 6-14.
9. Install the LB HPA PS 2 (30 VDC rectifier module) - see section 6.5.7.4.
10. Install the HB HPA PS 1 (30 VDC rectifier module) - see section 6.5.7.2.
11. Switch ON the HB HPA PSU circuit breaker (CB1), located on the PDU.
12. Switch ON the LB HPA PSU circuit breaker (CB2), located on the PDU.
13. Using the LBE GUI, place the LB sub-system in transmit_only mode.
14. Using the HBE GUI, place the HB sub-system in broadcast mode.
15. Close the HPA compartment front and rear doors.
16. Close the electronics compartment front door.

6.5.9 HPA Replacement

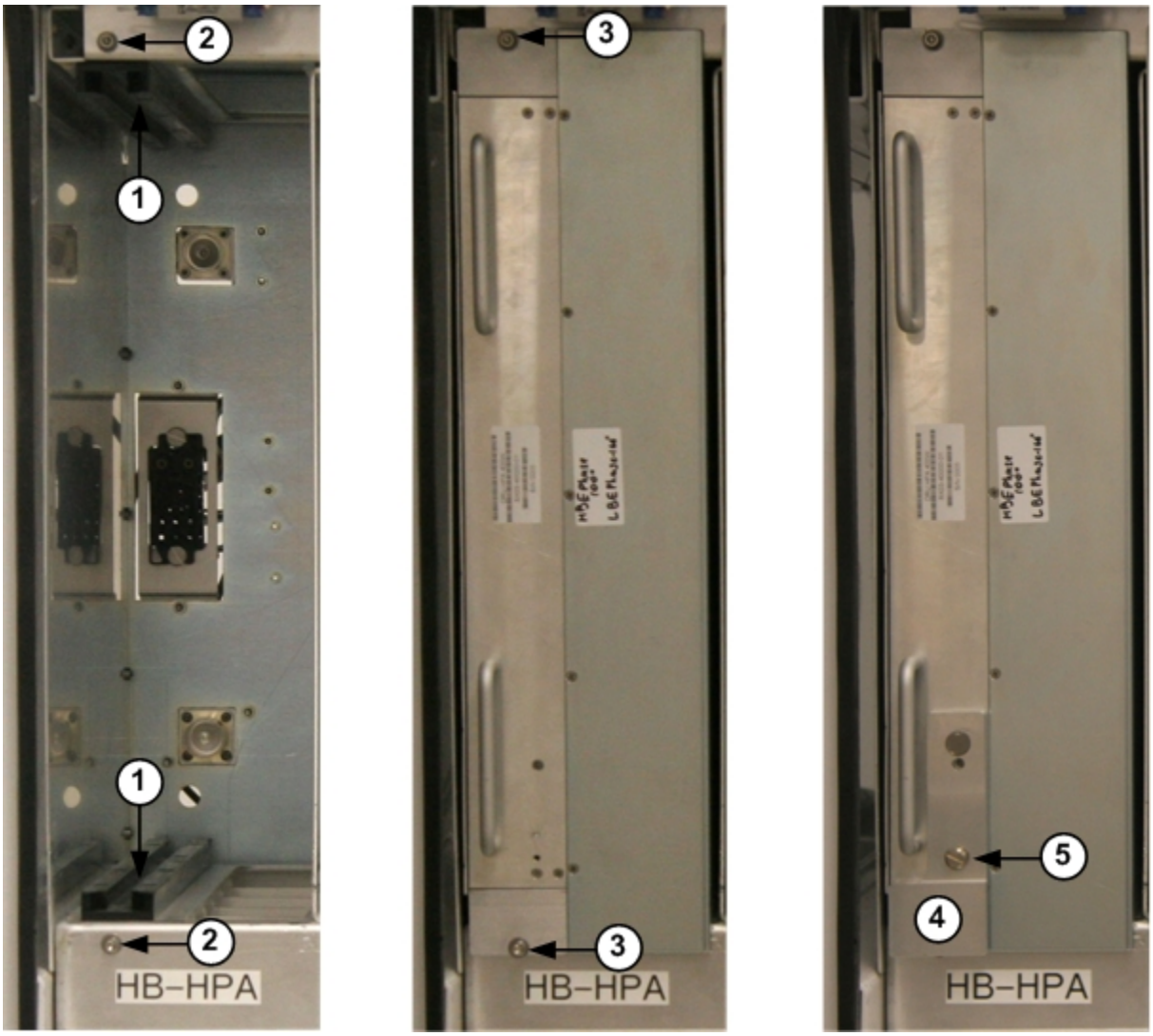
	Open or loose RF connections during operation may cause electric arcs that can cause burns and eye injuries, as well as damage equipment. Always ensure that the sub-system has been placed in standby mode and DC power to the HPA has been switched OFF.
	The HPA may be very hot from operation. Allow the HPA surface to cool before removing the equipment.
	Always remove/install the high power amplifiers with the aid of a second handler. The high power amplifier weighs approximately 55 lbs.
	To prevent damage to the connectors, do no stand the HPA on its rear panel.

Figure 6-15 Populated HPA Compartment



1) HB HPA 1
2) DR Filter Box
3) LB HPA 2
4) HB HPA PS 1 (30 VDC Rectifier Module)
5) LB HPA PS 2 (30 VDC Rectifier Module)

Figure 6-16 HPA Compartment (before and after)

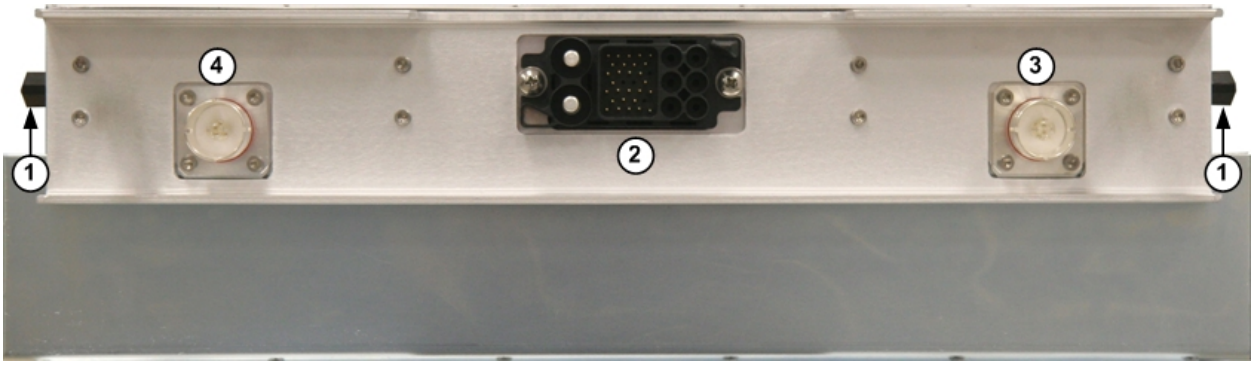


1) Magnetic Plate
2) Magnetic Plate 10-32 Phillips Head Captive Mounting Screw
3) 10-32 Phillips Head Captive Mounting Screw
4) Slide Rail
5) Mounting Screw Hole Location

Figure 6-17 HPA Front Panel

1) Handle
2) Magnetic Plate
3) Magnetic Plate 10-32 Phillips Head Captive Mounting Screw

Figure 6-18 HPA Rear Panel



1) Slider
2) DC and Control Connector
3) 7/8” Blind Mate RF Input Connector
4) 7/8” Blind Mate RF Output Connector

6.5.9.1 High Band HPA Removal

The HB HPA should be removed in the following sequence:

1. Open the electronics compartment front door.
2. Open the HPA compartment front door.
3. Using the HBE GUI, place the HB sub-system in standby mode.
4. Switch OFF the HB HPA PSU circuit breaker (CB1), located on the PDU.
5. Switch OFF the HPA-H 5A circuit breaker, located on the BMS front panel.
6. Remove the magnetic plate from the HPA front panel and set it aside by loosening the 10-32 Phillips head captive screw (located at the bottom of the HPA front panel) – see Figure 6-16.
7. Loosen the 10-32 Phillips head captive screw (located at the top of the HPA front panel) – see Figure 6-16.
8. Using two handlers, one located on each side of the HPA, pull the HPA from the HPA compartment frame and set it aside.

6.5.9.2 High Band HPA Installation

The replacement HB HPA should be installed in the following sequence:

1. Using two handlers, one located on each side of the HPA, lift the replacement HPA and position it level to the open space in the HPA compartment frame to the left of the DR filter box.
2. Carefully line up the HPA sliders (1 located on the top and 1 located on the bottom of the HPA) with the slide rails mounted in the HPA compartment frame – see Figure 6-16.
3. Slowly push the HPA into the HPA compartment frame until it stops.
4. There are three (3) blind mate connectors located on the HPA rear panel which are aligned with corresponding connectors on the HPA compartment frame backplane – see Figure 6-18. Ensure that the connectors are aligned properly and slowly push the HPA into the backplane until it stops. At this point, the back side of the HPA front panel should be flush with the HPA compartment frame.
5. Secure the HPA in place by tightening the 10-32 Phillips head captive screw (located at the top of the HPA front panel) with a torque rating of 19.2 Inch Lbs. – see Figure 6-16.
6. Place the magnetic plate at the bottom of the HPA front panel and tighten the 10-32 Phillips head captive screw with a torque rating of 19.2 Inch Lbs. – see Figure 6-16. Note: The magnetic plate must be installed in order for the HPA to power up later on.
7. Switch ON the HPA-H 5A circuit breaker, located on the BMS front panel.
8. Switch ON the HB HPA PSU circuit breaker (CB1), located on the PDU.
9. Using the HBE GUI, place the HB sub-system in broadcast mode.
10. Close the HPA compartment front door and the electronics compartment front door.

6.5.9.3 Low Band HPA Removal

The LB HPA should be removed in the following sequence:

1. Open the electronics compartment front door.
2. Open the HPA compartment front door.
3. Using the LBE GUI, place the LB sub-system in standby mode.
4. Switch OFF the LB HPA PSU circuit breaker (CB2), located on the PDU.
5. Switch OFF the HPA-L 5A circuit breaker, located on the BMS front panel.
6. Remove the magnetic plate from the HPA front panel and set it aside by loosening the 10-32 Phillips head captive screw (located at the bottom of the HPA front panel) – see Figure 6-16.
7. Loosen the 10-32 Phillips head captive screw (located at the top of the HPA front panel) – see Figure 6-16.
8. Using two handlers, one located on each side of the HPA, pull the HPA from the HPA compartment frame and set it aside.

6.5.9.4 Low Band HPA Installation

The replacement LB HPA should be installed in the following sequence:

1. Using two handlers, one located on each side of the HPA, lift the replacement HPA and position it level to the open space in the HPA compartment frame to the left of the DR filter box.
2. Carefully line up the HPA sliders (1 located on the top and 1 located on the bottom of the HPA) with the slide rails mounted in the HPA compartment frame – see Figure 6-16.
3. Slowly push the HPA into the HPA compartment frame until it stops.
4. There are three (3) blind mate connectors located on the HPA rear panel which are aligned with corresponding connectors on the HPA compartment frame backplane – see Figure 6-18. Ensure that the connectors are aligned properly and slowly push the HPA into the backplane until it stops. At this point, the back side of the HPA front panel should be flush with the HPA compartment frame.
5. Secure the HPA in place by tightening the 10-32 Phillips head captive screw (located at the top of the HPA front panel) with a torque rating of 19.2 Inch Lbs. – see Figure 6-16.
6. Place the magnetic plate at the bottom of the HPA front panel and tighten the 10-32 Phillips head captive screw with a torque rating of 19.2 Inch Lbs. – see Figure 6-16. Note: The magnetic plate must be installed in order for the HPA to power up later on.
7. Switch ON the HPA-L 5A circuit breaker, located on the BMS front panel.
8. Switch ON the LB HPA PSU circuit breaker (CB2), located on the PDU.
9. Using the LBE GUI, place the LB sub-system in transmit_only mode.
10. Close the HPA compartment front door and the electronics compartment front door.

6.5.10 7/8" Short U-link/Coupler Replacement

	Open or loose RF connections during operation may cause electric arcs that can cause burns and eye injuries, as well as damage equipment. Always ensure that the HB or LB sub-system has been placed in standby mode and DC power to the HB HPA or LB HPA has been switched OFF.

6.5.10.1 HB 7/8" Short U-link/Coupler Removal

The HB 7/8" short U-link/coupler should be removed in the following sequence:

1. Open the electronics compartment front door.
2. Open the HPA compartment rear door.
3. Using the HBE GUI, place the HB sub-system in standby mode.
4. Switch OFF the HB HPA PSU circuit breaker (CB1), located on the PDU.
5. Disconnect the RF cable (SX03-10908-04) from the short U-link/coupler forward coupling port – see **Figure 6-19**.
6. Remove the two (2) 8-32 socket head cap screws (with #8 lock washers) which secure the short U-link/coupler to the HPA compartment frame backplane – see **Figure 6-19**.
7. Pull the short U-link/coupler from the HPA compartment frame backplane and set it aside.

6.5.10.2 HB 7/8" Short U-link/Coupler Installation

	Any RF cable, which is terminated with a SMA connector, should be tightened with a 5/16" torque wrench to avoid over tightening and damaging the cable connector or mating connector.

The replacement HB 7/8" short U-link/coupler should be installed in the following sequence:

1. Carefully line up the replacement short U-link/coupler with the H8 and H9 7/8" blind mate connectors visible on the HPA compartment frame backplane. The arrow on the short U-link/coupler should be pointing towards connector H8.
2. Push the short U-link coupler into the connectors until it stops – see **Figure 6-19**.
3. Replace the two (2) 8-32 socket head cap screws (with #8 lock washers) which secure the short U-link/coupler to the HPA compartment frame backplane – see **Figure 6-19**. A torque rating of 10.8 Inch Lbs. must be used to tighten the screws.
4. Re-connect the RF cable (SX03-10908-04) to the short U-link/coupler forward coupling port – see **Figure 6-19**.

5. Switch ON the HB HPA PSU circuit breaker (CB1), located on the PDU.
6. Using the HBE GUI, place the HB sub-system in broadcast mode.
7. Close the HPA compartment rear door and the electronics compartment front door.

6.5.10.3 LB 7/8" Short U-link/Coupler Removal

The HB 7/8" short U-link/coupler should be removed in the following sequence:

1. Open the electronics compartment front door.
2. Open the HPA compartment rear door.
3. Using the LBE GUI, place the LB sub-system in standby mode.
4. Switch OFF the LB HPA PSU circuit breaker (CB2), located on the PDU.
5. Disconnect the RF cable (SX03-10908-02) from the short U-link/coupler forward coupling port – see **Figure 6-19**.
6. Remove the two (2) 8-32 socket head cap screws (with #8 lock washers) which secure the short U-link/coupler to the HPA compartment frame backplane – see **Figure 6-19**.
7. Pull the short U-link/coupler from the HPA compartment frame backplane and set it aside.

6.5.10.4 LB 7/8" Short U-link/Coupler Installation

	Any RF cable, which is terminated with a SMA connector, should be tightened with a 5/16" torque wrench to avoid over tightening and damaging the cable connector or mating connector.

The replacement LB 7/8" short U-link/coupler should be installed in the following sequence:

1. Carefully line up the replacement short U-link/coupler with the H1 and H4 7/8" blind mate connectors visible on the HPA compartment frame backplane. The arrow on the long U-link/coupler should be pointing towards connector H4.
2. Push the short U-link coupler into the connectors until it stops – see **Figure 6-19**.
3. Replace the two (2) 8-32 socket head cap screws (with #8 lock washers) which secure the short U-link/coupler to the HPA compartment frame backplane – see **Figure 6-19**. A torque rating of 10.8 Inch Lbs. must be used to tighten the screws.
4. Re-connect the RF cable (SX03-10908-02) to the lshortU-link/coupler forward coupling port – see **Figure 6-19**.
5. Switch ON the LB HPA PSU circuit breaker (CB2), located on the PDU.
6. Using the LBE GUI, place the LB sub-system in transmit_only mode.
7. Close the HPA compartment rear door and the electronics compartment front door.

6.5.11 7/8" Long U-link/Coupler Replacement

	Open or loose RF connections during operation may cause electric arcs that can cause burns and eye injuries, as well as damage equipment. Always ensure that the HB sub-system has been placed in standby mode and DC power to the HB HPA has been switched OFF.

6.5.11.1 7/8" Long U-link/Coupler Removal

The 7/8" long U-link/coupler should be removed in the following sequence:

8. Open the electronics compartment front door.
9. Open the HPA compartment rear door.
10. Using the LBE GUI, place the LB sub-system in standby mode.
11. Switch OFF the LB HPA PSU circuit breaker (CB2), located on the PDU.
12. Disconnect the RF cable (SX03-10908-02) from the long U-link/coupler forward coupling port – see **Figure 6-19**.
13. Remove the two (2) 8-32 socket head cap screws (with #8 lock washers) which secure the long U-link/coupler to the HPA compartment frame backplane – see **Figure 6-19**.
14. Pull the long U-link/coupler from the HPA compartment frame backplane and set it aside.

6.5.11.2 7/8" Long U-link/Coupler Installation

	Any RF cable, which is terminated with a SMA connector, should be tightened with a 5/16" torque wrench to avoid over tightening and damaging the cable connector or mating connector.

The replacement 7/8" long U-link/coupler should be installed in the following sequence:

8. Carefully line up the replacement long U-link/coupler with the H1 and H5 7/8" blind mate connectors visible on the HPA compartment frame backplane. The arrow on the long U-link/coupler should be pointing towards connector H5.
9. Push the long U-link coupler into the connectors until it stops – see **Figure 6-19**.
10. Replace the two (2) 8-32 socket head cap screws (with #8 lock washers) which secure the long U-link/coupler to the HPA compartment frame backplane – see **Figure 6-19**. A torque rating of 10.8 Inch Lbs. must be used to tighten the screws.
11. Re-connect the RF cable (SX03-10908-02) to the long U-link/coupler forward coupling port – see **Figure 6-19**.

12. Switch ON the LB HPA PSU circuit breaker (CB2), located on the PDU.
13. Using the LBE GUI, place the LB sub-system in transmit_only mode.
14. Close the HPA compartment rear door and the electronics compartment front door.

6.5.12 DR Filter Box Replacement

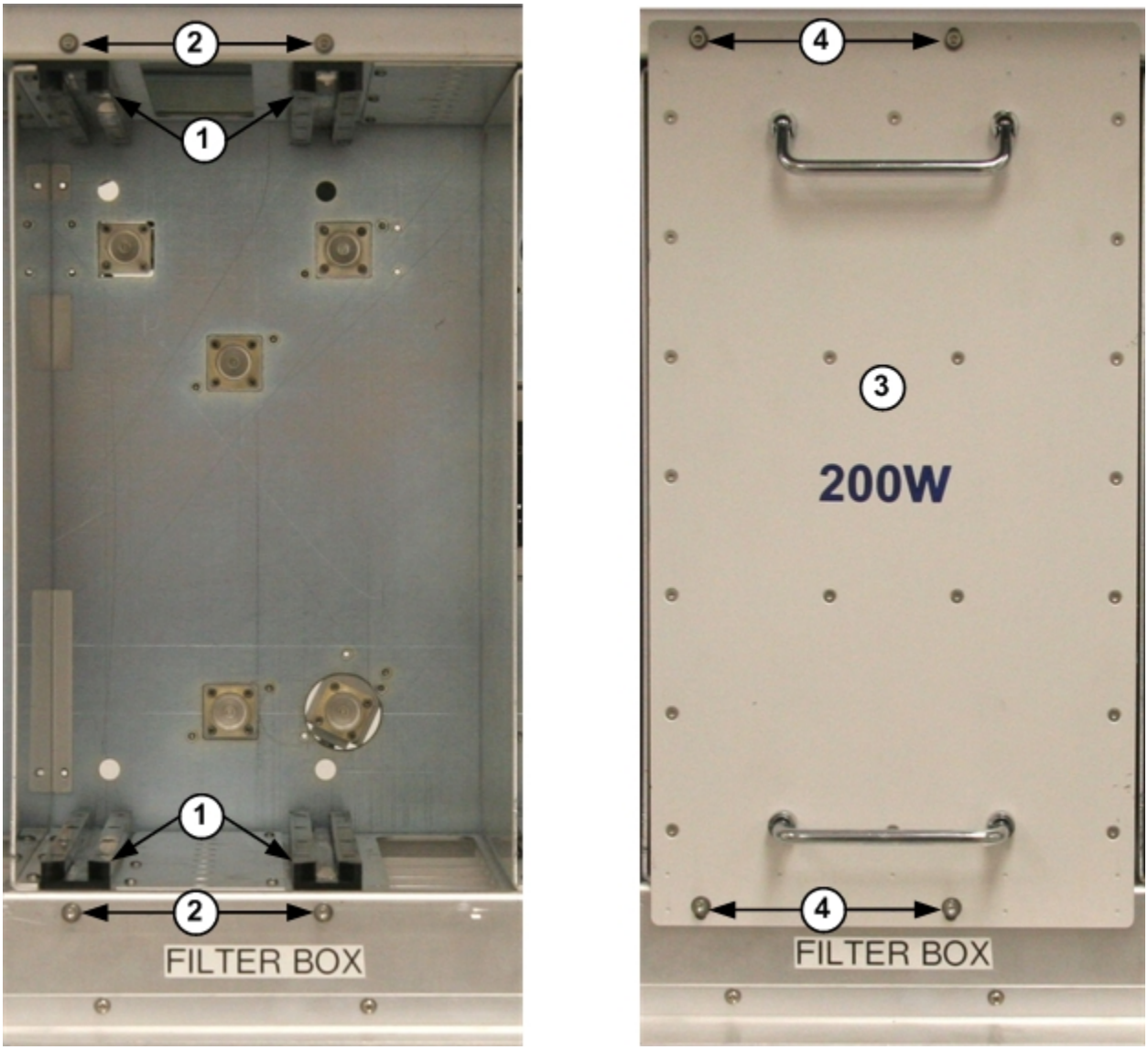
	Open or loose RF connections during operation may cause electric arcs that can cause burns and eye injuries, as well as damage equipment. Always ensure that both the HB and LB sub-systems have been placed in standby mode and DC power to the HPAs has been switched OFF.
	Always install the DR filter box with the aid of a second handler. The DR filter box weighs approximately 50 lbs.
	To prevent damage to the connectors, do no stand the DR filter box on its rear panel.

6.5.12.1 DR Filter Box Removal

The DR filter box should be removed in the following sequence:

1. Open the electronics compartment front door.
2. Open the HPA compartment front door.
3. Using the HBE GUI, place the HB sub-system in standby mode.
4. Using the LBE GUI, place the LB sub-system in standby mode.
5. Switch OFF the HB HPA PSU circuit breaker (CB1), located on the PDU.
6. Switch OFF the LB HPA PSU circuit breaker (CB2), located on the PDU.
7. Loosen the four (4) 10-32 Phillips head captive screws which secure the DR filter box to the HPA compartment frame – see Figure 6-19.
8. Using two handlers, one located on each side of the DR filter box, pull the DR filter box from the HPA compartment frame and set it aside.

Figure 6-19 DR Filter Box Compartment (before and after)



1) Independent DR Filter Box
2) 10-32 Phillips Head Captive Mounting Screw
3) Slide Rail
4) Mounting Screw Hole

6.5.12.2 DR Filter Box Installation

The replacement DR filter box should be installed in the following sequence:

1. Using two handlers, one located on each side of the DR filter box, lift the replacement DR filter box and position it level to the open space in the HPA compartment frame.
2. Carefully line up the DR filter box sliders (2 located on the top and 2 located on the bottom of the DR filter box) with the slide rails mounted in the HPA compartment frame – see Figure 6-19.
3. Slowly push the DR filter box into the HPA compartment frame until it stops.
4. There are five (5) 7/8" blind mate connectors located on the DR filter box rear panel which are aligned with corresponding connectors on the HPA compartment frame backplane. Ensure that the connectors are aligned properly and slowly push the DR filter box into the backplane until it stops. At this point, the back side of the DR filter box front panel should be flush with the HPA compartment frame.
5. Secure the DR filter box in place by tightening the four (4) 10-32 Phillips head captive screws with a torque rating of 19.2 Inch Lbs. – see Figure 6-19.
6. Switch ON the HB HPA PSU circuit breaker (CB1), located on the PDU.
7. Switch ON the LB HPA PSU circuit breaker (CB2), located on the PDU.
8. Using the LBE GUI, place the LB sub-system in transmit_only mode.
9. Using the HBE GUI, place the HB sub-system in broadcast mode.
10. Close the HPA compartment front door and the electronics compartment front door.

6.5.13 7/8" Combined Output Coupler/RF Detector Replacement

	Open or loose RF connections during operation may cause electric arcs that can cause burns and eye injuries, as well as damage equipment. Always ensure that the HB and LBD sub-systems have been placed in standby mode and DC power to the HB HPA has been switched OFF.

6.5.13.1 7/8" Combined Output Coupler/RF Detector Removal

The 7/8" combined output coupler/RF detector should be removed in the following sequence:

1. Open the electronics compartment front door.
2. Open the HPA compartment rear door.
3. Using the HBE GUI, place the HB sub-system in standby mode.
4. Using the LBE GUI, place the LB sub-system (Combined DRU) or LBD sub-system (Independent DRU) in standby mode.
5. Switch OFF the HB HPA PSU circuit breaker (CB1), located on the PDU.
6. Switch OFF the LB HPA PSU circuit breaker (CB2), located on the PDU (Combined DRU only).
7. Disconnect the transmission line or jumper cable from Output 1 by removing the three (3) 1/4-20 hex head bolts (with 1/4" flat washers and lock washers) if a rigid cable is used.
8. Disconnect the RF cable (SX03-10908-05) from the combined output coupler/RF detector forward coupling port – see Figure 6-20.
9. Disconnect the serial cable (SX03-10904-02) from the combined output coupler/RF detector serial port – see Figure 6-20.
10. Loosen the pipe clamp, which is fitted around the combined output coupler/RF detector output connector and the 7/8" EIA flange to 7/8" unflanged adapter – see Figure 6-21.
11. Remove the four (4) 10-32 socket head cap screws (with #10 lock washers) which secure the 7/8" EIA flange to 7/8" unflanged adapter to the back of the cabinet – see Figure 6-22.
12. Using two hands, carefully pull the 7/8" EIA flange to 7/8" unflanged adapter from the back of the cabinet and set it aside – see Figure 6-23.
13. Remove the pipe clamp and set it aside.
14. Remove the two (2) 8-32 socket head cap screws (with #8 lock washers) which secure the combined output coupler/RF detector to the HPA compartment frame backplane – see Figure 6-24.
15. Pull the combined output coupler/RF detector from the HPA compartment frame backplane and set it aside – see Figure 6-25.

Figure 6-20 7/8" Combined Output Coupler/RF Detector Cables

Picture TBD

Figure 6-21 7/8" Combined Output Coupler/RF Detector Pipe Clamp

Picture TBD

Figure 6-22 7/8" EIA Flange to 7/8" Unflanged Adapter Mounting Screws

Picture TBD

Figure 6-23 7/8" EIA Flange to 7/8" Unflanged Adapter Removed

Picture TBD

Figure 6-24 7/8" Combined Output Coupler/RF Detector Mounting Screws

Picture TBD

Figure 6-25 7/8" Combined Output Coupler/RF Detector Removed

Picture TBD

6.5.13.2 7/8" Combined Output Coupler/Detector Installation

	Any RF cable, which is terminated with a SMA connector, should be tightened with a 5/16" torque wrench to avoid over tightening and damaging the cable connector or mating connector.

The replacement 7/8" combined output coupler/RF detector should be installed in the following sequence:

1. Carefully line up the replacement combined output coupler/RF detector with the H6 7/8" blind mate connector visible on the HPA compartment frame backplane. The arrow on the combined output coupler/RF detector should be pointing upwards.
2. Push the combined output coupler/RF detector into the connectors until it stops – see Figure 6-23.
3. Carefully line up the 7/8" EIA flange to 7/8" unflanged adapter with the combined output coupler/RF detector output connector, which is visible through the opening in the back of the cabinet – see Figure 6-23. Ensure the pipe clamp is fitted loosely around one of the connectors before they are pushed together.
4. Using two hands, push the 7/8" EIA flange to 7/8" unflanged adapter and combined output coupler/RF detector together – see **Figure 6-19**.
5. Replace the four (4) 10-32 socket head cap screws (with #10 lock washers) which secure the 7/8" EIA flange to 7/8" unflanged adapter to the back of the cabinet – see Figure 6-22.
6. Tighten the pipe clamp, which is fitted around the combined output coupler/RF detector output connector and the 7/8" EIA flange to 7/8" unflanged adapter – see Figure 6-21.
7. Replace the two (2) 8-32 socket head cap screws (with #8 lock washers) which secure the combined output coupler/RF detector to the HPA compartment frame backplane – see Figure 6-24.
8. Re-connect the serial cable (SX03-10904-02) to the combined output coupler/RF detector serial port – see Figure 6-20.
9. Re-connect the RF cable (SX03-10908-05) from the combined output coupler/RF detector forward coupling port – see Figure 6-20.
10. Re-connect the transmission line or jumper cable to RF Output Port where applicable. Replace the three (3) 1/4-20 hex head bolts (with 1/4" flat washers and lock washers).
11. Switch ON the LB HPA PSU circuit breaker (CB2), located on the PDU (Combined DRU only).
12. Switch ON the HB HPA PSU circuit breaker (CB1), located on the PDU.
13. Using the LBE GUI, place the LB sub-system (Combined DRU) or LBD sub-system (Independent DRU) in broadcast mode.
14. Using the HBE GUI, place the HB sub-system in broadcast mode.

15. Close the HPA compartment rear door and the electronics compartment front door.

6.5.14 7/8" Independent Output Coupler/RF Detector Replacement

	Open or loose RF connections during operation may cause electric arcs that can cause burns and eye injuries, as well as damage equipment. Always ensure that the LB sub-system has been placed in standby mode and DC power to the LB HPA has been switched OFF.

6.5.14.1 7/8" Independent Output Coupler/RF Detector Removal

The 7/8" independent output coupler/RF detector should be removed in the following sequence:

1. Open the electronics compartment front door.
2. Open the HPA compartment rear door.
3. Using the LBE GUI, place the LB sub-system in standby mode.
4. Switch OFF the LB HPA PSU circuit breaker (CB2), located on the PDU.
5. Disconnect the transmission line or jumper cable from RF Output Port 2 by removing the three (3) 1/4-20 hex head bolts (with 1/4" flat washers and lock washers) if a rigid cable is used.
6. Disconnect the RF cable (SX03-10908-07) from the independent output coupler/RF detector forward coupling port – see **Figure 6-19**.
7. Disconnect the serial cable (SX03-10904-01) from the independent output coupler/RF detector serial port – see **Figure 6-19**.
8. Loosen the pipe clamp, which is fitted around the independent output coupler/RF detector output connector and the 7/8" EIA flange to 7/8" unflanged adapter – see **Figure 6-19**.
9. Remove the four (4) 10-32 socket head cap screws (with #10 lock washers) which secure the 7/8" EIA flange to 7/8" unflanged adapter to the back of the cabinet – see **Figure 6-19**.
10. Using two hands, carefully pull the 7/8" EIA flange to 7/8" unflanged adapter from the back of the cabinet and set it aside.
11. Loosen the pipe clamp, which is fitted around the independent output coupler/RF detector input connector and 7/8" unflanged rigid waveguide – see **Figure 6-19**.
12. Using two hands, carefully pull the independent output coupler/RF detector from the 7/8" unflanged rigid waveguide and set it aside – see **Figure 6-19**.

6.5.14.2 7/8" Independent Output Coupler/Detector Installation

	Any RF cable, which is terminated with a SMA connector, should be tightened with a 5/16" torque wrench to avoid over tightening and damaging the cable connector or mating connector.

The replacement 7/8" independent output coupler/RF detector should be installed in the following sequence:

1. Carefully line up the replacement independent output coupler/RF detector with the 7/8" unflanged rigid waveguide visible on the HPA compartment frame backplane. The arrow on the independent output coupler/RF detector should be pointing upwards. Ensure the pipe clamp is fitted loosely around independent output coupler/RF detector input connector and 7/8" unflanged rigid waveguide.
2. Push the independent output coupler/RF detector onto the 7/8" unflanged rigid waveguide until it stops – see **Figure 6-19**.
3. Carefully line up the 7/8" EIA flange to 7/8" unflanged adapter with the independent output coupler/RF detector output connector, which is visible through the opening in the back of the cabinet – see **Figure 6-19**. Ensure the pipe clamp is fitted loosely around one of the connectors before they are pushed together.
4. Using two hands, push the 7/8" EIA flange to 7/8" unflanged adapter and independent output coupler/RF detector together – see **Figure 6-19**.
5. Replace the four (4) 10-32 socket head cap screws (with #10 lock washers) which secure the 7/8" EIA flange to 7/8" unflanged adapter to the back of the cabinet – see **Figure 6-19**.
6. Tighten the pipe clamp, which is fitted around the independent output coupler/RF detector output connector and the 7/8" EIA flange to 7/8" unflanged adapter – see **Figure 6-19**.
7. Tighten the pipe clamp, which is fitted around the independent output coupler/RF detector input connector and 7/8" unflanged rigid waveguide – see **Figure 6-19**.
8. Re-connect the serial cable (SX03-10904-01) to the independent output coupler/RF detector serial port – see **Figure 6-19**.
9. Re-connect the RF cable (SX03-10908-07) from the independent output coupler/RF detector forward coupling port – see **Figure 6-19**.
10. Re-connect the transmission line or jumper cable to RF Output Port where applicable. Replace the three (3) 1/4-20 hex head bolts (with 1/4" flat washers and lock washers).
11. Switch ON the LB HPA PSU circuit breaker (CB2), located on the PDU.
12. Using the LBE GUI, place the LB sub-system in transmit_only mode.
13. Close the HPA compartment rear door and the electronics compartment front door.

6.5.15 Air Intake Filter Replacement

6.5.15.1 Air Intake Filter Removal

The air intake filter should be removed in the following sequence:

1. Remove the ten (10) 1/4-20 security socket head cap screws (with #10 flat washers and gaskets) which secure the air intake to the cabinet – see Figure 6-26.
2. Lift the air intake away from the cabinet and set it aside – see Figure 6-27.
3. Remove the air filter from the air intake and set it aside – see Figure 6-28.

Figure 6-26 Air Intake Mounted On Cabinet

Picture TBD

Figure 6-27 Air Intake with Filter

Picture TBD

Figure 6-28 Air Filter

Picture TBD

6.5.15.2 Air Intake Filter Installation

The replacement air intake filter should be installed in the following sequence:

1. Install the air filter in the air intake – see Figure 6-27.
2. Lift the air intake and position it over the opening in the cabinet.
3. Replace the ten (10) 1/4-20 security socket head cap screws (with #10 flat washers and gaskets) which secure the air intake to the cabinet – see Figure 6-26. A torque rating of 45.6 Inch Lbs. must be used to tighten the screws.

6.5.16 Fan Box Replacement

	Always ensure that both the HB and LB sub-systems have been placed in standby mode and DC power to the HPAs has been disabled. This will prevent damage to the HPAs due to overheating.
	Always ensure that the AC power to the fan box has been switched OFF prior to removing the fan box. This will prevent injury caused by electric shock and prevent damage to equipment.
	Always remove/install the fan box with the aid of a second handler. The fan box weighs approximately 38 lbs.

6.5.16.1 Fan Box Removal

The fan box should be removed in the following sequence:

1. Open the electronics compartment front door.
2. Open the HPA compartment rear door.
3. Using the HBE GUI, place the HB sub-system in standby mode.
4. Using the LBE GUI, place the LB sub-system in standby mode.
5. Switch OFF the HB HPA PSU circuit breaker (CB1), located on the PDU.
6. Switch OFF the LB HPA PSU circuit breaker (CB2), located on the PDU.
7. Remove the four (4) lifting eyes from the cabinet hood – see Figure 6-29.
8. Carefully lift the cabinet hood from the top of the cabinet and place it aside.
9. Disconnect the fan box AC power cables from the FAN 1 and FAN 2 panel mount connectors located on the HPA compartment frame backplane – see Figure 6-30.
10. Cut the cable ties which secure the fan box AC power cables to the top of the HPA compartment – see Figure 6-31.
11. Remove the eight (8) 1/4-20 socket head cap screws (with 1/4" lock washers and flat washers) which secure the fan box to the cabinet – see Figure 6-32.
12. Using two handlers, one located on each side of the cabinet, carefully lift the fan box from the top of the cabinet and set it aside. Ensure that the weatherproof gasket is not stuck to the bottom of the fan box.

Figure 6-29 Cabinet Top Hood

Picture TBD

Figure 6-30 Fan Box AC Power Cable Disconnect

Picture TBD

Figure 6-31 Fan Box AC Power Cable Ties

Picture TBD

Figure 6-32 Fan Box Mounting Screws

Picture TBD

Figure 6-33 Fan Box Weatherproof Gasket

Picture TBD

6.5.16.2 Fan Box Installation

The replacement fan box should be installed in the following sequence:

1. Before the replacement fan box is installed, ensure that the weatherproof gasket is placed on the top of the cabinet where the fan box will be installed – see Figure 6-33.
2. Using two handlers, one located on each side of the cabinet, carefully lift the fan box and place it over the opening in the top of the cabinet.
3. Replace the eight (8) 1/4-20 socket head cap screws (with 1/4" lock washers and flat washers) which secure the fan box to the cabinet – see Figure 6-32. A torque rating of 45.6 Inch Lbs. must be used to tighten the screws.
4. Route the fan box AC power cables to the HPA compartment frame backplane and secure the AC power cables to the cable tie mounts located in the cabinet – see Figure 6-31.
5. Re-connect the fan box AC power cables to the FAN 1 and FAN 2 panel mount connectors located on the HPA compartment frame backplane – see Figure 6-30.
6. Using two handlers, one located on each side of the cabinet, carefully lift the cabinet hood and place on top of the cabinet hood stands.
7. Secure the top hood in place by replacing the four (4) lifting eyes – see Figure 6-29.
8. Switch ON the HB HPA PSU circuit breaker (CB1), located on the PDU.
9. Switch ON the LB HPA PSU circuit breaker (CB2), located on the PDU.
10. Using the LBE GUI, place the LB sub-system in transmit_only mode.
11. Using the HBE GUI, place the HB sub-system in broadcast mode.
12. Close the HPA compartment rear door and the electronics compartment front door.

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Unique Broadband Systems Ltd.

Chapter 7

Contact Information

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7 Contact Information

7.1 Limited 3 Year Warranty

UBS' standard warranty is three (3) years from the project completion date, provided that the warranty labels have not been broken. Opening any the components/sub-assemblies without the expressed, written consent of UBS will automatically void the warranty for said component/sub-assembly.

UBS' liability for a warranty failure applies only to the equipment provided by UBS and excludes all other remedies, including, without limitation, incidental consequential damages. UBS is not responsible for any lost data, revenue, or any other consequential damages associated with a warranty or non-warranty failure.

In the event of a defect in/or failure of the UBS product, the customer shall contact UBS regarding the warranty claim. UBS is warranted to rework or repair the product at the UBS facility in Vaughan, Ontario once it has been properly returned by the customer.

To process a warranty claim or to obtain technical support, please contact UBS' Customer Service at either one of the following numbers:

Phone: 1-905-669-8533

Fax: 1-905-669-8516

7.2 Liability

The statements, specifications and instructions in this publication are believed to be correct to the best knowledge of Unique Broadband Systems Ltd. and its employees at the time of printing this manual. Unique Broadband Systems Ltd. will reserve the right to make changes to the content in this publication that reflects changes in equipment specifications and design. No liability is assumed for statements, results, or lack thereof from the use of information in this publication and for any direct or consequential damages, personal loss or injury and that all statements made herein are strictly to be used or relied on at the user's risk.

This document has been prepared by professional and properly trained personnel and the customer assumes all responsibility when using this document. UBS welcomes customer comments as part of the process of continual development and improvement of the documentation in the best way possible from the user's viewpoint. Please submit your comments to your UBS sales representative at the following address:

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