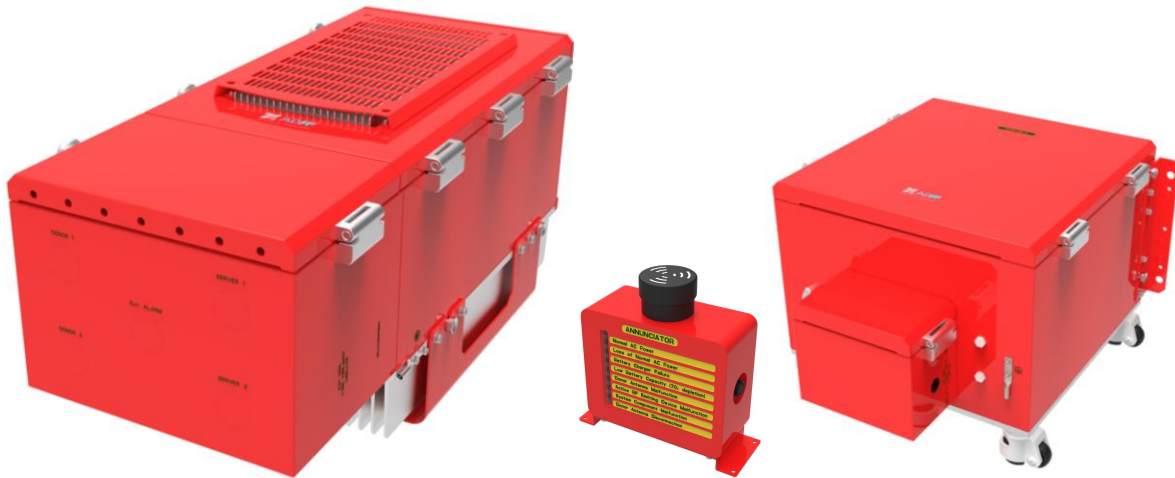


# PSR-VU-9537-UA Manual

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Version 0.1



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## Revision History

Version	Author	Descriptions	Date
0.1	YH Ko	Initial Release	29/10/20

## Change List

Version	Change list	Contents

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# Terms and Abbreviations

The following is a list of abbreviations and terms used throughout this document.

Abbreviation/Term	Definition
<b>AGC</b>	Automatic Gain Control
<b>ALC</b>	Automatic Level Control
<b>AROMS</b>	ADRF' Repeater Operation and Management System
<b>BCU</b>	Band Combiner Unit
<b>BTS</b>	Base Transceiver Station
<b>BDA</b>	Bi-directional Amplifier
<b>CDMA</b>	Code Division Multiple Access
<b>CHC</b>	Channel combiner
<b>CW</b>	Continuous Wave (un-modulated signal)
<b>DAS</b>	Distributed Antenna System
<b>DL</b>	Downlink
<b>Downlink</b>	The path covered from the Base Transceiver Station (BTS) to the subscribers' service area via the repeater
<b>HE</b>	Head End
<b>HPA</b>	High Power Amplifier
<b>HW</b>	Hardware
<b>IF</b>	Intermediate Frequency
<b>LNA</b>	Low Noise Amplifier
<b>LTE</b>	Long Term Evolution
<b>MS</b>	Mobile Station
<b>NMS</b>	Network Management System
<b>ODU</b>	Optical Donor Unit which is located in ADXV-HE.
<b>OEU</b>	Optic Expansion Unit
<b>PLL</b>	Phased Locked Loop
<b>POI</b>	Point Of Interface
<b>PSU</b>	Power Supply Unit
<b>RF</b>	Radio Frequency
<b>RU</b>	Remote Unit which is composed of master RU and multiple slaves RU
<b>RM</b>	Remote Module
<b>SW</b>	Software
<b>UL</b>	Uplink
<b>Uplink</b>	The path covered from the subscribers' service area to the Base Transceiver Station (BTS) via the repeater
<b>VSWR</b>	Voltage Standing Wave Ratio



## 1. INTRODUCTION

PSR-VU-9537-UA bi-directional amplifier (BDA) extends the coverage area of radio communications in buildings and RF shadow environments.

The unit features low noise figure and wide dynamic range and is certificated to UL 2524

### 1.1 Highlights

- NFPA 1221 2016 code compliant
- UL 2524 Listed
- Alarming output to supervised circuits for: antenna, amplifier, power supply, battery, and charger failure
- UL Type 4 enclosure for indoor environments
- Simultaneously supports Class A narrowband and Class B wideband repeater designations
- Single band choosable between VHF or UHF band by GUI
- Simultaneous Filter Supporting Up to 8 Non-Contiguous Narrow Bands
- Air convection cooling without fans
- Sharp Filter Roll-off performance (Wide: 60dBc @ Filter Bandwidth Edge + 1MHz | Narrow: 55dBc @ Filter Bandwidth Edge + 3 \* Filter BW)
- Web-based GUI Interface; No 3rd party GUI software required
- Web-GUI connectivity via DHCP in host mode
- Extenal Alarm Function supporting dry contacts 8 outputs and 2 inputs
- Support Emergency Power Off Switch

### 1.2 Product Covered

- 2-way emergency radio communication enhancement systems, Model PSR-VU-9537-UA with ADRF-BBS-U(or ADRF-BBL-U) and PSR-ANN

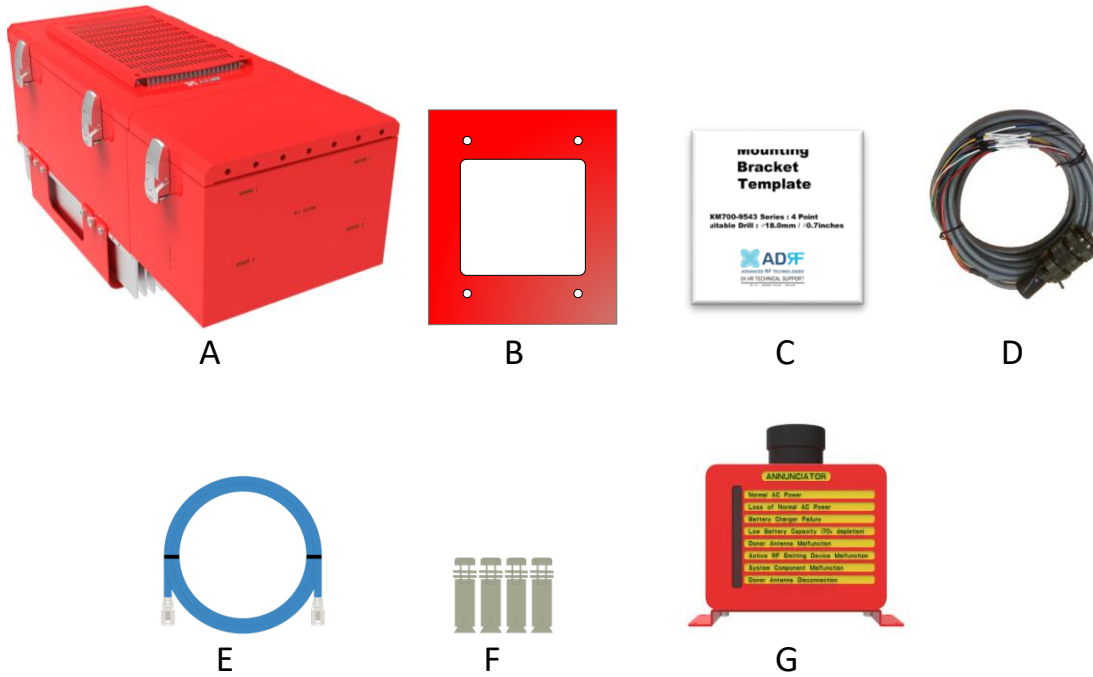
### 1.3 Product Description

- PSR-VU-9537-UA bi-directional amplifier (BDA) extends the coverage area of radio communications in buildings and RF shadow environments. This unit feature low noise figure and wide dynamic range and are certified to UL 2524.
- PSR-VU-9537-UA is a revolutionary digital public safety repeater designed to protect the lives of first responders and building occupants.
- Through the use of digital signal processing (DSP) filtering technology, the PSR-VU-9537-UA helps eliminate adjacent channel interference to allow band selectivity and support for VHF and UHF Public Safety frequencies band. Single wideband and up to 8 non-contiguous narrowband filters can be simultaneously supported via ADRF's celebrated web-based GUI, which provides versatility and total control to the users.
- The PSR-VU-9537-UA is the best-in-class public safety repeater and it is fully compliant with International Fire Code (IFC) and National Fire Protection Association (NFPA)

**1.4 Parts List**

**Table 1-1 Message Board Alarms and Notifications**

Label	Quantity	Description
A	1	PSR-VU-9537-UA
B	1	Wall Mount Bracket
C	1	Mounting Bracket Template
D	1	AAI Alarm Cable
E	1	Ethernet Cable (Crossover)
F	4	Anchor Bolt
G	1	PSR-ANN (Annunciator Box)



**Figure 1-1 PSR-VU-9537-UA Repeater Parts List**

1.5 Quick View

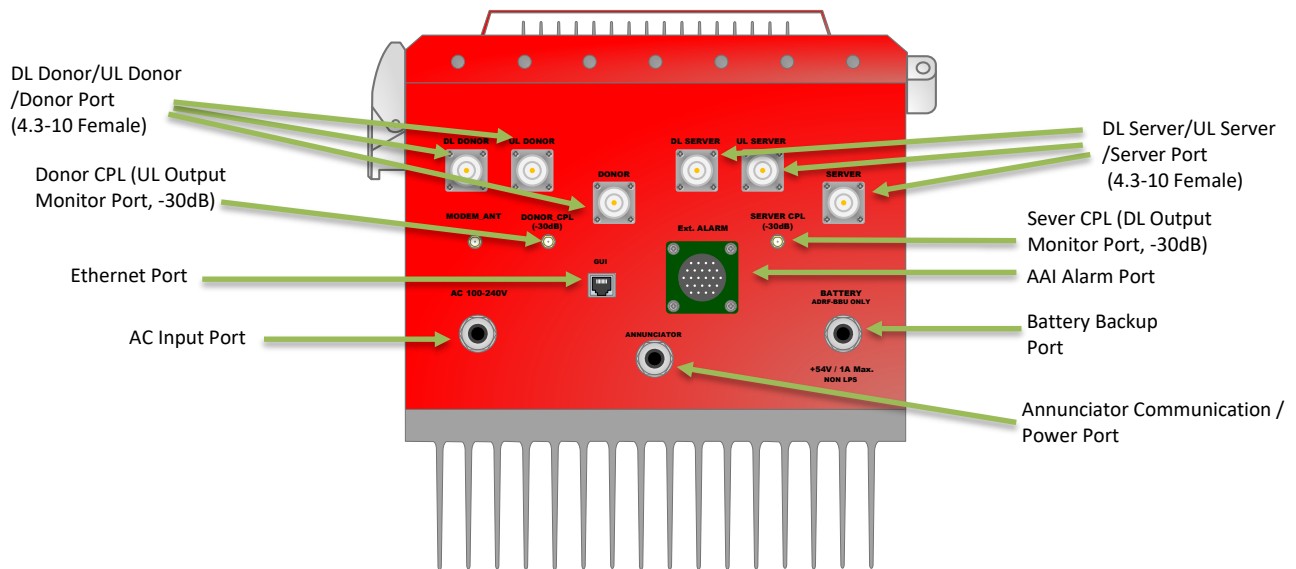
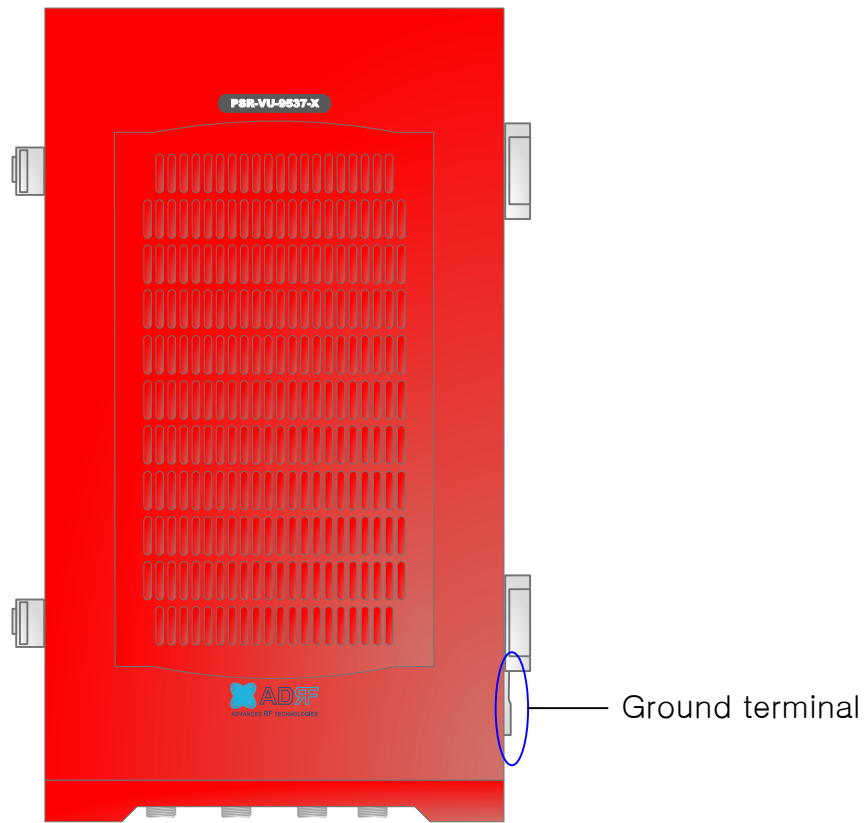


Figure 1-2 PSR-VU-9537-UA Quick View (front and bottom)



Figure 1-3 PSR-ANN Annunciator

## 1.6 Warnings and Hazards



### WARNING! ELECTRIC SHOCK

Opening the PSR-VU-9537-UA could result in electric shock and may cause severe injury.



### WARNING! EXPOSURE TO RF

Working with the PSR-VU-9537-UA while in operation, may expose the technician to RF electromagnetic fields that exceed FCC rules for human exposure. Visit the FCC website at [www.fcc.gov/oet/rfsafety](http://www.fcc.gov/oet/rfsafety) to learn more about the effects of exposure to RF electromagnetic fields.

### FCC RF EXPOSURE & ANTENNA PLACEMENT Guidelines

Actual separation distance is determined upon gain of antenna used.

In accordance with the FCC regulations (90.219), this device must meet 5W ERP requirements.

### WARRANTY

Opening or tampering the PSR-VU-9537-UA will void all warranties.

Lithium Battery: CAUTION. RISK OF EXPLOSION IF BATTERY IS REPLACED BY INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO INSTRUCTIONS.

Preclude indications that Home/ personal use are prohibited.

Use of unauthorized antennas, cables, and/or coupling devices not conforming with ERP/EIRP is prohibited.

### FCC Part 15.21

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

### FCC Part 15 Class A

**NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

### Part 90 Signal Boosters

### This is A 90.219 CLASS A DEVICE

**WARNING. THIS is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licensee to operate this device. You MUST register Class B signal boosters (as defined in 47 CFR 90.219) online at [www.fcc.gov/signal-boosters/registration](http://www.fcc.gov/signal-boosters/registration). Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.**

## RSS-GEN, (6.8 Transmit antenna)

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. (Max. peak gain: 18 dBi)

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada.

Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotroperayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. (Max. peak gain: 18 dBi)

## ISED RF Radiation Exposure

This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of **450 cm** between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. RF exposure will be addressed at time of installation and the use of higher gain antennas require larger separation distances.

L'antenne (ou les antennes) doit être installée de façon à maintenir à tout instant une distance minimum de au moins **450 cm** entre la source de radiation (l'antenne) et toute personne physique. Cet appareil ne doit pas être installé ou utilisé en conjonction avec une autre antenne ou émetteur.

## 2. INSTALLATION

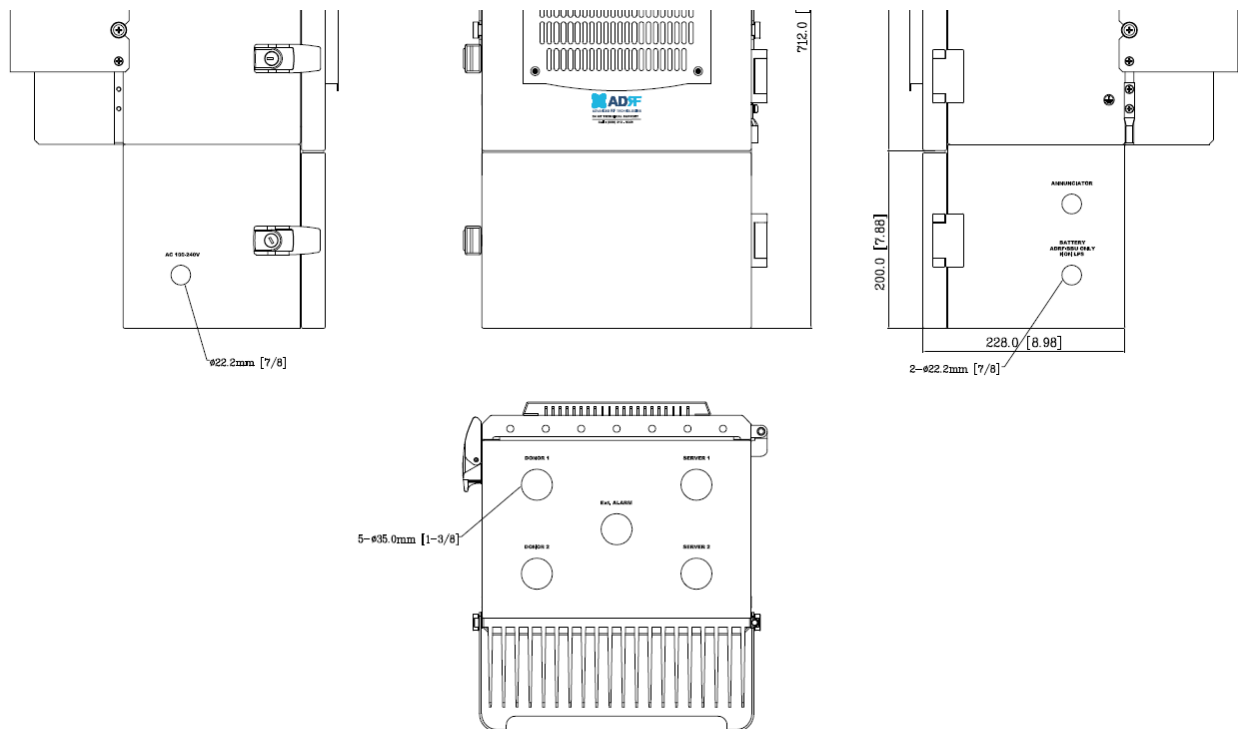
### 2.1 Wiring Compartment

The bottom of the PSR-VU-9537-UA is a wiring compartment with pre-cut holes. These holes are designed to be used in conjunction with conduit hubs to prevent water ingress. A total of 8 pre-cut holes are available to use for the various cables that will be needed for the proper operation of the repeater.

To maintain UL 2524 Listed status, unused ports must be properly weather proofed.

**Table 2-1 Pre-cut hole size and labels**

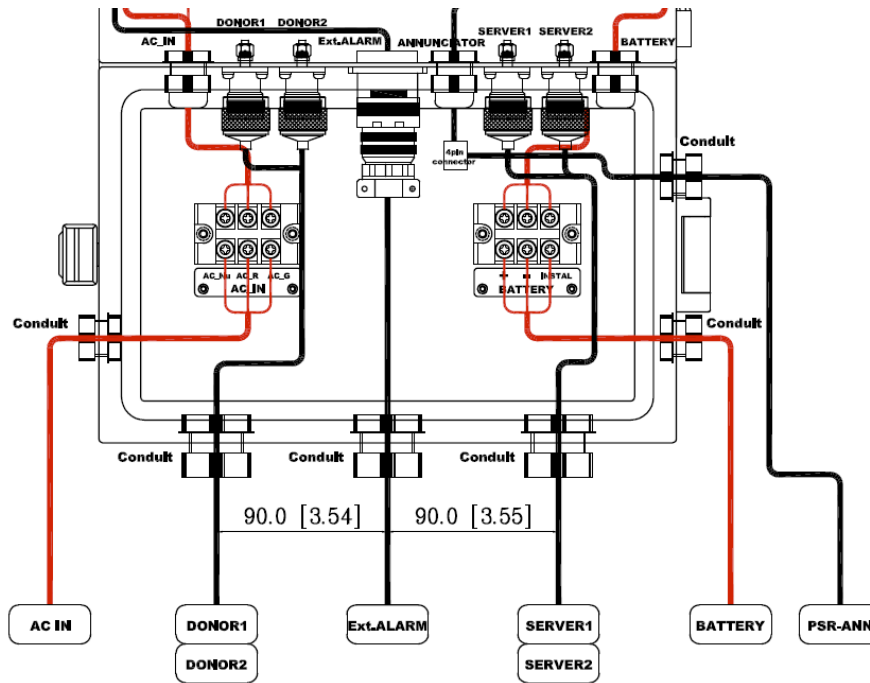
Silkscreen Label	Location	Diameter
AC 100-240V	LEFT	22.2mm (7/8")
ANNUNCIATOR	RIGHT	22.2mm (7/8")
BATTERY ADRF-BBU ONLY NON LPS	RIGHT	22.2mm (7/8")
DONOR1	BOTTOM	33.0mm (1-3/8")
DONOR2	BOTTOM	33.0mm (1-3/8")
Ext. ALARM	BOTTOM	33.0mm (1-3/8")
SERVER1	BOTTOM	33.0mm (1-3/8")
SERVER2	BOTTOM	33.0mm (1-3/8")





## 2.2 Wire Terminals

Non-power limited cables such as the AC power line and the DC battery line shown below in red must be separated by ¼” from power limited cables such as the donor/server, ext. alarm, and annunciator lines shown below in black. To maintain the ¼” spacing, route the annunciator line above the server line as shown in the picture below.



### 2.2.1 AC 100-240V Terminal Block

The AC 100-240V Terminal Block is located on the left side of the wiring compartment. One side of the terminal block will be pre-wired and connected to the PSU and the chassis ground. The open terminals must be connected to an AC power source between 100-240V AC and secured in an electrical breaker box on its own circuit. The terminal block can support up to a cable gauge of 12AWG.

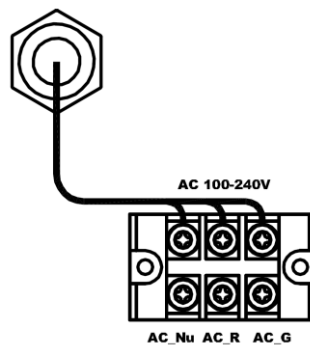


Figure 2-1 AC 100-240V Terminal Block

**Table 2-2 Terminal Block Definition**

Silkscreen Label	Line Type	Max Supported AWG
AC_NU	Neutral	12AWG
AC_R	Line or Hot	12AWG
AC_G	Ground	12AWG

### 3. OVERVIEW

#### 3.1 LED

PSR-VU-9537-UA LED indicator lights are located on the inside of the repeater towards the bottom. Below the LED indicators is a button that is used to trigger the door open alarm.



**Figure 3-1 LED Panel**

**Table 3-1 LED Specifications**

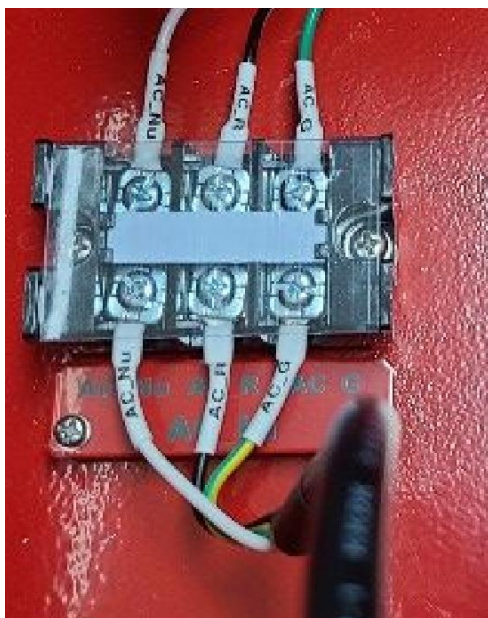
POWER	DL	UL	ALARM
AC Fail	DL Signal Not Detected	UL Out-Band Overload	Power-Related Alarms
DC Fail	DL Signal Low Detected	UL Input Overload	RF DL Path Related Alarms
Battery Fail	DL RF Power	UL DSP Over Input	RF UL Path Related Alarms
Low Battery	DL Out-Band Overload	UL Over Input	Over Temperature
Battery Not Charge	DL Input Overload	UL Over Power	DSP Communication
Battery Not Connected	DL DSP Over Input	UL Return Power	Door Open
Over Current	DL Over Input	UL PLL Fail	System Halt
	DL Over Power		
	DL Return Power		
	DL PLL Fail		

LED Indicator	Specifications
Solid Green	Normal operation
Solid Yellow	Soft Fail alarm exists in the system
Solid Red	Hard Fail alarm exists in the system

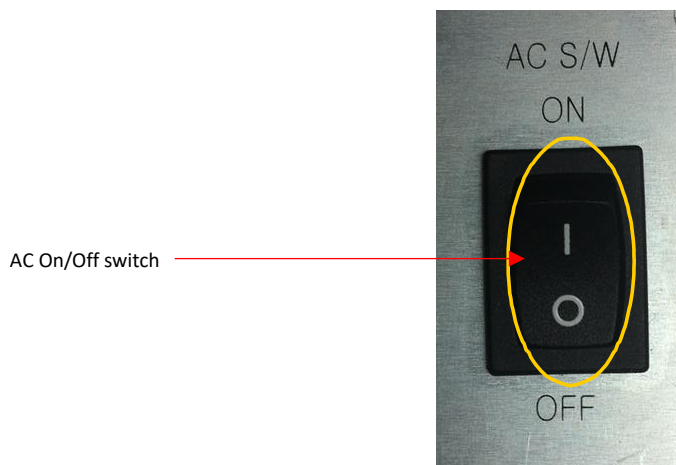
### 3.2 Cable Connection

#### 3.2.1 AC Power

The AC Terminal is located at the bottom of the wiring compartment on the opposite side of the wiring compartment door. The repeater has a free-voltage range input of 100-240V AC. The AC terminal box can support a max gauge of 12AWG and should be connected to the breaker box on its own circuit.



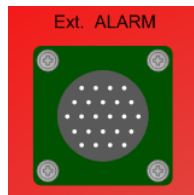
**Figure 3-2 AC Terminal**



**Figure 3-3 AC On/Off Switch**

The AC Power on/off switch is on the left-hand side of the PSU which is located inside of the repeater.

### 3.2.2 External Alarm



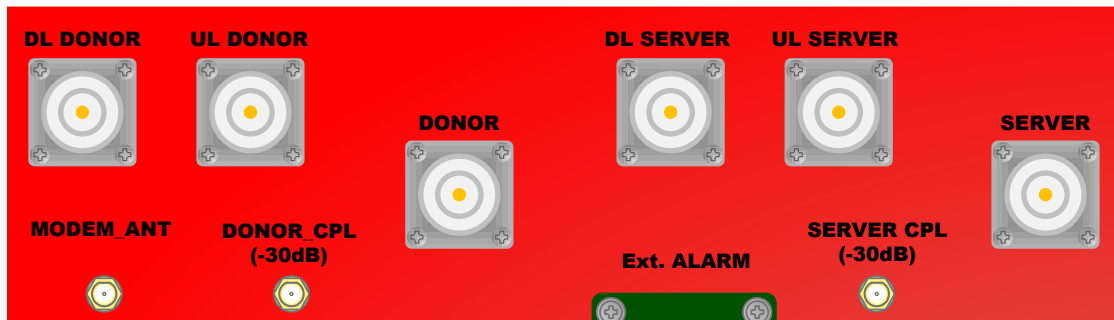
**Figure 3-4 External Alarm port**

This port should be connected only to the fire alarm control panel. The default length of the cable that is provided to connect to an FACP is 6m (19.5ft). The EXT alarm wiring cannot exceed 30m (98.5ft).

**Table 3-2 External Alarm Port Pin Description**

Pin	Color	Pin Description (24 pins)	ADRF External Alarm Box Pin Description	Alarm Type
A	Black	Donor antenna malfunction_P	1-POS	Output
B	Black	Donor antenna malfunction_N	1-NEG	Output
C	Brown	Active RF device malfunction_P	2-POS	Output
D	Brown	Active RF device malfunction_N	2-NEG	Output
E	Red	Low battery capacity (70%)_P	3-POS	Output
F	Red	Low battery capacity (70%)_N	3-NEG	Output
G	Orange	System component malfunction_P	4-POS	Output
H	Orange	System component malfunction_N	4-NEG	Output
J	Yellow	Normal AC Power_P	5-POS	Output
K	Yellow	Normal AC Power_N	5-NEG	Output
L	Green	Loss of normal AC Power_P	6-POS	Output
M	Green	Loss of normal AC Power_N	6-NEG	Output
N	Blue	Battery charger failure_P	7-POS	Output
P	Blue	Battery charger failure_N	7-NEG	Output
Q	Purple	Summary Alarm_P	8-POS	Output
R	Purple	Summary Alarm_N	8-NEG	Output
S	Grey	Donor Antenna Disconnect_P	9-POS	Output
T	Grey	Donor Antenna Disconnect_N	9-NEG	Output
U	White	Oscillation Alarm_P	10-POS	Output
V	White	Oscillation Alarm_N	10-NEG	Output
W	Pink	ANN Disconnection_P	11-POS	Output
X	Pink	ANN Disconnection_N	11-NEG	Output
Y	Light Blue	N.C.	-	-
Z	Light Blue	N.C	-	-

### 3.2.3 RF



The RF connections are made via two 4.3-10 female connectors. The RF connector labeled “DL DONOR1”, “UL DONOR” and “DONOR” must be connected to the antenna pointing towards the base station. The RF connection labeled “DL SERVER”, “UL SERVER” and “SERVER” must be connected to the antenna facing the area to be covered by the BDA. The RF connections must be made using cables with an impedance of 50 ohms.

The separation between the antennas is necessary to prevent oscillation. Oscillation occurs when the signal entering the system continually re-enters, due to the lack of separation between the donor and server antennas. In other words, the signal is being fed back into the system. This creates a constant amplification of the same signal. As a result, the noise level rises above the signal level.

To prevent feedback, the donor and server antennas must be separated by an appropriate distance to provide sufficient isolation. Isolation is attained by separating antennas a sufficient distance so that the output of one antenna does not reach the input of the other. This distance is dependent on the gain of the repeater.

- **DL DONOR** – 4.3-10 female which is used to connect the donor antenna (UHF DL IN)
- **UL DONOR** – 4.3-10 female which is used to connect the donor antenna (UL OUT)
- **DONOR** – 4.3-10 female which is used to connect the donor antenna (VHF DL IN)
- **DONOR\_CPL (30dB)** – SMA female 30 dB coupling port which is used to monitor the amplified UL signal
- **SERVER\_CPL (30dB)** – SMA female 30 dB coupling port which is used to monitor the amplified DL signal
- **DL SERVER** – 4.3-10 female which is used to connect the server antenna (DL OUT)
- **UL SERVER** – 4.3-10 female which is used to connect the server antenna (UHF UL IN)
- **SERVER** – 4.3-10 female which is used to connect the server antenna (VHF UL IN)

### 3.2.4 Annunciator

The Annunciator port provided power and communication to the PSR-ANN annunciator box. The PSR-ANN annunciator box provides a summary status of the repeater via LED indicator lights and an audible alarm.

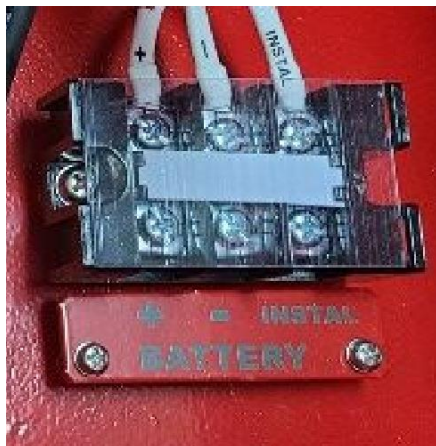
The default length of the cable that is provided to connect to the PSR-VU-9537-UA to the PSR-ANN is 2m (6.5ft). Additional cable lengths at 10ft, 20ft, and 33ft are available. The maximum distance of the cable between the PSR-VU-9537-UA repeater and the PSR-ANN annunciator is limited to 10m (33ft).



**Figure 3-5** Annunciator port of PSR-VU-9537-UA

### 3.2.5 Battery Backup Terminal

This port connects to the ADRF-BBS/BBL-24 (24V battery backup unit) via a dedicated cable provided by the ADRF.



**Figure 3-6** Battery Backup Port (4-pin Female)

When the ADRF-BBS/BBL-24 is connected to the repeater, the battery switch on the PSU must be switched to the ON position. This will enable the repeater to charge the ADRF-BBS/BBL-24 battery backup unit when AC power is present.



**Figure 3-7** Battery Switch

Connect the ADRF-BBS/BBL-24 to the PSR-VU-9537-UA via the external battery port to provide continuous power to the repeater during a power failure.

**(WARNING: The circuit breaker switch on the ADRF-BBS/BBL-24 must be set to OFF before connecting it to the PSR-VU-9537-UA to prevent damage to the repeater or the ADRF-BBS/BBL-24 and personal injury.)**

Note: Please contact ADRF Technical Support for assistance if you are unfamiliar with the installation procedure of the battery box.

### 3.2.6 Grounding

The grounding terminal is located at the lower right-hand side of the BDA. A grounding cable should be properly connected before powering on the equipment.



**Figure 3-8 Ground Cable Terminal**

Ground terminals located on the side of the repeater and can support a ground cable up to 1.25mm<sup>2</sup> (16AWG) in diameter and should be permanently connected to a grounding bar.

## 4. ALARMS

### 4.1 Message Board Alarms and Notifications

**Table 4-1 Message Board Alarms and Notifications**

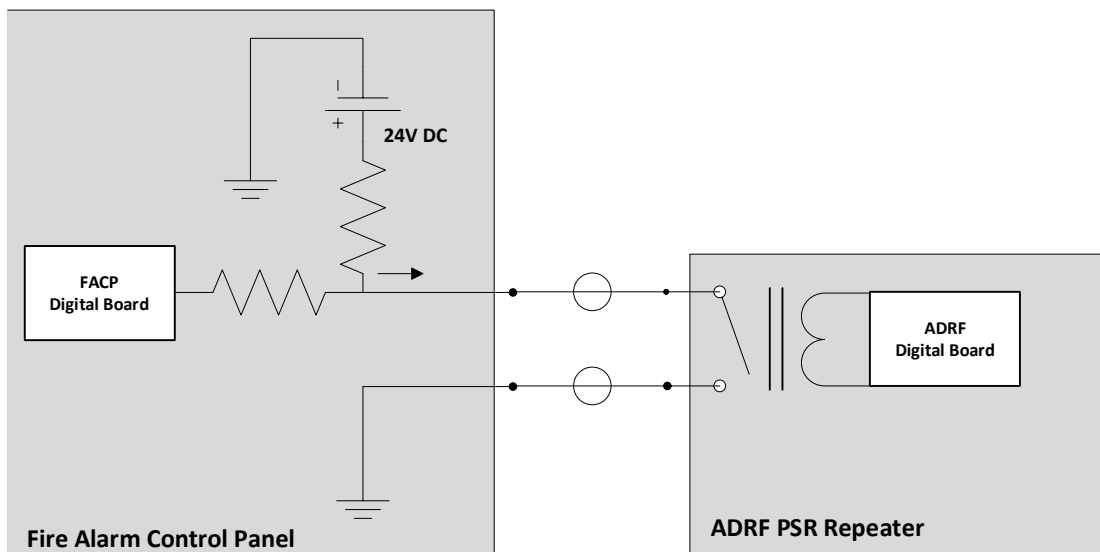
Alarm	Alarm Description	Trigger Condition
AC Fail	AC Input is outside of operating range	The power supply is not operating within specs. (4 seconds)
DC Fail	DC Output is outside of operating range	The power supply is not operating within specs. (4 seconds)
Temperature	The module is above/below the normal operating temperature	The module is above the normal operating temperature. (4 seconds) Over Temperature [Soft: 80~87° C, Hard: Above 87 °C]
Current	PSU is providing more than the max current	The power supply is not operating within specs. (4 seconds) Over Current [Hard: Above 20A]
System Halt	The system is in a shutdown state due to a hard fail alarm	The system is in a shutdown state due to a hard fail alarm. (10 cycles)
DSP Fault	The system has detected an issue with the internal DSP	The system has detected an issue with the internal DSP chip. (Cannot communicate with DSP)
OSC	Oscillation detected	Oscillation detected.
DL Signal not detected	DL signal is below the specified level	DL signal is below the specified level. (default: -90dBm, 4 seconds)
DL Signal Low	DL signal is below the specified level	DL signal is below the specified level. (default: -85dBm, 4 seconds)
Input Overload	Incoming in-band DL or UL signal is too strong	Input signal is above the threshold. (4 seconds) (Soft: DL -5dBm/UL -5dBm, Hard: DL +5dBm/UL +5dBm)
Out of band Overload	Incoming out-band DL or UL signal is too strong	Out of band signal is above the threshold. (4 seconds) (Soft: DL -5dBm/UL -5dBm, Hard: DL +5dBm/UL +5dBm)
Synthesizer Lock Fail	There is an issue with the internal PLL	There is an issue with internal PLL. (4 seconds)
DL RF Power	Input + gain does not match the output level (above delta of 6 dB)	Input + gain does not match the output level. (default delta of 6 dB)
Overpower	The output level is above the max output levels	The output level is above the max output levels. AGC On case (Soft: AGC Level + 1~2dB, Hard: AGC Level + >2dB) AGC Off case (Soft: max output level + 1~2dB, Hard: max output level + >2dB)
VSWR	Power is being reflected back to the repeater	Power is being reflected back to the repeater. Threshold = output power - 8dB. For example, if the repeater is outputting 24dBm and detects 16dBm of return power, then the VSWR will be triggered. (Alarm will only trigger when the output power is 15dBm or greater)
Heartbeat	Heartbeat is sent out to the NOC	Heartbeat sent at set interval.
Reboot	Soft reboot performed	Reboot is performed from the Control tab.
Factory setting	Factory default settings restored	Factory setting is set from the Control tab.
Door	Door alarm set/clear	Door alarm set: Door open Door alarm clear: Door close

### 4.2 External Alarms

The PSR-VU-9537-UA supports dry contact alarms and can be connected to a fire alarm control panel. The user can program the repeater to either create an open or closed circuit when an alarm is present in the system.



#### 4.2.1 External Alarm Output interface



External Alarm Name	Set Condition	Likely Causes
Donor Antenna Malfunction	- UL Return Power Hard Fail	- Damaged Donor Antenna
Active RF Device Malfunction	- RF Power Soft Fail - DL Return Power Hard Fail - DL/UL Over Power Hard Fail - DL/UL Input Overload Hard Fail	- Degrading Amplifier - Open or Disconnected Server Port - Oscillation - Strong RF Input Signal
Low Battery Capacity (70% depleted)	- Low Battery Soft Fail	- Battery Depleted
System Component Malfunction	- Over Current Hard Fail - Over Temperature Hard Fail - DSP Hard Fail - Out-band Overload Hard Fail	- Faulty or Damaged PSU - Ambient Temperature - DSP Filter Fault - Strong RF Input Signal
Normal AC Power	- AC Normal Set - AC Fail Soft Clear	- Powered by AC Power - Powered by DC Power
Loss of Normal AC Power	- AC Fail Soft Set - AC Normal Clear	- Powered by DC Power - Powered by AC Power
Battery Charger Failure	- Battery Fail Soft Fail - Battery Not Connected Soft fail - Battery Not Charge Soft Fail	- Low Battery Charging Voltage - Battery Cable Disconnected - Degraded Batteries
Summary Alarm	- Any Active Alarm	- Any Active Alarm Present in the System
Donor Antenna Disconnect	- No DL Signal Detected	- Disconnected Donor Line
Oscillation Alarm	- Oscillation Hard Fail	- Gain Set Too High or Lack of Isolation
Annunciator Disconnect	- Annunciator Disconnect Hard Fail	- Disconnected PSR-ANN

## 5. REPEATER INSTALLATION

### 5.1 Installation Procedures

#### 5.1.1 Wall Mount Procedure

- Verify that the PSR-VU-9537-UA and mounting holes are in good condition
- Place the PSR-VU-9537-UA mounting bracket template up against the wall and mark off mounting holes
- Drill the appropriate size holes and install the included wall anchors
- Remove the wall mount bracket from the repeater and bolt the wall mount bracket to the wall
- Place the repeater onto the wall mount bracket and secure the bracket to the repeater
- Connect the GND cable
- Connect the Antenna cables
- Connect the Power cable

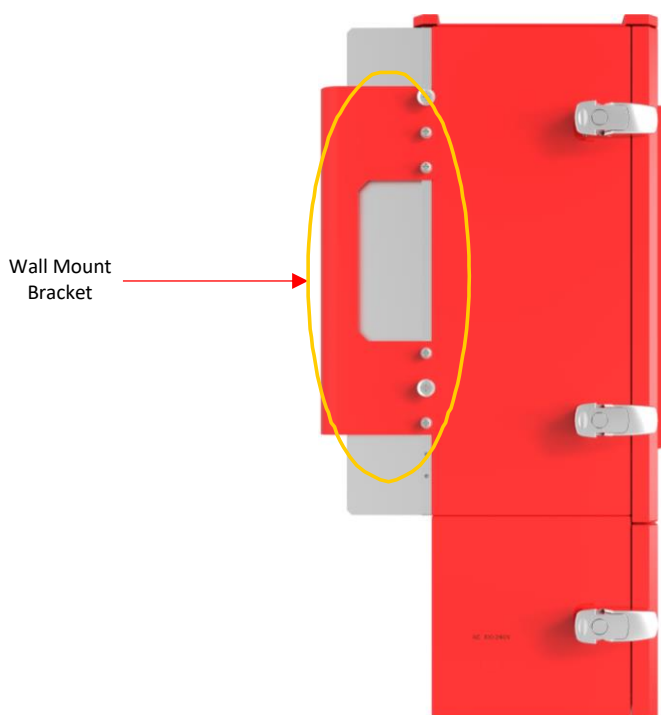


Figure 5-1 Wall Mount

#### 5.1.2 PSR-ANN Annunciator Installation

The PSR-ANN annunciator box has been designed to either mount on top of the PSR-VU-9537-UA repeater or can also be wall-mounted separately. By default, the mounting bracket is configured to mount to the top of the repeater with the mounting bracket at the bottom of the PSR-ANN annunciator box. If individually wall mounting the PSR-ANN, then the bracket will need to move from the bottom of the box to the back of the box.

Once the PSR-ANN annunciator box has been securely mounted, connect the included power/data cable from the side of the PSR-ANN box to the port labeled Annunciator on the PSR-VU-9537-UA.

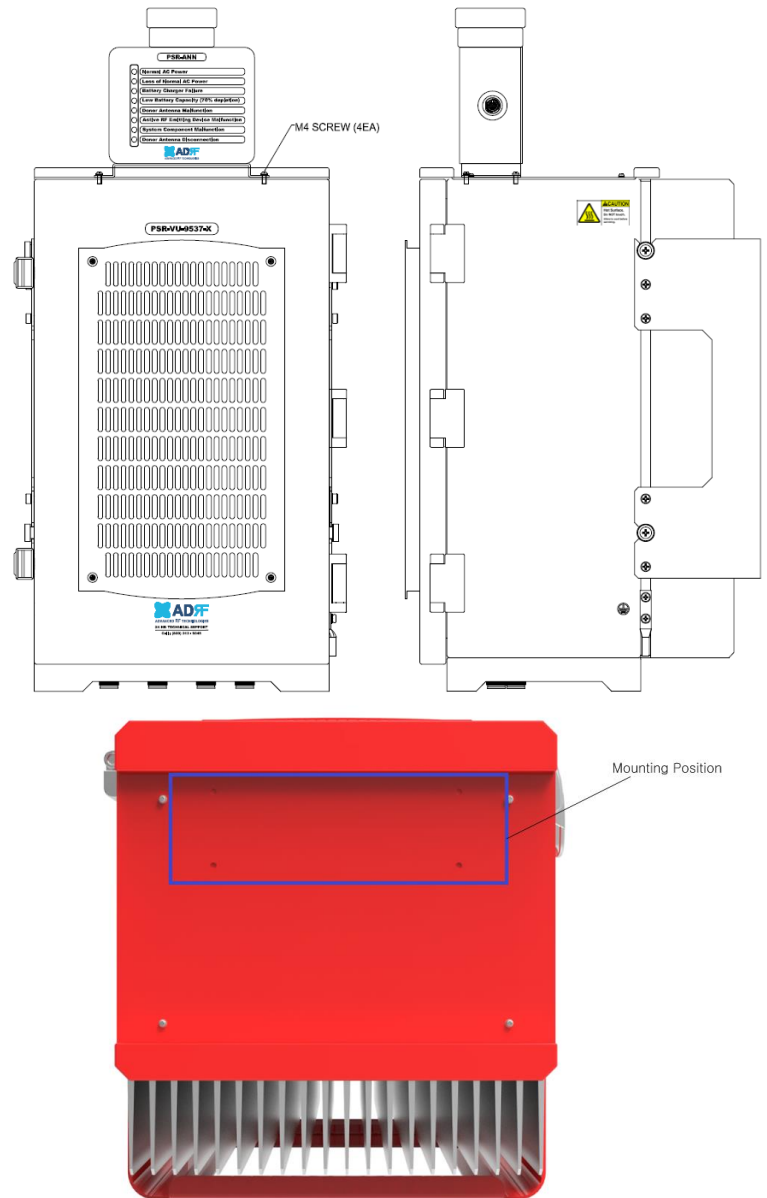


Figure 5-2 PSR-ANN Repeater Mount

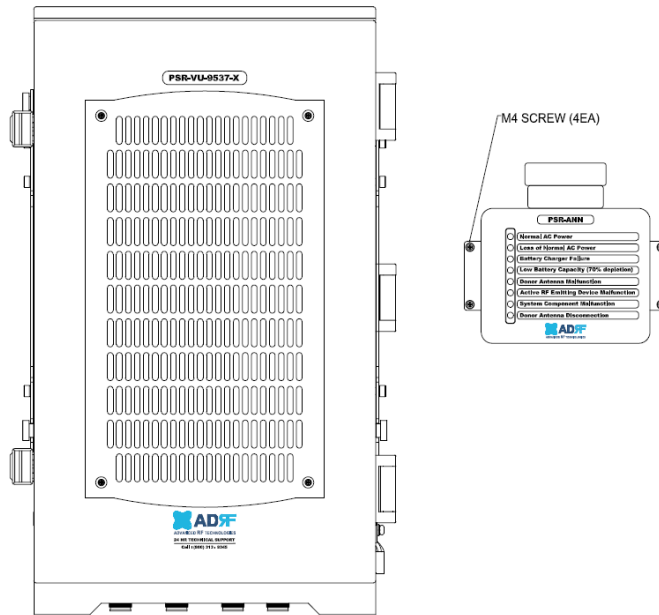
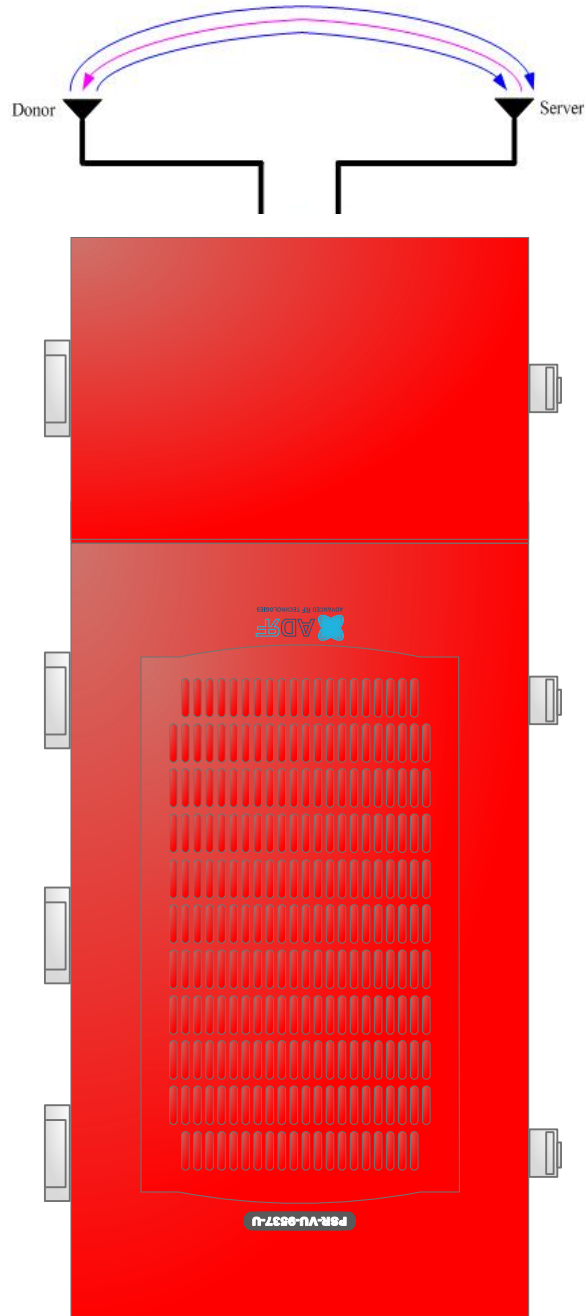


Figure 5-3 PSR-ANN Wall Mount

## 5.2 Antenna Separation/Isolation

The separation between the donor and server antennas is necessary to prevent oscillation. Oscillation occurs when the signal entering the system continually re-enters, due to the lack of separation between the donor and server antennas. In other words, the signal is being fed back into the system. This creates a constant amplification of the same signal. As a result, the noise level rises above the signal level.



**Figure 5-4 RF Repeater Oscillation**

To prevent feedback, the donor and server antennas must be separated by an appropriate distance to provide sufficient isolation. Isolation can be attained by separating antennas at a sufficient distance so that the output of one antenna does not reach the input of the other. This distance is dependent on the gain of the repeater.

Recommended isolation value is 15dB greater than the user-set gain of the repeater. For example, if the user-set gain of the repeater is 50dB, then isolation of 65dB or greater is required. In the same manner, to utilize the maximum gain of 95dB of the PSR-VU-9537-UA, isolation of at least 110dB is required.



**WARNING.** This is **NOT** a **CONSUMER** device. It is designed for installation by **FCC LICENSEES** and **QUALIFIED INSTALLERS**. You **MUST** have an **FCC LICENSE** or express consent of an FCC Licensee to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.

## **DO NOT APPLY AC POWER TO THE BDA UNTIL CABLES ARE CONNECTED TO BOTH PORTS OF THE BDA AND THE ANTENNAS.**

- Prior to equipment use, the device must be registered with the FCC. This can be done through the FCC's website at <https://signalboosters.fcc.gov/signal-boosters>
- 1. To mount on a wall, use the appropriate screws and anchors to attach the BDA to the wall using the four mounting holes with the included wall mount bracket.
- 2. Ensure that the isolation between the donor antenna and the serving antennas is at least 15 dB greater than the BDA gain.
- 3. Connect the cable from the donor antenna to the BDA connector labeled "DONOR" and the cable from the serving antennas to the BDA connector labeled "SERVER".
- 4. Wire the AC power source to the AC terminal block inside of the wiring compartment of the BDA and secure the line using the appropriate conduit and conduit hub connectors.
- 5. Power on the repeater by flipping the AC switch to the ON position located on the left side of the PSU.
- 6. Installation of the BDA is now complete. Adjust the gain controls to suit the specific signal environment through the GUI on your PC.

## **6. ADRF-BBL/BBS-U INSTALLATION**

### **6.1 Installation Procedures**

The ADRF-BBL/BBS-U battery backup unit houses two 12V batteries that are connected in series to have a nominal voltage of 24VDC. The battery charger is built into the PSU located inside of the PSR-VU-9537-UA. When the system is being powered by AC, the PSU will charge the ADRF-BBL/BBS-U battery backup. When there is a loss of primary power (AC), then repeater will switch over to the secondary power (DC) provided by the battery backup. Once the primary power is restored, the PSR-VU-9537-UA will switch back to operating with AC power and will resume charging the battery backup.

1. Verify that the repeater has been properly grounded.



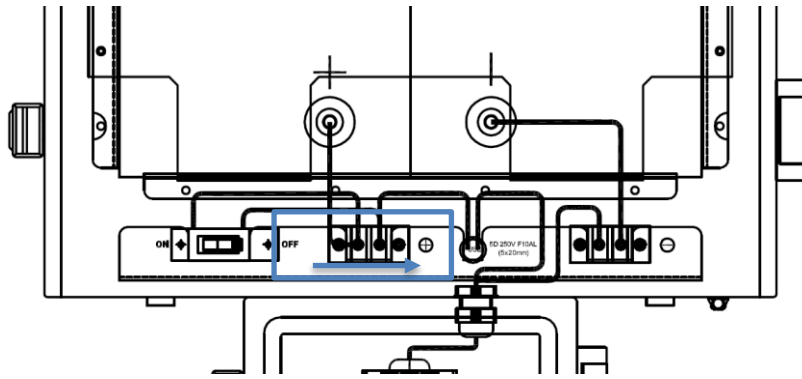
2. Loosen each wheel lock by spinning the red dial to the left.



3. Move the ADRF-BBL-U-24 to the desired location and spin the red dial to the right to tighten wheel locks.
4. The brackets on the back of the ADRF-BBL/BBS-U unit can be used to secure to the wall **ONLY when it is stationed on the floor**. Due to the total weight of the ADRF-BBL/BBS-U w/ batteries, it CANNOT be wall mounted off the ground. The brackets are not designed to support the full weight of the ADRF-BBL/BBS-U when it is wall mounted without any additional support. If a wall mounting solution is needed, then an optional wall mount kit (ADRF-BBL/BBS-X-WMK) is available for purchase.



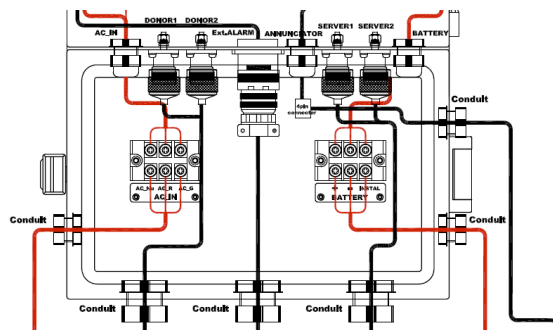
5. Use the included key to unlock the door latches to open the ADRF-BBL-U-24.
6. On the ADRF-BBL-U, set the power switch to the OFF position.



7. On the PSR-VU-9537-UA, verify that both **AC** and **BATT** switches have been set to the OFF position.

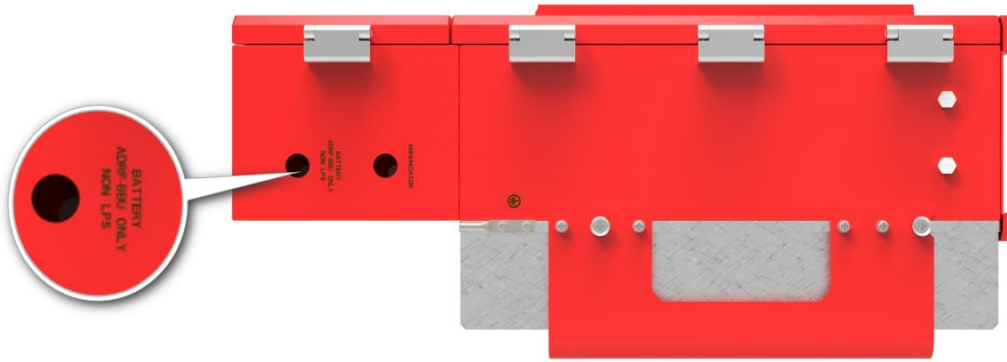


8. Use the provided battery backup cable from the ADRF-BBL-U and connect the wires to the terminal block located inside of the wiring compartment of the PSR-VU-9537-UA.

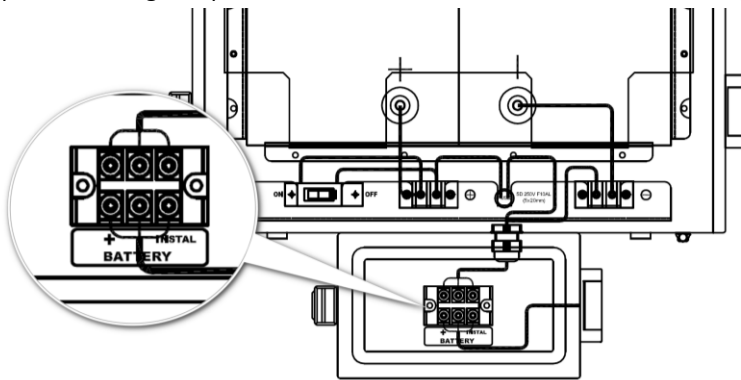


9. Install a conduit hub connector that can support 7/8" onto the PSR-VU-9537-UA hole labeled BATTERY and snake the cable through the conduit.

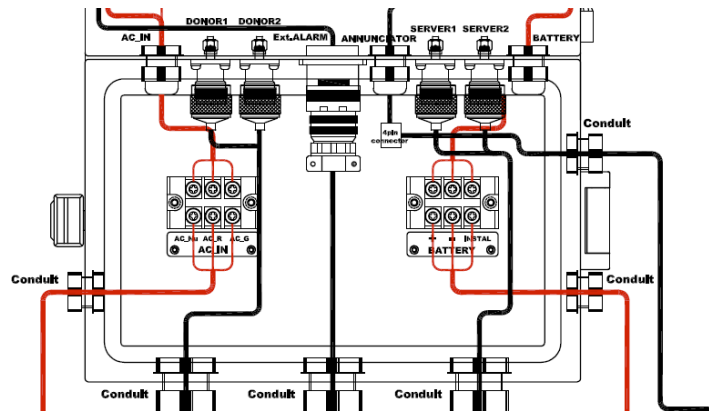




10. Install a conduit hub connector that can support 7/8" onto the ADRF-BBL-U hole labeled BATTERY.
11. Open the wiring compartment of the ADRF-BBL-U and wire the battery cable to the terminal block.



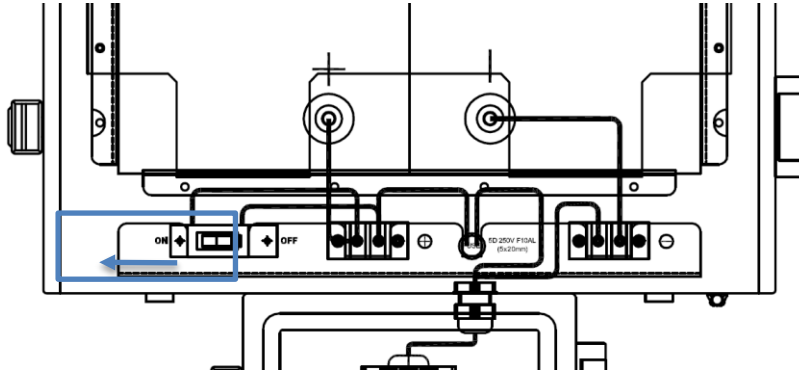
12. On the PSR-VU-9537-UA, wire the AC terminal block to your dedicated circuit breaker



13. On the PSR-VU-9537-UA, flip the **POWER** and **BATT** switch to the ON position.



14. On the ADRF-BBL-U-24, set the circuit breaker to the ON position.



## 7. PSR-VU-9537-UA WEB-GUI SETUP INTRODUCTION

The Web-GUI allows the user to communicate with the repeater locally. To connect to the repeater locally, you will need a laptop with an Ethernet port and an RJ-45 crossover cable.

<b>NOTICE TO USERS, INSTALLERS, AUTHORITIES HAVING JURISDICTION, AND OTHER INVOLVED PARTIES</b>			
This product incorporates field-programmable software. In order for the product to comply with the requirements in the Standard for in-building 2-Way Emergency Radio Communication Enhancement Systems, UL 2524 certain programming features or options must be limited to specific values or not used at all as indicated below.			
<b>Program feature or option</b>	<b>Permitted in UL 2524? (Y/N)</b>	<b>Possible settings</b>	<b>Settings permitted in UL 2524</b>
Remote Power Switch	N	Enable/Disable	Disable
Battery Not Charge Check	Y	On/Off	On
Battery Check	Y	Check All/Except Installed/Check Off	Check All
Donor Antenna Malfunction Check Time	Y	0sec, 10sec, 45sec, 90sec, 3min, 6min, 15min, 30min, 1hour, 2hour, 4hour, 8hour, 12hour, 24hour, and 48hour	0sec, 10sec, 45sec, 90sec, 3min, 6min, 15min, 30min, 1hour, 2hour, 4hour, 8hour, 12hour, and 24hour

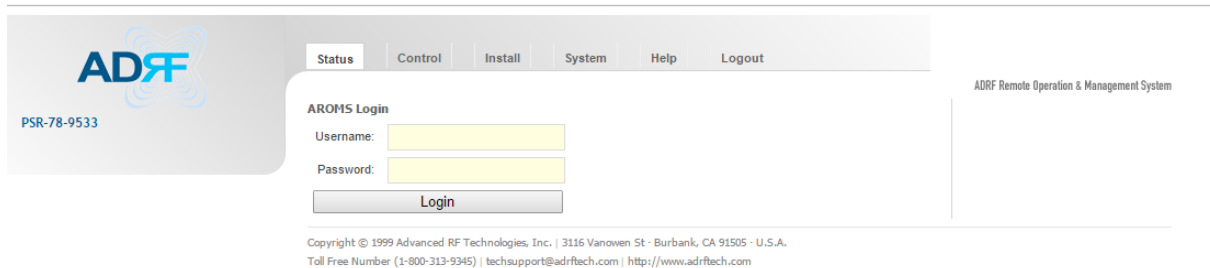
Please note that some selections of the Donor Antenna Malfunction Check Time setting could impact the compliance of the UL 2524 code. The selections available for this option are 0sec, 10sec, 45sec, 90sec, 3min, 6min, 15min, 30min, 1hour, 2hour, 4hour, 8hour, 12hour, 24hour, and 48hour. Selection of 24 hours or less will be required to remain compliant with UL 2524.



**Figure 7-1 Donor Antenna Malfunction Check Time**

## 7.1 Repeater/PC Connection Using Web-GUI

- Verify that your Local Area Network Connection is set to **obtain an IP address automatically** under the Internet Protocol (TCP/IP) properties.
- Connect the RJ-45 crossover cable between the laptop's Ethernet port and the repeater's Ethernet port.
- Launch either Internet Explorer or Google Chrome.
- Type the following IP address into the address bar of the Internet Browser: <http://192.168.63.1>
- The following login screen will appear:



ADRF Remote Operation & Management System

AROMS Login

Username:

Password:

Login

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Toll Free Number (1-800-313-9345) | techsupport@adrftech.com | http://www.adrftech.com

**Figure 7-2 Login Page**

If you are not the Administrator, please type in your assigned username & password which you should have received from the Administrator.

The default username and password for the General User is **adrf** & **adrf**, respectively.  
The default Administrator login is **admin** & **admin**, respectively.

## 7.2 Status Tab

PSR-VU-9537  
Site ID : Example  
Mode : LMR450

Donor : Duplex  
Server : Duplexer

*The Signal For Success*

Advanced RF Technologies, Inc. ("ADRF") is an established, leading provider of in-building equipment and services that improve wireless coverage and capacity for the largest service providers and enterprise customers around the world.

Status
Control
Install
Tools
System
Help
Logout

**Band Info**

	Downlink			Uplink		
	Input (dBm)	Center Frequency (MHz)	BW (KHz)	Input (dBm)	Center Frequency (MHz)	BW (KHz)
Wide	--	--	--	--	--	--
Narrow	Channel 1	470.46250	12.50	--	473.46250	12.50
	Channel 2	470.48750	12.50	--	473.48750	12.50
	Channel 3	470.51250	12.50	--	473.51250	12.50
	Channel 4	470.53750	12.50	--	473.53750	12.50
	Channel 5	483.56250	62.50	--	486.56250	62.50
	Channel 6	--	--	--	--	--
	Channel 7	--	--	--	--	--
	Channel 8	--	--	--	--	--

**Power & Gain**

	Downlink	Uplink
Input [dBm]	--	--
OutBand [dBm]	-57.5	-64.9
Gain [dB]	User Set	50.0
	Actual	50.0
Output [dBm]	--	--

**Alarms**

System
RF
Power

Over Temperature	Door Open
DSP Fail	System Halt

Normal
  Soft Fail
  Hard Fail
  Inactive

**AAI**

- Donor Antenna Malfunction
- Active RF Emitting Device Malfunction
- Low Battery Capacity (70% depletion)
- System Component Malfunction
- Normal AC Power
- Loss of Normal AC Power
- Battery Charger Failure
- Low Battery Capacity (70% depletion)
- Donor Antenna Malfunction
- Active RF Emitting Device Malfunction
- System Component Malfunction
- Alarm Door

Active
  Inactive

Figure 7-3 Status Tab

Advanced RF Technologies, Inc.

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### 7.2.1 Band Info

The Band Info section displays frequency information along with the corresponding bandwidths that have been set from the Install tab. Input levels for each channel are also displayed in this section.

		Downlink			Uplink		
		Input (dBm)	Center Frequency (MHz)	BW (KHz)	Input (dBm)	Center Frequency (MHz)	BW (KHz)
Wide		--	--	--	--	--	--
Narrow	Channel 1	--	470.46250	12.50	--	473.46250	12.50
	Channel 2	--	470.48750	12.50	--	473.48750	12.50
	Channel 3	--	470.51250	12.50	--	473.51250	12.50
	Channel 4	--	470.53750	12.50	--	473.53750	12.50
	Channel 5	--	483.56250	62.50	--	486.56250	62.50
	Channel 6	--	--	--	--	--	--
	Channel 7	--	--	--	--	--	--
	Channel 8	--	--	--	--	--	--

Figure 7-4 Status Tab – Band Info Display

### 7.2.2 Power & Gain

This section displays the Input, Gain, and Output for both downlink and uplink.

		Downlink	Uplink
Input [dBm]		--	--
OutBand [dBm]		-57.5	-64.9
Gain [dB]	User Set	50.0	50.0
	Actual	50.0	50.0
Output [dBm]		--	--

Figure 7-5 Status Tab – Power & Gain Display

- **Input [dBm]** – Displays the in-band Downlink/Uplink signal level. The system will display “--.” when the input level is < -90 dBm.
- **Outband [dBm]** – Displays the out-band composite power.
- **Gain [dB]**
  - **User Set:** Displays the amount of gain that the user set.
  - **Actual:** Displays the actual amount of gain that is currently in use.
- **Output [dB]** – Displays the Downlink/Uplink composite output power levels. The system will display “--.”, when the output level is < +5 dBm.
-

### 7.2.3 Alarms

This section displays the alarm status for System alarms, RF Alarms, and Power alarms. If an alarm is present in the system, then the color of the alarm tab will change according to the type of failure.

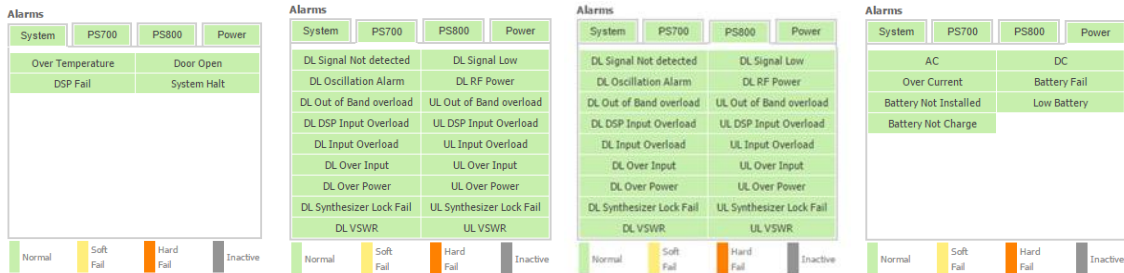


Figure 7-6 Status Tab – Alarm Display

### 7.2.4 AAI

This section displays the AAI alarm status for each dry contact alarm. Red indicates that the dry contact alarm is active and light blue indicates the alarm is inactive. Any alarms in red that are active will correspond to an active audible and visual alarm in the PSR-ANN with the exception of the “Normal AC Power” and “Loss of Normal AC Power” which will only provide visual alerts.

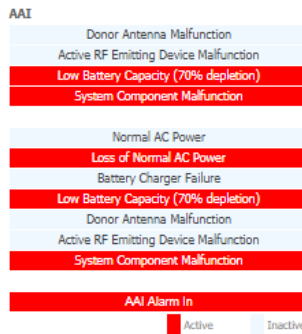


Figure 7-7 Status Tab – AAI Alarm Display

## 7.2.5 Repeater Info / Repeater Location / Technical Support / Installer Contact Info

Information	
Serial Number	
Latitude	
Longitude	
Firmware	F2.0.F
Web GUI	F2.0.0

Location	Description

**Technical Support**  
 Phone: 1-800-313-9345  
 E-mail: [techsupport@adrftech.com](mailto:techsupport@adrftech.com)

---

**Installer Contact Info**  
 Company:  
 Installer:  
 Phone:  
 E-mail:

---

**Figure 7-8 Status Tab – Repeater Info / Repeater Location / Technical Support / Installer Contact Info**

- **Repeater Info:** Displays the serial number, latitude, longitude, firmware version, and Web-GUI version
- **Repeater Location:** Displays the address where the repeater is installed
- **Technical Support:** Displays ADRF’s Technical Support contact information
- **Installer Contact Info:** Displays the installer’s name, phone, and e-mail address



### 7.3 Control Tab

#### General Settings

ALC On

DL HPA On       UL HPA On

Remote Power Switch

**Apply**

#### Manual Gain Control

DL Gain [dB] 50.0 ▼

UL Gain [dB] 50.0 ▼

DL ALC Level [dBm] 37.0 ▼

UL ALC Level [dBm] 27.0 ▼

DL ALC Offset Level [dB] 3.0 ▼

UL ALC Offset Level [dB] 3.0 ▼

**Apply**

#### System

**Reboot**
**Factory Set**

#### AAI Test

Alarm Set Status  Closed  Open

Donor Antenna Malfunction Check Time OFF ▼

AAI Test On

Fire Alarm

Donor Antenna Malfunction Normal ▼

Active RF Emitting Device Malfunction Normal ▼

Low Battery Capacity (70% depletion) Normal ▼

System Component Malfunction Set ▼

System Monitoring

Normal AC Power Normal ▼

Loss of Normal AC Power Set ▼

Battery Charger Failure Set ▼

Low Battery Capacity (70% depletion) Normal ▼

Donor Antenna Malfunction Normal ▼

Active RF Emitting Device Malfunction Normal ▼

System Component Malfunction Set ▼

**Apply**

#### Alarm Settings

DL Signal Low Level [dBm] -85.0 ▼

DL Signal Not Detect Level [dBm] -90.0 ▼

DL RF Power Level [dB] 6.0 ▼

DL Over Power Level [dBm] 37.0 ▼

UL Over Power Level [dBm] 27.0 ▼

**Apply**

#### Battery Alarm Settings

Battery Check Check All ▼

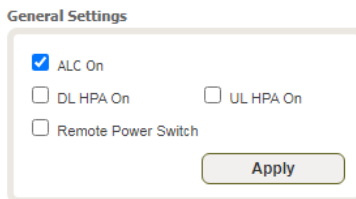
Battery Not Charge Check ON ▼

**Apply**

**Figure 7-9 Control Tab**

### 7.3.1 General Settings

The General Settings section allows the user to enable/disable amplifiers and the ALC routine.



**Figure 7-10 Control Tab – General Setting**

- **ALC ON:** Enables or disables Automatic Level Control (ALC)
- **DL HPA On:** Enables or disables the Downlink High Power Amplifier
- **UL HPA On:** Enables or disables the Uplink High Power Amplifier
- **Remote Power Switch:** Enables or disables the Remote Power Switch function. Note: Remote Power Switch needs to be disabled for UL 2524.

To enable/disable any of the settings, click on the checkbox and click the Apply button.

### 7.3.2 System

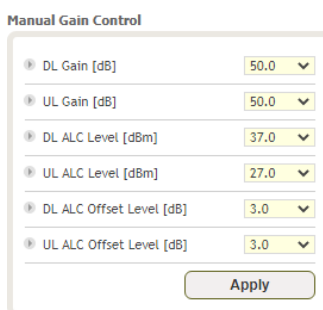
Under the System section, the user is able to perform a soft reboot on the repeater and also can restore factory default settings.



**Figure 7-11 Control Tab – System**

- **Reboot:** Performs a soft reboot of the repeater
- **Factory Set:** Restores all settings to factory defaults

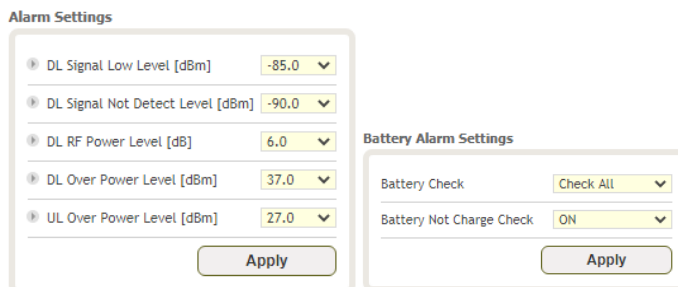
### 7.3.3 Manual Gain Control



**Figure 7-12 Control Tab – Manual Gain Control**

- **DL/UL Gain:** Gain levels of the repeater can be specified here
- **DL/UL ALC Level:** Prevents the output power from exceeding the specified value
- **DL/UL Output ALC Offset:** If any ALC attenuation has been applied, the system will release this attenuation when the signal level drops by the specified level

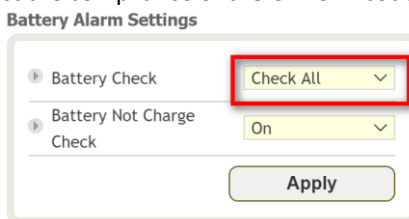
### 7.3.4 Alarm Settings & Battery Alarm Settings



**Figure 7-13 Control Tab – Alarm & Battery Alarm Settings**

- **DL Signal Low Level:** Allows the user to specify how low the signal can be before triggering a “Downlink Signal Low” soft-fail alarm
- **DL Signal Not Detected Level:** Allows the user to specify how low the signal can be before triggering a “Downlink Signal Not Detected” soft-fail alarm
- **DL RF Power Level:** Allows the user to set a maximum deviation value for the downlink RF power before triggering a “DL RF Power Level” soft-fail alarm
  - For example, if the input signal is -50 dBm and the gain is set to 60 dB, the expected output power should be 10 dBm. If the Downlink RF Power alarm value is set to 6dB, then a soft-fail alarm will trigger if the output power falls below 4 dBm
- **DL Over Power Level:** DL Over Power Alarm will trigger when the DL output level exceeds this level
- **UL Over Power Level:** UL Over Power Alarm will trigger when the UL output level exceeds this level
- 
- **Battery Check:**
  - Check All – All battery related alarms are checked which include Battery Fail, Battery Not Installed, Low Battery, and Battery Not Charge
  - Except Install – Only Battery Fail, Low Battery, and Battery Not Charge alarms are checked
  - Check Off – Does not perform any battery check
- **Battery Not Charge Check:**
  - On – Checks for the Battery Not Charge alarm
  - Off – Disables the check for the Battery Not Charge alarm
- 
- 

Please note that the Battery Check setting must to set to **Check All** to be compliant with UL 2524. Selecting Except Install or Check Off will impact the compliance of the UL 2524 code.



**Figure 7-14 Battery Alarm Settings**

•

## 7.4 Install Tab

**Technology**

LMR450 (450 - 512MHz)

---

**Band Selection**

	Downlink				Uplink			
	Channel Center Frequency (MHz)	Bandwidth (kHz)	Gain (dB)	Output (dBm)	Channel Center Frequency (MHz)	Bandwidth (kHz)	Gain (dB)	Output (dBm)
Wide	--,-	OFF	0.0	--	--,-	OFF	0.0	--
Ch. 1	470.46250	12.50	0.0	--	473.46250	12.50	0.0	--
Ch. 2	470.48750	12.50	0.0	--	473.48750	12.50	0.0	--
Ch. 3	470.51250	12.50	0.0	--	473.51250	12.50	0.0	--
Ch. 4	470.53750	12.50	0.0	--	473.53750	12.50	0.0	--
Ch. 5	483.56250	62.50	0.0	--	486.56250	62.50	0.0	--
Ch. 6	--,-	OFF	0.0	--	--,-	OFF	0.0	--
Ch. 7	--,-	OFF	0.0	--	--,-	OFF	0.0	--
Ch. 8	--,-	OFF	0.0	--	--,-	OFF	0.0	--

---

**SNMP**

Site ID: Example  
 Description:

**Modem Box Setting**

Repeater IP: 192.168.63.6  
 Subnet Mask: 255.255.255.0  
 Gateway:

---

**Location**

Latitude:   
 Longitude:

**AAI Input**

AAI Input Description: Alarm Door

---

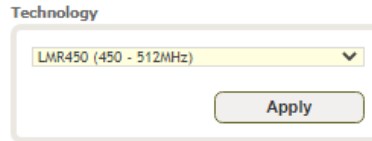
**Filter**

Donor: Duplex  
 Server: Duplexer

**Figure 7-15 Install Tab**

### 7.4.1 Technology

This section allows the user to set the repeater mode to either use VHF, APCO25, or LMR450.



**Figure 7-16 Install Tab – Technology**

The following choices are available from the drop-down menu:

- VHF(136-174MHz)
- APCO25(380-470MHz)
- LMR450(450-512MHz)

### 7.4.2 Band Selection

Band Selection

	Downlink				Uplink			
	Channel Center Frequency (MHz)	Bandwidth (kHz)	Gain (dB)	Output (dBm)	Channel Center Frequency (MHz)	Bandwidth (kHz)	Gain (dB)	Output (dBm)
Wide	--	OFF	0.0	--	--	OFF	0.0	--
Narrowband	Ch. 1	470.46250	12.50	0.0	--	473.46250	12.50	0.0
	Ch. 2	470.48750	12.50	0.0	--	473.48750	12.50	0.0
	Ch. 3	470.51250	12.50	0.0	--	473.51250	12.50	0.0
	Ch. 4	470.53750	12.50	0.0	--	473.53750	12.50	0.0
	Ch. 5	483.56250	62.50	0.0	--	486.56250	62.50	0.0
	Ch. 6	--	OFF	0.0	--	--	OFF	0.0
	Ch. 7	--	OFF	0.0	--	--	OFF	0.0
	Ch. 8	--	OFF	0.0	--	--	OFF	0.0

**Figure 7-17 Install Tab – Band Selection**

Band selection allows the user to specify the desired frequencies by inputting the center frequencies and selecting the bandwidths.

- **Channel Center Frequency:** The user can input the center frequency of the pass-band.
- **Bandwidth:** Allows the user to select the desired bandwidth for the passband. Narrowband choices include 6.25, 12.5 to 325, 331.25 kHz every 6.25 kHz unit.
- **Downlink Gain:** Minor gain adjustments can be performed on a per channel basis to equalize signal levels
- **Downlink Freq - Start:** Displays the start frequency of the pass-band once the band selection has been set
- **Downlink Freq - End:** Displays the end frequency of the pass-band once the band selection has been set
- 

### 7.4.3 Location

This section allows the user to input the latitude and the longitude of the repeater.

Location

Latitude

Longitude

**Figure 7-18 Install Tab – Location**

### 7.4.4 Location Info / Installer Info

This section allows the user to specify the address of the repeater and also the information of the installer.

**Location Info**

Company

Address1

Address2

City

State

ZIP Code

---

**Installer Info**

Company

Name

Phone

E-mail

---

**Figure 7-19 Install Tab – Location Info / Installer Info**

#### 7.4.5 Date & Time

This section allows the user to specify the current date and time.

**Date & Time**

Date

Time

---

**Figure 7-20 Install Tab – Date & Time**

## 7.5 System

The System tab allows the user to perform firmware updates, upload closeout packages, view any changes to the system, backup existing configuration, add/remove user accounts, and change the login credentials of the Administrator.

### 7.5.1 System: Account

#### 7.5.1.1 System: Account – Account Management

The Account Management section allows the Administrator to delete any user accounts. Please note that the Account Management section is only available if you are logged into the system as the Administrator. To delete a user account, click on the Account Management link and under the Edit column, click on the delete button.

Account Management / [New account](#) / [Change Password](#)

No	User Name	Password	Status	Last Login	Edit
1	admin	admin	administrator	2007-01-01 00:03:42	-
2	adrf	adrf	user	1970-01-01 00:00:00	<a href="#">delete</a>
3	guest	guest	guest	1970-01-01 00:00:00	<a href="#">delete</a>

**Figure 7-21 System: Account – Account Management**

#### 7.5.1.2 System: Account – New Account

The New account section allows the Administrator to create a new user account. Please note that the New account section is only available if you are logged into the system as the Administrator. To create a new user account, click on the new account link, fill in the fields, and click Create.

[Account Management](#) / [New account](#) / [Change Password](#)

① User Name

① User Group

① Password

① Confirm password

**Figure 7-22 System: Account – New Account**

#### 7.5.1.3 System: Account – Change Password

The Change Password section allows the current user who is logged into the system to change their login credentials.

[Account Management](#) / [New account](#) / [Change Password](#)

① User Name admin

① New User Name

① Confirm New User Name

① Password

① Confirm password

Please enter new password.

**Figure 7-23 System: Account – Change Password**



### 7.5.2 System – Logs

This section displays system events that have taken place. The Log displays the time and date of when the event took place, and what changes were made to the system.

Seq	Date	Event	Description
1	2020-10-28 06:39:09	Channel2 UL Narrow Band Frequency Set	UL Narrow Band Frequency Set to 473487.5, Bandwidth Set to 12.50
2	2020-10-28 06:39:09	Channel2 DL Narrow Band Frequency Set	DL Narrow Band Frequency Set to 470487.5, Bandwidth Set to 12.50
3	2020-10-28 06:38:32	Channel5 UL Narrow Band Frequency Set	UL Narrow Band Frequency Set to 486562.5, Bandwidth Set to 62.50
4	2020-10-28 06:38:20	Channel5 UL Narrow Band Frequency Set	UL Narrow Band Frequency Set to 486562.5, Bandwidth Set to 0.00
5	2020-10-28 06:38:11	Channel5 DL Narrow Band Frequency Set	DL Narrow Band Frequency Set to 483562.5, Bandwidth Set to 62.50
6	2020-10-28 06:37:58	Channel7 DL Narrow Band Frequency Set	DL Narrow Band Frequency Set to 483587.5, Bandwidth Set to 0.00
7	2020-10-28 06:37:58	Channel6 UL Narrow Band Frequency Set	UL Narrow Band Frequency Set to 486562.5, Bandwidth Set to 0.00
8	2020-10-28 06:37:58	Channel5 UL Narrow Band Frequency Set	UL Narrow Band Frequency Set to 483537.5, Bandwidth Set to 0.00
9	2020-10-28 06:37:58	Channel5 DL Narrow Band Frequency Set	DL Narrow Band Frequency Set to 483537.5, Bandwidth Set to 0.00
10	2020-10-28 06:37:45	Channel7 DL Narrow Band Frequency Set	DL Narrow Band Frequency Set to 0.0, Bandwidth Set to 12.50
11	2020-10-28 06:37:45	Channel6 UL Narrow Band Frequency Set	UL Narrow Band Frequency Set to 0.0, Bandwidth Set to 25.00
12	2020-10-28 06:37:45	Channel5 UL Narrow Band Frequency Set	UL Narrow Band Frequency Set to 0.0, Bandwidth Set to 12.50
13	2020-10-28 06:37:45	Channel5 DL Narrow Band Frequency Set	DL Narrow Band Frequency Set to 483562.5, Bandwidth Set to 62.50
14	2020-10-28 06:36:43	Channel7 UL Narrow Band Frequency Set	UL Narrow Band Frequency Set to 486587.5, Bandwidth Set to 12.50
15	2020-10-28 06:36:43	Channel6 DL Narrow Band Frequency Set	DL Narrow Band Frequency Set to 483562.5, Bandwidth Set to 25.00
16	2020-10-28 06:36:43	Channel2 UL Narrow Band Frequency Set	UL Narrow Band Frequency Set to 473487.5, Bandwidth Set to 25.00
17	2020-10-28 06:36:43	Channel2 DL Narrow Band Frequency Set	DL Narrow Band Frequency Set to 470487.5, Bandwidth Set to 25.00
18	2020-10-28 06:36:25	Channel7 UL Narrow Band Frequency Set	UL Narrow Band Frequency Set to 486587.5, Bandwidth Set to 12.50
19	2020-10-28 06:36:25	Channel7 DL Narrow Band Frequency Set	DL Narrow Band Frequency Set to 483587.5, Bandwidth Set to 12.50
20	2020-10-28 06:36:25	Channel6 UL Narrow Band Frequency Set	UL Narrow Band Frequency Set to 486562.5, Bandwidth Set to 25.00

Figure 7-24 System: Logs

### 7.5.3 System – Update

- To perform a firmware update, click on the Update tab and the following screen will appear.

**FW Update**

File Name  No file chosen

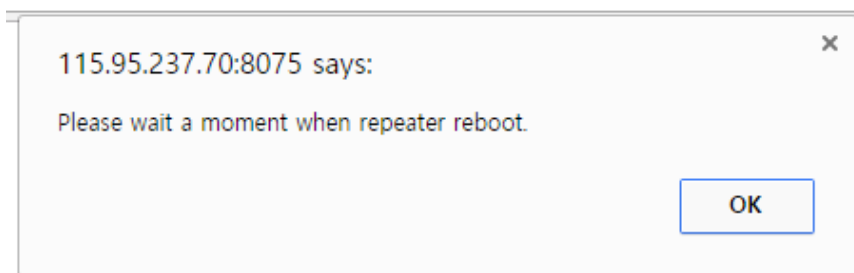
---

Click Upgrade to update the repeater firmware

Figure 7-25 System: Update

- Click on the Choose File button and locate the firmware file.
- Click on the Upgrade button to perform the firmware update.

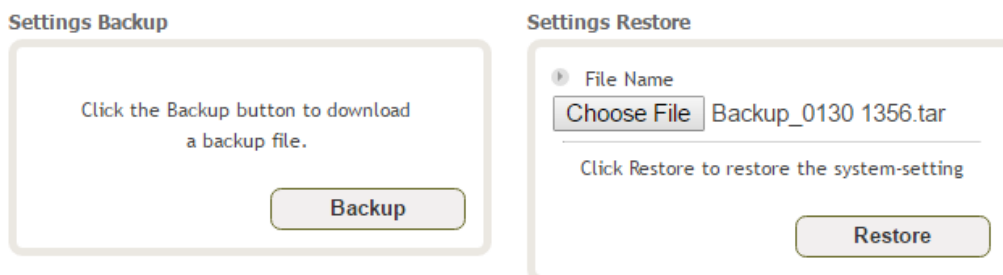
- Once the firmware update is complete, the following popup message will appear:



**Figure 7-26 System: Update is Complete Popup Message**

#### 7.5.4 System – Backup / Restore

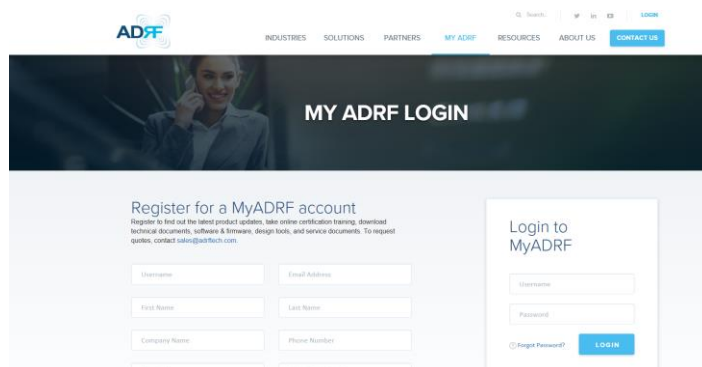
The Backup / Restore section allows the user to save the settings of the repeater. To perform the backup, click on the Backup button and you will be prompted to save the backup file. To restore the settings to the system, click on Choose File button, select the backup file, and click the Restore button.



**Figure 7-27 System: Backup / Restore**

## 7.6 Help

If an internet connection is available, clicking on the Help Tab will redirect the user to our Technical Support page.



**Figure 7-28 Help**

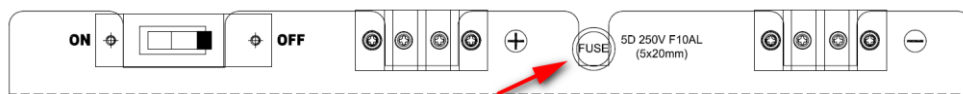
## 7.7 Logout

Clicking the Logout button will log the current user off the system.

## 8. MAINTENANCE GUIDE FOR PSR-VU-9537-UA REPEATER

### 8.1 Periodic Inspection Checklist

1. Repeater
  - a. Log into the ADRF unit and check for any alarms in the system
  - b. Address any outstanding alarms
  - c. Check for loose connections to the repeaters/remotes and antennas. If connections are loose, make sure that all connections are tightly fastened.
  - d. Check that cables and connectors are in good condition.
  - e. Ensure that the repeater/remote brackets are in good condition and that the repeater/remote is securely fastened.
  - f. Verify that the repeater has 3" of clearance on all sides to ensure proper ventilation.
2. Battery Backup
  - a. Open the ADRF-BBL-U/BBS-U enclosure and inspect the battery terminals for any corrosion buildup
  - b. Turn the circuit breaker to the off position and unscrew the fuse holder to inspect the fuse
    - i. A spare fuse is included with the purchase of the ADRF-BBL-U and can be used to replace the fuse if needed



- c. If the terminals need to be cleaned:
  - i. Set the ADRF-BBL-U/BBS-U breaker switch to the OFF position
  - ii. Disconnect the battery backup cable from the repeater
  - iii. Carefully disconnect battery terminals and clean the terminal with a battery terminal cleaner
  - iv. Wait for terminals to fully dry
  - v. Reconnect the battery terminals and set the breaker switch to the ON position
- d. The lifespan of the batteries will vary based on the number of outages, however we approximate that with an average of 4 outages a year, the batteries should last approximately 2-3 years

## **8.2 Preventive Measures for Optimal Operation**

### **8.2.1 Recommendations**

- Perform the *Periodic Inspection Checklist* on a semi-annually basis.

### **8.2.2 Precautions**

- Do not operate the repeater with the antennas in extremely close proximity to one another as this may cause damage to the repeater.
- Do not change the parameters unless instructed to do so by an authorized supervisor.
- Do not move the repeater unless instructed to do so by an authorized supervisor.
- Do not detach any cables to the repeater unless repair of respective components is necessary.

## **9. WARRANTY AND REPAIR POLICY**

### **9.1 General Warranty**

The PSR-VU-9537-UA carries a Standard Warranty period of two (2) years unless indicated otherwise on the package or in the acknowledgment of the purchase order.

### **9.2 Limitations of Warranty**

Your exclusive remedy for any defective product is limited to the repair or replacement of the defective product. Advanced RF Technologies, Inc. may elect which remedy or combination of remedies to provide in its sole discretion. Advanced RF Technologies, Inc. shall have a reasonable time after determining that a defective product exists to repair or replace the problem unit. Advanced RF Technologies, Inc. warranty applies to repaired or replaced products for the balance of the applicable period of the original warranty or ninety days from the date of shipment of a repaired or replaced product, whichever is longer.

### **9.3 Limitation of Damages**

The liability for any defective product shall in no event exceed the purchase price for the defective product.

### **9.4 No Consequential Damages**

Advanced RF Technologies, Inc. has no liability for general, consequential, incidental or special damages.

### **9.5 Additional Limitation on Warranty**

Advanced RF Technologies, Inc. standard warranty does not cover products which have been received improperly packaged, altered, or physically damaged. For example, broken warranty seal, labels exhibiting tampering, physically abused enclosure, broken pins on connectors, any modifications made without Advanced RF Technologies, Inc. authorization, will void all warranty.

### **9.6 Return Material Authorization (RMA)**

No product may be returned directly to Advanced RF Technologies, Inc. without first getting approval from Advanced RF Technologies, Inc. If it is determined that the product may be defective, you will be given an RMA number and instructions on how to return the product. An unauthorized return, i.e., one for which an RMA number has not been issued will be returned to you at your expense. Authorized returns are to be shipped to the address on the RMA in an approved shipping container. You will be given our courier information. It is suggested that the original box and packaging materials should be kept if an occasion arises where a defective product needs to be shipped back to Advanced RF Technologies, Inc. To request an RMA, please call (800) 313-9345 or send an email to [techsupport@adrfttech.com](mailto:techsupport@adrfttech.com).

## 10. SPECIFICATIONS

Parameters		Specification		Remarks
		DL	UL	
Frequency Range (Nominal Bandwidth) (MHz)	VHF	FCC: 150~174 (24) IC: 138~144 (6), 148~174 (26)		
	UHF	FCC: 406.1~470 (64.1), 470~512 (42) IC: 406.1~430 (24.1), 450~470(20)		
Composite Output Power	VHF	28 dBm	24 dBm	
	UHF	37 dBm	27 dBm	
Rated Mean Output Power	VHF	28 dBm	24 dBm	
	UHF	37 dBm	27 dBm	
Nominal Pass Band Gain (dB)	VHF	85	85	
	UHF	95(LMR450) 85(APCO25)	95(LMR450) 85(APCO25)	
Filter selection		Narrow	Narrow	
Support Filter numbers	Narrow	Up to 8(Noncontiguous)		
Filter Bandwidth	Narrow(kHz)	6.25 ~75 (6.25 x n , n= 1~12)		Noncontiguous
Filter Roll-off		Narrow: 60dBc@Filter Bandwidth Edge + (Filter BW / 2)		
Spurious		FCC meet		
Passband Ripple		±2 dB		Any 15MHz BW
ALC Dynamic Range		60dB		
Gain Dynamic Range		45dB		
Channel Setting Resolution		0.5 kHz		
Noise Figure @ Max. gain		3.5 dB		Without Duplexer
System Group Delay		5-240us		dependent on filter bandwidth and required adjacent channel rejection
Max RF Input Power		-20dBm		
No damage Max Input Power		+10 dBm		
Impedance		Input : 50 Ohm Output: 50 Ohm		
RF Connector		4.3-10(Female)		
VSWR		< 1.5:1		
Operating Temperature		-40°F to +140°F (-40°C to +60°C)		
Humidity		10% - 90% RH Condensed		
Dimensions W x D x H		12.0 x 13.0 x 21.7 in (w/out mount bracket)		

### 10.1 Mechanical Specifications

**Table 10-1 Mechanical Specifications**

PSR-VU-9537-UA	Specifications	Comments
Dimensions W x D x H	12 x 13.51 x 28.05 in (w/o mounting bracket)	
Weight	74 lbs (w/o mounting bracket)	

RF Connector	4.3-10 (Female)	
Weather Resistances	UL Type 4	

ADRF-BBL-U	Specifications	Comments
Dimensions W x D x H	17.3 x 22.0 x 12.1 in	
Weight (w/ out batteries)	46.7 lbs.	
Weight (w/ batteries)	186.7 lbs.	
Weather Resistances	UL Type 4	

## 10.2 Power Specifications

**Table 10-2 Power Specifications**

Parameters	Specifications	Comments
Repeater Rating	PSR-VU-9537-UA: 100 – 240 VAC, 50/60 Hz, 2.49-1.02A or 54VDC, 3.02A (Battery Port Only)	
Annunciator Rating	28VDC Nominal, 108.3mA	
AC Supply Protection	Fuse & Circuit Protector	T6.3L250V
Ground	External Threaded Stud	
Battery Type	Valve Regulated, Sealed Lead Acid Rechargeable Battery	
Battery Model	ADRF-BBL-U-24: Tempest TR120-12 ADRF-BBS-U-24: Tempest TR45-12	
Battery Capacity	TR120-12: 120Ah TR45-12: 48Ah	
Maximum Current Charge	3A	
Dry Contact Relay Rating (resistive)	<ul style="list-style-type: none"> <li>• Max switching voltage: 30V DC</li> <li>• Max switching current: 5A</li> <li>• Min switching capacity: 10mA, 5V DC</li> </ul>	

### 10.3 ADRF-BBS-U-24 / ADRF-BBL-U-24 Runtime Calculations

PSR-VU-9537-UA w/ ADRF-BBL/BBS-U-24(Two BBU serial connection) Battery Runtime Calculations

PSR-VU-9537-UA (Dual Band) w/

(1) ADRF-BBL-U-24(2 serial connection for 48V)

#### Repeater

- DC Power Consumption (W) – 175.2
- DC Voltage (V) – 48
- DC Current Draw (A) – 3.65

#### (1) Battery Backup

- Battery Capacity (Ah) – 120

#### Calculations

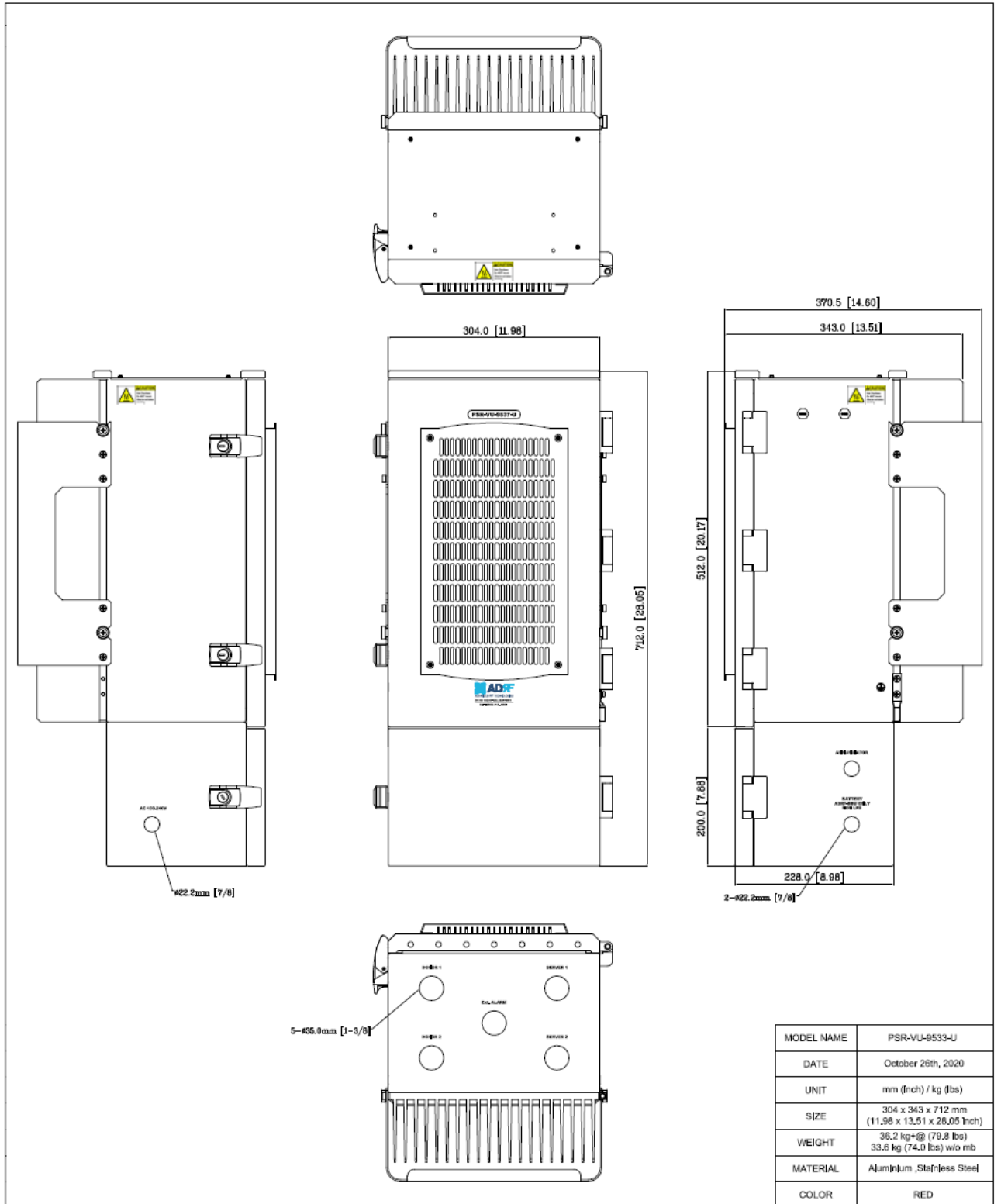
- Runtime (h) = Battery Capacity (Ah) / Current Draw (A)
- Runtime (h) = 120Ah / 3.65A
- Runtime (h) = 32.8h

### 10.4 Warranty & Certificates

Table 10-3 Warranty & Certificates

Parameters	Specifications	Comments
MTBF	> 100,000 Hours	Ambient
Compliance	UL2524 Listed	
	FCC CFR47 part 15	
	FCC CFR47 part 90	
Warranty	2 Years	

**11. MECHANICAL DRAWING**



**Figure 11-1 PSR-VU-9537-UA Mechanical Drawing**



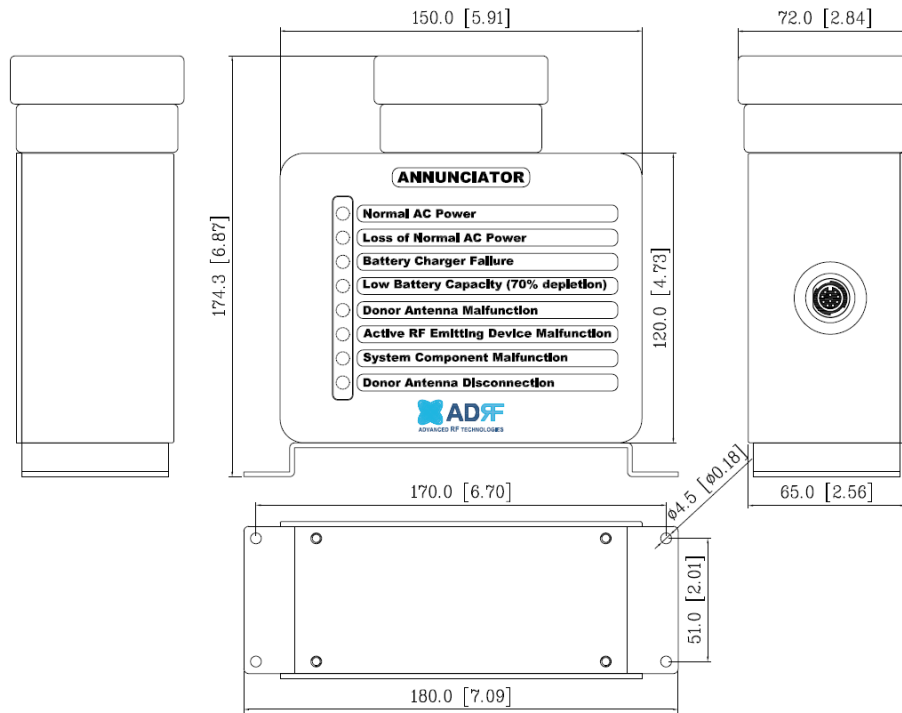
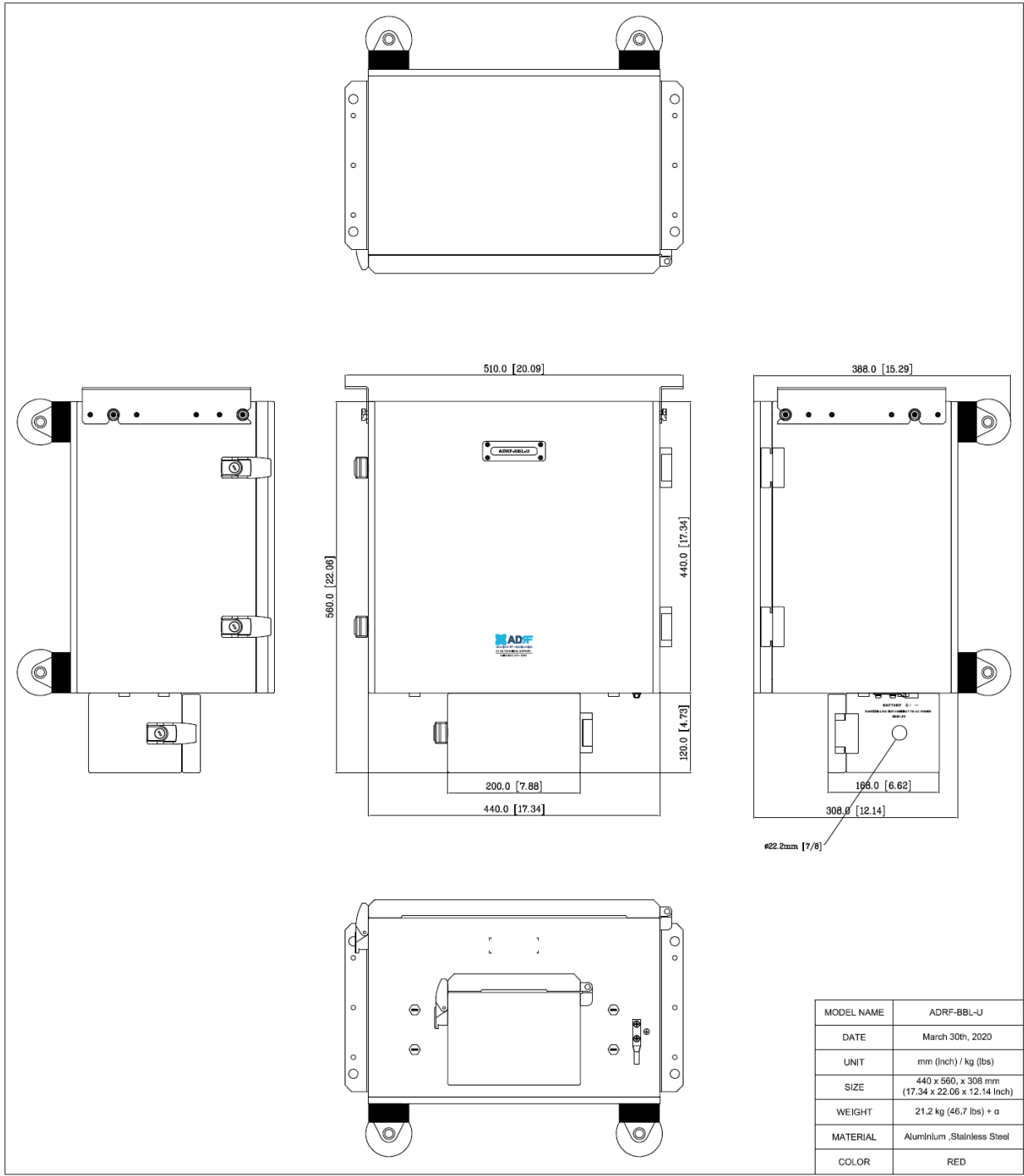
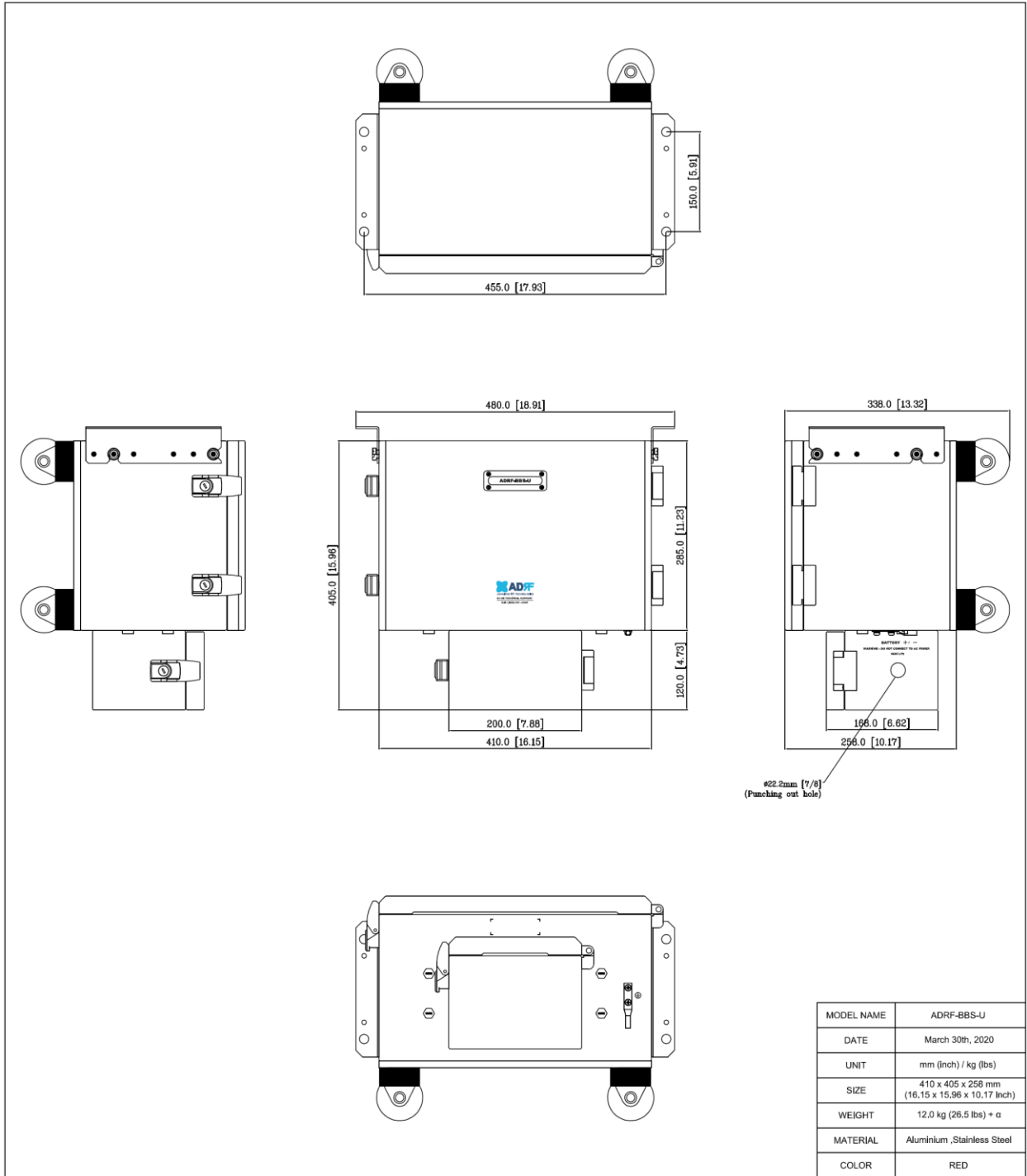


Figure 11-2 PSR-ANN Annunciator Mechanical Drawing



**Figure 11-3 ADRF-BBL-U Mechanical Drawing**



**Figure 11-4 ADRF-BBS-U Mechanical Drawing**

## 12. APPENDIX

### 12.1 Shutdown Retry Logic

The function of the built-in shutdown routine is to protect the repeater from any further damage from a hard-fail that the system may be experiencing.

Within 5 seconds of a hard-fail alarm being detected, the repeater will start the shutdown routine. The repeater will shut down by powering off the HPAs (high-powered amplifiers) for 30 seconds.

After 30 seconds have elapsed, the repeater will power on the HPAs and check to see if the hard-fail alarm still exists. If the hard-fail alarm still exists, then the repeater will shut down for 1 minute (double the time of the previous shutdown time).

After 1 minute has elapsed, the repeater will power on the HPAs and check to see if the hard-fail alarm still exists. If the hard-fail alarm still exists, then the repeater will shut down for 2 minutes (double the time of the previous shutdown time).

The shutdown routine will repeat itself a total of 10 times. If the hard-fail alarm still exists after the 10th retry, then the repeater will turn off its HPAs permanently until a reset is performed or factory set is executed.