



# RAC68BB Cabinet Setup Instructions

## I. INTRODUCTION

The purpose of this document is to assist users/installers in the mounting and configuration of the RAC68BB Cabinet that is intended to serve as a durable and environmentally controlled enclosure to mount electronics equipment and battery backup systems for outdoors deployment.

**Strict adherence to manufacturers' recommended mounting, installation, and operations procedures for sensitive electronic loads (radio systems, microwave gear, etc.) must be followed to ensure proper equipment operation, avoidance of damage, and maintenance of warranty. In many cases, a certified installer for such equipment may be required.**

Purcell Systems, Inc. is not responsible for any equipment damage or poor operating performance when those guidelines are not followed or when non-certified installers are used.

**NOTE:** This document is intended to be used as a general "guideline." To maintain warranties on various equipment installed within this cabinet, always reference and follow those specific Installation & Operations Manuals. Failure to do so may result in lapse of warranty and/or equipment damage. Further, careful attention must be given to conform to jurisdictional codes and construction covenants prior to any site install.

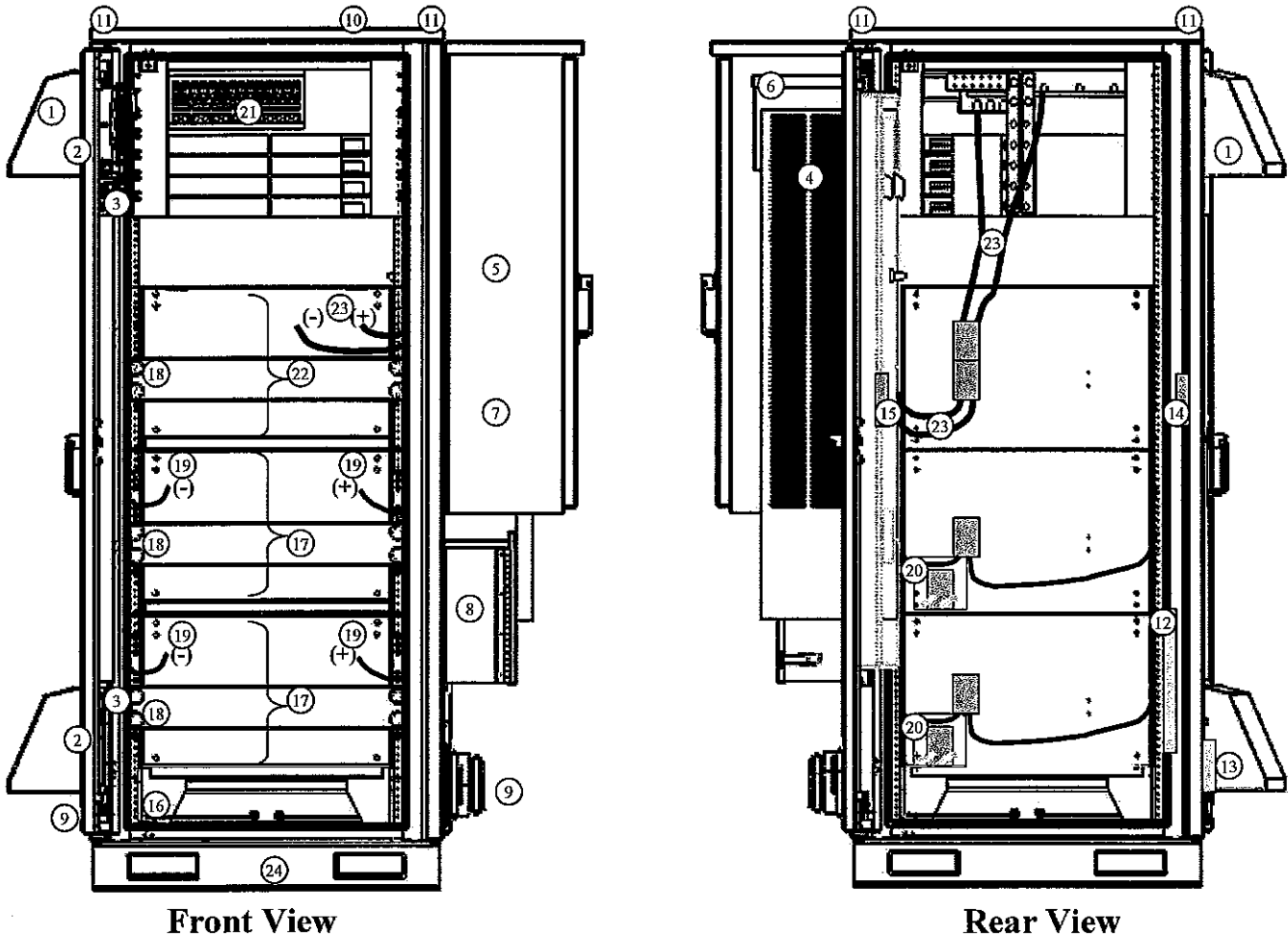
## II. TOPIC GUIDELINE

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## III. OTHER REFERENCED DOCUMENTS

- A. DC Power System "Installation and Operations Manual"
- B. Cabinet Air Conditioner Instruction Manual

#### IV. COMPONENT LAYOUT



- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Front Swing-out Door with Emergency Vent System (EVS)</li> <li>2. Emergency Vent System (Intake-Bottom, Exhaust-Top)</li> <li>3. Power leads &amp; 10A inline fuse for EVS (+ and -)</li> <li>4. Rear Swing-out Door with Air Conditioner</li> <li>5. 200A Purcell Power Cabinet (PPC) or 125A AC Load-Center</li> <li>6. Generator Inlet (PPC Option Only)</li> <li>7. Internal Strikesorb TVSS Modules (PPC Option Only)</li> <li>8. Telco Demark Cabinet (Optional)</li> <li>9. Cable Entry/Exit Ports (Both Sides)</li> <li>10. Solar Shield</li> <li>11. Lifting Eyes (4). Installed by removing Solar Shield</li> <li>12. Internal Master Ground Bar (MGB)</li> </ol> | <ol style="list-style-type: none"> <li>13. External Ground Bar (EGB, bonded to MGB)</li> <li>14. 120VAC GFI Duplex Outlet</li> <li>15. 120VAC Standard Duplex Outlet (Air Cond feed)</li> <li>16. Battery Area Riser (to allow side cable access)</li> <li>17. 48V Battery String Mounting Area (up to 4)</li> <li>18. Battery Box Retaining Bar &amp; Knobs</li> <li>19. 48V Battery Cables (-) &amp; (+) (up to 4)</li> <li>20. 48V Battery Cable Mating Kit (up to 4) for #4Cables</li> <li>21. +24VDC Power System (Optional) to power external amplifiers</li> <li>22. +24V Battery String Mounting Area (Optional)</li> <li>23. +24V Battery Cables with Quick-Disconnects (Optional)</li> <li>24. Mounting Plinth/Platform (Optional)</li> </ol> |
|---|---|

Figure 1. RAC68BB Component Layout

**A. Unpacking and Preparing for Mounting:**

**WARNING:** Do not lift a cabinet with any optional batteries installed. Once the cabinet has been securely set in place, follow instructions for battery installation.

1. Remove packaging materials to expose the cabinet as mounted on the provided palette for shipping.
2. The front door is pad-lockable (padlock provided by end-user).
3. To release the cabinet from the palette, 4 nuts & washers (at the inside corners of the Equipment Compartment) must be removed from provided mounting bolts.
4. Access the front bolts by opening the front swing-out door.
5. Access the rear bolts with the rear door open.
6. Retain mounting hardware if needed for future mounting to the pad/support structure.
7. The following table gives cabinet details so it can be determined if lifting apparatus is required for mounting or if standard hand-trucks & dollies may be used: **(Verify any transporting equipment is rated for the weights specified)**

Cabinet dimensions	68"H x ~29"W x ~31"D
Cabinet weight(s)	250 lbs. (Cabinet only),+50 lbs. (DC Plant/Rectifiers),+100 lbs. (Air Cond.)

**B. Cabinet Install (Pad Layout):**

**WARNING:** Personal Injury Hazard

**\*Carefully factor in the combined weight of all materials to be lifted (cabinet, internal equipment, air conditioners, etc.) before engineering a lifting apparatus. A site installation engineer should be consulted to verify adequate support prior to lifting anything.**

**\*Further, DO NOT lift the cabinet with batteries installed. The structure may bend from the excessive weight causing damage to the cabinet and/or the batteries resulting in a potentially hazardous material spill.**

**\*Carefully follow any installation directions from the manufacturers of installed equipment (radio gear, etc.) which may include populating the cabinet after it has been lifted on site. Failure to do so may result in equipment damage and lapse of warranty.**

Figure 2 below shows the pad layout for mounting hardware for the RAC68BB battery cabinet. The cabinet can support up to 4 strings of 48VDC, 170Ahr batteries for a combined weight of ~2500 lbs. The bottom area of the cabinet is ~6.03 ft<sup>2</sup> which means that the pad (or supporting structure) **must be designed to support 415 lbs./ft<sup>2</sup> minimum:**

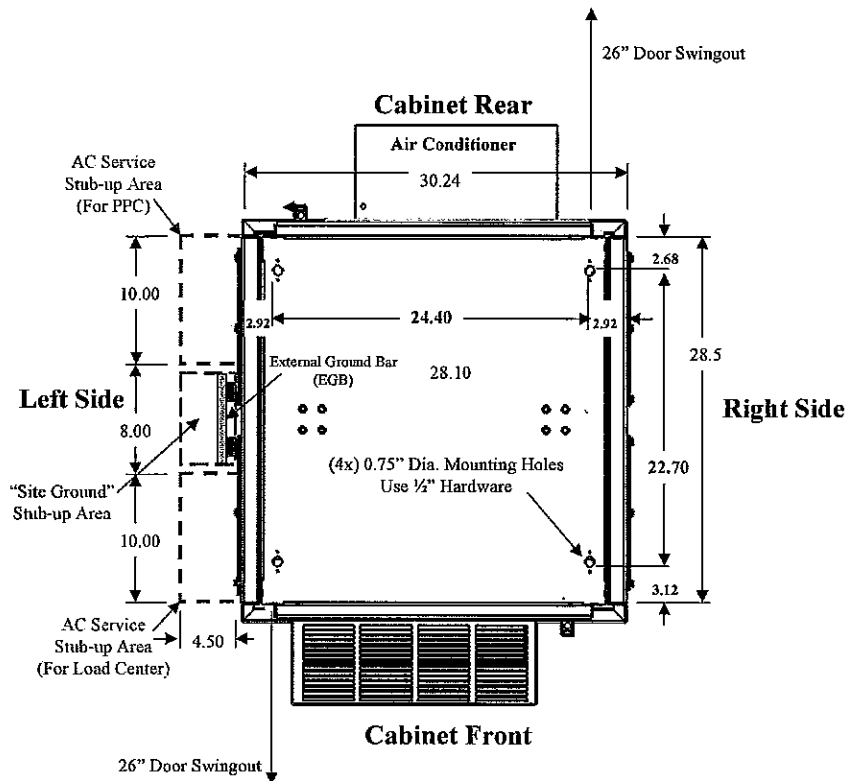


Figure 2: RAC68BB Pad Layout. (All dimensions are in inches. View is looking down onto pad.)

**Pad Install:**

1. Install 1/2" mounting bolts (extended 2" from the pad surface) in the pad according to the layout in Figure 2 (use dimensions in RED Text).
2. If the cabinet is not mounted on an integrated plinth (item 24, Figure 1), place the provided neoprene pad-gasket over the bolts to hold it in place. If mounting on a raised steel grating, the pad-gasket is not required but can be used if the grating is not adequately galvanized.
3. The cabinet lifting eyes are attached to the inside rack rail for shipping. Open the rear door and retrieve them for mounting.
4. To install the lifting eyes, first remove the top Solar Shield.
5. Secure the lifting eyes into the threaded sockets at the 4 corners of the cabinet.
6. Secure lifting apparatus designed for the load to the 4 lifting eyes.
7. Lift the cabinet and then lower it onto the pad over the mounting bolts. If mounting on a steel grating, lower the cabinet on the grating first and then install retaining hardware after it is in place.
8. Once the bolts are threaded through the mounting holes, lock cabinet down securely using 1/2" hardware (flat & lock washers and nuts).

**C. Grounding Service Connection:**

1. The various grounded components of the cabinet (Rack Grounds, AC Power Ground, DC Plant zero voltage reference [optional]) are bonded to the cabinet's Master Ground Bar (MGB) which is accessed on the right side of the cabinet after opening the rear door. The MGB is then bonded to the External Ground Bar (EGB). See Figure 3 below.
2. All necessary grounds for future equipment to be installed in the Equipment Compartment should be bonded to the MGB (see Figure 2) via 2-hole lugs (5/8" centers, 1/4"x20 stainless steel hardware) or the rack rails.
3. A ground riser from the site "Single-Point Ground" (e.g. buried ring) should be stubbed up below the EGB on the left side of the cabinet (See the area on the center left side with the green dashed lines in Figure 2). This riser is typically a #2 AWG solid tinned-copper conductor.

- The ground riser should be bonded to the EGB via CAD-weld.

**NOTE:** Adherence to grounding specifications from the end-user and equipment manufacturers is strongly recommended. Failure to do so could create opportunity for damaged equipment and may void equipment warranties.

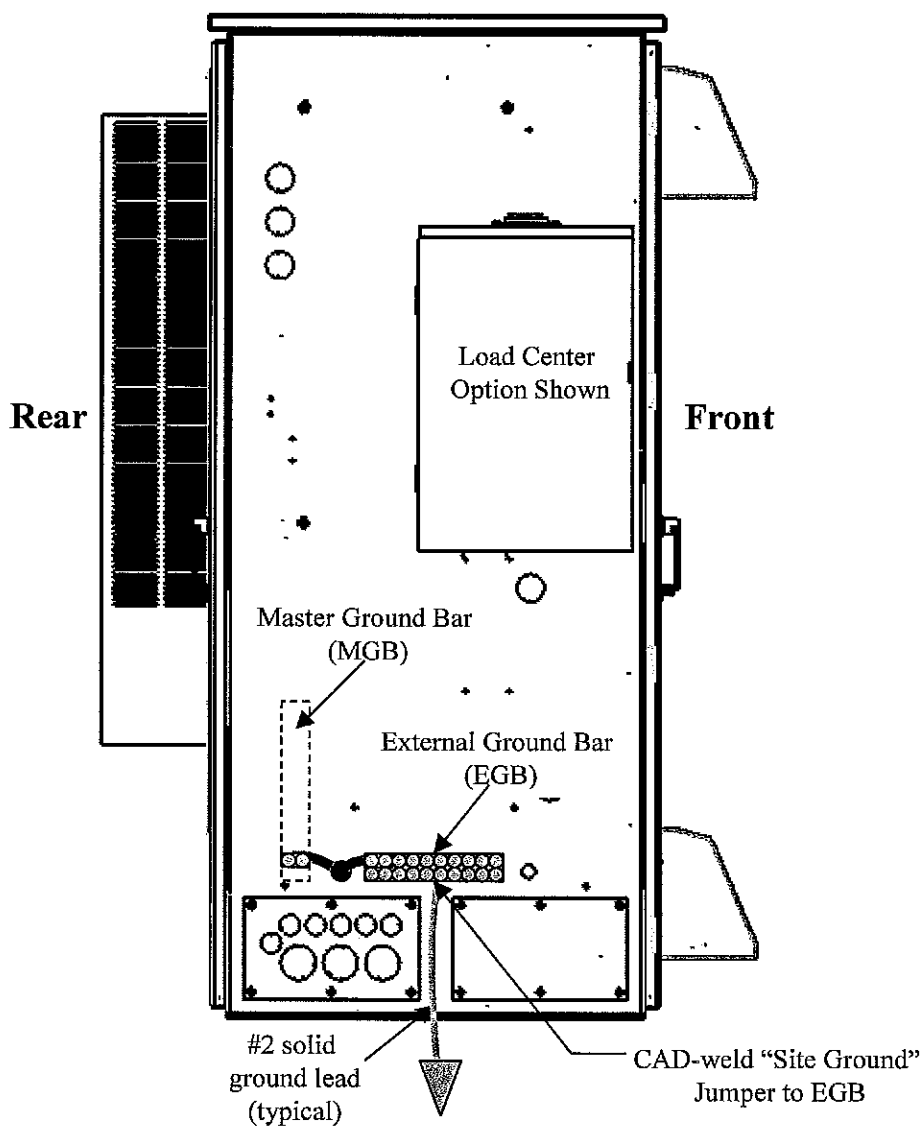


Figure 3. "Site Ground" Connection. Left-Side of Cabinet Shown.

**D. AC Power Service Connection (Incoming AC):**



**\*\*CAUTION\*\***  
 A qualified electrician should perform the procedures listed. The procedures outlined are recommended guidelines; be sure to follow the NEC, CEC (National Electrical Code, Canadian Electrical Code) and local codes.  
 Further, product manuals & labels from manufacturers (Purcell Systems, SquareD) are enclosed in the load-center for reference. Refer to that documentation for specific questions on any wiring or labeling.

The RAC68BB comes configured with one of two options for AC Power demarcation and distribution as seen in Figure 3 (Purcell Power Cabinet [PPC] or a SquareD Load-Center). The following Table gives information/specifications on these options:

	Pwr Dist Unit	Service Voltage (VAC)	Main/Gen Bkr Rating (Amps)	Main Bkr AIC Rating	Load-Center Bkr Positions
1	200A PPC w/ Gen Recept	240/120, 1- $\Phi$	200/200	65,000 Amps	24
2	125A Load-Center	240/120, 1- $\Phi$	125	Main Lugs	16

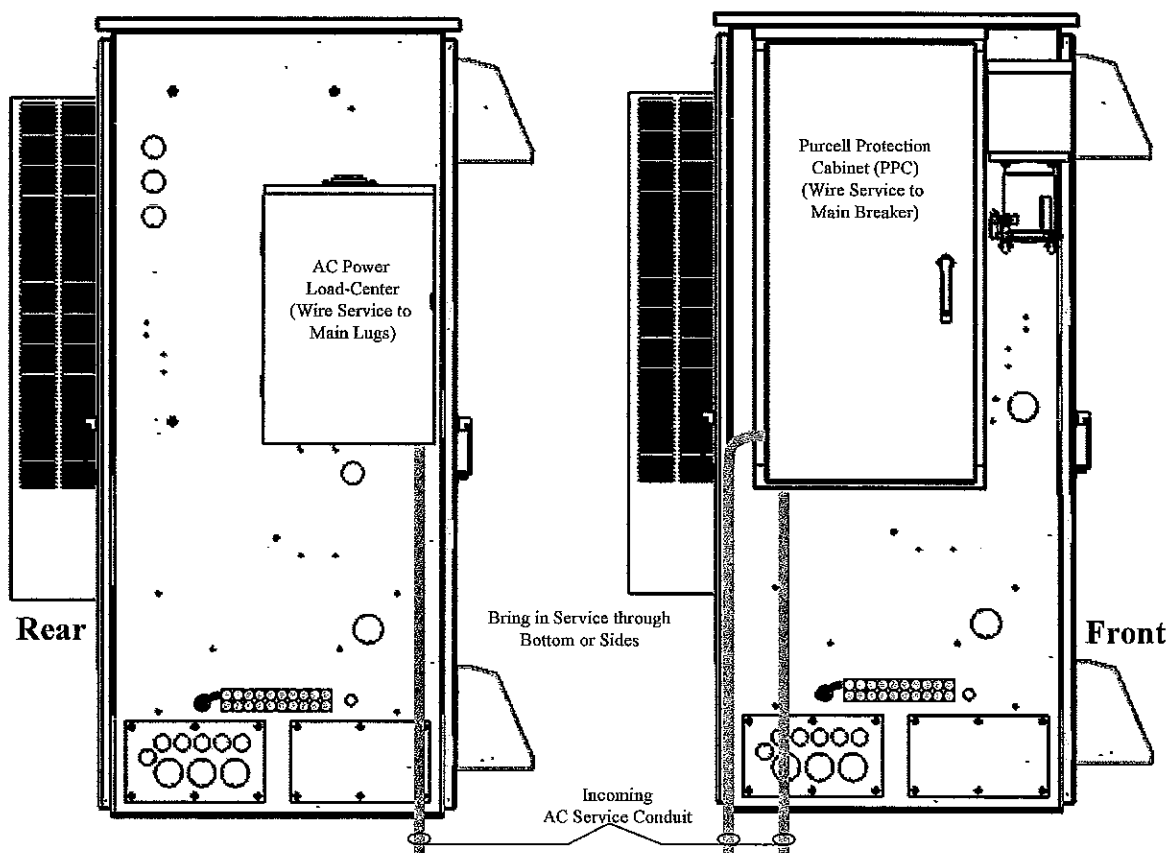


Figure 3: Left-side View showing AC Service Equipment.

**AC Power Hookup using Purcell Power Cabinet (PPC) with Generator Receptacle:**

For RAC813031-NK cabinets using the PPC for AC power distribution, it is assumed that the site meter is mounted at a remote location and the incoming service is brought to the cabinet in either appropriately sized conduit (see Figure 3) or an overhead drop.

Once the AC service is brought to the cabinet, it is designed to enter through a field-punched cut-out either on the right side or bottom of the PPC and be terminated as described below:

1. Install adequately sized conduit & fittings from the previously installed utility service stub-up area (See Figure 2) and connect to the PPC through a field-punched cut-out in the left side or bottom.
2. The internal connections points can be accessed by opening the PPC's swing-out dead-front.
3. The two "hot" conductors (Line1 & Line2) should be installed in the "Utility Main Breaker Input Lugs" on the top of the Commercial Main Breaker (see Figure 4).
4. The Neutral conductor (white) should be installed in the large lug position of the Neutral Buss located directly below the Main Breakers.
5. The Ground conductor (green) should be installed in an available position on the Ground Buss located near the Commercial Main Breaker (see Figure 4).
6. Under normal circumstances, the "Manual Transfer Switch" (sliding bar) should have the open end over the left-most breaker allowing the Commercial Disconnect to be ON (see Figure 4).
7. The electrician should ensure all other breaker, ground & neutral connections are secure & tight before closing up the PPC dead-front & cover.

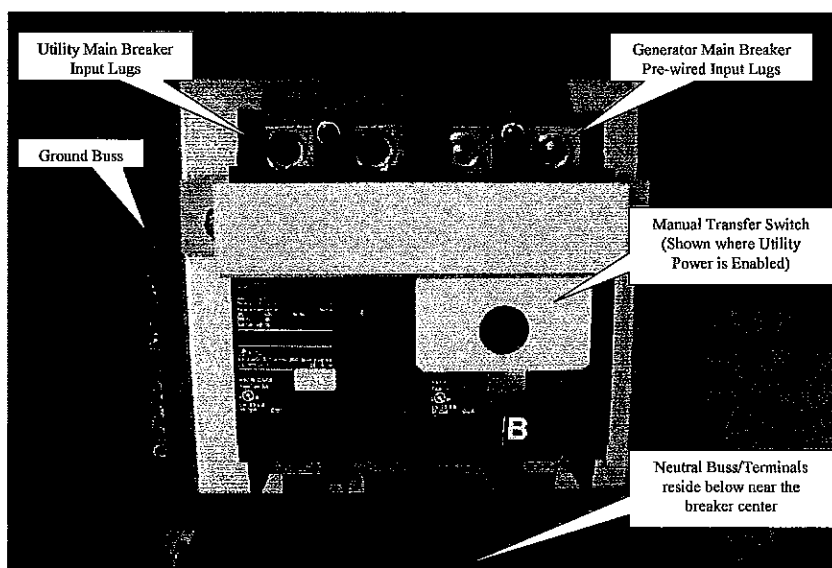


Figure 4. PPC Main Breaker Layout (left: Commercial Power, right: Generator)

**Generator Operation (refer to Figure 4 for procedures):**

During the loss of Commercial power, it may be necessary to switch over to generator power by hooking a generator up to the provided Generator Input on the right side of the PPC. This input is pre-wired to the Generator Main Breaker, Neutral & Ground busses.

1. Connect portable generator connector to the side input of the PPC.
2. Open the front door of the PPC to access the Manual Transfer Switch (it should be positioned so that the blocking "tab" is over the Generator Main Disconnect (right side breaker).
3. To slide the Manual Transfer Switch to a position where the Generator Disconnect can be turned ON, you must first turn the Commercial Disconnect OFF (slide switch lever DOWN).
4. Move the blocking "tab" of the Manual Transfer Switch to the leftmost position.

5. Now the Generator Disconnect can be set to the ON position (slide switch lever UP). This will allow the generator to feed power to the load-center below.
6. Once commercial power is restored, the Generator disconnect can be set to the OFF position, the Manual Transfer Switch can be moved, and the Commercial disconnect turned back ON.

**AC Service Delivery & Connection with the Load-Center Option:**

For RAC68BB cabinets using the Load-Center option for AC power distribution, it is assumed that the cabinet is being fed from a breaker in an existing upline Power Demarcation cabinet.

1. A 2-pole breaker in an upline cabinet should feed a 240/120VAC service (Line1, Line2, Neutral & Ground) to the RAC68BB cabinet through conduit that has been stubbed up below the AC load-center as seen in Figure 2. Size the feeder breaker according to the application (may range from 20A [48V battery boxes only installed] to 100A [internal DC Plant installed to power external amplifiers]).
2. Connect the conduit all the way to the SquareD panel through a Knock Out (K.O.) located either on the bottom or side. See Figure 4. You can access the interior of the SquareD panel by removing the screws holding on the dead-front.
3. Since there is no local “disconnect breaker,” the incoming “hot” conductors (Line1 & Line2) should be connected to the “Main Lug Inputs” located above the pre-installed breakers (see Figure5).
4. The Neutral (white) conductor should be installed to the large lug location on the load-center’s neutral buss located to the left of the Line1 & Line2 lugs. (see Figure5)
5. The Ground (green) conductor should be installed into an available position in the load-center’s ground buss located on the left side in the cabinet. (see Figure5)
6. Additional QO-style breakers can be installed & wired before the cover is replaced.

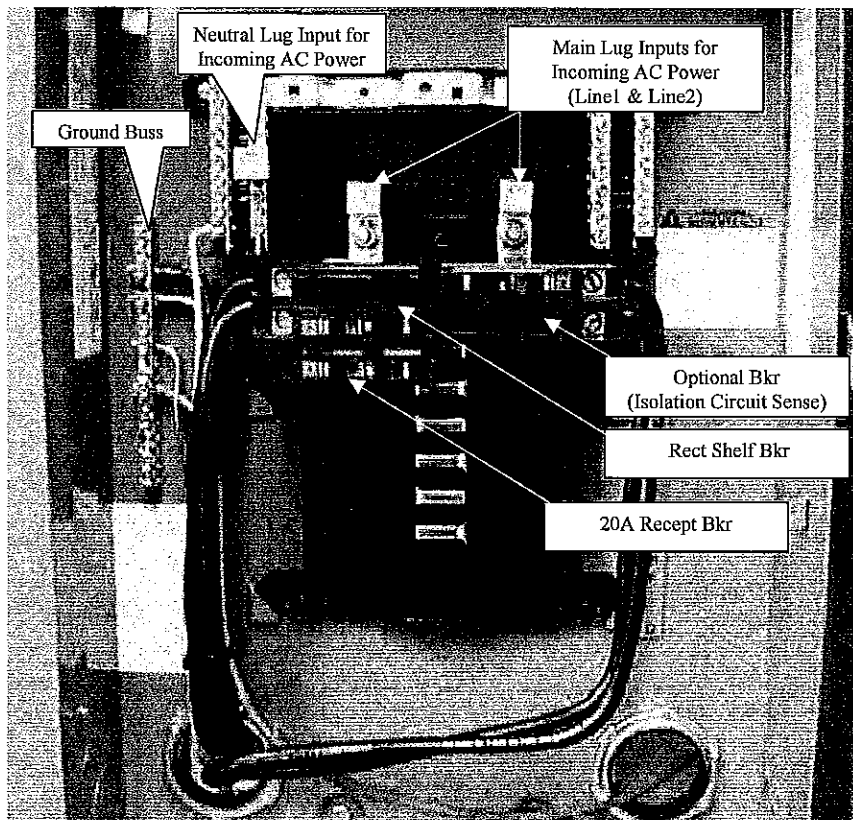


Figure 5. SquareD Load-Center Layout

**E. Battery Installation:**

**CAUTION:** Installation or maintenance of batteries should be done by qualified personnel because of potential exposure to harmful DC voltages and chemicals if batteries are misconnected or damaged. **The Battery Quick-Disconnects should always be OPEN when working on the batteries.** Further, careful attention should be given for proper battery polarity connection. Failure to connect batteries correctly could result in injury to personnel from arcing and damage to the DC rectifiers and any connected equipment that may void its warranty. Batteries are very heavy so extreme caution should be exercised when handling.

The RAC68BB can be configured in either of the following 2 possible ways:

Config	Description	Qty of 48V Batt Strings	Qty of 24V Batt Strings	Max. Battery Size
1	48V Batt Strings Only	Up to 4	0	170 AmpHr VRLA
2	24V DC Plant w/ Batt Backup and various 48V Batt Strings	Up to 2	Up to 2	170 AmpHr VRLA

Further, battery cables are pre-connected to the 48V Battery Boxes and/or 24V DC Power Plant making hook-up fast and easy.

1. Open the front door of the cabinet after it has been securely mounted in place. Locate the battery trays (up to 4, String 1 on the bottom, String 2 above String 1, etc.). See Figure 6.
2. **Make sure the Battery Quick-Disconnects are OPEN.**
3. At initial installation, any Rectifiers (packaged in boxes) or documentation kits located in the battery trays need to be removed and stored in a safe location.

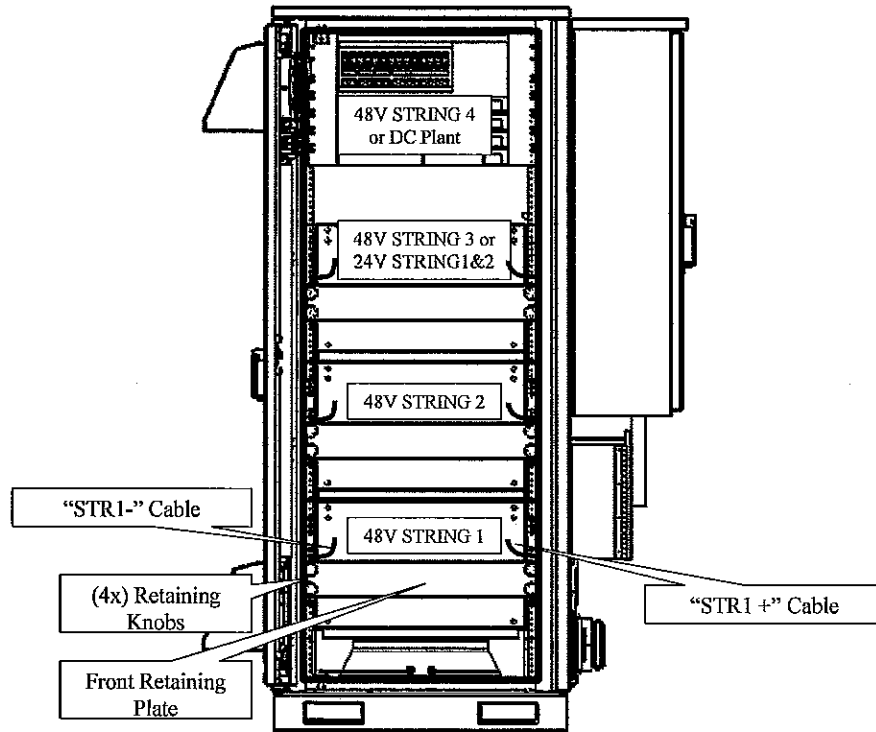


Figure 6. Battery Installation Layout.

4. Remove the front retaining plates for each tray where batteries are to be installed by unscrewing the (4) knobs holding them in place. Retain the plate & knob for reinstall.
  5. Move the battery cables out of the way during battery install.
  6. The batteries should be placed so there is ~ ½" gap between them (there should be 4 to a tray). Start from the bottom (String1).
  7. The battery connection cables come pre-crimped with a 1-hole lug to connect to the (-) terminal of the left-most battery and (+) terminal of the right-most battery for each string (See Figure 6). For safety, they have insulating heat-shrink over the metal lugs. For each string of batteries to be installed ONLY, strip off the insulation covering the metallic lug on the battery cables.
  8. Once the lugs are exposed, connect the "STR1 +" cable to the (+) terminal of the right battery.
  9. Next, connect the "STR1 -" cable to the (-) terminal of the left battery. (See Figure 6).
- Connect battery cables to right & left batteries before any intercell connectors are installed**
10. Install 3 intercell connectors across the battery string ([+] terminal of left battery to [-] terminal of adjacent battery to the right). **NOTE:** When the last intercell connector is attached, there may be a slight spark. This is normal operation.
  11. If a 2<sup>nd</sup>, 3<sup>rd</sup> or 4<sup>th</sup> string of batteries is to be installed, follow steps 8-10 above for those strings.
  12. When all batteries are installed, engage the Battery Quick-Disconnects as needed.

**F. DC Power Plant Setup & Operations:**

\*Refer to the Installation & Operations Manual of the provided DC Plant for specifics on issues relating to the DC Power Plant (installation, maintenance, etc.)

**G. DC Power Output Connections:**

Purcell Systems' RAC68BB is designed to provide Power Output/Backup for either or both of the following configurations:

1. When 48V Battery Strings & a 24V DC Plant is installed: Each 48V battery string connects to an external load (typically a radio cabinet [BTS]) via the rear 175A Quick-Disconnects while the 24V DC Plant powers external Amplifiers.
2. When 48V Battery Strings ONLY are installed: Each 48V battery string connects to an external load (typically a radio cabinet [BTS]) via the rear 175A Quick-Disconnects.

For Configuration 1 above, refer to the Installation & Operations Guide provided for the 24V DC System to connect to external loads.

For Configuration 2 above, do the following to connect each 48V battery string to its dedicated load to be backed-up:

1. Figure 7 shows the rear cabinet door open and the areas where the external DC Power connections (+ & -) will be made.

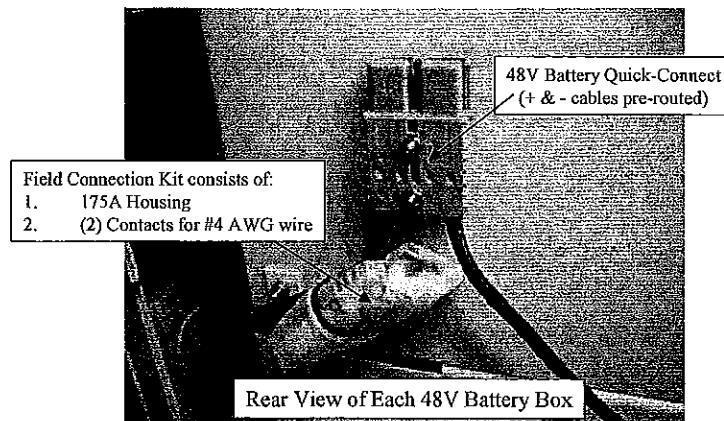


Figure 7: DC Power Connection Points for External DC Loads (BTS's)

2. The cables that will feed external loads (BTS's) should be routed into the cabinet through an available K.O. in the side plates (see Figure 8 below). Appropriate conduit & fittings should be used to maintain the environmental integrity of the cabinet. Cables should be #4 and have sufficient length to reach the connection point shown in Figure 7 for each 48V Battery Box.
3. The "Battery-End" of the Quick-Disconnect cables is pre-attached to the battery box and route around to the front to connect to the batteries. See Figure 7.
4. The "Load-End" of the Quick-Disconnect cables must be assembled in-the-field using the provided "Field Connection Kit" which consists of a 175A dual-input housing and (2) contacts to be crimped onto the incoming #4 cables. See Figure 7.
5. Crimp 1 contact onto the -48V feed to the external load and insert it into the (-) terminal of the housing.
6. Crimp the other contact onto the Zero Volt (Return) feed to the external load and insert it into the (+) terminal of the housing.
7. **Before connecting the "Load-End" to the "Battery-End" of the Quick-Disconnect cables, verify that the feeder circuit is properly connected & secured to the external load (BTS) with the correct polarity. Failure to do so may damage the equipment.**
8. Repeat steps 2 through 7 for all external loads to be fed.
9. Using cable ties, secure the DC Output connections (+ & -) to the cabinet frame or existing wiring to provide some strain-relief.

**H. Input/Output Cabling Connections:**

Figure 8 below shows the modular plates used for cable entry/exit. The cabinet has 4 ports total (2 on each side) and has covers with the following configuration:

1. 2 Blanks
2. 2 with various sized conduit K.O.'s

The plates can be rotated to route cables based on specific customer needs.

**NOTE:** Verify approved weather-tight fittings are used when entering/existing the cabinet.

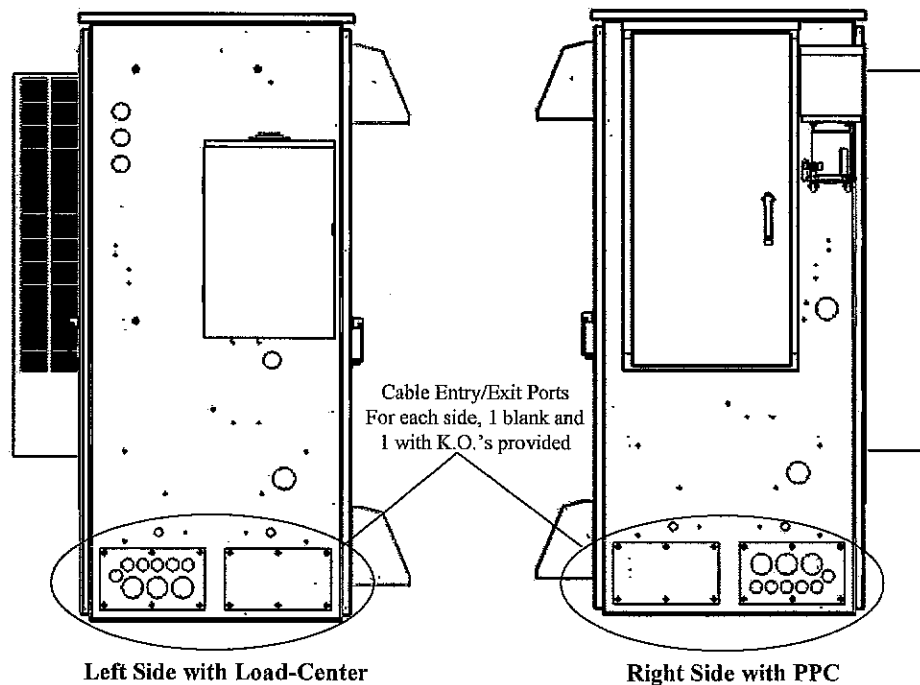


Figure 8. Entry/Exit Ports for Cabling/Conduit.

**I. Air Conditioner Considerations:**

An air conditioner is mounted on the rear door of the RAC68BB cabinet to regulate internal cabinet temperatures. The thermostat to control the A/C turn-on point is accessible by removing the outer cover & screen filter on the unit. Its default turn-on point is ~78degF. This can be adjusted by using a flat-head screwdriver to rotate the set point screw clockwise (colder) or counter-clockwise (warmer). Approximate temperature settings are around the circumference of this control knob. It also has a 500 Watt internal heater for use during colder months designed to turn on at 40degF. This turn-on point is not adjustable.

Each cabinet has the corresponding “Installation & Operations Manual” for the attached air conditioner included in the documentation package. Please refer to that manual for specific information related to that product. Retain that manual for any future maintenance.

**F. Hi-Heat Emergency Vent System (EVS) Details:**

Figure 8 below shows the components of the Hi-Heat Emergency Vent System. Both the upper exhaust (fan evacuated) and lower intake ports feature compression-sealed motorized dampers to maintain the environmental integrity of the cabinet when the internal cabinet temperature is below the turn-on threshold controlled by the BLUE thermostat knob. Once that threshold is exceeded (indicating an emergency situation like AC Power or Air Conditioner Failure, the system draws DC power from the batteries to open the dampers and run the fans to cool with ambient air. The RED thermostat knob controls the setpoint at which a Normally Closed dry-contact alarm (Open on alarm) is asserted for remote monitoring of a high-heat situation.

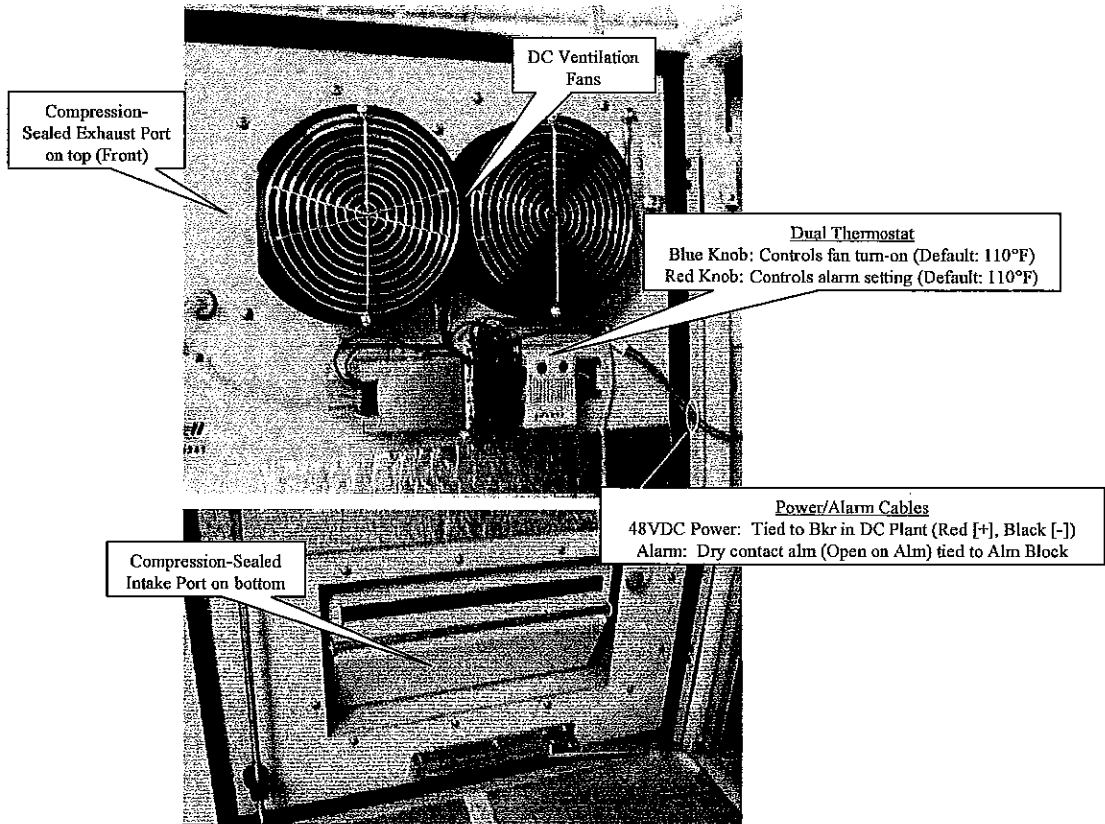


Figure 8: Hi-Heat Emergency Vent System (EVS) Layout

**To Test Fan & Damper Operation:**

1. Verify the DC Breaker feeding the EVS to test is in the ON position and that 48V power is available either through rectifier or battery power.  
**NOTE: The EVS is a +48V system. Verify correct polarity so that the + DC power terminal connects to the RED feed wire.**
2. Using a small flat-head screw-driver, rotate the BLUE knob counter-clockwise until the setpoint is below the ambient temperature.
3. You should hear the relay click engaging the DC fans and causing the motors to open the intake & exhaust dampers.
4. Once system operation is verified, rotate the BLUE knob clockwise until the system shuts off and adjust the setpoint back to the factory default of 110°F.

**To Test the Alarm Transport:**

1. Using a small flat-head screw-driver, rotate the RED knob counter-clockwise until the setpoint is below the ambient temperature.
2. The alarm contacts at the thermostat & the main alarm terminal block of the Power Cabinet should change from a "Closed" state to an "Open" state.
3. Once system operation is verified, rotate the RED knob clockwise to the factory default of 110°F. You should see the alarm state change back to "Closed."

**For any additional questions please contact Purcell Systems at (509) 755-0341**

