



# NetSure™ 2100 Series -48 VDC Power System

## Installation Manual

Specification Number: 582138000

Model Number: 2100

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### **Technical Support Site**

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures.

Visit <https://www.vertiv.com/en-us/support/> for additional assistance.

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## Admonishments Used in this Document



**DANGER!** Warns of a hazard the reader *will* be exposed to that will *likely* result in death or serious injury if not avoided. (ANSI, OSHA)



**WARNING!** Warns of a potential hazard the reader *may* be exposed to that *could* result in death or serious injury if not avoided. This admonition is not used for situations that pose a risk only to equipment, software, data, or service. (ANSI)



**CAUTION!** Warns of a potential hazard the reader *may* be exposed to that *could* result in minor or moderate injury if not avoided. (ANSI, OSHA) This admonition is not used for situations that pose a risk only to equipment, data, or service, even if such use appears to be permitted in some of the applicable standards. (OSHA)



**ALERT!** Alerts the reader to an action that *must be avoided* in order to protect equipment, software, data, or service. (ISO)



**ALERT!** Alerts the reader to an action that *must be performed* in order to prevent equipment damage, software corruption, data loss, or service interruption. (ISO)



**FIRE SAFETY!** Informs the reader of fire safety information, reminders, precautions, or policies, or of the locations of fire-fighting and fire-safety equipment. (ISO)



**SAFETY!** Informs the reader of general safety information, reminders, precautions, or policies not related to a particular source of hazard or to fire safety. (ISO, ANSI, OSHA)

# **Important Safety Instructions**

## **Safety Admonishments Definitions**

Definitions of the safety admonishments used in this document are listed under “Admonishments Used in this Document” on page v.

## **Safety and Regulatory Statements**

Refer to Section 4154 (provided with your customer documentation) for Safety and Regulatory Statements.

## **Déclarations de Sécurité et de Réglementation**

Reportez-vous à la Section 4154 (fourni avec les documents de votre client) pour les déclarations de sécurité et de réglementation.

# 1 Customer Documentation Package

This document (IM582138000) provides Installation Instructions for the Vertiv™ NetSure™ 2100 -48 VDC Power System: Model 2100, Spec. No. 582138000.

The complete Customer Documentation Package consists of...

Document Number	Document Description	How Provided
IM582138000	Power System Installation Instructions	Printed Manual and PDF File
UM1M831ANA	Mini Control Unit User Instructions	Printed Manual and PDF File
(per configuration file loaded into controller)	Mini Control Unit Configuration Drawing (C-drawing)	Printed Document and PDF File
UM582138000	Power System User Instructions	PDF files are provided on a supplied USB drive. See also Note 1.
SAG582138000	Power System "System Application Guide"	
UM1R481000e3	Rectifier Instructions	
Section 4154	Contact Information Page	
SD582138000	Power System Schematic Diagram	
T582138000	Power System Wiring Diagram	

**Note 1:** Also provided on the USB drive is a controller configuration drawing and the controller configuration files loaded into the controller as shipped.

For factory settings of all configurable controller parameters, refer to the controller configuration drawing (C-drawing) supplied with your power system.

## 2 Installation Acceptance Checklist

Provided in this section is an Installation Acceptance Checklist. This checklist helps ensure proper installation and initial operation of the system. As the procedures presented in this document are completed, check the appropriate box on this list. If the procedure is not required to be performed for your installation site, also check the box in this list to indicate that the procedure was read. When installation is done, ensure that each block in this list has been checked. Some of these procedures may have been factory performed for you.



**NOTE!** The system is not powered up until the end of this checklist.



**NOTE!** Some of these procedures may have been performed at the factory for you.

### Installing the System

- Relay Rack Secured to Floor (if furnished)
- System Secured to Relay Rack or Cabinet Equipment Rack (if required)
- System Secured to Suitable Wall (if required)
- Optional Battery Tray Installed
- Optional Battery Tray Battery Disconnect Circuit Breaker Installed
- Circuit Breakers and/or Fuses Installed

- Optional Battery Cabinet Installed
- Optional External IB5 Kit Installed
- Supplied USB Drive Storage Pouch Attached Near Power System

### **Making Electrical Connections**

- Relay Rack / Cabinet Frame Grounding Connection Made
- System Shelf Frame Grounding Connection Made
- Central Office Ground Connection Made
- Rectifier Input (AC or DC) and Input Equipment Grounding (AC or DC) Connections Made
- External Alarm, Reference, Monitoring, and Control Connections Made
- Mini Control Unit Ethernet Port Connection Made
- Mini Control Unit Second Ethernet Port Connection Made (if required)
- Load Connections Made
- Battery Connections Made
  - Batteries Installed and Connected in an Optional Battery Tray
  - Batteries Installed and Connected in an Optional Battery Cabinet
  - External Batteries Connected

### **Installing the Modules**

- Rectifier Modules Installed

### **Initially Starting the System**

- System Started, Configured, and Checked

## 3 Installing the System

### 3.1 General Requirements



**NOTE!** The system is furnished for 19" mounting as standard. For 23" mounting, replace the 19" mounting brackets on the shelf with the 23" mounting brackets (supplied with the system). A wall mounting option is also available. See SAG582138000 for ordering information.

- The installer should be familiar with the installation requirements and techniques to be used in securing the relay rack (if furnished) to the floor.
- The installer should be familiar with the installation requirements and techniques to be used in securing the system to a relay rack or equipment rack.
  - The top rear cover needs to be removed to access the battery and/or CO ground connection points. If other equipment is mounted above the shelf, leave enough clearance to access the screws securing the cover.
- The installer should be familiar with the installation requirements and techniques to be used in securing the system to a suitable wall (if required).
- This product is intended only for installation in a restricted access location on or above a non-combustible surface.
- This product must be located in a controlled environment with access to crafts persons only.
- This product is intended for installation in network telecommunication facilities (CO, vault, hut, or other environmentally controlled electronic equipment enclosure).
- This product is intended for connection to the common bonding network in a network telecommunication facility (CO, vault, hut, or other environmentally controlled electronic equipment enclosure).
- The DC return connection to this system can remain isolated from system frame and chassis (DC-I).
- This system is suitable for installation as part of the Common Bonding Network (CBN).
- The system must be mounted in an environment that does not exceed the rated operating ambient temperature range found in SAG582138000.
- Clearance requirements are (relay rack or equipment rack):
  - Minimum clearance is one inch from the face of the rectifier modules and one inch from the surface of the rear sheet metal (for ventilation only; operation, installation and maintenance require more clearance).
  - Recommended minimum aisle space clearance for the front of each bay is 2' 6" (for operation and maintenance).
  - Recommended minimum aisle space clearance for the rear of each bay is 2' 0" (for installation and maintenance).
  - List AA and CA: No space required above or below the unit (for ventilation only, installation and maintenance may require more clearance).
  - List BA and BB: 1RU of space is required above (preferred) or below the unit (for ventilation only, installation and maintenance may require more clearance).
- Clearance requirements are (cabinet or wall mounting):
  - Minimum clearance is one inch from the face of the rectifier modules and one inch from the surface of the rear sheet metal (for ventilation only; operation, installation, and maintenance require more clearance).
  - The system may also be mounted horizontally or vertically. Vertical mounting can be with the distribution located at the top of the unit orientation or at the bottom of the unit orientation.

## 3.2 Physical Security

This product is designed and intended to be deployed and operated in a physically secure and network firewall-protected location. Vertiv recommends a review of the physical security and operating environment of the unit. Since an attacker or disgruntled user can cause serious disruption, below are some recommended best practices that include, but are not limited to:

- Restrict access to areas, racks, and units with encrypted card RFID/badges, unique multi-factor passcode authentication for access, man traps, and biometric scanners for physical access to the equipment.
- Have trusted and background-checked security guards with 24x7x365 physical presence and written logs to help document and note physical access to a data center, building, rack, and so on.
- Restrict physical access to telecommunications equipment and network cabling. Physical access to the telecommunications lines and network cabling should be restricted to protect against attempts to intercept or sabotage communications. Best practices include use of metal conduits for the network cabling running between equipment cabinets.
- All USB, RJ45, and/or any other physical ports should be restricted on the units.
- Do not connect removable media (such as USB devices, SD cards, and so on) for any operation (such as firmware upgrade, configuration change, or boot application change) unless the origin of media is known and trusted. Before connecting any portable device through a USB port or SD card slot, scan the device for malware and viruses.

## 3.3 Securing the Relay Rack to the Floor (if furnished)

Secure the relay rack to the floor per site requirements. Refer to “General Requirements” on page 3.

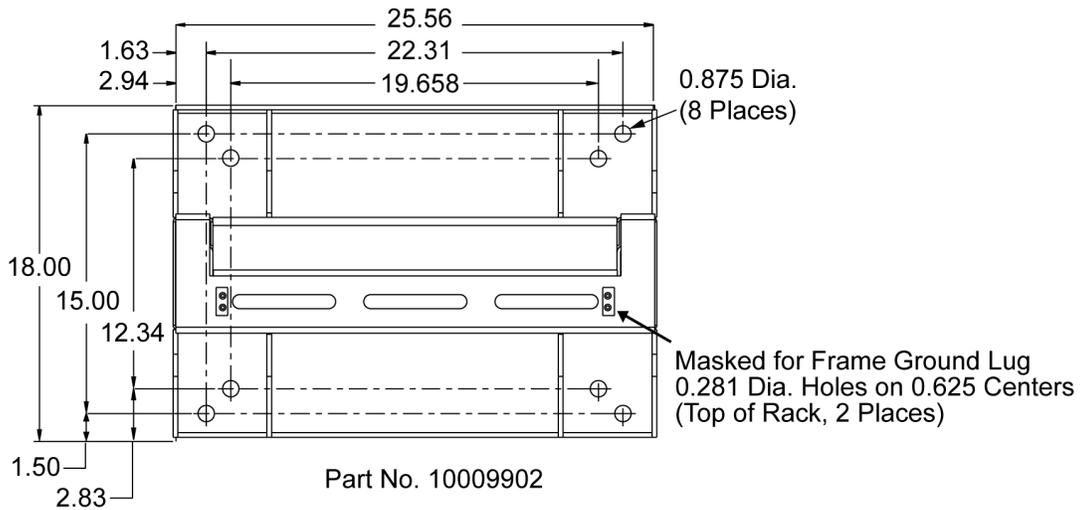
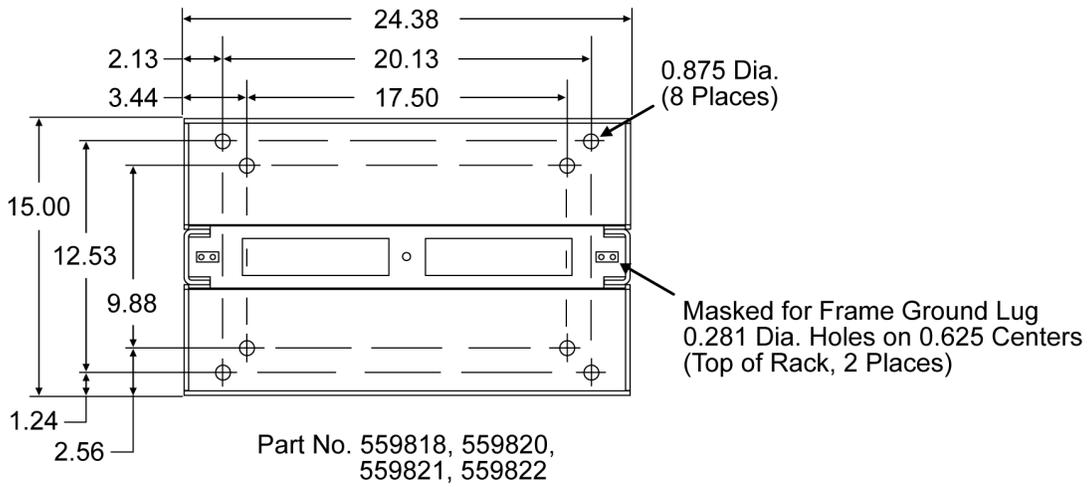
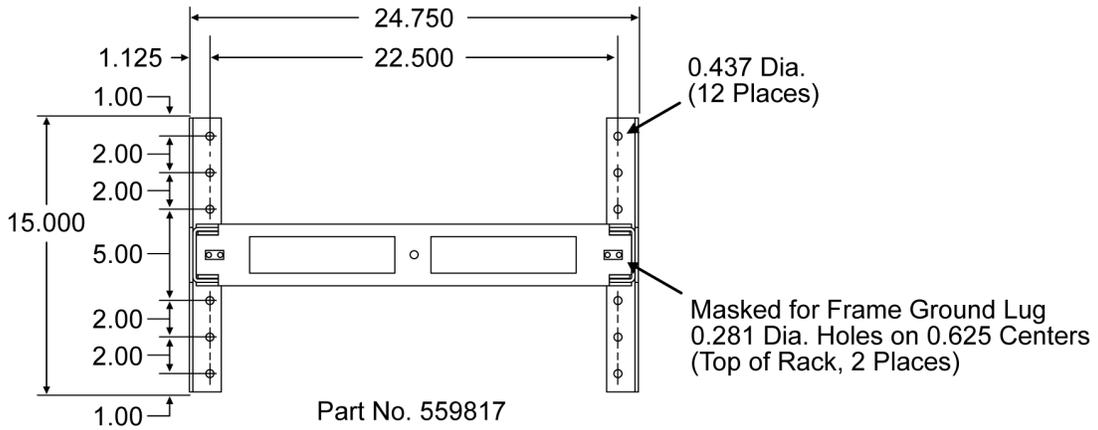
### **Ventilation Requirements**

Refer to “General Requirements” on page 3.

### **Relay Rack Floor Mounting Dimensions**

Refer to Figure 3.1 and Figure 3.2 for relay rack floor mounting dimensions.

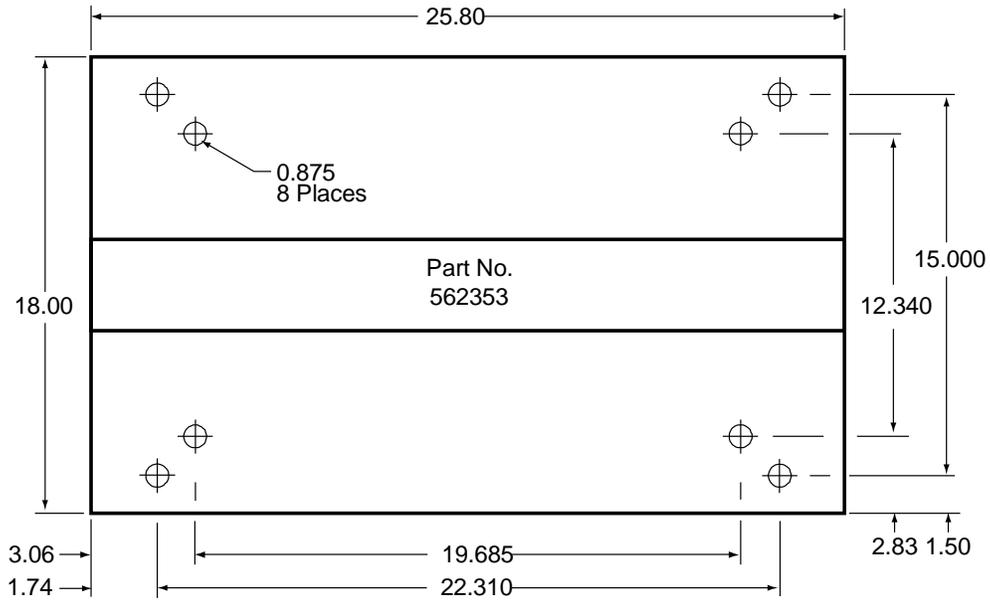
Figure 3.1 Relay Rack Floor Mounting Dimensions - 23" (cont'd on next page)



Notes:

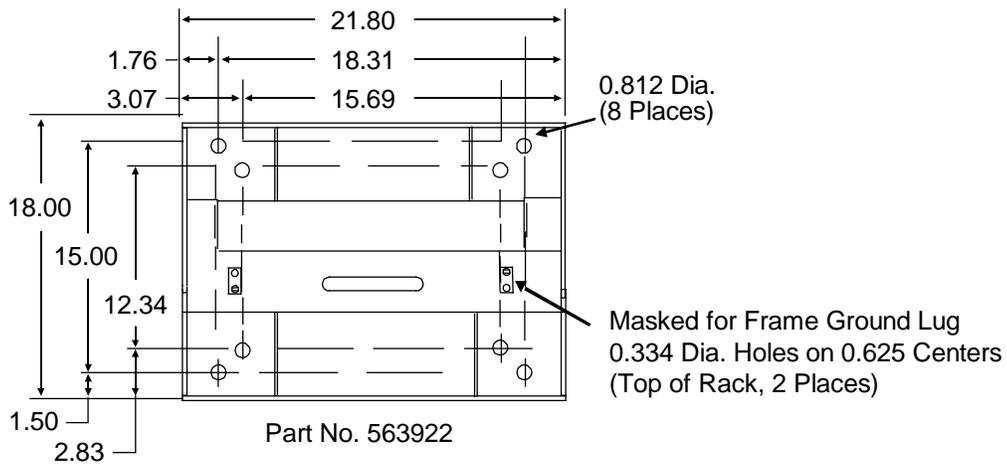
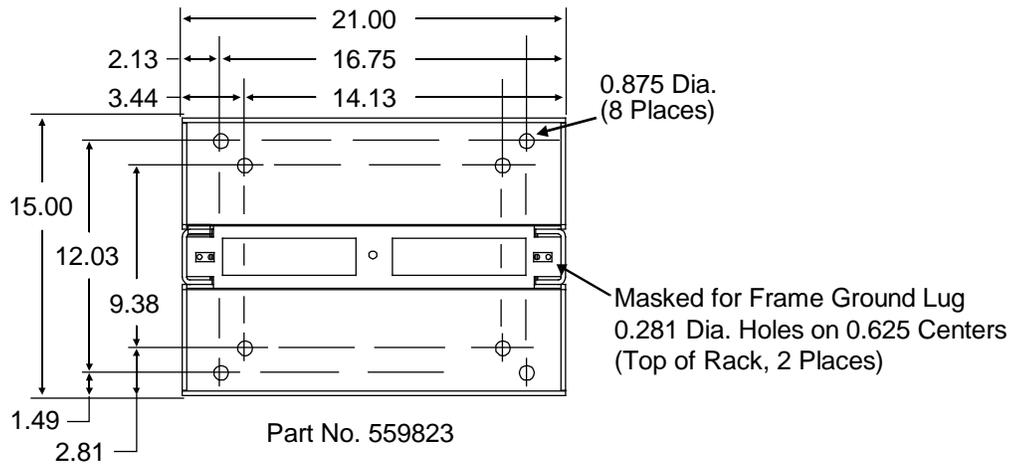
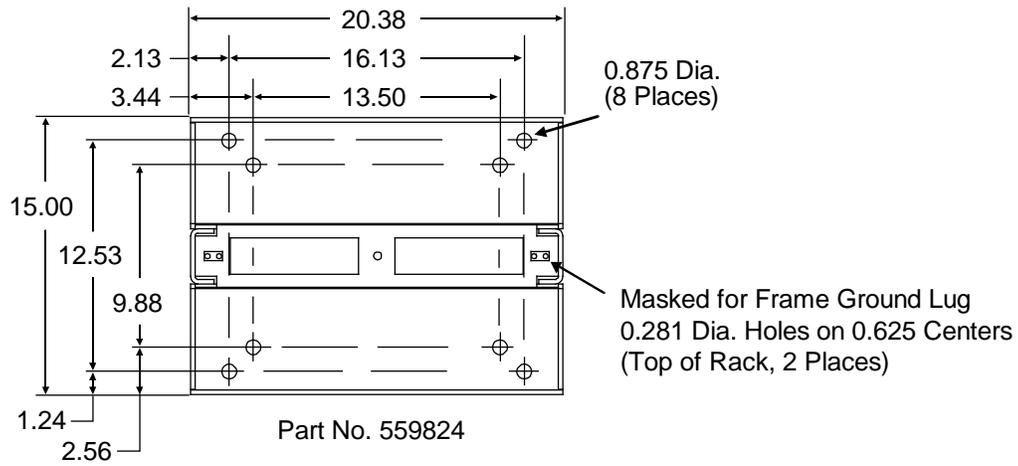
1. All dimensions are in inches.

Figure 3.1 Relay Rack Floor Mounting Dimensions - 23" (cont'd from previous page)



- Notes:
1. All dimensions are in inches.

**Figure 3.2 Relay Rack Floor Mounting Dimensions - 19"**



Notes:  
 1. All dimensions are in inches.

### 3.4 Securing the System to a Relay Rack or a Cabinet Equipment Rack (if required)



**DANGER!** If the system is mounted in a relay rack, the relay rack must be securely anchored to the floor before the system is installed.



**NOTE!** Refer to “General Requirements” on page 3 for mounting restrictions and ventilation requirements.

This power system is designed to mount in a standard 19” or 23” relay rack or equipment rack having 1” or 1 3/4” multiple drillings. Refer to System Application Guide SAG582138000 for overall dimensions and a list of available relay racks.

#### Procedure

1. The system is furnished for 19” mounting as standard. For 23” mounting, replace the 19” mounting brackets on the shelf with the 23” mounting brackets (supplied with the system).
2. Position the system in the relay rack or cabinet equipment rack.
3. Secure the system to the relay rack or cabinet equipment rack using hardware as shown in Figure 3.3 (see Figure 3.3 for recommended torque). Use grounding washers as indicated in Figure 3.3.



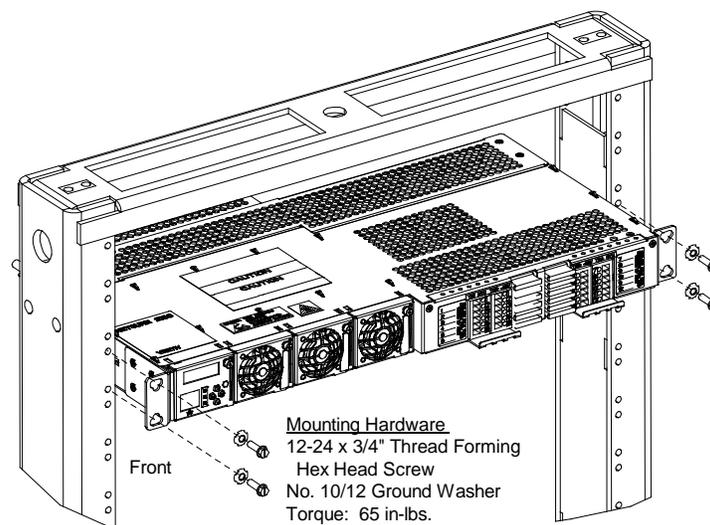
**NOTE!** Install (orient) the ground washers so the teeth dig into the mounting angles for a secure ground connection.



**NOTE!** Compliance with Telcordia GR-1089-CORE requires that prior to mounting the system to the equipment rack:

- o All paint must be removed from the front surface of each equipment rack rail where it mates with a shelf-mounting bracket, so that good metal-to-metal contact can be established between the shelf and rack.
- o The shelf-to-rack mating surfaces must be cleaned.
- o Electrical anti-oxidizing compound must be applied to the shelf-to-rack mating surfaces.

**Figure 3.3 Mounting the System in a Relay Rack or a Cabinet Equipment Rack**



### 3.5 Securing the System to a Wall with Wall Bracket Kit P/N 541285 (if furnished)

An optional wall mount bracket kit (P/N 541285) is available for horizontal or vertical wall mounting of the system.

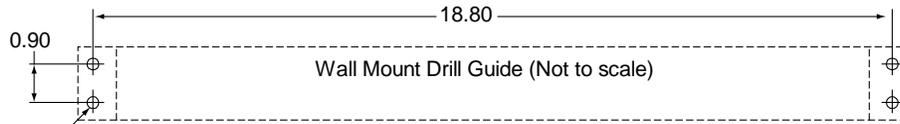


**NOTE!** Refer to “General Requirements” on page 3 for mounting restrictions and ventilation requirements.

#### **Procedure**

1. The installer must provide fasteners for securing the system to a wall or other vertical surface. Ensure that the wall and fastening technique are suitable for supporting the weight of the system. Refer to System Application Guide SAG582138000 for system weight and additional dimensions.
2. Select either the vertical-mount or horizontal-mount brackets as required for your application. Attach the brackets to the system mounting angles using kit-furnished screws. Torque to 60 in-lbs. Refer to Figure 3.4 or Figure 3.5.
3. Using the drill guide dimensions in Figure 3.4 or Figure 3.5, prepare the wall for customer-furnished fasteners. Secure the system to the wall.

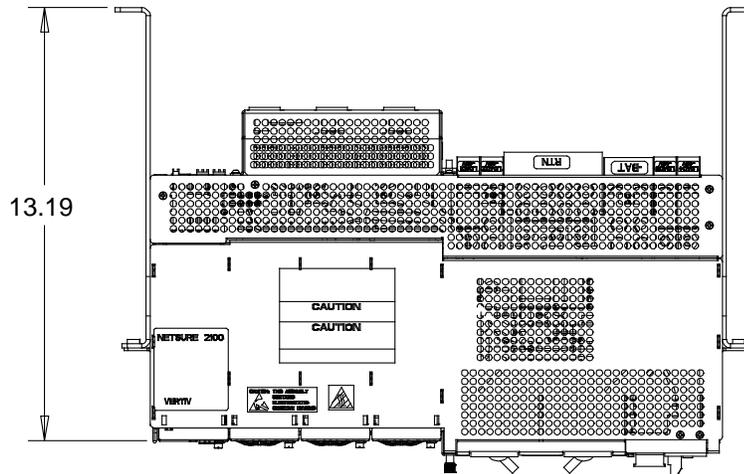
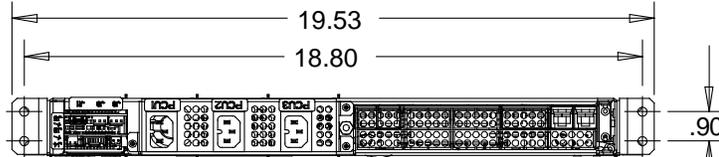
**Figure 3.4 Horizontal Wall Mounting with P/N 541285**



0.277 Dia. Clearance  
Hole in Bracket  
for Wall Fastener

**Notes:**

1. All dimensions are in inches, unless otherwise specified.
2. Installer to furnish hardware for fastening brackets to wall.



Installer to furnish hardware  
for fastening brackets to wall.

Installer to furnish hardware  
for fastening brackets to wall.

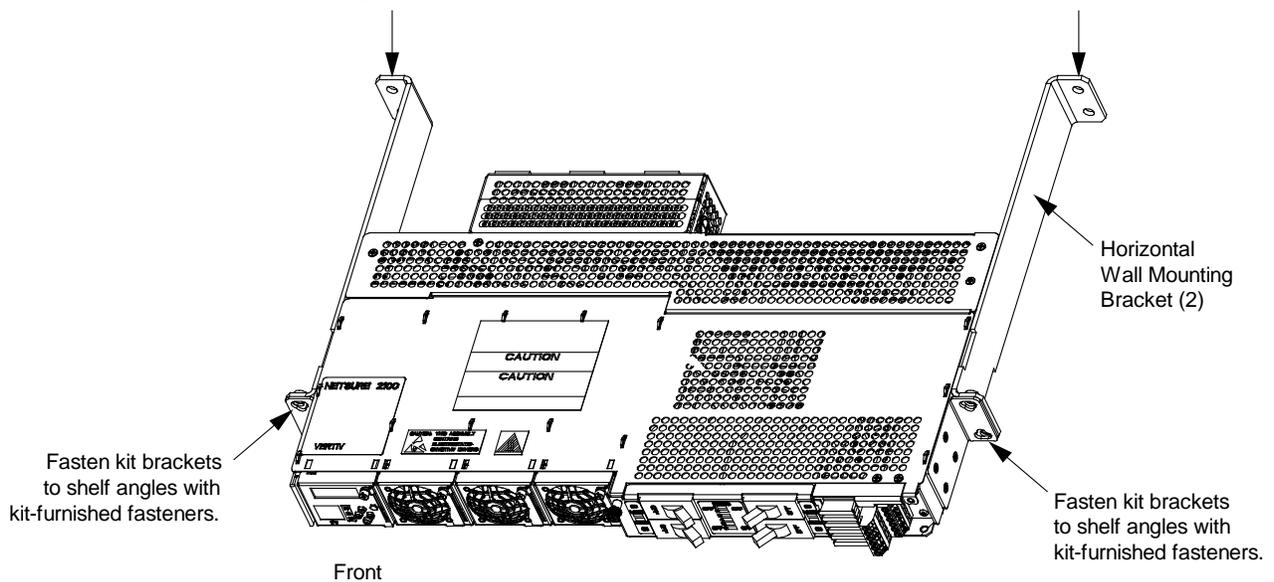
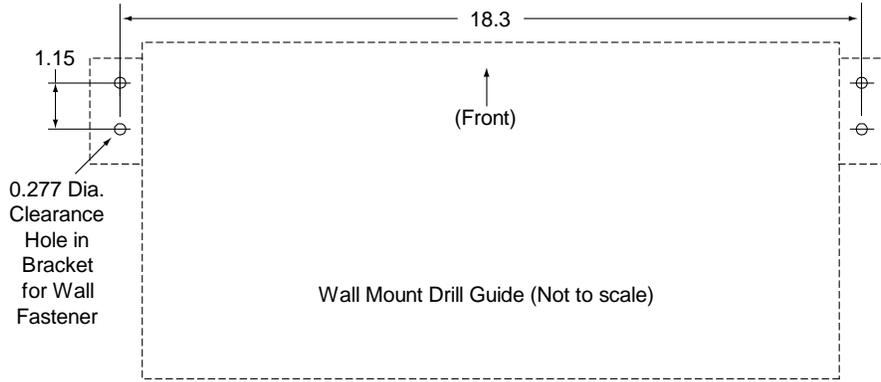
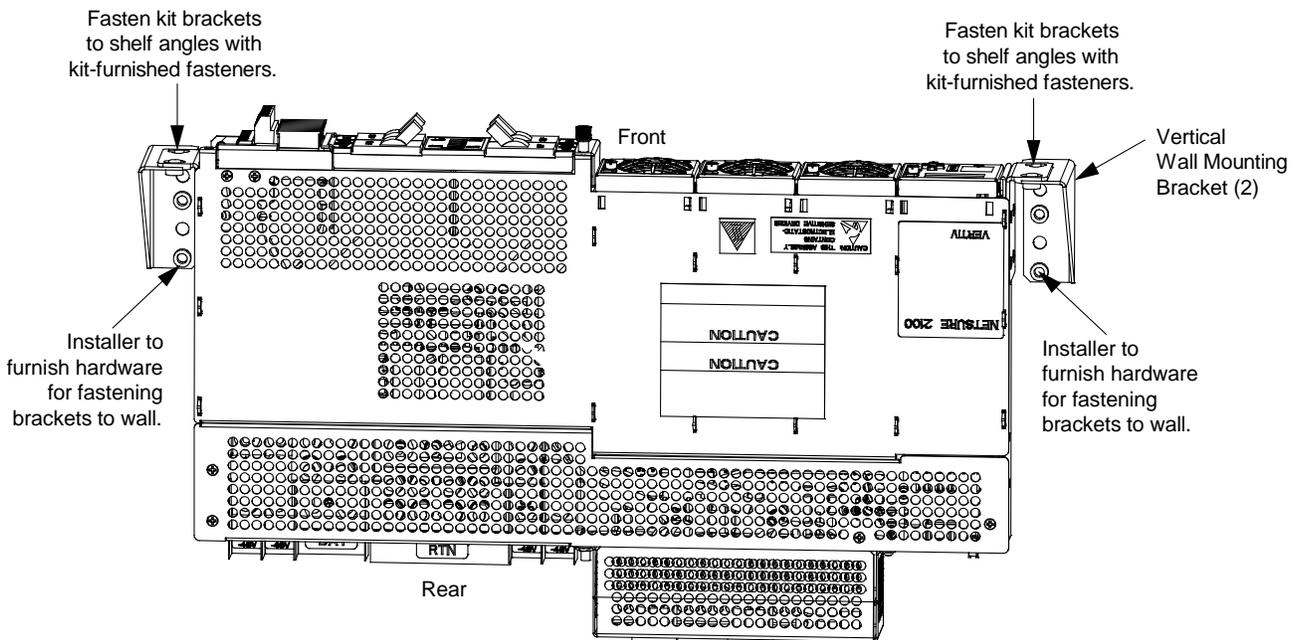
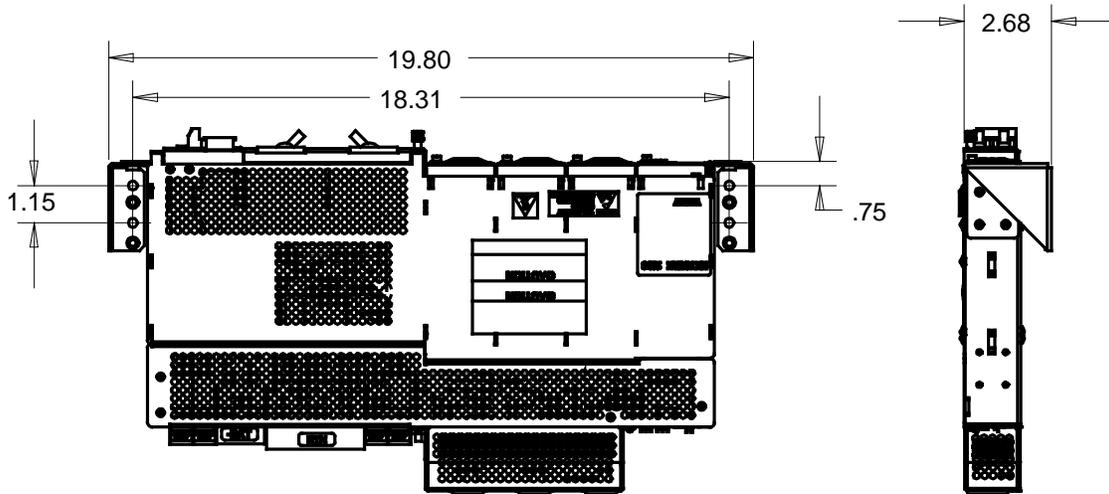


Figure 3.5 Vertical Wall Mounting with P/N 541285



Notes:

1. All dimensions are in inches, unless otherwise specified.
2. Installer to furnish hardware for fastening brackets to wall.



## 3.6 Installing a List 93, 94 Battery Tray and Optional Battery Tray Circuit Breaker

Perform the following procedures to install a battery tray and optional battery tray circuit breaker.



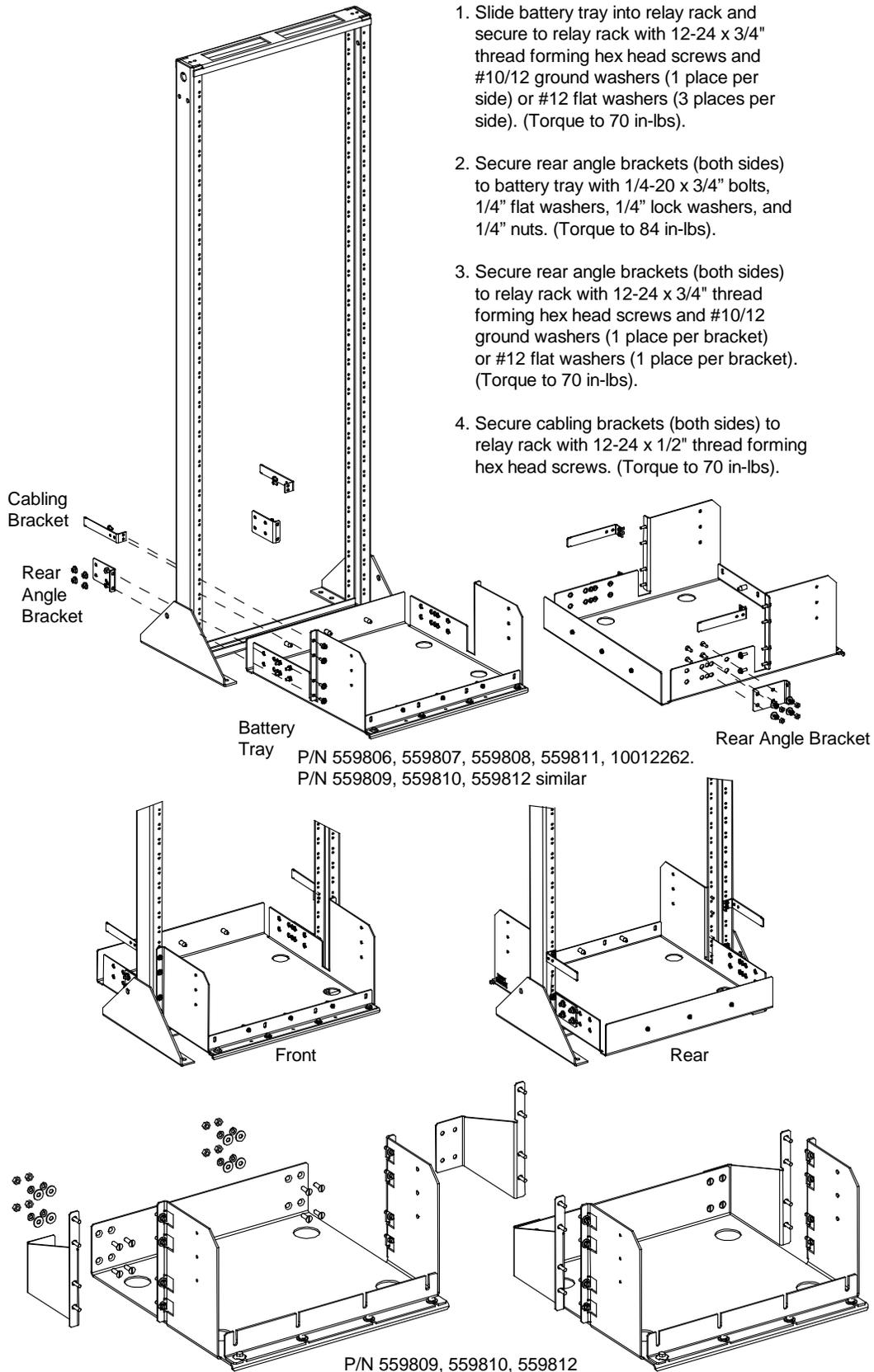
**DANGER!** The relay rack must be securely anchored to the floor before a battery tray is installed.

### 3.6.1 Battery Tray Installation

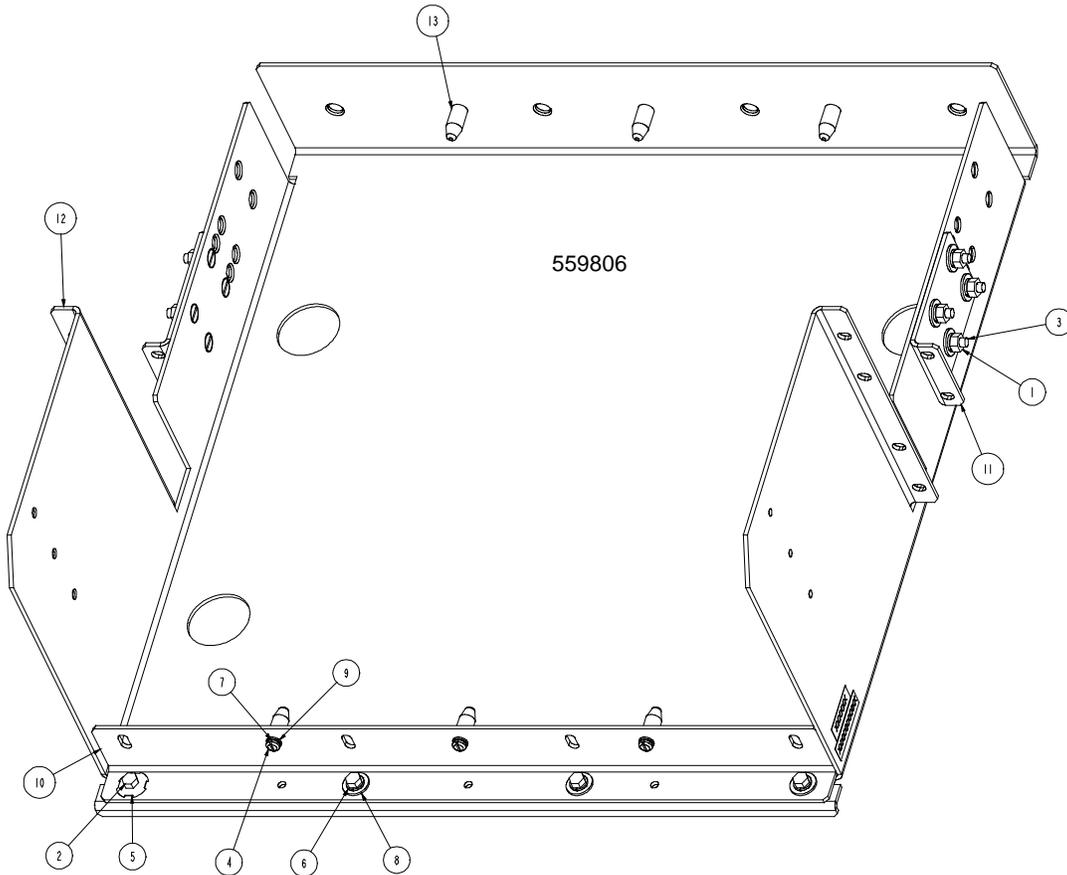
#### Procedure

1. To install a battery tray, perform the procedure detailed in Figure 3.6. See also Figure 3.7, Figure 3.8, Figure 3.9, Figure 3.10, Figure 3.11, Figure 3.12, and Figure 3.13.

Figure 3.6 Installing a List 93, 94 Battery Tray

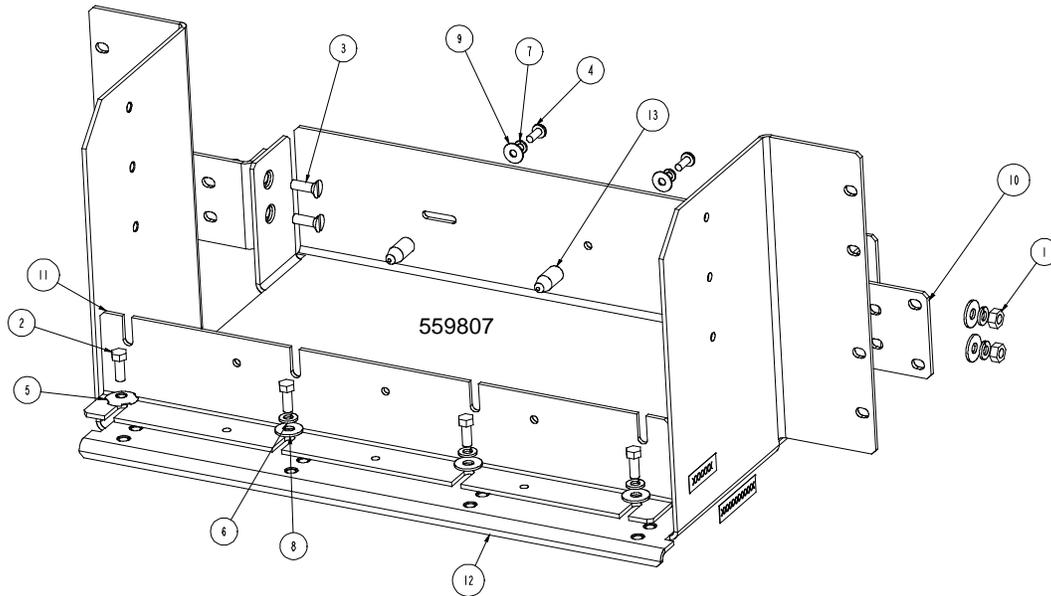


**Figure 3.7 559806 Battery Tray**



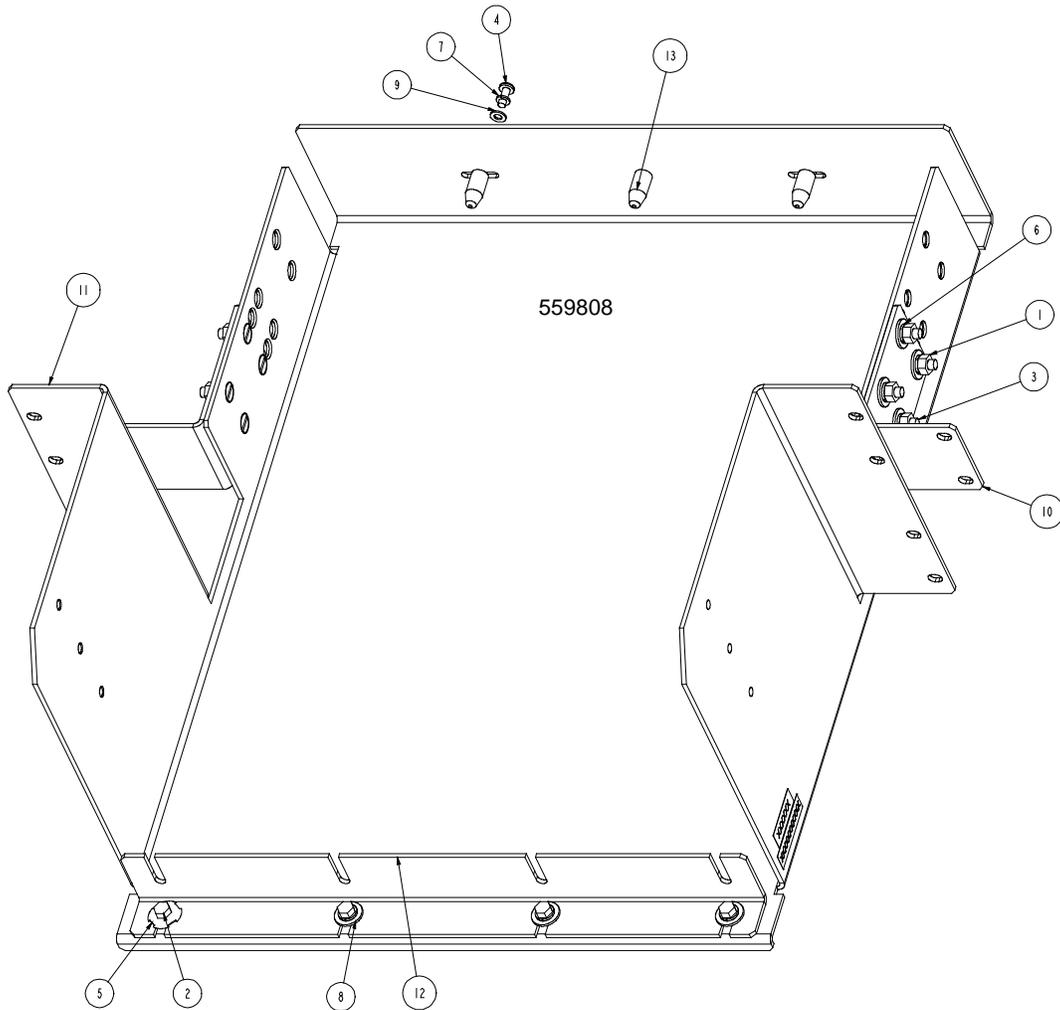
13	525095	SPACER, BATTERY	6
12	SXK2300175/1	TRAY, BATTERY	1
11	SXA2300174/1	BRACKET, BATTERY TRAY, MOUNTING	2
10	SXA2300173/1	BRACKET, BATTERY	1
9	214108100	FW, NO.10, .406 OD, .040 THK	6
8	214110200	FW, 1/4, .734 OD, .063 THK	11
7	215110900	LW, NO.10, .344 OD, .047 THK	6
6	215111100	LW, 1/4, .489 OD, .062 THK	11
5	215640800	GND.W, 1/4	1
4	221631400	PH, 10-32 X 1/2, SLOTTED	6
3	224430600	FH, 1/4-20 X 3/4	8
2	227640300	HHCS, 1/4-20 X 5/8	4
1	228557100	NUT, - HEX -, 1/4-20	8
INDEX	PART NO.	DESCRIPTION	QTY
PARTS/MATERIAL LIST			

Figure 3.8 559807 Battery Tray



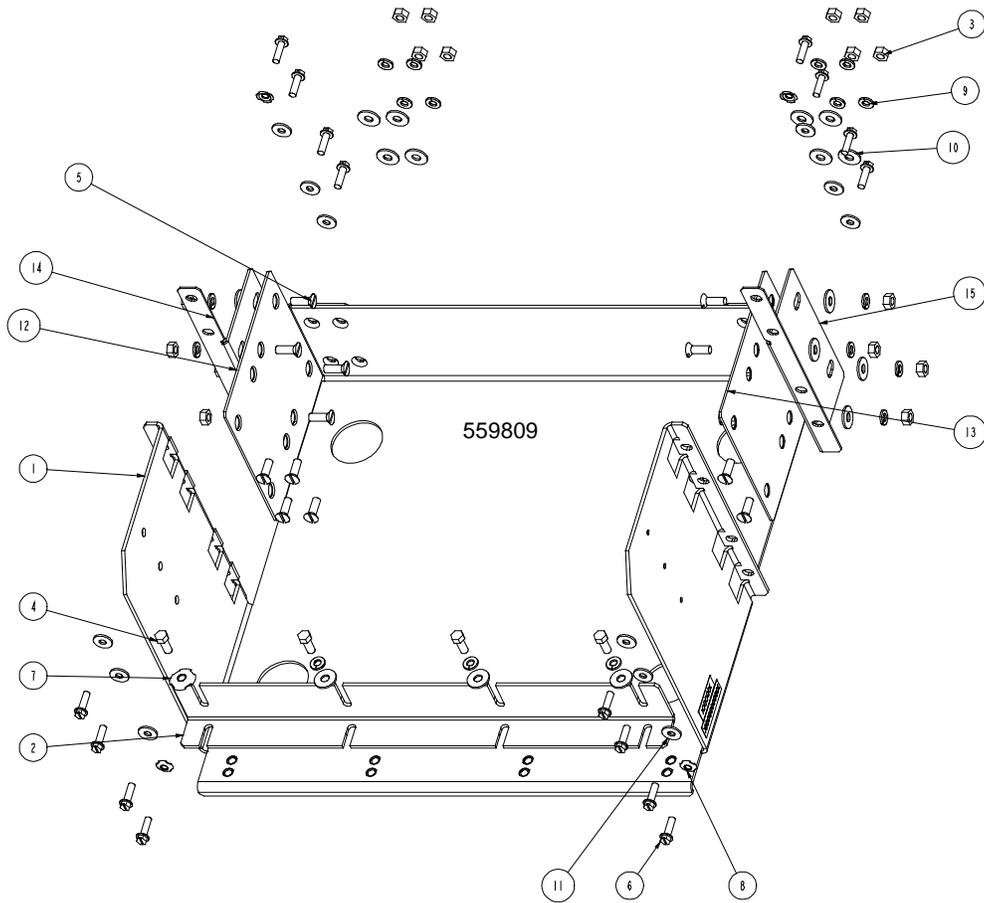
13	525095	SPACER, BATTERY	3
12	SXK2300172/1	TRAY, BATTERY, 23 IN, MTG	1
11	SXA2300171/1	BRKT, BAT. HLD, 19 IN	1
10	SXA2300170/1	BRKT, BAT TRAY, MTG	2
9	214108200	FW, NO.10, .562 OD, .040 THK	3
8	214110200	FW, 1/4, .734 OD, .063 THK	7
7	215110900	LW, NO.10, .344 OD, .047 THK	3
6	215111100	LW, 1/4, .489 OD, .062 THK	7
5	215640800	GND.W, 1/4	1
4	221631400	PH, 10-32 X 1/2, SLOTTED	3
3	224430600	FH, 1/4-20 X 3/4	4
2	227640300	HHCS, 1/4-20 X 5/8	4
1	228557100	NUT, - HEX -, 1/4-20	4
INDEX	PART NO.	DESCRIPTION	QTY
PARTS/MATERIAL LIST			

**Figure 3.9 559808 Battery Tray**



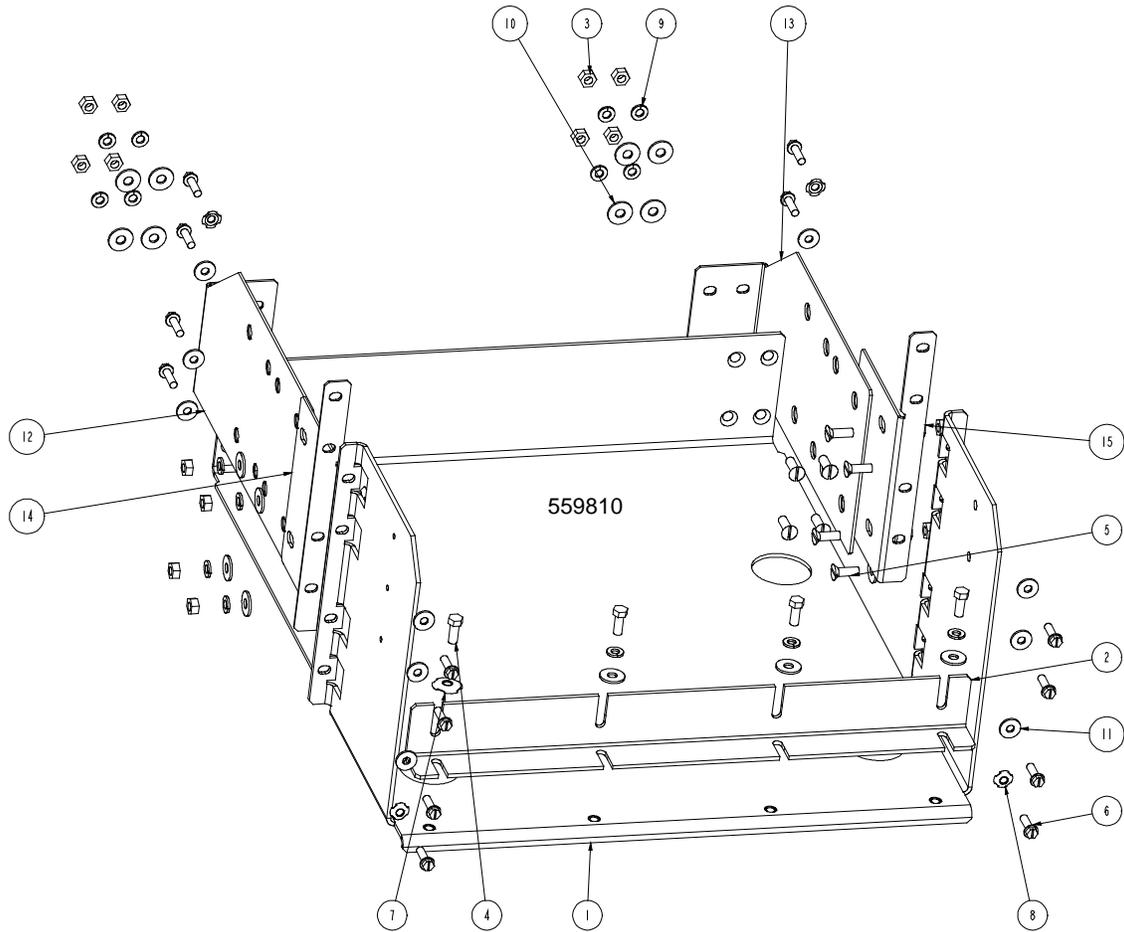
13	525095	SPACER, BATTERY	3
12	SXA2300177/1	BRACKET, BATTERY	1
11	SXK2300178/1	TRAY, BATTERY	1
10	SXA2300176/1	BRKT, BATTERY TRAY, MOUNTING	2
9	214108100	FW, NO.10, .406 OD, .040 THK	3
8	214110200	FW, 1/4, .734 OD, .063 THK	11
7	215110900	LW, NO.10, .344 OD, .047 THK	3
6	215111100	LW, 1/4, .489 OD, .062 THK	11
5	215640800	GND.W, 1/4	1
4	221631400	PH, 10-32 X 1/2, SLOTTED	3
3	224430600	FH, 1/4-20 X 3/4	8
2	227640300	HHCS, 1/4-20 X 5/8	4
1	228557100	NUT, - HEX -, 1/4-20	8
INDEX	PART NO.	DESCRIPTION	QTY
PARTS/MATERIAL LIST			

Figure 3.10 559809 Battery Tray



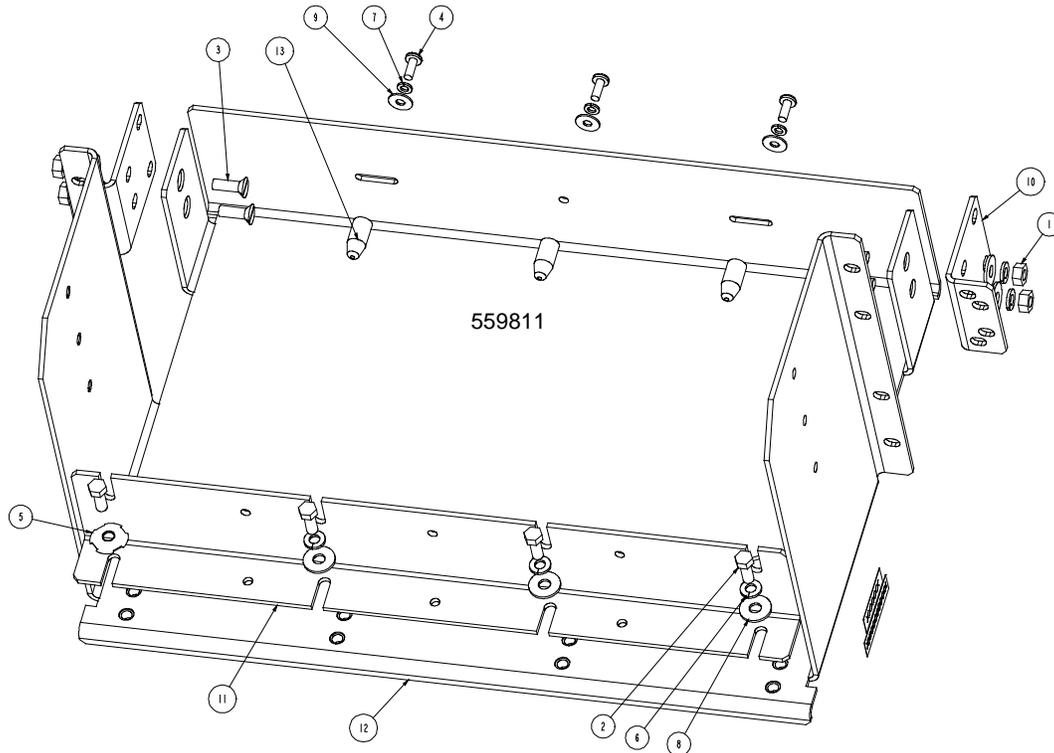
15	565089	BRKT, BATT TRAY, RIGHT MTG	1
14	565090	BRKT, BATT TRAY, LEFT MTG	1
13	565091	BRKT, BATT TRAY, RIGHT	1
12	565092	BRKT, BATT TRAY, RIGHT	1
11	214109200	FW, NO.12, .625 OD, .063 THK	12
10	214110200	FW, 1/4, .734 OD, .063 THK	19
9	215111100	LW, 1/4, .489 OD, .062 THK	19
8	215640600	GND.W, 10/12	4
7	215640800	GND.W, 1/4	1
6	218710600	TFHH, 12-24 X 3/4	16
5	224430600	FH, 1/4-20 X 3/4	16
4	227640300	HHCS, 1/4-20 X 5/8	4
3	228557100	NUT, - HEX -, 1/4-20	16
2	SXA2300177/1	BRACKET, BATTERY	1
1	SXK2300200/1	TRAY, BATTERY, 19" MTG	1
INDEX	PART NO.	DESCRIPTION	QTY
PARTS/MATERIAL LIST			

**Figure 3.11 559810 Battery Tray**



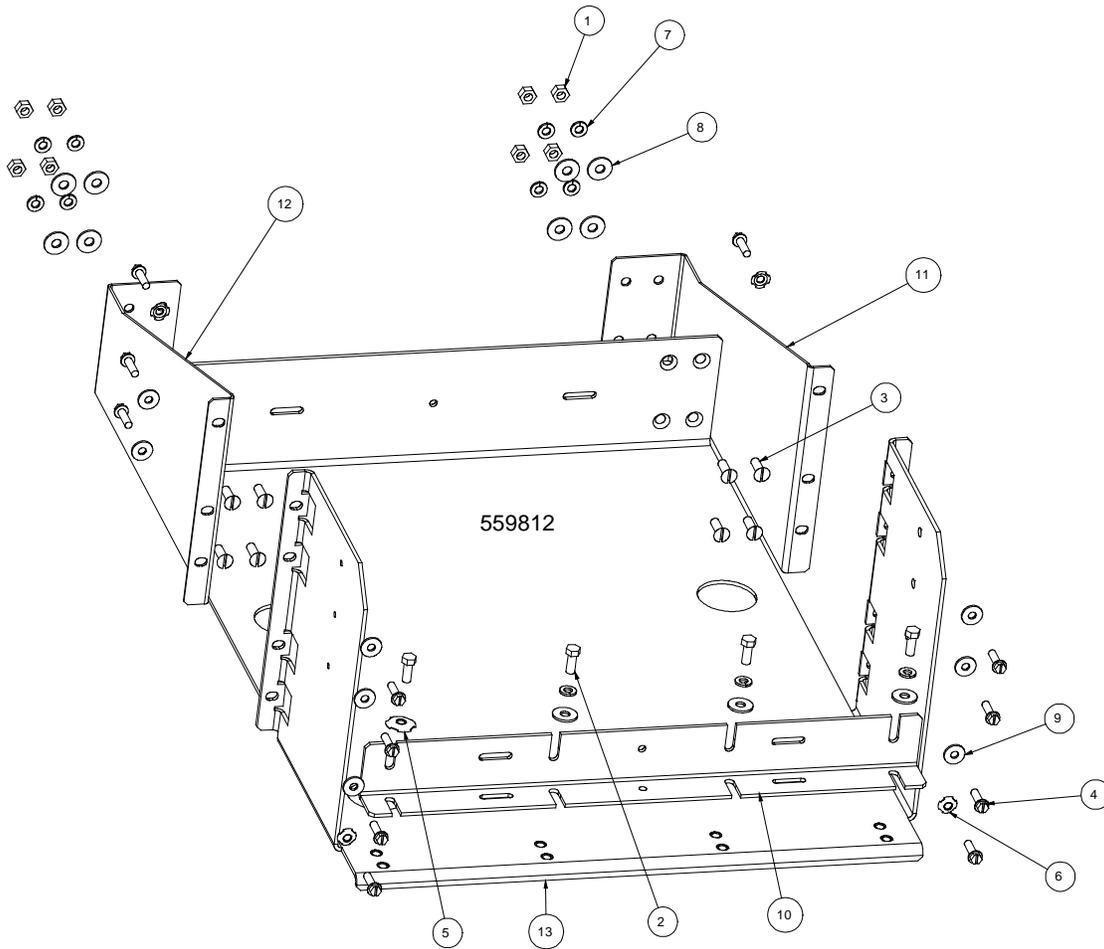
15	564857	BRKT, BATT TRAY, RIGHT MTG	1
14	564858	BRKT, BATT TRAY, LEFT MTG	1
13	564859	BRKT, BATT TRAY, RIGHT	1
12	564860	BRKT, BATT TRAY, LEFT	1
11	214109200	FW, NO.12, .625 OD, .063 THK	12
10	214110200	FW, 1/4, .734 OD, .063 THK	19
9	215111100	LW, 1/4, .489 OD, .062 THK	19
8	215640600	GND.W, 10/12	4
7	215640800	GND.W, 1/4	1
6	218710600	TFHH, 12-24 X 3/4	16
5	224430600	FH, 1/4-20 X 3/4	16
4	227640300	HHCS, 1/4-20 X 5/8	4
3	228557100	NUT, - HEX -, 1/4-20	16
2	SXA2300177/1	BRACKET, BATTERY	1
1	SXK2300193/1	TRAY, BATTERY, 19" MTG	1
INDEX	PART NO.	DESCRIPTION	QTY
PARTS/MATERIAL LIST			

Figure 3.12 559811 Battery Tray



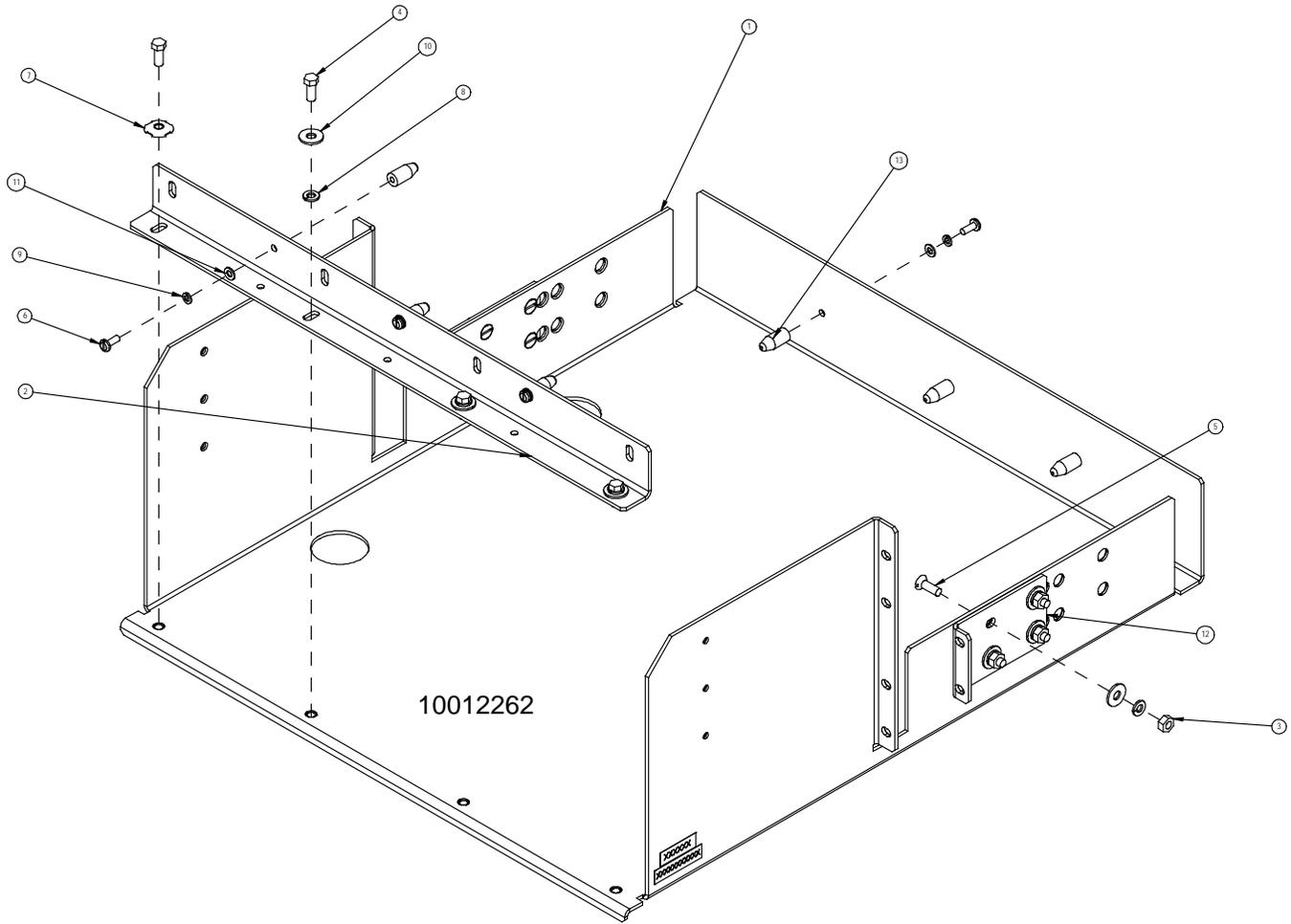
13	525095	SPACER, BATTERY	3
12	SXK2300197/1	TRAY, BATTERY, 19 IN, MTG	1
11	SXA2300171/1	BRKT, BAT. HLDR, 19 IN	1
10	SXA2300196/1	BRKT, BAT TRAY, MTG	2
9	214108200	FW, NO.10, .562 OD, .040 THK	3
8	214110200	FW, 1/4, .734 OD, .063 THK	7
7	215110900	LW, NO.10, .344 OD, .047 THK	3
6	215111100	LW, 1/4, .489 OD, .062 THK	7
5	215640800	GND.W, 1/4	1
4	221631400	PH, 10-32 X 1/2, SLOTTED	3
3	224430600	FH, 1/4-20 X 3/4	4
2	227640300	HHCS, 1/4-20 X 5/8	4
1	228557100	NUT, - HEX -, 1/4-20	4
INDEX	PART NO.	DESCRIPTION	QTY
PARTS/MATERIAL LIST			

Figure 3.13 559812 Battery Tray



13	SXK2300204/1	TRAY, BATTERY, 19" MTG	1
12	SXA2300203/1	BRKT, BATT TRAY, LEFT, MTG	1
11	SXA2300202/1	BRKT, BATT TRAY, RIGHT, MTG	1
10	SXA2300205/1	BRACKET, BATTERY	1
9	214109200	FW, NO.12, .625 OD, .063 THK	10
8	214110200	FW, 1/4, .734 OD, .063 THK	11
7	215111100	LW, 1/4, .489 OD, .062 THK	11
6	215640600	GND.W, 10/12	4
5	215640800	GND.W, 1/4	1
4	218710600	TFHH, 12-24 X 3/4	14
3	224430600	FH, 1/4-20 X 3/4	8
2	227640300	HHCS, 1/4-20 X 5/8	4
1	228557100	NUT, - HEX -, 1/4-20	8
INDEX	PART NO.	DESCRIPTION	QTY
PARTS/MATERIAL LIST			

Figure 3.14 10012262 Battery Tray



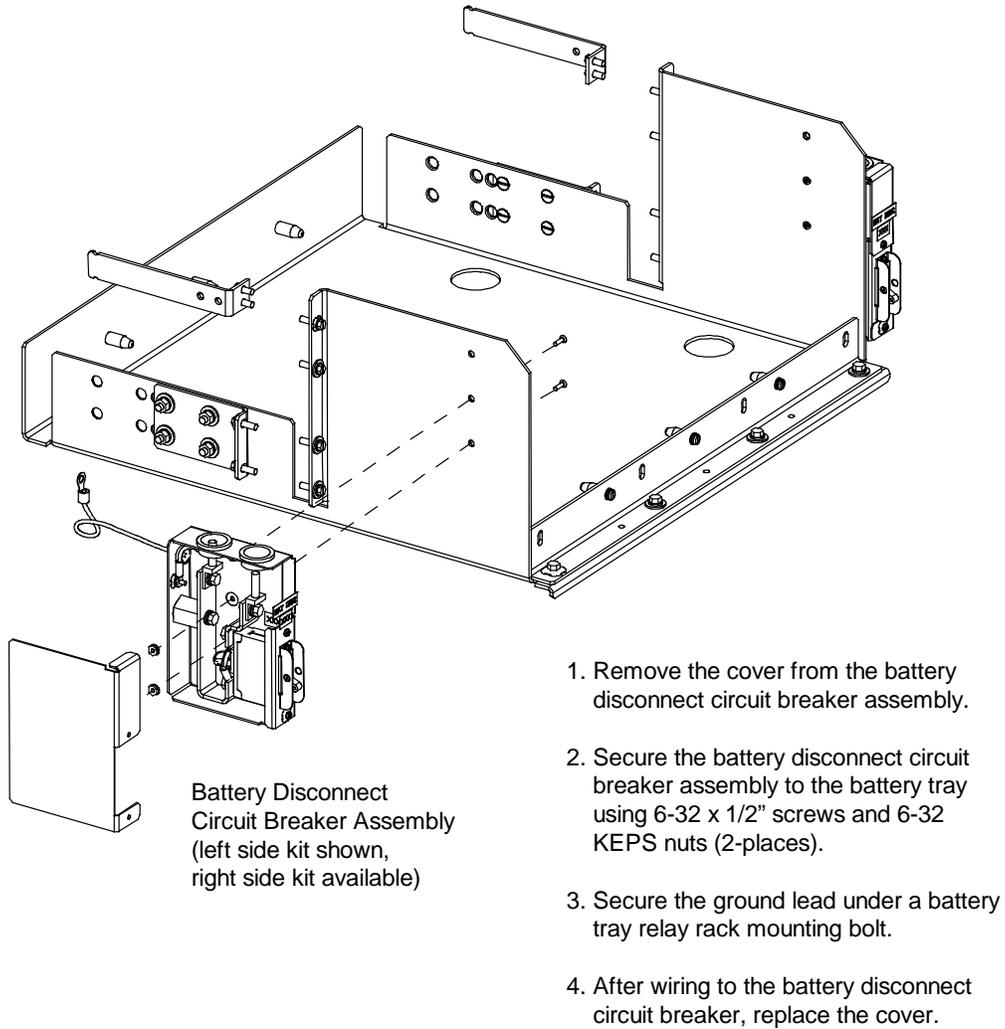
13	525095	SPACER, BATTERY,	6
12	SXA2300174_1	BRACKET, BATTERY TRAY, MOUNTING	2
11	214108100	FW, NO.10, .406 OD, .040 THK,	6
10	214110200	FW, 1/4, .734 OD, .063 THK,	11
9	215110900	LW, NO.10, .344 OD, .047 THK,	6
8	215111100	LW, 1/4, .489 OD, .062 THK,	11
7	215640800	GND.W, 1/4,	1
6	221631400	PH, 10-32 X 1/2, SLOTTED	6
5	224430600	FH, 1/4-20 X 3/4,	8
4	227640300	HHCS, 1/4-20 X 5/8,	4
3	228557100	NUT, - HEX -, 1/4-20	8
2	SXA2300173_1	BRACKET, BATTERY,	1
1	10012261	TRAY, BATTERY, 23"	1
INDEX	PART NO.	DESCRIPTION	QTY
PARTS/MATERIAL LIST			

### 3.6.2 Optional Battery Disconnect Circuit Breaker Installation

#### Procedure

1. To install an optional battery disconnect circuit breaker onto the battery tray, perform the procedure detailed in Figure 3.15.
2. Battery tray wiring is shown in “Installing and Connecting Batteries in an Optional List 93 or 94 Battery Tray (if furnished)” on page 61.

**Figure 3.15** Installing Optional Battery Disconnect Circuit Breaker onto a List 93, 94 Battery Tray



## 3.7 Installing Circuit Breakers and Fuses

Circuit breakers and/or fuses may have been factory installed for you. If so, verify their positions and sizes.

Refer to SAG582138000 for any temperature, sizing, and spacing restrictions.

### 3.7.1 Installing GMT Load Distribution Fuses (List AA, BA, BB, CA)

#### Procedure

1. Install correctly sized GMT fuses into the fuseholders located on the front of the distribution unit, as required. If a dummy fuse is installed, first remove the dummy fuse. Install a safety fuse cover over each GMT fuse. Install a dummy fuse in all unused fuse positions. See to Figure 3.16, Figure 3.17, Figure 3.18, and Figure 3.19.

Figure 3.16 Installing GMT Load Distribution Fuses (List AA)

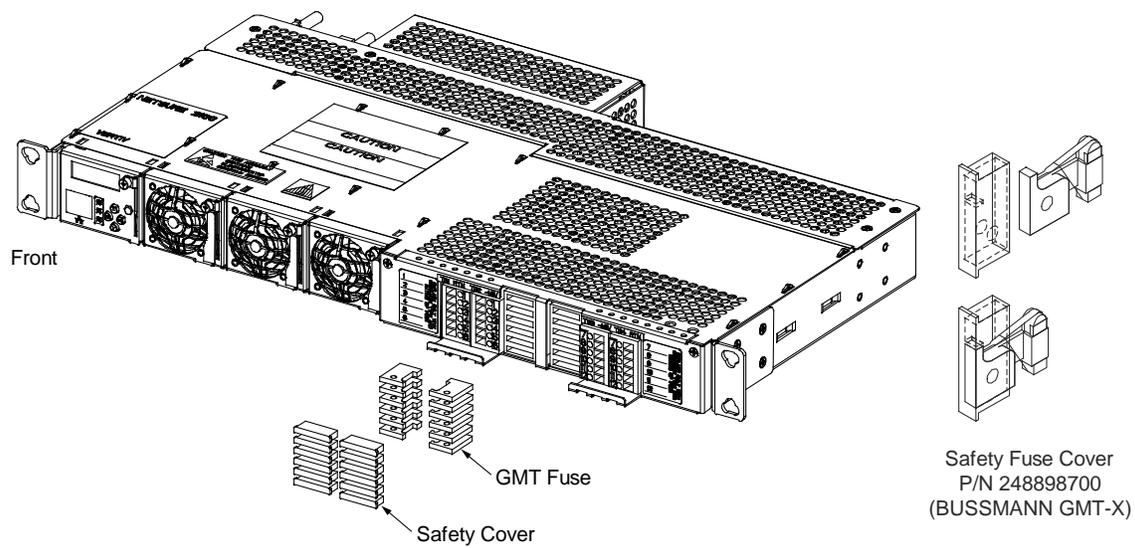
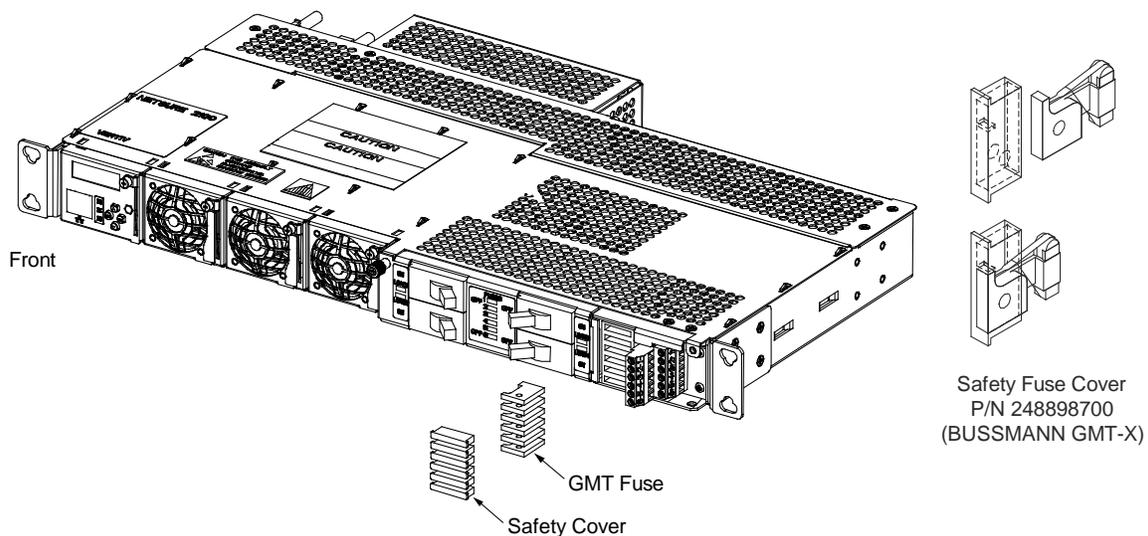
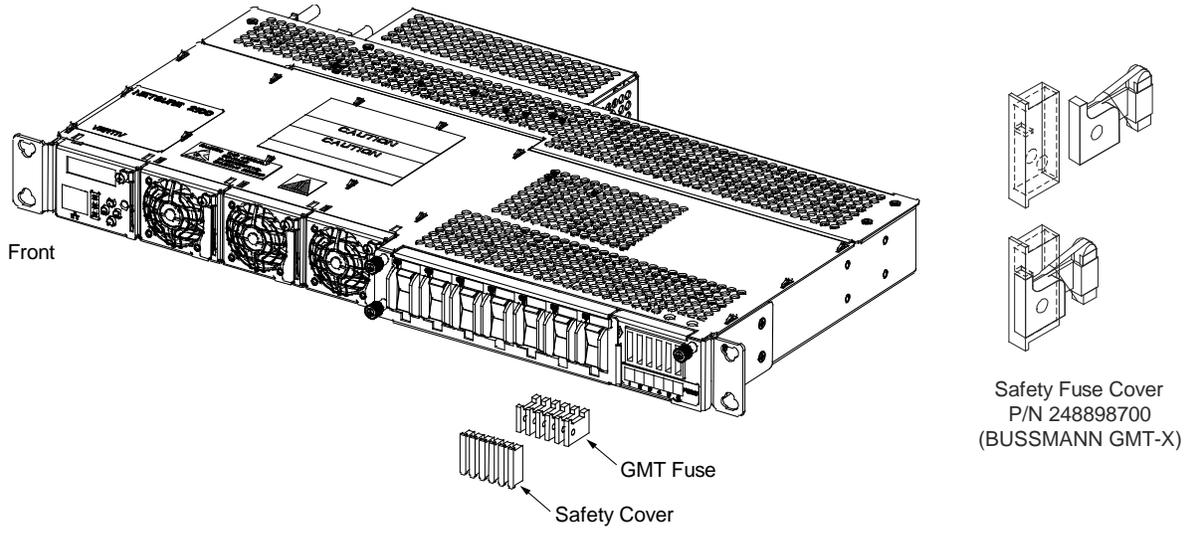


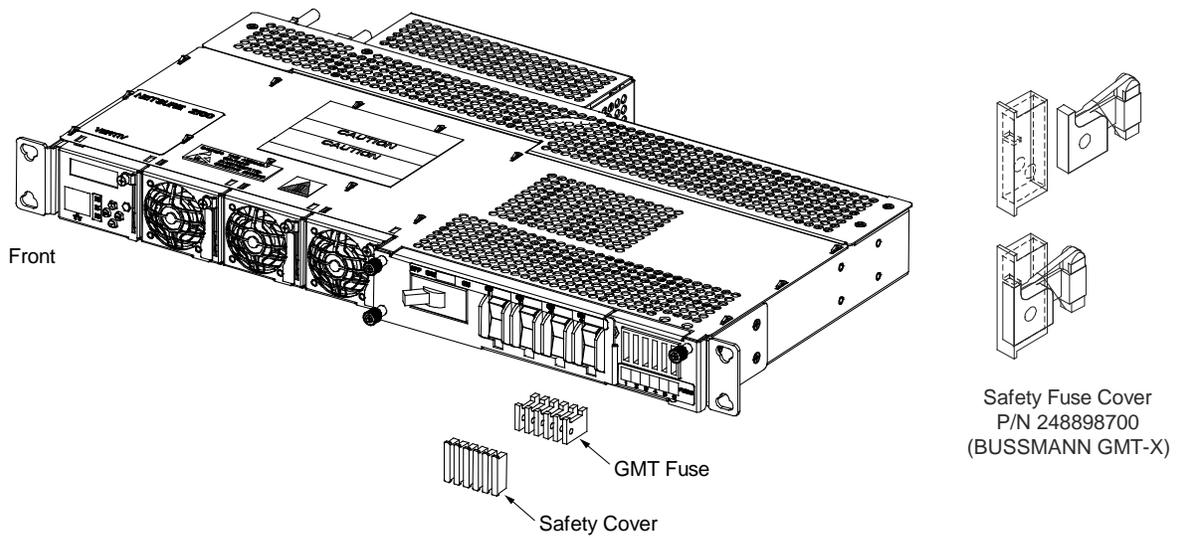
Figure 3.17 Installing GMT Load Distribution Fuses (List CA)



**Figure 3.18** Installing GMT Load Distribution Fuses (List BA)



**Figure 3.19** Installing GMT Load Distribution Fuses (List BB)

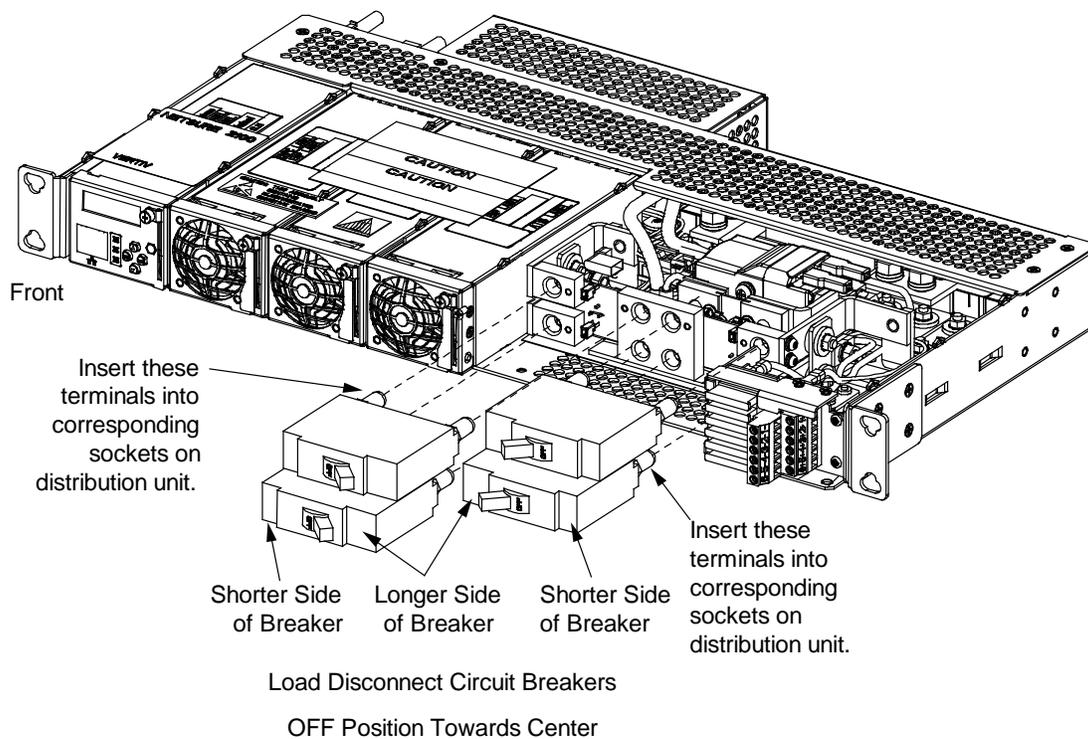


### 3.7.2 Installing Bullet Nose Type Load Distribution Circuit Breakers (List CA)

#### Procedure

1. Remove the cover from the circuit breaker mounting positions.
2. Ensure that the circuit breaker is in the OFF position and is of the correct rating. Orient the circuit breaker as shown in Figure 3.20. Insert the terminals on the rear of the circuit breaker into their corresponding sockets on the distribution unit. Ensure the alarm contact on the back of the circuit breaker makes contact with the alarm terminal on the distribution unit. Push distribution device in firmly until fully seated in the distribution unit.
3. Replace the cover over the circuit breaker mounting positions and tighten the captive fastener.

**Figure 3.20** Installing Bullet Nose Type Load Distribution Circuit Breakers (List CA)



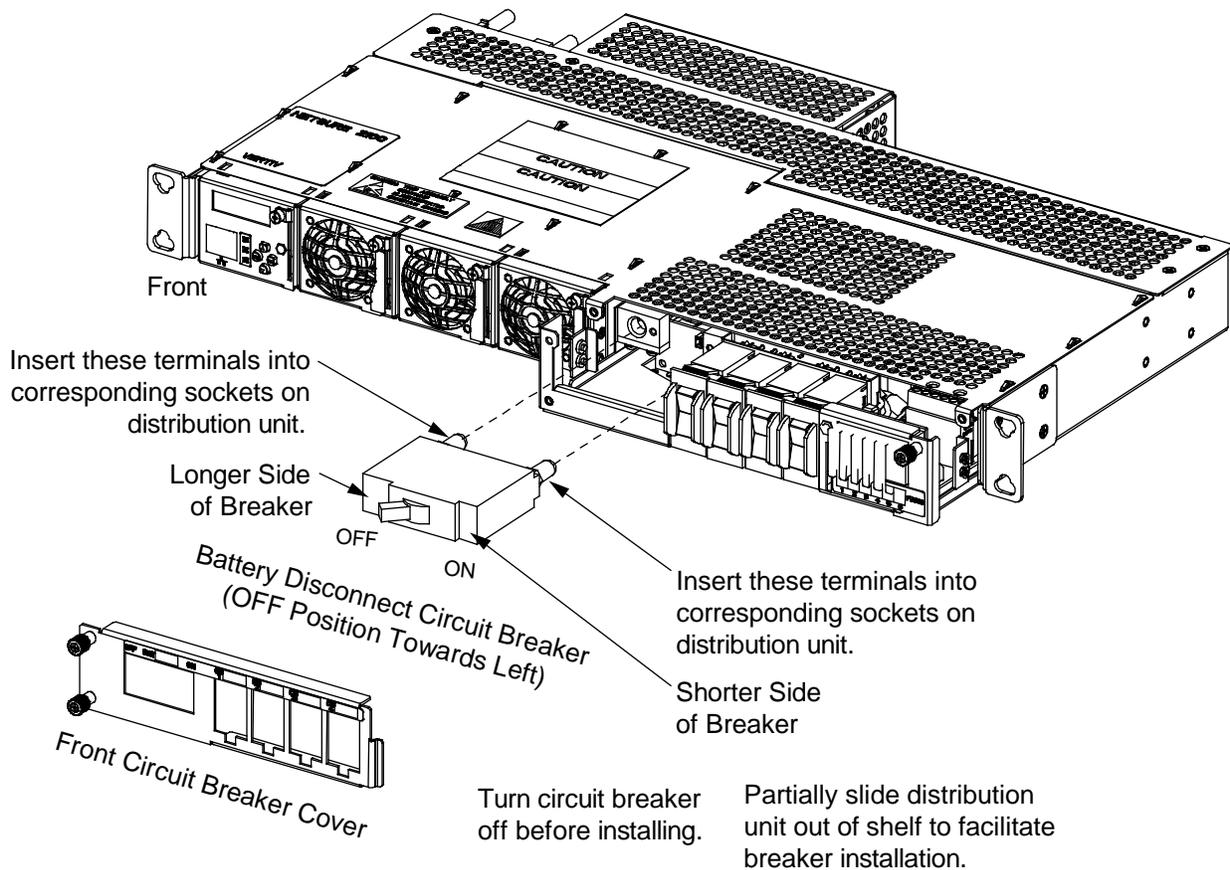
Turn circuit breaker off before installing.      Components removed in illustration for clarity only.

### 3.7.3 Installing Bullet Nose Type Battery Disconnect Circuit Breaker (List BB)

**Procedure**

1. Remove the cover from the circuit breaker mounting position.
2. Loosen the distribution unit captive fastener and partially slide the distribution unit out from shelf to facilitate circuit breaker installation.
3. Ensure that the circuit breaker is in the OFF position and is of the correct rating. Orient the circuit breaker as shown in Figure 3.21. Insert the terminals on the rear of the circuit breaker into their corresponding sockets on the distribution unit. Ensure the alarm contact on the back of the circuit breaker makes contact with the alarm terminal on the distribution unit. Push distribution device in firmly until fully seated in the distribution unit.
4. Slide the distribution unit back into the shelf and secure with the captive fastener.
5. Replace the cover over the circuit breaker mounting position and tighten the captive fasteners.

**Figure 3.21** Installing Bullet Nose Type Battery Disconnect Circuit Breaker (List BB)

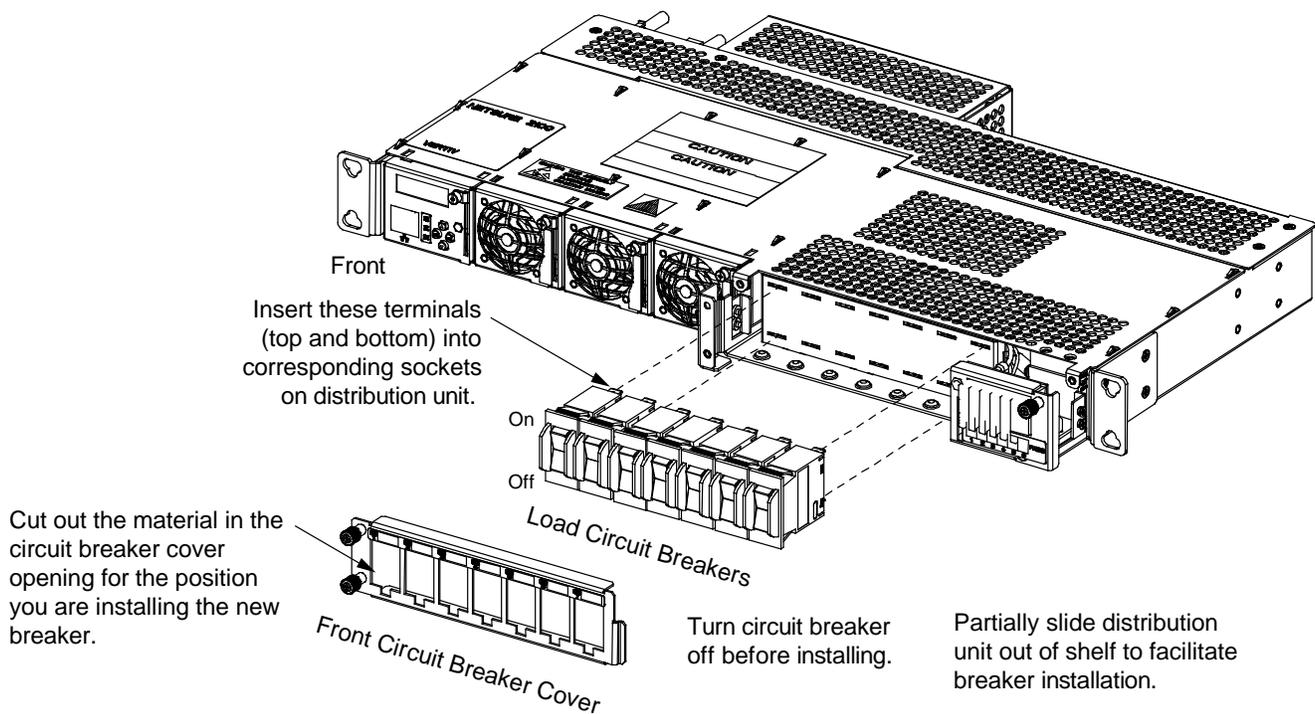


### 3.7.4 Installing Compact Type Load Distribution Circuit Breakers (List BA, BB)

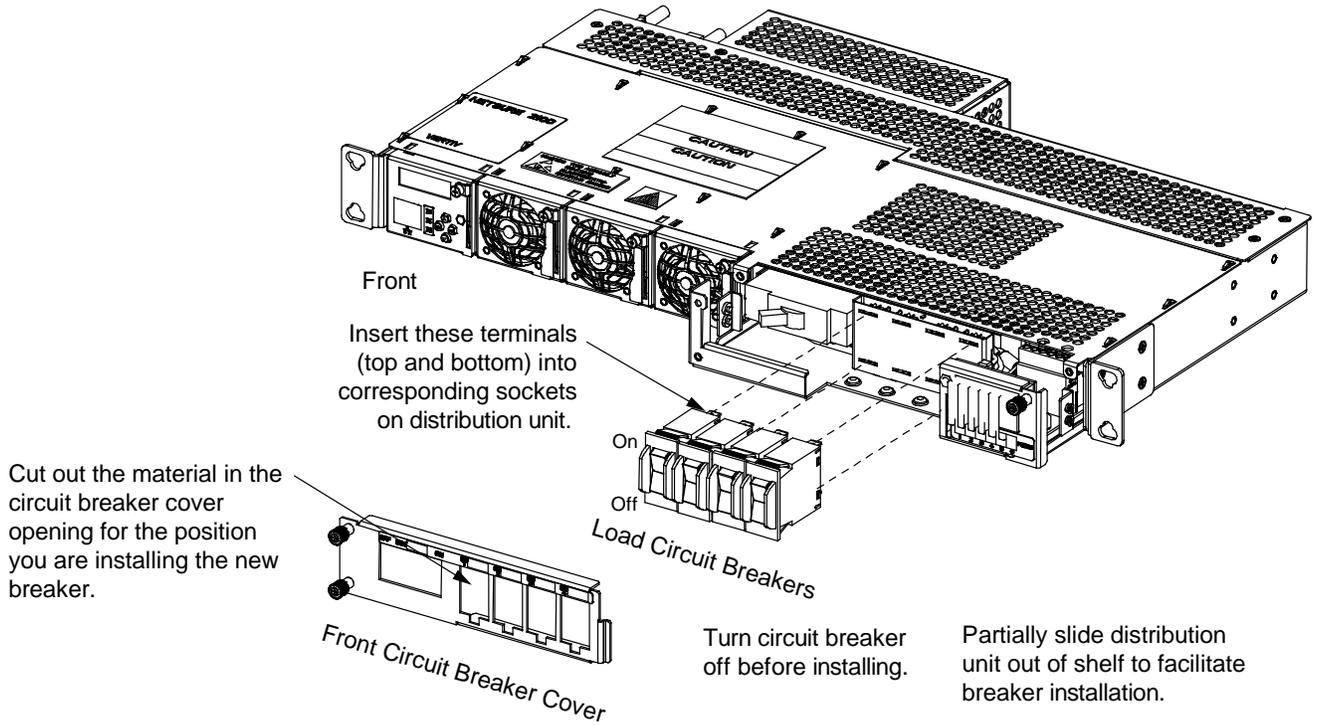
#### Procedure

1. Remove the cover from the circuit breaker mounting positions. Use a knife to cut out the material in the circuit breaker cover opening for the position you are installing the new breaker.
2. Loosen the distribution unit captive fastener and partially slide the distribution unit out from shelf to facilitate circuit breaker installation.
3. Ensure that the circuit breaker is in the OFF position and is of the correct rating. Orient the circuit breaker as shown in Figure 3.22 and Figure 3.23. Insert the terminals on the rear of the circuit breaker into their corresponding sockets on the distribution unit. Push distribution device in firmly until fully seated in the distribution unit.
4. Slide the distribution unit back into the shelf and secure with the captive fastener.
5. Replace the cover over the circuit breaker mounting positions and tighten the captive fastener.

Figure 3.22 Installing Compact Type Load Distribution Circuit Breakers (List BA)



**Figure 3.23** Installing Compact Type Load Distribution Circuit Breakers (List BB)



## 3.8 Installing an Optional Battery Cabinet

### **Vertiv™ NetSure™ 211BC Battery Cabinet, P/N 541434**

Refer to the battery cabinet instructions (Section 6023).

### **Vertiv™ NetSure™ 211BC Battery Cabinet, P/N 545534**

Refer to the battery cabinet instructions (Section 6033).

### **Vertiv™ NetSure™ 211BC Battery Cabinet, P/N 545506**

Refer to the battery cabinet instructions (Section 6036).

### **Vertiv™ NetSure™ 211BC Battery Cabinet, P/N 554631**

Refer to the battery cabinet instructions (UM554631).

### 3.9 Installing an Optional External IB5 Kit P/N 60203173

 **NOTE!** IB5 boards with a 10M/100M/1G Ethernet port replaced IB4 boards with a 10M/100M Ethernet port. This transition enables the support of connected devices that communicate up to 1G. While both boards are physically interchangeable, the IB5 board does require the NCU to have V1.2.80 or higher software loaded.

#### **Procedure**

 **NOTE!** Refer to Figure 3.24 as this procedure is performed.

1. Mount the external IB5 assembly within 3 feet of the system interface connector (J11).
2. Plug cable P/N 147605 (supplied with the external IB5 assembly) between the assembly and the system interface connector (J11) as shown in Figure 3.24.

 **NOTE!** External IB5 kit P/N 60203173 contains two (2) cables. Use cable P/N 147605 with the 582138000 power system.

3. If the system is in operation, reboot the Mini Control Unit.

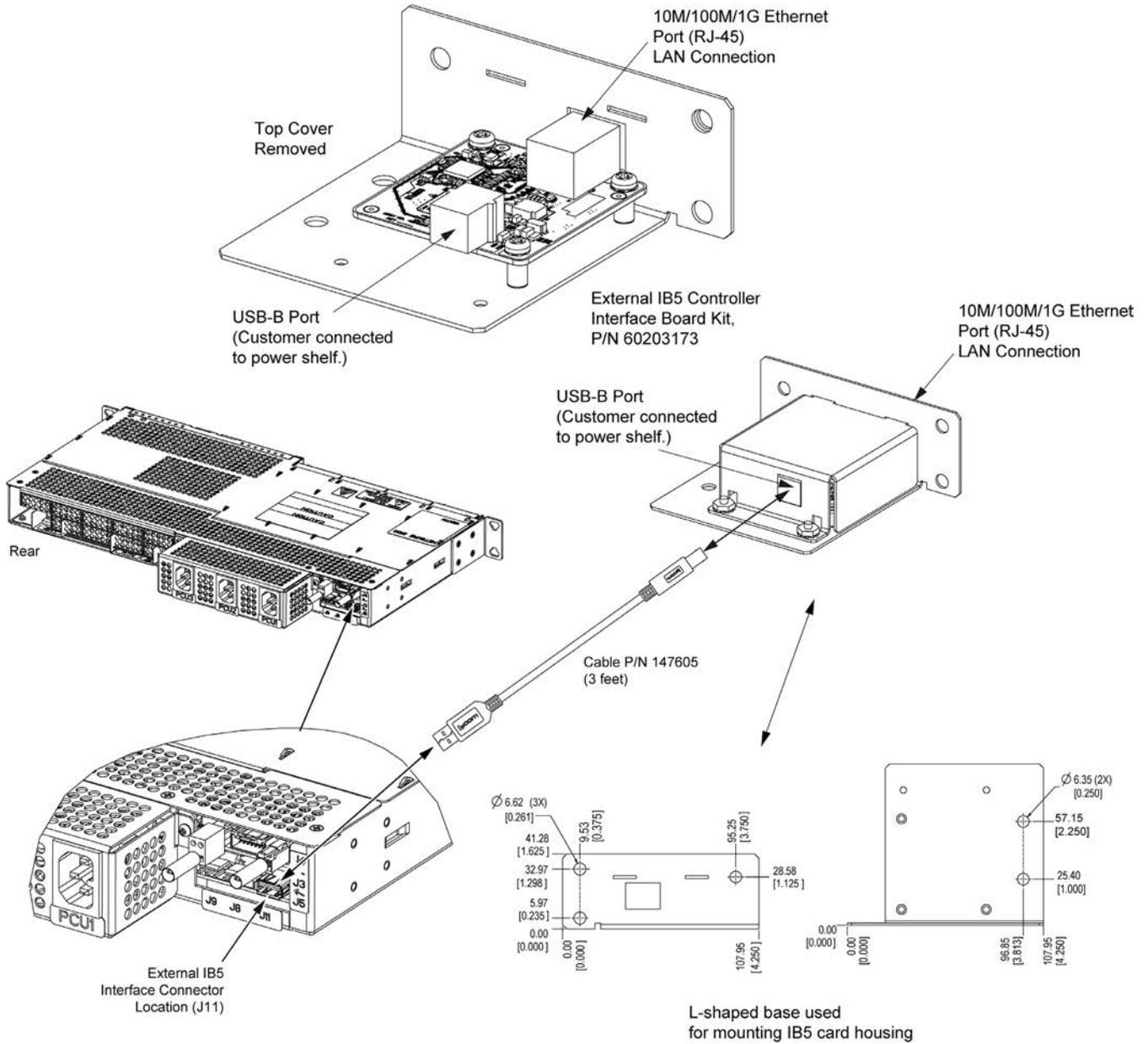
#### **Local Menu Navigation:**

At the Main Screen, press ENT and ESC at the same time to reboot the Mini Control Unit.

#### **Web Menu Navigation:**

Advance Settings Menu / SW Maintenance Tab / Reboot Controller button.

**Figure 3.24** Installing an Optional External IB5 Kit P/N 60203173



### 3.10 Attaching Supplied USB Drive Storage Pouch Near Power System

The system is provided with a USB drive that contains the controller configuration files loaded into the controller as shipped. Also provided on the USB drive is a controller configuration drawing and all customer documentation. The USB drive is to be stored in the pouch provided. The pouch needs to be attached to a surface near the system by the customer.

#### **Procedure**

1. Customer must choose a location near the system to attach the USB drive pouch to.
2. Make sure the surface is clean, then peel the backing of the pouch fastener and adhere it to the surface.
3. Attach the pouch to the pouch fastener.
4. Store the provided USB drive in the USB drive pouch.

## 4 Making Electrical Connections

### 4.1 Important Safety Instructions



**DANGER!** Adhere to the “Important Safety Instructions” starting on page vi.

### 4.2 Wiring Considerations

All wiring and branch circuit protection should follow the current edition of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC), and applicable local codes. For operation in countries where the NEC is not recognized, follow applicable codes.

For wire size, branch circuit protection, crimp lug, and general wiring recommendations, refer to System Application Guide SAG582138000. Lugs must be crimped per lug manufacturer's specifications.

### 4.3 Relay Rack / Cabinet Frame Grounding Connection

For relay rack / cabinet frame grounding requirements, refer to the current edition of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC), applicable local codes, and your specific site requirements.

#### Procedure

1. Attach a customer grounding network lead to the equipment mounting rack per site requirements. Holes are provided on the top of each relay rack for installing a lead with a two-hole lug that has 1/4" bolt clearance holes on 5/8" centers. When using 1/4-inch hardware, recommended torque is 84 in-lbs when a standard flat washer and lock washer are used. Refer to Figure 4.1 for locations.



**NOTE!** REMOVE TAPE FROM HOLE LOCATIONS BEFORE INSTALLING LUG.

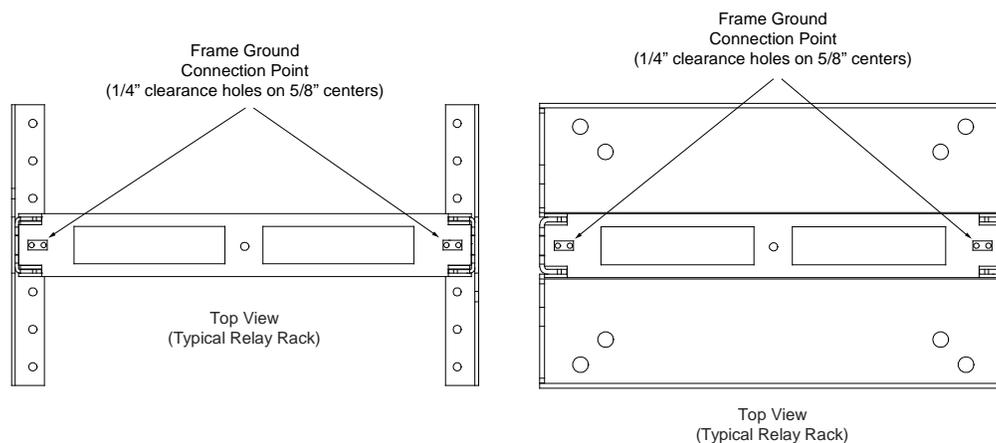


**NOTE!** The DC return connection to this system can remain isolated from system frame and chassis (DC-I).



**NOTE!** This system is suitable for installation as part of the Common Bonding Network (CBN).

**Figure 4.1** Relay Rack Frame Grounding Connection Points



## 4.4 System Shelf Frame Grounding Connection

For shelf grounding requirements, refer to the current edition of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC), applicable local codes, and your specific site requirements.



**NOTE!** The DC return connection to this system can remain isolated from system frame and chassis (DC-I).



**NOTE!** This system is suitable for installation as part of the Common Bonding Network (CBN).

### 4.4.1 Relay or Cabinet Rack

#### Procedure

1. The frame grounding connection to the shelf is made by using grounding washers with the mounting hardware used to secure the shelf to the relay rack or cabinet. Refer to “Securing the System to a Relay Rack or a Cabinet Equipment Rack (if required)” on page 8. Ensure that the relay rack or cabinet is properly grounded.



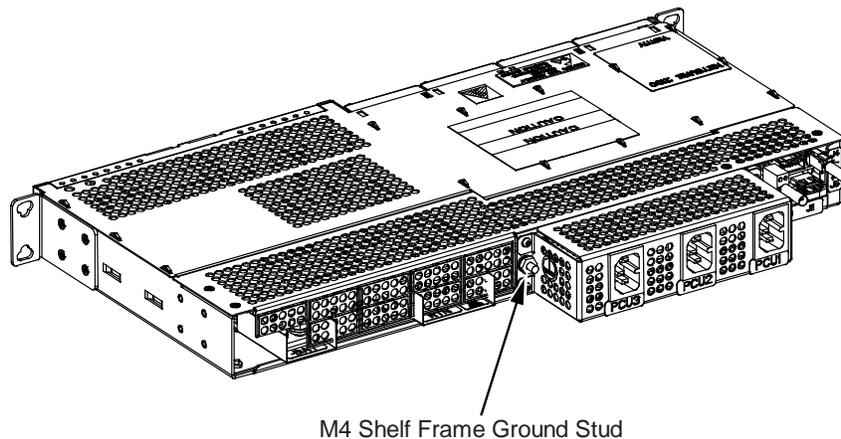
**NOTE!** An M4 frame ground stud is located on the rear of the system shelf. Provide a grounding lead to this stud, if required. Refer to Figure 4.2 for location.

### 4.4.2 Wall Mounting

#### Procedure

1. An M4 frame ground stud is located on the rear of the system shelf. Refer to Figure 4.2 for location. Provide a grounding lead to this stud as required.

**Figure 4.2 System Shelf Frame Grounding Connection Point**



## 4.5 Central Office Ground Connection

Landing points are provided on the battery return bus for a central office ground lead (see Figure 4.12 on page 52, Figure 4.13 on page 54, Figure 4.14 on page 56, and Figure 4.15 on page 59). For central office grounding requirements, refer to the current edition of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC), applicable local codes, and your specific site requirements.

## 4.6 Rectifier Nominal 120 VAC / 208 VAC / 240 VAC or 130 VDC Input and AC or DC Input Equipment Grounding Connections



**DANGER!** Adhere to the “Important Safety Instructions” starting on page vi.

### 4.6.1 General

List 01 may be equipped with...

- rear IEC receptacles for connection of AC input line cords (one AC feed per rectifier position),
- pre-wired AC input when factory installed in a Vertiv OSP cabinet (one AC feed per rectifier position), or
- pre-wired input (AC or DC) with a single AC input line cord or input cable (AC or DC) assembly (one AC feed per shelf).

### 4.6.2 AC Input Connections to Rear AC Input IEC Receptacles, if furnished

Each List 01 shelf, when equipped with rear IEC receptacles, requires three (3) AC input line cords. Each feeds one (1) rectifier position. Refer to SAG582138000 for AC input line cord options and recommended branch circuit protection.

#### **Procedure**

1. Plug the mating end of the AC input line cords into the IEC AC input receptacles located on the rear of the shelf. Refer to Figure 4.3.
2. Plug the other end of the AC input line cords into a properly wired AC outlet. Refer to Figure 4.3.

### 4.6.3 AC Input Connections When System is Pre-Wired in a Vertiv OSP Cabinet

When the system is pre-wired into a Vertiv OSP cabinet, refer to the cabinet documentation for rectifier AC input wiring.

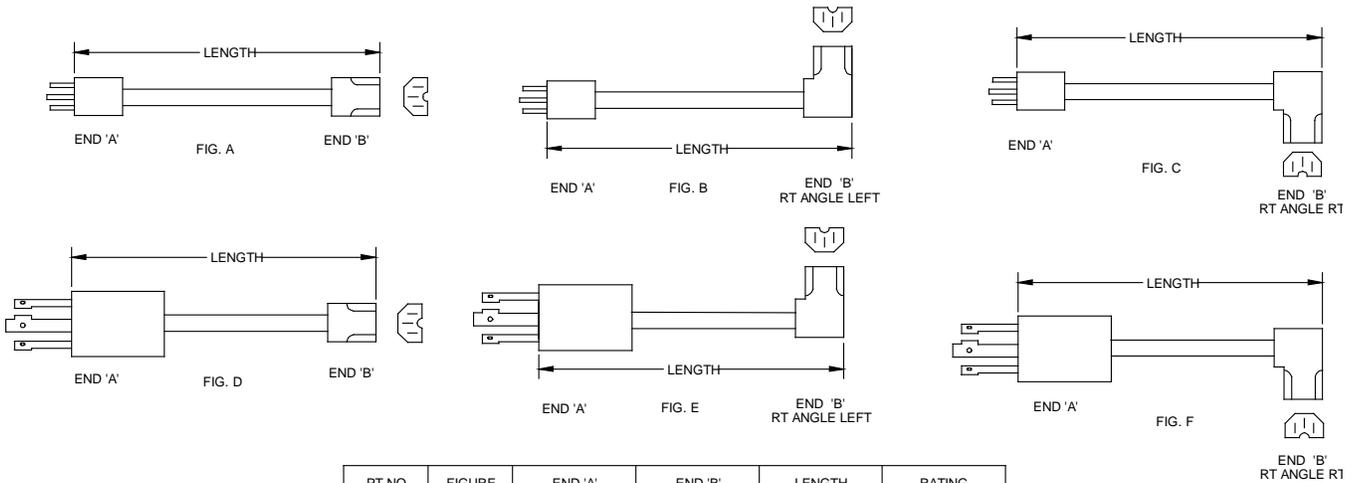
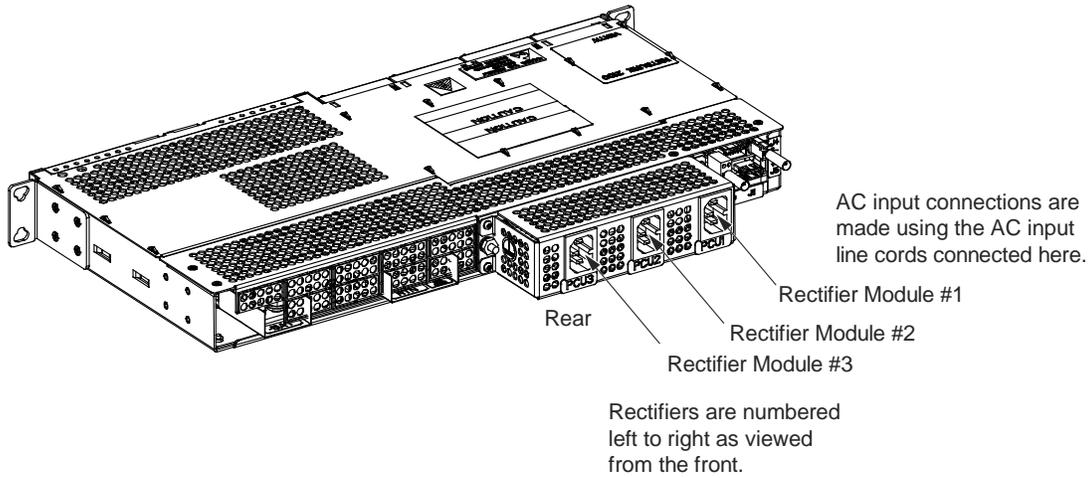
### 4.6.4 Input Connections (AC or DC) when Single AC Input Line Cord or Input Cable (AC or DC) Assembly is Factory Installed

Refer to the following procedure if a single AC input line cord or an AC or DC input cable assembly is factory installed. This AC input line cord or input cable (AC or DC) assembly feeds all rectifier positions in the shelf. Refer to SAG582138000 for AC input line cord and AC or DC input cable assembly options and recommended branch circuit protection.

#### **Procedure**

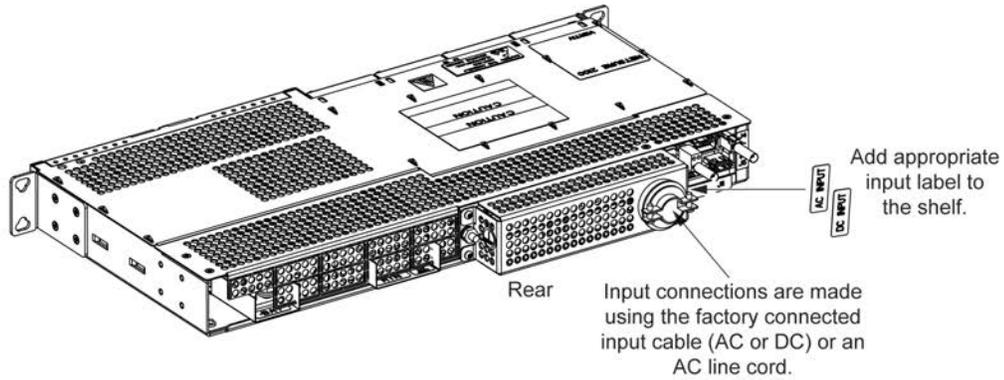
1. Connect the dedicated end of the AC input line cord or input cable (AC or DC) assembly into a properly wired AC or DC outlet or distribution box. Refer to Figure 4.4.
2. Add the input label AC INPUT or DC INPUT to the shelf. Refer to Figure 4.4.

**Figure 4.3 Individual Rectifier AC Input Feeds when IEC Receptacle Kit P/N 564840 is Factory Installed on List 01 Shelf**



PT NO	FIGURE	END 'A'	END 'B'	LENGTH	RATING
151873	A	NEMA 5-15P	IEC 320-C15 STRAIGHT	6 FT	15A-125V
151874	D	NEMA L5-15P	IEC 320-C15 STRAIGHT	6 FT	15A-125V
151875	D	NEMA L6-15P	IEC 320-C15 STRAIGHT	6 FT	15A-250V
151876	B	NEMA 5-15P	IEC 320-C15 RT ANGLE LEFT	6 FT	15A-125V
151877	E	NEMA L5-15P	IEC 320-C15 RT ANGLE LEFT	6 FT	15A-125V
151878	E	NEMA L6-15P	IEC 320-C15 RT ANGLE LEFT	6 FT	15A-250V
151879	C	NEMA 5-15P	IEC 320-C15 RT ANGLE RT	6 FT	15A-125V
151880	F	NEMA L5-15P	IEC 320-C15 RT ANGLE RT	6 FT	15A-125V
151881	F	NEMA L6-15P	IEC 320-C15 RT ANGLE RT	6 FT	15A-250V
151882	A	NEMA 5-15P	IEC 320-C15 STRAIGHT	14 FT	15A-125V
151883	D	NEMA L5-15P	IEC 320-C15 STRAIGHT	14 FT	15A-125V
151884	D	NEMA L6-15P	IEC 320-C15 STRAIGHT	14 FT	15A-250V
151885	B	NEMA 5-15P	IEC 320-C15 RT ANGLE LEFT	14 FT	15A-125V
151886	E	NEMA L5-15P	IEC 320-C15 RT ANGLE LEFT	14 FT	15A-125V
151887	E	NEMA L6-15P	IEC 320-C15 RT ANGLE LEFT	14 FT	15A-250V
151888	C	NEMA 5-15P	IEC 320-C15 RT ANGLE RT	14 FT	15A-125V
151889	F	NEMA L5-15P	IEC 320-C15 RT ANGLE RT	14 FT	15A-125V
151890	F	NEMA L6-15P	IEC 320-C15 RT ANGLE RT	14 FT	15A-250V

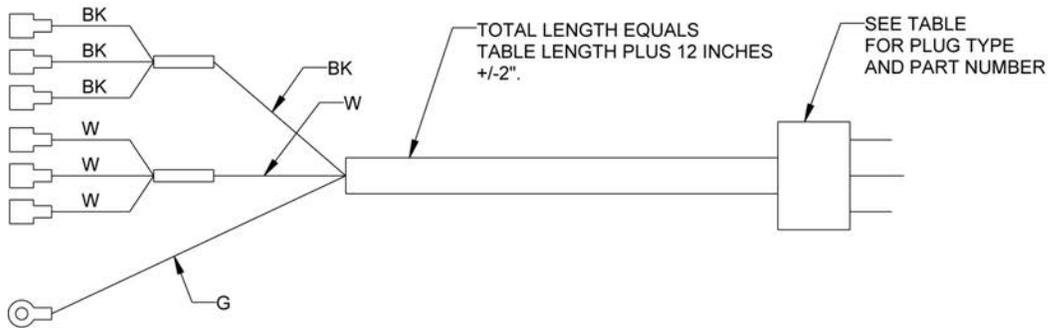
**Figure 4.4 Single Shelf Input Feed when Cord Clamp Kit P/N 564841 and AC Input Line Cord or Input Cable (AC or DC) Assembly is Factory Installed on List 01 Shelf**



Customer Nominal  
 120 VAC / 208 VAC / 240 VAC  
 85 VDC / 130 VDC / 185 VDC  
 Rectifier AC or DC Input  
 Connection

Plug or — White\* — L2-N — Factory  
 Unterminated — Green\* — Ground — Connections  
 Wires — Black\* — L1 — to Shelf

\* Color of input cable assembly or line cord lead.



PT NO	NOMINAL LENGTH. SEE FIGURE FOR TOTAL LENGTH.	PLUG PT NO	PLUG TYPE	INPUT
565487	30"	UNTERMINATED.	---	AC or DC
565488	6 FT	UNTERMINATED.	---	AC or DC
565489	12 FT	UNTERMINATED.	---	AC or DC
565490	6 FT	142841	5-20P 125V, 20A	AC
565491	14 FT	142841	5-20P 125V, 20A	AC
565494	6 FT	140393	L5-20P 125V, 20A	AC
565495	14 FT	140393	L5-20P 125V, 20A	AC
565496	6 FT	247113700	L6-20P 250V, 20A	AC
565497	14 FT	247113700	L6-20P 250V, 20A	AC
565498	6 FT	144267	IEC C20 250V, 16A	AC

## 4.7 External Alarm, Reference, Monitoring, and Control Connections

### 4.7.1 Connection Point Locations

Refer to Figure 4.5.

**Figure 4.5** External Alarm, Reference, Monitoring, and Control Connection Point Locations (cont'd on next page)

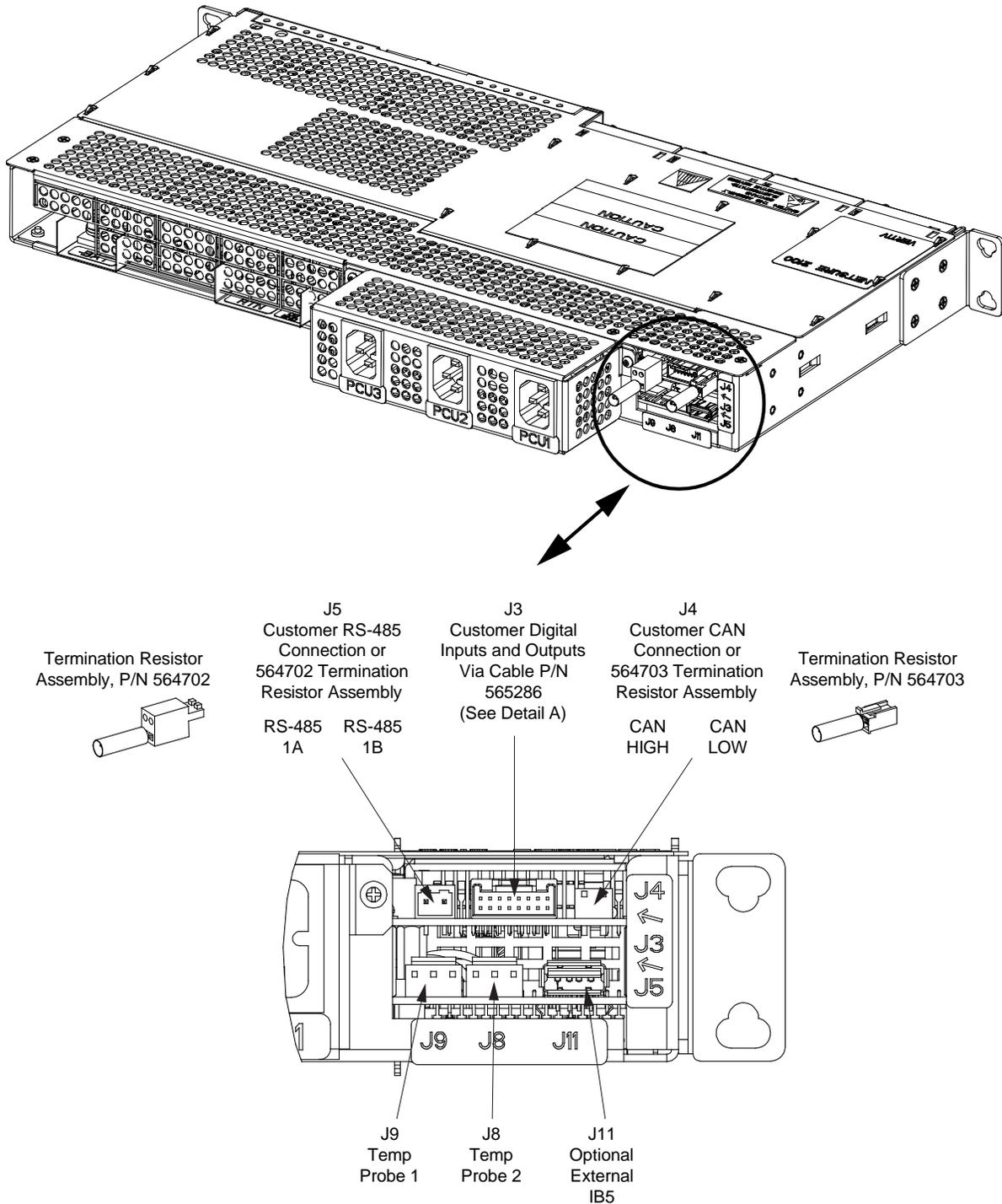
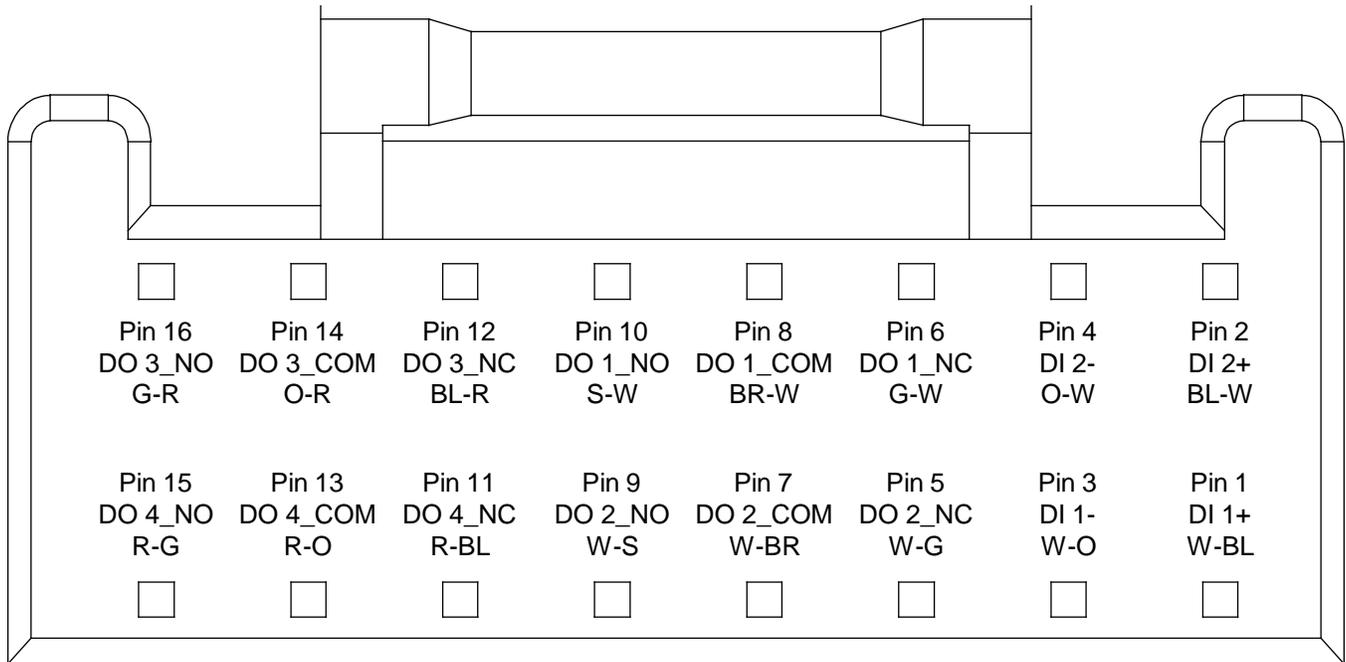


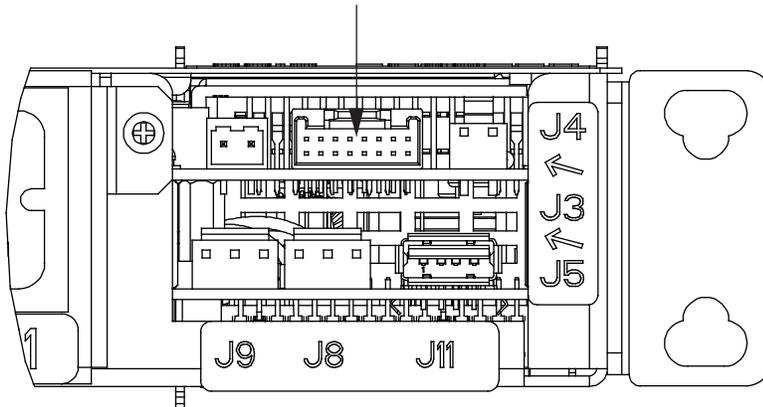
Figure 4.5 External Alarm, Reference, Monitoring, and Control Connection Point Locations (cont'd from previous page)

DETAIL A

J3 Pin-Outs and  
Customer Digital Inputs and Outputs  
Cable P/N 565286 Color Scheme



J3  
Customer Digital  
Inputs and Outputs  
Via Cable P/N  
565286



The controller relay assigned to “Critical Summary” alarm (relay 1 by default) will operate in the “Fail Safe Mode”. “Fail Safe Mode” means Relay 1 is de-energized during an alarm condition, opening the contacts between the C and NO terminals, and closing the contacts between the C and NC terminals.

The controller’s remaining three (3) relays energize during an alarm condition, closing the contacts between the C and NO terminals, and opening the contacts between the C and NC terminals.

## 4.7.2 RS-485 Connector J5

The RS-485 connector (J5) is used to interface with the various SM supervisory modules.

### Procedure

1. Remove the termination resistor assembly from RS-485 connector J5 located on the rear of the shelf. See Figure 4.5.
2. Use cable P/N 552888 (ordered separately) (discard splices) to interface with SM-AC, SM-BAT, SM-RC, or SM-IO supervisory modules. Connect this cable from the SM module to J5 located on the rear of the shelf. See Figure 4.5 for location.
3. If no SM module is connected to the system, ensure termination resistor assembly P/N 564702 is installed onto connector J5 located on the rear of the shelf.

## 4.7.3 Mini Control Unit CAN Port Connector J4 (RJ-45)

The CAN port connector (J4) is used to connect a supporting device or system into the Mini Control Unit CAN bus.

### Procedure

1. Remove the termination resistor assembly from CAN port connector J4 located on the rear of the shelf. See Figure 4.5.
2. Connect the device or system to CAN port connector J4 located on the rear of the shelf. See Figure 4.5 for location. Refer to Table 4.1 for CAN port connector J4 pin-outs. Ensure that the last device on the controller's CAN bus has a CAN termination resistor. Refer also to the external device's or system's instruction manual.



**NOTE!** *Optional SM-Temp Module:* The analog output of the SM-Temp Module may be connected to an Mini Control Unit temperature port input. In lieu of connecting the analog output of the SM-TEMP module to a Mini Control Unit temperature port input, the SM-TEMP module can simply be connected at the end of the Mini Control Unit CAN bus. Refer to the above procedure and the SM-Temp Module Instructions (UM547490) for details. Ensure the last SM-Temp Module (or if only one) has a CAN termination strap as shown in the SM-Temp Module Instructions (UM547490).

3. If CAN port connector J4 is not used, ensure termination resistor assembly P/N 564703 is installed onto connector J4 located on the rear of the shelf.

**Table 4.1 CAN Port Connector (J4)**

Mini Control Unit CAN Port J4 (RJ-45)		SM-Temp Module CAN Port Pin Number
Pin Number	Function	
1	CAN H	TB1-3 (CAN H)
2	CAN L	TB1-5 (CAN L)
3	--	--
4	--	--
5	--	--
6	--	--
7	--	--
8	--	--

#### 4.7.4 Temperature Probe Port Connectors J8 and J9

Temp Probe Port 1 connector (J9) and Temp Probe Port 2 connector (J8) are used to connect temperature probes to the system. See Figure 4.5 for location.



**NOTE!** Each temperature probe consists of two or three pieces that plug together to make a complete probe. See SAG582138000 for part numbers and descriptions.

Any combination of the temperature probes can be programmed to monitor ambient temperature and/or battery temperature. A temperature probe set to monitor battery temperature can also be used for the rectifier battery charge temperature compensation feature, or the battery charge temperature compensation feature can be programmed to use the average or highest value of all battery temperature probes. The battery charge temperature compensation feature allows the controller to automatically increase or decrease the output voltage of the system to maintain battery float current as battery temperature decreases or increases, respectively. Battery life can be extended when an optimum charge voltage to the battery with respect to temperature is maintained. A temperature probe set to monitor battery temperature can also be used for the BTRM (Battery Thermal Runaway Management) feature. The BTRM feature lowers output voltage when a high temperature condition exists to control against battery thermal runaway.

The temperature sensor end of the probe contains a tab with a 5/16" clearance hole for mounting.

A temperature probe programmed to monitor battery temperature should be mounted on the negative post of a battery cell to sense battery temperature. A temperature probe used for battery charge temperature compensation and/or BTRM (Battery Thermal Runaway Management) should also be mounted on the negative post of a battery cell. A temperature probe programmed to monitor ambient temperature should be mounted in a convenient location, away from direct sources of heat or cold.

##### **Procedure**

1. Connect up to two (2) temperature probes to the system using Temp Probe Port 1 connector (J9) and Temp Probe Port 2 connector (J8). See Figure 4.5 for location.

#### 4.7.5 Optional External IB5 Connector J11

The external IB5 connector (J11) is used to connect the Optional External IB5 Kit P/N 60203173 to the system. See Figure 4.5 for location.

##### **Procedure**

1. Refer to "Installing an Optional External IB5 Kit P/N " on page 30 for a procedure.

#### 4.7.6 Digital Inputs and Relay Outputs Connector J3

Digital inputs and relay outputs connector J3 is used to connect external digital inputs into the system and to connect relay outputs from the system to external alarm/control circuits. See Figure 4.5 for location.



**NOTE!** Digital input and relay output cable P/N 565286 is available (see SAG582138000). One end connects to connector J3 located on the rear of the shelf. The other end has unterminated leads for connections into customer circuits. Refer to Table 4.2 for color scheme.



**CAUTION!** All conductors in this cable may be connected within the shelf. Shorting or grounding of unused conductors may result in service interruption or equipment damage. Therefore, insulate all conductor ends not being used in your application.

## **Digital Inputs**

You can connect up to two (2) digital inputs to the system. Note that you must supply both paths for the digital input (either a positive or a negative signal and the opposite polarity return path). Observe proper polarity. Refer to Figure 4.5 for terminal locations and Table 4.2 for pin-out information.

The digital inputs can be programmed to provide an alarm when the signal is applied (HIGH) or removed (LOW). Refer to the Mini Control Unit Instructions (UM1M831ANA) for programming information.

Digital Input Ratings: Refer to the following.

- a) Maximum Voltage Rating: 60V DC.
- b) Active High: > 19V DC.
- c) Active Low: < 1V DC.

The digital inputs may be preprogrammed for specific functions. Refer to the configuration drawing (C-drawing) supplied with your system for your system's specific configuration.

### **Procedure**

1. Connect up to two (2) digital inputs to the system. Refer to Figure 4.5 for terminal locations and Table 4.2 for pin-out information.

## **Programmable Relay Outputs**

The system has four (4) programmable alarm relays with dry Form-C contacts. Refer to Figure 4.5 for terminal locations and Table 4.2 for pin-out information.

Refer to the Mini Control Unit Instructions (UM1M831ANA) for programming information.

Relay Ratings: Refer to the following.

- a) Steady State: 0.5 A @ 60 VDC, 1 A @ 30 VDC.
- b) Peak: 3 A @ 30 VDC.

The relays may be preprogrammed for specific functions. Refer to the configuration drawing (C-drawing) supplied with your system for your system's specific configuration.

### **Procedure**

1. Connect up to four (4) relay outputs to the system. Refer to Figure 4.5 for terminal locations and Table 4.2 for pin-out information.

**Table 4.2 Programmable Digital Inputs**

Programmable Digital Input	J3 Pin No.		Cable P/N 565286 Color Scheme	Dedicated to...
1	J3-1	+	W-BL	User Defined
	J3-3	-	W-O	
2	J3-2	+	BL-W	User Defined
	J3-4	-	O-W	
Programmable Relay Output	J3 Pin No.		Cable P/N 565286 Color Scheme	Alarms Assigned to this Relay (Default)
1 (Note 1)	J3-10	NO	S-W	User Defined
	J3-8	COM	BR-W	
	J3-6	NC	G-W	
2	J3-9	NO	W-S	User Defined
	J3-7	COM	W-BR	
	J3-5	NC	W-G	
3	J3-16	NO	G-R	User Defined
	J3-14	COM	O-R	
	J3-12	NC	BL-R	
4	J3-15	NO	R-G	User Defined
	J3-13	COM	R-O	
	J3-11	NC	R-BL	



**CAUTION!** All conductors in this harness may be connected within the cabinet. Shorting or grounding of unused conductors may result in service interruption or equipment damage. Therefore insulate all conductor ends not being used in your application.

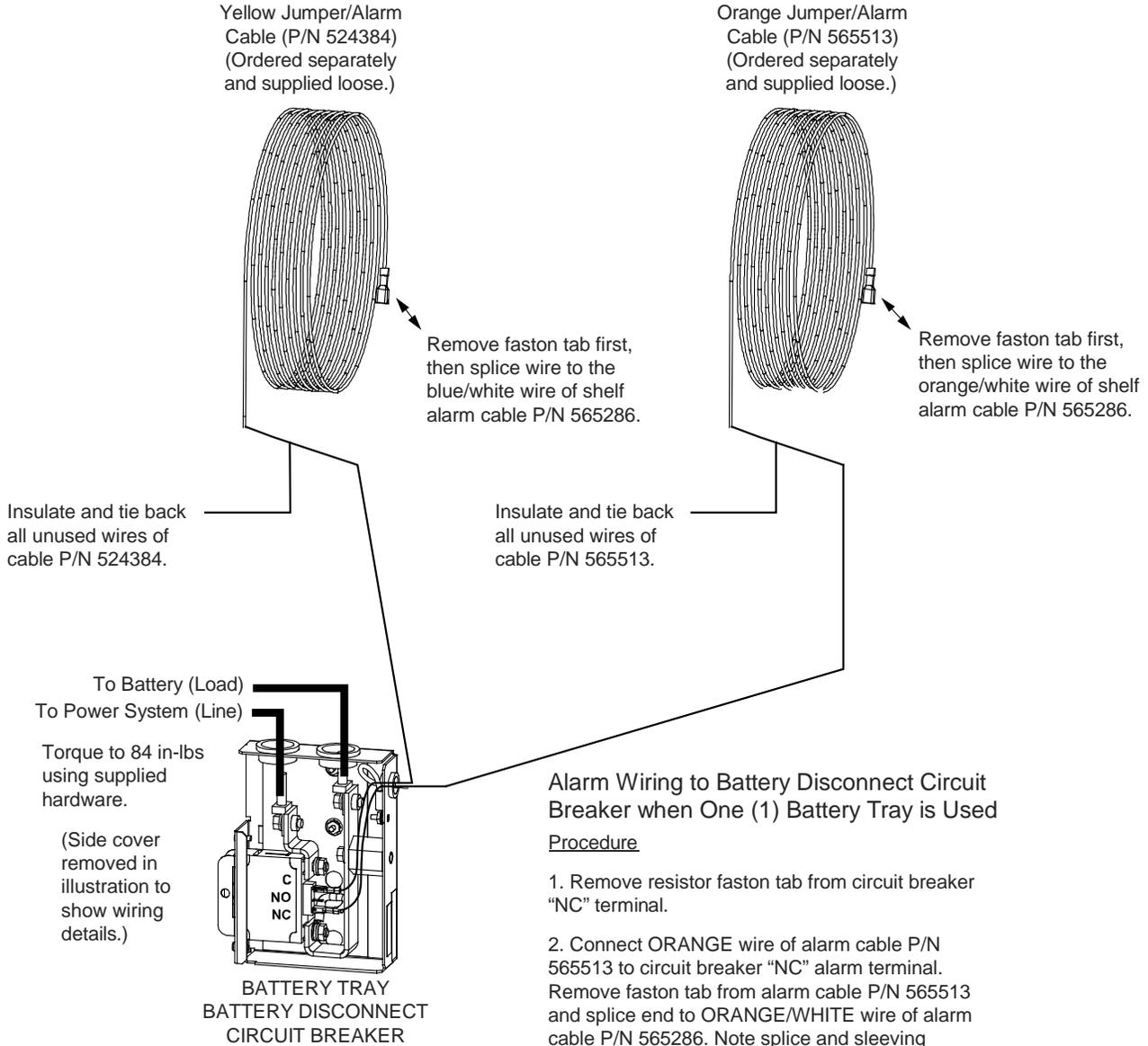


**NOTE:** The controller relay assigned to “Critical Summary” alarm (relay 1 by default) will operate in the “Fail Safe Mode”. “Fail Safe Mode” means Relay 1 is de-energized during an alarm condition, opening the contacts between the C and NO terminals, and closing the contacts between the C and NC terminals. The controller’s three (3) remaining relays energize during an alarm condition, closing the contacts between the C and NO terminals, and opening the contacts between the C and NC terminals.

## 4.7.7 Circuit Breaker Alarm Connections to Battery Disconnect Circuit Breakers on Battery Trays

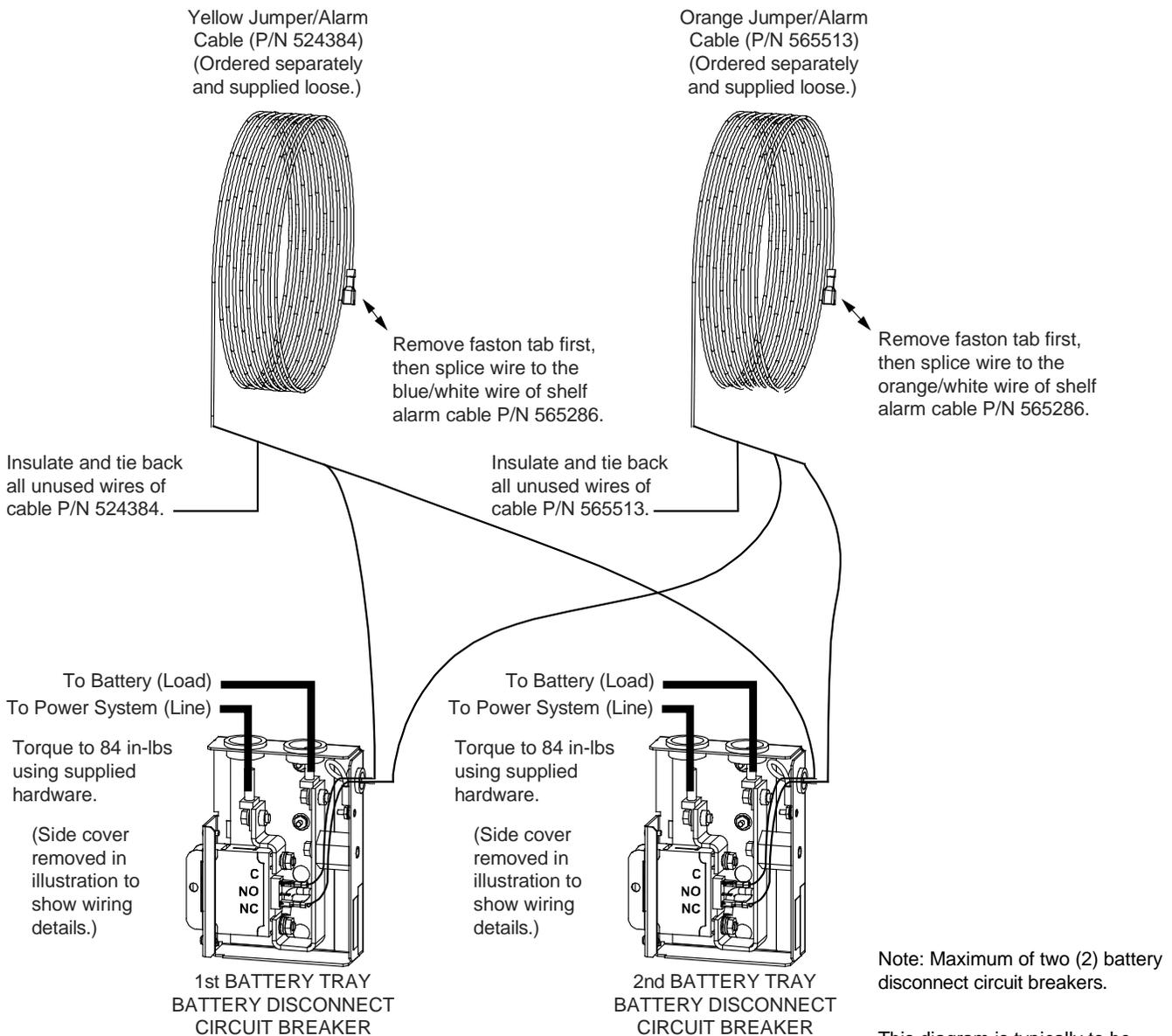
Connect the circuit breaker alarm leads from an optional battery tray to J3 located on the rear of the shelf. Refer to Figure 4.6 and Figure 4.7.

**Figure 4.6 Alarm Wiring to Battery Disconnect Circuit Breaker when One (1) Battery Tray is Used**



This diagram is typically to be used when adding a battery tray to an existing system. If system was ordered with battery trays, factory makes these connections.

1. Remove resistor faston tab from circuit breaker "NC" terminal.
2. Connect ORANGE wire of alarm cable P/N 565513 to circuit breaker "NC" alarm terminal. Remove faston tab from alarm cable P/N 565513 and splice end to ORANGE/WHITE wire of alarm cable P/N 565286. Note splice and sleeving included in 565286. Insulate and tie back all unused wires of alarm cable P/N 565513.
3. Connect Yellow wire of alarm cable P/N 524384 to circuit breaker "C" alarm terminal. Remove faston tab from alarm cable P/N 524384 and splice end to BLUE/WHITE wire of alarm cable P/N 565286. Note splice and sleeving included in 565286. Insulate and tie back all unused wires of alarm cable P/N 524384.
4. There is NO connection to the circuit breaker "NO (Normally Open)" alarm terminal.

**Figure 4.7 Alarm Wiring to Battery Disconnect Circuit Breakers when Two (2) Battery Trays are Used**

### Alarm Wiring to Battery Disconnect Circuit Breakers when Two (2) Battery Trays are Used

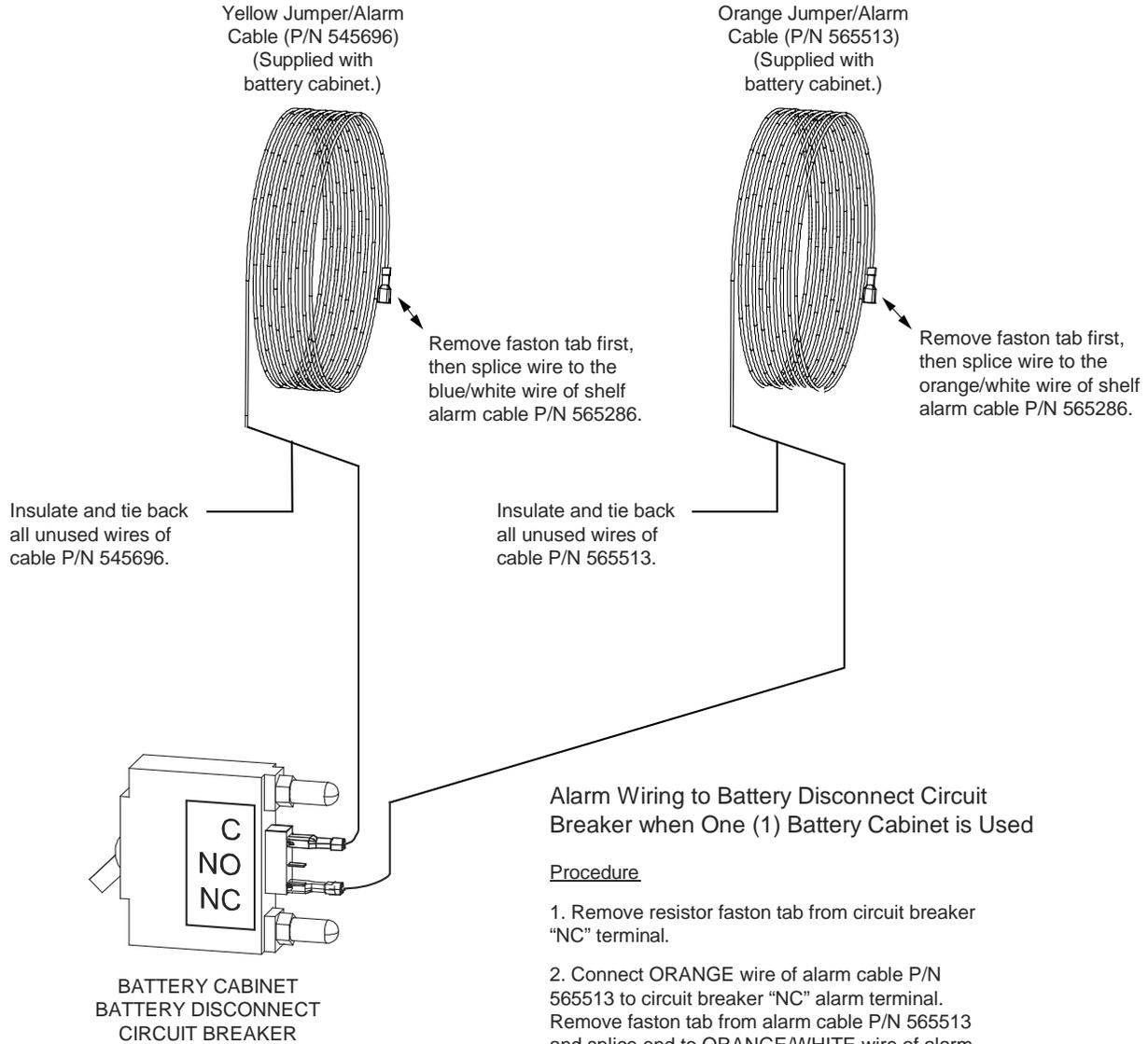
#### Procedure

1. Remove resistor faston tab from circuit breaker "NC" terminal on each battery disconnect.
2. Connect an ORANGE wire of alarm cable P/N 565513 to each circuit breaker "NC" alarm terminal. Remove faston tab from alarm cable P/N 565513 and splice end to ORANGE/WHITE wire of alarm cable P/N 565286. Note splice and sleeving included in 565286. Insulate and tie back all unused wires of alarm cable P/N 565513.
3. Connect a Yellow wire of alarm cable P/N 524384 to each circuit breaker "C" alarm terminal. Remove faston tab from alarm cable P/N 524384 and splice end to BLUE/WHITE wire of alarm cable P/N 565286. Note splice and sleeving included in 565286. Insulate and tie back all unused wires of alarm cable P/N 524384.
4. There is NO connection to the circuit breaker "NO (Normally Open)" alarm terminal.

## 4.7.8 Circuit Breaker Alarm Connections to Battery Disconnect Circuit Breakers on Battery Cabinets

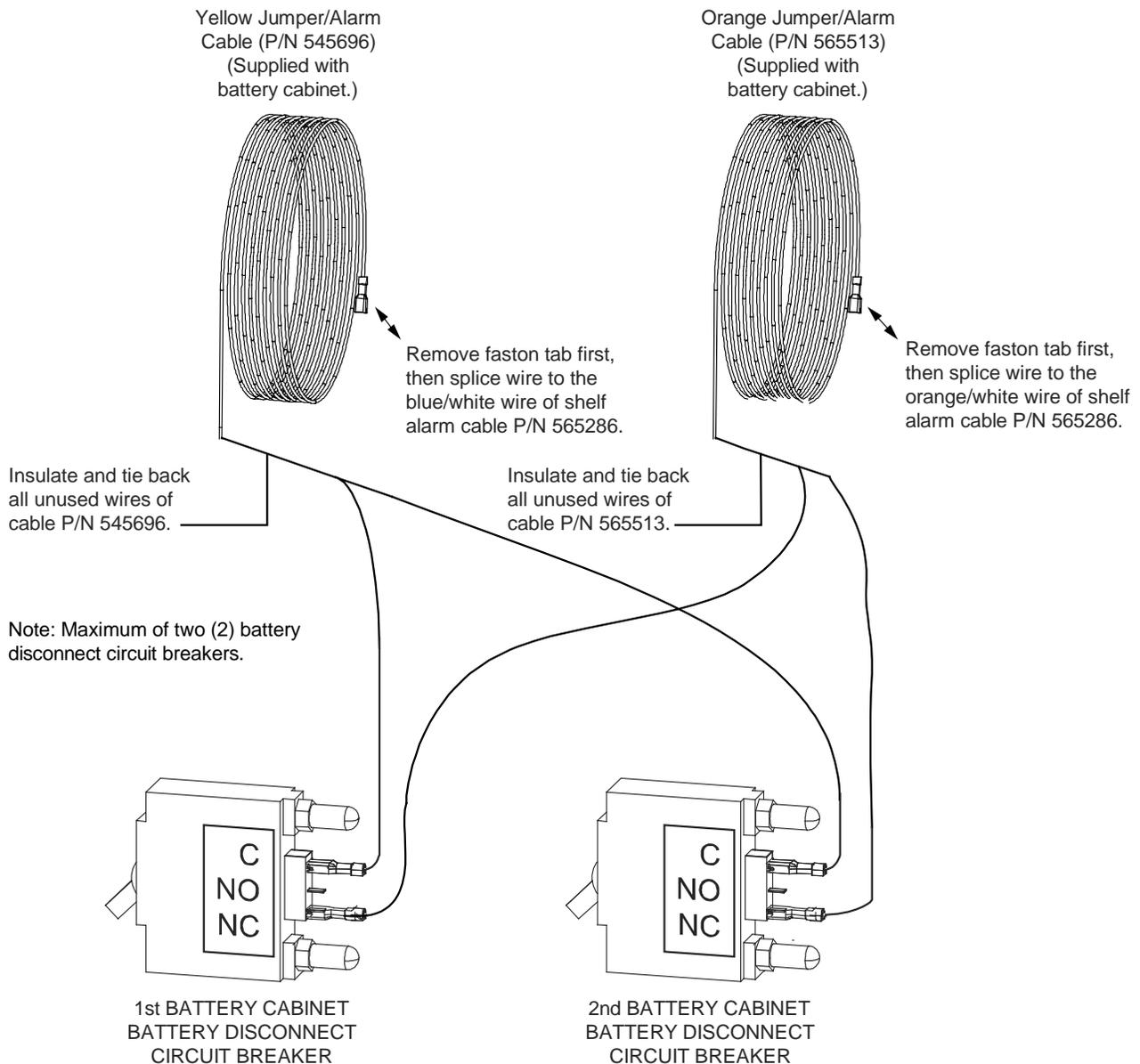
Connect the circuit breaker alarm lead from an optional battery cabinet to J3 located on the rear of the shelf. Refer to Figure 4.8 and Figure 4.9.

**Figure 4.8 Alarm Wiring to Battery Disconnect Circuit Breaker when One (1) Battery Cabinet is Used**



### Procedure

1. Remove resistor faston tab from circuit breaker "NC" terminal.
2. Connect ORANGE wire of alarm cable P/N 565513 to circuit breaker "NC" alarm terminal. Remove faston tab from alarm cable P/N 565513 and splice end to ORANGE/WHITE wire of alarm cable P/N 565286. Note splice and sleeving included in 565286. Insulate and tie back all unused wires of alarm cable P/N 565513.
3. Connect Yellow wire of alarm cable P/N 545696 to circuit breaker "C" alarm terminal. Remove faston tab from alarm cable P/N 545696 and splice end to BLUE/WHITE wire of alarm cable P/N 565286. Note splice and sleeving included in 565286. Insulate and tie back all unused wires of alarm cable P/N 545696.
4. There is NO connection to the circuit breaker "NO (Normally Open)" alarm terminal.

**Figure 4.9 Alarm Wiring to Battery Disconnect Circuit Breakers when Two (2) Battery Cabinets are Used**

### Alarm Wiring to Battery Disconnect Circuit Breakers when Two (2) Battery Cabinets are Used

#### Procedure

1. Remove resistor faston tab from circuit breaker "NC" terminal on each battery disconnect.
2. Connect an ORANGE wire of alarm cable P/N 565513 to each circuit breaker "NC" alarm terminal. Remove faston tab from alarm cable P/N 565513 and splice end to ORANGE/WHITE wire of alarm cable P/N 565286. Note splice and sleeving included in 565286. Insulate and tie back all unused wires of alarm cable P/N 565513.
3. Connect a Yellow wire of alarm cable P/N 545696 to each circuit breaker "C" alarm terminal. Remove faston tab from alarm cable P/N 545696 and splice end to BLUE/WHITE wire of alarm cable P/N 565286. Note splice and sleeving included in 565286. Insulate and tie back all unused wires of alarm cable P/N 545696.
4. There is NO connection to the circuit breaker "NO (Normally Open)" alarm terminal.

## 4.8 Mini Control Unit Ethernet Connection (if required)

The Mini Control Unit provides a Web Interface via an Ethernet connection to a TCP/IP network. This interface can be accessed locally on a computer or remotely through a network.

### Procedure

1. An RJ-45 10BaseT jack is provided on the front of the Mini Control Unit for connection into a customer's network. This jack has a standard Ethernet pin configuration scheme, twisted pair. Refer to Figure 4.10 for location and Table 4.3 for pin outs. Use shielded Ethernet cable (grounded at both ends). Note that the Mini Control Unit RJ-45 jack is connected to chassis ground. Refer to the Mini Control Unit Instructions (UM1M831ANA) for operational details.



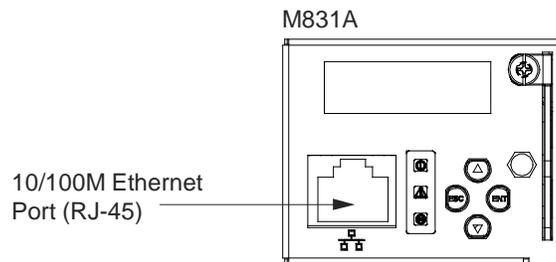
**NOTE!** You can access the Web pages of the power system locally by using a "crossover" or "straight" cable connected directly between your PC and the Mini Control Unit.



**WARNING!** The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly **MUST NOT** be metallically connected to the interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

The intra-building port (RJ-45) of the equipment or subassembly must use shielded intra-building cabling/wiring that is grounded at both ends.

**Figure 4.10 Mini Control Unit Ethernet Port**



**NOTE!** If the system is connected to external IB5 assembly P/N 60203173, **DO NOT** connect your Local Area Network (LAN) to the Mini Control Unit's front panel Ethernet port. See "Mini Control Unit Second Ethernet Port Connection (if Optional External IB5 Kit P/N 60203173 Furnished)" on page 49.

**Table 4.3 Mini Control Unit RJ-45 Ethernet Port Pin Configuration**

Port Pin Number	Name	Definition
1	Tx+	Write Signal +
2	Tx-	Write Signal -
3	Rx+	Read Signal +
4	--	no connection
5	--	no connection
6	Rx-	Read Signal -
7	--	no connection
8	--	no connection

## 4.9 Mini Control Unit Second Ethernet Port Connection (if Optional External IB5 Kit P/N 60203173 Furnished)

### 4.9.1 General

Your system may be connected to an external IB5 assembly (see “Installing an Optional External IB5 Kit P/N ” on page 30). The IB5 assembly provides a second Ethernet port. When the system is connected to an external IB5 assembly, the Ethernet port located on the Mini Control Unit’s front panel can ONLY be used to connect a computer directly to the Mini Control Unit and the Ethernet port located on the IB5 assembly is to be used to connect the Mini Control Unit to your Local Area Network (LAN).



**NOTE!** If your system is connected to an IB5 assembly, DO NOT connect your Local Area Network (LAN) to the Mini Control Unit’s front panel Ethernet port.

### 4.9.2 Default IB5 Ethernet Port Parameters

#### IPv4

IP Address: 192.168.1.2  
 Subnet Mask: 255.255.255.0  
 Default Gateway: 192.168.1.1

#### IPv6

IPv6 Address: 20fa:fffd:ffc:ffb:ffa:fff9:fff8:fff7  
 IPv6 Prefix: 0  
 IPv6 Gateway: 20fa:1:ffe:fff:ffe:ffd:fff:ffe

#### Procedure

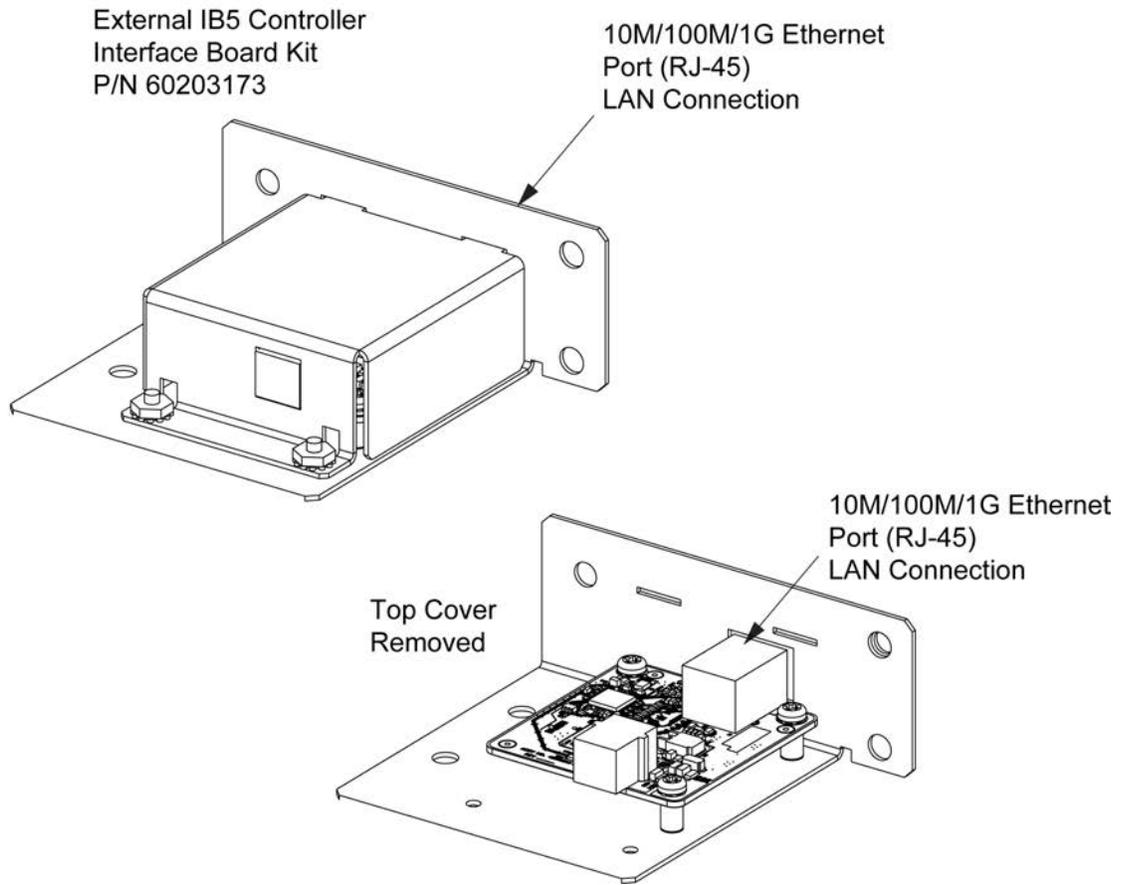
1. An RJ-45 10BaseT jack is provided on the IB5 assembly for connection into a customer’s network. This jack has a standard Ethernet pin configuration scheme, twisted pair. Refer to Figure 4.11 for location and Table 4.3 for pin outs. Use shielded Ethernet cable (grounded at both ends). Note that the IB5 board’s RJ-45 jack is connected to chassis ground. Refer to the Mini Control Unit Instructions (UM1M831ANA) for operational details.



**WARNING!** The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly **MUST NOT** be metalically connected to the interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 4) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metalically to OSP wiring.

The intra-building port (RJ-45) of the equipment or subassembly must use shielded intra-building cabling/wiring that is grounded at both ends.

**Figure 4.11 Mini Control Unit Second Ethernet Port Located on External IB5 Assembly**



## 4.10 Load Distribution Wiring, Input Battery Wiring, and CO Ground Wiring



**DANGER!** Adhere to the “Important Safety Instructions” starting on page vi.



**WARNING!** Check for correct polarity before making connections.

### 4.10.1 Load Distribution Wiring, Input Battery Wiring, and CO Ground Wiring To List AA

Refer to Figure 4.12. Cut off perforated areas of shield as required for exiting leads from shelf.

#### **Central Office (CO) Ground Wiring**

Landing points are provided on the battery return bus for a central office ground lead. Refer to Figure 4.12 for stud size/spacing and recommended torque. For central office grounding requirements, refer to the current edition of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC), applicable local codes, and your specific site requirements.

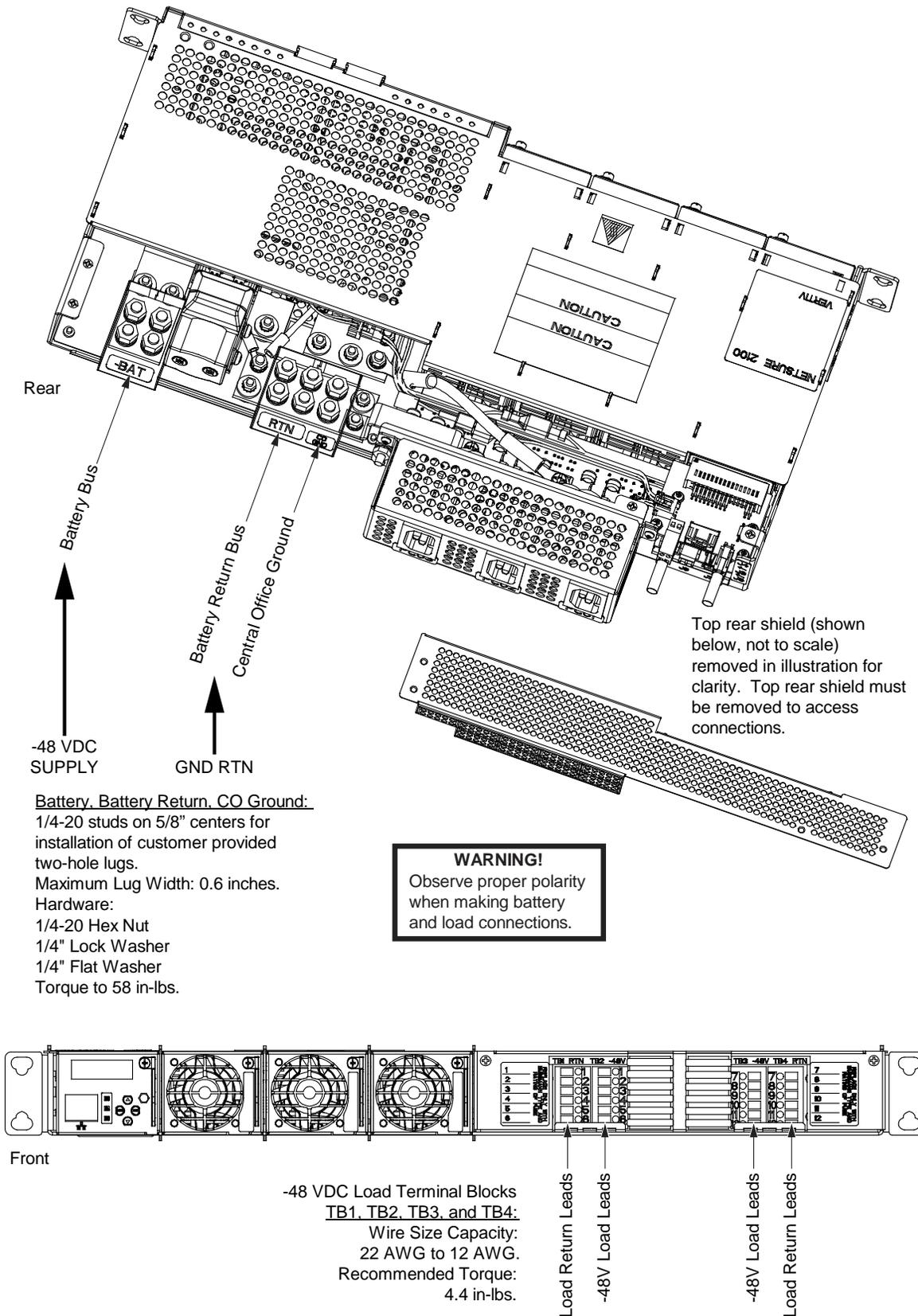
#### **Load Distribution Wiring to GMT Fuse Blocks**

Load and load return leads are connected to screw-type terminal blocks located on the front of the distribution unit. Refer to Figure 4.12 for terminal block wire size capacity and recommended torque.

#### **Input Battery Wiring**

Input battery and battery return leads terminated in two-hole lugs are connected to threaded studs located on the rear inside of the distribution unit. Refer to Figure 4.12 for stud size/spacing and recommended torque.

Figure 4.12 Load Distribution Wiring, Input Battery Wiring, and CO Ground Wiring (Lists AA)



## 4.10.2 Load Distribution Wiring, Input Battery Wiring, and CO Ground Wiring to List CA

Refer to Figure 4.13. Cut off perforated areas of shield as required for exiting leads from shelf.

### **Central Office (CO) Ground Wiring**

Landing points are provided on the battery return bus for a central office ground lead. Refer to Figure 4.13 for stud size/spacing and recommended torque. For central office grounding requirements, refer to the current edition of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC), applicable local codes, and your specific site requirements.

### **Load Distribution Wiring to GMT Fuse Blocks**

Load and load return leads are connected to screw-type terminal blocks located on the front of the distribution unit. Refer to Figure 4.13 for terminal block wire size capacity and recommended torque.

### **Load Distribution Wiring to Distribution Circuit Breakers**

Load distribution and load return leads terminated in two-hole lugs are connected to threaded studs located on the rear inside of the distribution unit. Refer to Figure 4.13 for stud size/spacing and recommended torque.

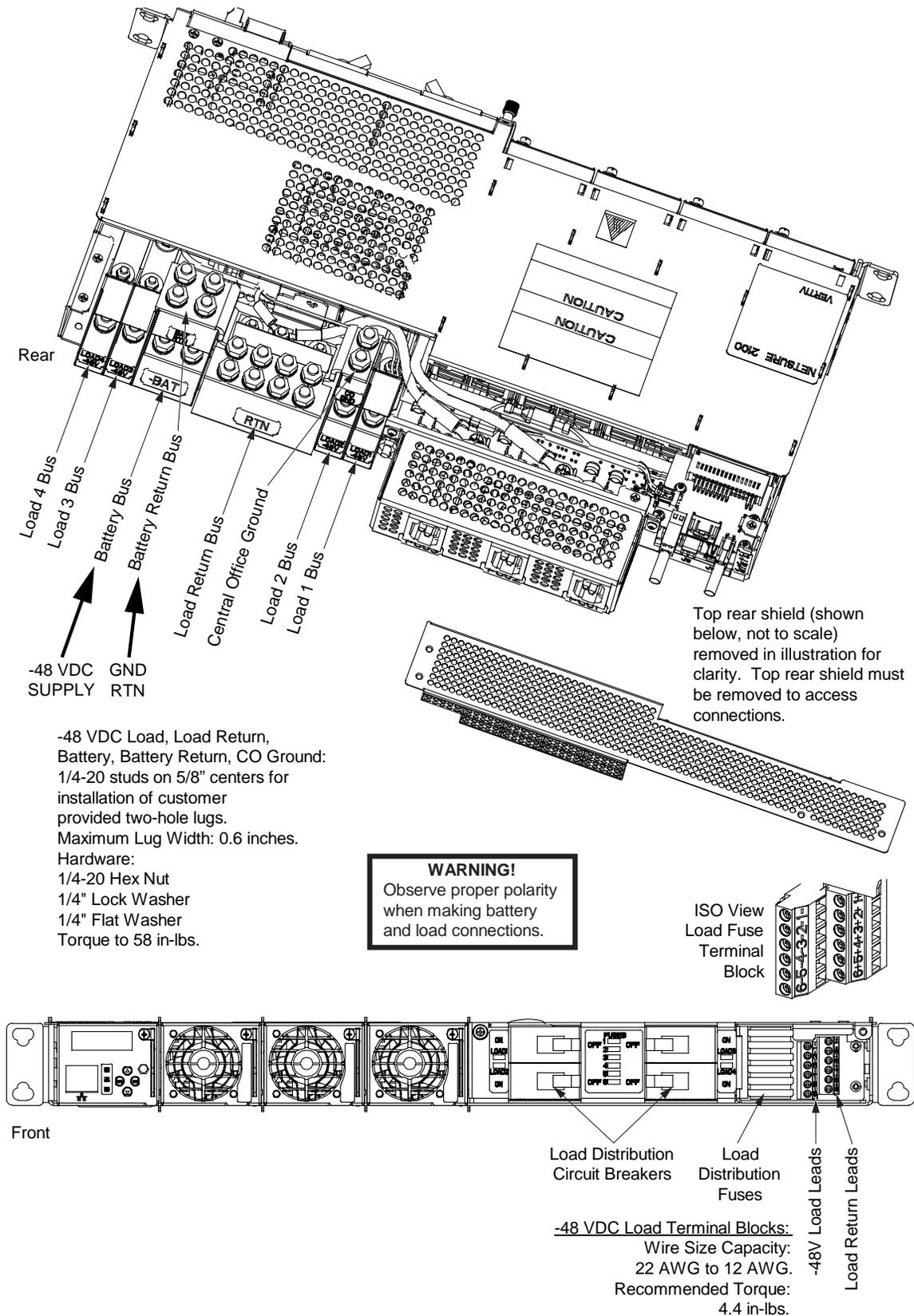


**NOTE!** Connect these leads prior to mounting the shelf in a rack with no rear access.

### **Input Battery Wiring**

Input battery and battery return leads terminated in two-hole lugs are connected to threaded studs located on the rear inside of the distribution unit. Refer to Figure 4.13 for stud size/spacing and recommended torque.

Figure 4.13 Load Distribution Wiring, Input Battery Wiring, and CO Ground Wiring (Lists CA)



### **4.10.3 Load Distribution Wiring, Input Battery Wiring, and CO Ground Wiring to List BA**

Refer to Figure 4.14. Cut off perforated areas of shield as required for exiting leads from shelf.

#### **Central Office (CO) Ground Wiring**

Landing points are provided on the battery return bus for a central office ground lead. Refer to Figure 4.14 for stud size/spacing and recommended torque. For central office grounding requirements, refer to the current edition of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC), applicable local codes, and your specific site requirements.

#### **Optional CO Ground Jumper**

A jumper is supplied loose with the system (P/N 10020338). This jumper is used as required to tie the CO ground terminal located on the return bus (see Figure 4.14) to the shelf frame ground stud located on the rear of the unit (see Figure 4.2). See Figure 4.14 for jumper installation details.

#### **Load Distribution Wiring to GMT Fuse Blocks**

Load and load return leads are connected to screw-type terminal blocks located inside the distribution unit. Refer to Figure 4.14 for terminal block wire size capacity and recommended torque.

Feed wires from rear right side (as viewed from front) of shelf into distribution unit area. Secure distribution wiring to rear of sheetmetal distribution unit slide. Leave slack in wires at rear to allow distribution unit to slide in and out after wiring.

#### **Load Distribution Wiring to Distribution Circuit Breakers**

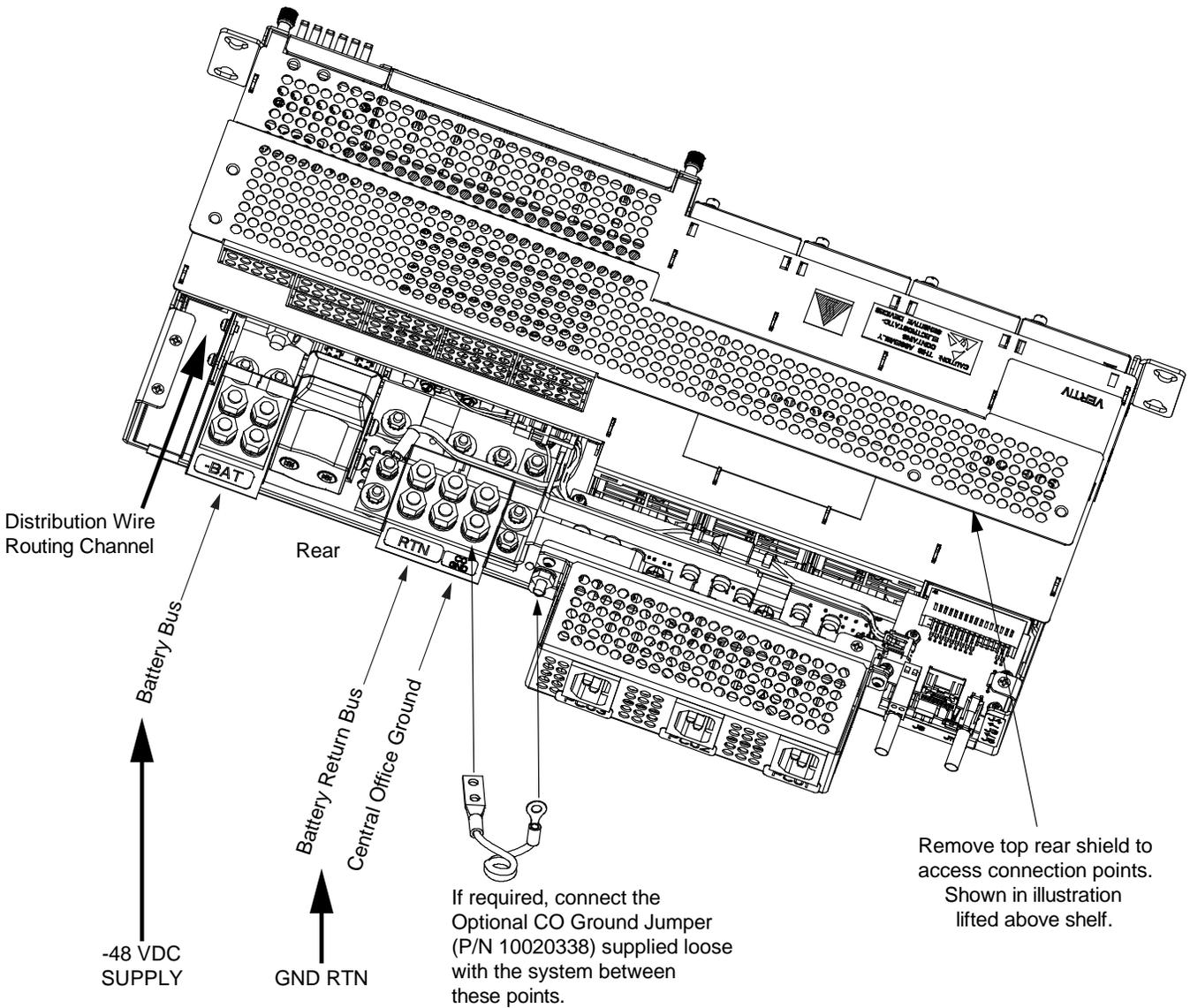
Load and load return leads are connected to screw-type terminal blocks located inside the distribution unit. Refer to Figure 4.14 for terminal block wire size capacity and recommended torque.

Feed wires from rear right side (as viewed from front) of shelf into distribution unit area. Secure distribution wiring to rear of sheetmetal distribution unit slide. Leave slack in wires at rear to allow distribution unit to slide in and out after wiring.

#### **Input Battery Wiring**

Input battery and battery return leads terminated in two-hole lugs are connected to threaded studs located on the rear inside of the distribution unit. Refer to Figure 4.14 for stud size/spacing and recommended torque.

Figure 4.14 Load Distribution Wiring, Input Battery Wiring, and CO Ground Wiring (Lists BA) (cont'd on next page)



**Battery, Battery Return, CO Ground:**

1/4-20 studs on 5/8" centers for installation of customer provided two-hole lugs.

Maximum Lug Width: 0.6 inches.

Hardware:

1/4-20 Hex Nut

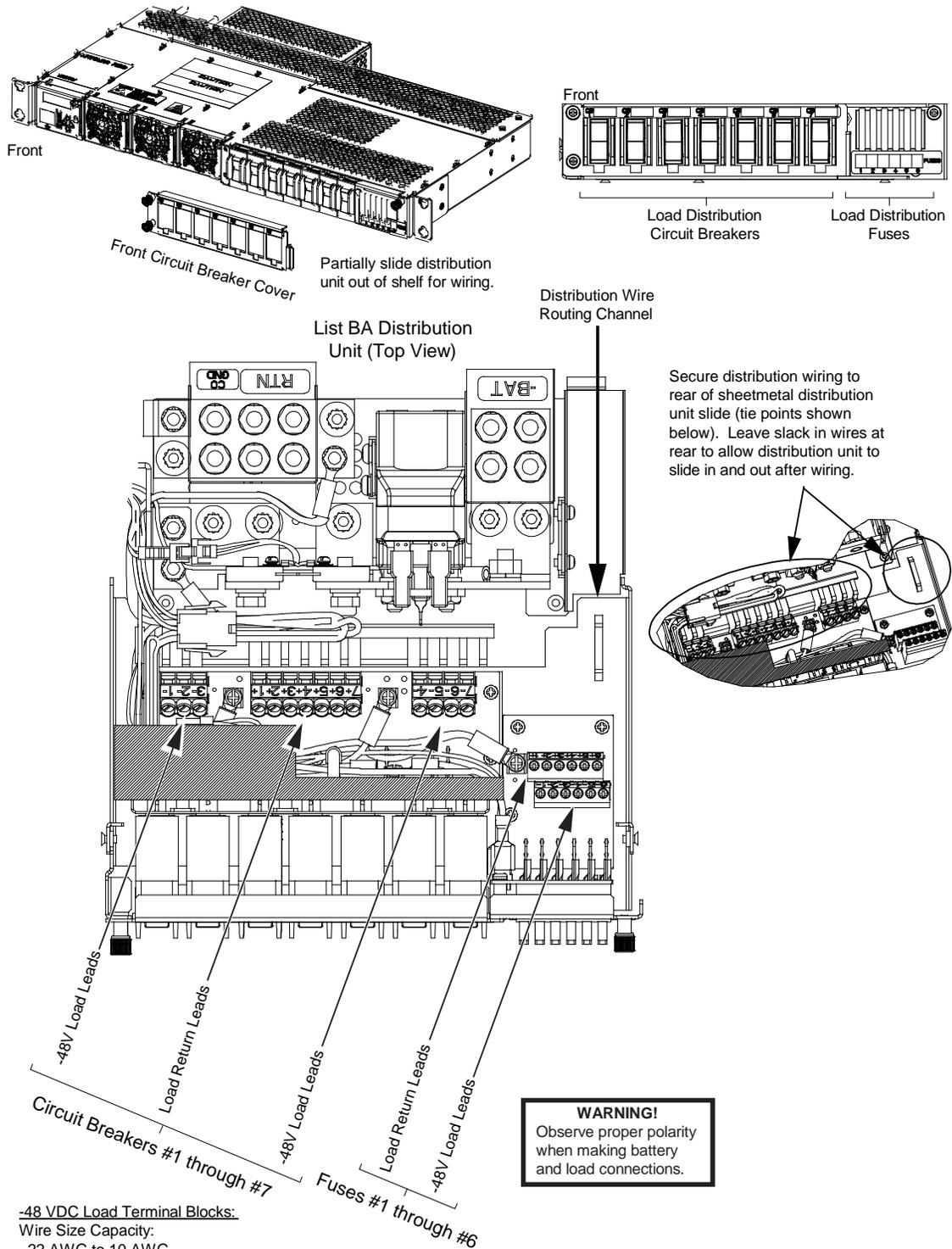
1/4" Lock Washer

1/4" Flat Washer

Torque to 58 in-lbs.

**WARNING!**  
Observe proper polarity when making battery and load connections.

Figure 4.14 Load Distribution Wiring, Input Battery Wiring, and CO Ground Wiring (Lists BA) (cont'd from previous page)



-48 VDC Load Terminal Blocks:  
 Wire Size Capacity:  
 22 AWG to 10 AWG.  
 Recommended Torque:  
 5.3 in-lbs.

-48 VDC Load Terminal Blocks:  
 Wire Size Capacity:  
 22 AWG to 12 AWG.  
 Recommended Torque:  
 4.4 in-lbs.

## **4.10.4 Load Distribution Wiring, Input Battery Wiring, and CO Ground Wiring to List BB**

Refer to Figure 4.15. Cut off perforated areas of shield as required for exiting leads from shelf.

### **Central Office (CO) Ground Wiring**

Landing points are provided on the battery return bus for a central office ground lead. Refer to Figure 4.15 for stud size/spacing and recommended torque. For central office grounding requirements, refer to the current edition of the American National Standards Institute (ANSI) approved National Fire Protection Association's (NFPA) National Electrical Code (NEC), applicable local codes, and your specific site requirements.

### **Optional CO Ground Jumper**

A jumper is supplied loose with the system (P/N 10020338). This jumper is used as required to tie the CO ground terminal located on the return bus (see Figure 4.15) to the shelf frame ground stud located on the rear of the unit (see Figure 4.2). See Figure 4.15 for jumper installation details.

### **Load Distribution Wiring to GMT Fuse Blocks**

Load and load return leads are connected to screw-type terminal blocks located inside the distribution unit. Refer to Figure 4.15 for terminal block wire size capacity and recommended torque.

Feed wires from rear right side (as viewed from front) of shelf into distribution unit area. Secure distribution wiring to rear of sheetmetal distribution unit slide. Leave slack in wires at rear to allow distribution unit to slide in and out after wiring.

### **Load Distribution Wiring to Distribution Circuit Breakers**

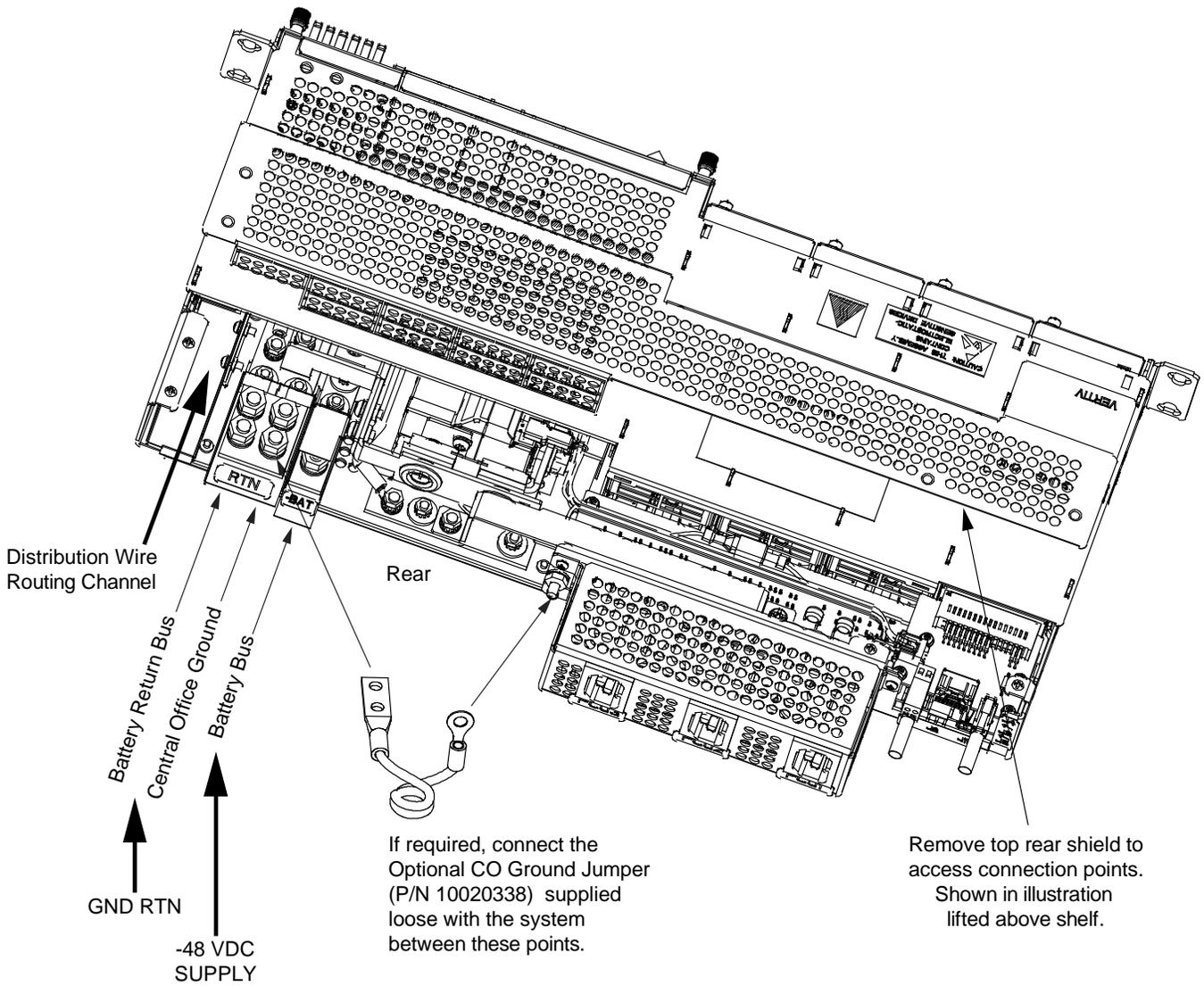
Load and load return leads are connected to screw-type terminal blocks located inside the distribution unit. Refer to Figure 4.15 for terminal block wire size capacity and recommended torque.

Feed wires from rear right side (as viewed from front) of shelf into distribution unit area. Secure distribution wiring to rear of sheetmetal distribution unit slide. Leave slack in wires at rear to allow distribution unit to slide in and out after wiring.

### **Input Battery Wiring**

Input battery and battery return leads terminated in two-hole lugs are connected to threaded studs located on the rear inside of the distribution unit. Refer to Figure 4.15 for stud size/spacing and recommended torque.

Figure 4.15 Load Distribution Wiring, Input Battery Wiring, and CO Ground Wiring (Lists BB) (cont'd on next page)



Battery, Battery Return, CO Ground:

1/4-20 studs on 5/8" centers for installation of customer provided two-hole lugs.

Maximum Lug Width: 0.6 inches.

Hardware:

1/4-20 Hex Nut

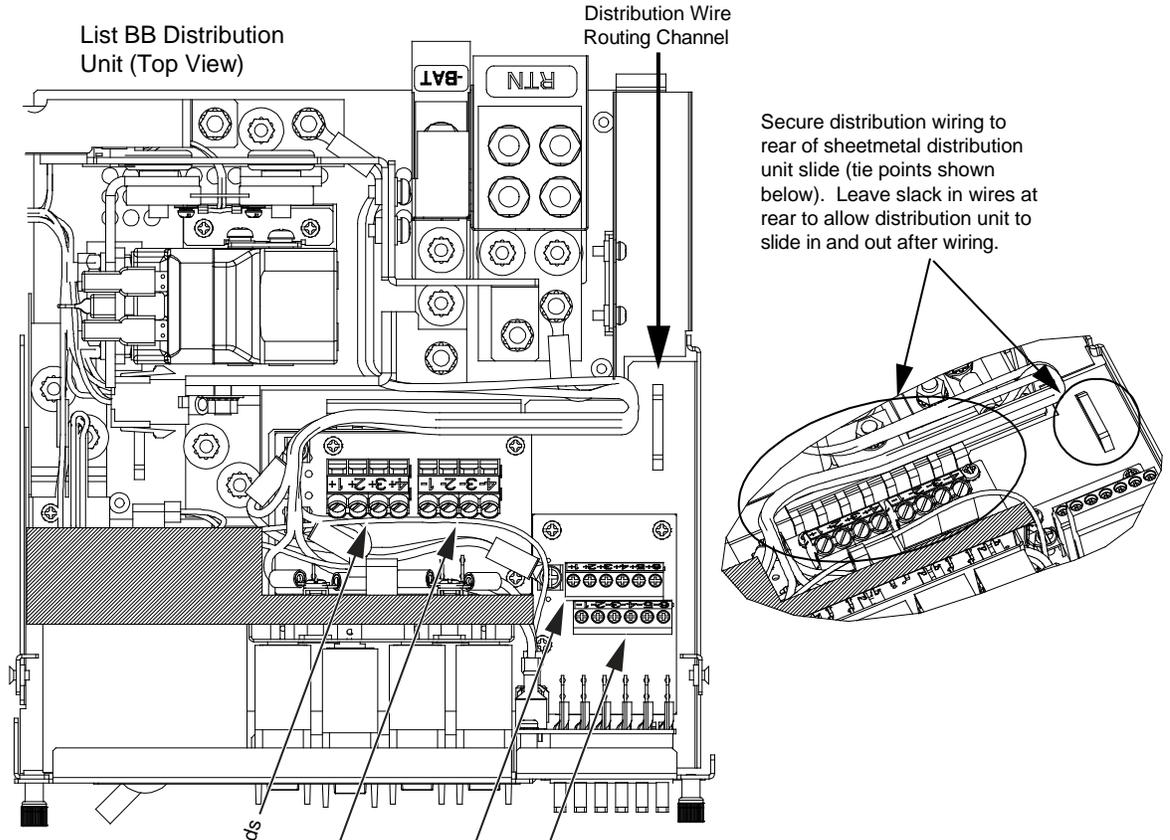
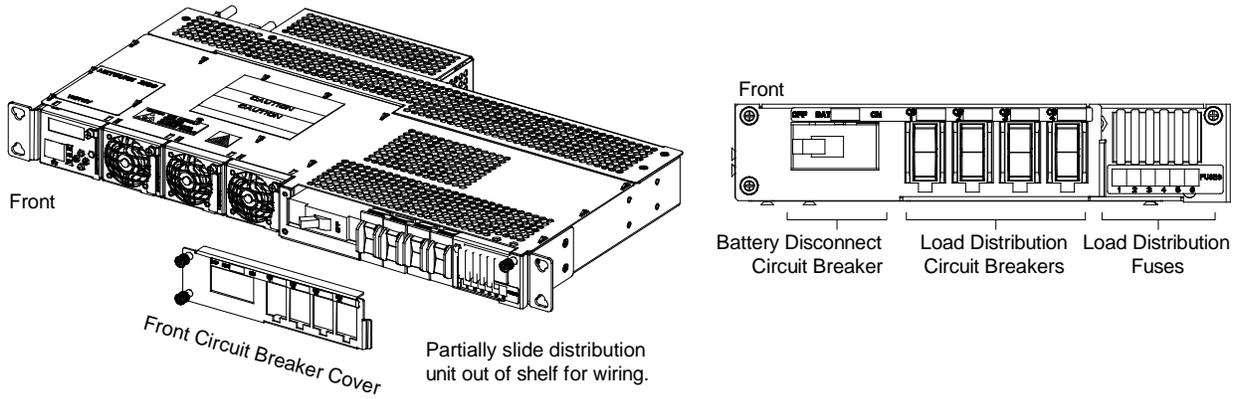
1/4" Lock Washer

1/4" Flat Washer

Torque to 58 in-lbs.

**WARNING!**  
Observe proper polarity when making battery and load connections.

Figure 4.15 Load Distribution Wiring, Input Battery Wiring, and CO Ground Wiring (Lists BB) (cont'd from previous page)



**WARNING!**  
Observe proper polarity when making battery and load connections.

**-48 VDC Load Terminal Blocks:**  
Wire Size Capacity:  
22 AWG to 10 AWG.  
Recommended Torque:  
5.3 in-lbs.

**Circuit Breakers #1 through #4**

**Fuses #1 through #6**

**-48 VDC Load Terminal Blocks:**  
Wire Size Capacity:  
22 AWG to 12 AWG.  
Recommended Torque:  
4.4 in-lbs.

## 4.11 Connecting to an Optional Battery Cabinet

### **Vertiv™ NetSure™ 211BC Battery Cabinet, P/N 541434**

Refer to the battery cabinet instructions (Section 6023).

### **Vertiv™ NetSure™ 211BC Battery Cabinet, P/N 545534**

Refer to the battery cabinet instructions (Section 6033).

### **Vertiv™ NetSure™ 211BC Battery Cabinet, P/N 545506**

Refer to the battery cabinet instructions (Section 6036).

### **Vertiv™ NetSure™ 211BC Battery Cabinet, P/N 554631**

Refer to the battery cabinet instructions (UM554631).

## 4.12 Installing and Connecting Batteries in an Optional List 93 or 94 Battery Tray (if furnished)

### 4.12.1 Important Safety Instructions



**DANGER!** Adhere to the “Important Safety Instructions” starting on page vi.

### 4.12.2 Installing and Connecting Batteries

#### **Procedure**

Tray P/N 559806 is used in the following procedure. The procedure for all other available trays is similar.



**NOTE!** Refer to Figure 4.16 as this procedure is performed. See also Figure 3.7, Figure 3.8, Figure 3.9, Figure 3.10, Figure 3.11, Figure 3.12, and Figure 3.13.

1. **If Battery Trays are Equipped with a Circuit Breaker:** Turn OFF the battery disconnect circuit breaker located on all battery trays. Refer to Figure 4.16 for locations. Follow local lockout/tagout procedures to ensure circuit breakers remain in the off position during installation.
2. Remove the battery retention bracket as shown in Figure 4.16. To do so, remove the four 1/4-20 x 5/8” bolts and associated washers.
3. Slide batteries into the tray, with the battery terminals toward the front as shown in Figure 4.16. Slide batteries into the tray as far as they will go.



**NOTE!** The battery retention bracket can be oriented two ways to accommodate batteries of different lengths. A correctly oriented bracket will fit snugly against the batteries. If your batteries require the alternate bracket orientation shown in Detail A of Figure 4.16, remove and reinstall the bullet-shaped spacers (if furnished) as shown in Detail A before performing the next step.

4. Reinstall the battery retention bracket. The spacers on the bracket should separate the batteries from each other. Secure with the hardware removed in a previous step. Refer to Figure 4.16 for washer location.



**NOTE!** The spacers on the bracket are used to accommodate the various sizes of batteries available. Install or remove the spacers as required so that the batteries are tight in the battery tray.

5. Connect three links supplied by the battery manufacturer between pairs of battery terminals as shown in Figure 4.16. Use hardware furnished by the battery manufacturer. Torque hardware to battery manufacturer's recommendations.
6. Ensure the battery cable ends in all trays are insulated with sleeving before performing the next step.



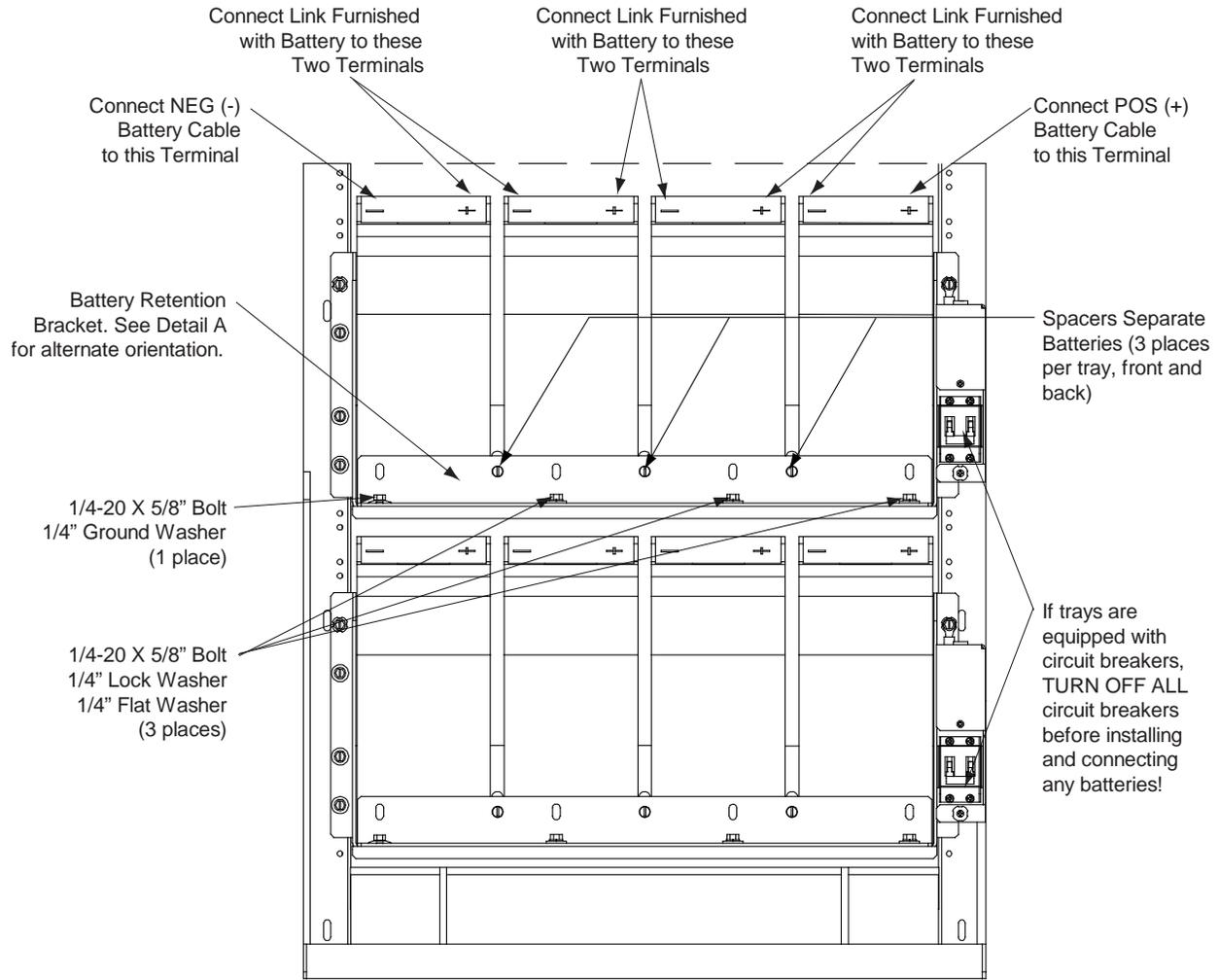
**DANGER!** In multiple-tray installations, when batteries in one tray are connected, the battery cables in all trays will be energized. Remove sleeving from and connect one cable at a time. Do not allow a cable end to contact the battery tray or equipment rack.



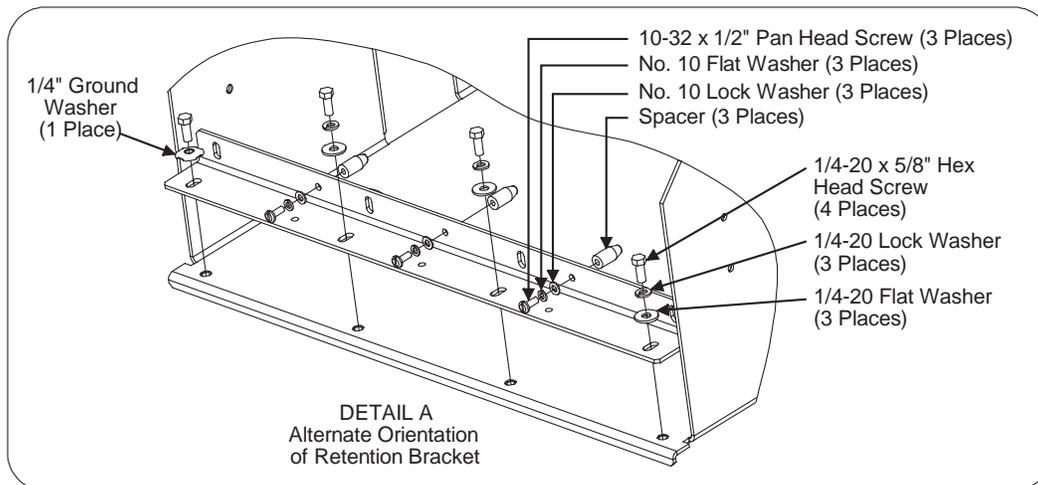
**WARNING!** In the next step, observe correct polarity. Connect only cables labeled "+" to battery terminals labeled "+". Likewise, connect only cables labeled "-" to battery terminals labeled "-".

7. Connect the cables found in the battery tray to the battery terminals, "+" to "+" and "-" to "-". Observe correct polarity. Refer to Figure 4.16. Secure with hardware furnished with the battery. Torque hardware to battery manufacturer's recommendations.
8. Repeat steps 1 through 7 for any remaining battery trays.
9. **If Battery Trays Are Equipped With a Circuit Breaker:** To connect the batteries to the power system, turn ON the battery disconnect circuit breaker located on all battery trays.

**Figure 4.16 List 93 and 94 Battery Tray Battery Installation Details**



- Note:
1. Two trays shown as example.
  2. Cabling detail omitted.



## 5 Installing Rectifier Modules

Refer to the rectifier instruction manual UM1R481000e3 for a rectifier installation procedure.

## 6 Initially Starting, Configuring, and Checking System Operation

### 6.1 Important Safety Instructions



**CAUTION!** Performing various steps in the following procedures may cause a service interruption and/or result in the extension of alarms. Notify any appropriate personnel before starting these procedures. Also, notify personnel when these procedures are completed.

### 6.2 Initial Startup Preparation

- Ensure that all blocks (except the last one) in the “Installation Acceptance Checklist” starting on page 1 have been checked.
- Ensure that rectifier mounting positions are filled by a rectifier module or a blank module as required.
- Refer to the separate Mini Control Unit User Manual (UM1M831ANA) supplied with your power system for complete controller operating information.
- Refer to the configuration drawing (C-drawing) supplied with your power system documentation for factory settings of adjustable parameters.

### 6.3 Initially Starting the System



**NOTE!** After power is initially applied to the system it takes several seconds for the rectifier modules to begin producing power and the control module initialization routine takes several minutes.

#### **Procedure**

1. Apply battery power to the system by closing the external battery disconnect(s) or protective device(s) that supplies battery power to the system, if furnished. Close the system’s internal battery disconnect circuit breakers, if furnished.
2. Apply rectifier AC or DC input power to the system by closing ALL external AC or DC disconnects or protective devices that supply rectifier AC or DC input power to the rectifier mounting shelf.
3. Rectifiers automatically start.
4. The Mini Control Unit starts and goes through an initialization process. See “Mini Control Unit (Controller) Initialization” on page 65.
5. Place each distribution circuit breaker (if furnished) to the ON position.
6. Refer to “Configuring the System” on page 65 and set the Mini Control Unit as required for your application. Note: Your system may be pre-programmed for your application. Refer to the configuration drawing (C-drawing) supplied with your power system documentation.
7. Refer to “Checking System Operation” on page 70 and check system operation.
8. Refer to “Checking System Status” on page 75 and check system status.

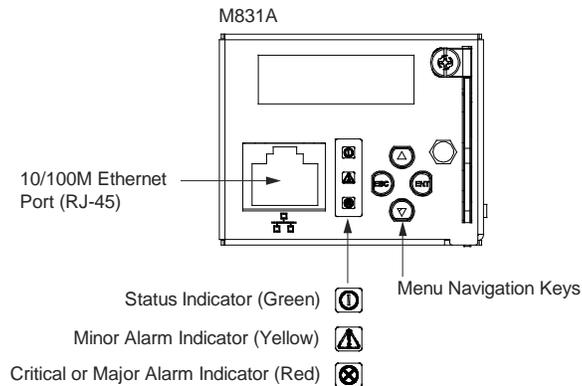
## 6.4 Configuring the System

### 6.4.1 Mini Control Unit

Refer to the Mini Control Unit User Manual (UM1M831ANA) for detailed instructions.

Refer to Figure 6.1 for locations of the Mini Control Unit local indicators and navigation keys.

**Figure 6.1 Mini Control Unit Local Indicators and Navigation Keys**



### 6.4.2 Mini Control Unit (Controller) Initialization

The controller goes through an initialization process when power is initially applied to the system.

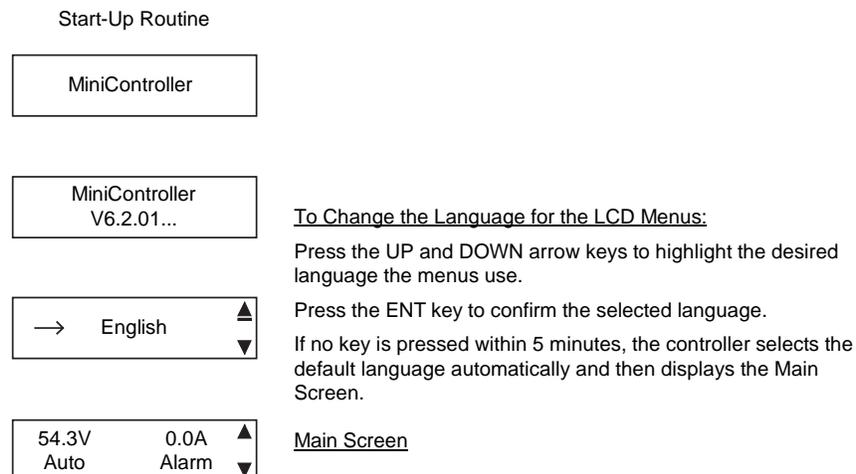


**NOTE!** The initialization routine takes several minutes. During that time various alarm indicators may illuminate on the controller's front panel and an audible alarm may sound. Disregard all alarms. An audible alarm can be silenced at any time by momentarily depressing the ENT key on the controller.

#### **Initialization**

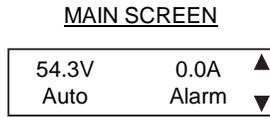
1. After the controller is powered on, it goes through an initialization routine. See Figure 6.2.
2. When initialization is complete, the language screen appears. Press the UP or DOWN arrow key to select the desired language. Press the ENT key to confirm the selection. See Figure 6.2.

**Figure 6.2: Controller Start-Up**



- The MAIN SCREEN displays. See Figure 6.3.

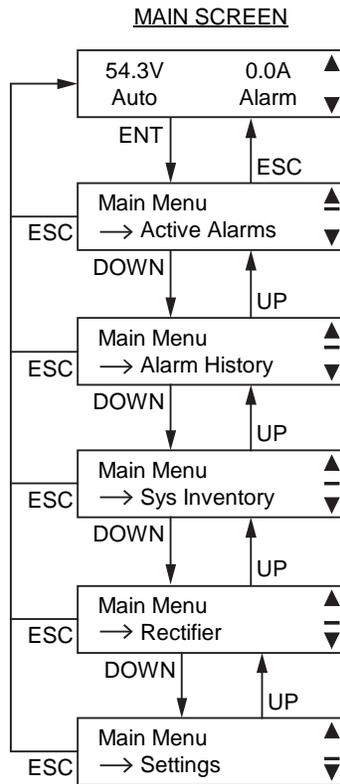
**Figure 6.3 Controller Local Display MAIN SCREEN**



To reboot the Controller, from the Main Screen press the ENT and ESC keys at the same time. Release both keys. Press ENT to confirm.

- From the MAIN SCREEN, press the ENT key to go to the MAIN MENU. See Figure 6.4.

**Figure 6.4 Controller Local Display MAIN MENU**



- From the MAIN MENU, you can press the UP and DOWN arrow keys to select a submenu. Press the ENT key to enter the selected submenu.



**NOTE!** Repeatedly press the ESC key to return in reverse order level by level from any submenu until the MAIN SCREEN appears.

## 6.4.3 Setting the Mini Control Unit as Required for Your Application

### General

Refer to the Mini Control Unit Instructions (UM1M831ANA) for additional information.

Temperature Probes: Depending on if controller temperature probe inputs are enabled or disabled in the controller configuration, you may have to program the controller for any temperature probes being used. Note that some temperature probe inputs may not be enabled by default. Refer to the C-drawing supplied with your system to determine if temperature probe inputs are enabled and pre-programmed. Refer to “Setting Temperature Sensors” in the “Common Tasks Performed via the Local Keypad and/or Web Interface” section of the controller manual (UM1M831ANA) if temperature probe inputs require programming.



**NOTE!** Verify the controller temperature probe configuration if temperature probes are installed from the factory. Refer to the C-drawing supplied with your system.



**NOTE!** When setting total rectifier current limit, the set point to each rectifier is the total set point divided by the number of rectifiers. For example, if the system contains three rectifiers and the current limit is set to 30 amps, then each rectifier has a current limit set point of 10 amps. If one or more rectifiers are removed or fails it will take several seconds for the individual set points to the remaining rectifiers to be reset. In the example given, if one rectifier is removed the current limit set point will drop to 20 amps (10 amps times two remaining rectifiers) until the controller can send updated set points to the remaining rectifiers. This takes a couple communication cycles (several seconds) after which each rectifier would have a new set point of 15 amps for a total of 30 amps. The total current limit of the rectifiers should not be set such that the loss of the redundant rectifiers will cause this temporary set point to drop below the actual maximum expected load. If batteries are used on the rectifier output, the batteries should support the load until the current limit set points can be re-established due to loss of a rectifier.

### Verifying the Configuration File

Your Mini Control Unit was programmed with a configuration file that sets all adjustable parameters. The version number of the configuration file can be found on the configuration drawing (C-drawing) that is supplied with your power system documentation, and on a label located on the Mini Control Unit. You can verify that the correct configuration file has been loaded into your Mini Control Unit by performing the following procedure.

#### Procedure

1. With the Main Screen displayed, press ESC. A screen displays the Mini Control Unit serial number. Repeatedly press the ENT key to display the hardware version, software version, configuration file number, file system, IP address, and MAC address.
2. Press ESC to return to the Main Screen.

### Checking Basic System Settings

Navigate through the controller menus and submenus to check system settings. You can adjust any parameter as required. Note that these settings can also be checked (and changed if required) via the WEB Interface.



**NOTE!** Repeatedly press the “ESC” key to return in reverse order level by level from any submenu until the Main Menu appears.

#### Procedure

1. **To Select a Sub-Menu:**  
From the MAIN SCREEN, press the ENT key to go to the MAIN MENU.  
From the MAIN MENU, press the UP and DOWN keys to highlight the desired sub-menu.  
Press the ENT key to enter the selected sub-menu.

2. **To Select a User and Enter a Password (Settings Menus):**

To select a User, use the UP and DOWN arrow keys to select a User previously programmed into the controller. Press ENT to select the User. Note that only Users programmed into the controller are shown. Users are programmed via the Web Interface. The default User is admin.

To enter a password, use the UP and DOWN keys to choose a character. Press ENT to accept and move to the next character. Continue this process until all characters are entered. Press ENT again to accept the password. Default Password: 640275.

3. **To Change a Parameter:**

Press the UP and DOWN keys to move up and down the list of parameters.

Press ENT to select the parameter.

Press the UP and DOWN keys to change the parameter.

Press ENT to make the change. Press ESC to cancel the change.

4. Table 6.1 shows the menu navigation for some basic settings. Refer to the separate Mini Control Unit Manual (UM1M831ANA) supplied with your power system for complete Local Display menus.

**Table 6.1 Mini Control Unit Basic Settings Menu Navigation**

Parameter	Menu Navigation
Date	Main Menu / Settings / Sys Settings / Date.
Time	Main Menu / Settings / Sys Settings / Time.
IP Communications Parameters (IP address, subnet mask address, gateway address)	Main Menu / Settings / Communication / enter parameters.
Float Voltage	Main Menu / Settings / Batt Settings / Float Voltage.
Equalize Voltage	Main Menu / Settings / Batt Settings / EQ Voltage.
Battery Current Limit	Main Menu / Settings / Batt Settings / Curr Limit Mode (set to yes) and Batt Curr Limit.
Battery Capacity	Main Menu / Settings / Batt1 Setting or Batt2 Setting / Rated Capacity.
Reset Battery Capacity	Main Menu / Settings / Batt Settings / Reset Batt Cap
BTRM Feature	<b>Web Menu Navigation Only:</b> Settings Menu / Battery Tab.
Battery Charge Temperature Compensation	Main Menu / Settings / Batt Settings / (enter parameters).
HVSD Limit	<b>Web Menu Navigation Only:</b> Settings Menu / Rectifiers Tab / HVSD (set to enabled) then set HVSD Limit.
Rectifier Current Limit	Main Menu / Settings / Rect Settings / Current Limit (set to enabled) then set Curr Limit Pt.
Over Voltage Alarm 1	Main Menu / Settings / Other Setting / Over Voltage 1.
Over Voltage Alarm 2	Main Menu / Settings / Other Setting / Over Voltage 2.
Under Voltage Alarm 1	Main Menu / Settings / Other Setting / Under Voltage 1.
Under Voltage Alarm 2	Main Menu / Settings / Other Setting / Under Voltage 2.

### Changing Battery Capacity Rating in the Mini Control Unit



**NOTE!** After setting the battery capacity, the User should also reset the battery capacity (battery must be fully charged).

1. Change the battery capacity setting of the Mini Control Unit to match the battery connected to the power system.

**Local Menu Navigation:**

Main Menu / Settings / Batt1 Setting or Batt2 Setting / Rated Capacity.

**Web Menu Navigation:**

Settings Menu / Battery Tab / Batt1 Rated Capacity and Batt2 Rated Capacity.

2. Reset the battery capacity (resets the battery capacity calculation).



**NOTE!** Only reset the battery capacity when the battery is fully charged; otherwise, the battery charge status may not be accurate.

**Local Menu Navigation:**

Main Menu / Settings / Batt Settings / Reset Batt Cap.

**Web Menu Navigation:**

Settings Menu / Battery Tab / Reset Battery Capacity.

Refer to the Mini Control Unit Instructions (UM1M831ANA) for detailed instructions.

### **Configuring the Mini Control Unit Identification of Rectifiers and Assigning which Input Feed is Connected to the Rectifiers**

When rectifiers are all installed prior to applying power and starting the system, the order in which the Mini Control Unit identifies the rectifiers is by serial number (lowest serial number is Rect 1, next lowest is Rect 2, etc.). If you prefer the Mini Control Unit to identify the rectifiers by position in the system, perform the following procedure.

Upon power up, the Mini Control Unit arbitrarily assigns Feed AC1, AC2, or AC3 to each rectifier. This assignment is used to display rectifier AC input feed voltage(s). The User may reassign the feed to each rectifier per your specific installation by following the procedure below.

#### **Local Menu Navigation:**

None.

#### **Web Menu Navigation:**

Refer to the Mini Control Unit Instructions (UM1M831ANA) for detailed instructions.

## **6.5 Checking System Operation**

### **Mini Control Unit Alarm Relay Check**

The following procedures can be used to verify operation of the external alarm relays in a power system equipped with a Mini Control Unit with the factory default configuration. Note that alarm relays on a Mini Control Unit with a custom configuration may operate differently.



**NOTE!** There are two methods to check alarm relays. The first is by actually causing an alarm. The second is by using the Mini Control Unit alarm relay check function. The first method is used in the following procedures.

### **Checking the AC Fail Alarm**

#### **Procedure**



**NOTE!** Battery must be connected during this procedure.

1. Verify system is operating and no alarms are present.
2. Verify the Mini Control Unit displays the Main Menu. If not, press ESC repeatedly to return to the Main Menu.
3. Open the external AC disconnect(s) or protective device(s) that supply power to all of the rectifier modules.
  - a) **Requirement:** An audible alarm sounds. Alarm will be silenced in Requirement d.
  - b) **Requirement:** On subject rectifier module(s), the “Protection” indicator goes from off to yellow. After approximately 30 seconds, the green “Power” and yellow “Protection” indicators go off.
  - c) **Requirement:** Mini Control Unit “Critical/Major” alarm indicator goes from off to red.
  - d) **Requirement:** Mini Control Unit displays “Rect AC Fail” alarm.

To see the specific alarm(s), navigate to the Alarm Menu and press **ENT**. The Active Alarm screen lists two critical alarms. **“Power System CAN Comm Fail Critical”** is displayed. Scroll down by pressing the down arrow key. **“Rect Mains Failure Critical”** is displayed.

- e) **Requirement:** External “AC Fail” (Relay 6) and “Critical” (Relay 1) alarms activate.
4. Return external AC disconnect(s) or protective device(s) to the ON position.

- a) **Requirement:** “Power” indicator on subject rectifier modules goes from off to green.



**NOTE!** A “Rect Group All Rect No Response” alarm may activate briefly.

- b) **Requirement:** Mini Control Unit “Critical/Major” alarm indicator goes from red to off.
- c) **Requirement:** Press ESC repeatedly to return to the Main screen. Mini Control Unit displays “No Alarm”.
- d) **Requirement:** All external alarms deactivate.

## **Checking Rectifier Alarm**

### **Procedure**

1. Verify system is operating and no alarms are present.
2. Verify the Mini Control Unit displays the Main Menu. If not, press ESC repeatedly to return to the Main Menu.
3. Pull one rectifier module half way out of the shelf. To do this, first loosen the captive fastener securing the top of the latch mechanism to the front of the rectifier module. Pull the top of the latch mechanism away from the rectifier module (this will retract the latch mechanism located on the underside of the rectifier module).
  - a) **Requirement:** An audible alarm sounds. Alarm will be silenced in Requirement c.
  - b) **Requirement:** Mini Control Unit “Critical/Major” alarm indicator goes from off to red.
  - c) **Requirement:** Mini Control Unit displays “Alarm”.

To see the specific alarm(s), navigate to the Alarm Menu and press **ENT**. The “Active Alarm” screen lists one major alarm. “**Rect (###) Comm Fail Major**” is displayed.

- d) **Requirement:** External “Rectifier” (Relay 8) and “Major” (Relay 2) alarms activate.



**NOTE!** If the system is equipped with only one rectifier, skip step 4.

4. Pull a second rectifier module half way out of the shelf, as described in Step 3.
  - a) **Requirement:** An audible alarm sounds. The alarm will cancel in Requirement c.
  - b) **Requirement:** Mini Control Unit “Critical/Major” alarm indicator stays red.
  - c) **Requirement:** Press ESC repeatedly to return to the Main screen. Mini Control Unit displays “Alarm”.

To see the specific alarm(s), navigate to the Alarm Menu and press **ENT**. The Active Alarm screen lists one critical and two major alarms. “**Rect Group Multi-Rect Fail Critical**” is displayed. Use arrow keys to scroll through the list of alarms. “**Rect ### Comm Fail Major**” is displayed for each removed rectifier.

- d) **Requirement:** External “Rectifier” (Relay 8) and “Major” (Relay 2) alarms remain in alarm state and “Critical” (Relay 1) alarm activates.
5. Reinstall the rectifier module(s).
    - a) **Requirement:** “Power” indicator on subject rectifier(s) goes from off to green.
    - b) **Requirement:** Mini Control Unit “Critical/Major” alarm indicator goes from red to off.
    - c) **Requirement:** Press ESC repeatedly to return to the Main screen. Mini Control Unit displays “No Alarm”.

- d) **Requirement:** All external alarms deactivate.

### **Checking System Over Voltage Alarm 1 and Over Voltage Alarm 2**

1. Verify system is operating and no alarms are present.
2. Verify the Mini Control Unit displays the Main Menu. If not, press ESC repeatedly to return to the Main Menu.
3. Record the system voltage displayed on the Mini Control Unit Main screen.
4. Navigate to the Settings Menu.
5. With the Settings menu screen displayed, navigate to “Over Voltage 1”. Main Menu / Settings Icon / Other Settings / Over Voltage 1. Record the displayed voltage setpoint.
6. Press the Enter (ENT) key; then use the UP or DOWN keys to adjust the “Over Voltage 1” value to below the system voltage recorded in step 3. Press ENT.

- a) **Requirement:** An audible alarm sounds. The alarm will be silenced in Requirement c.

- b) **Requirement:** Mini Control Unit “Critical/Major” alarm indicator goes from off to red.

- c) **Requirement:** Press ESC repeatedly to return to the Main Menu. Mini Control Unit displays “Alarm”.

To see the specific alarm(s), navigate to the Alarm Menu and press **ENT**. The Active Alarm screen lists one critical alarm. **“Power System Over Voltage 1 Critical”** is displayed.

- d) **Requirement:** External “DC Over Voltage 1” (Relay 3) and “Critical” (Relay 1) alarms activate.

7. Without readjusting the “Over Voltage 1” setpoint, navigate to **“Over Voltage 2”**. Main Menu / Settings Icon / Other Settings / Over Voltage 2. Record the displayed voltage setpoint.
8. Press the Enter (ENT) key; then use the UP or DOWN keys to adjust the “Over Voltage 2” value to below the system voltage recorded in step 3. Press ENT.

- a) **Requirement:** An audible alarm sounds. Alarm will be silenced in Requirement d.

- b) **Requirement:** Mini Control Unit “Critical/Major” alarm indicator stays red.

- c) **Requirement:** Press ESC repeatedly to return to the Main Menu. Mini Control Unit displays “Alarm”.

To see the specific alarm(s), navigate to the Alarm Menu and press **ENT**. The Active Alarm screen lists two critical alarms. **“Power System Over Voltage 2 Critical”** is displayed. Use arrow keys to scroll through the list of alarms. **“Power System Over Voltage 1 Critical”** is displayed.

- d) **Requirement:** External “DC Over Voltage 1” (Relay 3) alarm and “Critical” (Relay 1) alarm remain active.

9. Navigate to **“Over Voltage 2”**. Main Menu / Settings Icon / Other Settings / Over Voltage 2.
10. Press ENT; then use the UP or DOWN keys to adjust the “Over Voltage 2” setting to the value recorded in step 7. Press ENT.



**NOTE!** Over Voltage 2 alarm will retire. The audible alarm will be silenced in the next step.

11. Use the UP or DOWN keys to scroll up to **“Over Voltage 1”**.
  12. Press ENT; then use the UP or DOWN keys to adjust the “Over Voltage 1” setting to the value recorded in step 5. Press ENT.
- a) **Requirement:** Mini Control Unit “Critical/Major” alarm indicator goes from red to off.

- b) **Requirement:** Press ESC repeatedly to return to the Main screen. Mini Control Unit displays “No Alarm”.
- c) **Requirement:** All external alarms deactivate.

### **Checking System Under Voltage Alarm 1 and Under Voltage Alarm 2**

1. Verify system is operating and no alarms are present.
2. Verify the Mini Control Unit displays the Main Menu. If not, press ESC repeatedly to return to the Main Menu.
3. Record the system voltage displayed on the Mini Control Unit Main screen.
4. Navigate to the Settings Menu.
5. With the Settings Menu screen displayed, navigate to **“Under Voltage 1”**. Main Menu / Settings Icon / Other Settings / Under Voltage 1. Record the displayed voltage setpoint
6. Press the Enter (ENT) key; then use the UP or DOWN keys to adjust the “Under Voltage 1” value to above the system voltage recorded in step 3. Press ENT.
  - a) **Requirement:** An audible alarm sounds. The alarm will be silenced in Requirement c.
  - b) **Requirement:** Mini Control Unit “Critical/Major” alarm indicator goes from off to red.
  - c) **Requirement:** Press ESC repeatedly to return to the Main screen. Mini Control Unit displays “Alarm”.

To see the specific alarm(s), navigate to the Alarm Menu and press **ENT**. The Active Alarm screen lists one critical alarm. **“Power System Under Voltage 1 Critical”** is displayed.

- d) **Requirement:** External “DC Under Voltage 1” (Relay 4) and “Critical” (Relay 1) alarms activate.
7. Without readjusting the “Under Voltage 1” setpoint, navigate to **“Under Voltage 2”**. Main Menu / Settings Icon / Other Settings / Under Voltage 2. Record the displayed voltage setpoint.
  8. Press the Enter (ENT) key; then use the UP or DOWN keys to adjust the “Under Voltage 2” value to above the system voltage recorded in step 3. Press ENT.
    - a) **Requirement:** An audible alarm sounds. Alarm will be silenced in Requirement c.
    - b) **Requirement:** Mini Control Unit “Critical/Major” alarm indicator stays red.
    - c) **Requirement:** Press ESC repeatedly to return to the Main screen. Mini Control Unit displays “Alarm”.
- To see the specific alarm(s), navigate to the Alarm Menu and press **ENT**. The Active Alarm screen lists two critical alarms. **“Power System Under Voltage 2 Critical”** is displayed. Use arrow keys to scroll through the list of alarms. **“Power System Under Voltage 1 Critical”** is displayed.
- d) **Requirement:** External “DC Under Voltage 2” (Relay 5) alarm activates, “DC Under Voltage 1” (Relay 4) alarm resets, and “Critical” (Relay 1) alarm remains active.

9. Navigate to **“Under Voltage 2”**.
10. Press ENT; then use the UP or DOWN keys to adjust the “Under Voltage 2” setting to the value recorded in step 7. Press ENT.



**NOTE!** Low Voltage 2 alarm will retire. The audible alarm will be silenced in the next step.

11. Use the UP or DOWN keys to scroll up to “**Under Voltage 1**”.
12. Press ENT; then use the UP or DOWN keys to adjust the “Under Voltage 1” setting to the value recorded in step 5. Press ENT.
  - a) **Requirement:** Mini Control Unit “Critical/Major” alarm indicator goes from red to off.
  - b) **Requirement:** Press ESC repeatedly to return to the Main screen. Mini Control Unit displays “**No Alarm**”.
  - c) **Requirement:** All external alarms deactivate.

### **Checking Circuit Breaker/Fuse Alarm**



**NOTE!** For all shelves equipped with battery disconnect circuit breakers, an open battery disconnect circuit breaker will not activate the fuse/circuit breaker alarm unless a battery (or a temporary test load) is connected to the system battery terminals.

1. Verify system is operating and no alarms are present.
2. Verify the Mini Control Unit displays the Main Menu. If not, press ESC repeatedly to return to the Main Menu.
3. Open the front door of the distribution unit at the right-hand side of the shelf.



**NOTE!** The following procedure is to be used only with circuit breakers that provide an alarm indication when manually placed to the OFF (open) position (black handle). Electrical trip alarm circuit breakers (white handle) cannot be easily tested in the field.

4. Do one of the following: (1) Remove a good fuse or a dummy fuse from a GMT fuse position, and replace it with a blown fuse, or (2) Place the handle (if black) of a load circuit breaker in the OFF (open) position.
  - a) **Requirement:** An audible alarm sounds. The alarm will be silenced in Requirement c.
  - b) **Requirement:** Mini Control Unit “Critical/Major” alarm indicator goes from off to red.
  - c) **Requirement:** Mini Control Unit displays “**Alarm**”.

To see the specific alarm(s), navigate to the Alarm Menu and press **ENT**. The Active Alarm screen lists one critical alarm. “**Power System Load Fuse Brkr Critical**” is displayed.

  - d) **Requirement:** External “Fuse/Circuit Breaker Alarm” (Relay 7) and “Critical” (Relay 1) alarms activate.
5. Do one of the following: (1) Replace the blown GMT fuse with a known good fuse (or a dummy fuse), or (2) place the handle of the circuit breaker in the ON (closed) position.
  - a) **Requirement:** Mini Control Unit “Critical/Major” alarm indicator goes from red to off.
  - b) **Requirement:** Press ESC repeatedly to return to the Main screen. Mini Control Unit displays “**No Alarm**”.
  - c) **Requirement:** All external alarms deactivate.

## 6.6 Checking System Status

### Procedure

1. Observe the status of the indicators located on the controller and rectifiers. If the system is operating normally, the status of these is as shown in Table 6.2.

**Table 6.2 Status and Alarm Indicators**

Component	Indicator	Indicator	Normal State
Mini Control Unit		Status (Green)	On
		Minor Alarm (Yellow)	Off
		Critical or Major Alarm (Red)	Off
Rectifier Modules		Power (Green)	On
		Protection (Yellow)	Off
		Alarm (Red)	Off

## 6.7 Final Steps

### Procedure

1. If any controller configuration settings were changed, refer to the Mini Control Unit Instructions (UM1M831ANA) and save a copy of the configuration file. This file can be used to restore the controller settings, if required, at a later date.



**NOTE!** Provided on a USB drive furnished with the system is a controller configuration drawing (C-drawing) and the controller configuration files loaded into the controller as shipped.

2. Verify all rectifier modules and the controller are fully seated, latched, and the latch handle screws are secured.

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