NetSure™

+24 VDC Power System

Installation Instructions (Section 6012), Revision H

Specification Number: 581126000
Model Number: 700NVBA

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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 7.

General Safety

DANGER! YOU MUST FOLLOW APPROVED SAFETY PROCEDURES.
Performing the following procedures may expose you to hazards. These procedures should be performed by qualified technicians familiar with the hazards associated with this type of equipment. These hazards may include shock, energy, and/or burns. To avoid these hazards:

a) The tasks should be performed in the order indicated.

b) Remove watches, rings, and other metal objects.

c) Prior to contacting any uninsulated surface or termination, use a voltmeter to verify that no voltage or the expected voltage is present. Check for voltage with both AC and DC voltmeters prior to making contact.

d) Wear eye protection.

e) Use certified and well maintained insulated tools. Use double insulated tools appropriately rated for the work to be performed.

Voltages

AC Input Voltages

DANGER! This system operates from AC input voltage capable of producing fatal electrical shock. AC input power must be completely disconnected from the branch circuits wiring used to provide power to the system before any AC electrical connections are made. Follow local lockout/tagout procedures to ensure upstream branch circuit breakers remain de-energized during installation. DO NOT apply AC input power to the system until all electrical connections have been completed and checked.

DC Output and Battery Voltages

DANGER! This system produces DC power and may have a battery source connected to it. Although the DC voltage is not hazardously high, the rectifiers and/or battery can deliver large amounts of current. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact an output terminal or battery terminal or exposed wire connected to an output terminal or battery terminal. NEVER allow a metal object, such as a tool, to contact more than one termination or battery terminal at a time, or to simultaneously contact a termination or battery terminal and a grounded object. Even a momentary short circuit can cause sparking, explosion, and injury.

DANGER! Follow local lockout/tagout procedures to ensure DC branch circuit protection devices remain de-energized during installation at loads, as required.

Personal Protective Equipment (PPE)

DANGER! ARC FLASH AND SHOCK HAZARD.
Appropriate PPE and tools required when working on this equipment. An appropriate flash protection boundary analysis should be done determine the "hazard/risk" category, and to select proper PPE.

This product is intended only for installation in a Restricted Access Location.

Only authorized and properly trained personnel should be allowed to install, inspect, operate, or maintain the equipment.

Do not work on LIVE parts. If required to work or operate live parts, obtain appropriate Energized Work Permits as required by the local authority, per NFPA 70E "Standard for Electrical Safety in the Workplace".

Hazardous Voltage

DANGER! HAZARD OF ELECTRICAL SHOCK.
More than one disconnect may be required to de-energize the system before servicing.

Handling Equipment Containing Static Sensitive Components

ALERT! Installation or removal of equipment containing static sensitive components requires careful handling. Before handling any equipment containing static sensitive components, read and follow the instructions contained on the Static Warning Page.

Maintenance and Replacement Procedures

CAUTION! When performing any step in procedures that requires removal or installation of hardware, use caution to ensure no hardware is dropped and left inside the unit; otherwise service interruption or equipment damage may occur.

NOTE! *When performing any step in procedures that requires removal of existing hardware, retain all hardware for use in subsequent steps, unless otherwise directed.*

STATIC WARNING

This equipment contains static sensitive components. The warnings listed below must be observed to prevent damage to these components. Disregarding any of these warnings may result in personal injury or damage to the equipment.

1. Strictly adhere to the procedures provided in this document.
2. Before touching any equipment containing static sensitive components, discharge all static electricity from yourself by wearing a wrist strap grounded through a one megohm resistor. Some wrist straps have a built-in one megohm resistor; no external resistor is necessary. Read and follow wrist strap manufacturer's instructions outlining use of a specific wrist strap.
3. Do not touch traces or components on equipment containing static sensitive components. Handle equipment containing static sensitive components only by the edges that do not have connector pads.
4. After removing equipment containing static sensitive components, place the equipment only on conductive or anti-static material such as conductive foam, conductive plastic, or aluminum foil. Do not use ordinary Styrofoam™ or ordinary plastic.
5. Store and ship equipment containing static sensitive components only in static shielding containers.
6. If necessary to repair equipment containing static sensitive components, wear an appropriately grounded wrist strap, work on a conductive surface, use a grounded soldering iron, and use grounded test equipment.

FCC INFORMATION

The MCA Interface Modem Option (if installed) has been granted a registration number by the Federal Communications Commission, under Part 68 rules and regulations for direct connection to the telephone lines. In order to comply with these FCC rules, the following instructions must be carefully read and applicable portions followed completely:

1. Direct connection to the telephone lines may be made only through the standard plug- ended cord furnished to the utility installed jack. No connection may be made to party or coin phone lines. Prior to connecting the device to the telephone lines, you must:
2. Call your telephone company and inform them you have an FCC registered device you desire to connect to their telephone lines. Give them the number(s) of the line(s) to be used, the make and model of the device, the FCC registration number and ringer equivalence. This information will be found on the device or enclosed with instructions as well as the jack suitable for your device.
3. After the telephone company has been advised of the above you may connect your device if the jack is available, or after the telephone company has made the installation.
4. Repairs may be made only by the manufacturer or his authorized service agency. Unauthorized repairs void registration and warranty. Contact seller or manufacturer for details of permissible user performed routine repairs, and where and how to have other than routine repairs.
5. If, through abnormal circumstances, harm to the telephone lines is caused, it should be unplugged until it can be determined if your device or the telephone line is the source. If your device is the source, it should not be reconnected until necessary repairs are effected.
6. Should the telephone company notify you that your device is causing harm, the device should be unplugged. The telephone company will, where practicable, notify you, that temporary discontinuance of service may be required. However, where prior notice is not practicable, the telephone company may temporarily discontinue service, if such action is reasonably necessary, in such cases the telephone company must (A) Promptly notify you of such temporary discontinuance, (B) Afford you the opportunity to correct the condition and (C) Inform you of your rights to bring a complaint to the FCC under their rules.
7. The telephone company may make changes in its communications facilities, equip¬ment, operations or procedures, where such action is reasonably required in the operation of its business and is not inconsistent with FCC rules. If such changes can be reasonably expected to render any customer's devices incompatible with telephone company facilities, or require modification or alteration, or otherwise materially affect its performance, written notification must be given to the user, to allow uninterrupted service.

The following information is provided here and on a label attached to the outside of the MCA Interface Modem Option (if installed).

JACK	RINGER EQUIVALENCE	FCC REGISTRATION NUMBER
RJ-11	0.2A	B46USA-22429-MM-E

DESCRIPTION

This document (Section 6012) provides *Installation Instructions* for NetSure™ Power System Model 700NVBA, Spec. No. 581126000.

For *User Instructions*, refer to Section 6013 provided on the CD (Electronic Documentation Package) furnished with your system.

Refer to SAG581126000 (*System Application Guide*) for additional information. This document, along with the complete document set, can be accessed from the CD (Electronic Documentation Package) furnished with your system.

Refer to PD588705100/PD588705101/PD588705102/PD588705103/PD588705104 (Power Data Sheet) for Module Mounting Shelf information. This document can be accessed from the CD (Electronic Documentation Package) furnished with your system.

Refer to UM1R243000 (Rectifier Module User Instructions) for Rectifier Module (PCU) information. This document can be accessed from the CD (Electronic Documentation Package) furnished with your system.

Refer to UM1C24481500 (Converter Module User Instructions) for Converter Module information. This document can be accessed from the CD (Electronic Documentation Package) furnished with your system.

For a color MCA Menu Tree, refer to Section 6022. Section 6022 is provided in the separate *INSTALLATION MANUAL* and the CD CARRIER MANUAL (it is also provided on the CD).

INSTALLATION ACCEPTANCE CHECKLIST

Provided below is an Installation Acceptance Checklist. This checklist helps ensure proper installation and initial operation of the system. As the procedures presented in Sections *"Installing System Components"* through *"Installing Modules and Initially Starting the System"* of 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 System Components

- ❑ Relay Racks Mounted to the Floor
- ❑ All Equipment Mounted in Relay Rack(s)
- ❑ MCA Interface Option Installed (if required)
- ❑ Battery Charge Digital Temperature Compensation Probe Mounted (if required)
- ❑ TXM (Multiple Probe Concentrator Module) and Probes Mounted (if required)
- ❑ Bullet Nose Type Fuseholders and TPS/TLS Fuses Installed (if required)
- ❑ Bullet Nose Type Circuit Breakers Installed (if required)
- ❑ GMT Fuse Distribution Assembly Installed (if required)
- ❑ TPH Fuses Installed (if required)

Setting Wiring Options

- ❑ Internal/External Voltage Sensing and Internal/External System Voltage Meter Reading Circuit Card Oriented to Proper Position
- ❑ Fuses and Fuse Alarm Polarity Circuit Card Oriented to Proper Position
- ❑ LVD and Shunt POD Jumpers Set
- ❑ Quad Low Voltage Disconnect Circuit Card Identification Switches Set
- ❑ Audible Alarm Local/Remote Jumpers Set (List 71 only)
- ❑ MCA Local and Remote Access Lockout Switches Set
- ❑ Modem or RS 232/Modem Option (if furnished) "Number of Rings before Answer" Jumper Set
- ❑ RS 232/Modem Option (if furnished) "RS 232 Hardware Handshake" Jumper Set

Making Electrical Connections

- ❑ Relay Rack Grounding Connection (Frame Ground) Made
- ❑ AC Input and AC Input Equipment Grounding Connections Made
- ❑ External Alarm, Reference, and Control Connections Made
- ❑ Interbay and Bay-to-Bay Cable Connections Made (as required)
- ❑ Bay-to-Bay Busbars Installed (List 2 only)
- ❑ MCA Interface Option Cable Connection(s) Made (as required)
- ❑ Load Connections Made
- ❑ Battery Connections Made
- ❑ Bay-to-Bay Busbar Covers Installed (List 2 only)

Installing the Modules and Initially Starting the System

- ❑ Rectifier Modules (PCUs) Installed
- ❑ System Started, Configured, and Checked

INSTALLING SYSTEM COMPONENTS

General Requirements

- This product is intended only for installation in a Restricted Access Location on or above a non-combustible surface.
- 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 installer should be familiar with the installation requirements and techniques to be used in mounting the relay racks to the floor.
- Clearance requirements are:
  - Recommended minimum aisle space clearance for the front of the relay rack is 2' 6".
  - Recommended minimum aisle space clearance for the rear of the relay rack is 2' 0" for any of the following conditions:
    - Multiple bay arrangements that incorporate rear inter-bay busbars (List 2 bays).
    - Making AC input connections to Module Mounting Shelves.
    - Addition of a Module Mounting Shelf in the field.

For all other conditions, recommended minimum aisle space clearance for the rear of the relay rack is that which is specified for proper Module Mounting Shelf ventilation. Refer to the specific Module Mounting Shelf Power Data Sheet for ventilation spacing requirements.

NOTE! *Minimum spacing specified for ventilation may not permit replacement of certain components such as bus bars or Rectifier Mounting Shelves.*

Mounting the Relay Rack

NOTE! *Refer to the General Requirements section at the beginning of this section.*

Mounting

All equipment cabinets are factory mounted to the relay rack(s) specified when ordered.

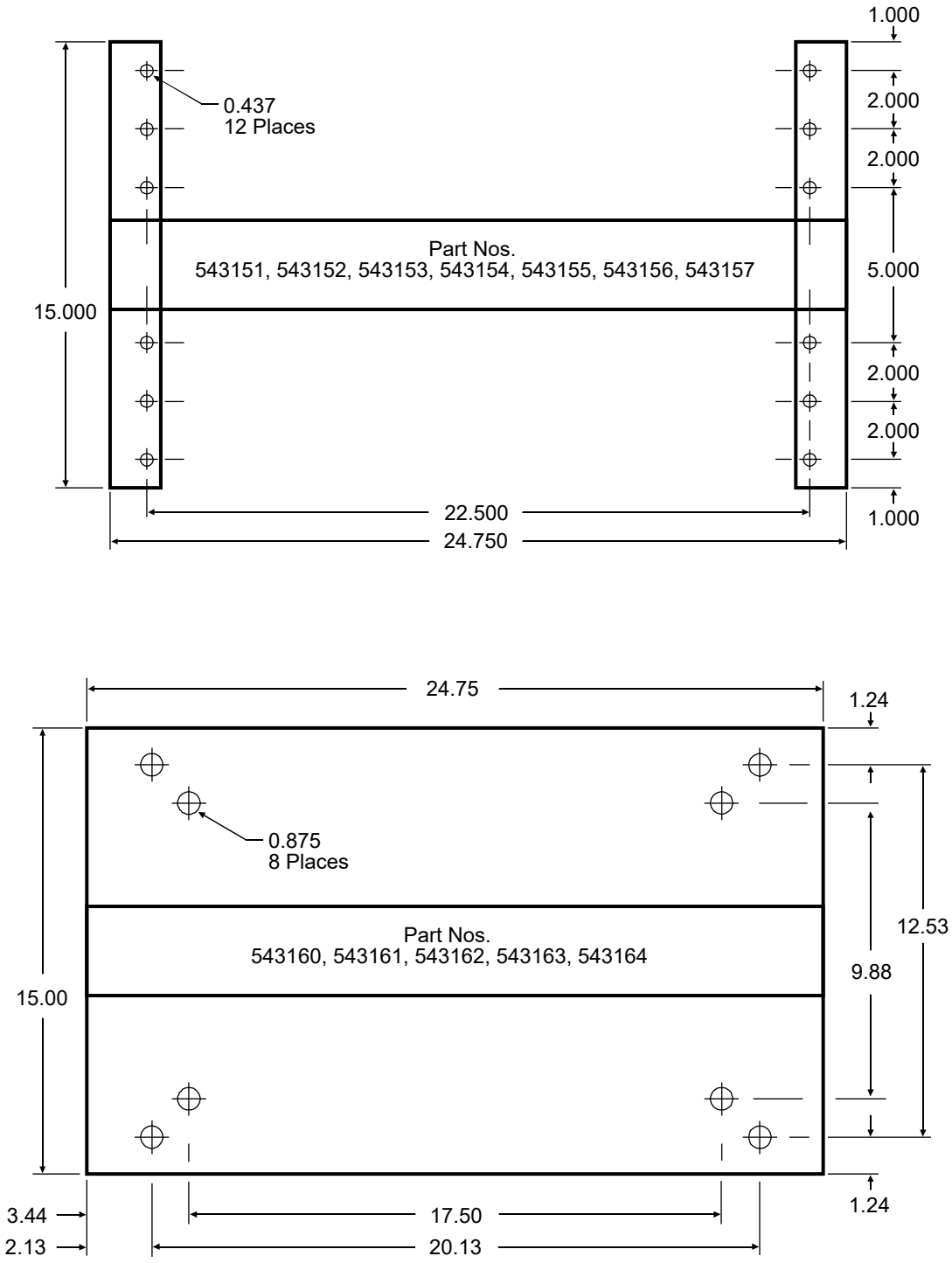
The system consists of one or two relay racks. For busbar-connected systems (List 1 with List 2), locate relay racks in a line adjacent to each other, with no space between them.

Refer to **Figure 1** for relay rack floor mounting dimensions.

Ventilation Requirements

Follow the requirements stated in the "Ventilation Requirements" section of PD588705100 (Power Data Sheet). The Power Data Sheet can be accessed from the CD (Electronic Documentation Package) furnished with your system.

Figure 1: *Relay Rack Floor Mounting Dimensions*



Mounting System Components in an Equipment Rack

NOTE! *If the power system was ordered in a relay rack, all procedures in this section have been performed at the factory.*

This power system is designed to mount in a standard 23" relay rack having 1" or 1-3/4" multiple drillings. Refer to System Application Guide SAG581126000 for overall dimensions and a list of available relay racks. The SAG can be accessed from the CD (Electronic Documentation Package) furnished with your system.

Mounting the Distribution Cabinet

The Distribution Cabinet must be the top-most component in the rack. Perform the following steps to mount the Distribution Cabinet.

DANGER! The relay rack must be securely anchored to the floor before the Distribution Cabinet is installed.

The Distribution Cabinet is heavy. Use a hoist, battery lift, or other appropriate lifting device to raise and support the cabinet during the installation. Take appropriate precautions to avoid injury. Use caution not to damage bus bars that extend from the bottom of the cabinet. Do not attempt to support the cabinet on these bus bars.

Procedure

[ ] 1. Remove the Distribution Cabinet from its shipping brackets. Position the cabinet in the equipment rack.

NOTE! *Install the ground washers so the teeth dig into the paint on the mounting angles. Torque all screws to 65 in-lbs.*

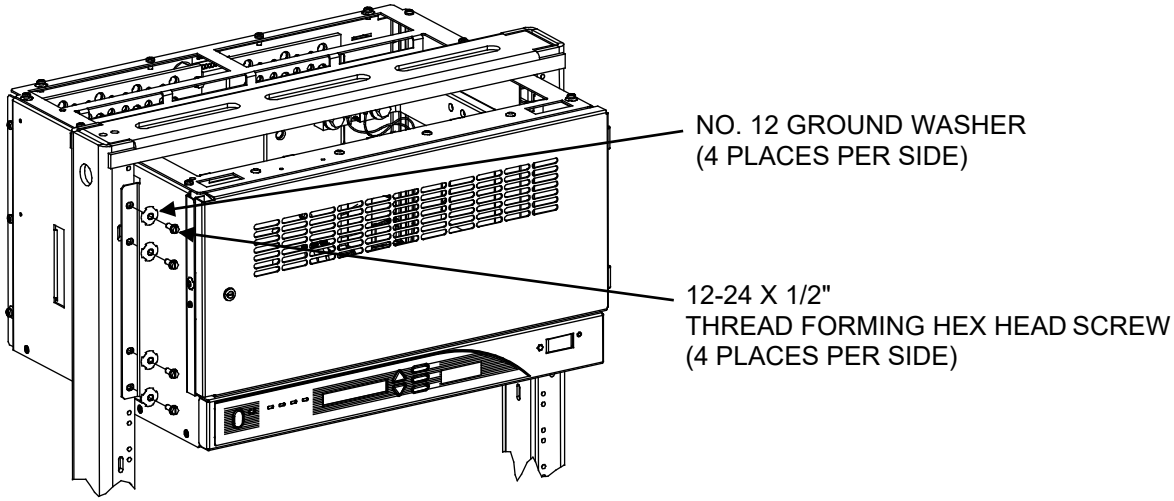
[ ] 2. 1-Row Cabinet: Install (8) 12-24 x 1/2" hex head thread-forming screws (P/N 218710500) and (8) No. 12 ground washers (P/N 215640600). Refer to **Figure 2A**.

[ ] 3. 2-Row Cabinet: Install (8) 12-24 x 1/2" hex head thread-forming screws (P/N 218710500) and (8) No. 12 ground washers (P/N 215640600). Refer to **Figure 2A**.

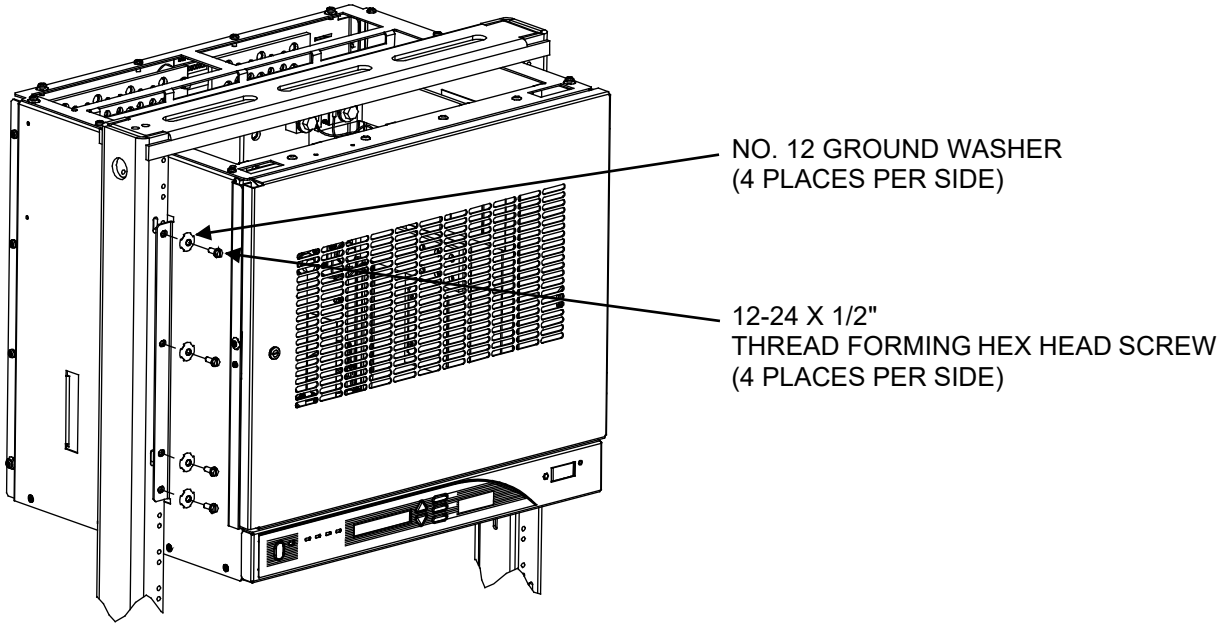
[ ] 4. 3-Row Cabinet: Install (14) 12-24 x 1/2" hex head thread-forming screws (P/N 218710500) and (14) No. 12 ground washers (P/N 215640600). Refer to **Figure 2B**.

[ ] 5. 4-Row Cabinet: Install (16) 12-24 x 1/2" hex head thread-forming screws (P/N 218710500) and (16) No. 12 ground washers (P/N 215640600). Refer to **Figure 2B**.

Figure 2A: *Mounting the 1- and 2-Row Distribution Cabinets*

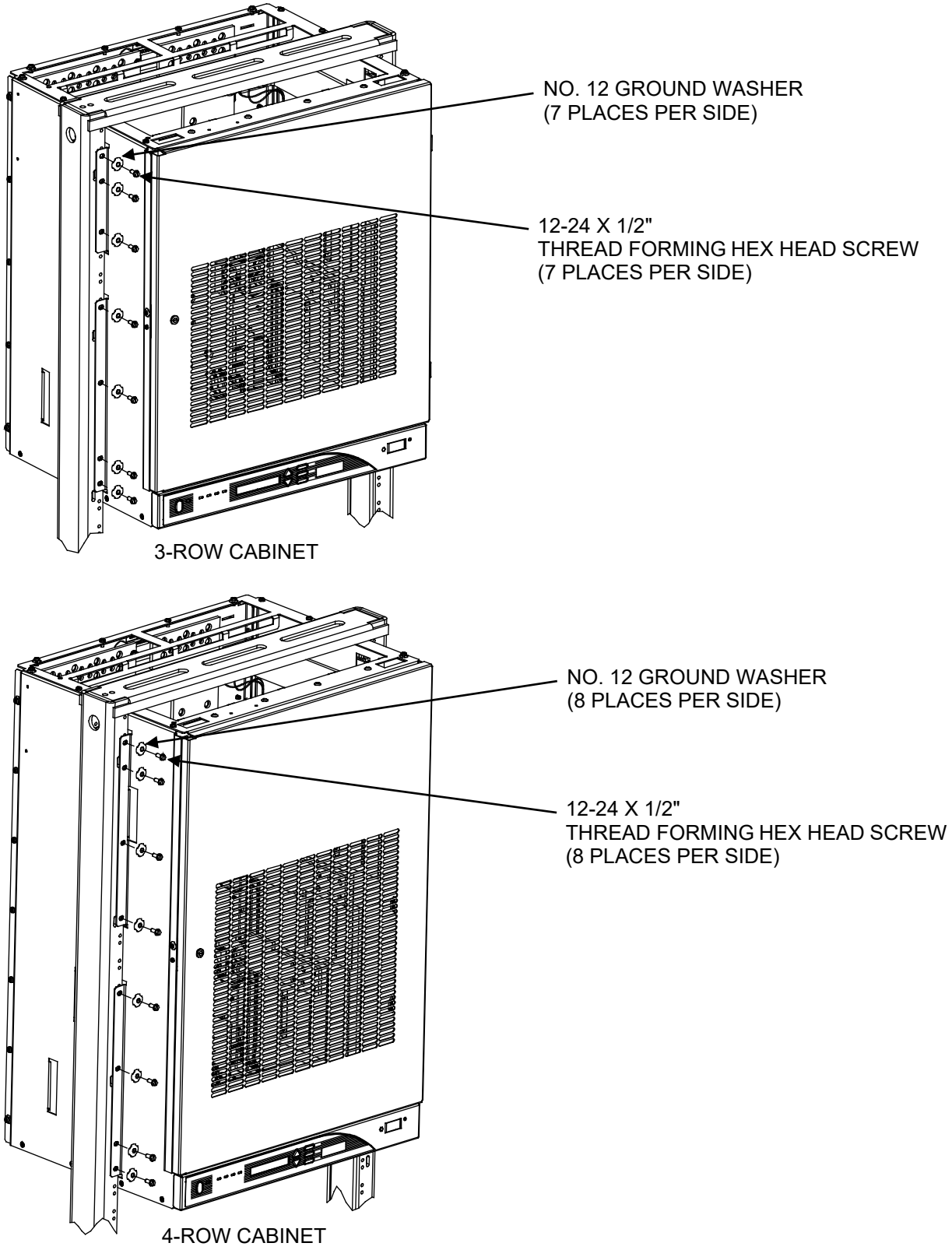


1-ROW CABINET



2-ROW CABINET

Figure 2B: *Mounting the 3- and 4-Row Distribution Cabinets*



Mounting the Module Assembly

Procedure

Figure 3A: *Mounting the Module Assembly (cont'd on next page)*

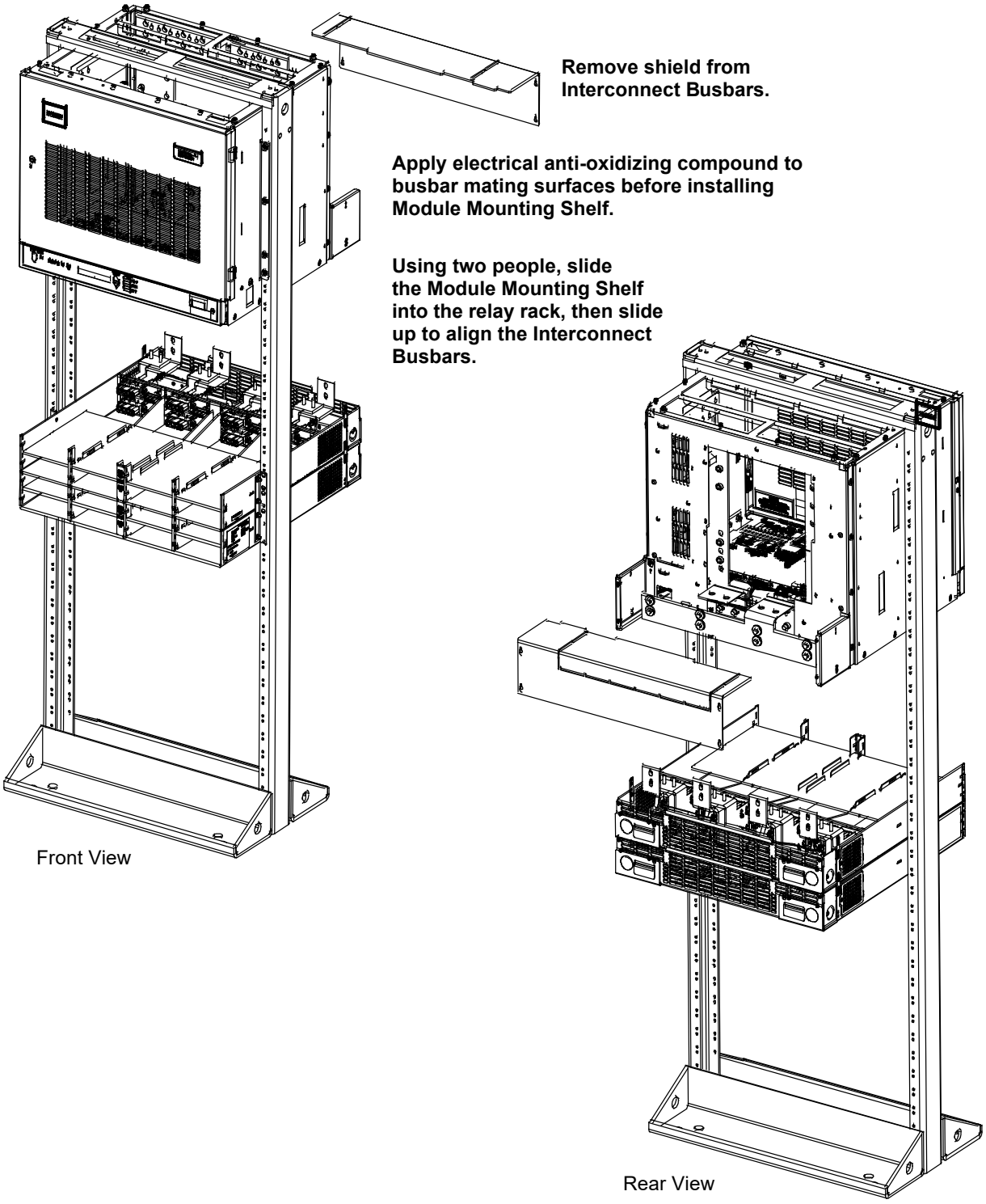


Figure 3B: *Mounting the Module Assembly (cont'd on next page)*

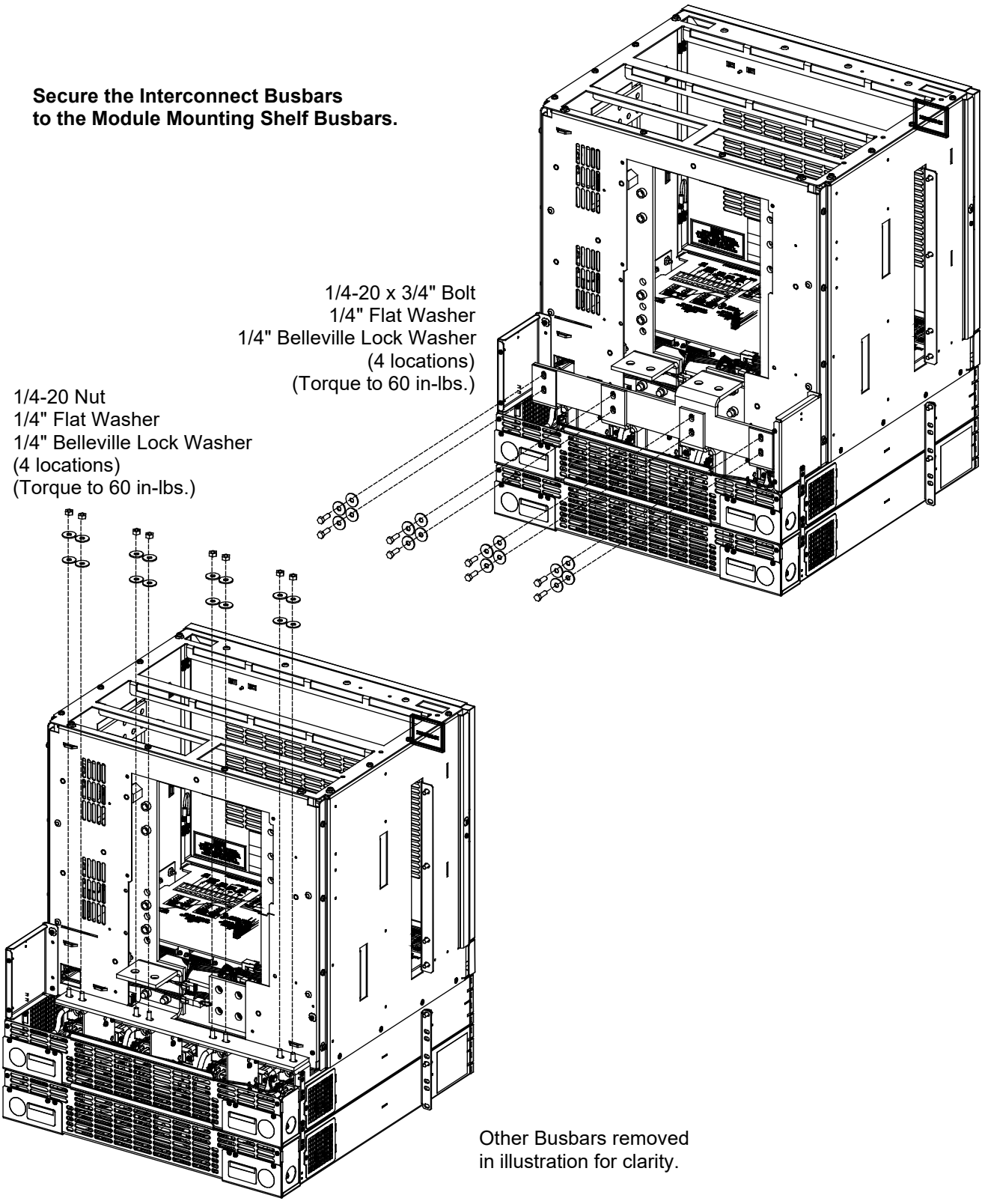


Figure 3C: *Mounting the Module Assembly (cont'd on next page)*

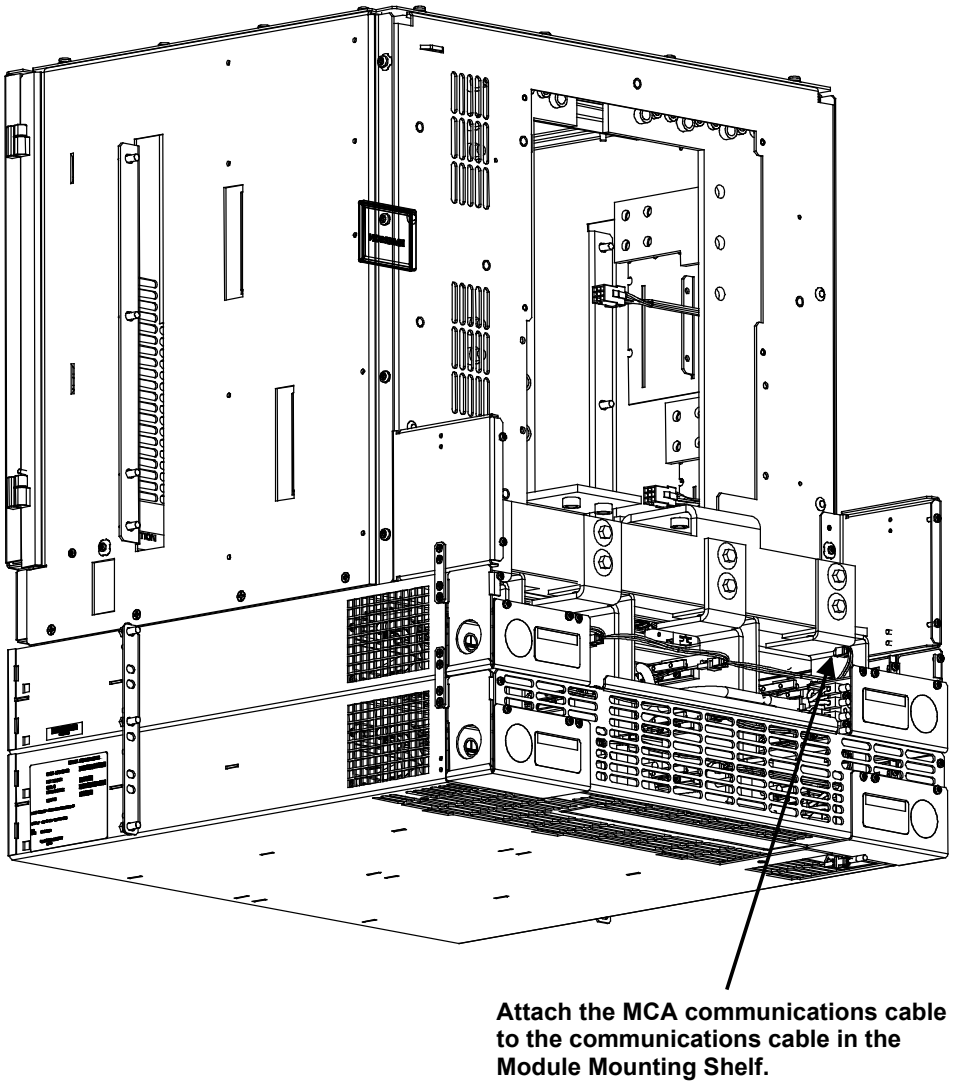
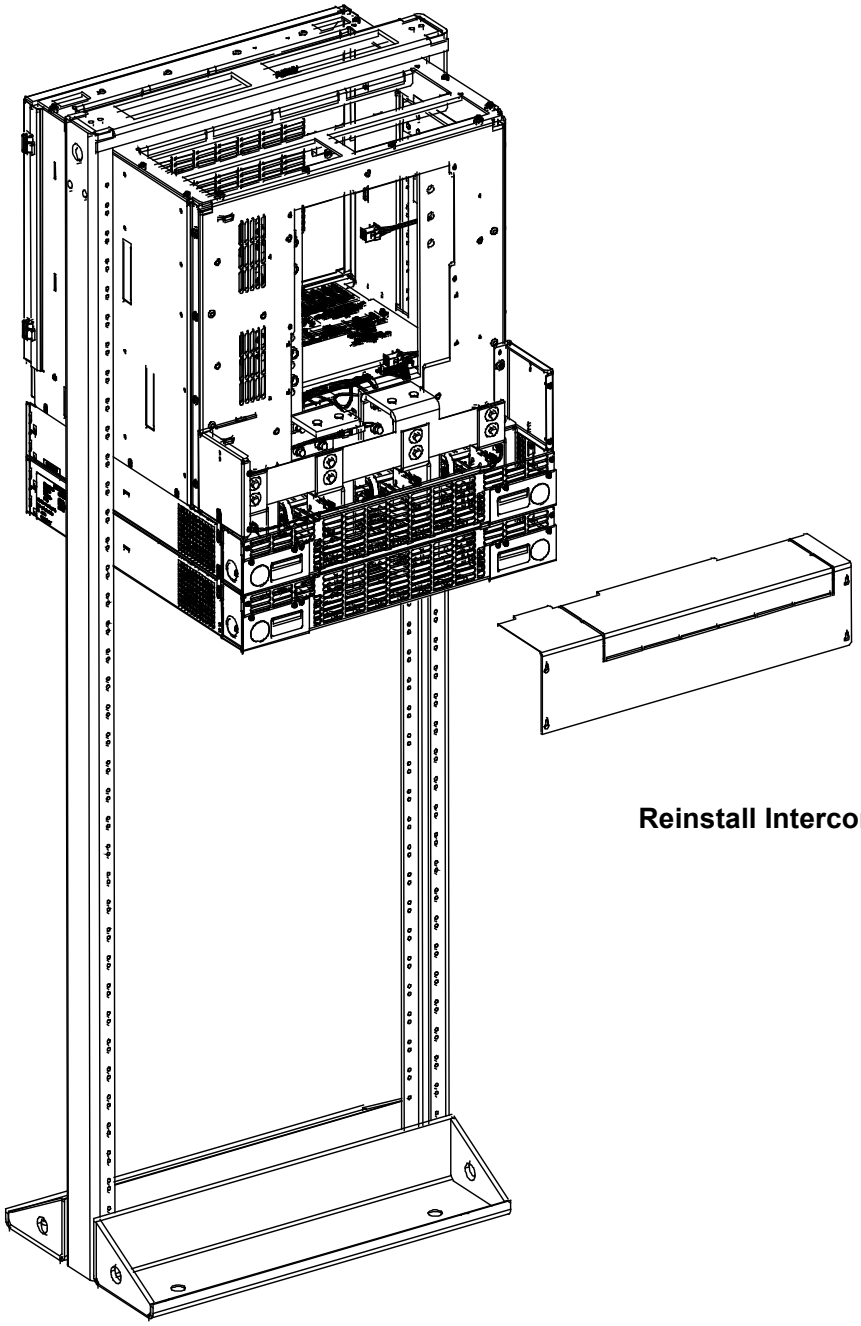


Figure 3D: *Mounting the Module Assembly (cont'd from previous page)*



Reinstall Interconnect Busbar Shield.

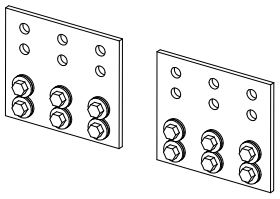
Installing Optional Busbar Extension Kits, Part Nos. 514713 And 529143

These kits provide plates that extend the system busbars above the top of the Distribution Cabinet and increase the number of lug landings available for battery cables. The Part No. 514713 kit provides back-to-back landings for up to six lugs per polarity. The Pat No. 529143 kit provides back-to-back landings for up to 12 lugs per polarity.

Installing Part No. 514713 Busbar Kit

This kit consists of the following:

Qty.	Part No.	Description
2	514712	Busbar extension plates, flat
12	214204100	Flat washer, 3/8" x 1" O.D.
12	214825000	Belleville washer, 3/8"
12	227646800	Hex head bolt, 3/8-16 x 1-1/4"



Perform the following steps to install the battery busbar extension plates. Refer to **Figure 4** as the procedure is performed.

Procedure

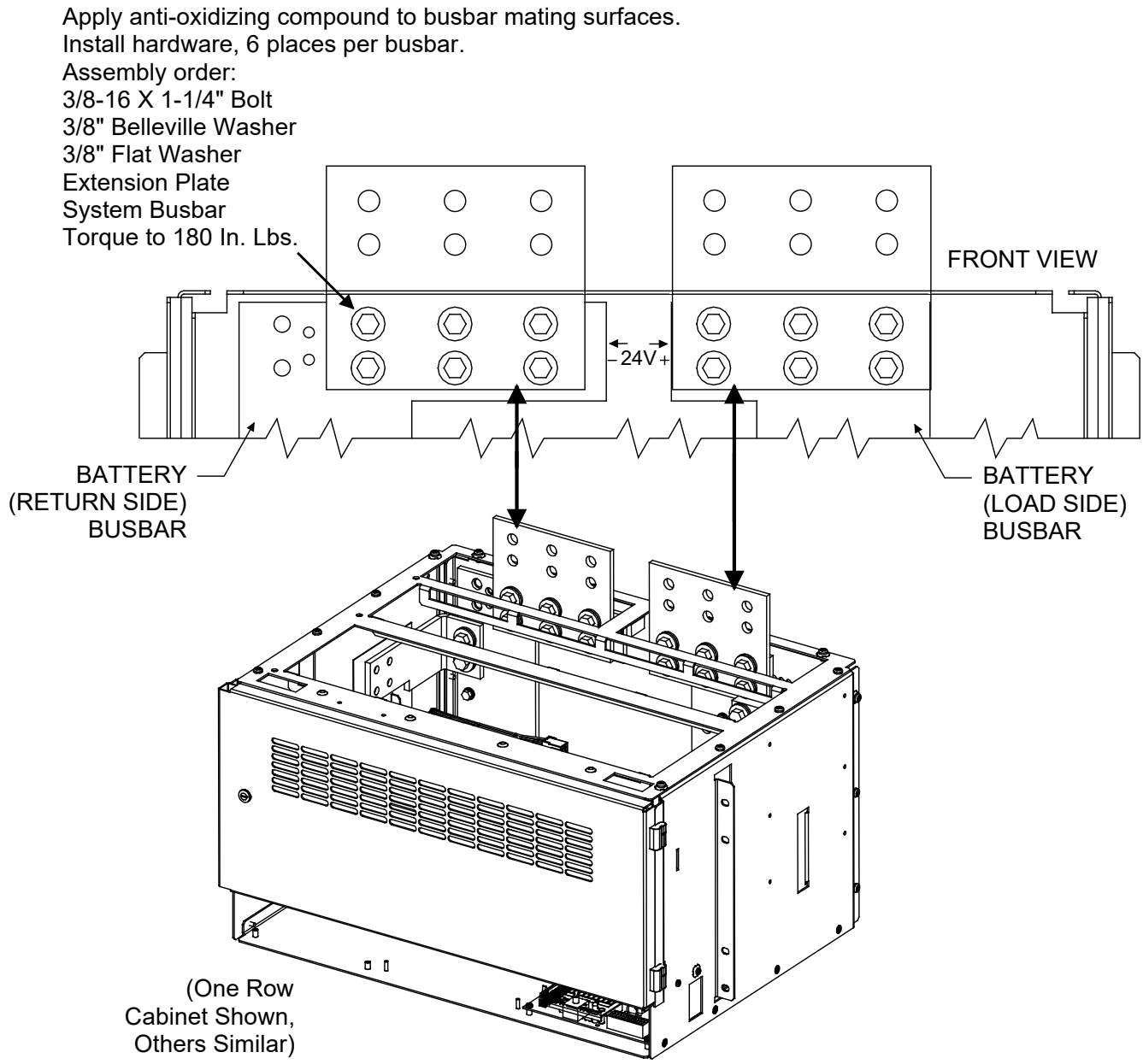
[ ] 1. Open the Distribution Cabinet front door by turning and holding the latch in the counterclockwise position.

[ ] 2. Install busbar extension plates as shown in the figure. Apply anti-oxidizing compound to busbar mating surfaces before assembling. Tighten bolts to the recommended torque value shown in the figure.

NOTE! *Install the Belleville lock washers so the concave side is towards the busbar.*

[ ] 3. Close the Distribution Cabinet access door. The door can be shut without turning the latch.

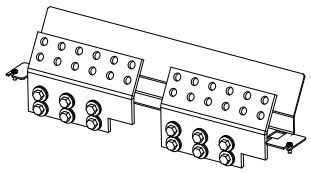
Figure 4: *Installing Battery Busbar Extension Kit, Part No. 514713*



Installing Part No. 529143 Busbar Kit

This kit consists of the following:

Qty.	Part No.	Description
2	529144	Busbar extension plates, angled
1	534565	Shield, battery busbar
12	214204100	Flat washer, 3/8” x 1” O.D.
12	214825000	Belleville washer, 3/8”
12	227646800	Hex head bolt, 3/8-16 x 1-1/4”
2	218706300	Thread-forming screws, 10-32 x 1/2"



Perform the following steps to install the battery busbar extension plates. Refer to **Figure 5** as the procedure is performed.

Procedure

[ ] 1. Open the Distribution Cabinet front door by turning and holding the latch in the counterclockwise position.

[ ] 2. Install busbar extension plates as shown in the figure. Apply anti-oxidizing compound to busbar mating surfaces before assembling. Tighten bolts to the recommended torque value shown in the figure.

NOTE! *Install the Belleville lock washers so the concave side is towards the busbar.*

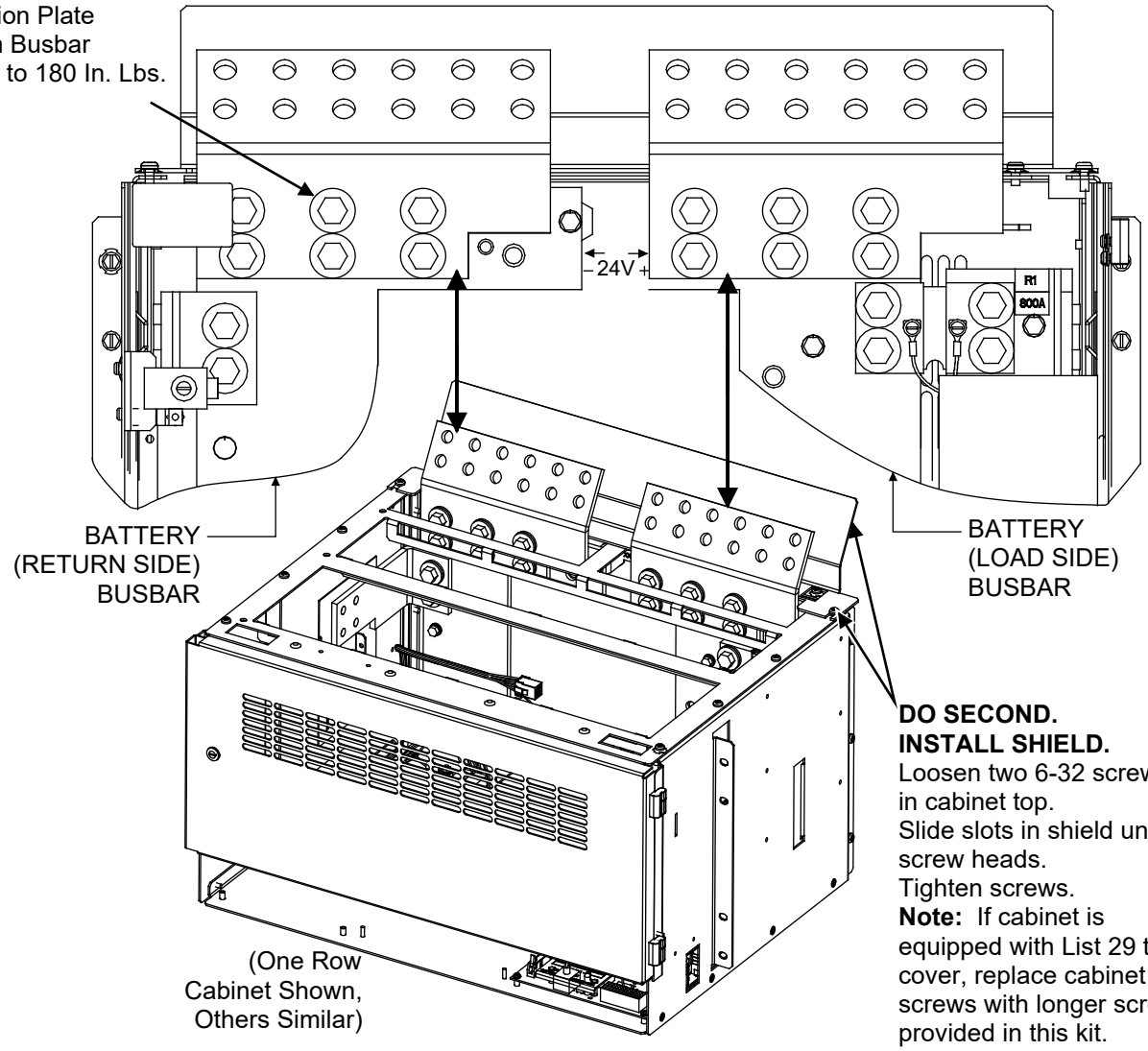
[ ] 3. Install the busbar shield as shown in the figure. Loosen two 10-32 screws on the top of the Distribution Cabinet. Slide slots in the shield under the screw heads. Tighten the screws.

NOTE! *If the Distribution Cabinet is equipped with a List 29 top cover, use two kit-furnished 10-32 x 1/2" screws in place of the screws described in this step.*

[ ] 4. Close the Distribution Cabinet access door. The door can be shut without turning the latch.

Figure 5: *Installing Battery Busbar Extension Kit, Part No. 529143*

DO FIRST.
INSTALL BUSBAR EXTENSION PLATES
Apply anti-oxidizing compound to busbar mating surfaces.
Install hardware, 6 places per busbar.
Assembly order:
3/8-16 X 1-1/4" Bolt
3/8" Belleville Washer
3/8" Flat Washer
Extension Plate
System Busbar
Torque to 180 In. Lbs.



DO SECOND.
INSTALL SHIELD.
Loosen two 6-32 screws in cabinet top.
Slide slots in shield under screw heads.
Tighten screws.
Note: If cabinet is equipped with List 29 top cover, replace cabinet screws with longer screws provided in this kit.

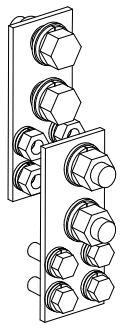
Installing Optional Lug Adapter Busbar Kits, Part Nos. 514714 and 534449

These kits provide lug adapter busbars plus hardware for use with 2-pole and 3-pole circuit breakers.

Installing the Lug Adapter Busbars

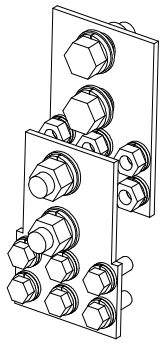
Kit P/N 534449 (for 2-pole circuit breakers) consists of the following:

Qty.	Part No.	Description
1	534447	Busbar
1	534448	Busbar
8	214110100	Flat washer, 1/4”
4	214112100	Flat washer, 3/8”
8	215111100	Lock washer, 1/4”
4	215111300	Lock washer, 3/8”
4	227640400	Hex head bolt, 1/4-20 x 3/4”
2	227646600	Hex head bolt, 3/8-16 x 1”
4	228557100	Nut, 1/4-20
2	228567100	Nut, 3/8-16



Kit P/N 514714 (for 3-pole circuit breakers) consists of the following:

Qty.	Part No.	Description
1	514676	Busbar
1	514678	Busbar
12	214110100	Flat washer, 1/4”
4	214112100	Flat washer, 3/8”
12	215111100	Lock washer, 1/4”
4	215111300	Lock washer, 3/8”
6	227640400	Hex head bolt, 1/4-20 x 3/4”
2	227646600	Hex head bolt, 3/8-16 x 1”
6	228557100	Nut, 1/4-20
2	228567100	Nut, 3/8-16



Perform the following steps to install the lug adapter busbars. Refer to **Figure 6** as the procedure is performed. Note also the restrictions on location in **Figure 6**.

Procedure

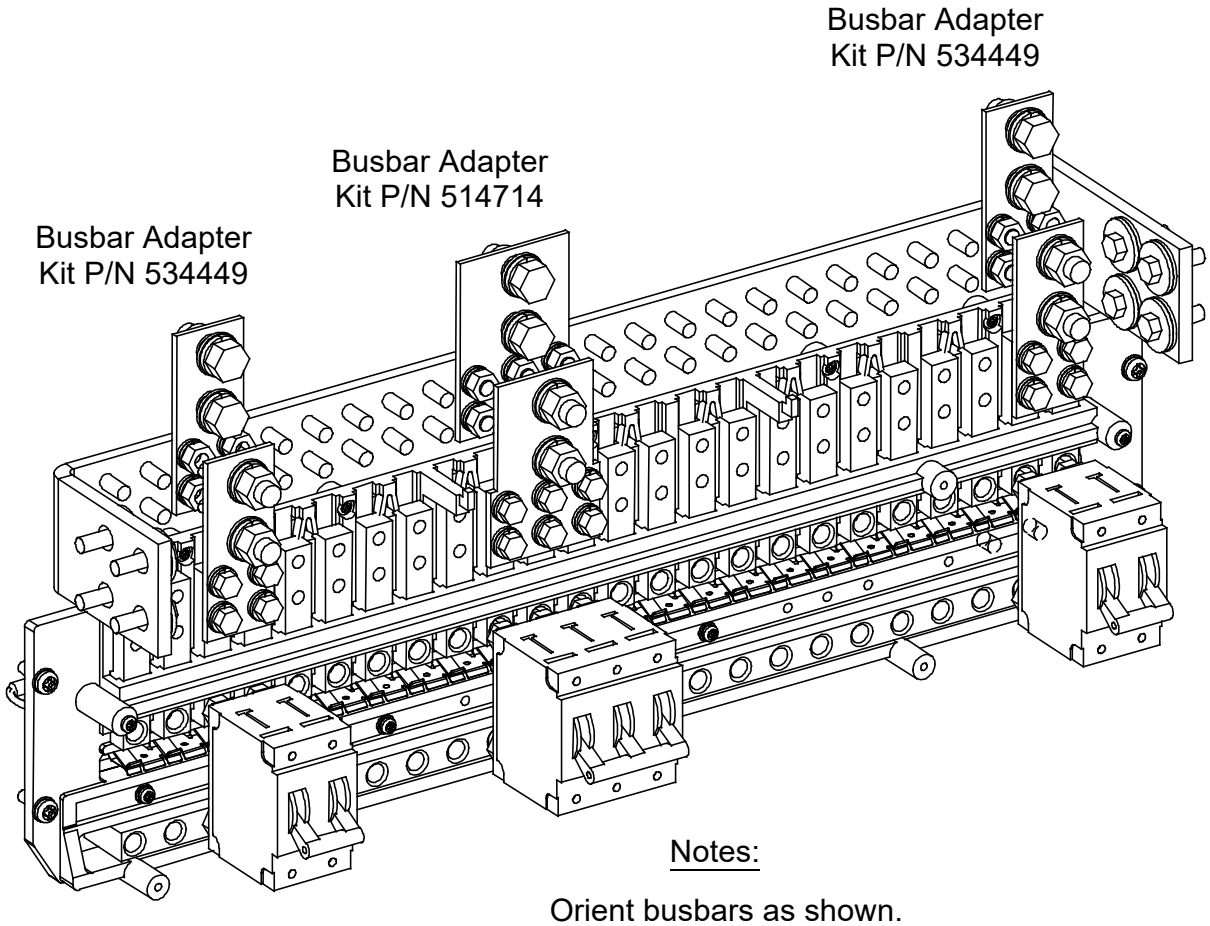
[ ] 1. Open the Distribution Cabinet front door by turning and holding the latch in the counterclockwise position.

[ ] 2. Install the lug adapter busbars as shown in **Figure 6**. Apply anti-oxidizing compound to busbar mating surfaces before assembling. Recommended torque is 72 in-lbs using the supplied 1/4" bolts and hardware.

[ ] 3. Orient the load lug hardware as shown in **Figure 6**. Recommended torque is 300 in-lbs using the supplied 3/8" bolts and hardware.

[ ] 4. Close the Distribution Cabinet access door. The door can be shut without turning the latch.

Figure 6: *Installing Lug Adapter Busbar Kits*



Notes:

Orient busbars as shown.

Shield not shown. Remove breakaway areas from shield as required. Breakaways are only provided for positions 1-8 and 9-12 in a 20-position panel and 1-8, 9-12, and 23-24 in a 24-position panel. This restricts 2 and 3-pole breakers to be located in these positions only. Note also that a shield mounting tab is located between positions 8 and 9, thus a 2 or 3-pole breaker cannot span between positions 8 and 9.

Circuit breaker locations for reference only.

Installing the List 72, List 74, List 75, List 76, List 77, or List 78 MCA Interface Option (If Furnished)

If List 72, 74, 75, 76, 77, or 78 is ordered with the power system; this option is installed at the factory.

To field install these kits, refer to Section 5949. Section 5949 is furnished with each kit. Section 5949 is also provided in the hardcopy System Installation Manual and can also be accessed from the CD (Electronic Documentation Package) furnished with your system.

Mounting a Battery Charge Digital Temperature Compensation Probe (if furnished)

NOTE! *For proper operation, the Battery Charge Digital Temperature Compensation Probe should be mounted near the batteries.*

Procedure

[ ] 1. Mount the Battery Charge Digital Temperature Compensation Probe to any suitable surface located near the battery. One 1/4-inch hole is provided to mount the probe. Recommended torque is 25 in-lbs, maximum.

Mounting a TXM (Multiple Probe Concentrator Module) and Probes (if furnished)

Refer to Section 5940. Section 5940 is provided in the hardcopy System Installation Manual and can also be accessed from the CD (Electronic Documentation Package) furnished with your system.

Installing Bullet Nose Type Fuseholders and TPS/TLS Fuses (if furnished)

Refer to the illustrations in the MAKING ELECTRICAL CONNECTIONS section for typical Distribution Cabinet fuse/circuit breaker position numbering schemes.

Refer to the following procedure, and install Bullet Nose Type fuseholders and appropriately sized TPS/TLS fuses into the proper mounting positions in the Distribution Cabinet(s). Record all fuse sizes on the card provided within the Distribution Cabinet(s).

Bullet Nose Type fuseholders and TPS/TLS fuses may have been factory installed for you. If so, verify their positions and sizes.

NOTE! *Each bus in the Distribution Cabinet is rated for a maximum current of 500 amperes. Each Distribution Cabinet is rated for a maximum of 500 amperes (List 21), 1000 amperes (List 22), 1500 amperes (List 23), or 2000 amperes (List 24).*

Procedure

NOTE! *Refer to* ***Figure 7*** *as this procedure is performed.*

[ ] 1. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

[ ] 2. Orient the fuseholder so the LOAD designation found on the fuseholder side is at the top, and the LINE designation is at the bottom. Insert the terminals on the rear of the fuseholder into their corresponding sockets on the Distribution Row Assembly. Push fuseholder in firmly until fully seated in the Distribution Row Assembly.

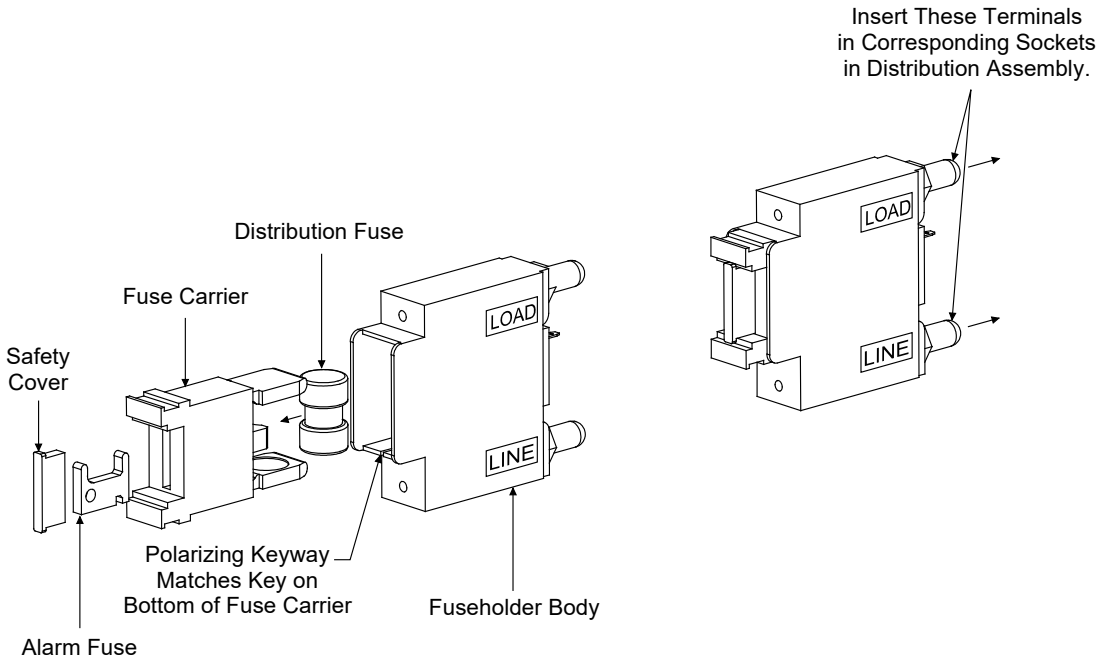
[ ] 3. When all fuseholders are installed, install an appropriately sized TPS/TLS fuse in each. To do this, remove the fuse carrier from the mounted fuseholder body by pulling it straight out. Slide the fuse in place between the contacts of the fuse carrier. When done, push the fuse carrier back into the fuseholder body. Note that a polarizing key on the bottom of the carrier prevents the carrier from being inserted upside down.

[ ] 4. Record all fuse sizes on the card provided within the Distribution Cabinet(s).

[ ] 5. Verify that an 18/100 ampere alarm fuse is present in each fuseholder, and that a plastic safety cover is installed on this fuse. Refer to SAG581126000 for part numbers.

[ ] 6. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fasteners.

Figure 7: *Installing a Bullet Nose Type Fuseholder and TPS/TLS Fuse*



Installing Bullet Nose Type Circuit Breakers (if furnished)

Refer to the illustrations in the MAKING ELECTRICAL CONNECTIONS section for typical Distribution Cabinet fuse/circuit breaker position numbering schemes.

CAUTION! Circuit breakers with a rating greater than 150 amperes SHALL HAVE an empty mounting position between it and any other overcurrent protective device.

Refer to the following procedure, and install appropriately sized Bullet Nose type circuit breakers into the proper mounting positions in the Distribution Cabinet(s). Record all circuit breaker sizes on the card provided within the Distribution Cabinet(s).

Bullet Nose Type circuit breakers may have been factory installed for you. If so, verify their positions and sizes.

NOTE! *Each bus in the Distribution Cabinet is rated for a maximum current of 500 amperes. Each Distribution Cabinet is rated for a maximum of 500 amperes (List 21), 1000 amperes (List 22), 1500 amperes (List 23), or 2000 amperes (List 24).*

Procedure

NOTE! *Refer to* ***Figure 8*** *as this procedure is performed.*

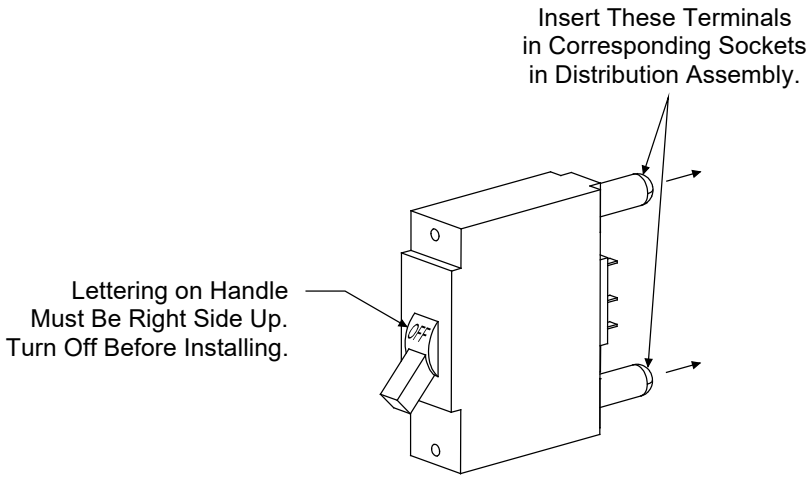
[ ] 1. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

[ ] 2. Ensure that the circuit breaker is in the OFF position, and is of the correct rating. Orient the circuit breaker so the OFF and ON labeling on the handle is right side up. Insert the terminals on the rear of the circuit breaker into their corresponding sockets on the Distribution Row Assembly. Push circuit breaker in firmly until fully seated in the Distribution Row Assembly.

[ ] 3. Record all circuit breaker sizes on the card provided within the Distribution Cabinet(s).

[ ] 4. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fasteners.

Figure 8: *Installing a Bullet Nose Type Circuit Breaker*



Installing GMT Fuse Distribution Assembly (P/N 509128) On A Bullet Nose Type Distribution Assembly (if furnished)

The GMT Fuse Distribution Assembly is provided in a kit, P/N 514432, which consists of:

- (1) GMT Fuse Distribution Circuit Card Assembly (P/N 509128)
- (1) Ground Return Busbar Link (P/N 514420)
- (1) Insulator (P/N 528401)
- (1) 1/4-20 x 1/2" Hex Head Machine Screw
- (1) 1/4-20 Hex Nut
- (2) 1/4" Flat Washers
- (2) 1/4" Lock Washers
- (1) 1/4-20 x 3/8" Screw
- (2) GND Symbol Label (P/N 317304400)

Refer to the following procedure to install the kit. Then install appropriately sized GMT fuses into the fuseholders on the GMT Fuse Distribution Circuit Card Assembly. Record all fuse sizes on the card provided within the Distribution Cabinet(s).

NOTE! *Each P/N 509128 GMT Fuse Distribution Circuit Card Assembly is rated for a maximum current of 30 amperes.*

Procedure

NOTE! *Refer to* ***Figure 9*** *as this procedure is performed.*

[ ] 1. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

NOTE! *Each P/N 509128 GMT Fuse Distribution Circuit Card Assembly occupies five mounting positions on a Bullet Nose Type Distribution Row Assembly. It is recommended that the fuse assembly be mounted starting at the right side of the distribution row.*

[ ] 2. Ensure that no load connections have been made to the five Bullet Nose Type mounting positions into which the P/N 509128 GMT Fuse Distribution Circuit Card Assembly will be installed.

[ ] 3. Orient the P/N 509128 GMT Fuse Distribution Circuit Card Assembly as shown in **Figure 9**. Insert the four terminals on the rear of the assembly into their corresponding sockets on the Bullet Nose Type Distribution Row Assembly. Push the GMT Fuse Distribution Circuit Card Assembly in firmly until fully seated in the Distribution Row Assembly.

[ ] 4. On the Bullet Nose Type Distribution Row Assembly, connect a furnished busbar link between the ground busbar and either of the two linking busbars as shown in **Figure 9**. Secure with the hardware furnished. Recommended torque is 72 in lbs.

[ ] 5. Install the furnished P/N 528401 insulator over the busbars above the GMT Fuse Distribution Circuit Card Assembly. See detail in **Figure 9**. Secure with the furnished screw.

[ ] 6. Adhere the GND Symbol labels to the insulator as shown in **Figure 9**.

[ ] 7. Install an appropriately sized GMT fuse in each fuse mounting position on the GMT Fuse Distribution Circuit Card Assembly as required. If dummy fuses are installed, first remove the dummy fuse.

[ ] 8. Record all fuse sizes (installed on the GMT Fuse Distribution Circuit Card Assembly) on the card provided within the Distribution Cabinet(s).

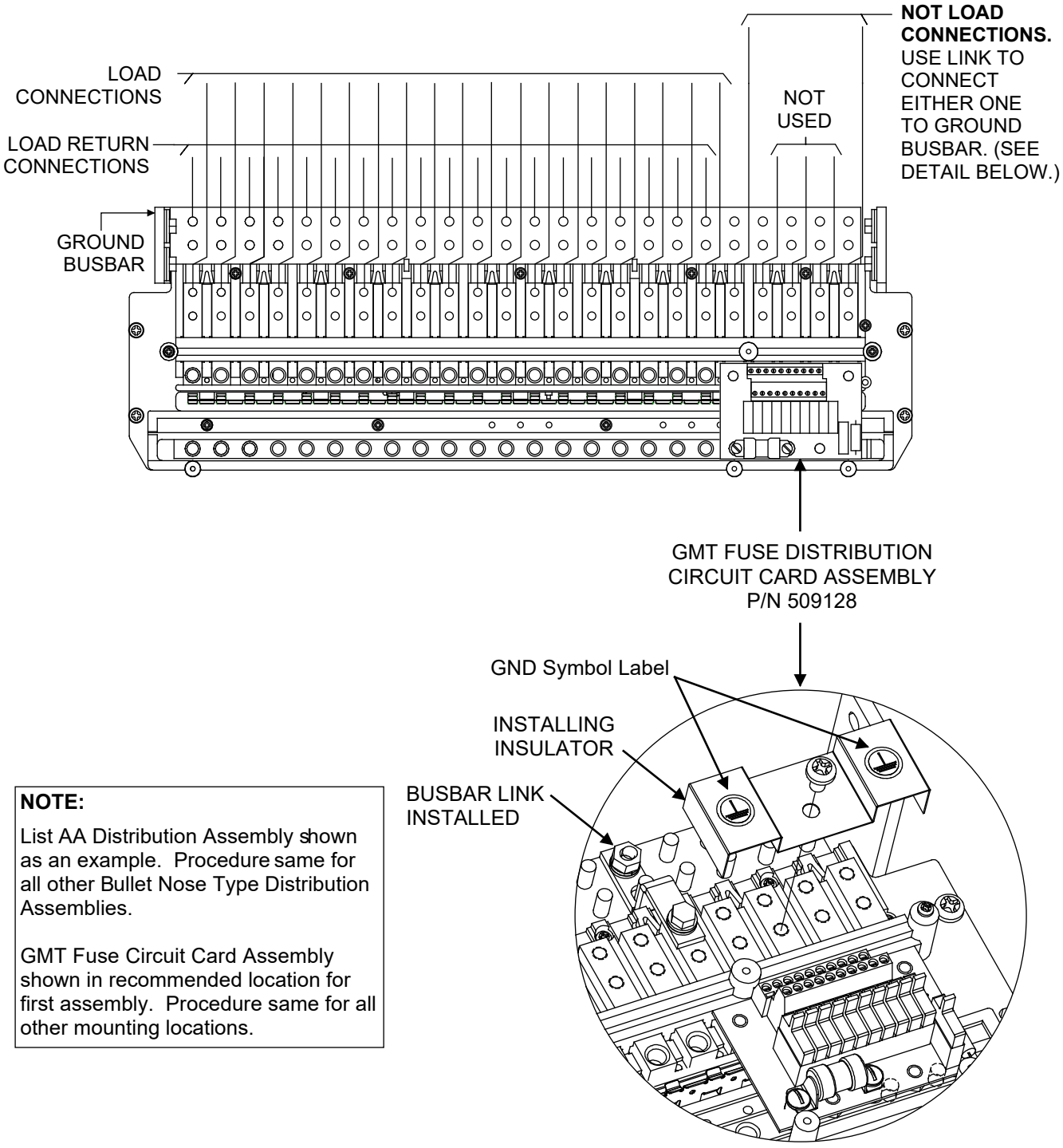
[ ] 9. Verify that a 1/4 ampere alarm fuse is present in fuse position F11 of the GMT Fuse Distribution Circuit Card Assembly. Refer to SAG581126000 for part number.

[ ] 10. Verify that a plastic safety cover is installed on all GMT fuses on the GMT Fuse Distribution Circuit Card Assembly. Refer to SAG581126000 for part number.

[ ] 11. Verify that dummy fuses are installed in all unused fuse positions on the GMT Fuse Distribution Circuit Card Assembly.

[ ] 12. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fasteners.

Figure 9: *Installing a P/N 509128 GMT Fuse Distribution Assembly on a Bullet Nose Type Distribution Row Assembly*



NOTE:

List AA Distribution Assembly shown as an example. Procedure same for all other Bullet Nose Type Distribution Assemblies.

GMT Fuse Circuit Card Assembly shown in recommended location for first assembly. Procedure same for all other mounting locations.

Installing TPH Fuses (if furnished)

Refer to the illustrations in the "*MAKING ELECTRICAL CONNECTIONS*" section for typical Distribution Cabinet fuse/circuit breaker position numbering schemes.

Refer to the following procedure, and install appropriately sized TPH fuses into the proper fuseholders in the Distribution Cabinet(s). Record all fuse sizes on the card provided within the Distribution Cabinet(s).

TPH fuses may have been factory installed for you. If so, verify their positions and sizes.

NOTE! *Each bus in the Distribution Cabinet is rated for a maximum current of 500 amperes. Each Distribution Cabinet is rated for a maximum of 500 amperes (List 21), 1000 amperes (List 22), 1500 amperes (List 23), or 2000 amperes (List 24).*

Procedure

NOTE! *Refer to* ***Figure 10*** *as this procedure is performed.*

[ ] 1. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

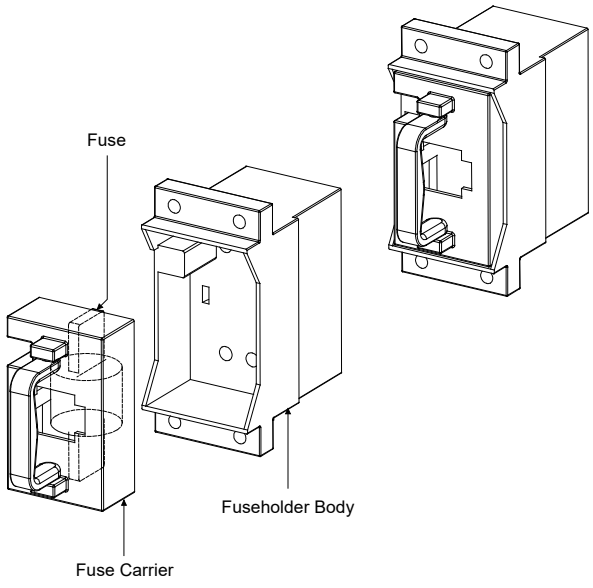
[ ] 2. Remove the TPH fuse carrier from the mounted fuseholder body by grasping its handle and firmly pulling it straight out. Install the TPH fuse into the fuse carrier. When done, push the fuse carrier securely back into the mounted fuseholder body.

[ ] 3. Record all fuse sizes on the card provided within the Distribution Cabinet(s).

[ ] 4. Verify that a 1/4 ampere alarm fuse is installed in the GMT-type fuseholder located adjacent to the TPH fuseholder, and that a plastic safety cover is install on this fuse. Refer to SAG581126000 for part numbers.

[ ] 5. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fasteners.

Figure 10: *Installing a TPH Fuse*



SETTING WIRING OPTIONS

DANGER! TECHNICIANS MUST FOLLOW APPROVED SAFETY PROCEDURES.

Performing the following procedures may expose technicians to hazards. These procedures should be performed by qualified technicians familiar with the hazards associated with this type of equipment. These hazards may include shock, energy, and/or burns. To avoid these hazards:

a) The tasks should be performed in the order indicated.

b) Remove watches, rings, and other jewelry.

c) Prior to contacting any uninsulated surface or termination, use a voltmeter to verify that no voltage or the expected voltage is present.

d) Wear eye protection, and use recommended tools.

e) Use insulated tools.

(To avoid danger to the installer or damage to the equipment, the tools used in this procedure should have insulated grips. All exposed metal shafts, extensions, handles, etc. should be completely insulated with a minimum of three half-lapped layers of electrical tape. Ensure that wrenches with more than one working end have only one end exposed.)

Voltages

AC Input Voltages

DANGER! This system operates from AC voltage capable of producing fatal electrical shock.

DC Input/Output Voltages

DANGER! This system produces DC Power and may require battery to be connected to it. Although the DC voltage is not hazardously high, the Rectifier Modules and/or battery can deliver large amounts of current. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact a battery terminal or exposed wire connected to a battery terminal. NEVER allow a metal object, such as a tool, to contact more than one termination at a time, or to simultaneously contact a termination and a grounded object. Even a momentary short circuit can cause explosion and injury.

Circuit Card Handling

WARNING! Installation or removal of the circuit cards requires careful handling. Before handling any circuit card, read and follow the instructions contained on the Static Warning Page located at the beginning of this document.

To avoid possibility of circuit card damage from static discharge, a static wrist strap grounded through a one megohm resistor should always be worn when handling the circuit cards.

Wiring Options on Interconnect/LVD Inhibit Circuit Card P/N 509532 Located in Distribution Cabinet(s)

Perform the following procedures to verify the factory settings and/or make the required wiring option settings per your site requirements. These procedures can also be used to make adjustments on a replacement circuit card.

Accessing Interconnect/LVD Inhibit Circuit Card P/N 509532

Procedure

[ ] 1. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

[ ] 2. Remove the clear plastic panel that covers the circuit cards at the bottom of the cabinet. To do so, loosen but do not remove the two screws that secure the cover. Slide the cover to the front until the screw heads clear the keyhole slots in the cover. Then lift the cover out of the cabinet.

WARNING! Damage to a circuit card may result if the next step is not followed.

[ ] 3. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.

Internal/External Voltage Sensing and Internal/External System Voltage Meter Reading Circuit Card P/N 500476 Orientation

Circuit card P/N 500476 is located on Interconnect/LVD Inhibit circuit card P/N 509532 mounted in the Main Bay Distribution Cabinet (the one containing the MCA). Refer to **Figure 11**.

The orientation of this circuit card determines...

- If the Rectifier Modules are sensing output voltage through internal 'Distribution' wiring (internal), or at a location connected to the system via the external voltage sensing leads (external).
- If the voltage source the MCA displays as "System Output Voltage" is the voltage source connected through the internal 'Distribution' wiring (internal), or the voltage source connected to the system via the external system voltage meter reading leads (external).

Procedures are provided later in these instructions detailing connection of external voltage sensing leads and external system voltage meter reading leads.

Orient this circuit card per site requirements as described in the following procedure.

Procedure

NOTE! *A P/N 509532 circuit card is located in each Distribution Cabinet.* ***Perform this procedure only on the circuit card located in the Main Bay Distribution Cabinet****. The orientation of circuit card P/N 500476 on circuit card P/N 509532 located in a Supplemental Bay Distribution Cabinet has no effect.*

[ ] 1. If not already done, perform the "Accessing Interconnect/LVD Inhibit Circuit Card P/N 509532" procedure described above.

[ ] 2. Refer to **Figure 11**, and locate Interconnect/LVD Inhibit circuit card P/N 509532 mounted in the Main Bay Distribution Cabinet (the one containing the MCA).

[ ] 3. Refer to **Figure 11**, and locate the Internal/External Voltage Sensing and Internal/External System Voltage Meter Reading circuit card P/N 500476 installed on Interconnect/LVD Inhibit circuit card P/N 509532 at J4.

[ ] 4. For Internal Voltage Sensing and Internal System Voltage Meter Reading: Orient the circuit card so that the SENSE ARROW points to INT.

For External Voltage Sensing and External System Voltage Meter Reading: Orient the circuit card so that the SENSE ARROW points to EXT.

[ ] 5. If there are no more adjustments to circuit card P/N 509532, perform the "Final Procedure" procedure described below.

Fuses and Fuse Alarm Polarity Circuit Card P/N 500477 Orientation

NOTE! *This procedure has been performed at the factory. You may use the procedure to verify the settings or to make adjustments on a replacement circuit card.*

Circuit card P/N 500477 is located on Interconnect/LVD Inhibit circuit card P/N 509532 mounted in each Distribution Cabinet. Refer to **Figure 11**.

The orientation of this circuit card sets the proper polarity for the fuses and fuse alarm circuits.

Orient this circuit card as described in the following procedure.

Procedure

NOTE! *A P/N 509532 circuit card is located in each Distribution Cabinet.* ***Perform this procedure on the circuit card located in each Distribution Cabinet.***

[ ] 1. If not already done, perform the "Accessing Interconnect/LVD Inhibit Circuit Card P/N 509532" procedure described above.

[ ] 2. Refer to **Figure 11**, and locate Interconnect/LVD Inhibit circuit card P/N 509532 mounted in each Distribution Cabinet.

[ ] 3. Refer to **Figure 11**, and locate the Fuses and Fuse Alarm circuit card P/N 500477 installed on Interconnect/LVD Inhibit circuit card P/N 509532 at J7.

[ ] 4. Orient the circuit card so that the SYSTEM ARROW points to -48V. (System distribution voltage in this power system is -48V.)

[ ] 5. If there are no more adjustments to circuit card P/N 509532, perform the "Final Procedure" procedure described below.

[ ] 6. If the system consists of other Distribution Cabinets, set this option as required on each cabinet.

LVD (J5) Jumper

NOTE! *This procedure has been performed at the factory. You may use the procedure to verify the settings or to make adjustments on a replacement circuit card.*

This jumper is located on Interconnect/LVD Inhibit circuit card P/N 509532 mounted in each Distribution Cabinet. Refer to **Figure 11**.

Set this jumper as described in the following procedure.

Procedure

NOTE! *A P/N 509532 circuit card is located in each Distribution Cabinet. Perform this procedure on the circuit card located in each Distribution Cabinet.*

[ ] 1. If not already done, perform the "Accessing Interconnect/LVD Inhibit Circuit Card P/N 509532" procedure described above.

[ ] 2. Refer to **Figure 11**, and locate Interconnect/LVD Inhibit circuit card P/N 509532 mounted in each Distribution Cabinet.

[ ] 3. Refer to **Figure 11**, and locate connector J5 on this circuit card.

[ ] 4. If the Distribution Cabinet that contains this circuit card:

- Is the last cabinet that contains Low Voltage Disconnect circuit cards, or if the system only consists of this cabinet and contains Low Voltage Disconnect circuit cards, place the supplied jumper between pins 1 and 2 of J5.
- Has NO Low Voltage Disconnect circuit cards, or contains Low Voltage Disconnect circuit cards but is NOT the last cabinet in the system, place the supplied jumper on pins 2 and 3 of J5.

[ ] 5. If there are no more adjustments to circuit card P/N 509532, perform the "Final Procedure" procedure described below.

[ ] 6. If the system consists of other Distribution Cabinets, set this option as required on each cabinet.

Shunt Pod (J6) Jumper

NOTE! *This procedure has been performed at the factory. You may use the procedure to verify the settings or to make adjustments on a replacement circuit card.*

This jumper is located on Interconnect/LVD Inhibit circuit card P/N 509532 mounted in each Distribution Cabinet. Refer to **Figure 11**.

Set this jumper as described in the following procedure.

Procedure

NOTE! *A P/N 509532 circuit card is located in each Distribution Cabinet. Perform this procedure on the circuit card located in each Distribution Cabinet.*

[ ] 1. If not already done, perform the "Accessing Interconnect/LVD Inhibit Circuit Card P/N 509532" procedure described above.

[ ] 2. Refer to **Figure 11**, and locate Interconnect/LVD Inhibit circuit card P/N 509532 mounted in each Distribution Cabinet.

[ ] 3. Refer to **Figure 11**, and locate connector J6 on this circuit card.

[ ] 4. If the Distribution Cabinet containing this circuit card:

- DOES NOT contain a Shunt POD circuit card, place the supplied jumper between pins 1 and 2 of J6.
- DOES contain a Shunt POD circuit card, place the supplied jumper between pins 2 and 3 of J6.

[ ] 5. If there are no more adjustments to circuit card P/N 509532, perform the "Final Procedure" procedure described below.

[ ] 6. If the system consists of other Distribution Cabinets, set this option as required in each cabinet.

Final Procedure

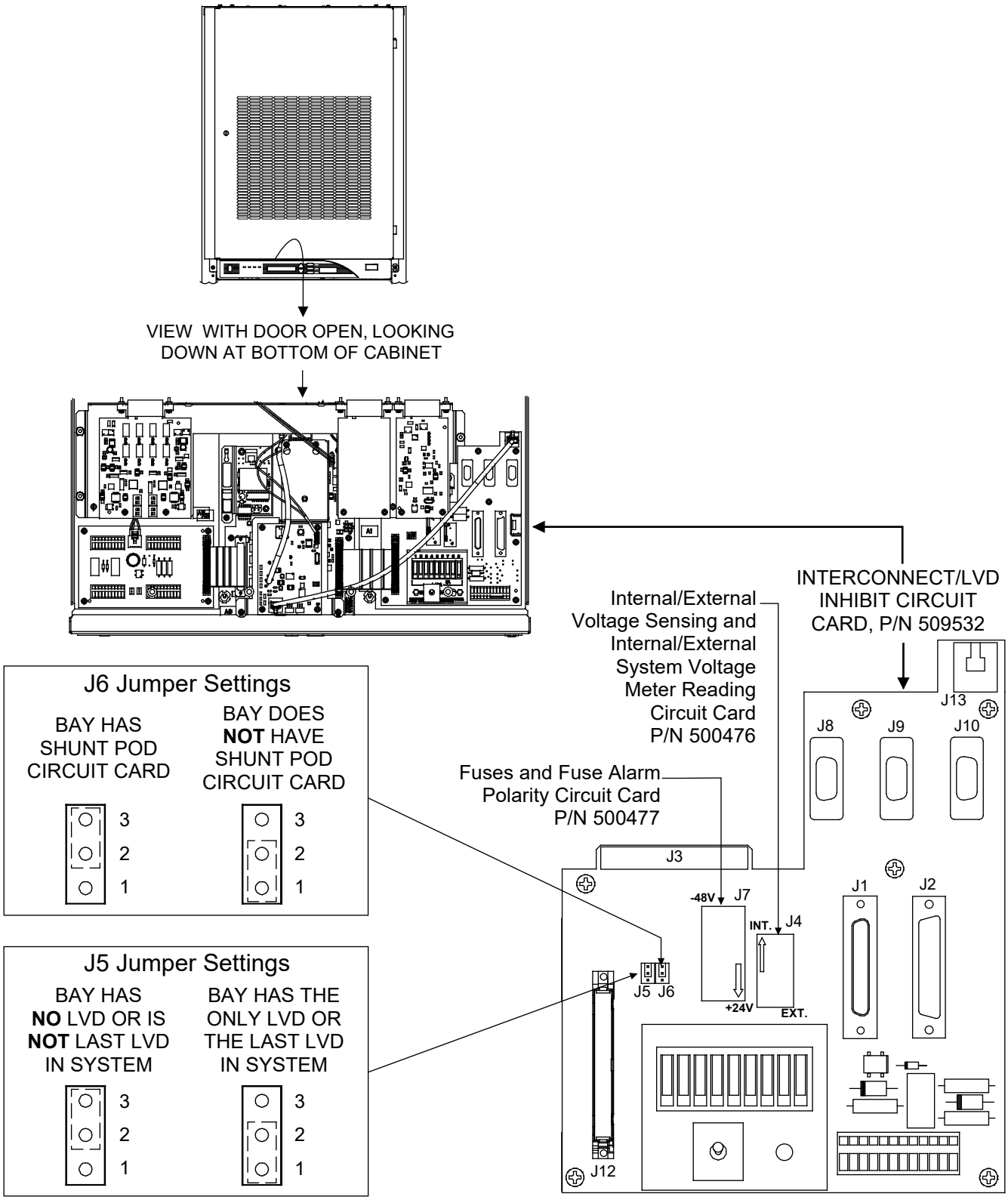
Procedure

[ ] 1. Reinstall the clear plastic cover in the bottom of the cabinet. To do so, place the cover on its two mounting posts so that the mounting screw heads pass through the keyhole slots in the cover. Slide the cover towards the back. Tighten the two screws.

[ ] 2. Remove the grounding wrist strap.

[ ] 3. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

Figure 11: *Wiring Options on Interconnect/LVD Inhibit Circuit Card P/N 509532*



Quad Low Voltage Disconnect Circuit Card P/N 509477 Switches S1 through S4 Settings

NOTE! *This procedure has been performed at the factory. You may use the procedure to verify the settings or to make adjustments on a replacement circuit card.*

The MCA provides three separate LVD disconnect levels (with separate A and B side adjustable setpoints for each level) and one adjustable global reconnect setpoint. The levels are designated LVD1, LVD2, and LVD3.

A Quad Low Voltage Disconnect circuit card P/N 509477 is provided in each Distribution Cabinet that…

- Contains one or more distribution rows having an LVD contactor, or
- Controls an LVD contactor located on an associated Battery Stand.

Four switches, S1-S4, are provided on each Quad Low Voltage Disconnect circuit card. The setting of these switches determines which of the three available disconnect levels controls the contactor in the corresponding distribution row or battery stand, as shown in **Table 1**.

Refer to **Figure 12** for location of switches S1-S4 on circuit card P/N 509477.

Set these switches as described in the following procedure.

Procedure

[ ] 1. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

[ ] 2. Remove the clear plastic panel that covers the circuit cards at the bottom of the cabinet. To do so, loosen but do not remove the two screws that secure the cover. Slide the cover to the front until the screw heads clear the keyhole slots in the cover. Then lift the cover out of the cabinet.

WARNING! Damage to a circuit card may result if the next step is not followed.

[ ] 3. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.

[ ] 4. Refer to **Figure 12**, and locate Quad Low Voltage Disconnect circuit card P/N 509477. Locate switches S1 through S4 on the circuit card.

[ ] 5. Set the switches per **Table 1**. Be sure to set all four switches on the circuit card, regardless of the number of LVD contactors and/or distribution rows in the cabinet.

[ ] 6. Reinstall the clear plastic cover in the bottom of the cabinet. To do so, place the cover on its two mounting posts so that the mounting screw heads pass through the keyhole slots in the cover. Slide the cover towards the back. Tighten the two screws.

[ ] 7. Remove the grounding wrist strap.

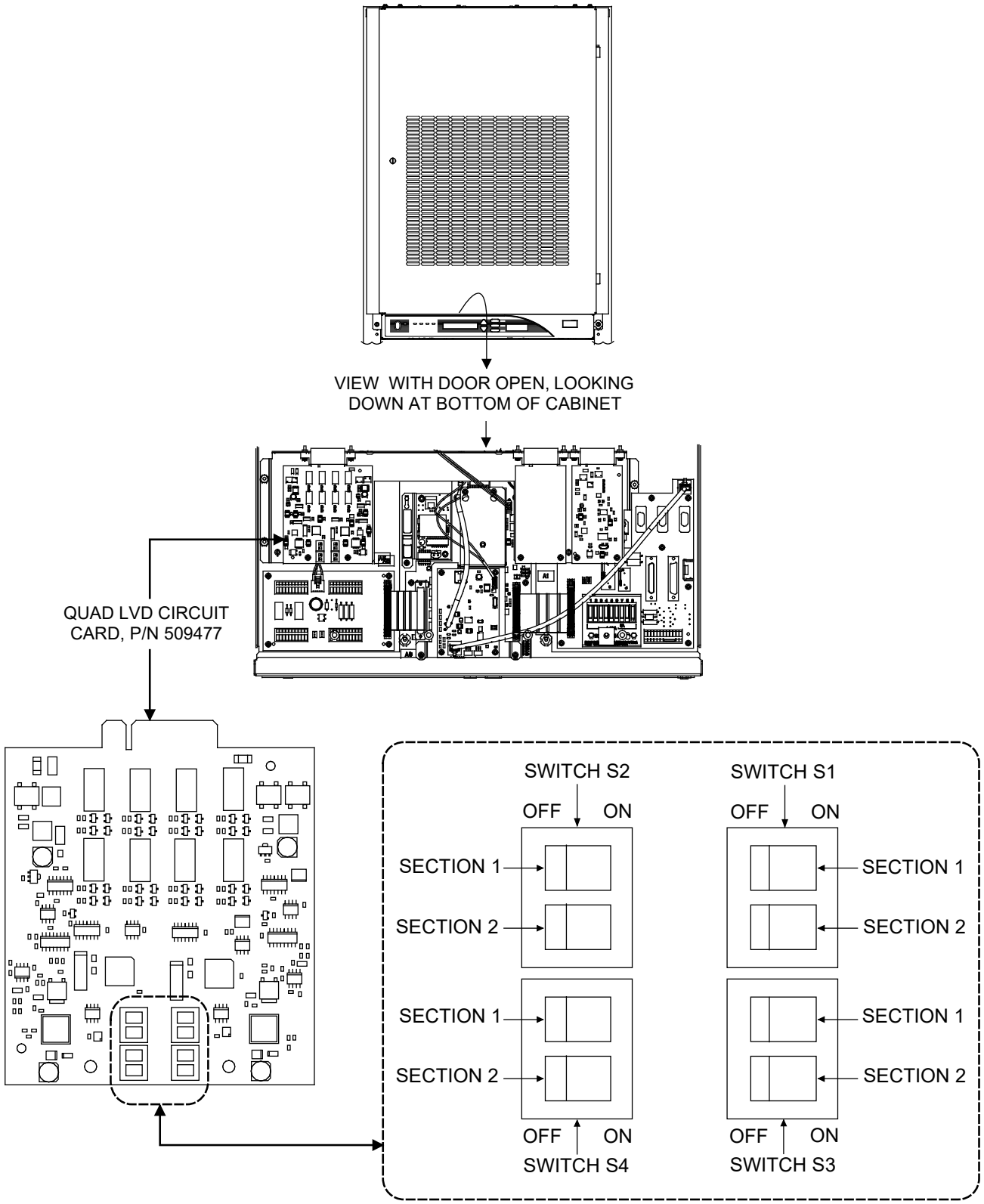
[ ] 8. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

[ ] 9. If the system consists of other Distribution Cabinets containing (or controlling) LVD contactor(s), set the switches on the Quad Low Voltage Disconnect circuit card installed in these cabinets as required.

Table 1: *Quad Low Voltage Disconnect Circuit Card P/N 509477 Switches S1 - S4 Settings*

Switch S1 Controls LVD Contactor in Row 1 or an Associated Battery Stand, if present		
Setting	Section 1 of S1	Section 2 of S1
Control Disabled (Set here if no row present or row has no LVD.)	OFF	OFF
Contactor Controlled by MCA LVD1 A/B Settings	OFF	ON
Contactor Controlled by MCA LVD2 A/B Settings	ON	OFF
Contactor Controlled by MCA LVD3 A/B Settings	ON	ON
Switch S2 Controls LVD Contactor in Row 2, if present		
Setting	Section 1 of S2	Section 2 of S2
Control Disabled (Set here if no row present or row has no LVD.)	OFF	OFF
Contactor Controlled by MCA LVD1 A/B Settings	OFF	ON
Contactor Controlled by MCA LVD2 A/B Settings	ON	OFF
Contactor Controlled by MCA LVD3 A/B Settings	ON	ON
Switch S3 Controls LVD Contactor in Row 3, if present		
Setting	Section 1 of S3	Section 2 of S3
Control Disabled (Set here if no row present or row has no LVD.)	OFF	OFF
Contactor Controlled by MCA LVD1 A/B Settings	OFF	ON
Contactor Controlled by MCA LVD2 A/B Settings	ON	OFF
Contactor Controlled by MCA LVD3 A/B Settings	ON	ON
Switch S4 Controls LVD Contactor in Row 4, if present		
Setting	Section 1 of S4	Section 2 of S4
Control Disabled (Set here if no row present or row has no LVD.)	OFF	OFF
Contactor Controlled by MCA LVD1 A/B Settings	OFF	ON
Contactor Controlled by MCA LVD2 A/B Settings	ON	OFF
Contactor Controlled by MCA LVD3 A/B Settings	ON	ON

Figure 12: *Quad Low Voltage Disconnect Circuit Card P/N 509477 Switches S1 - S4 Location*



Alarm Termination / Audible Alarm Circuit Card P/N 524734 Jumpers J10 and J11 Settings (List 71 Only)

NOTE THAT LIST 10 AND 11 MCA's PROVIDE AUDIBLE ALARM RELAY CONTACTS. LIST 12 AND 13 MCA's DO NOT. AN AUDIBLE ALARM IS ONLY AVAILABLE WHEN LIST 10 OR 11 MCA IS FURNISHED.

List 71 provides Alarm Termination / Audible Alarm circuit card P/N 524734 installed in the Main Bay Distribution Cabinet. This circuit card contains a local audible alarm sounding device, plus connection points for a remote audible alarm sounding device (List 10 and 11 MCA's only). Located on this circuit card are jumpers J10 and J11. Placement of these jumpers determines if the local or remote audible alarm sounding device is active.

CAUTION! List 12 and List 13 MCA's do not provide an audible alarm function. For correct external alarm operation, jumpers J10 and J11 must be set to the REMOTE position when the power system is equipped with List 12 or List 13 MCA.

Set the jumpers per site requirements as described in the following procedure.

Procedure

[ ] 1. Open the Main Bay Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

[ ] 2. Remove the clear plastic panel that covers the circuit cards at the bottom of the cabinet. To do so, loosen but do not remove the two screws that secure the cover. Slide the cover to the front until the screw heads clear the keyhole slots in the cover. Then lift the cover out of the cabinet.

WARNING! Damage to a circuit card may result if the next step is not followed.

[ ] 3. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.

[ ] 4. Refer to **Figure 13** and locate Alarm Termination / Audible Alarm circuit card P/N 509539 mounted in the Main Bay Distribution Cabinet.

[ ] 5. Refer to **Figure 13** and locate connectors J10 and J11 on this circuit card.

- For LOCAL audible alarm operation: Place the jumper on J10 between pins 1 and 2. Place the jumper on J11 between pins 1 and 2.
- For REMOTE audible alarm operation: Place the jumper on J10 between pins 2 and 3. Place the jumper on J11 between pins 2 and 3.

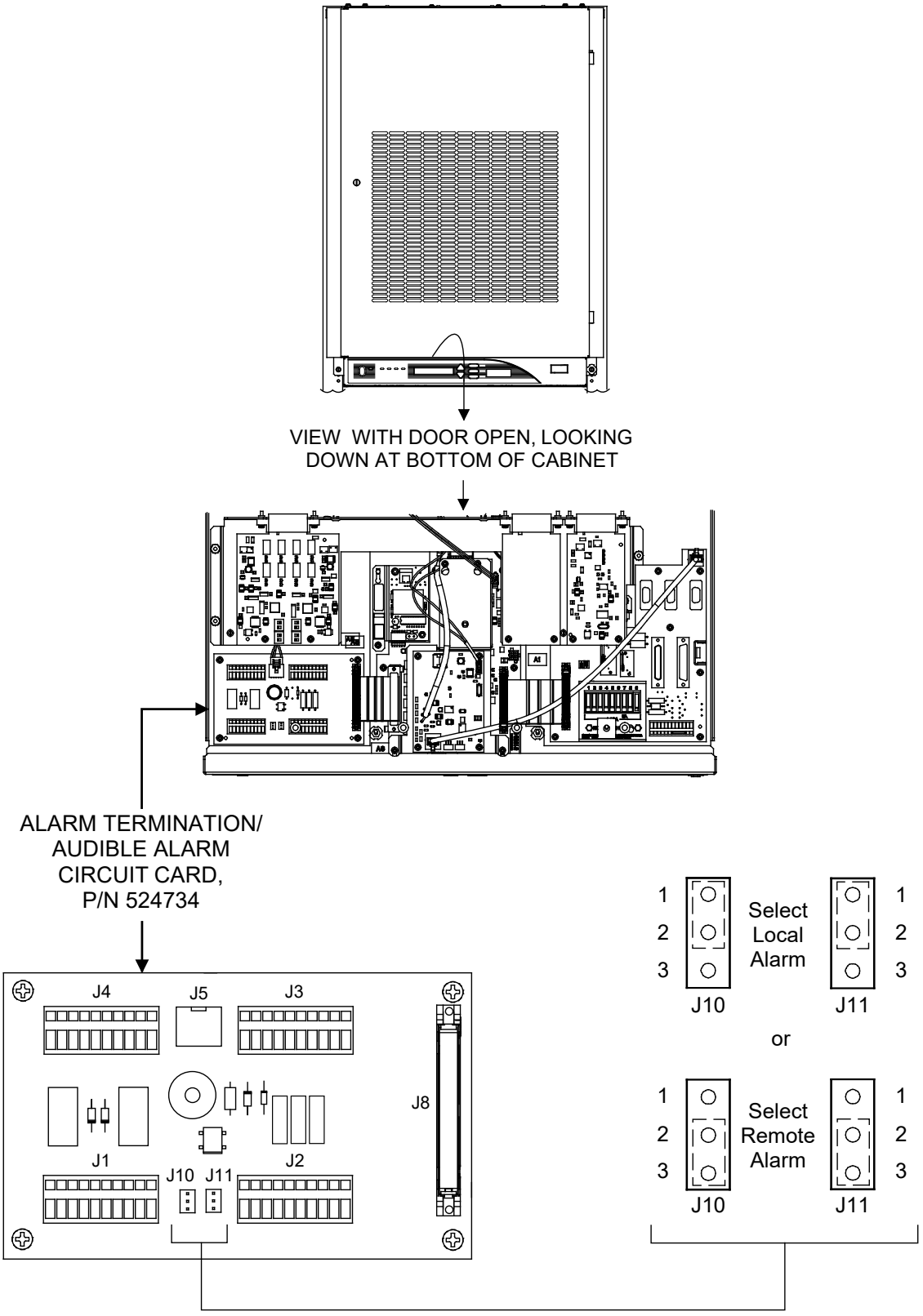
  (Use this setting if the power system contains a List 12 or List 13 MCA.)

[ ] 6. Reinstall the clear plastic cover in the bottom of the cabinet. To do so, place the cover on its two mounting posts so that the mounting screw heads pass through the keyhole slots in the cover. Slide the cover towards the back. Tighten the two screws.

[ ] 7. Remove the grounding wrist strap.

[ ] 8. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

Figure 13: *Alarm Termination / Audible Alarm Circuit Card P/N 509539 Jumpers J10 and J11 Location*



MCA Local and Remote Access Lockout Switch S1 Settings on MCA Main Controller Circuit Card (Main Bay Only)

The MCA Main Controller circuit card installed in the Main Bay Distribution Cabinet contains switch S1. This switch allows you to enable/disable changing system settings via the MCA's Local Interface Pad (locally) and enable/disable changing system settings via the MCA's remote interface port(s) (remotely).

Refer to **Figure 14** for switch S1 location.

Set the switch settings per site requirements as described in the following procedure.

Procedure

NOTE! *When performing any step in this procedure that requires removal of existing hardware, retain all hardware for use in subsequent steps.*

[ ] 1. Open the Main Bay Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

[ ] 2. Remove the clear plastic panel that covers the circuit cards at the bottom of the cabinet. To do so, loosen but do not remove the two screws that secure the cover. Slide the cover to the front until the screw heads clear the keyhole slots in the cover. Then lift the cover out of the cabinet.

WARNING! Damage to a circuit card may result if the next step is not followed.

[ ] 3. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.

[ ] 4. Locate the metal bracket that is under the Rectifier Shelf Interface circuit card. Loosen but do not remove the four Phillips screws that secure the metal bracket. Remove the metal bracket with the Rectifier Shelf Interface circuit card by sliding toward the rear of the MCA assembly until the screw heads clear the slots in the bracket. Lift the bracket and circuit card to gain access to switch S1 on the MCA Main Controller circuit card that is beneath the bracket.

[ ] 5. Refer to **Figure 14**, and locate switch S1 on the MCA Main Controller circuit card.

- To disable changing system settings locally, place section 2 of S1 in the ON position.

  To enable changing system settings locally, place section 2 of S1 in the OFF position.

- To disable changing system settings remotely, place switch 3 of S1 in the ON position.

  To enable changing system settings remotely, place switch 3 of S1 in the OFF position.

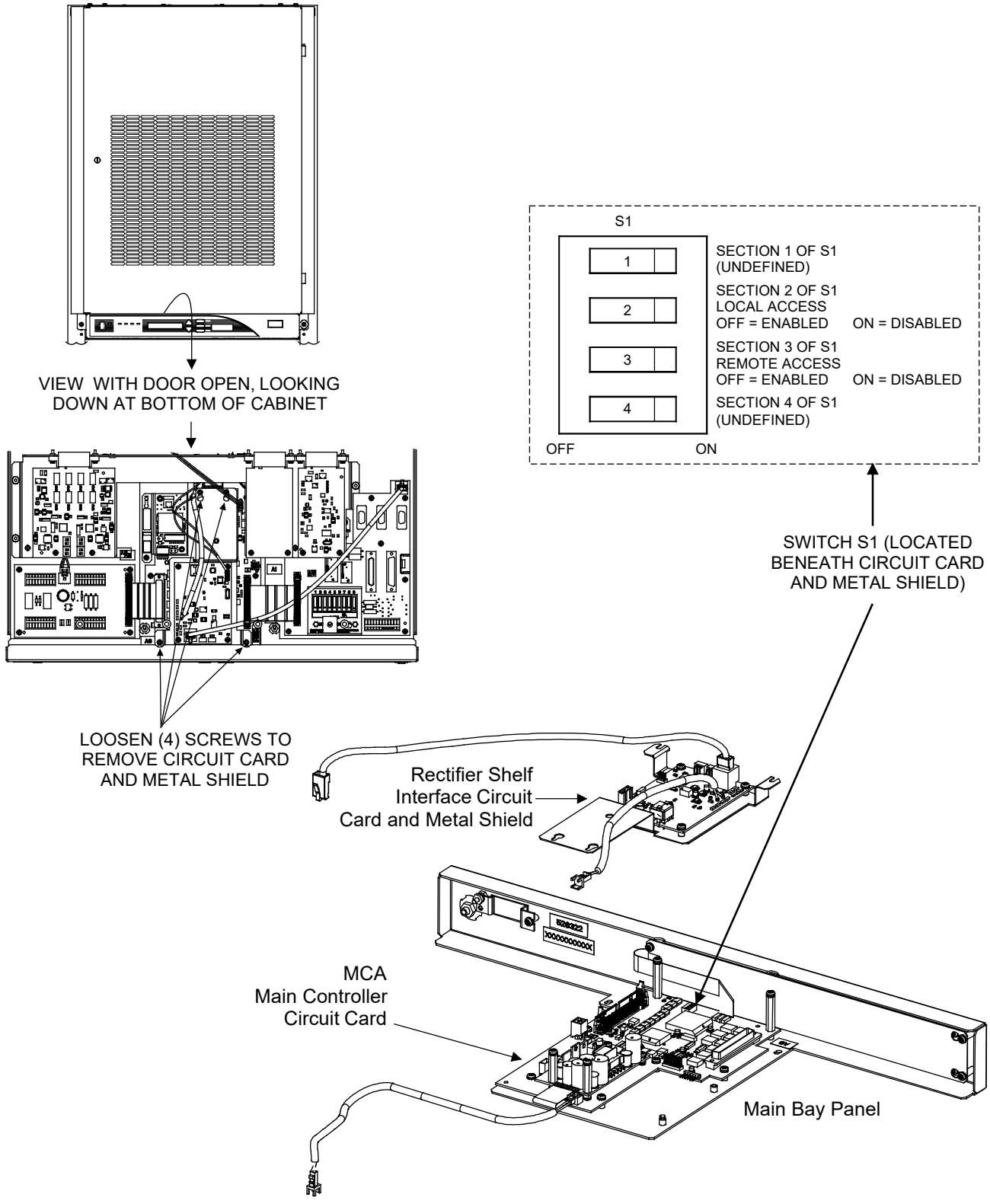
[ ] 6. Reinstall the previously removed metal bracket and Rectifier Shelf Interface circuit card. To do so, place the bracket on its four mounting posts so that the mounting screw heads pass through the slots in the bracket. Slide the bracket toward the front of the MCA assembly. Tighten the four screws.

[ ] 7. Reinstall the clear plastic cover in the bottom of the cabinet. To do so, place the cover on its two mounting posts so that the mounting screw heads pass through the keyhole slots in the cover. Slide the cover towards the back. Tighten the two screws.

[ ] 8. Remove the grounding wrist strap.

[ ] 9. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

Figure 14: *Location of MCA Remote and Local Access Lockout Switch S1 on MCA Main Controller Circuit Card*



MCA Modem Interface Option "Number of Rings Before Answer" Jumper (Main Bay Only)

This jumper is located on the Modem circuit card (if furnished). This circuit card is located in the Main Bay Distribution Cabinet.

The placement of this jumper determines the number of rings before the modem answers an incoming telephone call.

Refer to **Figure 15** for jumper location.

Set this jumper per site requirements as described in the following procedure.

Procedure

[ ] 1. Open the Main Bay Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

[ ] 2. Remove the clear plastic panel that covers the circuit cards at the bottom of the cabinet. To do so, loosen but do not remove the two screws that secure the cover. Slide the cover to the front until the screw heads clear the keyhole slots in the cover. Then lift the cover out of the cabinet.

WARNING! Damage to a circuit card may result if the next step is not followed.

[ ] 3. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.

[ ] 4. Refer to **Figure 15**, and locate J3 on the Modem circuit card.

- To set the modem to answer on 1 ring, remove the jumper from the two pins of J3. The jumper may be stored on one of the pins. This is the factory setting.
- To set the modem to answer on 5 rings, place the jumper provided on the two pins of J3.

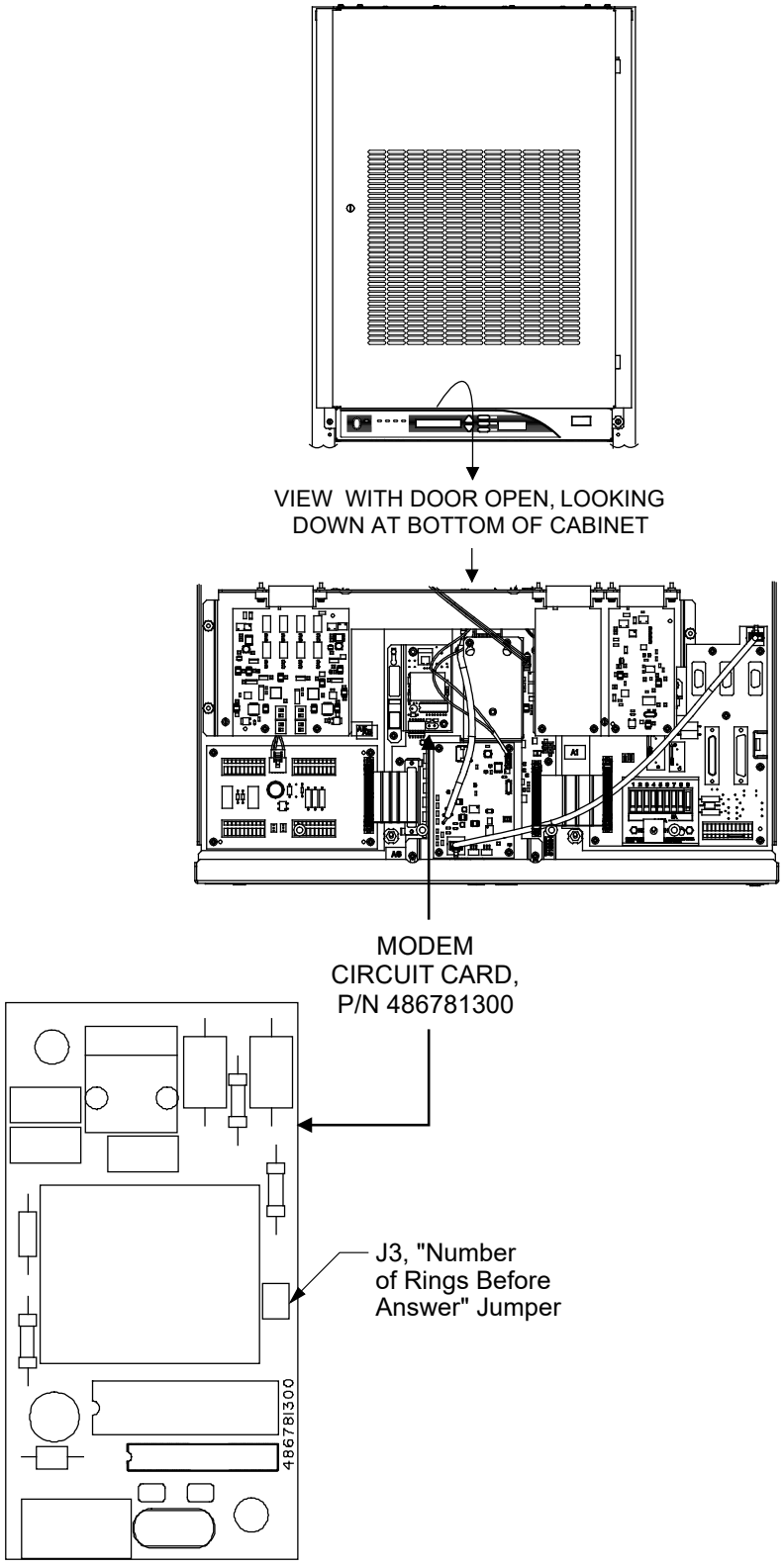
NOTE! *When the MCA modem is set to answer on 5 rings, add the following to the end of the modem initialization string set in WinLink: S7=60.*

[ ] 5. Reinstall the clear plastic cover in the bottom of the cabinet. To do so, place the cover on its two mounting posts so that the mounting screw heads pass through the keyhole slots in the cover. Slide the cover towards the back. Tighten the two screws.

[ ] 6. Remove the grounding wrist strap.

[ ] 7. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

Figure 15: *Modem Circuit Card "Number of Rings before Answer" Jumper Location*



MCA RS-232/Modem Interface Option "Number of Rings Before Answer" Jumper (Main Bay Only)

This jumper is located on the RS 232/Modem circuit card assembly (if furnished). This circuit card is located in the Main Bay Distribution Cabinet.

The placement of this jumper determines the number of rings before the modem answers an incoming telephone call.

Refer to **Figure 16** for jumper location.

Set this jumper per site requirements as described in the following procedure.

Procedure

[ ] 1. Open the Main Bay Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

[ ] 2. Remove the clear plastic panel that covers the circuit cards at the bottom of the cabinet. To do so, loosen but do not remove the two screws that secure the cover. Slide the cover to the front until the screw heads clear the keyhole slots in the cover. Then lift the cover out of the cabinet.

WARNING! Damage to a circuit card may result if the next step is not followed.

[ ] 3. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.

[ ] 4. Refer to **Figure 16**, and locate J3 on the RS 232/Modem circuit card assembly.

- To set the modem to answer on 1 ring, remove the jumper from the pins 1 and 2 of J3. The jumper may be stored on one of the pins.
- To set the modem to answer on 5 rings, place the jumper provided between pins 1 and 2 of J3.

NOTE! *When the MCA modem is set to answer on 5 rings, add the following to the end of the modem initialization string set in WinLink: S7=60.*

[ ] 5. Reinstall the clear plastic cover in the bottom of the cabinet. To do so, place the cover on its two mounting posts so that the mounting screw heads pass through the keyhole slots in the cover. Slide the cover towards the back. Tighten the two screws.

[ ] 6. Remove the grounding wrist strap.

[ ] 7. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

MCA RS-232/Modem Interface Option "RS-232 Port Hardware Handshake" Jumper (Main Bay Only)

This jumper is located on the RS 232/Modem circuit card assembly (if furnished). This circuit card is located in the Main Bay Distribution Cabinet.

The placement of this jumper determines if the RS 232 Port Hardware Handshaking is enabled or disabled.

Refer to **Figure 16** for jumper location.

Set this jumper per site requirements as described in the following procedure. Note that for use with WinLink, Hardware Handshaking is not required.

Procedure

[ ] 1. Open the Main Bay Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

[ ] 2. Remove the clear plastic panel that covers the circuit cards at the bottom of the cabinet. To do so, loosen but do not remove the two screws that secure the cover. Slide the cover to the front until the screw heads clear the keyhole slots in the cover. Then lift the cover out of the cabinet.

WARNING! Damage to a circuit card may result if the next step is not followed.

[ ] 3. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.

[ ] 4. Refer to **Figure 16**, and locate J3 on the RS 232/Modem circuit card assembly.

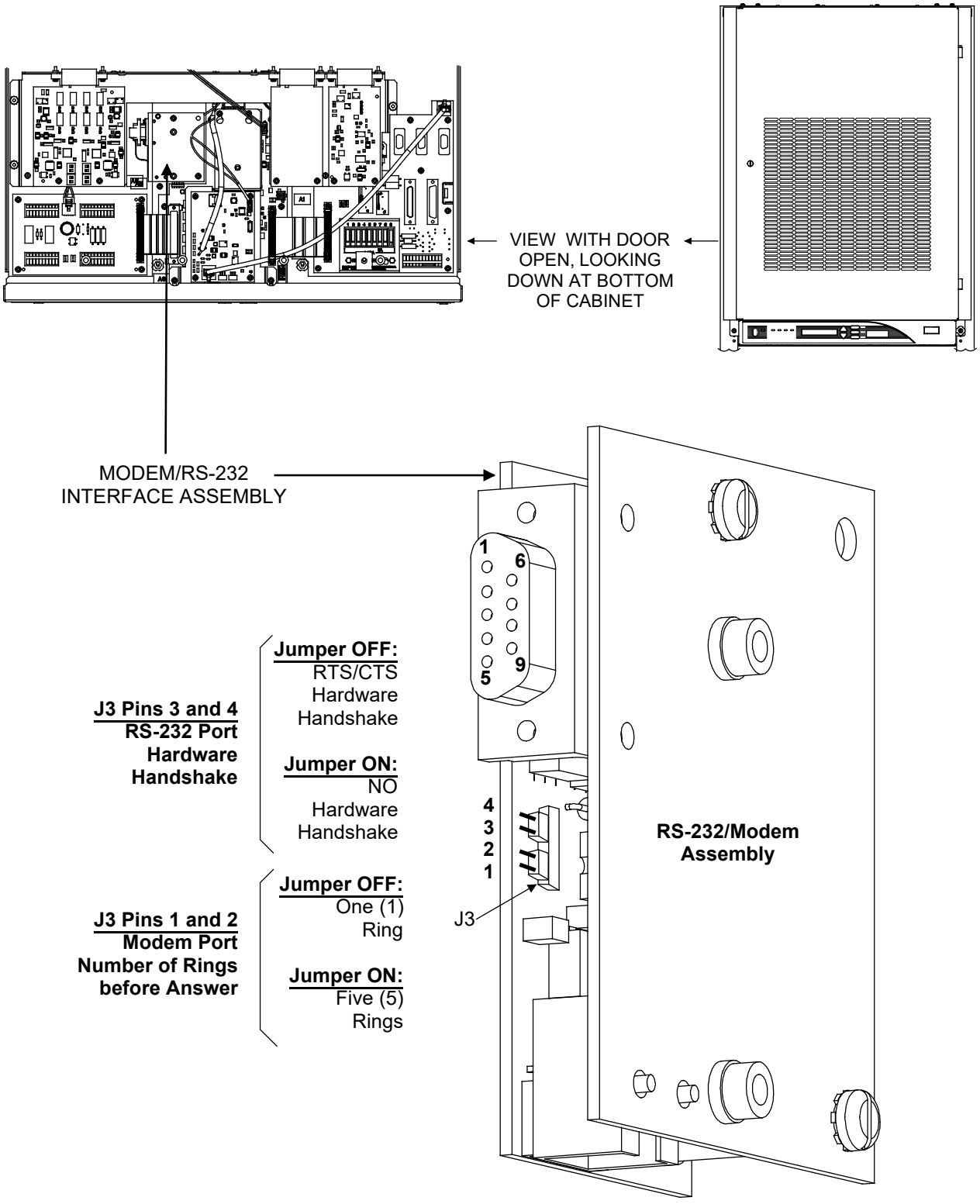
- To enable Hardware Handshaking, remove the jumper from the pins 3 and 4 of J3. The jumper may be stored on one of the pins.
- To disable Hardware Handshaking, place the jumper provided between pins 3 and 4 of J3.

[ ] 5. Reinstall the clear plastic cover in the bottom of the cabinet. To do so, place the cover on its two mounting posts so that the mounting screw heads pass through the keyhole slots in the cover. Slide the cover towards the back. Tighten the two screws.

[ ] 6. Remove the grounding wrist strap.

[ ] 7. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

Figure 16: *RS-232/Modem Circuit Card Assembly "Modem Number of Rings Before Answering" and "RS-232 Port Hardware Handshake" Jumper Locations*



List RD and RE Shunt Monitoring (Shunt POD) Circuit Card Switch Settings

List RD and RE are equipped with a Shunt Monitoring (Shunt POD) Circuit Card, P/N 501981. The MCA is capable of monitoring up to sixteen shunts. The MCA separately identifies shunts connected to system voltage distribution, those connected to subsystem voltage distribution, and those connected to battery. To access the Shunt POD circuit card in a List RD or RE, remove the rear cover from the assembly (shown removed in **Figure 17**). Reinstall cover after switch settings have been checked.

Shunt Capacity Selection Switches

NOTE! *This procedure has been performed at the factory. You may use the procedure to verify the settings or to make adjustments on a replacement circuit card.*

Located on each Shunt POD circuit card P/N 501981 are two switches. These switches allow the Shunt POD circuit card to be used with a variety of shunt sizes. The switches are factory set to match the shunt factory connected to the circuit card. The following procedure is provided to check the factory setting, or to set the switches on a replacement Shunt POD.

Procedure

[ ] 1. Refer to **Figure 17**, and locate Switches S1 and S2 on Shunt POD circuit card P/N 501981.

[ ] 2. Refer to **Table 2**, and set the switches to match the capacity of the shunt connected to this circuit card.

NOTE! *Factory setting of this switch is as follows (2000A/25mV.):*

Switch S2 Section 3: "Open"
Switch S1: "C"

Shunt Pod Identification Switch

NOTE! *This procedure has been performed at the factory. You may use the procedure to verify the settings or to make adjustments on a replacement circuit card.*

Located on each Shunt POD circuit card P/N 501981 is a DIP switch. The settings of two sections of this DIP switch determines how the MCA identifies this Shunt POD (and the shunt connected to it). The Shunt POD can be identified as monitoring system load current, subsystem load current, or battery current. This switch is factory set. The following procedure is provided to check the factory setting, or to set the switch on a replacement Shunt POD. Refer to **Figure 17** for circuit card location and switch identification.

NOTE! *Section 1 of switch S2 is not used in this assembly.*

Procedure

[ ] 1. Refer to **Figure 17**, and locate Switch S2 on Shunt POD circuit card P/N 501981.

[ ] 2. Refer to **Table 3** and set switch S2 for the type of shunt.

NOTE! *Factory setting of these switch sections is for "+ Battery Current".*

Table 2: *Shunt POD Circuit Card P/N 501981 Shunt Capacity Selection Switch Settings*

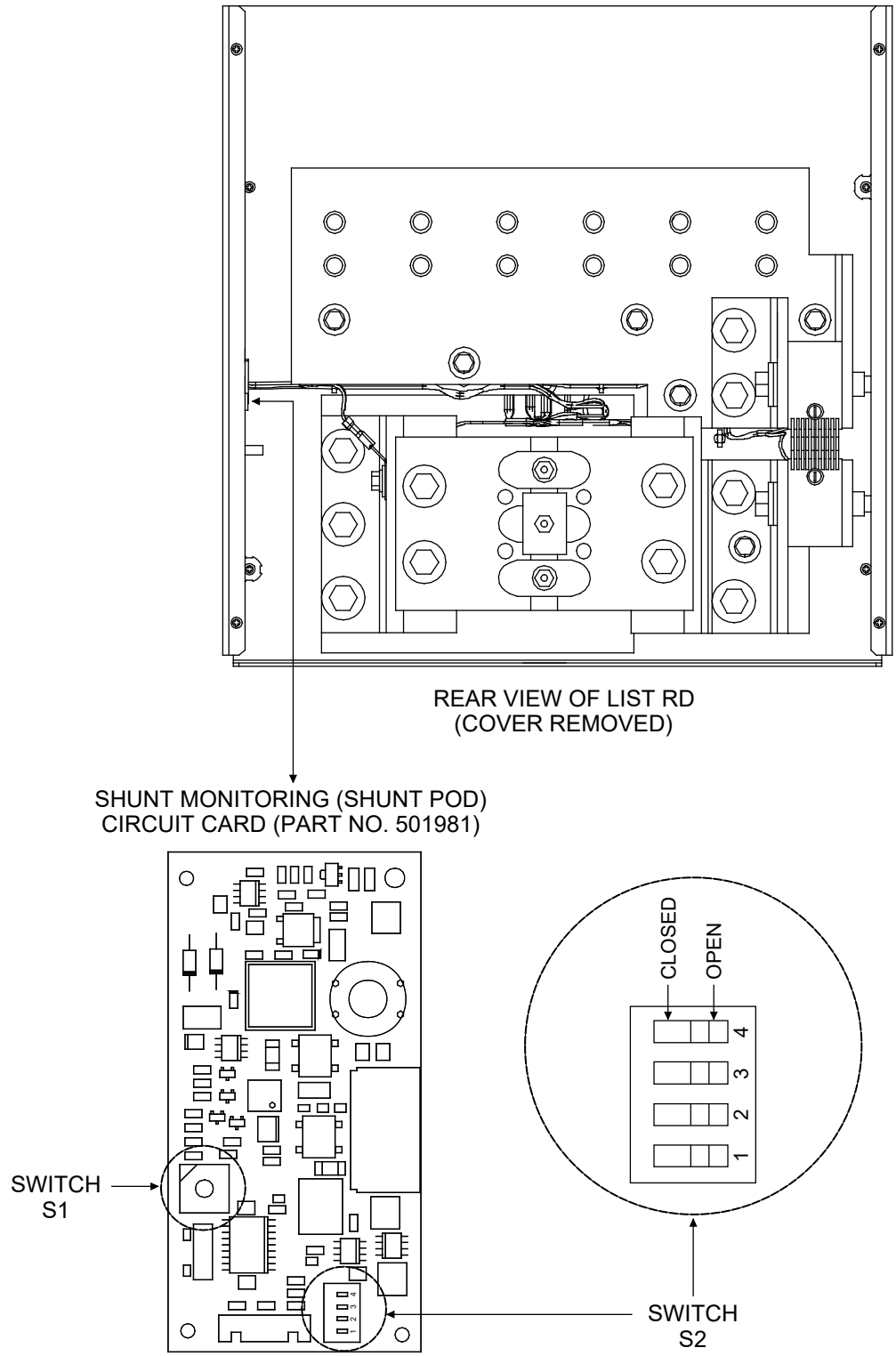
Switch S2 Section 3 Position	Switch S1 Position	25mV. Shunt Capacity	50mV. Shunt Capacity
Open	0	50A	100A
Open	1	100A	200A
Open	2	150A	300A
Open	3	200A	400A
Open	4	250A	500A
Open	5	300A	600A
Open	6	400A	800A
Open	7	500A	1000A
Open	8	600A	1200A
Open	9	800A	1600A
Open	A	1000A	2000A
Open	B	1500A	3000A
Open	C	2000A	4000A
Open	D	2500A	5000A
Open	E	4000A	8000A
Open	F	5000A	10000A

Switch S2 Section 3 Position	Switch S1 Position	25mV. Shunt Capacity	50mV. Shunt Capacity
Closed	0	400A	800A
Closed	1	650A	1300A
Closed	2	1200A	2400A
Closed	3	1250A	2500A
Closed	4	1300A	2600A
Closed	5	1600A	3200A
Closed	6	2000A	4000A
Closed	7	2600A	5200A
Closed	8	3000A	6000A
Closed	9	3750A	7500A
Closed	A	4000A	8000A
Closed	B	5000A	10000A
Closed	C	6000A	12000A
Closed	D	7500A	15000A
Closed	E	8000A	16000A
Closed	F	10000A	20000A

Table 3: *Shunt POD Circuit Card P/N 501981 Shunt Type Identification Switch Settings*

Switch S2		Shunt Type
Section 2	Section 4	
Open	Open	+ Battery Current
Open	Closed	– Battery Current
Closed	Open	System Load Current
Closed	Closed	Subsystem Load Current

Figure 17: *List RD and RE Shunt POD Circuit Card Switch Location*



Rectifier Shelf Interface Circuit Card P/N 535250 Switches S1 and S2 Settings

NOTE! *This procedure has been performed at the factory. You may use the procedure to verify the settings or to make adjustments on a replacement circuit card.*

A Rectifier Shelf Interface circuit card is installed in each bay. Two switches (S1 and S2) are provided on this circuit card. The setting of these switches determines the bays beginning rectifier addressing number.

Refer to **Figure 18** for location of switches S1 and S2 on circuit card P/N 535250.

Set these switches as described in the following procedure.

Procedure

[ ] 1. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

[ ] 2. Remove the clear plastic panel that covers the circuit cards at the bottom of the cabinet. To do so, loosen but do not remove the two screws that secure the cover. Slide the cover to the front until the screw heads clear the keyhole slots in the cover. Then lift the cover out of the cabinet.

WARNING! Damage to a circuit card may result if the next step is not followed.

[ ] 3. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.

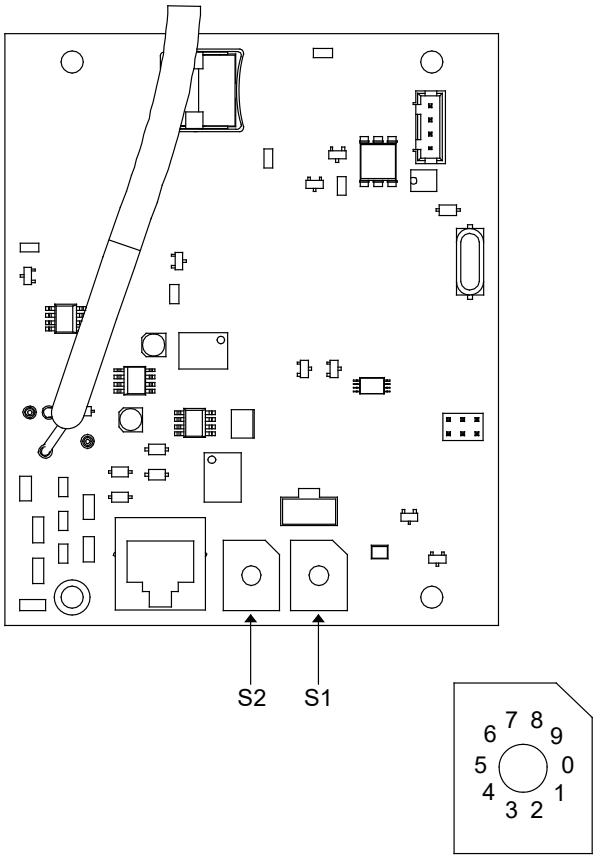
[ ] 4. Refer to **Figure 18**, and locate switches S1 and S2 on the Rectifier Shelf Interface circuit card. Set the switches in the main bay as follows: set switch S2 to 0 and switch S1 to 1 (this sets rectifier addressing in this bay starting at 01). Set the switches in the supplemental bay as follows: set switch S2 to 4 and switch S1 to 1 (this sets rectifier addressing in this bay starting at 41). Note that when a rectifier is replaced with a new rectifier, it is initially assigned the next available address respective to that bay. You then are prompted to replace the new rectifier with the old address. That is why rectifier addressing in the supplemental bay starts at 41 instead of 37.

[ ] 5. Reinstall the clear plastic cover in the bottom of the cabinet. To do so, place the cover on its two mounting posts so that the mounting screw heads pass through the keyhole slots in the cover. Slide the cover towards the back. Tighten the two screws.

[ ] 6. Remove the grounding wrist strap.

[ ] 7. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

Figure 18: *Rectifier Shelf Interface Circuit Card P/N 535250 Switches S1 and S2 Location*



MAKING ELECTRICAL CONNECTIONS

DANGER! INSTALLERS MUST FOLLOW APPROVED SAFETY PROCEDURES.

This system operates from AC voltage capable of producing fatal electrical shock. AC input power must be completely disconnected from the branch circuits wiring used to provide power to the system before any electrical connections are made. DO NOT apply AC power to the system until all electrical connections have been completed and checked.

This system may also require connection to battery. Although battery voltage is not hazardously high, the battery can deliver large amounts of current. Exercise extreme caution not to inadvertently contact or allow any tool inadvertently contact a battery terminal or exposed wire connected to a battery terminal. NEVER allow a metal object, such as a tool, to contact more than one termination at a time, or to simultaneously contact a termination and a grounded object. Even a momentary short circuit can cause explosion and injury. Remove watches, rings, or other jewelry before connecting battery leads. Make the DC (battery) connections last. Make all other electrical connections without DC input power applied to the system.

Wiring Considerations

For wire size, branch circuit protection, crimp lug, and general wiring recommendations; refer to System Application Guide SAG581126000. The SAG can be accessed from the CD (Electronic Documentation Package) furnished with your system.

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

Relay Rack Grounding Connection (Frame Ground)

NOTE! *Refer to System Application Guide SAG581126000 for crimp lugs. Refer to drawing 031110100 for lug crimping information. Refer to drawings 031110200 and 031110300 for additional lug information. The SAG and Engineering Drawings can be accessed from the CD (Electronic Documentation Package) furnished with your system. A copy of drawings 031110100, 031110200, and 031110300 are also located in the hardcopy INSTALLATION MANUAL for your convenience.*

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

A customer's grounding network lead can be attached to the top of each relay rack. Provision is made 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.

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).*

AC Input and AC Input Equipment Grounding Connections

NOTE! *Refer to System Application Guide SAG581126000 and Power Data Sheet PD588705100 for recommended wire size and branch circuit protection. These can be accessed from the CD (Electronic Documentation Package) furnished with your system.*

Connections to Module Mounting Shelves

Spec. Nos. 588705101, 588705102, 588705103, and 588705104 Module Mounting Shelf Assemblies provide a separate AC input connection for each Rectifier Module (PCU). Circular openings are provided in the side panels (side feed) and rear covers (rear feed) of the Module Mounting Shelf for AC input and AC input equipment-grounding conductors. The openings accept 3/4" inch conduit fittings. AC input wiring should be provided to all mounting positions intended for rectifier modules (PCUs), including currently unused positions. This wiring will ease future installation of Rectifier Modules to meet increased load requirements.

NOTE! *An equipment-grounding conductor must be provided with the AC input wiring in each conduit.*

Procedure

Refer to ***Figure 19*** *as these procedures are performed.*

NOTE! *Repeat the following procedures for each Module Mounting Shelf in the Module Mounting Assembly installed in the Power System.*

Accessing Connections and Routing Wire

[ ] 1. Remove the two AC Input Access Covers from the rear of the Rectifier Module Mounting Shelf by first removing the screws that secure them.

[ ] 2. Install conduit fittings in the side or rear openings as required. Plug buttons are provided, and must be installed in the openings not being used.

[ ] 3. Route wiring into the shelf through the previously installed conduit fittings.

Making AC Input Connections

NOTE! *In each shelf, module mounting positions are lettered left to right as viewed from the front of the shelf, A-D in the top row and E-H in the bottom row.*

NOTE! *If module mounting positions B, C, F, and G are intended for DC-DC Converter installation (Converter Option must be installed), AC input connections to these positions are not required.*

Make AC input connections as shown in **Table 4**.

[ ] 1. Connect each wire by inserting the stripped end into the wire opening, and then tightening the screw. Recommended torque is 10 in-lbs.

Table 4: *AC Input Connections to Module Mounting Shelf*

<table>
<tr><th colspan="12">Module Mounting Shelf</th></tr>
<tr><th colspan="5">Left Side as Viewed from Rear</th><td rowspan="3">208/240 VAC Service Type:
• Line to Line:
Connect Line 1 to Terminal 1.
Connect Line 2 to Terminal 2.
• Line to Neutral:
Connect Line to Terminal 1.
Connect Neutral to Terminal 2.</td><th colspan="5">Right Side as Viewed from Rear</th></tr>
<tr><th colspan="2">TB4</th><th></th><th colspan="2">TB3</th><th colspan="2">TB2</th><th></th><th colspan="2">TB1</th></tr>
<tr><td>1</td><td rowspan="2">D</td><td rowspan="4"></td><td>1</td><td rowspan="2">C</td><td rowspan="2">B</td><td>1</td><td rowspan="4"></td><td rowspan="2">A</td><td>1</td></tr>
<tr><td>2</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>1</td><td rowspan="2">H</td><td>1</td><td rowspan="2">G</td><td rowspan="2">F</td><td>1</td><td rowspan="2">E</td><td>1</td></tr>
<tr><td>2</td><td>2</td><td>2</td><td>2</td></tr>
</table>

Making AC Equipment Grounding Connections

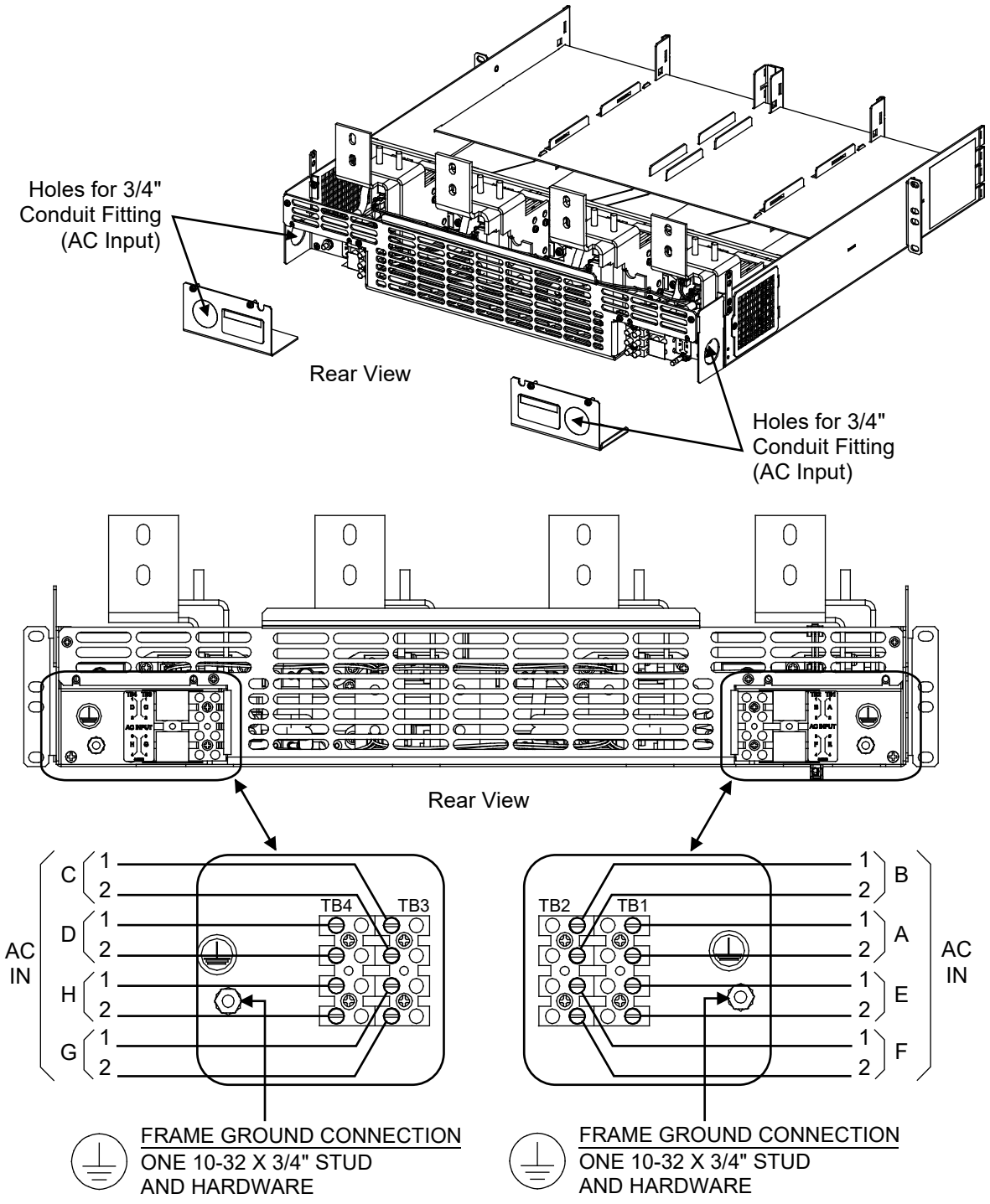
NOTE! *Make equipment grounding connections to earth ground, not to the branch circuit neutral conductor.*

[ ] 1. Connect AC input equipment grounding leads to the frame ground studs using installer-provided ring lugs and factory-supplied mounting hardware. Recommended torque is 23 in-lbs.

Reinstalling Covers

[ ] 1. After all AC input and equipment grounding connections have been made and checked, reinstall the two AC Input Access Covers on the back of the shelf. Secure with the previously removed screws.

Figure 19: *AC Input and Equipment Grounding Connections to Module Mounting Shelf*



Note: Module mounting positions are lettered left to right as viewed from front of shelf, A-D in top row and E-H in bottom row.

Note: If mounting positions B, C, F, and G are intended for DC-DC Converter installation (Converter Option must be installed), AC input connections to these positions are not required.

External Alarm, Reference, and Control Connections

NOTE! *For recommended wire size and alarm relay contact ratings, refer to System Application Guide SAG581126000. The SAG can be accessed from the CD (Electronic Documentation Package) furnished with your system.*

All external alarm, reference and control connections to the power system are made within the Main Bay Distribution Cabinet.

If List 71 Audible Alarm/Alarm Termination Circuit Card is NOT Provided

Connect external alarm, reference, and control conductors to connector J8 on the MCA Main Controller circuit card P/N 534868 and to terminal block TB1 on the Interconnect/LVD Inhibit circuit card P/N 509532. Refer to **Figure 20** for connector location and identification, and **Figure 21** and **Figure 22A** through **Figure 22D** for connector pinout information. A pre-assembled cable is provided for connections to J8. One end connects to J8, the other end contains stripped leads suitable for splicing to customer wiring. The furnished cable is 15 ft. long. A 60 ft. long cable is available. Refer to SAG581126000 for cable part numbers.

NOTE! *Remote Test/Equalize, Remote High Voltage Shutdown and Restart, and Rectifier Module Emergency Shutdown and Fire Alarm Disconnect connections can be made to J8 on the MCA Main Controller circuit card or to TB1 located on Interconnect/LVD Inhibit circuit card.*

If List 71 Audible Alarm/Alarm Termination Circuit Card IS Provided

List 71 provides an Audible Alarm/Alarm Termination circuit card (P/N 509539) inside the Main Bay Distribution Cabinet. Make alarm connections to terminal blocks J1 through J4 on this circuit card. Terminal block J4 on the Alarm Termination circuit card is internally interconnected (via the relays on the circuit card) to the external major and minor alarm circuits of the optional Converter Modules. Refer to **Figure 20** for connector location and identification, and **Figure 21** and **Figure 22A** through **Figure 22D** for connector pinout information. Also make external reference and control connections to terminal block TB1 on the Interconnect/LVD Inhibit circuit card P/N 509532 as described above.

To Access All External Alarm, Reference and Control Connections

[ ] 1. Open the front door of the Main Bay Distribution Cabinet by turning and holding the captive fastener in the counterclockwise position.

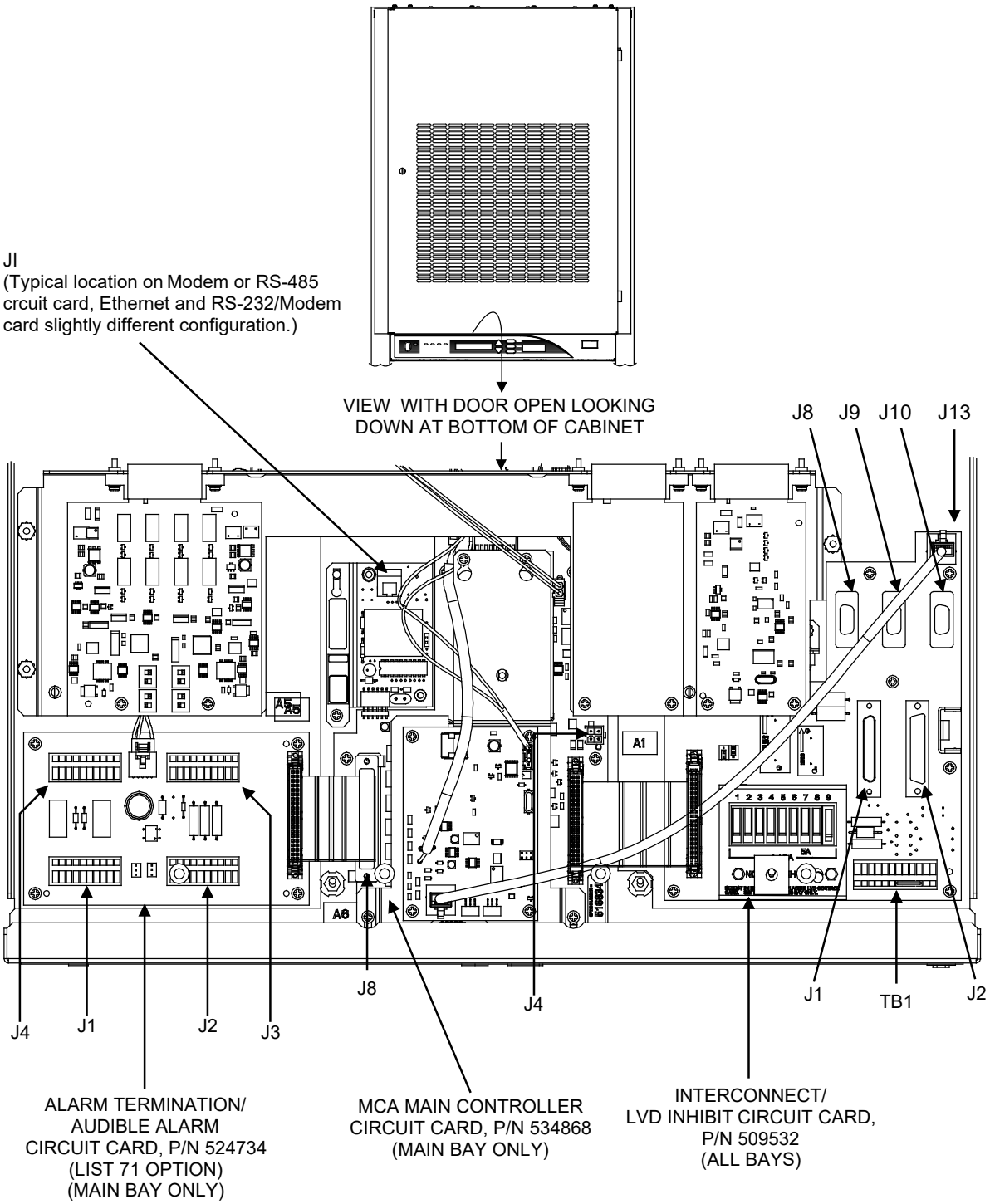
[ ] 2. Remove the clear plastic panel that covers the circuit cards at the bottom of the cabinet. To do so, loosen but do not remove the two screws that secure the cover. Slide the cover to the front until the screw heads clear the keyhole slots in the cover. Then lift the cover out of the cabinet.

After Completing All External Alarm, Reference and Control Connections

[ ] 1. Reinstall the clear plastic cover in the bottom of the cabinet. To do so, place the cover on its two mounting posts so that the mounting screw heads pass through the keyhole slots in the cover. Slide the cover towards the back. Tighten the two screws.

[ ] 2. Close the Main Bay Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

Figure 20: *External Alarm, Reference, and Control Connector Location and Identification*



Battery Charge Digital Temperature Compensation Probe or TXM (Multiple Probe Concentrator Module) Connection (if required)

Procedure

[ ] 1. If furnished, connect the Battery Charge Digital Temperature Compensation Probe or TXM (multiple probe concentrator module) to connector J4 located on the MCA Main Controller circuit card in the Main Bay Distribution Cabinet. Refer to **Figure 20** for location of J4.

[ ] 2. If using a TXM module, complete the remaining electrical connections to the module per Section 5940. Section 5940 can be found in the hardcopy *Power System Installation Manual*, and on the CD (Electronic Documentation Package) furnished with your system.

Connections to Terminal Block TB1 on Interconnect/LVD Inhibit Circuit Card P/N 509532

Terminal block TB1 is located inside the Main Bay Distribution Cabinet on Interconnect/LVD Inhibit circuit card P/N 509532. Refer to **Figure 20** for connector location, and **Figure 21** for connector pinouts.

TB1 provides spring-clamp type terminals for customer connections. To connect wire, strip approximately 1/4 inch of insulation from the wire end. Fully insert the bare wire end into the rectangular opening in the terminal block. Gently tug on the wire to ensure that it cannot be pulled out of the terminal block. (Wire may be removed from the terminal block by inserting a small flat-blade screwdriver into the square cavity directly behind the wire, then depressing the screwdriver until the wire is released and can be pulled out of the terminal block.)

NOTE! *A P/N 509532 circuit card is located in each Distribution Cabinet. Unless otherwise specified in these instructions, only make connections to TB1 on the circuit card located in the Main Bay Distribution Cabinet (the one connected to the MCA).*

Procedure

[ ] 1. Remote Test/Equalize: Customer furnished system ground applied to terminal 1 of TB1 places all Rectifier Modules into the test/equalize mode of operation. Removal of the signal places all Rectifier Modules into the float mode of operation.

NOTE! *This connection can also be made to same terminal on any other Interconnect/LVD Inhibit circuit card that may be connected to this circuit card.*

[ ] 2. External System Voltage Meter Reading: If desired, extend external system voltage meter reading leads from the voltage source to be read to terminals 2 (battery) and 3 (return) of TB1. This is the voltage source the MCA monitors for system alarms and displays as "System Output Voltage".

WARNING! Equipment damage may result if leads are connected to the wrong terminals of TB1.

NOTE! *Ensure the Internal/External System Voltage Meter Reading circuit card on Interconnect/LVD Inhibit circuit card P/N 509532 is in the EXT position, as previously described in "Setting Wiring Options".*

NOTE! *System Voltage Meter Reading leads are factory connected to the cabinet's output busbars when Internal/External Voltage System Voltage Meter Reading circuit card located on Interconnect/LVD Inhibit circuit card P/N 509532 is in the INT position, as previously described in "Setting Wiring Options".*

NOTE! *This connection **cannot** be made to same terminals on any other Interconnect/LVD Inhibit circuit card that may be connected to this circuit card.*

[ ] 3. External Voltage Sensing: If desired, extend external voltage sensing leads from the battery or other voltage sense location to terminals 4 (positive) and 5 (negative) of TB1. The external voltage sensing leads should be fused at 1-1/3 amperes.

WARNING! Equipment damage may result if leads are connected to the wrong terminals of TB1.

NOTE! *Ensure the Internal/External Voltage Sensing circuit card located on Interconnect/LVD Inhibit circuit card P/N 509532 is in the EXT position, as previously described in "Setting Wiring Options".*

NOTE! *External voltage sensing lead connections must be made to the SYSTEM side of any battery protective or disconnect devices present.*

NOTE! *Sense leads are factory connected to the cabinet's output busbars when Internal/External Voltage Sensing circuit card located on Interconnect/LVD Inhibit circuit card P/N 509532 is in the INT position, as previously described in "Setting Wiring Options".*

NOTE! *This connection **cannot** be made to same terminals on any other Interconnect/LVD Inhibit circuit card that may be connected to this circuit card.*

[ ] 4. Internally Fused Voltage Source: Terminal 7 of TB1 on Interconnect/LVD Inhibit circuit card P/N 509532 is internally connected to 5 ampere fuse F7 located on the same circuit card. This fuse is connected to system output. Terminal 6 of TB1 on the same circuit card is provided for the return connection. These terminals are not used in this system.

[ ] 5. Emergency Shutdown and Fire Alarm Disconnect: Customer furnished system ground applied to terminal 10 of TB1 inhibits all Rectifier Modules.

If low voltage disconnect is furnished and is also to be controlled by the emergency shutdown and fire alarm disconnect switch, connect an external Form-C Emergency Stop switch to TB1 as follows: Connect the normally close contacts between TB1-8 and TB1-9. Connect the normally open contacts between TB1-9 and TB1-10. Activating the switch inhibits all Rectifier Modules, and disconnects the battery and system output from the controlled load(s).

NOTE! *If low voltage disconnect is furnished and an emergency stop switch is not required, for proper low voltage disconnect operation, jumper TB1-8 to TB1-9.*

NOTE! *Remove any jumpers from TB1-8, 9, and 10 on all other Interconnect/LVD Inhibit circuit cards that may be connected to this circuit card.*

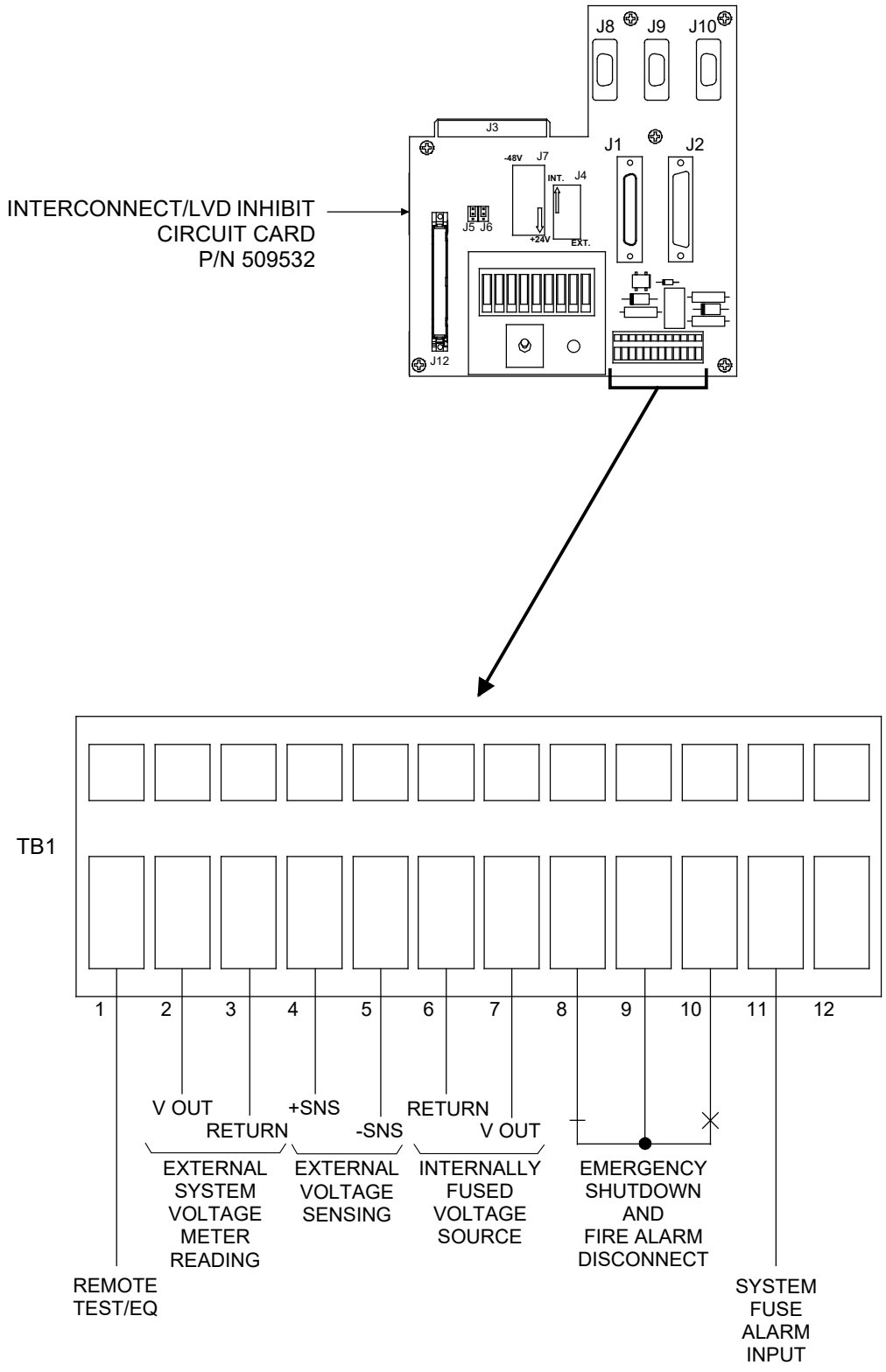
NOTE! *This connection can also be made to same terminals on any other Interconnect/LVD Inhibit circuit card that may be connected to this circuit card.*

[ ] 6. System Fuse Alarm Input: The system fuse alarm circuit activates when a ±18 to 60 volts DC signal is applied to terminal 11 of TB1.

NOTE! *This connection can also be made to same terminal on any other Interconnect/LVD Inhibit circuit card that may be connected to this circuit card.*

[ ] 7. Terminal 12 is not used.

Figure 21: *External Reference and Control Connections to TB1*



Connections to J8 on MCA Main Controller Circuit Card P/N 534868
(if List 71 Audible Alarm/Alarm Termination Circuit Card is NOT Provided)

Connector J8 on the MCA Main Controller circuit card is a subminiature D-type connector. Refer to **Figure 20** for connector location, and **Figure 22A** through **Figure 22D** for connector pinouts.

A 15' color-coded pre-assembled cable is furnished (an optional 60 ft. cable is also available). Refer to SAG581126000 for cable part numbers. This cable connects to J8 on the MCA Main Controller circuit card and provides leads that can be spliced to customer leads. Splice these leads as described below. The color scheme for this cable is shown in **Figure 22A** through **Figure 22D**. This wire harness cannot be used when List 71 Audible Alarm/Alarm Termination circuit card is connected to J8 on the MCA Main Controller circuit card.

MCA External Alarm Relay Contacts: The MCA provides 9 Form-C alarm relay contacts (available at J8 on the MCA Main Controller circuit card or J1-J4 on the optional List 71 Audible Alarm/Alarm Termination circuit card). The configuration of these alarm relays is determined by the MCA Configuration Number set in your system. You can determine the MCA Configuration Number by the List Number of the MCA (located on the Power System's nameplate). You can also view your system's MCA Configuration Number after power-up by following the MCA Menu Tree (Section 6022) (MCA Menu Tree Line Item "SPECNO#########" in the 'Inventory Menu').

NOTE! *Do not apply voltages higher than 42.4 volts AC (peak) or 60 volts DC to the MCA external alarm relay terminals.*

If Equipped with List 10 MCA (Configuration Number 534876)

Refer to **Figure 22A**.

[ ] 1. Remote High Voltage Shutdown and Restart: Customer furnished system ground applied to terminal 8 of J8 activates the internal high voltage shutdown and restart circuit on all Rectifier Modules.

[ ] 2. Emergency Shutdown and Fire Alarm Disconnect: Customer furnished system ground applied to terminal 9 of J8 (or terminal 10 of TB1 on Interconnect/LVD Inhibit circuit card P/N 509532) inhibits all Rectifier Modules.

If low voltage disconnect is furnished and is also to be controlled by the emergency shutdown and fire alarm disconnect switch, use the terminals of TB1 on Interconnect/LVD Inhibit circuit card P/N 509532 as previously described.

[ ] 3. Remote Test/Equalize: Customer furnished system ground applied to terminal 10 of J8 (or terminal 1 of TB1 on Interconnect/LVD Inhibit circuit card P/N 509532) places all Rectifier Modules into the test/equalize mode of operation. Removal of the signal places all Rectifier Modules into the float mode of operation.

[ ] 4. Major Alarm (Relay K1): During an alarm condition, a closed loop circuit is provided between terminals 30 and 31 of J8, and an open loop circuit is provided between terminals 29 and 30 of J8.

[ ] 5. Minor Alarm (Relay K2): During an alarm condition, a closed loop circuit is provided between terminals 12 and 13 of J8, and an open loop circuit is provided between terminals 11 and 12 of J8.

[ ] 6. High Voltage Alarm 1 (Relay K3): During an alarm condition, a closed loop circuit is provided between terminals 26 and 27 of J8, and an open loop circuit is provided between terminals 27 and 28 of J8.

[ ] 7. **High Voltage Alarm 2 (Relay K4):** During an alarm condition, a closed loop circuit is provided between terminals 14 and 15 of J8, and an open loop circuit is provided between terminals 15 and 16 of J8.

[ ] 8. **Battery On Discharge Alarm (Relay K5):** During an alarm condition, a closed loop circuit is provided between terminals 23 and 24 of J8, and an open loop circuit is provided between terminals 24 and 25 of J8.

[ ] 9. **50% Battery On Discharge Alarm (Relay K6):** During an alarm condition, a closed loop circuit is provided between terminals 17 and 18 of J8, and an open loop circuit is provided between terminals 18 and 19 of J8.

[ ] 10. **AC Fail Alarm (Relay K7):** During an alarm condition, a closed loop circuit is provided between terminals 21 and 22 of J8, and an open loop circuit is provided between terminals 20 and 21 of J8.

[ ] 11. **MCA Audible Alarm (Relay K8):** During an alarm condition, a closed loop circuit is provided between terminals 32 and 33 of J8, and an open loop circuit is provided between terminals 33 and 34 of J8.

[ ] 12. **Test/Equalize (Relay K9):** When the system is placed in the test/equalize mode (locally or remotely), a closed loop circuit is provided between terminals 35 and 36 of J8, and an open loop circuit is provided between terminals 36 and 37 of J8.

[ ] 13. **System Ground:** System ground is supplied at terminal 4 of J8 for connection into customer's alarm circuits, if required.

Figure 22A: *External Alarm, Reference and Control Connections to J8 on MCA Main Controller Circuit Card P/N 534868 when Power System is Equipped with LIST 10 MCA (Configuration Spec. No. 534876) (if no List 71)*

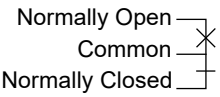
Alarm or Control	J8 Pin	Mating Harness Wire Colors [5]
Test/ Equalize (Relay K9) [2]	37	Blue/Black
	36	Violet/Black
	35	Slate/Green
MCA Audible Alarm (Relay K8) [3]	34	Slate/Red
	33	Lt. Blue/Green
	32	Lt. Blue/Blue
Major Alarm (Relay K1) [3]	31	Lt. Blue/Red
	30	Lt. Blue/Black
	29	Lt. Blue
High Voltage Alarm 1 (Relay K3) [2]	28	Pink/Green
	27	Pink/Blue
	26	Pink/Red
Battery On Discharge Alarm (Relay K5) [2]	25	Pink/Black
	24	Slate/Black
	23	Green/Black
AC Fail Alarm (Relay K7) [2]	22	Yellow/Black
	21	Orange/Black
	20	Red/Black

J8 ON MCA

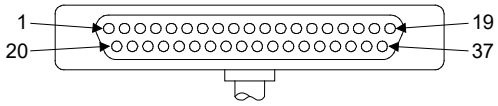
37 19

20 1

Mating Harness Wire Colors [5]	J8 Pin	Alarm or Control
Violet/White	19	50% Battery On Discharge Alarm (Relay K6) [2]
Blue/White	18	
Green/White	17	
Orange/White	16	High Voltage Alarm 2 (Relay K4) [2]
Red/White	15	
Brown/White	14	
Black/White	13	Minor Alarm (Relay K2) [2]
Lt. Green	12	
Pink	11	
White	10	Remote Test/Equalize [4]
Slate	9	Rectifier Module Emergency Shutdown [4]
Violet	8	Remote HVSD
Blue	7	(Not Used)
Green	6	(Not Used)
Yellow	5	(Not Used)
Orange	4	System Ground
Red	3	(Not Used)
Brown	2	(Not Used)
Black	1	(Not Used)



RELAY CONTACT LEGEND



FRONT VIEW OF PLUG ON MATING HARNESS

Notes:

1. "Normally open" and "normally closed" refer to contact state with relay de-energized. All relays are shown de-energized. See Notes 2 and 3 for relay state during alarm condition.
2. These relays are de-energized during normal operation, and energized during an alarm condition.
3. These relays are energized during normal operation, and de-energized during an alarm condition.
4. These connections can be made at J8 or at TB1 on Interconnect/LVD Inhibit circuit card P/N 509532 located within the Distribution Assembly.
5. Mating Harness Wire Colors apply to standard wire harness P/N 514327 (15 ft.) or accessory wire harness P/N 514380 (60 ft.).

CAUTION! All wires in the mating wire harness may be connected within the cabinet. Shorting or grounding of unused wires may result in service interruption or equipment damage. Therefore, insulate all wire ends not being used in your application.

If Equipped with List 11 MCA (Configuration Number 534877)

Refer to **Figure 22B**.

[ ] 1. Remote High Voltage Shutdown and Restart: Customer furnished system ground applied to terminal 8 of J8 activates the internal high voltage shutdown and restart circuit on all Rectifier Modules.

[ ] 2. Emergency Shutdown and Fire Alarm Disconnect: Customer furnished system ground applied to terminal 9 of J8 (or terminal 10 of TB1 on Interconnect/LVD Inhibit circuit card P/N 509532) inhibits all Rectifier Modules.

If low voltage disconnect is furnished and is also to be controlled by the emergency shutdown and fire alarm disconnect switch, use the terminals of TB1 on Interconnect/LVD Inhibit circuit card P/N 509532 as previously described.

[ ] 3. Remote Test/Equalize: Customer furnished system ground applied to terminal 10 of J8 (or terminal 1 of TB1 on Interconnect/LVD Inhibit circuit card P/N 509532) places all Rectifier Modules into the test/equalize mode of operation. Removal of the signal places all Rectifier Modules into the float mode of operation.

[ ] 4. Major Alarm (Relay K1): During an alarm condition, a closed loop circuit is provided between terminals 30 and 31 of J8, and an open loop circuit is provided between terminals 29 and 30 of J8.

[ ] 5. Minor Alarm (Relay K2): During an alarm condition, a closed loop circuit is provided between terminals 12 and 13 of J8, and an open loop circuit is provided between terminals 11 and 12 of J8.

[ ] 6. High Voltage Alarm 1 (Relay K3): During an alarm condition, a closed loop circuit is provided between terminals 26 and 27 of J8, and an open loop circuit is provided between terminals 27 and 28 of J8.

[ ] 7. Rectifier Module Fail Major Alarm (Relay K4): During an alarm condition, a closed loop circuit is provided between terminals 14 and 15 of J8, and an open loop circuit is provided between terminals 15 and 16 of J8.

[ ] 8. Battery On Discharge Alarm (Relay K5): During an alarm condition, a closed loop circuit is provided between terminals 23 and 24 of J8, and an open loop circuit is provided between terminals 24 and 25 of J8.

[ ] 9. Rectifier Module Fail Alarm (Relay K6): During an alarm condition, a closed loop circuit is provided between terminals 17 and 18 of J8, and an open loop circuit is provided between terminals 18 and 19 of J8.

[ ] 10. AC Fail Alarm (Relay K7): During an alarm condition, a closed loop circuit is provided between terminals 21 and 22 of J8, and an open loop circuit is provided between terminals 20 and 21 of J8.

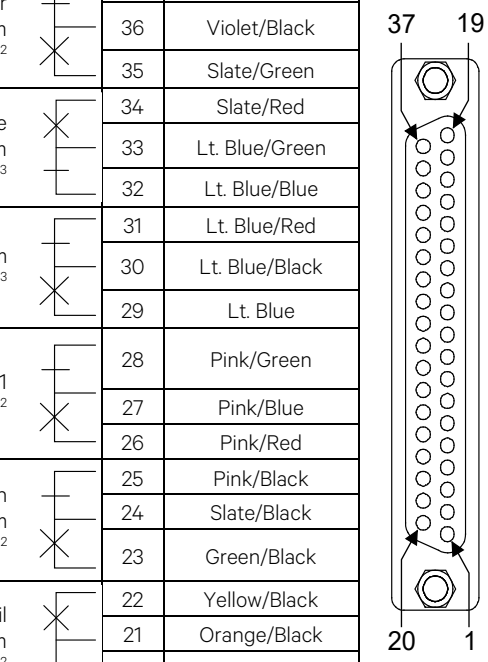
[ ] 11. MCA Audible Alarm (Relay K8): During an alarm condition, a closed loop circuit is provided between terminals 32 and 33 of J8, and an open loop circuit is provided between terminals 33 and 34 of J8.

[ ] 12. Fuse/Circuit Breaker Alarm (Relay K9): During an alarm condition, a closed loop circuit is provided between terminals 35 and 36 of J8, and an open loop circuit is provided between terminals 36 and 37 of J8.

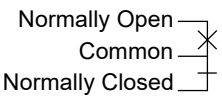
[ ] 13. **System Ground:** System ground is supplied at terminal 4 of J8 for connection into customer's alarm circuits, if required.

Figure 22B: *External Alarm, Reference and Control Connections to J8 on MCA Main Controller Circuit Card P/N 534868 when Power System is Equipped with LIST 11 MCA (Configuration Spec. No. 534877) (if no List 71)*

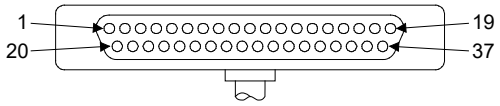
Alarm or Control	J8 Pin	Mating Harness Wire Colors [5]
Fuse/Circuit Breaker Alarm (Relay K9) [2]	37	Blue/Black
	36	Violet/Black
	35	Slate/Green
MCA Audible Alarm (Relay K8) [3]	34	Slate/Red
	33	Lt. Blue/Green
	32	Lt. Blue/Blue
Major Alarm (Relay K1) [3]	31	Lt. Blue/Red
	30	Lt. Blue/Black
	29	Lt. Blue
High Voltage Alarm 1 (Relay K3) [2]	28	Pink/Green
	27	Pink/Blue
	26	Pink/Red
Battery On Discharge Alarm (Relay K5) [2]	25	Pink/Black
	24	Slate/Black
	23	Green/Black
AC Fail Alarm (Relay K7) [2]	22	Yellow/Black
	21	Orange/Black
	20	Red/Black



Mating Harness Wire Colors [5]	J8 Pin	Alarm or Control
Violet/White	19	Rectifier Module Fail Alarm (Relay K6) [2]
Blue/White	18	
Green/White	17	
Orange/White	16	Rectifier Module Fail Major Alarm (Relay K4) [2]
Red/White	15	
Brown/White	14	
Black/White	13	Minor Alarm (Relay K2) [2]
Lt. Green	12	
Pink	11	
White	10	Remote Test/Equalize [4]
Slate	9	Rectifier Module Emergency Shutdown [4]
Violet	8	Remote HVSD
Blue	7	(Not Used)
Green	6	(Not Used)
Yellow	5	(Not Used)
Orange	4	System Ground
Red	3	(Not Used)
Brown	2	(Not Used)
Black	1	(Not Used)



RELAY CONTACT LEGEND



FRONT VIEW OF PLUG ON MATING HARNESS

Notes:

1. "Normally open" and "normally closed" refer to contact state with relay de-energized. All relays are shown de-energized. See Notes 2 and 3 for relay state during alarm condition.
2. These relays are de-energized during normal operation, and energized during an alarm condition.
3. These relays are energized during normal operation, and de-energized during an alarm condition.
4. These connections can be made at J8 or at TB1 on Interconnect/LVD Inhibit circuit card P/N 509532 located within the Distribution Assembly.
5. Mating Harness Wire Colors apply to standard wire harness P/N 514327 (15 ft.) or accessory wire harness P/N 514380 (60 ft.).

CAUTION! All wires in the mating wire harness may be connected within the cabinet. Shorting or grounding of unused wires may result in service interruption or equipment damage. Therefore, insulate all wire ends not being used in your application.

If Equipped with List 12 MCA (Configuration Number 534878)

Refer to **Figure 22C**.

[ ] 1. Remote High Voltage Shutdown and Restart: Customer furnished system ground applied to terminal 8 of J8 activates the internal high voltage shutdown and restart circuit on all Rectifier Modules.

[ ] 2. Emergency Shutdown and Fire Alarm Disconnect: Customer furnished system ground applied to terminal 9 of J8 (or terminal 10 of TB1 on Interconnect/LVD Inhibit circuit card P/N 509532) inhibits all Rectifier Modules.

If low voltage disconnect is furnished and is also to be controlled by the emergency shutdown and fire alarm disconnect switch, use the terminals of TB1 on Interconnect/LVD Inhibit circuit card P/N 509532 as previously described.

[ ] 3. Remote Test/Equalize: Customer furnished system ground applied to terminal 10 of J8 (or terminal 1 of TB1 on Interconnect/LVD Inhibit circuit card P/N 509532) places all Rectifier Modules into the test/equalize mode of operation. Removal of the signal places all Rectifier Modules into the float mode of operation.

[ ] 4. Major Alarm (Relay K1): During an alarm condition, a closed loop circuit is provided between terminals 30 and 31 of J8, and an open loop circuit is provided between terminals 29 and 30 of J8.

[ ] 5. Minor Alarm (Relay K2): During an alarm condition, a closed loop circuit is provided between terminals 11 and 12 of J8, and an open loop circuit is provided between terminals 12 and 13 of J8.

[ ] 6. High Voltage Alarm 1 (Relay K3): During an alarm condition, a closed loop circuit is provided between terminals 27 and 28 of J8, and an open loop circuit is provided between terminals 26 and 27 of J8.

[ ] 7. MCA Fail Alarm (Relay K4): During an alarm condition, a closed loop circuit is provided between terminals 15 and 16 of J8, and an open loop circuit is provided between terminals 14 and 15 of J8.

[ ] 8. Battery On Discharge Alarm (Relay K5): During an alarm condition, a closed loop circuit is provided between terminals 24 and 25 of J8, and an open loop circuit is provided between terminals 23 and 24 of J8.

[ ] 9. Very Low Voltage Alarm (Relay K6): During an alarm condition, a closed loop circuit is provided between terminals 18 and 19 of J8, and an open loop circuit is provided between terminals 17 and 18 of J8.

[ ] 10. AC Fail Alarm (Relay K7): During an alarm condition, a closed loop circuit is provided between terminals 20 and 21 of J8, and an open loop circuit is provided between terminals 21 and 22 of J8.

[ ] 11. Fuse Alarm (Relay K8): During an alarm condition, a closed loop circuit is provided between terminals 32 and 33 of J8, and an open loop circuit is provided between terminals 33 and 34 of J8.

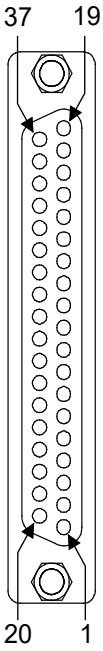
[ ] 12. Rectifier Module Fail Alarm (Relay K9): During an alarm condition, a closed loop circuit is provided between terminals 36 and 37 of J8, and an open loop circuit is provided between terminals 35 and 36 of J8.

[ ] 13. System Ground: System ground is supplied at terminal 4 of J8 for connection into customer's alarm circuits, if required.

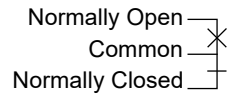
Figure 22C: *External Alarm, Reference and Control Connections to J8 on MCA Main Controller Circuit Card P/N 534868 when Power System is Equipped with LIST 12 MCA (Configuration Spec. No. 534878) (if no List 71)*

Alarm or Control	J8 Pin	Mating Harness Wire Colors [5]
Rectifier Module Fail Alarm (Relay K9) [3]	37	Blue/Black
	36	Violet/Black
	35	Slate/Green
Fuse Alarm (Relay K8) [3]	34	Slate/Red
	33	Lt. Blue/Green
	32	Lt. Blue/Blue
Major Alarm (Relay K1) [3]	31	Lt. Blue/Red
	30	Lt. Blue/Black
	29	Lt. Blue
High Voltage Alarm 1 (Relay K3) [3]	28	Pink/Green
	27	Pink/Blue
	26	Pink/Red
Battery On Discharge Alarm (Relay K5) [3]	25	Pink/Black
	24	Slate/Black
	23	Green/Black
AC Fail Alarm (Relay K7) [3]	22	Yellow/Black
	21	Orange/Black
	20	Red/Black

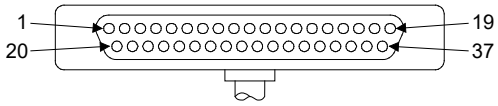
J8 ON MCA



Mating Harness Wire Colors [5]	J8 Pin	Alarm or Control
Violet/White	19	Very Low Voltage Alarm (Relay K6) [3]
Blue/White	18	
Green/White	17	
Orange/White	16	MCA Fail Alarm (Relay K4) [3]
Red/White	15	
Brown/White	14	
Black/White	13	Minor Alarm (Relay K2) [3]
Lt. Green	12	
Pink	11	
White	10	Remote Test/Equalize [4]
Slate	9	Rectifier Module Emergency Shutdown [4]
Violet	8	Remote HVSD
Blue	7	(Not Used)
Green	6	(Not Used)
Yellow	5	(Not Used)
Orange	4	System Ground
Red	3	(Not Used)
Brown	2	(Not Used)
Black	1	(Not Used)



RELAY CONTACT LEGEND



FRONT VIEW OF PLUG ON MATING HARNESS

Notes:

1. "Normally open" and "normally closed" refer to contact state with relay de-energized. All relays are shown de-energized. See Notes 2 and 3 for relay state during alarm condition.
2. These relays are de-energized during normal operation, and energized during an alarm condition.
3. These relays are energized during normal operation, and de-energized during an alarm condition.
4. These connections can be made at J8 or at TB1 on Interconnect/LVD Inhibit circuit card P/N 509532 located within the Distribution Assembly.
5. Mating Harness Wire Colors apply to standard wire harness P/N 514327 (15 ft.) or accessory wire harness P/N 514380 (60 ft.).

CAUTION! All wires in the mating wire harness may be connected within the cabinet. Shorting or grounding of unused wires may result in service interruption or equipment damage. Therefore, insulate all wire ends not being used in your application.

If Equipped with List 13 MCA (Configuration Number 534879)

Refer to **Figure 22D**.

[ ] 1. Remote High Voltage Shutdown and Restart: Customer furnished system ground applied to terminal 8 of J8 activates the internal high voltage shutdown and restart circuit on all Rectifier Modules.

[ ] 2. Emergency Shutdown and Fire Alarm Disconnect: Customer furnished system ground applied to terminal 9 of J8 (or terminal 10 of TB1 on Interconnect/LVD Inhibit circuit card P/N 509532) inhibits all Rectifier Modules.

If low voltage disconnect is furnished and is also to be controlled by the emergency shutdown and fire alarm disconnect switch, use the terminals of TB1 on Interconnect/LVD Inhibit circuit card P/N 509532 as previously described.

[ ] 3. Remote Test/Equalize: Customer furnished system ground applied to terminal 10 of J8 (or terminal 1 of TB1 on Interconnect/LVD Inhibit circuit card P/N 509532) places all Rectifier Modules into the test/equalize mode of operation. Removal of the signal places all Rectifier Modules into the float mode of operation.

[ ] 4. Major Alarm (Relay K1): During an alarm condition, a closed loop circuit is provided between terminals 30 and 31 of J8, and an open loop circuit is provided between terminals 29 and 30 of J8.

[ ] 5. Minor Alarm (Relay K2): During an alarm condition, a closed loop circuit is provided between terminals 12 and 13 of J8, and an open loop circuit is provided between terminals 11 and 12 of J8.

[ ] 6. Test/Equalize Mode 2 (Relay K3): During an alarm condition, a closed loop circuit is provided between terminals 26 and 27 of J8, and an open loop circuit is provided between terminals 27 and 28 of J8.

[ ] 7. Fuse/Circuit Breaker Alarm (Relay K4): During an alarm condition, a closed loop circuit is provided between terminals 14 and 15 of J8, and an open loop circuit is provided between terminals 15 and 16 of J8.

[ ] 8. Battery On Discharge Alarm (Relay K5): During an alarm condition, a closed loop circuit is provided between terminals 23 and 24 of J8, and an open loop circuit is provided between terminals 24 and 25 of J8.

[ ] 9. AC Fail Major Alarm (Relay K6): During an alarm condition, a closed loop circuit is provided between terminals 17 and 18 of J8, and an open loop circuit is provided between terminals 18 and 19 of J8.

[ ] 10. AC Fail Alarm (Relay K7): During an alarm condition, a closed loop circuit is provided between terminals 21 and 22 of J8, and an open loop circuit is provided between terminals 20 and 21 of J8.

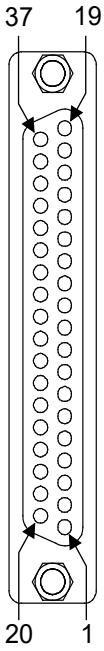
[ ] 11. LVD Alarm (Relay K8): During an alarm condition, a closed loop circuit is provided between terminals 32 and 33 of J8, and an open loop circuit is provided between terminals 33 and 34 of J8.

[ ] 12. Test/Equalize Mode 1 (Relay K9): When the system is placed in the test/equalize mode (locally or remotely), a closed loop circuit is provided between terminals 35 and 36 of J8, and an open loop circuit is provided between terminals 36 and 37 of J8.

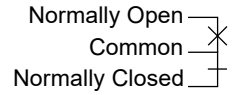
[ ] 13. System Ground: System ground is supplied at terminal 4 of J8 for connection into customer's alarm circuits, if required.

Figure 22D: *External Alarm, Reference and Control Connections to J8 on MCA Main Controller Circuit Card P/N 534868 when Power System is Equipped with LIST 13 MCA (Configuration Spec. No. 534879) (if no List 71)*

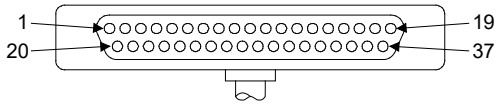
Alarm or Control	J8 Pin	Mating Harness Wire Colors [5]
Test/Equalize Mode 1 (Relay K9) [2]	37	Blue/Black
	36	Violet/Black
	35	Slate/Green
LVD Alarm (Relay K8) [3]	34	Slate/Red
	33	Lt. Blue/Green
	32	Lt. Blue/Blue
Major Alarm (Relay K1) [3]	31	Lt. Blue/Red
	30	Lt. Blue/Black
	29	Lt. Blue
Test/Equalize Mode 2 (Relay K3) [2]	28	Pink/Green
	27	Pink/Blue
	26	Pink/Red
Battery On Discharge Alarm (Relay K5) [2]	25	Pink/Black
	24	Slate/Black
	23	Green/Black
AC Fail Alarm (Relay K7) [2]	22	Yellow/Black
	21	Orange/Black
	20	Red/Black



Mating Harness Wire Colors [5]	J8 Pin	Alarm or Control
Violet/White	19	AC Fail Major Alarm (Relay K6) [2]
Blue/White	18	
Green/White	17	
Orange/White	16	Fuse/Circuit Breaker Alarm (Relay K4) [2]
Red/White	15	
Brown/White	14	
Black/White	13	Minor Alarm (Relay K2) [2]
Lt. Green	12	
Pink	11	
White	10	Remote Test/Equalize [4]
Slate	9	Rectifier Module Emergency Shutdown [4]
Violet	8	Remote HVSD
Blue	7	(Not Used)
Green	6	(Not Used)
Yellow	5	(Not Used)
Orange	4	System Ground
Red	3	(Not Used)
Brown	2	(Not Used)
Black	1	(Not Used)



RELAY CONTACT LEGEND



FRONT VIEW OF PLUG ON MATING HARNESS

Notes:

1. "Normally open" and "normally closed" refer to contact state with relay de-energized. All relays are shown de-energized. See Notes 2 and 3 for relay state during alarm condition.
2. These relays are de-energized during normal operation, and energized during an alarm condition.
3. These relays are energized during normal operation, and de-energized during an alarm condition.
4. These connections can be made at J8 or at TB1 on Interconnect/LVD Inhibit circuit card P/N 509532 located within the Distribution Assembly.
5. Mating Harness Wire Colors apply to standard wire harness P/N 514327 (15 ft.) or accessory wire harness P/N 514380 (60 ft.).

CAUTION! All wires in the mating wire harness may be connected within the cabinet. Shorting or grounding of unused wires may result in service interruption or equipment damage. Therefore, insulate all wire ends not being used in your application.

Connections to Terminal Blocks J1-J4 on Audible Alarm / Alarm Termination Circuit Card P/N 524734 (List 71 only)

Terminal blocks J1-J4 on the Audible Alarm / Alarm Termination circuit card provide spring-clamp type terminals for customer connections. Refer to **Figure 20** for terminal block location, and **Figure 23A through Figure 23B** for connector pinouts.

To Make Wiring Connection: To connect wire, strip approximately 1/4 inch of insulation from the wire end. Fully insert the bare wire end into the rectangular opening in the terminal block. Gently tug on the wire to ensure that it cannot be pulled out of the terminal block. (Wire may be removed from the terminal block by inserting a small flat-blade screwdriver into the square cavity directly behind the wire, then depressing the screwdriver until the wire is released and can be pulled out of the terminal block.)

MCA External Alarm Relay Contacts: The MCA provides 9 Form-C alarm relay contacts (available at J8 on the MCA Main Controller circuit card or J1-J4 on the optional List 71 Audible Alarm/Alarm Termination circuit card). The configuration of these alarm relays is determined by the MCA Configuration Number set in your system. You can determine the MCA Configuration Number by the List Number of the MCA (located on the Power System's nameplate). You can also view your system's MCA Configuration Number after power-up by following the MCA Menu Tree (Section 6022) (MCA Menu Tree Line Item "SPECNO#########" in the 'Inventory Menu').

NOTE! *Do not apply voltages higher than 42.4 volts AC (peak) or 60 volts DC to the external alarm relay terminals.*

The Audible Alarm / Alarm Termination circuit card also provides a set of Converter Major Alarm and Converter Minor Alarm external alarm relay contacts.

If Equipped with List 10 MCA (Configuration Number 534876)

Refer to **Figure 23A**.

[ ] 1. Major Alarm (Relay K1): During an alarm condition a closed loop circuit is provided between terminals 8 and 9 of J1, and an open loop circuit is provided between terminals 9 and 10 of J1.

[ ] 2. Minor Alarm (Relay K2): During an alarm condition a closed loop circuit is provided between terminals 9 and 10 of J3, and an open loop circuit is provided between terminals 8 and 9 of J3.

[ ] 3. High Voltage Alarm 1 (Relay K3): During an alarm condition a closed loop circuit is provided between terminals 3 and 4 of J2, and an open loop circuit is provided between terminals 2 and 3 of J2.

[ ] 4. High Voltage Alarm 2 (Relay K4): During an alarm condition a closed loop circuit is provided between terminals 6 and 7 of J3, and an open loop circuit is provided between terminals 5 and 6 of J3.

[ ] 5. Battery On Discharge Alarm (Relay K5): During an alarm condition a closed loop circuit is provided between terminals 6 and 7 of J2, and an open loop circuit is provided between terminals 5 and 6 of J2.

[ ] 6. 50% Battery On Discharge Alarm (Relay K6): During an alarm condition a closed loop circuit is provided between terminals 3 and 4 of J3, and an open loop circuit is provided between terminals 2 and 3 of J3.

[ ] 7. AC Fail Alarm (Relay K7): During an alarm condition a closed loop circuit is provided between terminals 9 and 10 of J2, and an open loop circuit is provided between terminals 8 and 9 of J2.

[ ] 8. MCA Audible Alarm (Relay K8): During an alarm condition a closed loop circuit is provided between terminals 5 and 6 of J1, and an open loop circuit is provided between terminals 6 and 7 of J1.

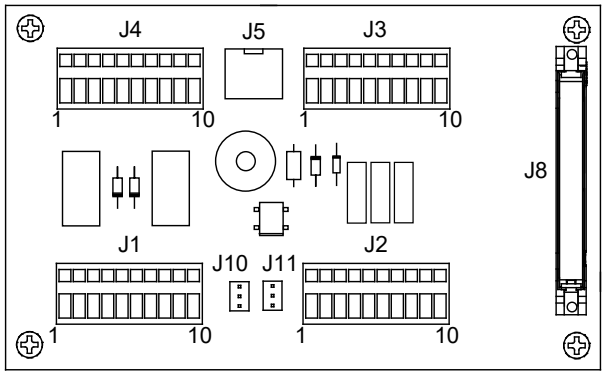
NOTE! *External audible alarm connections are inoperative if Local/Remote option jumpers on the List 71 circuit card are set for Local alarm operation. See "Setting Wiring Options" for an adjustment procedure.*

[ ] 9. Test/Equalize (Relay K9): When the system is placed in the test/equalize mode (locally or remotely) a closed loop circuit is provided between terminals 3 and 4 of J1, and an open loop circuit is provided between terminals 2 and 3 of J1.

[ ] 10. Converter Minor Alarm: During an alarm condition, a closed loop circuit is provided between terminals 2 and 3 of J4, and an open loop circuit is provided between terminals 1 and 2 of J4.

[ ] 11. Converter Major Alarm: During an alarm condition, a closed loop circuit is provided between terminals 5 and 6 of J4, and an open loop circuit is provided between terminals 4 and 5 of J4.

Figure 23A: *External Alarm Connections to LIST 71 Audible Alarm / Alarm Termination Circuit Card when Power System is Equipped with LIST 10 MCA (Configuration Spec. No. 534876)*



Alarm	Term.	Of
(Not Used)	1	J1
Test/ Equalize (Relay K9) [2]	2	
	3	
	4	
MCA Audible Alarm (Relay K8) [3]	5	
	6	
	7	
Major Alarm (Relay K1) [3]	8	
	9	
	10	
(Not Used)	1	J2
High Voltage Alarm 1 (Relay K3) [2]	2	
	3	
	4	
Battery On Discharge Alarm (Relay K5) [2]	5	
	6	
	7	
AC Fail Alarm (Relay K7) [2]	8	
	9	
	10	

Alarm	Term.	Of
(Not Used)	1	J3
50% Battery On Discharge Alarm (Relay K6) [2]	2	
	3	
	4	
High Voltage Alarm 2 (Relay K4) [2]	5	
	6	
	7	
Minor Alarm (Relay K2) [2]	8	
	9	
	10	
Converter Minor Alarm [2,4]	1	J4
	2	
	3	
Converter Major Alarm [2,4]	4	
	5	
	6	
(Not Used)	7	
	8	
	9	
	10	

Notes:

1. "Normally open" and "normally closed" refer to contact state with relay de-energized. All relays are shown de-energized. See Notes 2 and 3 for relay state during alarm condition.
2. These relays are de-energized during normal operation, and energized during an alarm condition.
3. These relays are energized during normal operation, and de-energized during an alarm condition.

Normally Open
Common
Normally Closed

If Equipped with List 11 MCA (Configuration Number 534877)

Refer to **Figure 23B**.

[ ] 1. Major Alarm (Relay K1): During an alarm condition a closed loop circuit is provided between terminals 8 and 9 of J1, and an open loop circuit is provided between terminals 9 and 10 of J1.

[ ] 2. Minor Alarm (Relay K2): During an alarm condition a closed loop circuit is provided between terminals 9 and 10 of J3, and an open loop circuit is provided between terminals 8 and 9 of J3.

[ ] 3. High Voltage Alarm 1 (Relay K3): During an alarm condition a closed loop circuit is provided between terminals 3 and 4 of J2, and an open loop circuit is provided between terminals 2 and 3 of J2.

[ ] 4. Rectifier Module Fail Major Alarm (Relay K4): During an alarm condition a closed loop circuit is provided between terminals 6 and 7 of J3, and an open loop circuit is provided between terminals 5 and 6 of J3.

[ ] 5. Battery On Discharge Alarm (Relay K5): During an alarm condition a closed loop circuit is provided between terminals 6 and 7 of J2, and an open loop circuit is provided between terminals 5 and 6 of J2.

[ ] 6. Rectifier Module Fail Alarm (Relay K6): During an alarm condition a closed loop circuit is provided between terminals 3 and 4 of J3, and an open loop circuit is provided between terminals 2 and 3 of J3.

[ ] 7. AC Fail Alarm (Relay K7): During an alarm condition a closed loop circuit is provided between terminals 9 and 10 of J2, and an open loop circuit is provided between terminals 8 and 9 of J2.

[ ] 8. MCA Audible Alarm (Relay K8): During an alarm condition a closed loop circuit is provided between terminals 5 and 6 of J1, and an open loop circuit is provided between terminals 6 and 7 of J1.

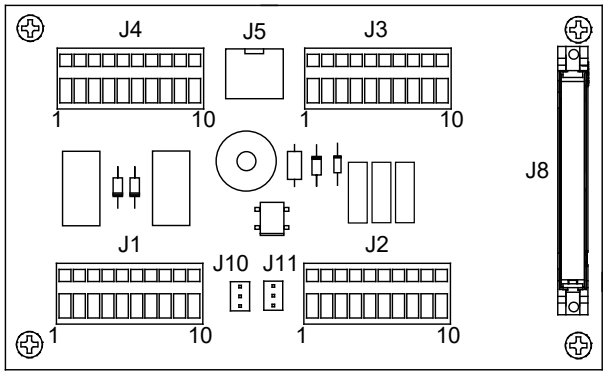
NOTE! *External audible alarm connections are inoperative if Local/Remote option jumpers on the List 71 circuit card are set for Local alarm operation. See "Setting Wiring Options" for an adjustment procedure.*

[ ] 9. Fuse/Circuit Breaker Alarm (Relay K9): When the system is placed in the test/equalize mode (locally or remotely) a closed loop circuit is provided between terminals 3 and 4 of J1, and an open loop circuit is provided between terminals 2 and 3 of J1.

[ ] 10. Converter Minor Alarm: During an alarm condition, a closed loop circuit is provided between terminals 2 and 3 of J4, and an open loop circuit is provided between terminals 1 and 2 of J4.

[ ] 11. Converter Major Alarm: During an alarm condition, a closed loop circuit is provided between terminals 5 and 6 of J4, and an open loop circuit is provided between terminals 4 and 5 of J4.

Figure 23B: *External Alarm Connections to LIST 71 Audible Alarm / Alarm Termination Circuit Card when Power System is Equipped with LIST 11 MCA (Configuration Spec. No. 534877)*

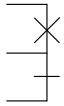


Alarm	Term.	Of
(Not Used)	1	J1
Fuse/Circuit Breaker Alarm (Relay K9) [2]	2	
	3	
	4	
MCA Audible Alarm (Relay K8) [3]	5	
	6	
	7	
Major Alarm (Relay K1) [3]	8	
	9	
	10	
(Not Used)	1	J2
High Voltage Alarm 1 (Relay K3) [2]	2	
	3	
	4	
Battery On Discharge Alarm (Relay K5) [2]	5	
	6	
	7	
AC Fail Alarm (Relay K7) [2]	8	
	9	
	10	

Alarm	Term.	Of
(Not Used)	1	J3
Rectifier Module Fail Alarm (Relay K6) [2]	2	
	3	
	4	
Rectifier Module Fail Major Alarm (Relay K4) [2]	5	
	6	
	7	
Minor Alarm (Relay K2) [2]	8	
	9	
	10	
Converter Minor Alarm [2,4]	1	J4
	2	
	3	
Converter Major Alarm [2,4]	4	
	5	
	6	
(Not Used)	7	
	8	
	9	
	10	

Notes:

1. "Normally open" and "normally closed" refer to contact state with relay de-energized. All relays are shown de-energized. See Notes 2 and 3 for relay state during alarm condition.
2. These relays are de-energized during normal operation, and energized during an alarm condition.
3. These relays are energized during normal operation, and de-energized during an alarm condition.



If Equipped with List 12 MCA (Configuration Number 534878)

Refer to **Figure 23C**.

[ ] 1. Major Alarm (Relay K1): During an alarm condition a closed loop circuit is provided between terminals 8 and 9 of J1, and an open loop circuit is provided between terminals 9 and 10 of J1.

[ ] 2. Minor Alarm (Relay K2): During an alarm condition a closed loop circuit is provided between terminals 8 and 9 of J3, and an open loop circuit is provided between terminals 9 and 10 of J3.

[ ] 3. High Voltage Alarm 1 (Relay K3): During an alarm condition a closed loop circuit is provided between terminals 2 and 3 of J2, and an open loop circuit is provided between terminals 3 and 4 of J2.

[ ] 4. MCA Fail Alarm (Relay K4): During an alarm condition a closed loop circuit is provided between terminals 5 and 6 of J3, and an open loop circuit is provided between terminals 6 and 7 of J3.

[ ] 5. Battery On Discharge Alarm (Relay K5): During an alarm condition a closed loop circuit is provided between terminals 5 and 6 of J2, and an open loop circuit is provided between terminals 6 and 7 of J2.

[ ] 6. Very Low Voltage Alarm (Relay K6): During an alarm condition a closed loop circuit is provided between terminals 2 and 3 of J3, and an open loop circuit is provided between terminals 3 and 4 of J3.

[ ] 7. AC Fail Alarm (Relay K7): During an alarm condition a closed loop circuit is provided between terminals 8 and 9 of J2, and an open loop circuit is provided between terminals 9 and 10 of J2.

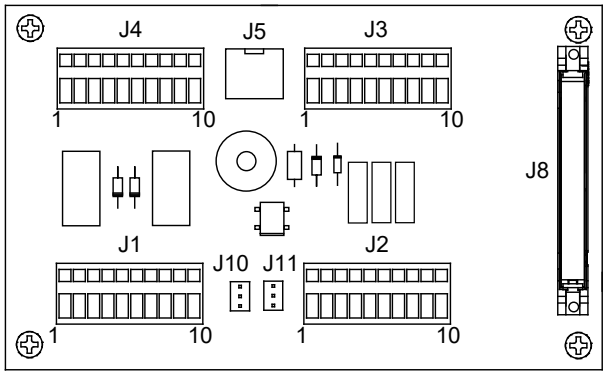
[ ] 8. Fuse Alarm (Relay K8): During an alarm condition a closed loop circuit is provided between terminals 5 and 6 of J1, and an open loop circuit is provided between terminals 6 and 7 of J1.

[ ] 9. Rectifier Module Fail Alarm (Relay K9): When the system is placed in the test/equalize mode (locally or remotely) a closed loop circuit is provided between terminals 2 and 3 of J1, and an open loop circuit is provided between terminals 3 and 4 of J1.

[ ] 10. Converter Minor Alarm: During an alarm condition, a closed loop circuit is provided between terminals 2 and 3 of J4, and an open loop circuit is provided between terminals 1 and 2 of J4.

[ ] 11. Converter Major Alarm: During an alarm condition, a closed loop circuit is provided between terminals 5 and 6 of J4, and an open loop circuit is provided between terminals 4 and 5 of J4.

Figure 23C: *External Alarm Connections to LIST 71 Audible Alarm / Alarm Termination Circuit Card when Power System is Equipped with LIST 12 MCA (Configuration Spec. No. 534878)*

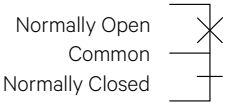


Alarm	Term.	Of
(Not Used)	1	J1
Rectifier Module Fail Alarm (Relay K9) [3]	2	
	3	
	4	
Fuse/Circuit Breaker Alarm (Relay K8) [3]	5	
	6	
	7	
Major Alarm (Relay K1) [3]	8	
	9	
	10	
(Not Used)	1	J2
High Voltage Alarm 1 (Relay K3) [3]	2	
	3	
	4	
Battery On Discharge Alarm (Relay K5) [3]	5	
	6	
	7	
AC Fail Alarm (Relay K7) [3]	8	
	9	
	10	

Alarm	Term.	Of
(Not Used)	1	J3
Very Low Voltage Alarm (Relay K6) [3]	2	
	3	
	4	
MCA Fail Alarm (Relay K4) [3]	5	
	6	
	7	
Minor Alarm (Relay K2) [3]	8	
	9	
	10	
Converter Minor Alarm [2,4]	1	J4
	2	
	3	
Converter Major Alarm [2,4]	4	
	5	
	6	
(Not Used)	7	
	8	
	9	
	10	

Notes:

1. "Normally open" and "normally closed" refer to contact state with relay de-energized. All relays are shown de-energized. See Notes 2 and 3 for relay state during alarm condition.
2. These relays are de-energized during normal operation, and energized during an alarm condition.
3. These relays are energized during normal operation, and de-energized during an alarm condition.



If Equipped with List 13 MCA (Configuration Number 534879)

Refer to **Figure 23D**.

[ ] 1. Major Alarm (Relay K1): During an alarm condition a closed loop circuit is provided between terminals 8 and 9 of J1, and an open loop circuit is provided between terminals 9 and 10 of J1.

[ ] 2. Minor Alarm (Relay K2): During an alarm condition a closed loop circuit is provided between terminals 9 and 10 of J3, and an open loop circuit is provided between terminals 8 and 9 of J3.

[ ] 3. Test/Equalize Mode 2 (Relay K3): During an alarm condition a closed loop circuit is provided between terminals 3 and 4 of J2, and an open loop circuit is provided between terminals 2 and 3 of J2.

[ ] 4. Fuse/Circuit Breaker Alarm (Relay K4): During an alarm condition a closed loop circuit is provided between terminals 6 and 7 of J3, and an open loop circuit is provided between terminals 5 and 6 of J3.

[ ] 5. Battery On Discharge Alarm (Relay K5): During an alarm condition a closed loop circuit is provided between terminals 6 and 7 of J2, and an open loop circuit is provided between terminals 5 and 6 of J2.

[ ] 6. AC Fail Major Alarm (Relay K6): During an alarm condition a closed loop circuit is provided between terminals 3 and 4 of J3, and an open loop circuit is provided between terminals 2 and 3 of J3.

[ ] 7. AC Fail Alarm (Relay K7): During an alarm condition a closed loop circuit is provided between terminals 9 and 10 of J2, and an open loop circuit is provided between terminals 8 and 9 of J2.

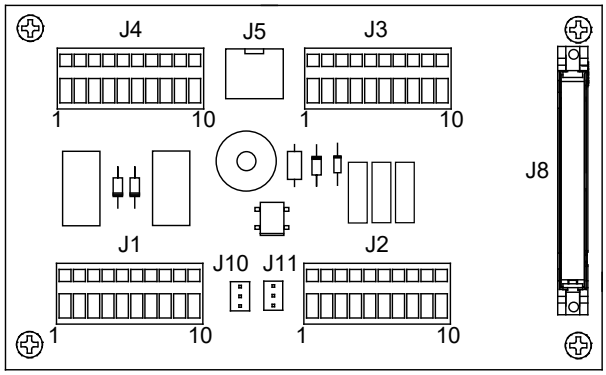
[ ] 8. LVD Alarm (Relay K8): During an alarm condition a closed loop circuit is provided between terminals 6 and 7 of J1, and an open loop circuit is provided between terminals 5 and 6 of J1.

[ ] 9. Test/Equalize Mode 1 (Relay K9): When the system is placed in the test/equalize mode (locally or remotely) a closed loop circuit is provided between terminals 3 and 4 of J1, and an open loop circuit is provided between terminals 2 and 3 of J1.

[ ] 10. Converter Minor Alarm: During an alarm condition, a closed loop circuit is provided between terminals 2 and 3 of J4, and an open loop circuit is provided between terminals 1 and 2 of J4.

[ ] 11. Converter Major Alarm: During an alarm condition, a closed loop circuit is provided between terminals 5 and 6 of J4, and an open loop circuit is provided between terminals 4 and 5 of J4.

Figure 23D: *External Alarm Connections to LIST 71 Audible Alarm / Alarm Termination Circuit Card when Power System is Equipped with LIST 13 MCA (Configuration Spec. No. 534879)*



Alarm	Term.	Of
(Not Used)	1	J1
Test/Equalize Mode 1 (Relay K9) [2]	2	
	3	
	4	
LVD Alarm (Relay K8) [3]	5	
	6	
	7	
Major Alarm (Relay K1) [3]	8	
	9	
	10	
(Not Used)	1	J2
Test/Equalize Mode 2 (Relay K3) [2]	2	
	3	
	4	
Battery On Discharge Alarm (Relay K5) [2]	5	
	6	
	7	
AC Fail Alarm (Relay K7) [2]	8	
	9	
	10	

Alarm	Term.	Of
(Not Used)	1	J3
AC Fail Major Alarm (Relay K6) [2]	2	
	3	
	4	
Fuse/Circuit Breaker Alarm (Relay K4) [2]	5	
	6	
	7	
Minor Alarm (Relay K2) [2]	8	
	9	
	10	
Converter Minor Alarm [2,4]	1	J4
	2	
	3	
Converter Major Alarm [2,4]	4	
	5	
	6	
(Not Used)	7	
	8	
	9	
	10	

Notes:

1. "Normally open" and "normally closed" refer to contact state with relay de-energized. All relays are shown de-energized. See Notes 2 and 3 for relay state during alarm condition.
2. These relays are de-energized during normal operation, and energized during an alarm condition.
3. These relays are energized during normal operation, and de-energized during an alarm condition.

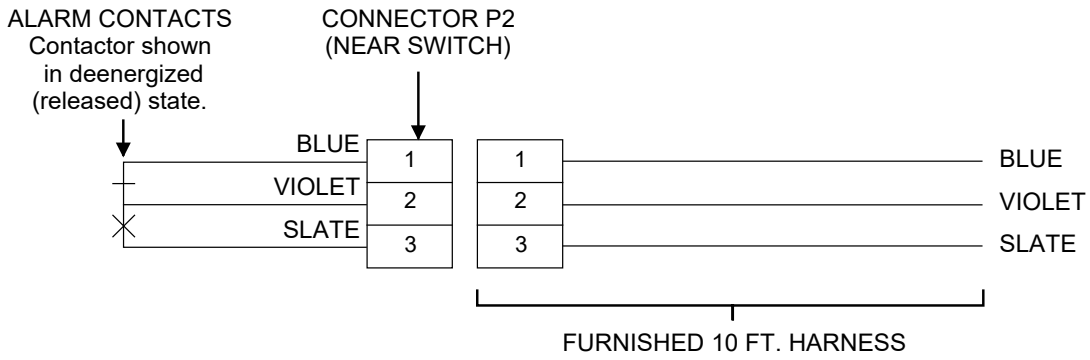
Normally Open
Common
Normally Closed

Battery Disconnect External Alarm Connections to List RB, RC, RD, or RE (if furnished)

When the power system is equipped with List RB, RC, RD, or RE; one set of Form-C contacts is provided to control a customer-furnished external alarm. The contacts are rated for 5A at 28VDC. Connections are made via a 3-pin locking-type connector (P2) located within the Distribution Cabinet (top left corner directly in front of the battery disconnect unit). A 10-ft. long mating wire harness suitable for splicing to customer alarm circuits is furnished. Refer **Figure 24** for the color code.

Alarm contacts operate as follows. When the contactor is energized (pulled in), contacts open between pins 1 and 2 of connector P2, and contacts close between pins 2 and 3 of P2. When the contactor is deenergized (released), contacts close between pins 1 and 2 of connector P2, and contacts open between pins 2 and 3 of P2.

Figure 24: *Battery Disconnect Alarm Connections (List RB, RC, RD, RE)*



Load Shunt Connections (Shunted GJ/218 Circuit Breakers and/or List AJ and CJ Distribution Bus Panels) (if furnished)

The Power System may include distribution options that provide individual load metering shunts. These include GJ/218 circuit breakers that are equipped with shunts, and List AJ and CJ Distribution Bus Panels, which also provide shunts. In all cases, the shunt leads are labeled for identification. The labels indicate the bay (BAY 1 or BAY 2) and the mounting order of the GJ circuit breakers and/or TPH fuse holders in the Distribution Cabinet. Refer to **Figure 25A** or **Figure 25B**. for examples. Note that numbering is from left to right or bottom to top in each row, and starts with the bottom row in the cabinet. Unoccupied mounting positions are not counted. GJ/218 circuit breakers NOT equipped with shunts also are not counted. The leads are color-coded: red for positive (+) and black for negative (-).

Unless otherwise specified, the shunt leads exit the Distribution Cabinet at the rear of the bottom panel. Lead length from this exit point ranges from approximately 7 to 10 feet. The leads are 22 AWG stranded wire in twisted pairs. Refer to System Application Guide SAG581126000 for shunt ratings.

Figure 25A: *Distribution Option Example Showing Circuit Breaker Shunt Lead Numbering Scheme (Numbers shown on circuit breakers do not appear on actual device.)*

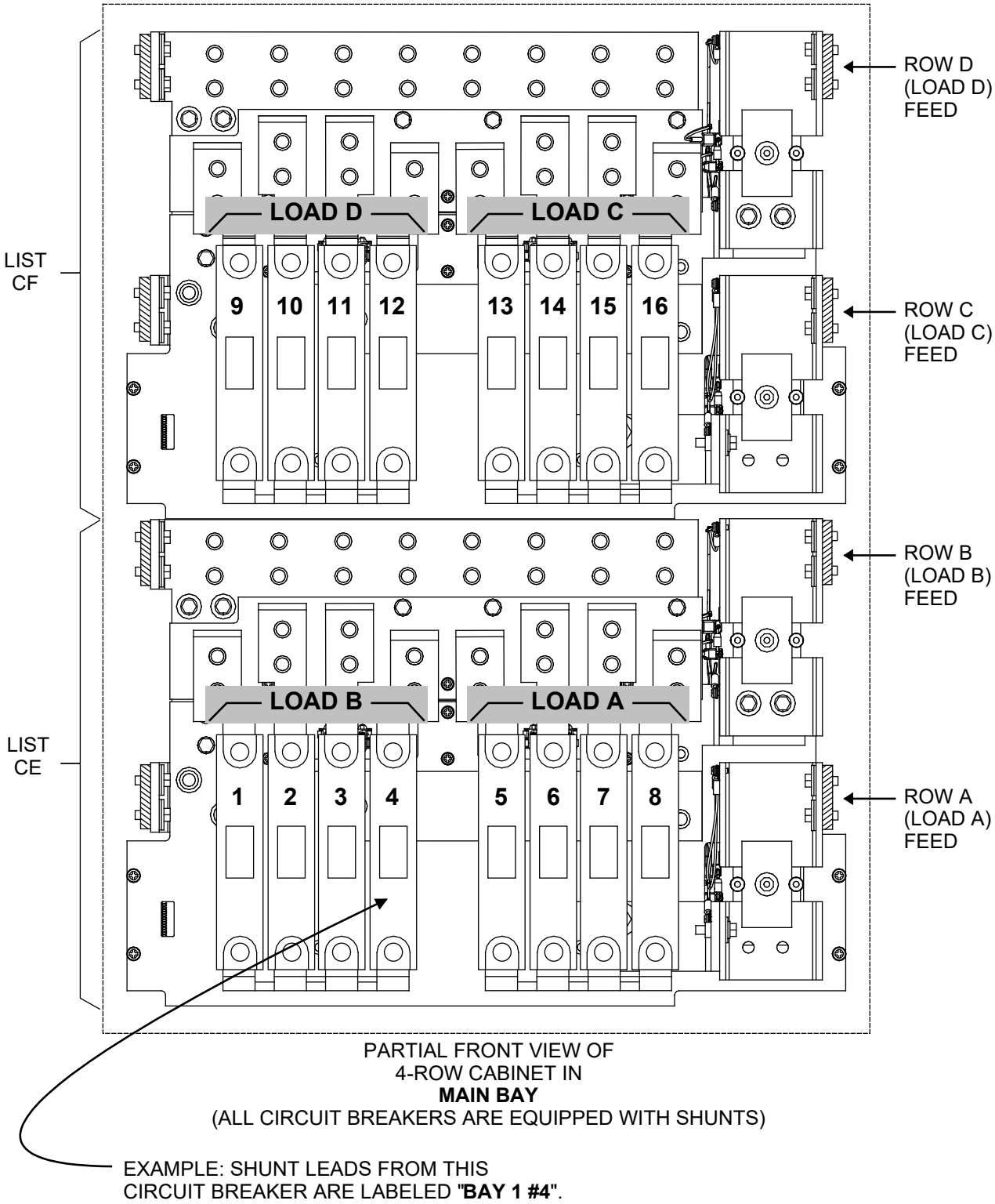
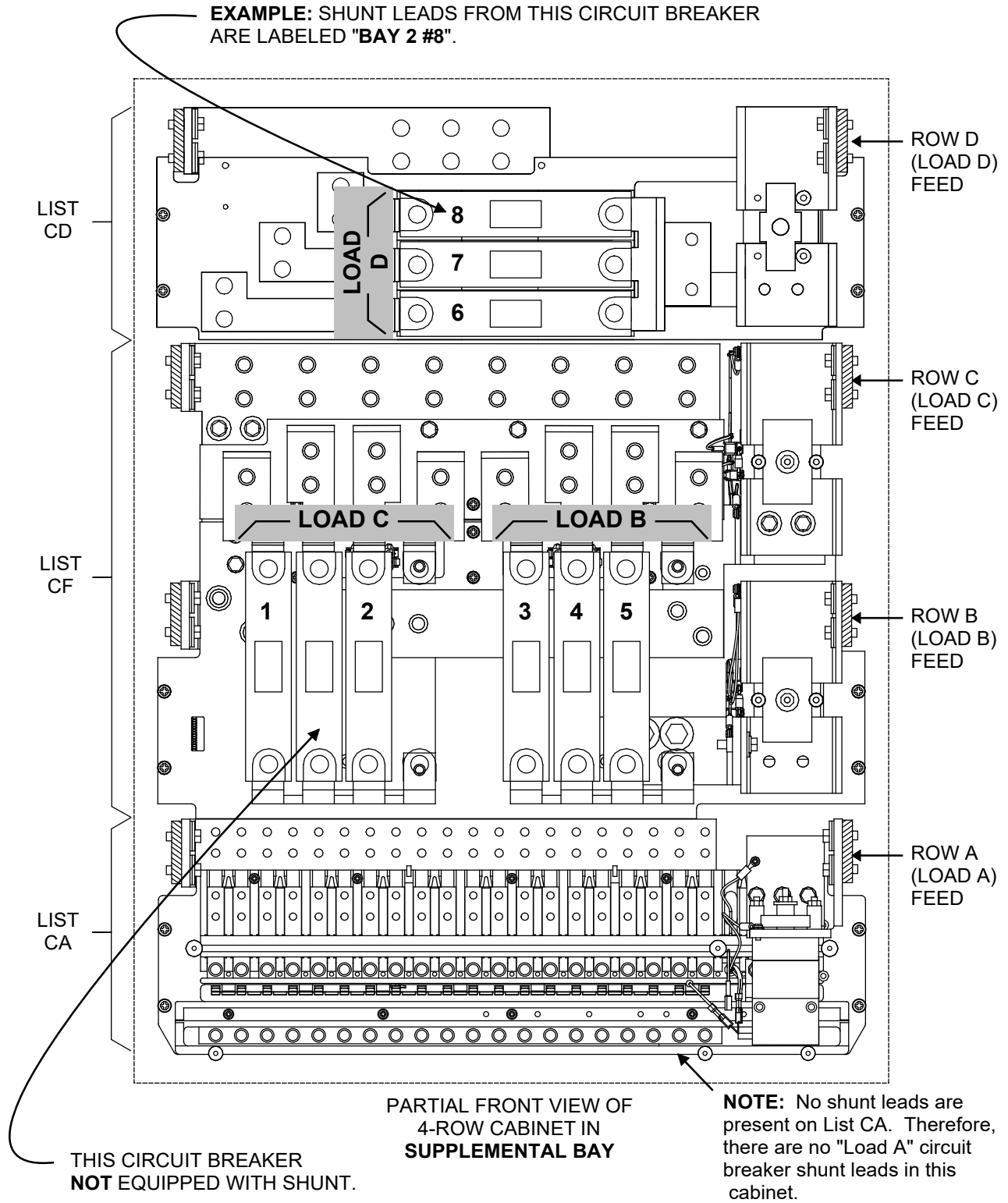


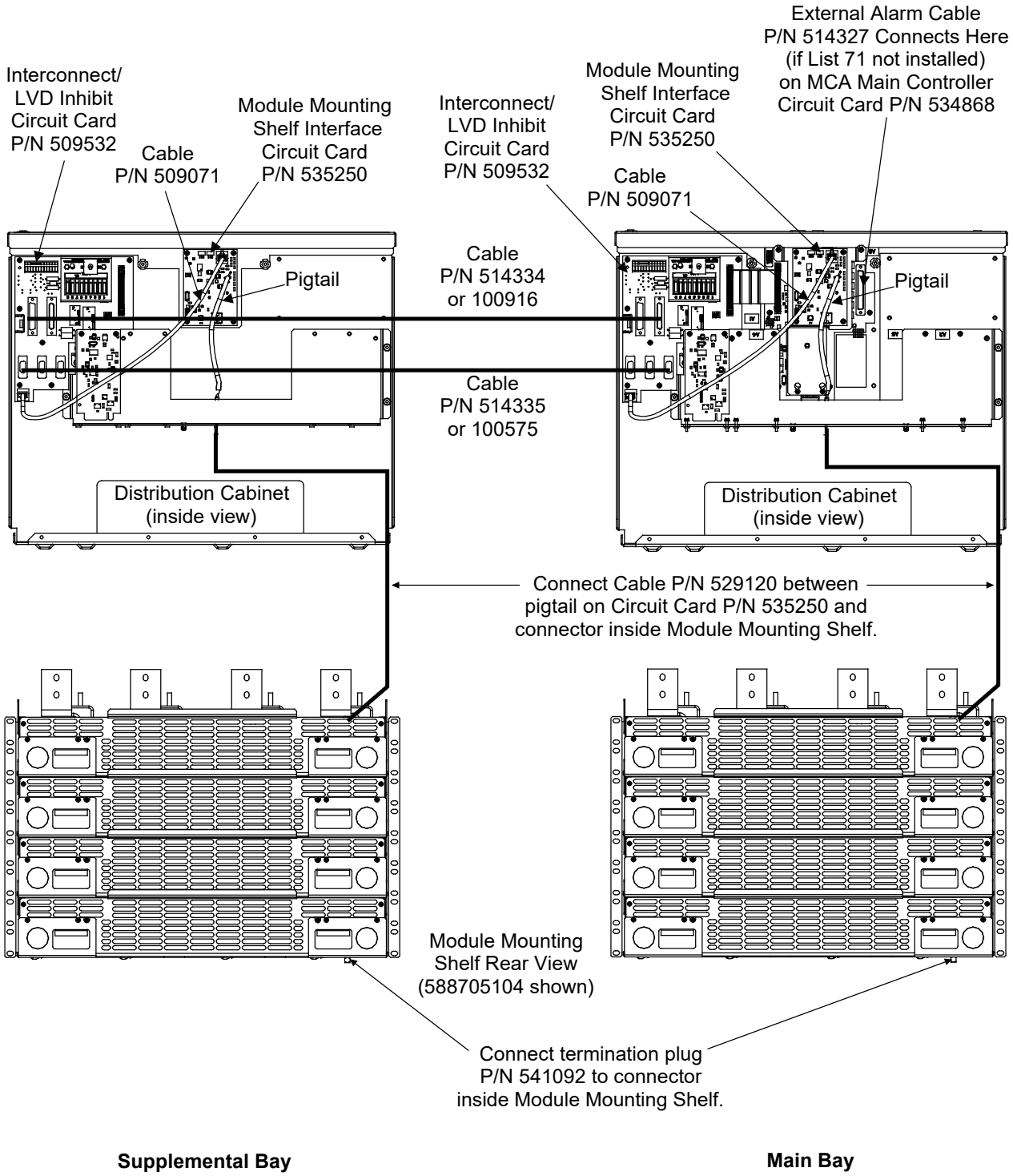
Figure 25B: *Distribution Option Example Showing Circuit Breaker Shunt Lead Numbering Scheme (Numbers shown on circuit breakers do not appear on actual device.)*



Interbay and Bay-to-Bay Cable Connections

Refer to **Figure 26** for an interbay and bay-to-bay cable diagram.

Figure 26: *Interbay and Bay-to-Bay Cable Diagram*



Factory Connected Interbay Cables

Bay's Module Mounting Shelf Interface Circuit Card to MCA Interconnect Cable (MCA Module Control Signal)

NOTE! *This cable is factory connected. You can use this procedure to verify the connection.*

A cable (P/N 509071) is factory connected between the Module Mounting Shelf Interface circuit card P/N 535250 located in the Bay's Distribution Cabinet and the Interconnect/LVD Inhibit circuit card P/N 509532 located in the same Distribution Cabinet, as shown in **Figure 26**.

Bay's Shelf Interface Circuit Card to Top-Most Module Mounting Shelf Interconnect Cable (MCA Module Control Signal)

NOTE! *This cable is factory connected. You can use this procedure to verify the connection.*

A cable (P/N 529120) is factory connected between the pigtail located on Module Mounting Shelf Interface circuit card P/N 535250 located in the Bay's Distribution Cabinet and the connector exiting the top of the top most installed Module Mounting Shelf located in the same Distribution Cabinet, as shown in **Figure 26**.

Bay's Module Mounting Shelf to Module Mounting Shelf Interconnect Cable (MCA Module Control Signal)

NOTE! *This cable is factory connected. You can use this procedure to verify the connection.*

Module Mounting Shelves located within the same bay are interconnected via the shelf's internal wiring harness. A connector exits the top and bottom of each Module Mounting Shelf. The cable exiting the bottom of one Module Mounting Shelf is connected to the mating connector exiting the top of the shelf installed below it.

Customer Connected Bay-to-Bay Cables

Bay-to-Bay 'MCA Module Control Signal' Interconnect Cable

NOTE! *Applies only if power system includes a supplemental bay that contains Module Mounting Shelves. If the supplemental bay is "distribution only" (List 4 option), these connections are not required.*

Procedure:

NOTE! *Refer to **Figure 27**.*

[ ] 1. For each bay in the power system, open the front door of the Distribution Cabinet by turning and holding the captive fastener in the counterclockwise position.

[ ] 2. For each bay in the power system, remove the clear plastic panel that covers the circuit cards at the bottom of the cabinet. To do so, loosen but do not remove the two screws that secure the cover. Slide the cover to the front until the screw heads clear the keyhole slots in the cover. Then lift the cover out of the cabinet.

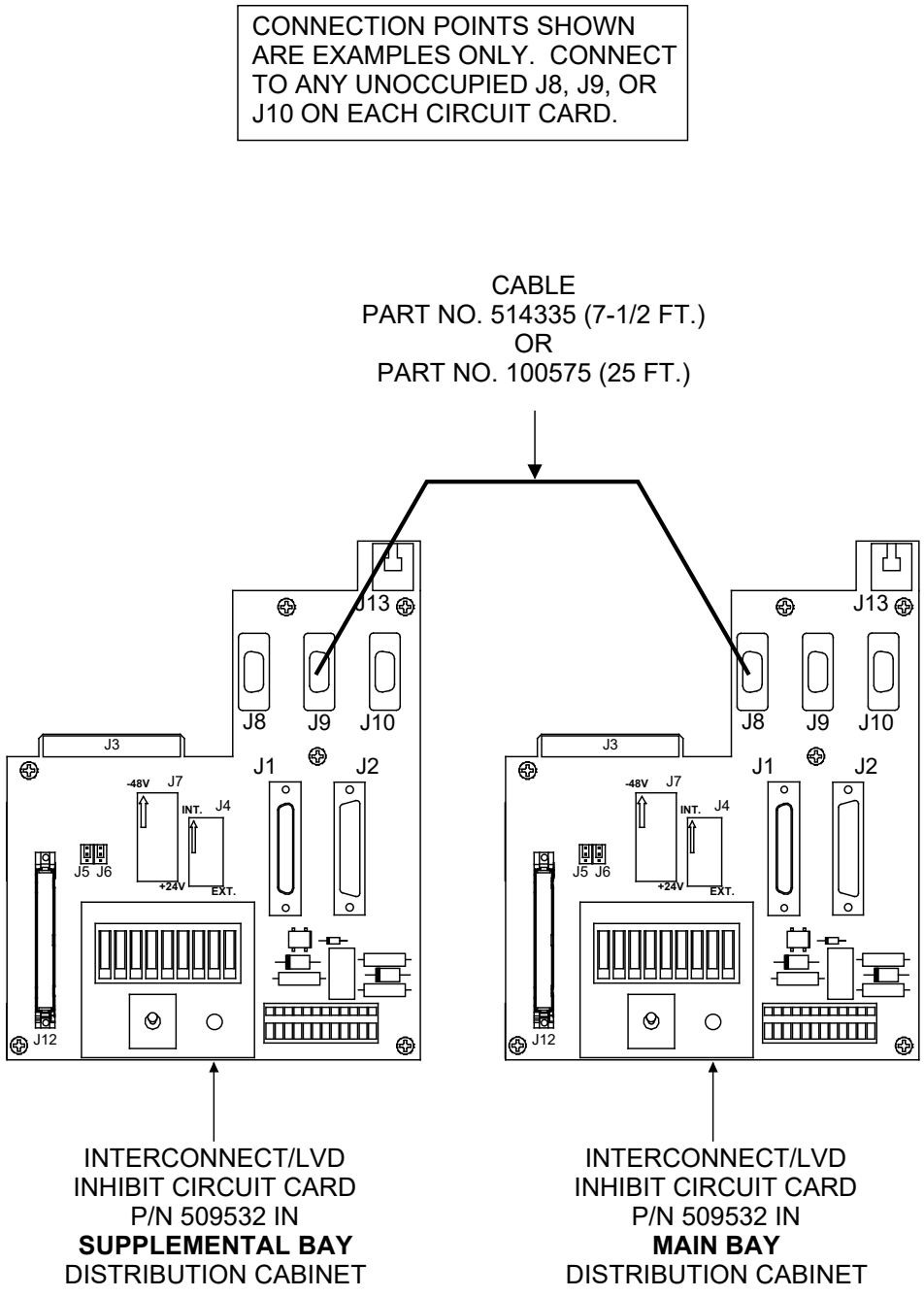
[ ] 3. Connect one end of the supplied interconnecting cable to any unoccupied connector J8, J9, or J10 on Interconnect/LVD Inhibit circuit card P/N 509532 located within the Main Bay Distribution Cabinet. Connect the remaining cable end to any unoccupied connector J8, J9, or J10 on Interconnect/LVD Inhibit circuit card P/N 509532 located within the Supplemental Bay Distribution Cabinet. Route this cable through the opening provided in the back of each Distribution Cabinet.

- Cable P/N 514335 is provided with List 2 (7.5' cable).
- Cable P/N 100575 is provided with List 5 (25' cable).

[ ] 4. If no more connections required: For each bay in the power system, reinstall the clear plastic cover in the bottom of the cabinet. To do so, place the cover on its two mounting posts so that the mounting screw heads pass through the keyhole slots in the cover. Slide the cover towards the back. Tighten the two screws.

[ ] 5. If no more connections required: For each bay in the power system, close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

Figure 27: *MCA Module Control Signal' Cable Connections Between Bays*



Bay-to-Bay 'MCA Distribution Control Signal' Interconnect Cable

NOTE! *Applies only if power system includes more than one bay.*

Procedure:

NOTE! *Refer to* ***Figure 28****.*

[ ] 1. For each bay in the power system, open the front door of the Distribution Cabinet by turning and holding the captive fastener in the counterclockwise position.

[ ] 2. For each bay in the power system, remove the clear plastic panel that covers the circuit cards at the bottom of the cabinet. To do so, loosen but do not remove the two screws that secure the cover. Slide the cover to the front until the screw heads clear the keyhole slots in the cover. Then lift the cover out of the cabinet.

[ ] 3. Connect one end of the supplied interconnecting cable to connector J1 on Interconnect/LVD Inhibit circuit card P/N 509532 located within the Main Bay Distribution Cabinet. Connect the remaining cable end to connector J2 on Interconnect/LVD Inhibit circuit card P/N 509532 located within the Supplemental Bay Distribution Cabinet. Route this cable through the opening provided in the back of each Distribution Cabinet.

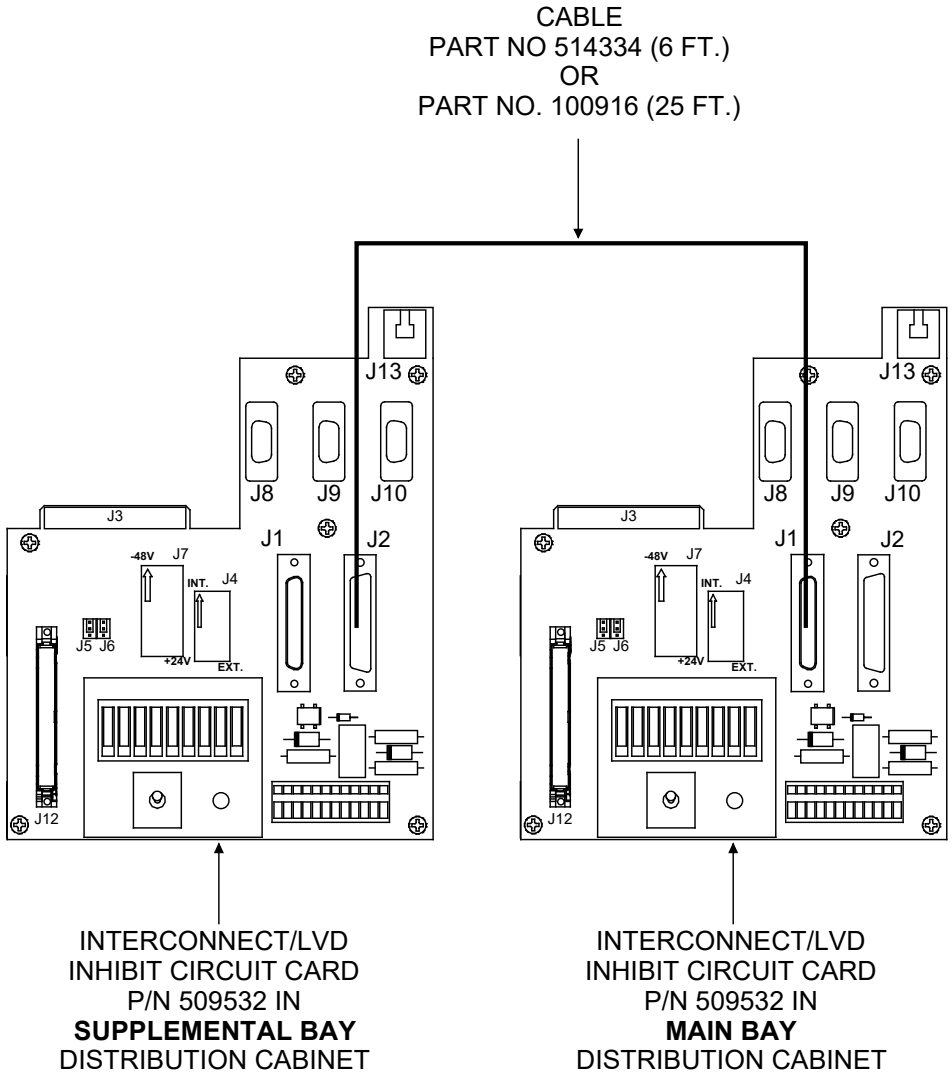
- Cable P/N 514334 is provided with List 2 (6' cable).
- Cable P/N 100916 is provided with List 5 (25' cable).

NOTE! *Connector J2 on the Interconnect/LVD Inhibit circuit card in the Main Bay is not used.*

[ ] 4. If no more connections required: For each bay in the power system, reinstall the clear plastic cover in the bottom of the cabinet. To do so, place the cover on its two mounting posts so that the mounting screw heads pass through the keyhole slots in the cover. Slide the cover towards the back. Tighten the two screws.

[ ] 5. If no more connections required: For each bay in the power system, close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

Figure 28: *MCA Distribution Control Signal' Cable Connections Between Bays*



Installing Bay-To-Bay Busbars (List 2 Only)

When List 2 is ordered, Bay-to-Bay Busbars and hardware are provided for system power connections between Distribution Cabinets. Interconnect per **Figure 29A**.

Figure 29A: *Installing Bay-To-Bay Busbars (List 2 Only) (cont'd on next page)*

Note: Upper and lower busbars are similar, but not identical. When correctly installed, lower busbar projects farther out from rear of cabinet than upper busbar.

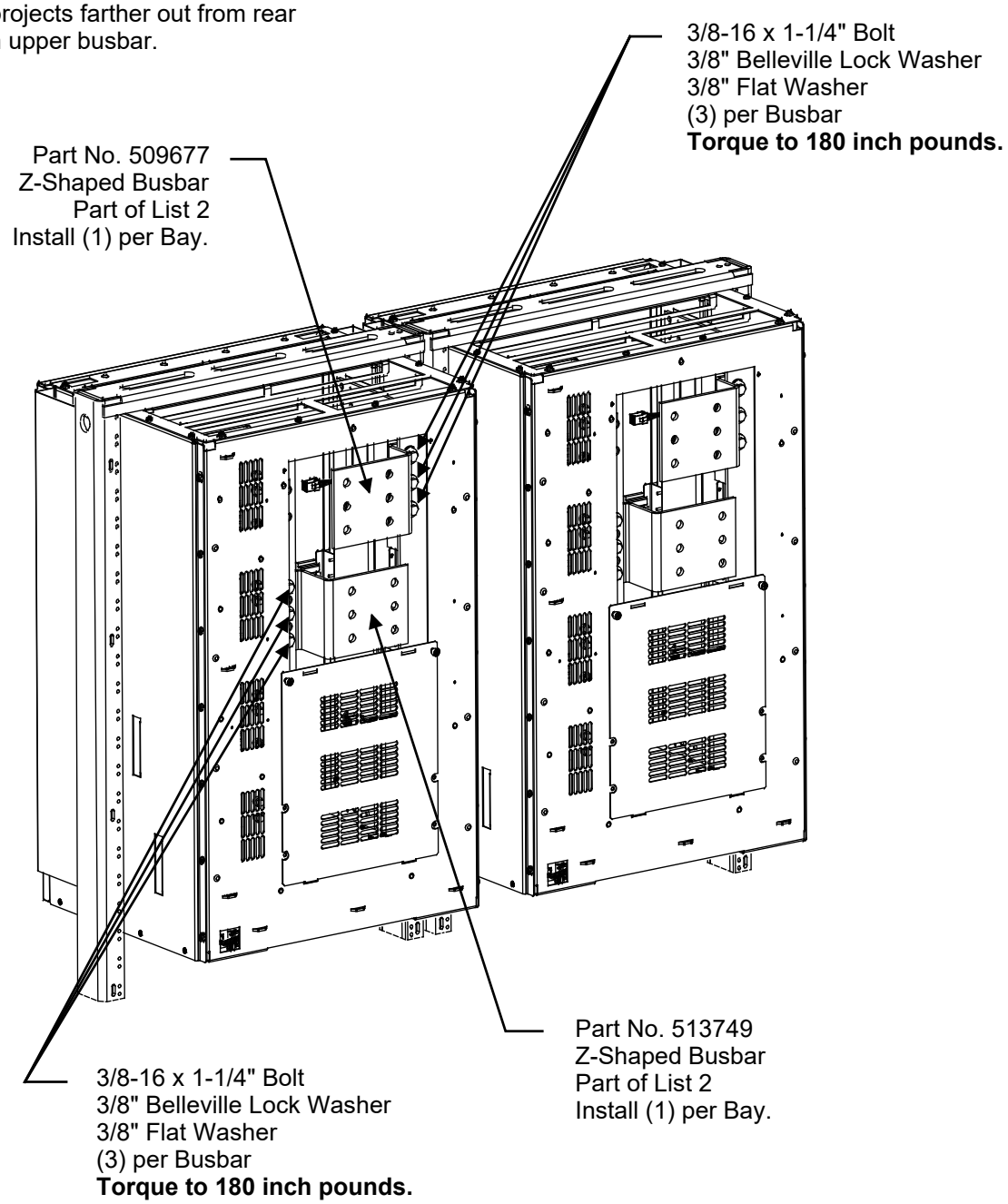
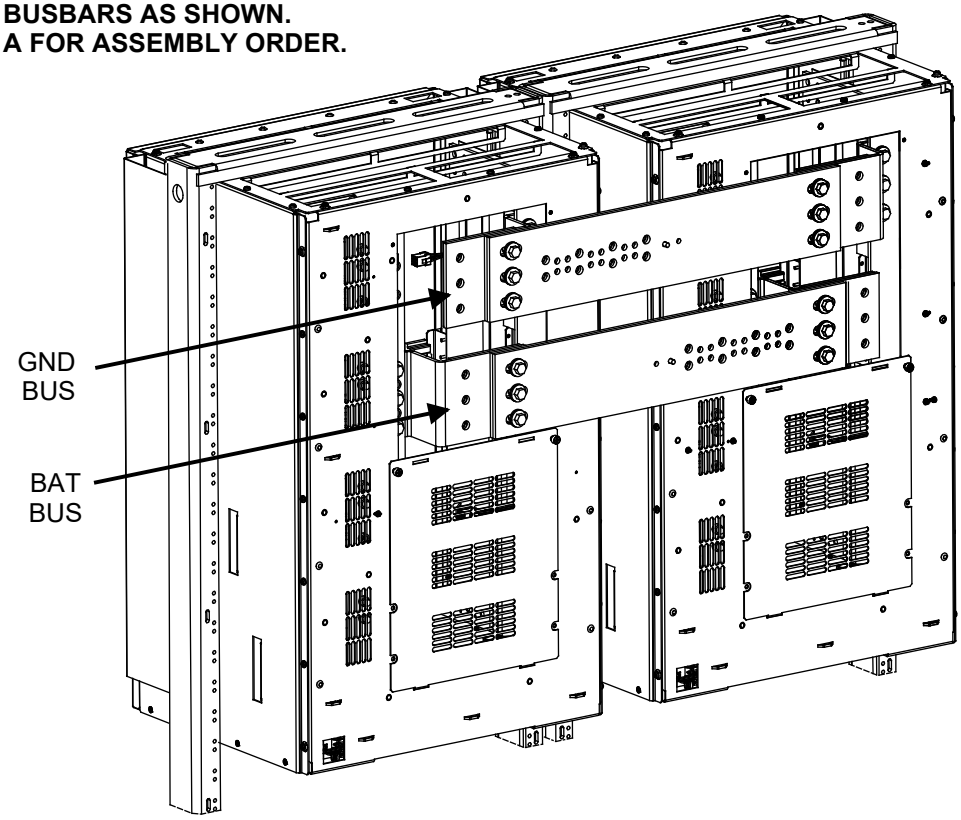
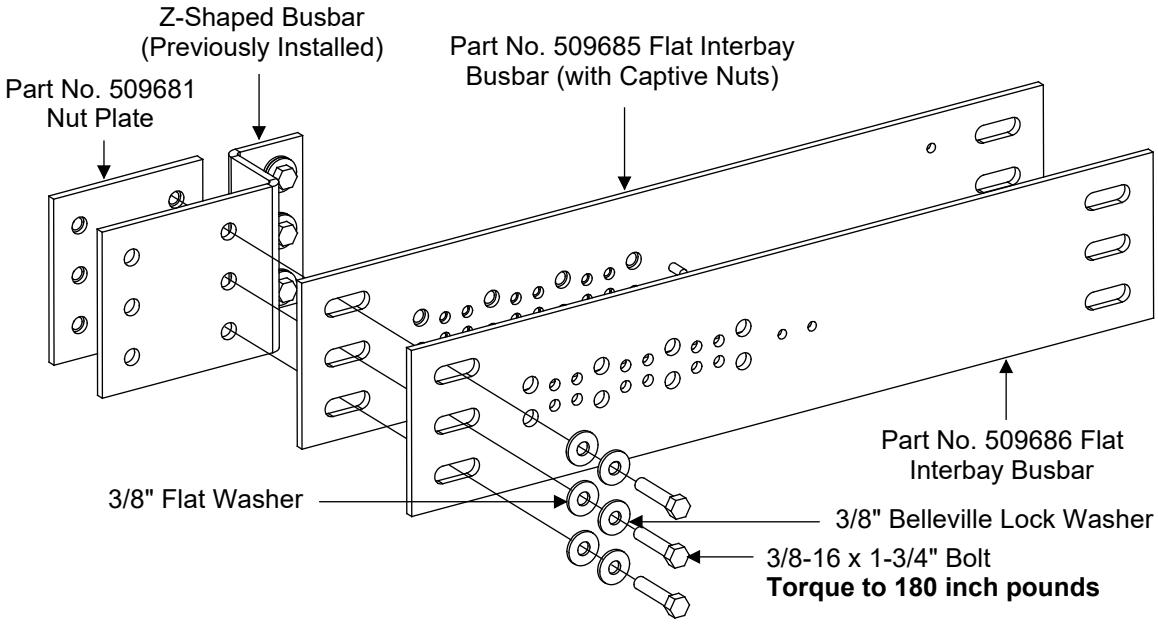


Figure 29B: *Installing Bay-To-Bay Busbars (List 2 Only) (cont'd from previous page)*

ORIENT BUSBARS AS SHOWN.
SEE DETAIL A FOR ASSEMBLY ORDER.



DETAIL A
ASSEMBLY ORDER
(GND BUS SHOWN; BAT BUS SIMILAR)



Cable Connection(s) to the MCA Interface Option

Modem MCA Interface Option Connection (Lists 72 and 74 Only)

When the Modem or RS-232/Modem MCA Interface Option is installed, the remote access phone line is connected to the RJ-11 jack (J1, Modem) located on the Modem or RS-232/Modem circuit card installed in the Main Bay Distribution Cabinet. Refer to **Figure 30** for location.

The MCA can be accessed using WinLink installed on a remote PC.

Procedure

[ ] 1. Open the front door of the Distribution Cabinet by turning and holding the captive fastener in the counterclockwise position.

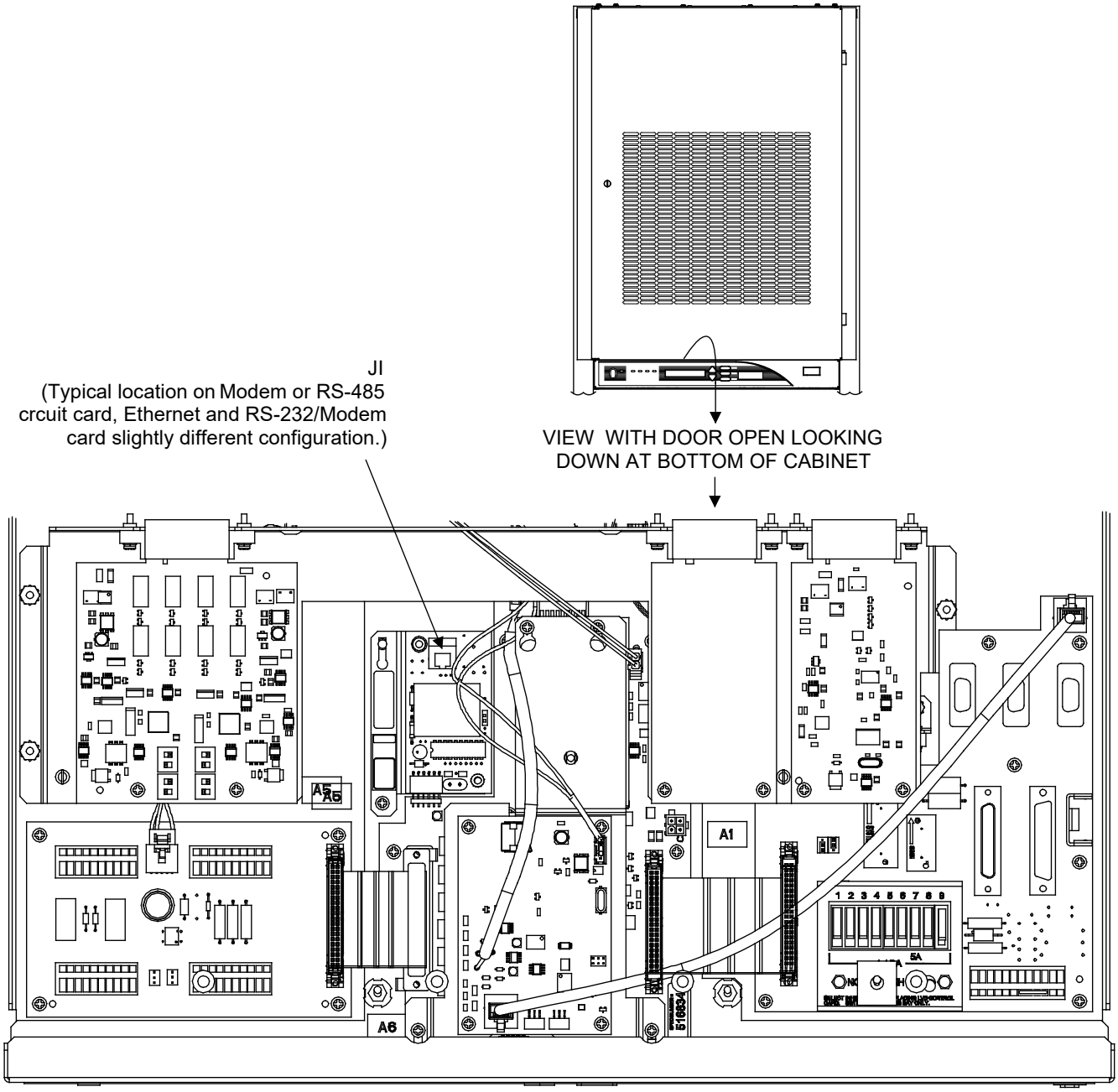
[ ] 2. Remove the clear plastic panel that covers the circuit cards at the bottom of the cabinet. To do so, loosen but do not remove the two screws that secure the cover. Slide the cover to the front until the screw heads clear the keyhole slots in the cover. Then lift the cover out of the cabinet.

[ ] 3. Connect a cable from the RJ 11 connector (J1, Modem) located on the Modem circuit card installed in the Main Bay Distribution Cabinet to a phone line dedicated to this MCA.

[ ] 4. Reinstall the clear plastic cover in the bottom of the cabinet. To do so, place the cover on its two mounting posts so that the mounting screw heads pass through the keyhole slots in the cover. Slide the cover towards the back. Tighten the two screws.

[ ] 5. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

Figure 30: *MCA Interface Option Connector Locations and Identification*



RS-232 MCA Interface Option Connection (List 74 Only)

When the RS 232/Modem MCA Interface Option is installed, a remote access PC can be connected to the 9-pin female D Type connector located on the front of the Main Distribution Cabinet. Refer to **Figure 31** and **Table 5** f for connector pin-outs.

With the RS 232/Modem MCA Interface Option installed, maximum recommended cable length is 100 feet.

The MCA can be accessed using WinLink installed on the remote PC.

Procedure

[ ] 1. Connect a cable from the 9-pin female D-Type connector, located at the right-hand side of the Main Distribution Cabinet front panel, to a PC running WinLink.

Figure 31: *Front Panel RS-232 Port (if furnished)*

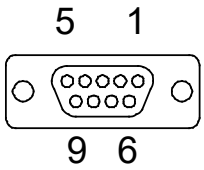


Table 5: *Front Panel RS-232 Port Pinouts (if furnished)*

RS-232 Port Pin	Application
1	--
2	Transmitted Data (TxD)
3	Received Data (RxD)
4	Data Set Ready (/DSR)
5	Signal Ground (GND)
6	Data Terminal Ready (/DTR)
7	Clear to Send (/CTS)*
8	Request to Send (/RTS)*
9	--

* Hardware Handshake Signal (when RTS/CTS Hardware Handshake Enabled)

Ethernet MCA Interface Option Connection (Lists 75-78 Only)

Perform the procedure under *Setting Up the MCA Ethernet Option* in "INSTALLING THE RECTIFIER MODULE AND INITIALLY STARTING THE SYSTEM" to program the IP parameters into the MCA Ethernet card. If you installed an MCA Ethernet card that supports SNMP, you will also set the SNMP parameters when you perform the procedure.

The MCA is connected to the customer's network running TCP/IP via the RJ-45 10BaseT jack located on the MCA Ethernet circuit card installed in the Main Distribution Cabinet, labeled "J1, Ethernet". Refer to **Figure 30** for location. Jack pin configuration is a standard Ethernet scheme, twisted pair.

NOTE! *Use shielded Ethernet cable (grounded at both ends). Note that the MCA RJ-45 jack is connected to chassis ground.*

Note that a Front Access Ethernet Connector Kit P/N 525110 may be installed, allowing you to make the Ethernet cable connection at the front of the MCA Panel.

The MCA can be accessed via a Web-Browser from the PC or via Modbus® TCP. An Ethernet Interface option is also available that adds SNMP support and Battery Monitoring.

Procedure

[ ] 1. Open the front door of the Distribution Cabinet by turning and holding the captive fastener in the counterclockwise position.

[ ] 2. Remove the clear plastic panel that covers the circuit cards at the bottom of the cabinet. To do so, loosen but do not remove the two screws that secure the cover. Slide the cover to the front until the screw heads clear the keyhole slots in the cover. Then lift the cover out of the cabinet.

[ ] 3. Connect a network cable to the Ethernet connector (J1, Ethernet) located on the Ethernet circuit card in the Main Bay Distribution Cabinet.

[ ] 4. Reinstall the clear plastic cover in the bottom of the cabinet. To do so, place the cover on its two mounting posts so that the mounting screw heads pass through the keyhole slots in the cover. Slide the cover towards the back. Tighten the two screws.

[ ] 5. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

Load Connections to Distribution Cabinet(s)

NOTE! *Refer to System Application Guide SAG581126000 for recommended wire sizes and crimp lugs. Refer also to the SAG for maximum size of wire to connect to the various lug landing points. Refer to drawing 031110100 for lug crimping information. Refer to drawings 031110200 and 031110300 for additional lug information. The SAG and Engineering Drawings can be accessed from the CD (Electronic Documentation Package) furnished with your system. A copy of drawings 031110100, 031110200, and 031110300 are also located in the hardcopy INSTALLATION MANUAL for your convenience.*

Refer to the following table for supplemental lug crimping information when using the special application crimp lug / strap combination.

SUPPLEMENTAL LUG CRIMPING INFORMATION				
Crimp Lug Part No.		Crimp Tool Required[1], T&B Model TBM12 or TBM15 Hydraulic Heads		
		Color Key	Die Index/ Code No.	Die Cat. Number
245393500	Burndy: YA25L-4TCG1	PINK	42H	15508
245393600	Burndy: YA26L-4TCG1	BLACK	45	15526
245393700	Burndy: YA27L-4TCG1	ORANGE	50	15530
245393800	Burndy: YA28L-4TCG1	PURPLE	54H	15511
514872	T & B: 256-30695-1879	YELLOW	62	15510
	Burndy: YA29L-4TCG1			
514873	T & B: 256-30695-1880	RED	71	15514
	Burndy: YA31L-4TCG1			

[1] The lugs should be crimped to the specifications given in the manufacturer's instructions furnished with the crimp tool or lug.

Distribution Assemblies Wiring Illustrations

Table 6 cross-references the List Number of the available Distribution Assemblies with the wiring illustrations provided in this section.

Table 6: *Distribution Bus Assembly Wiring Illustrations*

List No.	See **Figure 32**
P/N 509128	A
AA	B
AB	C
AC	C
AD	D
AE	D
AG	E
AH	E
AJ	E
AK	F
AL	F
AM	G
BA	H
CA	J
CB	C
CD	C
CE	K
CF	K

List No.	See **Figure 32**
CG	E
CJ	E
EA	L
GB	M
JA	N
JB	O
JC	P
JD	Q
KA	R
LB	S
LC	T
NA	U
NB	V
NC	W
ND	X
RA	Y
RB	Y
RC	Z
RD and RE	Z

Connecting Loads to Distribution Assemblies Equipped with Bullet Nose Type Distribution Devices (TPS/TLS Fuses and/or Bullet Nose-Type Circuit Breakers)

Lug-terminated load leads are connected to the individual load busbars located on the Distribution Bus Module and the respective distribution ground busbar. To access these, open the front door of the Distribution Cabinet by turning and holding the captive fastener in the counterclockwise position.

- The individual load busbars provide 1/4 20 threaded holes for installation of customer-provided two-hole lugs that have 5/8 inch centers and 1/4 inch bolt clearance holes. Customer must provide lug mounting bolts and hardware.
- The distribution ground busbar provides 1/4 20 studs for installation of the same type of customer-provided lugs. Customer must provide lug mounting hardware.

Refer to the appropriate detail of **Figure 32** for lug mounting location and identification, as well as recommended torque. Maximum size of wire to be connected to a single position is 2 AWG. When special application crimp lug/strap combination is used, maximum wire size is as listed in SAG581126000.

NOTE! *LOAD A Bus may be arranged with battery disconnect fuse(s)/circuit breakers. Refer to the CIRCUIT DESIGNATION REFERENCE CARDS furnished inside the cabinet's front door for location of any battery disconnect fuse(s)/circuit breakers installed.*

Connecting Loads to Distribution Assemblies Equipped with TPH-Type Distribution Fuse Mounting Blocks and/or GJ/218-Type Distribution Circuit Breaker Mounting Blocks

Lug-terminated load leads are connected to the individual load busbars located on the Distribution Bus Module and the respective distribution ground busbar. To access these, open the front door of the Distribution Cabinet by turning and holding the captive fastener in the counterclockwise position.

- The individual load busbars provide 3/8 16 captive nuts for installation of customer-provided two-hole lugs that have 1 inch centers and 3/8 inch bolt clearance holes. Customer must provide lug mounting bolts and hardware.
- The distribution ground busbar provides 3/8 16 captive nuts for installation of the same type of customer-provided lugs. Customer must provide lug mounting bolts and hardware.

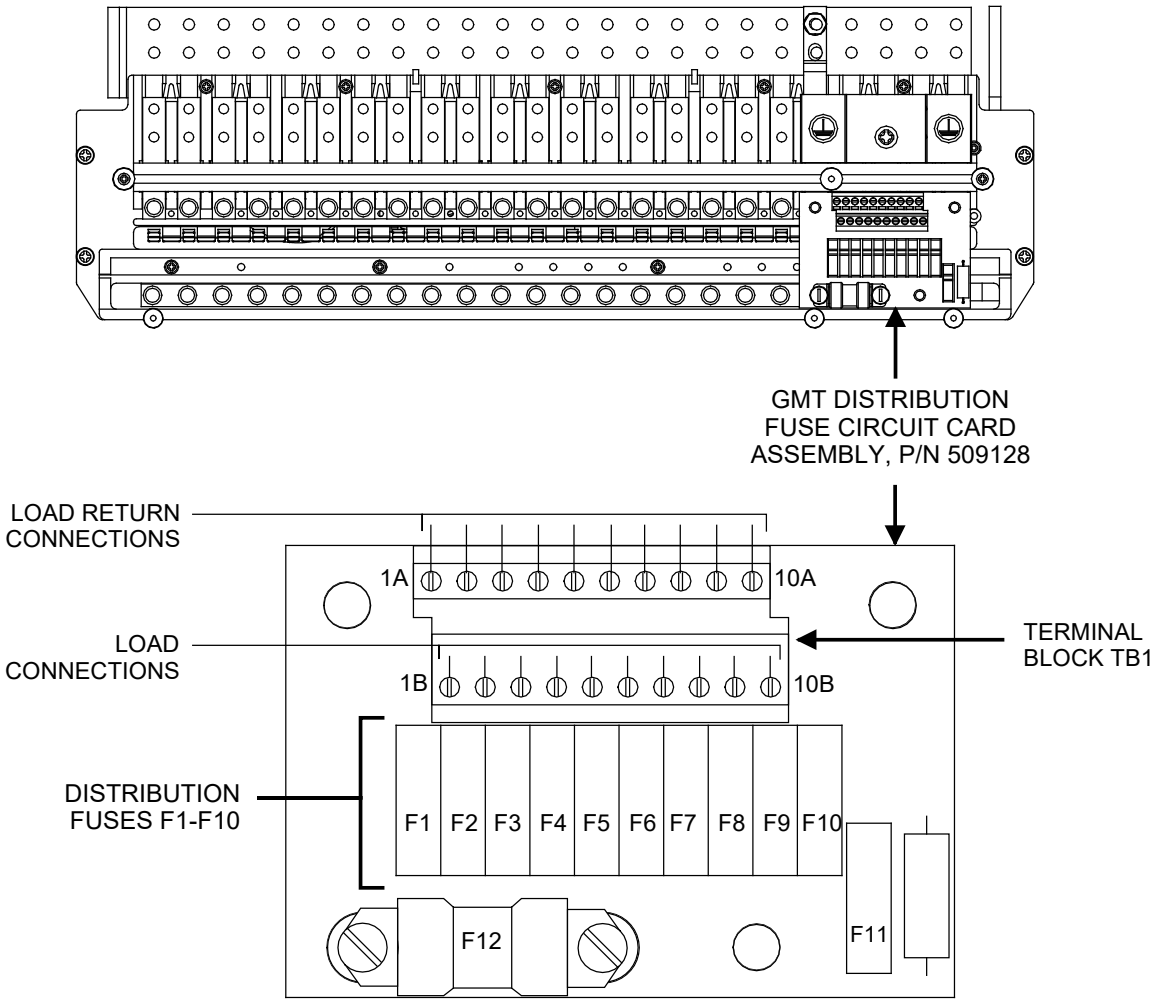
Refer to the appropriate detail of **Figure 32** for lug mounting location and identification, as well as recommended torque.

NOTE! *LOAD A Bus may be arranged with battery disconnect fuse(s)/circuit breakers. Refer to the CIRCUIT DESIGNATION REFERENCE CARDS furnished inside the cabinet's front door for location of any battery disconnect fuse(s)/circuit breakers installed.*

Connecting Loads to a P/N 509128 GMT Fuse Distribution Circuit Card Assembly

Load conductors are connected to terminal block TB1 on the circuit card assembly. To access TB1, open the front door of the Distribution Cabinet by turning and holding the captive fastener in the counterclockwise position. TB1 provides screw clamp type terminals for customer connection. Refer to the appropriate detail of **Figure 32** for location and identification, and for recommended torque.

Figure 32: (*Detail A) Part No. 509128 GMT Fuse Distribution Assembly Load Connections*



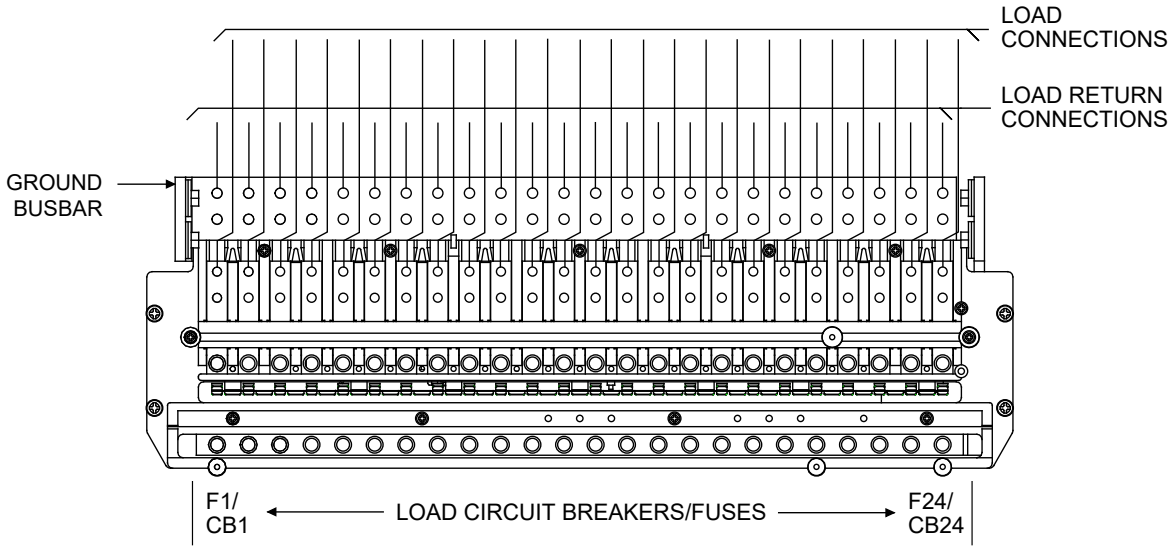
NOTE:

GMT-TYPE FUSE DISTRIBUTION CIRCUIT CARD ASSEMBLY SHOWN IN TYPICAL LOCATION IN TYPICAL BULLET NOSE TYPE DISTRIBUTION ASSEMBLY.

TB1 TERMINALS 1A THROUGH 10A AND 1B THROUGH 10B CORRESPOND TO LOAD FUSES F1 THROUGH F10.

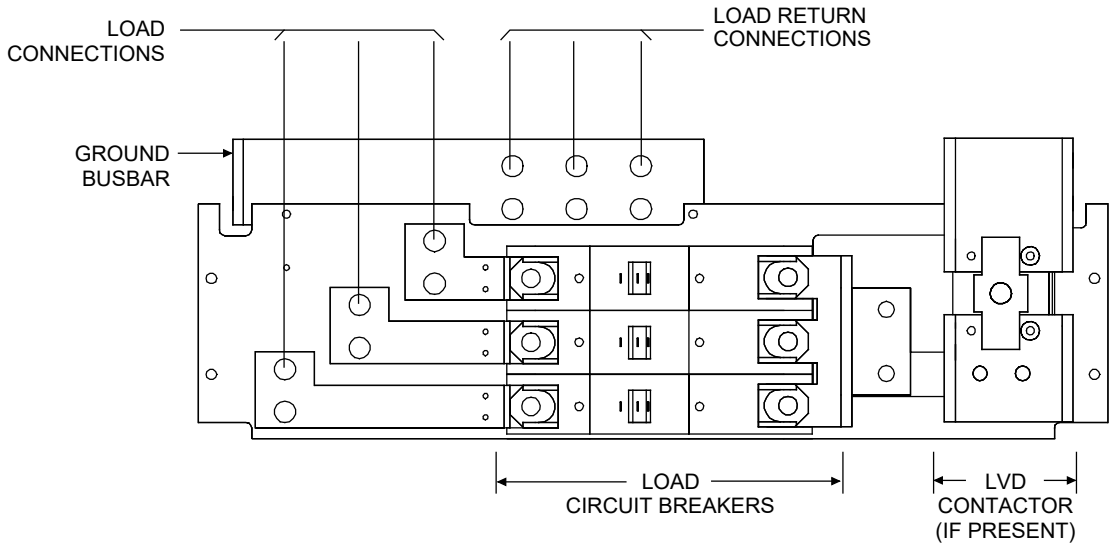
LOAD	LOAD RETURN (GND)	Torque (in-lbs)
Screw Clamp	Screw Clamp	5.0

Figure 32B: *(Detail B) List AA Load Connections*



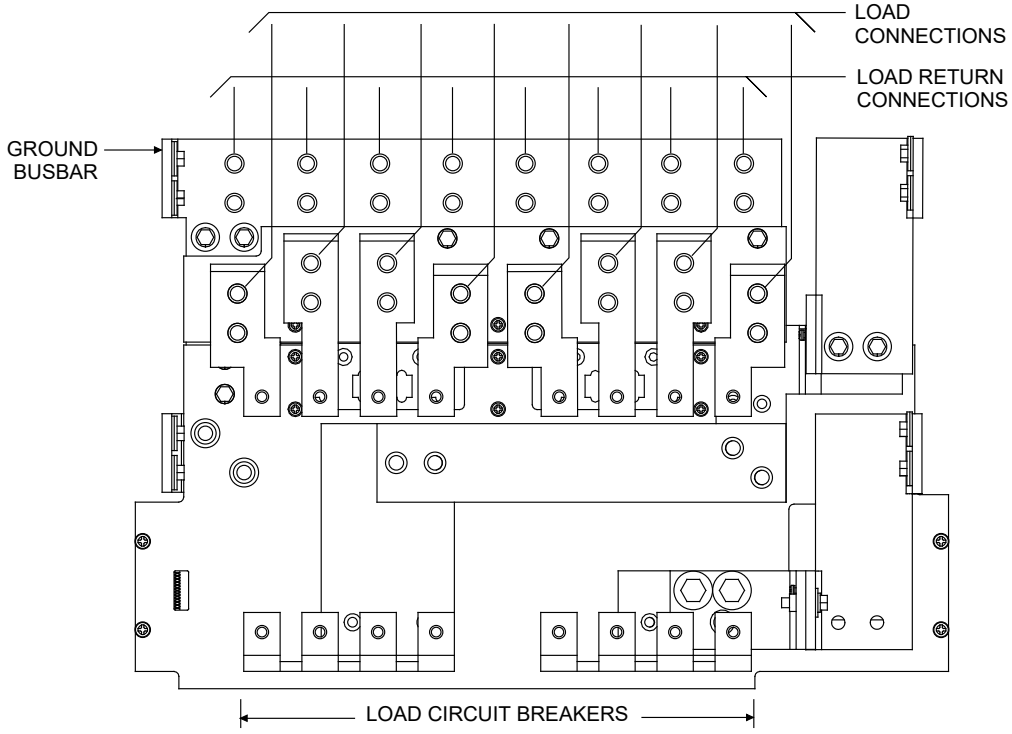
LOAD	LOAD RETURN (GND)	TORQUE (in-lbs)
1/4–20 threaded holes on 5/8" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 3/4".	1/4–20 threaded studs on 5/8" centers. Customer to provide lugs and hardware.	72 (Standard Flat and Lock Washer).

Figure 32C: *(Detail C) List AB, AC, CB, and CD Load Connections*



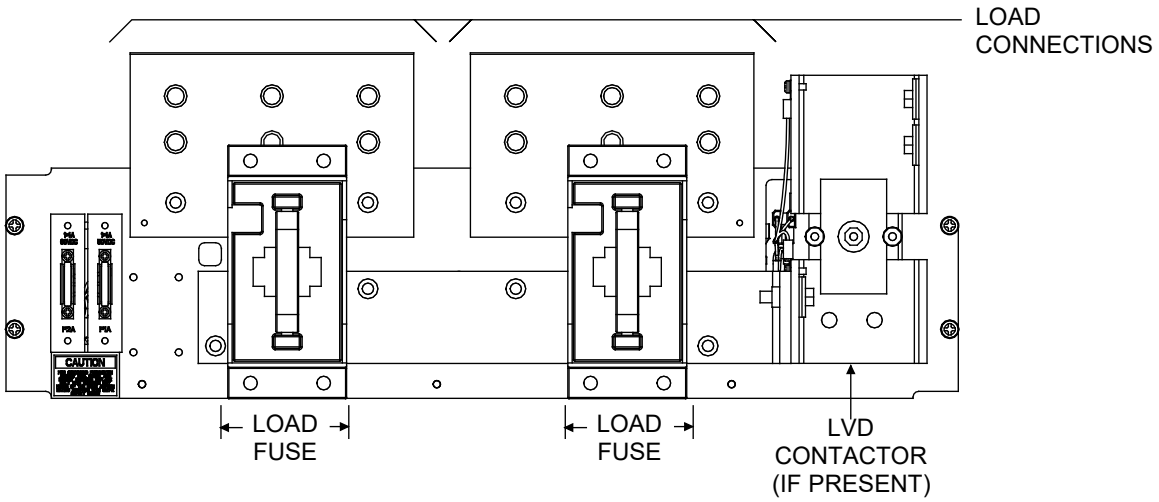
LOAD and LOAD RETURN (GND)	TORQUE (in-lbs)
3/8-16 captive nuts on 1" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 1-1/4".	180 (Belleville Lock Washer). 300 (Standard Flat and Lock Washer).

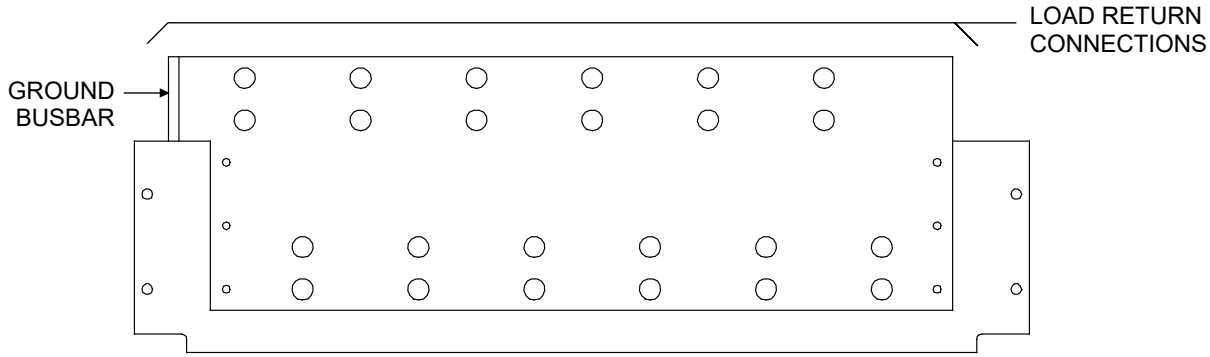
Figure 32D: *(Detail D) List AD or AE Load Connections*



LOAD and LOAD RETURN (GND)	TORQUE (in-lbs.)
3/8-16 captive nuts on 1" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 1-1/4".	180 (Belleville Lock Washer). 300 (Standard Flat and Lock Washer).

Figure 32E: *(Detail E) List AG, AJ, CG or CJ Load Connections List AH Load Return Connections*

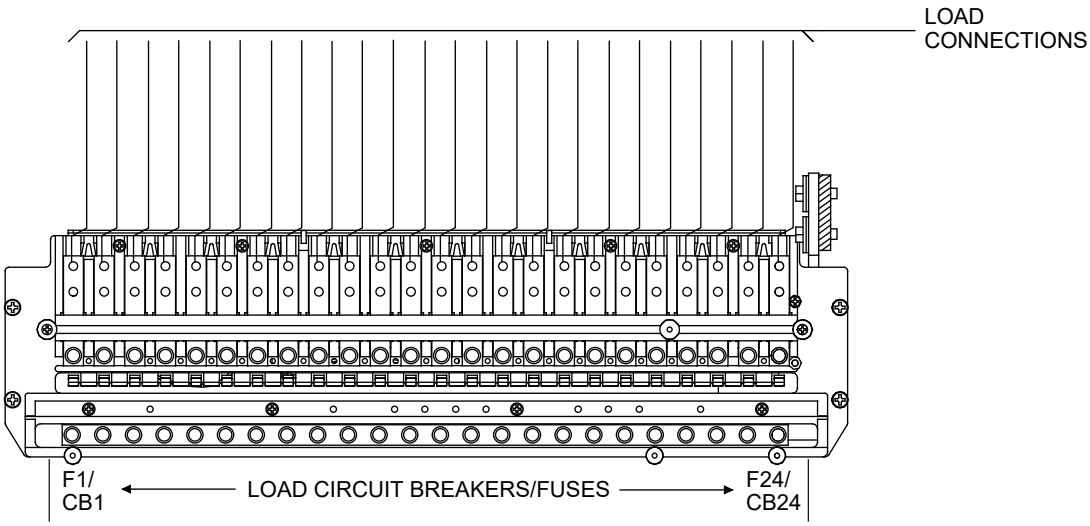




LOAD and LOAD RETURN (GND)	TORQUE (in-lbs)
3/8-16 captive nuts on 1" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 1-1/4".	180 (Belleville Lock Washer). 300 (Standard Flat and Lock Washer).

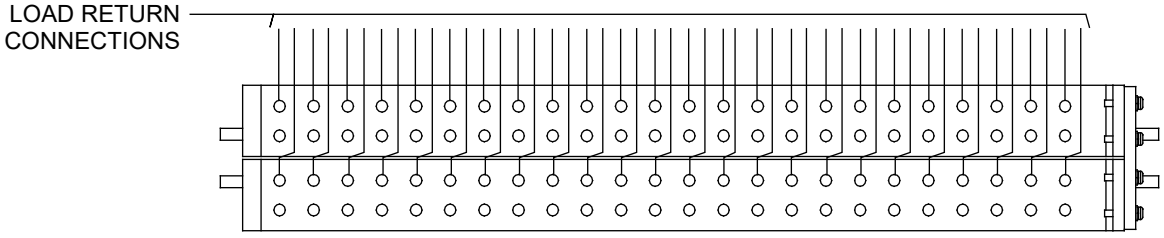
Figure 32F: *(Detail F) List AK Load Connections List AL Load Return Connections*

LIST AK



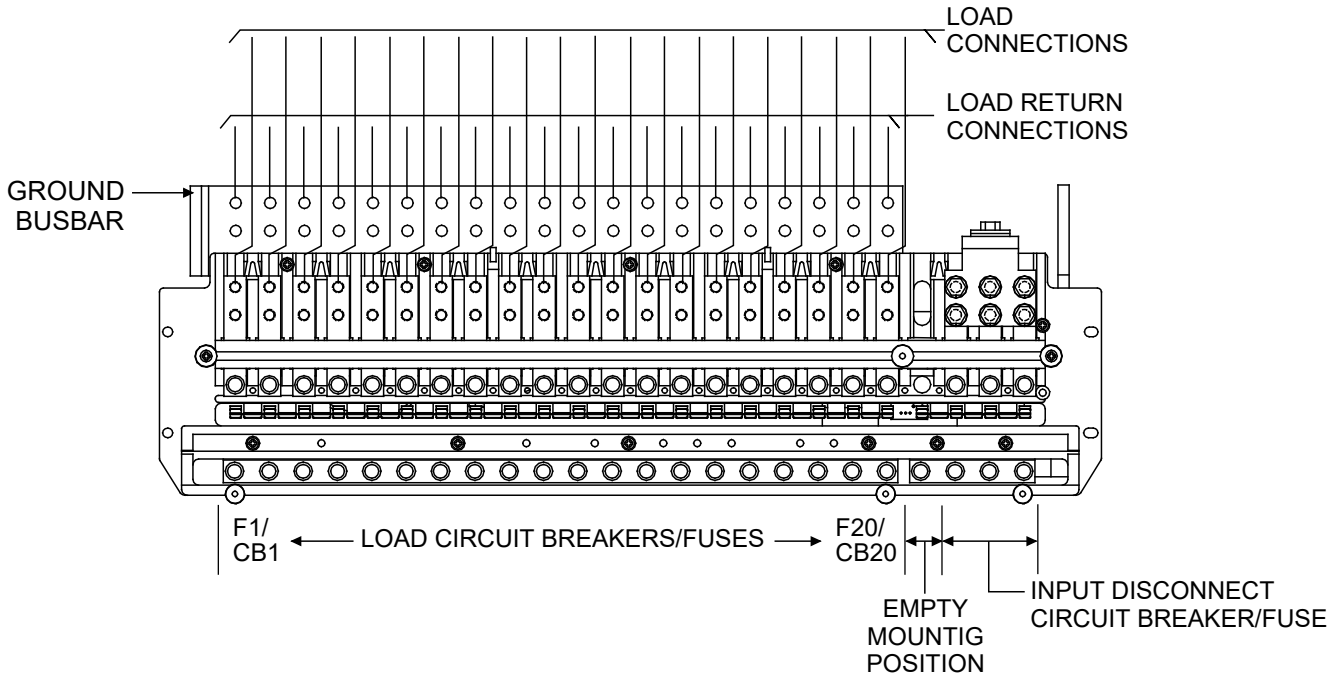
MAKE LOAD RETURN CONNECTIONS TO AN EXTERNAL LOAD RETURN BUS OR TO LIST AL IF PROVIDED.

LIST AL



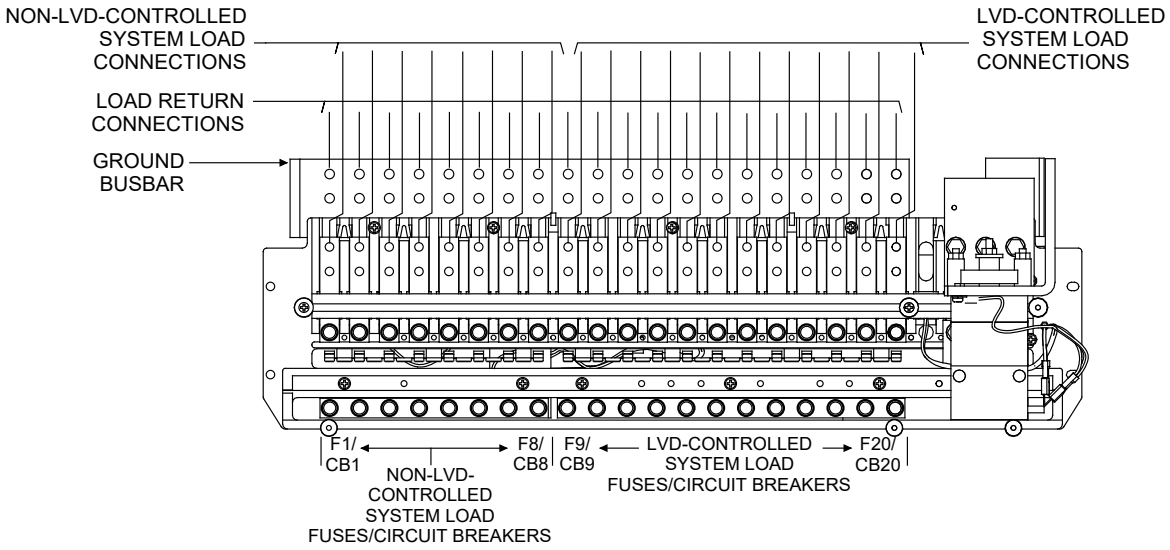
LOAD	LOAD RETURN (GND)	TORQUE (in-lbs)
1/4–20 threaded holes on 5/8” centers. Customer to provide lugs, bolts, and hardware. Bolt length: 3/4".	1/4–20 threaded studs on 5/8” centers. Customer to provide lugs and hardware.	72 (Standard Flat and Lock Washer).

Figure 32G: *(Detail G) List AM Load Connections*



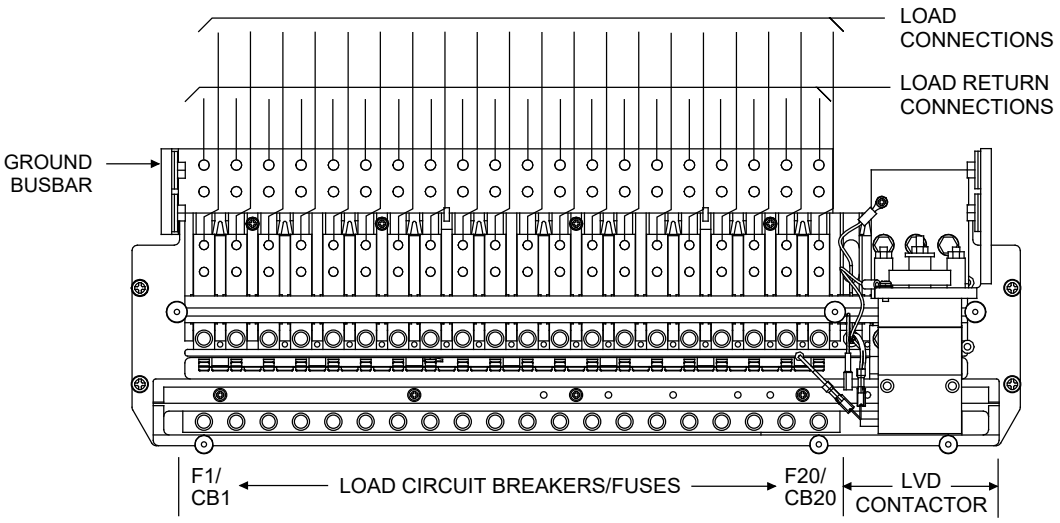
LOAD	LOAD RETURN (GND)	TORQUE (in-lbs)
1/4–20 threaded holes on 5/8" centers Customer to provide lugs, bolts, and hardware. Bolt length: 3/4".	1/4–20 threaded studs on 5/8" centers. Customer to provide lugs and hardware.	72 (Standard Flat and Lock Washer).

Figure 32H: *(Detail H) List BA Load Connections*



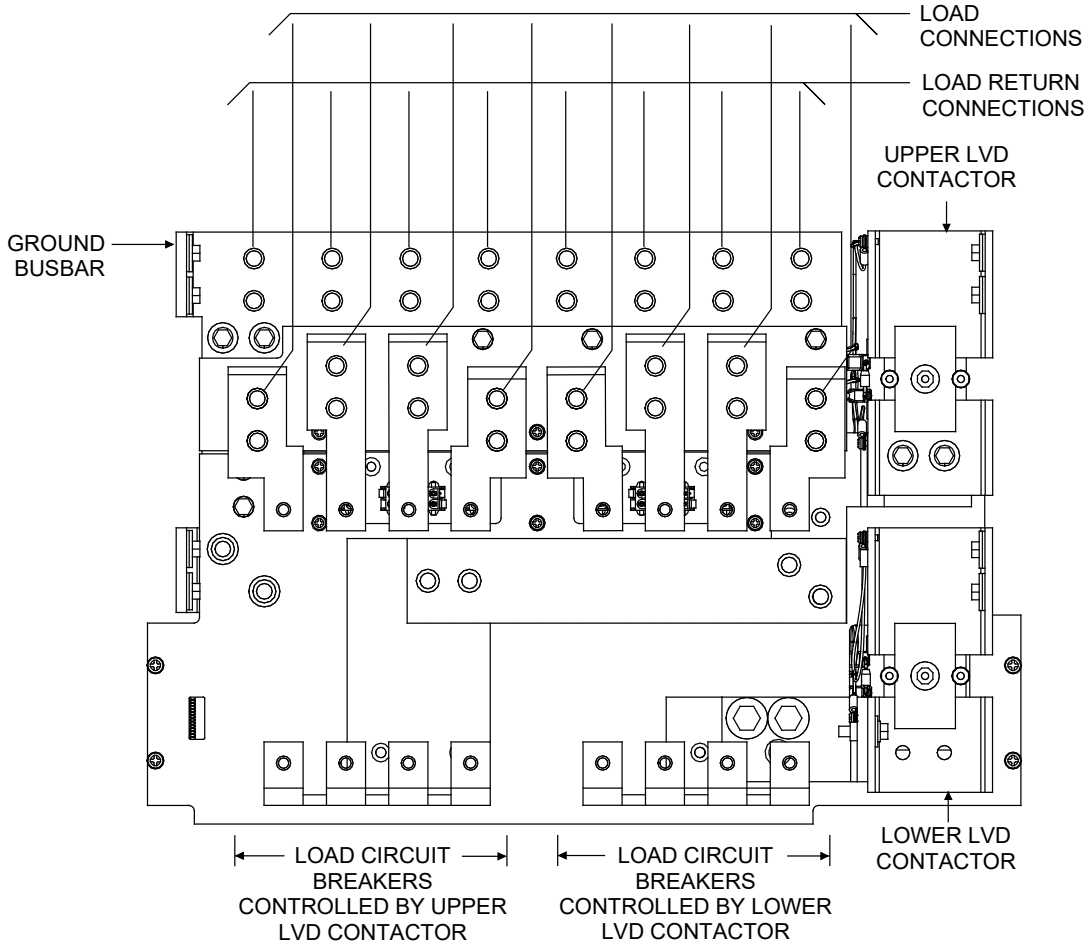
LOAD	LOAD RETURN (GND)	TORQUE (in-lbs)
1/4–20 threaded holes on 5/8" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 3/4".	1/4–20 threaded studs on 5/8" centers. Customer to provide lugs and hardware.	72 (Standard Flat and Lock Washer).

Figure 32J: *(Detail J) List CA Load Connections*



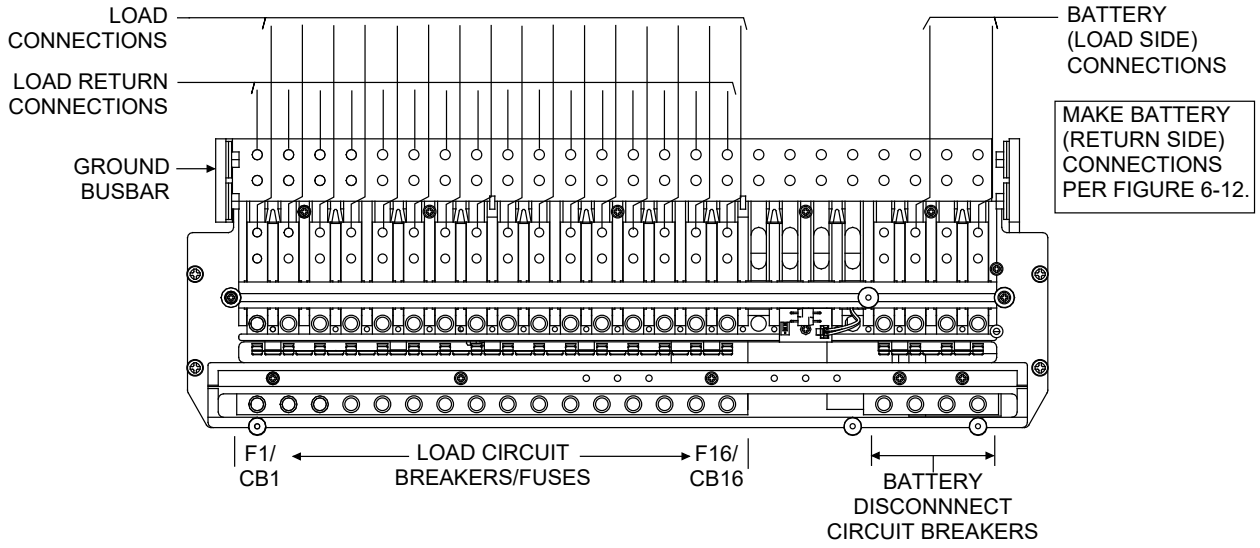
LOAD	LOAD RETURN (GND)	TORQUE (in-lbs)
1/4 –20 threaded holes on 5/8" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 3/4".	1/4–20 threaded studs on 5/8" centers. Customer to provide lugs and hardware.	72 (Standard Flat and Lock Washer)

Figure 32K: *(Detail K) List CE or CF Load Connections*



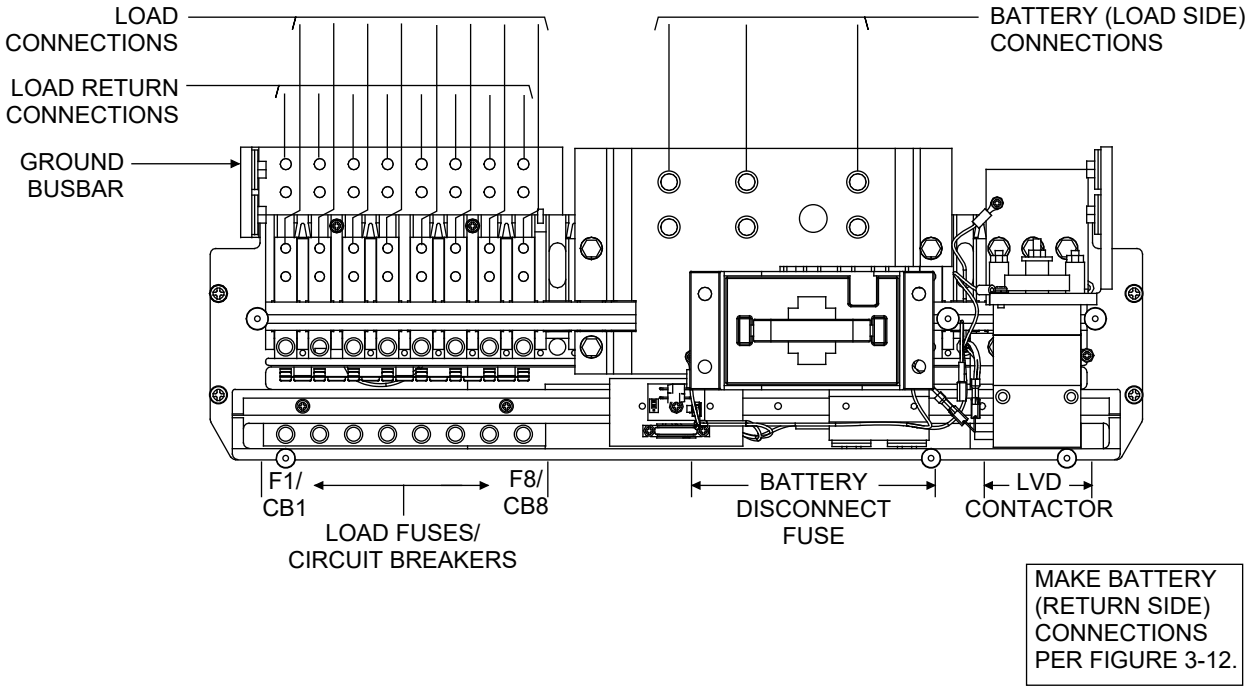
LOAD	LOAD RETURN (GND)	Torque (in-lbs)
1/4 –20 threaded holes on 5/8” centers. Customer to provide lugs, bolts, and hardware. Bolt length: 3/4".	1/4–20 threaded studs on 5/8” centers. Customer to provide lugs and hardware.	72 (Standard Flat and Lock Washer).

Figure 32L: *(Detail L) List EA Load and Battery Connections*



LOAD	LOAD RETURN (GND)	Torque (in-lbs)
1/4 –20 threaded holes on 5/8" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 3/4".	1/4–20 threaded studs on 5/8" centers. Customer to provide lugs and hardware.	72 (Standard Flat and Lock Washer).

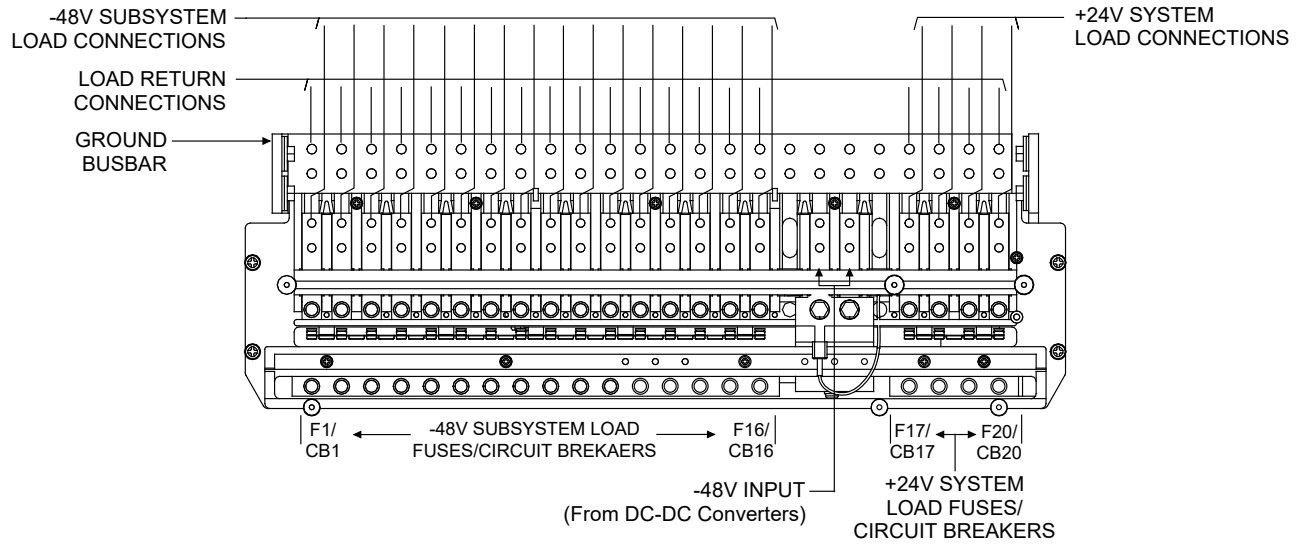
Figure 32M: *(Detail M) List GB Load and Battery Connections*



LOAD	LOAD RETURN (GND)	TORQUE (in-lbs)
1/4–20 threaded holes on 5/8" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 3/4".	1/4–20 threaded studs on 5/8" centers. Customer to provide lugs and hardware.	72 (Standard Flat and Lock Washer)

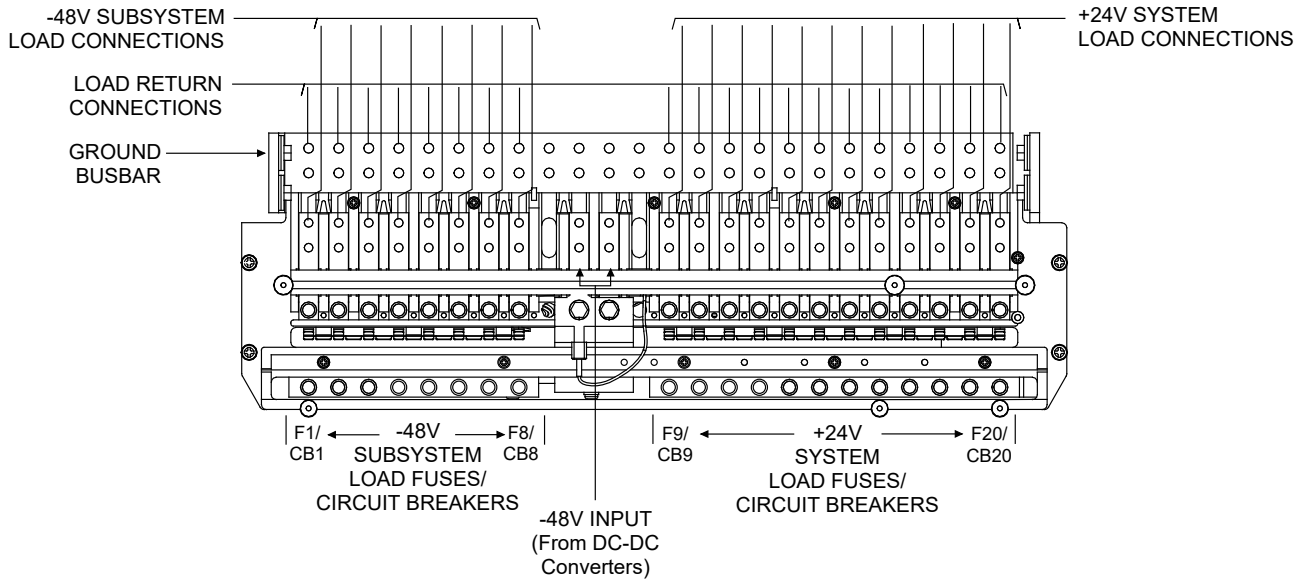
BATTERY (LOAD SIDE)	TORQUE (in-lbs)
3/8-16 captive nuts on 1" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 1-1/4".	180 (Belleville Lock Washer) 300 (Standard Flat and Lock Washer)

Figure 32N: *(Detail N) List JA Load Connections*



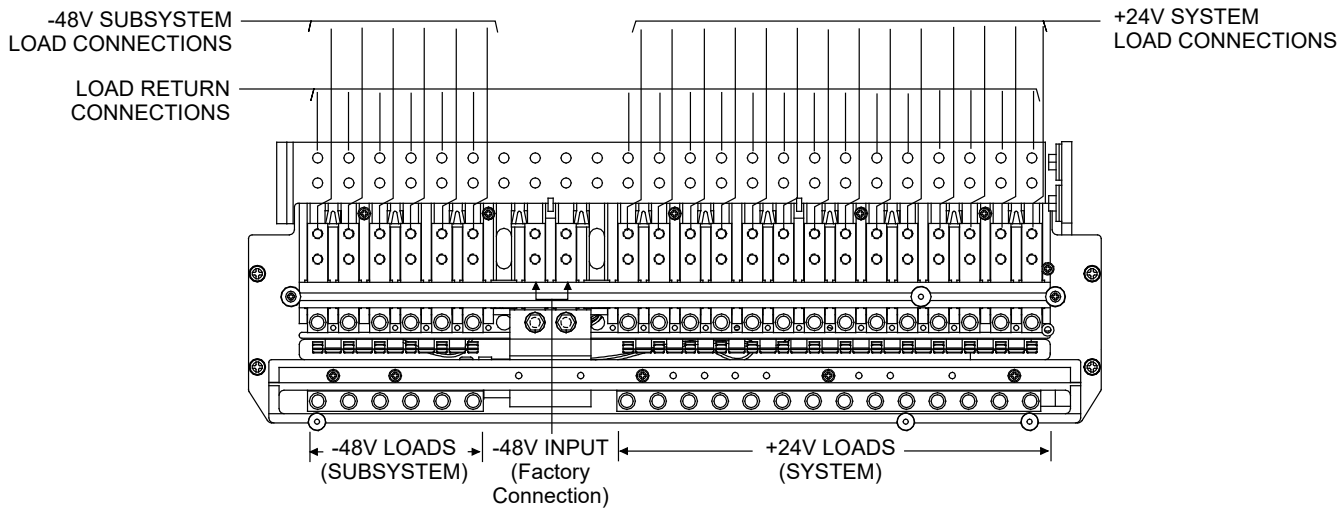
LOAD	LOAD RETURN (GND)	Torque (In. Lbs.)
1/4 –20 threaded holes on 5/8" centers, customer to provide lugs, bolts & hardware. Bolt length: 3/4'"	1/4 –20 threaded studs on 5/8" centers, customer to provide lugs & hardware	72 (Standard flat & lock washers)

Figure 32O: *(Detail O) List JB Load Connections*



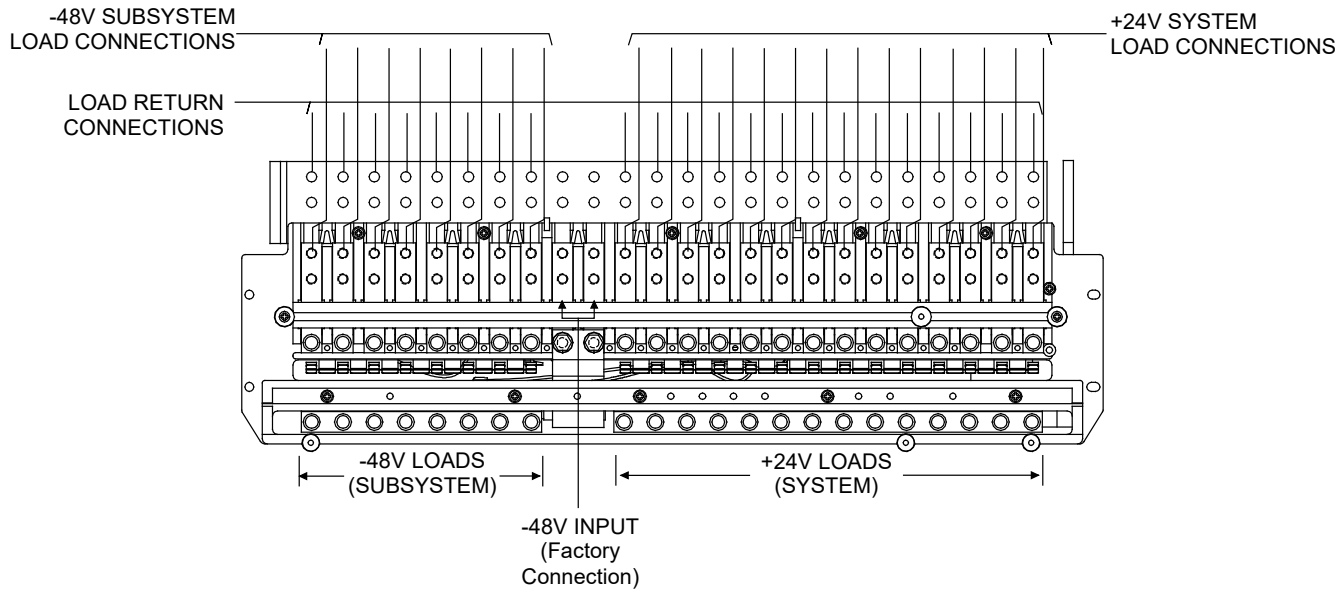
LOAD	LOAD RETURN (GND)	Torque (In. Lbs.)
1/4 –20 threaded holes on 5/8" centers, customer to provide lugs, bolts & hardware. Bolt length: 3/4'"	1/4 –20 threaded studs on 5/8" centers, customer to provide lugs & hardware	72 (Standard flat & lock washers)

Figure 32P: *(Detail P) List JC Load Connections*



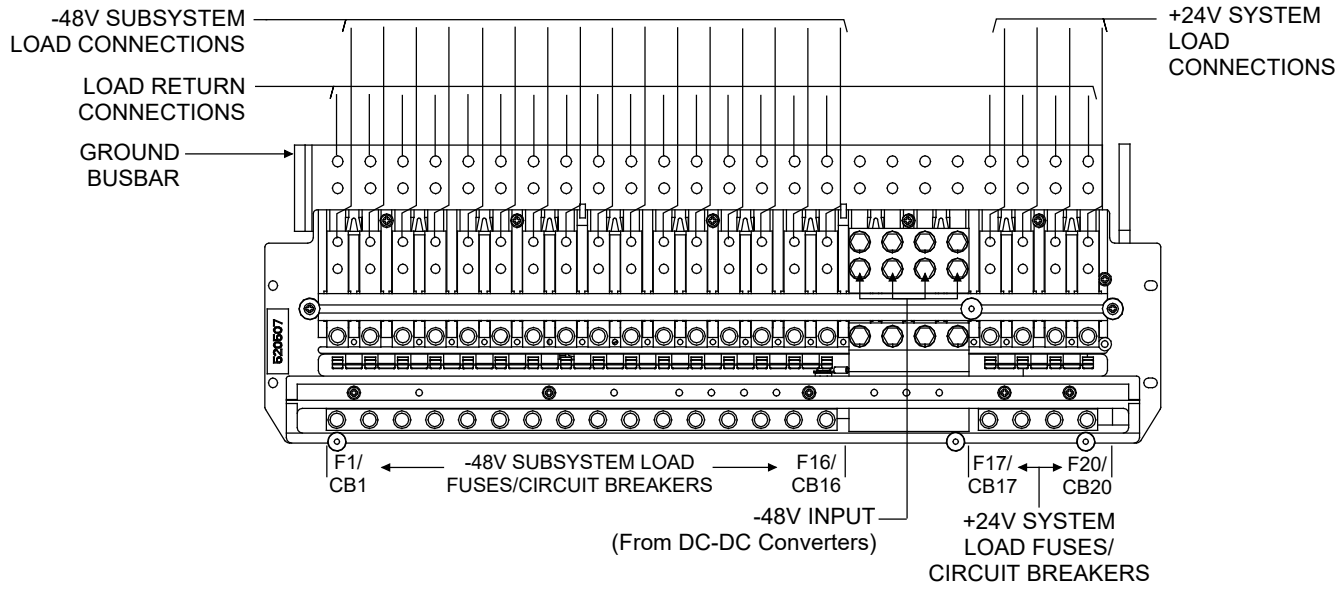
LOAD	LOAD RETURN (GND)	Torque (In. Lbs.)
1/4 –20 threaded holes on 5/8" centers, customer to provide lugs, bolts & hardware. Bolt length: 3/4'"	1/4 –20 threaded studs on 5/8" centers, customer to provide lugs & hardware.	72 (Standard flat & lock washers)

Figure 32Q: *(Detail Q) List JD Load Connections*



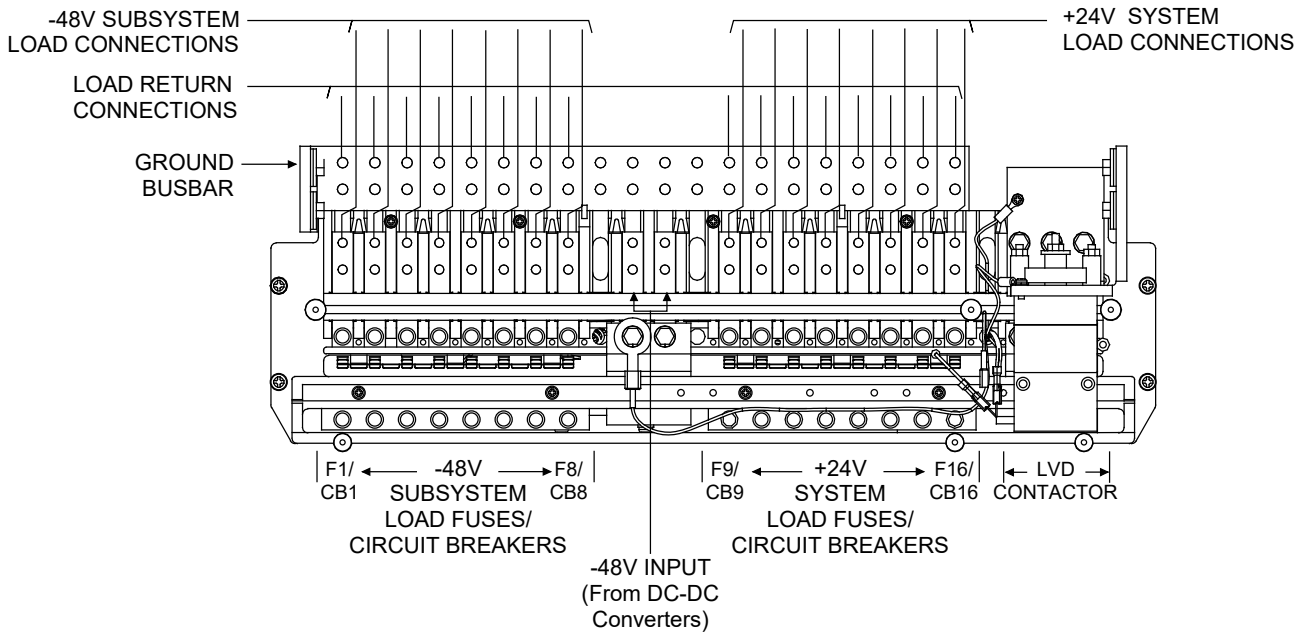
LOAD	LOAD RETURN (GND)	Torque (In. Lbs.)
1/4 –20 threaded holes on 5/8" centers, customer to provide lugs, bolts & hardware. Bolt length: 3/4'"	1/4 –20 threaded studs on 5/8" centers, customer to provide lugs & hardware.	72 (Standard flat & lock washers)

Figure 32R: *(Detail R) List KA Load Connections*



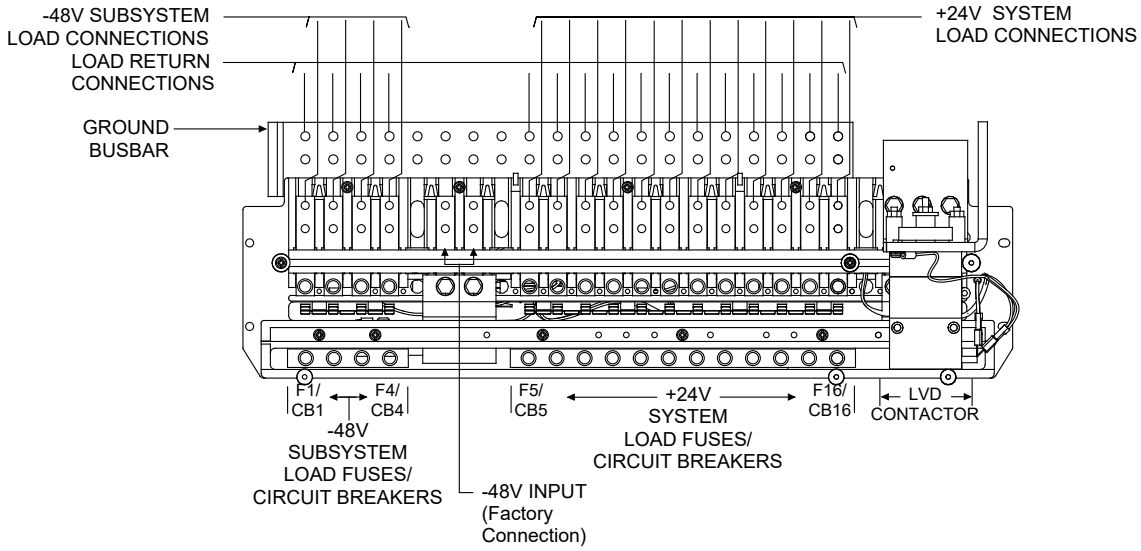
LOAD	LOAD RETURN (GND)	Torque (In. Lbs.)
1/4 –20 threaded holes on 5/8" centers, customer to provide lugs, bolts & hardware. Bolt length: 3/4"'	1/4 –20 threaded studs on 5/8" centers, customer to provide lugs & hardware	72 (Standard flat & lock washers)

Figure 32S: *(Detail S) List LB Load Connections*



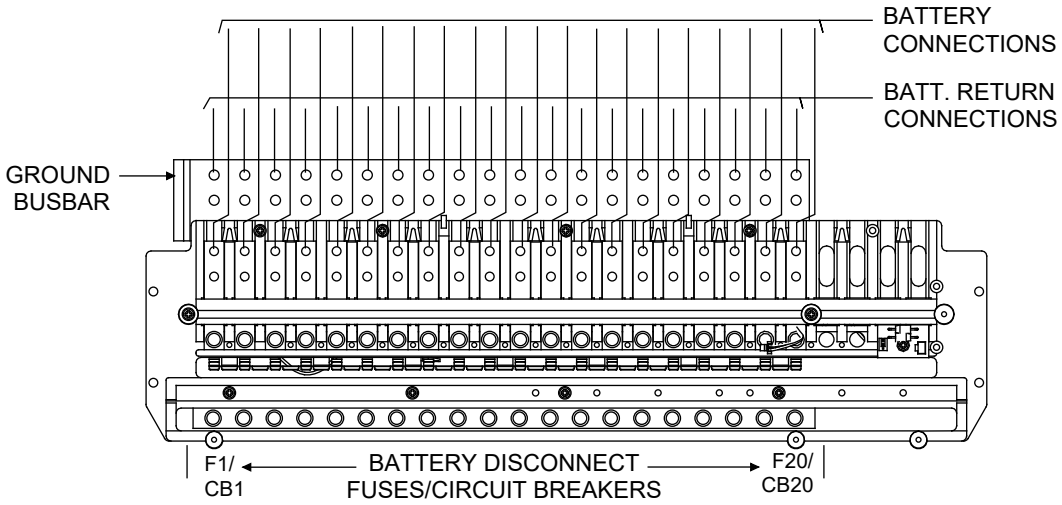
LOAD	LOAD RETURN (GND)	Torque (In. Lbs.)
1/4 –20 threaded holes on 5/8" centers, customer to provide lugs, bolts & hardware. Bolt length: 3/4'"	1/4 –20 threaded studs on 5/8" centers, customer to provide lugs & hardware	72 (Standard flat & lock washers)

Figure 32T: *(Detail T) List LC Load Connections*



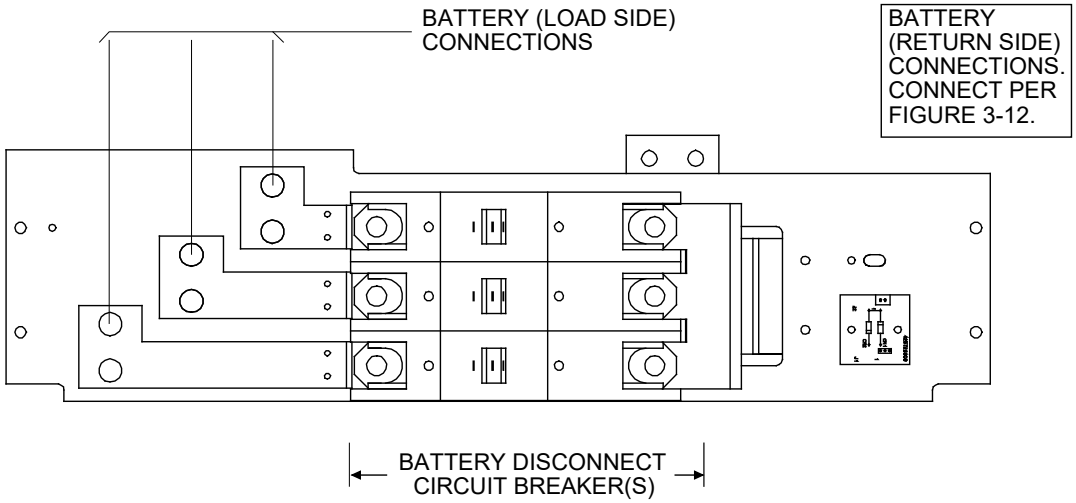
LOAD	LOAD RETURN (GND)	Torque (In. Lbs.)
1/4 –20 threaded holes on 5/8" centers, customer to provide lugs, bolts & hardware. Bolt length: 3/4'"	1/4 –20 threaded studs on 5/8" centers, customer to provide lugs & hardware	72 (Standard flat & lock washers)

Figure 32U: *(Detail U) List NA Battery Connections*



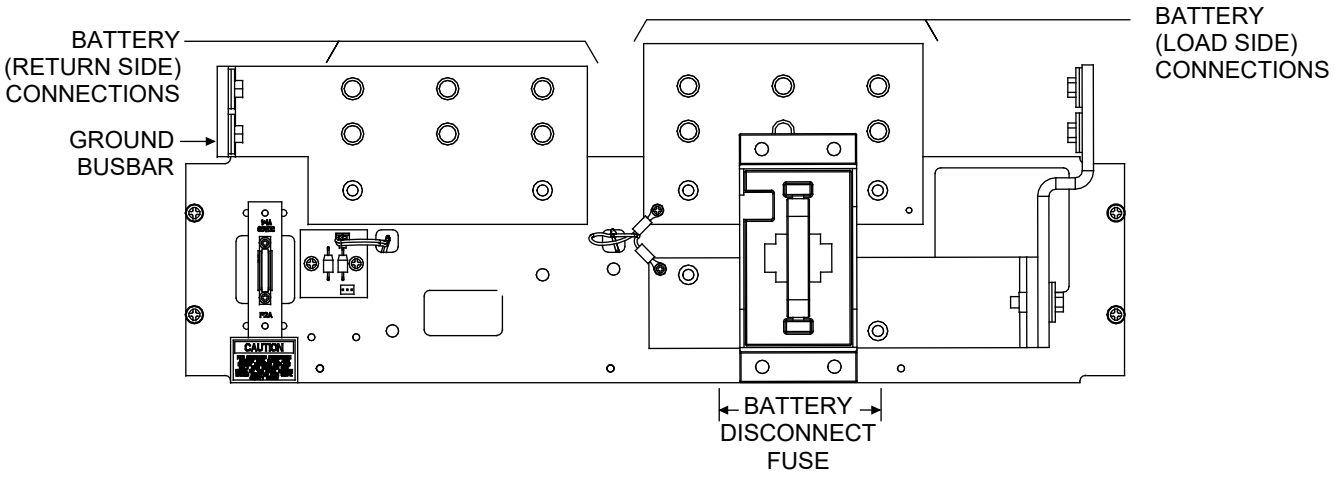
BATTERY	BATTERY RETURN (GND)	TORQUE (in-lbs)
1/4–20 threaded holes on 5/8" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 3/4".	1/4–20 threaded studs on 5/8" centers. Customer to provide lugs and hardware.	72 (Standard Flat and Lock Washer).

Figure 32V: *(Detail V) List NB Battery Connections*



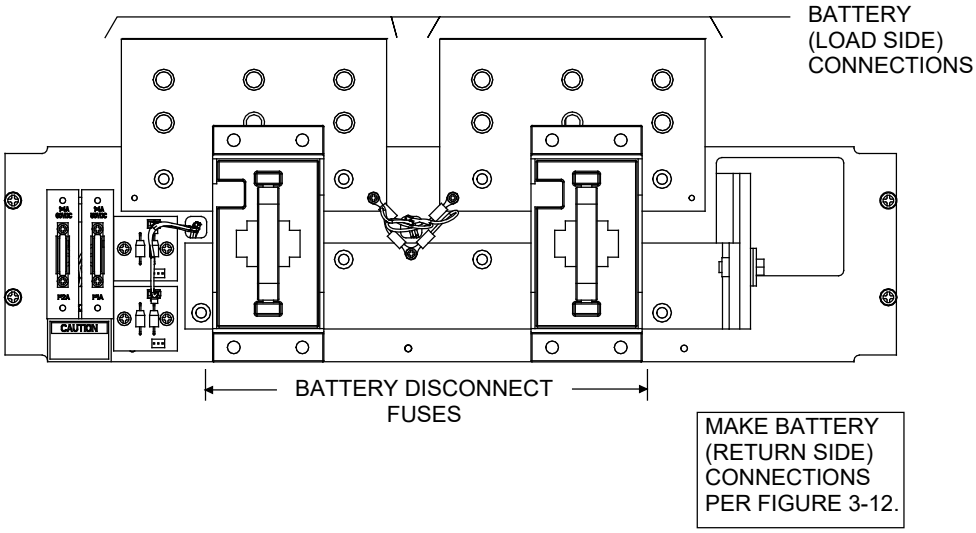
BATTERY (LOAD SIDE)	Torque (in-lbs)
3/8-16 captive nuts on 1" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 1-1/4".	180 (Belleville Lock Washer). 300 (Standard Flat and Lock).

Figure 32W: *(Detail W) List NC Battery Connections*



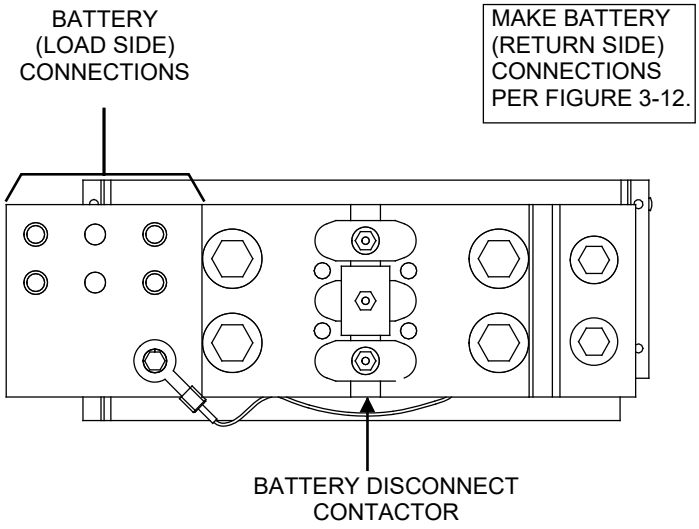
BATTERY (LOAD SIDE)	TORQUE (in-lbs)
3/8-16 captive nuts on 1" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 1-1/4".	180 (Belleville Lock Washer). 300 (Standard Flat and Lock Washer).

Figure 32X: *(Detail X) List ND Battery Connections*



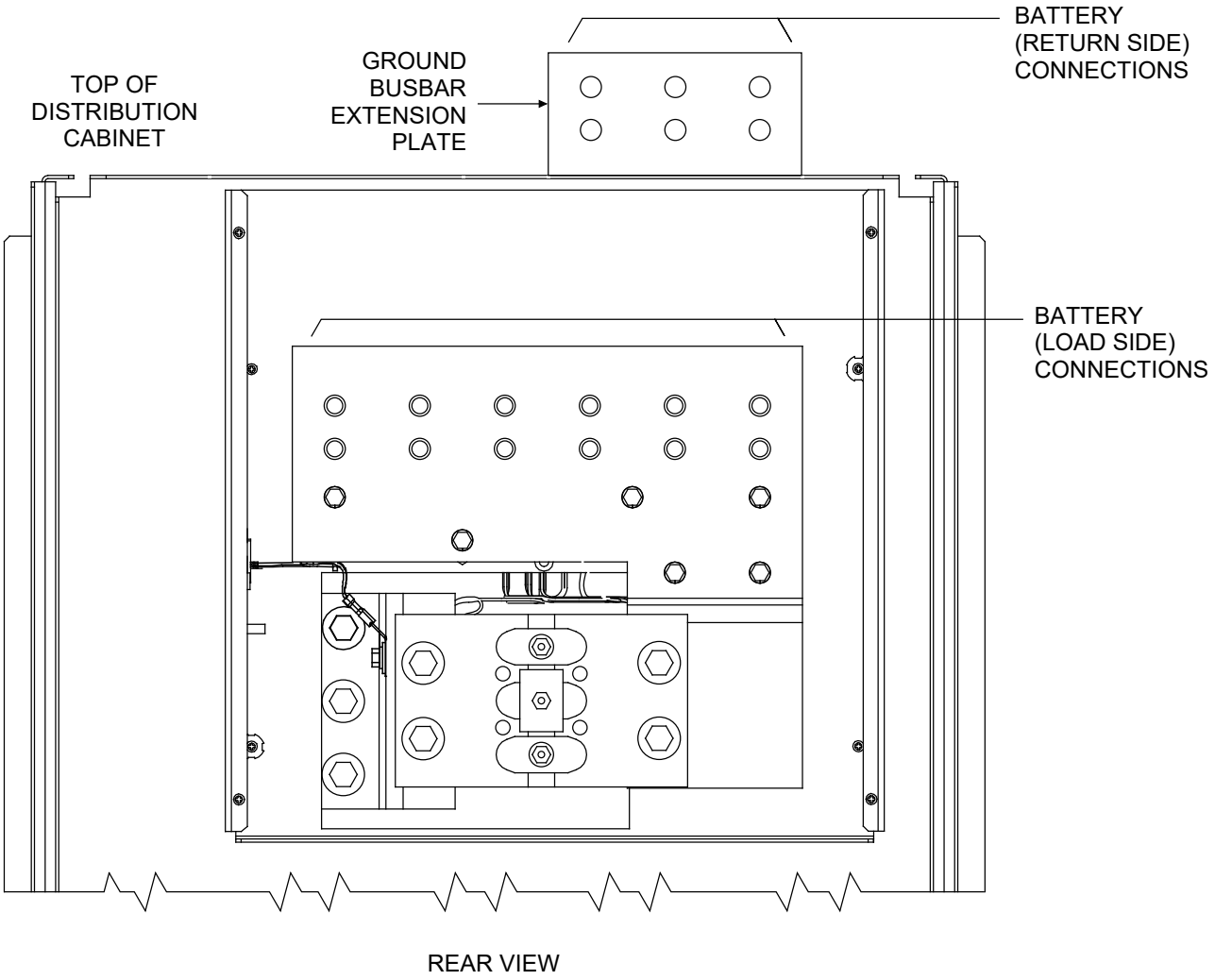
BATTERY (LOAD SIDE)	TORQUE (in-lbs)
3/8-16 captive nuts on 1" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 1-1/4".	180 (Belleville Lock Washer). 300 (Standard Flat and Lock Washer).

Figure 32Y: *(Detail Y) List RA or RB Battery Connections*



BATTERY (LOAD SIDE)	Torque (in-lbs)
3/8-16 captive nuts on 1" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 1-1/4".	180 (Belleville Lock Washer). 300 (Standard Flat and Lock Washer).

Figure 32Z: *(Detail Z) List RC, RD, and RE Battery Connections (List RC shown; List RD and RE similar)*



BATTERY (LOAD SIDE)	Torque (in-lbs)
3/8-16 captive nuts on 1" centers. Customer to provide lugs, bolts, and hardware. Bolt length: 1-1/4".	180 (Belleville Lock Washer). 300 (Standard Flat and Lock Washer).

Connecting List 60 Converter Output Jumpers

NOTE! *If List 60 is not provided, skip this procedure.*

NOTE! *If the power system was ordered in a relay rack, this procedure has been performed at the factory.*

Procedure

[ ] 1. Locate the output jumpers (labeled -48V) supplied with List 60 (P/O kit P/N 540858). There are two (2) cables per List 60.

[ ] 2. Open the front door of the Distribution Cabinet by turning and holding the captive fastener in the counterclockwise position.

[ ] 3. Loosen the (2) screws holding the plastic shield over the circuit breakers or fuseholders on the dual voltage distribution panel. Slide the shield upwards and remove.

[ ] 4. Connect the output jumpers to the distribution bus panel subsystems input terminals as shown in **Figure 33**. Apply electrical anti-oxidizing compound to lug mating surfaces before connecting. Mount two lugs back-to-back per mounting position if required. Torque as shown in the figure.

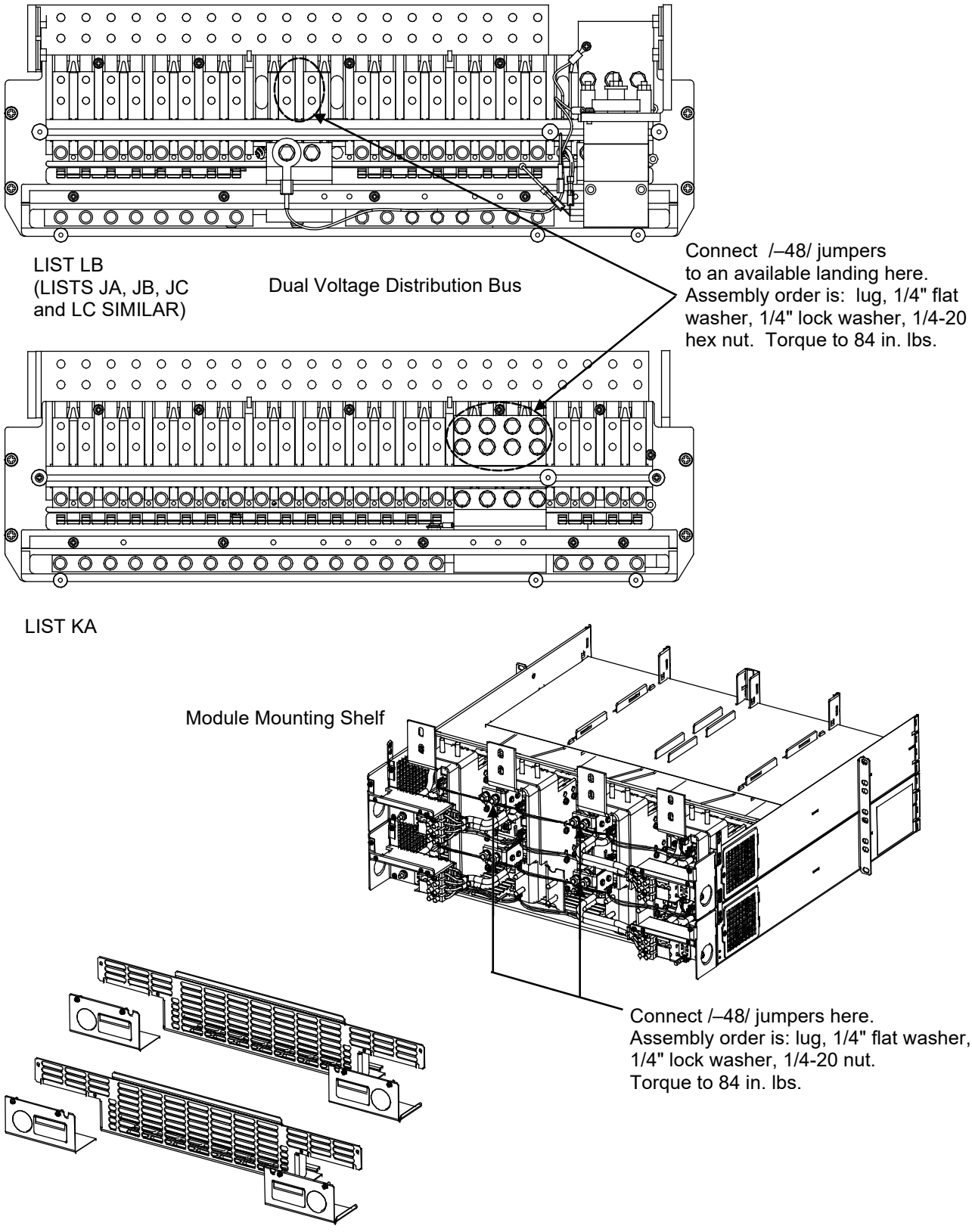
[ ] 5. Route the output jumpers installed in the previous step over the top of the distribution bus panel ground bar, toward the back of the cabinet, and down through the opening in the bottom of the Distribution Cabinet (between the cabinet main busbars).

[ ] 6. Route the output jumpers to the converter output terminals as shown in **Figure 33**.

[ ] 7. Connect the output jumpers to the converter output terminals as shown in **Figure 33**. Apply electrical anti-oxidizing compound to lug mating surfaces before connecting. Torque as shown in the figure.

[ ] 8. Install the plastic shield that was removed in a previous step, over the circuit breakers or fuseholders. To do so, position the shield and slide downwards on screws. Tighten screws.

Figure 33: *Installing Converter Output Cables*



Battery Connections to Power System

DANGER! Although battery voltage is not hazardously high, the battery can deliver large amounts of current. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact a battery terminal or exposed wire connected to a battery terminal. NEVER allow a metal object, such as a tool, to contact more than one termination at a time, or to simultaneously contact a termination and a grounded object. Even a momentary short circuit can cause explosion and injury. Remove watches, rings, or other jewelry before connecting battery leads. Make the DC (battery) connections last. Make all other electrical connections without DC input power applied to the system.

NOTE! *Refer to System Application Guide SAG581126000 for recommended wire sizes and crimp lugs. Refer to drawing 031110100 for lug crimping information. Refer to drawings 031110200 and 031110300 for additional lug information. The SAG and Engineering Drawings can be accessed from the CD (Electronic Documentation Package) furnished with your system. A copy of drawings 031110100, 031110200, and 031110300 are also located in the hardcopy INSTALLATION MANUAL for your convenience.*

There are four methods of connecting the battery, as determined by the bus arrangement and List options specified when the system was ordered.

If NO Internal Battery Disconnect Device is Provided

- Directly to the Battery Busbar and Battery Ground Busbar: Lug-terminated input battery leads are connected to the battery busbar and battery return (ground) busbar located within a Distribution Cabinet. To access these, open the front door of the Distribution Cabinet by turning and holding the captive fastener in the counterclockwise position.

  These busbars are provided with 3/8-16 and 1/4-20 captive nuts for installation of customer provided two hole lugs with 1 or 5/8 inch centers and 3/8 or 1/4 inch bolt clearance holes, respectively. Customer must provide lug mounting bolts and additional hardware. Refer to **Figure 34A**, **Figure 34B**, and **Figure 34C** for lug mounting location and identification, as well as recommended bolt length and torque.

- Directly to Bay-to-Bay Busbars (if power system is equipped with List 2 only): Battery busbars within the Distribution Cabinets are rated for 2000A maximum. For 2000A to 4000A, additional lug-terminated input battery leads should be connected to the bay-to-bay battery busbar and battery return (ground) busbar that link the Distribution Cabinets in List 1 and List 2 bays.

  These busbars are provided with 3/8-16 and 1/4-20 captive nuts for installation of customer provided two hole lugs with 1 or 5/8 inch centers and 3/8 or 1/4-inch bolt clearance holes, respectively. Customer must provide lug mounting bolts and additional hardware. Refer to **Figure 34D** for lug mounting location and identification, as well as recommended bolt length and torque.

If Internal Battery Disconnect Fuses or Circuit Breakers are Provided

- When Distribution Bus Modules Using Bullet Nose-Type Devices (TPS/TLS Fuses and/or Bullet Nose-Type Circuit Breakers) are Provided: Lug-terminated input battery leads are connected to the individual battery busbars located on the Distribution Bus Module and the respective battery return (ground) busbar located in the Distribution Cabinet. To access these, open the front door of the Distribution Cabinet by turning and holding the captive fastener in the counterclockwise position. Refer to the CIRCUIT DESIGNATION REFERENCE CARDS furnished inside the cabinet's front door for location of any battery disconnect fuse(s) or circuit breaker(s) installed.

  Battery Load Side: The individual input battery busbars provide 1/4 20 threaded holes for installation of customer-provided two-hole lugs that have 5/8 inch centers and 1/4 inch bolt clearance holes. Customer must provide lug mounting hardware. Maximum size of wire to be connected to a single breaker/fuseholder mounting position is 2 AWG. When special application crimp lug / strap combination is used, maximum wire size is as listed in SAG581126000. Refer to the appropriate detail of **Figure 34** for lug mounting location and identification, as well as recommended bolt length and torque.

  Battery Return (Ground) Side: The battery return (ground) busbar provides 3/8 16 and 1/4 20 captive nuts for installation of customer-provided two-hole lugs that have 1 or 5/8 inch centers and 3/8 or 1/4 inch bolt clearance holes, respectively. Customer must provide lug mounting bolts and hardware. Refer to the appropriate detail of **Figure 34** for lug mounting location and identification, as well as recommended bolt length and torque.

- When Distribution Bus Modules Using GJ/218 Circuit Breakers or TPH Fuses are Provided: Lug-terminated input battery leads are connected to the individual battery busbars located on the Distribution Bus Module and the respective battery return (ground) busbar located in the Distribution Cabinet. To access these, open the front door of the Distribution Cabinet by turning and holding the captive fastener in the counterclockwise position. Refer to the CIRCUIT DESIGNATION REFERENCE CARDS furnished inside the cabinet assembly's front door for location of any battery disconnect fuse(s) or circuit breaker(s) installed.

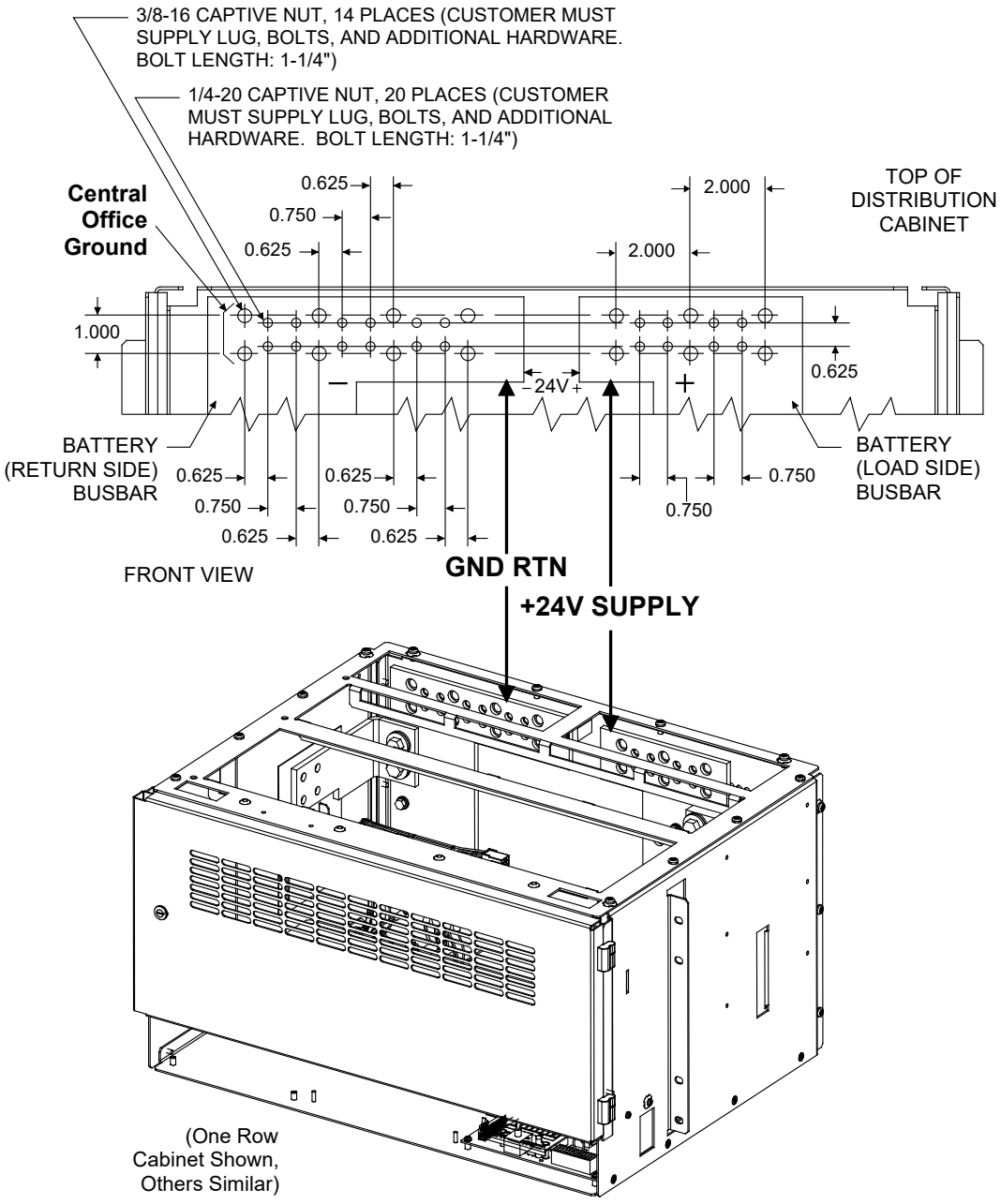
  Battery Load Side: The individual input battery busbars provide 3/8 16 captive nuts for installation of customer-provided two-hole lugs that have 1 inch centers and 3/8 inch bolt clearance holes. Customer must provide lug mounting bolts and hardware. Refer to the appropriate detail of **Figure 34** for lug mounting location and identification, as well as recommended bolt length and torque.

  Battery Return (Ground) Side: The battery return (ground) busbar provides 3/8 16 and 1/4 20 captive nuts for installation of customer-provided two-hole lugs that have 1 or 5/8 inch centers and 3/8 or 1/4 inch bolt clearance holes, respectively. Customer must provide lug mounting bolts and hardware. Refer to the appropriate detail of **Figure 34** for lug mounting location and identification, as well as recommended bolt length and torque.

If an Internal Battery Disconnect Contactor is Provided (List RA, RB, RC, RD, RE)

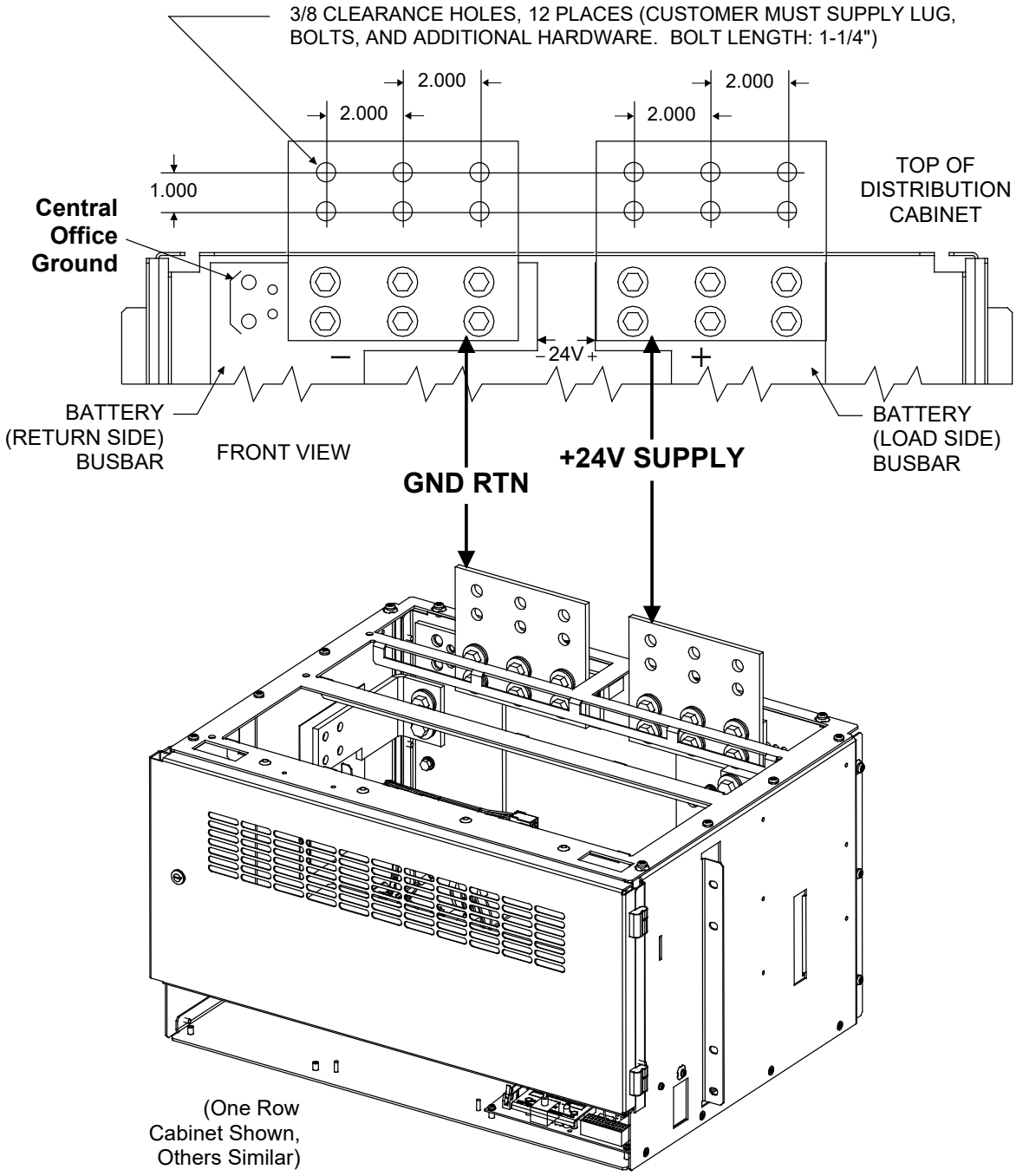
Lug-terminated input battery leads are connected to the battery return (ground) busbar and to the battery disconnect contactor busbar. Connections to List RA and RB are located in the Distribution Cabinet. To access these, open the front door of the Distribution Cabinet by turning and holding the captive fastener in the counterclockwise position. Connections to List RC, RD, and RE are made from the rear of the Distribution Cabinet. To access these, remove a plastic access cover from at the rear of the cabinet by first loosening the four screws that secure it. Refer to the appropriate detail of **Figure 34** for lug mounting location and identification, as well as recommended bolt length and torque.

Figure 34A: *Battery Connections (Up to 1200A) No Battery Disconnect Fuses, Circuit Breakers, or Contactors Provided.*



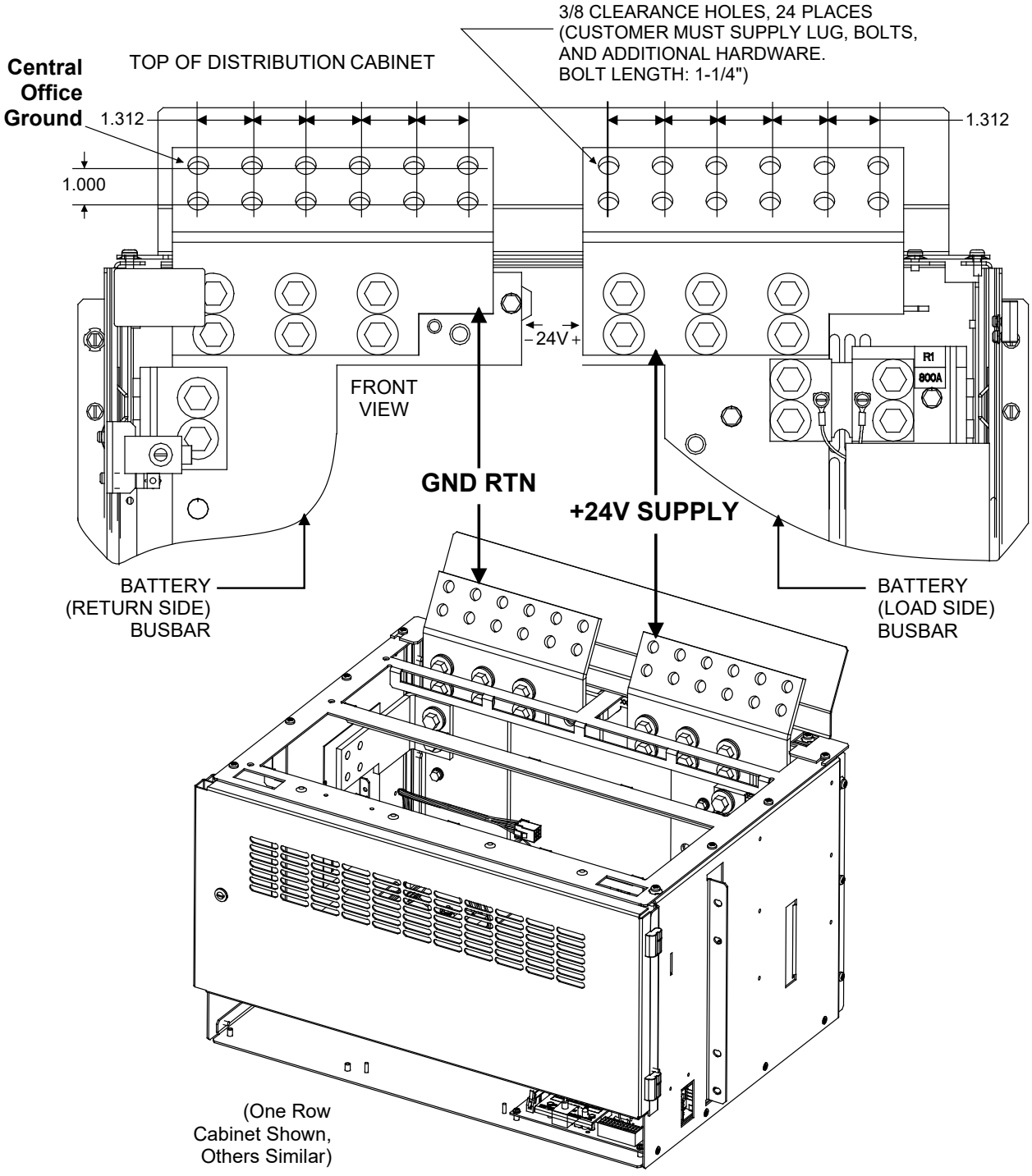
BOLT SIZE	TORQUE (in-lbs.)
1/4–20	72 (Standard Flat and Lock Washer)
3/8-16	180 (Belleville Lock Washer) 300 (Standard Flat and Lock Washer)

Figure 32B: *Battery Connections (1200A to 2000A),* ***Using Battery Busbar Extension Kit (P/N 514713)*** *No Battery Disconnect Fuses, Circuit Breakers, or Contactors Provided. No Interbay Busbars Provided.*



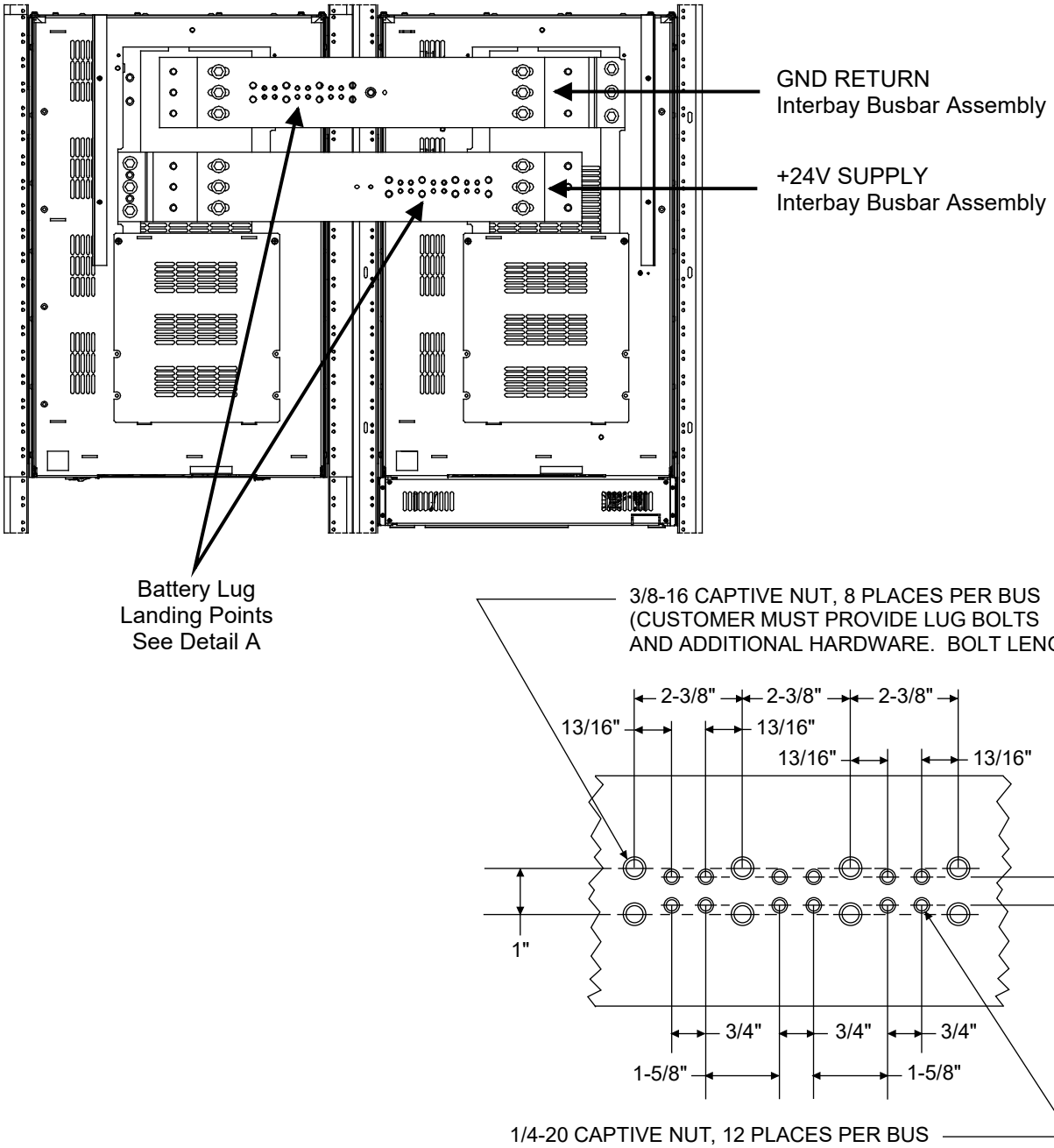
BOLT SIZE	TORQUE (in-lbs)
3/8-16	180 (Belleville Lock Washer) 300 (Standard Flat and Lock Washer)

Figure 34C: *Battery Connections (1200A to 2000A),* ***Using Battery Busbar Extension Kit (P/N 529143)*** *No Battery Disconnect Fuses, Circuit Breakers, or Contactors Provided. No Interbay Busbars Provided.*



BOLT SIZE	TORQUE (in-lbs)
3/8-16	180 (Belleville Lock Washer) 300 (Standard Flat and Lock Washer)

Figure 34D: *Battery Connections (1200A to 4000A) No Battery Disconnect Fuses, Circuit Breakers, or Contactors Provided. Bay-to-Bay Busbars Provided.*



DETAIL A

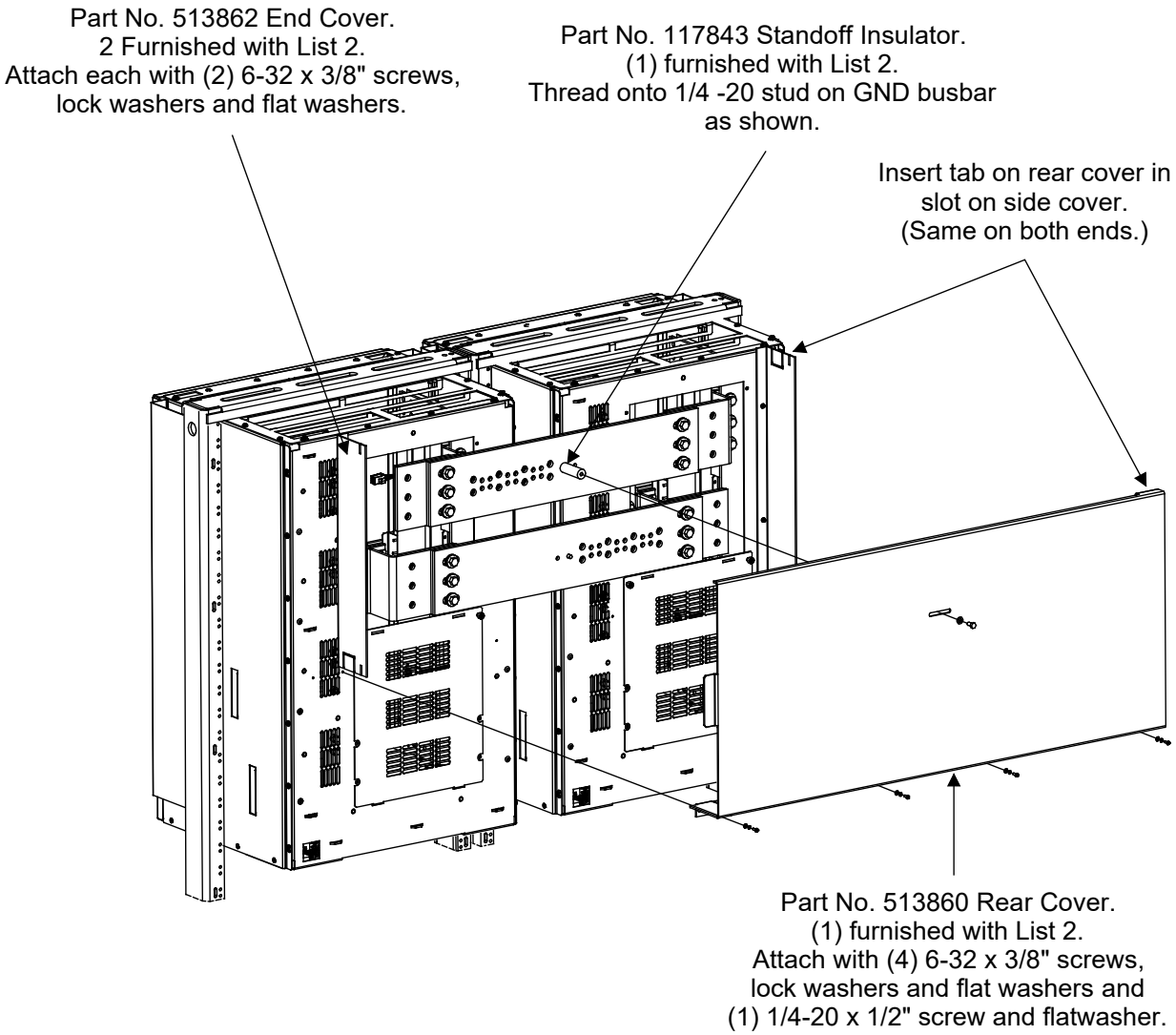
BOLT SIZE	TORQUE (in-lbs.)
¼–20	72 (Standard Flat and Lock Washer)
3/8-16	180 (Belleville Lock Washer) 300 (Standard Flat and Lock Washer)

Installing Bay-to-Bay Busbar Covers (List 2 Only)

Procedure

[ ] 1. After bay-to-bay busbars have been installed, and battery connections made to them as required, furnished covers should be installed. Refer to **Figure 35** for details.

Figure 35: *Installing Bay-to-Bay Busbar Covers*



Installing and Connecting Batteries in List 93 (If Provided)

DANGER! THIS EQUIPMENT IS USED IN CONJUNCTION WITH LEAD-ACID BATTERIES. WORKING NEAR LEAD-ACID BATTERIES IS DANGEROUS!

- Batteries contain sulfuric acid.
- Batteries may generate explosive gases.
- Batteries are an energy source that can produce high amounts of electrical current.

FOR THESE REASONS, IT IS OF CRITICAL IMPORTANCE THAT YOU READ THESE INSTRUCTIONS AND FOLLOW THEM EXACTLY.

WHEN WORKING WITH LEAD-ACID BATTERIES:

- Wear complete protection for eyes, face, hands, and clothing. Examples are safety goggles or face shield, a rubber apron, and gloves.
- If battery acid enters your eye, immediately flush your eye with running cold water for at least 15 minutes. Get medical attention immediately.
- If battery acid contacts skin or clothing, wash immediately with soap and water.
- NEVER smoke or allow a flame or spark near batteries.
- NEVER allow a metal object, such as a tool, to contact more than one terminal of a battery at a time, or to simultaneously contact a terminal and a grounded object (such as the battery enclosure). Even a momentary short circuit can cause sparking or explosion. To avoid such short circuits:
  - Remove watches, bracelets and rings.
  - Use only tools having insulated handles.
  - If insulated tools are not available, completely cover tool handles with a minimum of three half-lapped layers of vinyl electrical tape.
  - Ensure that wrenches with more than one working end have only one end exposed.
- Always follow the battery manufacturer's recommendations and admonishments.

Battery Manufacturer Information

Refer to System Application Guide SAG581126000 for specifications and manufacturers of the batteries to be installed in this power system.

Installing and Connecting Batteries

Procedure

NOTE! *Refer to* ***Figure 36*** *as this procedure is performed.*

[ ] 1. If Battery Trays are Equipped with Circuit Breakers: Turn OFF the Battery Disconnect circuit breakers located on all battery trays. Refer to **Figure 36** for locations.

[ ] 2. Remove the Battery Retention Bracket as shown in **Figure 36**. 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 36**. 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 snuggly against the batteries. If your batteries require the alternate bracket orientation shown in Detail A of* ***Figure 36*** *remove and reinstall the bullet-shaped spacers 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 36** for washer location.

[ ] 5. Connect three links supplied by the battery manufacturer between pairs of battery terminals as shown in **Figure 36**. 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 cable end to contact the battery tray or equipment rack.

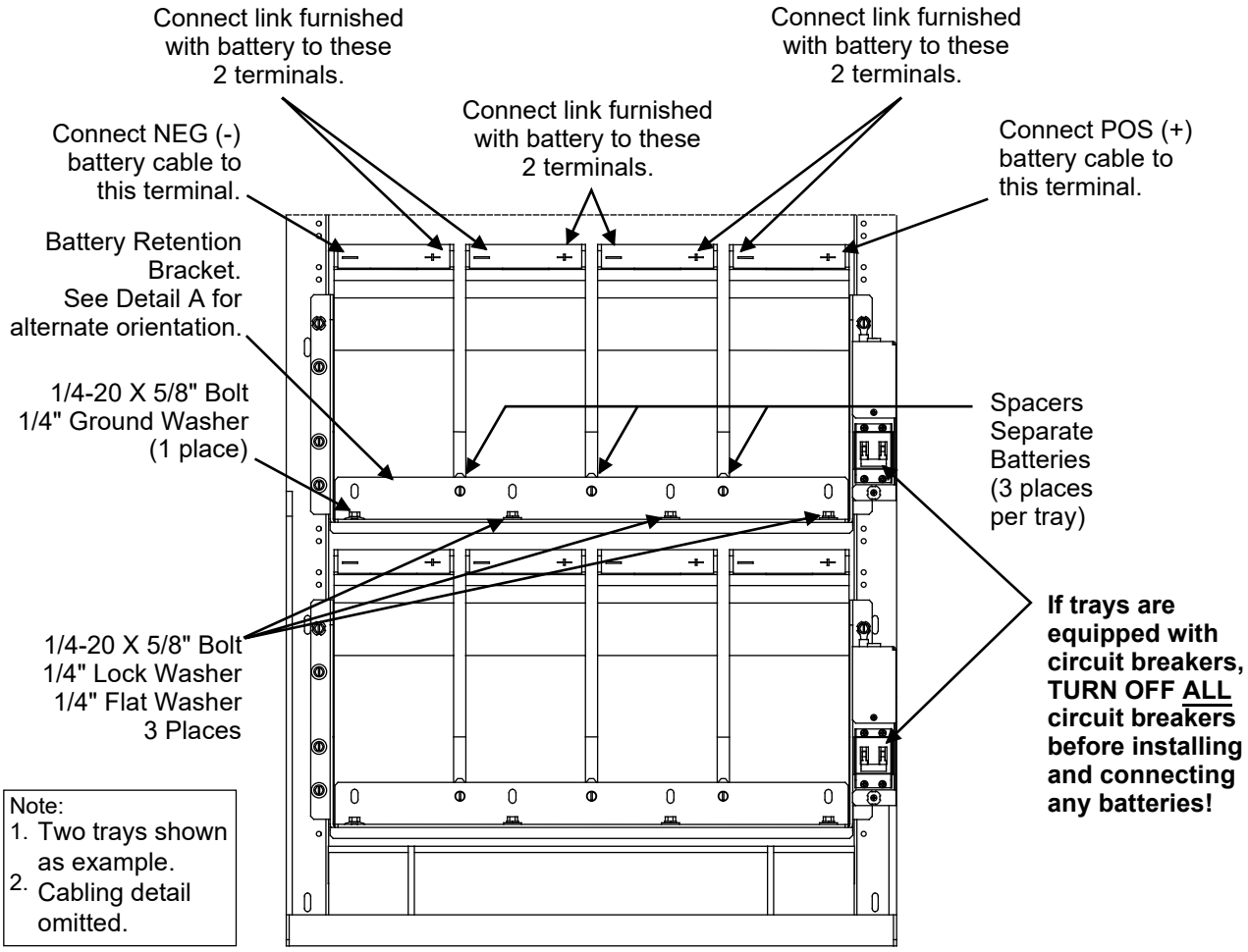
WARNING! In the next step, observe correct polarity. Connect only cable labeled "+" to battery terminal labeled "+". Likewise, connect only cable labeled "–" to battery terminal labeled "–".

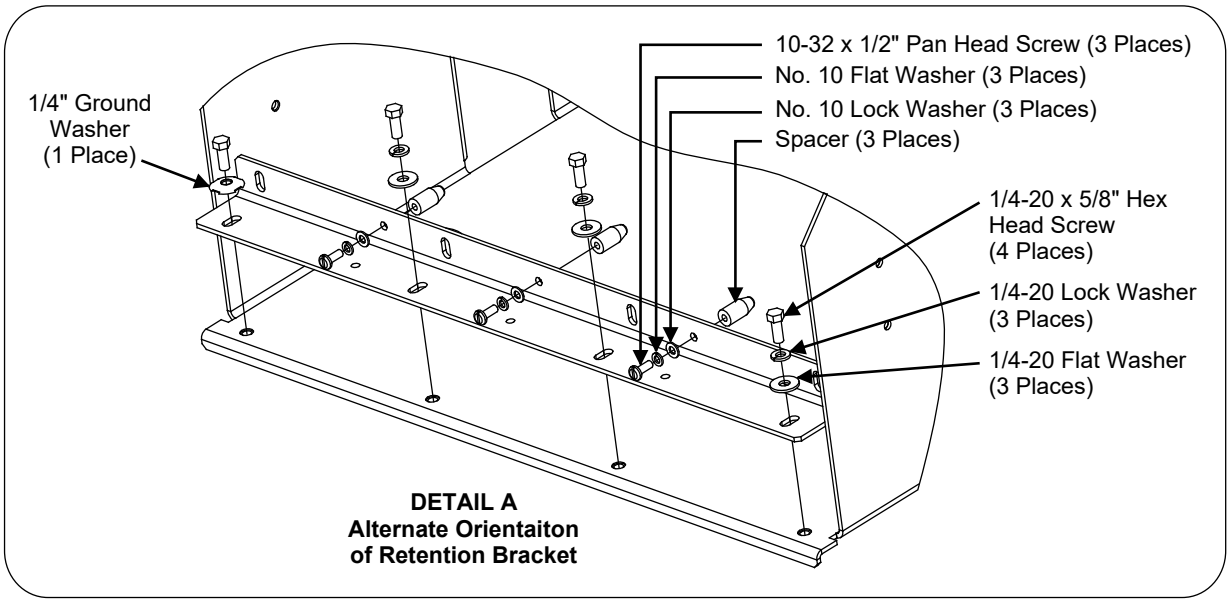
[ ] 7. Connect the cables found in the battery tray to the battery terminals, "+" to "+" and"–" to "– ". Observe correct polarity. Refer to **Figure 36**. Secure with kit-furnished hardware as shown in the figure. Torque hardware to battery manufacturer's recommendations.

[ ] 8. Repeat steps 1 through 7 for any remaining battery trays.

[ ] 9. If Battery Trays Are Equipped with Circuit Breakers: To connect the batteries to the Power System, turn ON the Battery Disconnect circuit breakers located on all battery trays.

Figure 36: *List 93 Battery Installation Details*



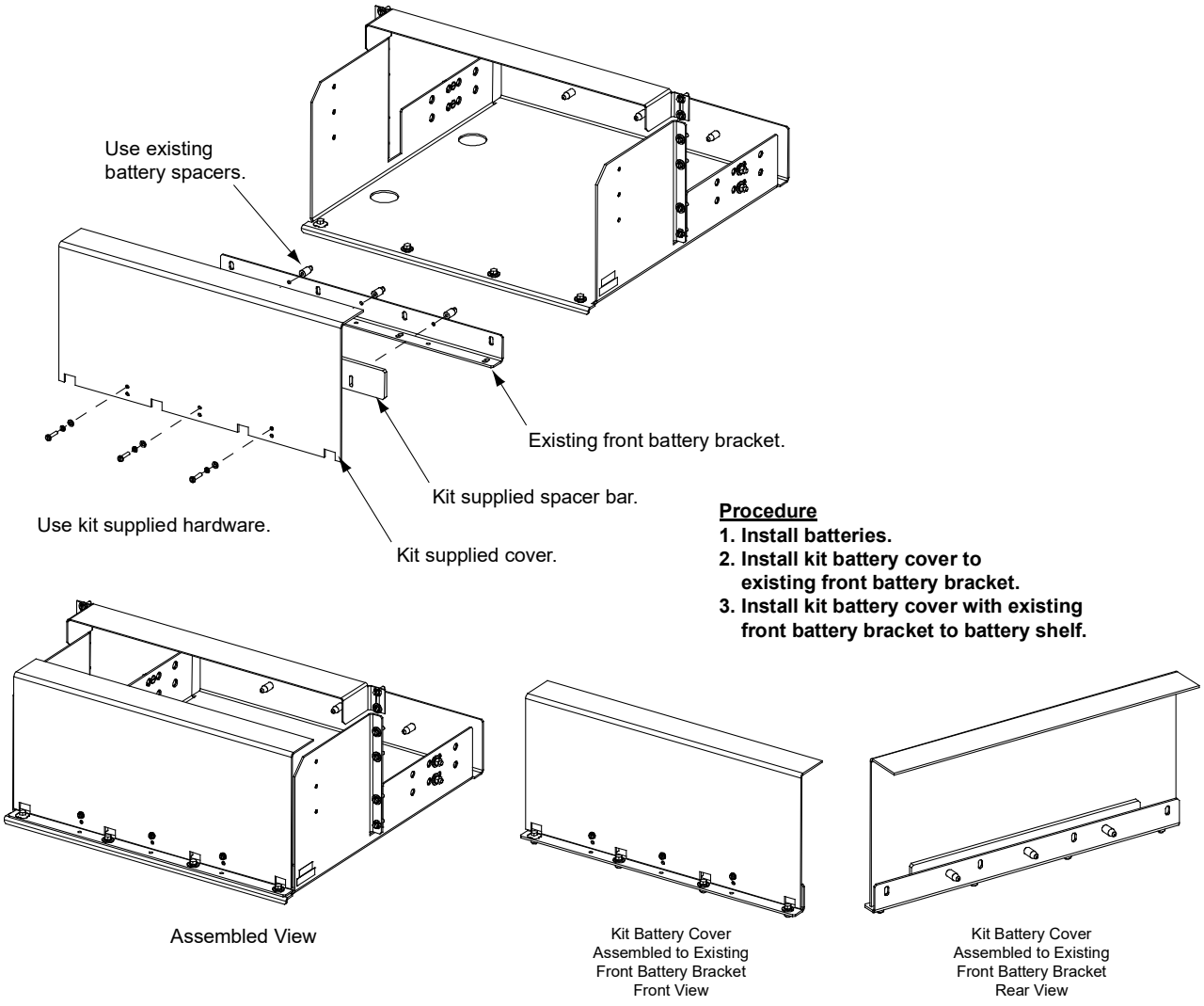


Installing Optional Front Battery Cover (23” Trays Only)

Procedure

[ ] 1. Follow the procedure in **Figure 37**.

Figure 37: *Installing Optional Front Battery Cover*

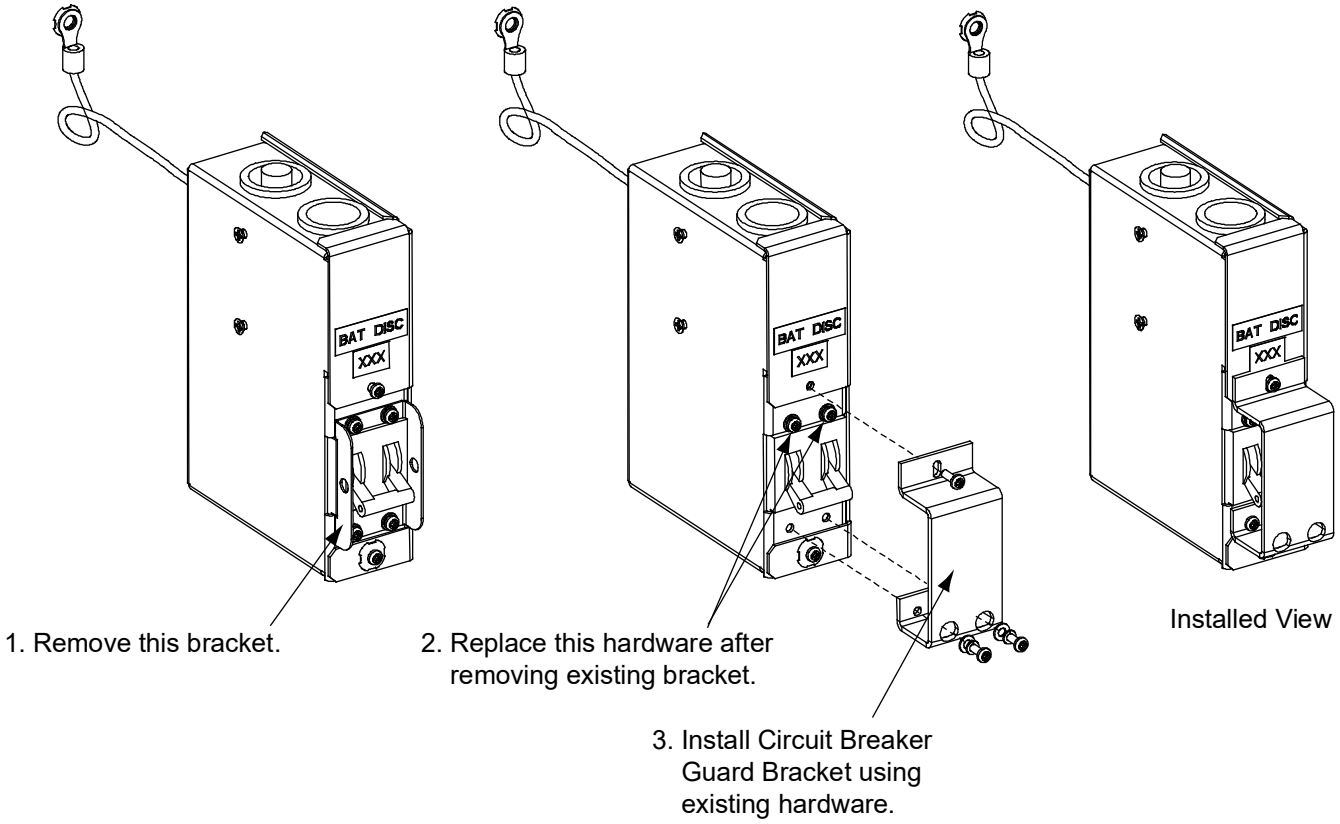


Installing Optional Circuit Breaker Guard

Procedure

[ ] 1. Follow the procedure in **Figure 38**.

Figure 38: *Installing Optional Circuit Breaker Guard*



INSTALLING MODULES AND INITIALLY STARTING THE SYSTEM

Installing the Rectifier and DC-DC Converter Modules

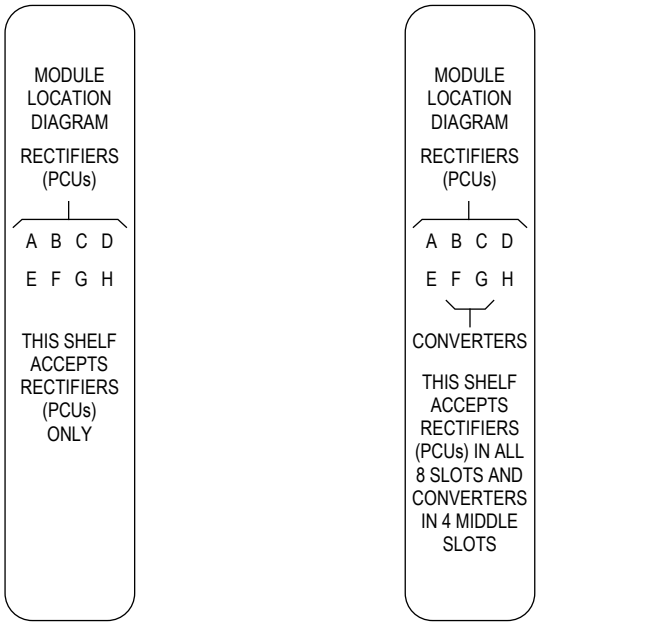
Modules can be inserted or removed with power applied (hot swappable).

The module location diagram on the front of each shelf shows which type modules can be operated in that shelf. (See **Figure 39**) Rectifier Modules will operate in any mounting position in any shelf. If a shelf accepts DC-DC Converter Modules, they must be installed in any or all of the four middle mounting positions.

NOTE! *Each Rectifier and DC-DC Converter Module locks into the Module Mounting Shelf by means of a latch located on the right-hand side of the module. The latch and module handle are interactive. Pushing the handle into the module front panel causes the latch to extend to the locking position; pulling the handle out from the module front panel causes the latch to retract. See* ***Figure 40*** *for handle operation.*

WARNING! To prevent damage to the latching mechanism, ensure the handle is in the open position when installing or removing a module. NEVER hold the handle in the closed position when installing a module into a shelf.

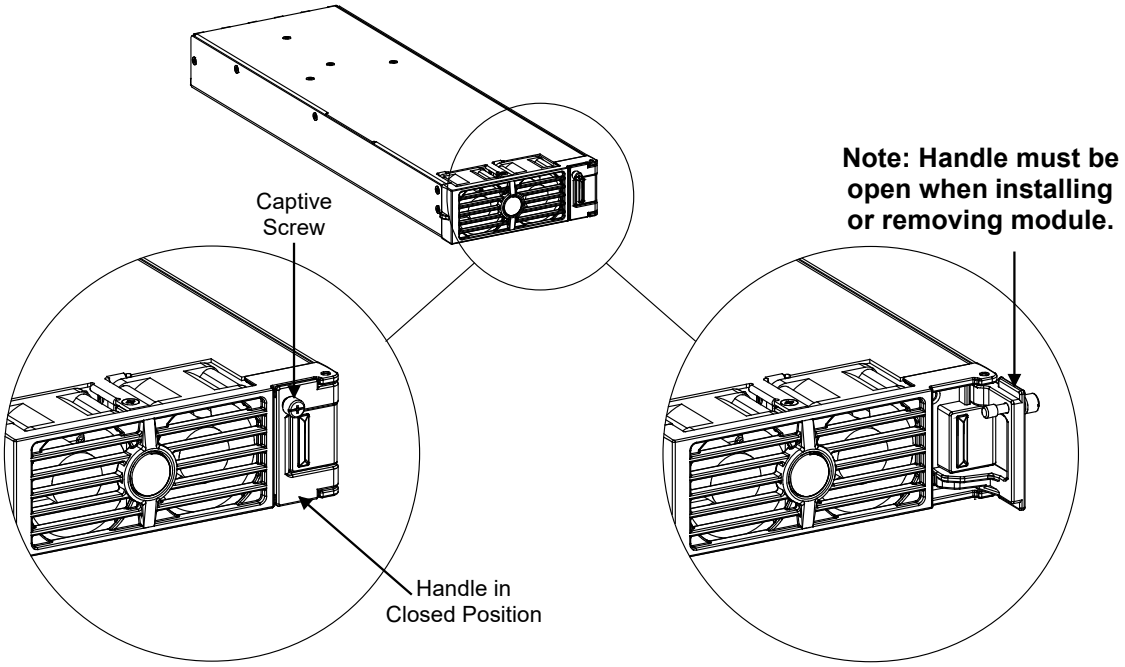
Figure 39: *Module Location Diagrams (on the front of each shelf)*



This Shelf Accepts Rectifier Modules Only

This Shelf Accepts Rectifier and DC-DC Converter Modules

Figure 40: *Handle/Latch Operation on the Rectifier and DC-DC Converter Modules*



Procedure

[ ] 1. Unpack the modules.

[ ] 2. Note the model number located on the handle of each module. Model numbers starting with the letter "R" (R24-2500 or R24-3000) are Rectifier Modules (PCUs). Model numbers starting with the letter "C" (C2448-1500) are DC-DC Converter Modules.

[ ] 3. Check the module location diagram on the front of the shelf to determine which type of module (Rectifier or DC-DC Converter) can be installed in each mounting position. See **Figure 39**.

[ ] 4. If present, remove blank cover panels from the mounting positions into which Rectifier or DC-DC Converter Modules are to be installed.

[ ] 5. Place the module into an unoccupied mounting slot without sliding it in completely.

[ ] 6. Loosen the captive screw on the module handle. Pull the handle to pivot it out of the module front panel (this will also retract the latch mechanism located at the right side of the module).

[ ] 7. Push the module completely into the shelf.

[ ] 8. Push the handle into the front panel of the module. This will lock the module securely to the shelf. Tighten the captive screw on the handle.

[ ] 9. Repeat the above steps for each Module being installed in the system.

[ ] 10. After the Modules are physically installed in the mounting shelf(s), they are ready for operation immediately after power is supplied to them.

Initially Starting, Configuring, and Checking System Operation

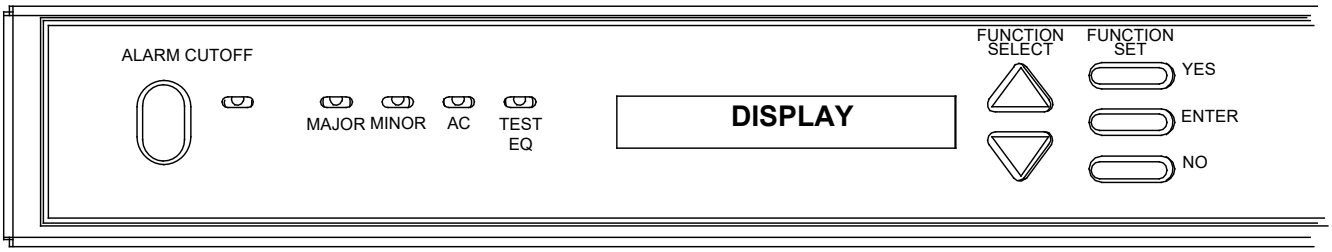
CAUTION! Performing various steps in the following procedures may cause a service interruption and/or result in the extension of alarms. Notify any appropriate personnel before starting these procedures. Also, notify personnel when these procedures are completed.

Controls and Indicators

In the following procedures, all controls and indicators are located on the MCA Local Interface Pad, unless otherwise stated. Refer to "*System Operating Procedures*" of the separate *User Instructions (Section 6013)* for controls and indicators locations and descriptions. Section 6013 can be accessed from the CD (Electronic Documentation Package) furnished with your system.

The MCA Local Interface Pad is located on the front of the Main Bay Distribution Cabinet. Refer to **Figure 41**.

Figure 41: *MCA Local Interface Pad and Display*

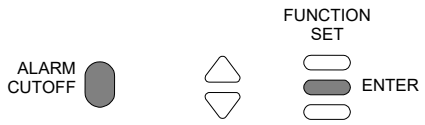
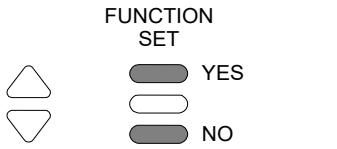
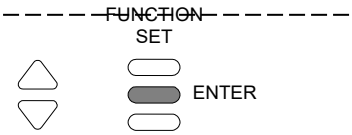
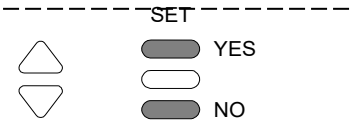
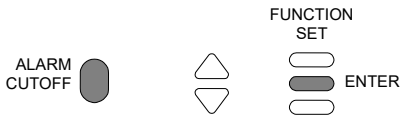
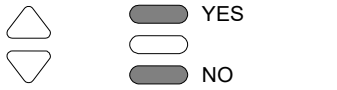


Navigating the MCA

Section 6022 provides a color MCA Menu Tree. Section 6022 is located in the separate *INSTALLATION MANUAL* and the *CD CARRIER MANUAL*. It is also provided on the CD (Electronic Documentation Package) furnished with your system.

Navigating the MCA is an easy process. You just have to remember a few key combinations (as shown in the following chart).

TASK	KEY OR KEY COMBINATIONS	NOTES
Getting to Home Position	FUNCTION SET YES NO	At any level in the MCA menus, pressing YES and NO simultaneously takes you back to the beginning of the MCA menu tree.
Moving from One Menu to Another Menu	FUNCTION SET ENTER	You can travel left to right from one menu to another by pressing ENTER. You can also go back to a specified menu by pressing ENTER while the menu's name is being displayed.
Moving Within a Menu	FUNCTION SELECT	Press Up Arrow to move up the list of available entries in the active menu. Press Down Arrow to move down the list of available entries in the active menu.

TASK	KEY OR KEY COMBINATIONS	NOTES
Changing a Value or Setting Entering the Adjustment/Change Setting Mode		Changing a value or setting requires four (4) steps. 1. With the current value or setting being displayed, simultaneously press **ENTER** and **ALARM CUTOFF**. 2. To increase the value or change the setting, press **YES**. To decrease the value or change the setting, press **NO**. 3. With the correct value or setting being displayed, press **ENTER**. 4. To accept the change, at the "ARE YOU SURE?" prompt press **YES**. To reject the change, at the "ARE YOU SURE?" prompt press **NO**.
Changing the Value or Setting		
Locking the Change		
Confirming the Change		
Changing a Control Function Entering the Adjustment/Change Setting Mode		Changing a control function requires two (2) steps. 1. With the control function menu item being displayed, simultaneously press **ENTER** and **ALARM CUTOFF**. 2. To accept the change, at the "ARE YOU SURE?" prompt press the **YES**. To reject the change, at the "ARE YOU SURE?" prompt press **NO**.
Confirming the Change		

Initial Startup Preparation

- Ensure that all blocks for Sections "*Installing System Components"* through *"Setting Wiring Options*" in the Installation Acceptance Checklist, located in Section "*Installation Acceptance Checklist"*, have been checked.
- Ensure that a Bypass Circuit Card (P/N 117086) is installed in every unused Quad Shunt POD Circuit Card or Quad Low Voltage Disconnect Circuit Card Mounting Position in every Distribution Cabinet in the Power System.
- Ensure that all Rectifier Module mounting positions are filled, either by a Rectifier Module or a blank cover panel.

Initially Starting the System

Procedure

NOTE! *Before system (MCA) startup, be prepared to view the MCA Display. Different user actions are required depending on what is displayed.*

[ ] 1. Apply DC input power to the system by closing the external DC disconnect(s) or protective device(s) that supplies battery power to the system. Observe and record the MCA Configuration Spec. No. briefly displayed as the MCA starts.

Note the possible MCA Configuration Spec. Nos. for your power system in the following table.

Power System List No.	Configuration No.
10	534876
11	534877
12	534878
13	534879

If present, DC-DC Converter Modules will automatically start.

[ ] 2. Apply AC input power to the system by closing the external AC disconnects or protective devices that supply AC power to the Rectifier Module Mounting Shelves. Rectifier Modules will automatically start.

[ ] 3. Open the Distribution Cabinet(s) front door by turning and holding the captive fastener in the counterclockwise position.

[ ] 4. If List RB, RC, or RD (manual battery disconnect) is furnished, place the BATTERY DISCONNECT switch in the NORM position.

[ ] 5. Place each distribution circuit breaker (if furnished) to the ON position.

MCA Initialization

Whenever a system is initially started (or the MCA has been replaced), the MCA performs an initialization routine, as detailed here. During this period "INITIALIZING..." is displayed along with the maximum remaining initialization time in seconds.

NOTE! *During MCA startup, one of three scenarios may occur. Be prepared to view the MCA Display. Different user actions are required depending on which scenario occurs.*

Scenario One: On initial MCA startup, the display will briefly show the proper value for the MCA Configuration Spec. No. and System Voltage for two seconds, then continue on.

Scenario Two: On initial MCA startup, the display will immediately pause at "MUST SET SPEC NO.".

Scenario Three: On initial MCA startup, the display will briefly show an MCA Configuration Spec. No. and System Voltage for two seconds other than the proper value, then continue on.

NOTE! *After power-up, you can also view the MCA Configuration Spec. No. Refer to Line Item "Spec. No." in the MCA INVENTORY MENU. Another option if you miss the displayed MCA Configuration Spec. No., is to simply remove and reapply MCA input power to restart the MCA initialization process.*

Procedure 1 (the Proper MCA Configuration Spec. No. and System Voltage was Briefly Displayed)

Perform one of the following steps, as determined by what is being displayed.

"SET ##V DEFAULTS" Displayed

Description: If the MCA detects that it is configured for proper voltage operation consistent with the Rectifier Modules (e.g. set for 48V operation and 48V Rectifier Modules detected), the MCA then compares the output capacities (amps) and serial numbers of all Rectifier Modules with what it has stored in memory. If any Rectifier Module capacity does not match the value stored or if none of the serial numbers match, the MCA displays "SET ##V DEFAULTS".

NOTE! *If this system was factory set with customer specified settings that are different than the defaults listed in the System Application Guide (SAG), do not reset all stored variables to factory defaults. Instead, see "To Start the System with the MCA's Existing Setpoints Procedure:".*

To Reset all Stored Variables to Factory Defaults Procedure:

[ ] 1. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 2. At the "ARE YOU SURE? +-" prompt, press the FUNCTION SET YES (+) pushbutton.

[ ] 3. The MCA displays "INITIALIZING..." along with the maximum remaining initialization time in seconds while it is resetting the variables, followed by "CHECK SETPOINTS".

[ ] 4. As you press the FUNCTION SELECT UP and DOWN arrow pushbuttons, each value listed later in this procedure under "CHECK SETPOINTS ADJUSTABLE VALUES" is displayed. Determine if the value displayed is correct for your installation, change the value as required.

   a) To change the setting of the currently displayed entry, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

   b) The portion of the display before the equal sign (=) flashes.

   c) Use the FUNCTION SET YES (+) or NO (-) pushbutton to increase or decrease, respectively, the setting.

d) Press the FUNCTION SET ENTER pushbutton.

e) At the "ARE YOU SURE? +-" prompt, press the FUNCTION SET YES (+) pushbutton to store the new value, or the FUNCTION SET NO (-) pushbutton to cancel this operation without changing the setting.

f) Display the next or previous entry using the FUNCTION SELECT UP or DOWN arrow pushbutton.

g) Repeat this procedure for each entry presented.

[ ] 5. When all the adjustable values have been properly set, press the FUNCTION SELECT DOWN arrow pushbutton until "START THE SYSTEM" is displayed.

[ ] 6. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 7. At the "ARE YOU SURE? +-" prompt, press the FUNCTION SET YES (+) pushbutton.

[ ] 8. The MCA briefly displays " INITIALIZING..." along with the maximum remaining initialization time in seconds while it is starting the system.

To Start the System with the MCA's Existing Setpoints Procedure:

[ ] 1. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 2. At the "ARE YOU SURE? + -" prompt, press the FUNCTION SET NO (-) pushbutton.

[ ] 3. The MCA displays "CHECK SETPOINTS" during and after system startup. Press the FUNCTION SELECT UP or DOWN pushbutton to move to the "System Adjustment Menu". Check each setting for your installation, change as required.

"MUST SET SYS=##V" Displayed

Description: If the MCA detects that it is configured for voltage operation not consistent with the Rectifier Modules (e.g. set for 24V operation and 48V Rectifier Modules detected, or set for 48V operation and 24V Rectifier Modules are detected), the MCA displays "MUST SET SYS=##V".

Procedure:

[ ] 1. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 2. At the "ARE YOU SURE? +-" prompt, press the FUNCTION SET YES (+) pushbutton.

[ ] 3. The MCA displays "INITIALIZING..." along with the maximum remaining initialization time in seconds while it reconfigures itself for proper voltage operation, and then displays "CHECK SETPOINTS".

[ ] 4. As you press the FUNCTION SELECT UP and DOWN arrow pushbuttons, each value listed later in this procedure under "CHECK SETPOINTS ADJUSTABLE VALUES" is displayed. Determine if the value displayed is correct for the application.

a) To change the setting of the currently displayed entry, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

b) The portion of the display before the equal sign (=) flashes.

c) Use the FUNCTION SET YES (+) or NO (-) pushbutton to increase or decrease, respectively, the setting.

d) Press the FUNCTION SET ENTER pushbutton.

e) At the "ARE YOU SURE? +-" prompt, press the FUNCTION SET YES (+) pushbutton to store the new value, or the FUNCTION SET NO (-) pushbutton to cancel this operation without changing the setting.

f) Display the next or previous entry using the FUNCTION SELECT UP or DOWN arrow pushbutton.

g) Repeat this procedure for each entry presented.

[ ] 5. When all the adjustable values have been properly set, press the FUNCTION SELECT DOWN arrow pushbutton until "START THE SYSTEM" is displayed.

[ ] 6. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 7. At the "ARE YOU SURE? +-" prompt, press the FUNCTION SET YES (+) pushbutton.

[ ] 8. The MCA briefly displays " INITIALIZING..." along with the maximum remaining initialization time in seconds while it is starting the system.

"CHECK SETPOINTS" Displayed

Description: If some serial numbers match, MCA starts the system using the MCA's existing setpoints. The MCA displays "CHECK SETPOINTS" during and after system startup.

Procedure:

[ ] 1. Press the FUNCTION SELECT UP or DOWN pushbutton to move to the "System Adjustment Menu". Check all MCA settings.

"SYSTEM OK" or "## ALARMS ACTIVE" Displayed

Description: If all serial numbers match, the MCA starts the system using its existing setpoints. After the system is started, the MCA displays "SYSTEM OK" or "## ALARMS ACTIVE".

Procedure:

[ ] 1. Go to the "System Adjustment Menu", and check all MCA settings.

Procedure 2 (MCA Displays "MUST SET SPEC NO.")

[ ] 2. Press and release the FUNCTION SELECT UP and DOWN arrow pushbuttons until the proper MCA Configuration Spec. No. and System Voltage are shown.

NOTE! *Selecting an MCA Configuration Spec. No. or System Voltage different from your system's original will alter system performance, and is* ***not*** *recommended. Refer to the System Application Guide (SAG) to determine the proper MCA Configuration (Spec. No.) and system voltage.*

[ ] 3. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 4. At the "ARE YOU SURE? +-" prompt, press the FUNCTION SET YES (+) pushbutton.

[ ] 5. The MCA displays “CHANGING SPEC” then "INITIALIZING..." along with the maximum remaining initialization time in seconds while it reconfigures itself for proper operation, and then displays "CHECK SETPOINTS".

[ ] 6. As you press the FUNCTION SELECT UP and DOWN arrow pushbuttons, each value listed later in this procedure under "CHECK SETPOINTS ADJUSTABLE VALUES" is displayed. Determine if the value displayed is correct for the application.

a) To change the setting of the currently displayed entry, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

b) The portion of the display before the equal sign (=) flashes.

c) Use the FUNCTION SET YES (+) or NO (-) pushbutton to increase or decrease, respectively, the setting.

d) Press the FUNCTION SET ENTER pushbutton.

e) At the "ARE YOU SURE? +-" prompt, press the FUNCTION SET YES (+) pushbutton to store the new value, or the FUNCTION SET NO (-) pushbutton to cancel this operation without changing the setting.

f) Display the next or previous entry using the FUNCTION SELECT UP or DOWN arrow pushbutton.

g) Repeat this procedure for each entry presented.

[ ] 7. When all the adjustable values have been properly set, press the FUNCTION SELECT DOWN arrow pushbutton until "START THE SYSTEM" is displayed.

[ ] 8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 9. At the "ARE YOU SURE? +-" prompt, press the FUNCTION SET YES (+) pushbutton.

[ ] 10. The MCA briefly displays "INITIALIZING..." along with the maximum remaining initialization time in seconds while it is starting the system.

Procedure 3 (an MCA Configuration Spec. No. and System Voltage other than the Proper Value was Briefly Displayed)

[ ] 1. Immediately depress and hold the ALARM CUTOFF, FUNCTION SELECT UP, and FUNCTION SELECT DOWN pushbuttons at the same time while the display is showing the MCA "SPEC" number and then the "MCA SW ##.##.## " version number. Only after the "MCA SW ##.##.##" version number goes off, release the three buttons.

"SET ###### @ ##V" should appear.

NOTE! *The pushbuttons must be depressed before "INITIALIZING ##" appears on the display. Remove and re-apply MCA input power to restart this step, if necessary.*

[ ] 2. Press and release the FUNCTION SELECT UP and DOWN arrow pushbuttons until the proper MCA Configuration Spec. No. and System Voltage are shown.

NOTE! *Selecting an MCA Configuration Spec. No. or System Voltage different from your system's original will alter system performance, and is **not** recommended. Refer to the System Application Guide (SAG) to determine the proper MCA Configuration (Spec. No.) and system voltage.*

[ ] 3. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 4. At the "ARE YOU SURE? +-" prompt, press the FUNCTION SET YES (+) pushbutton.

[ ] 5. The MCA displays “CHANGING SPEC” then "INITIALIZING..." along with the maximum remaining initialization time in seconds while it reconfigures itself for proper operation, and then displays "CHECK SETPOINTS".

[ ] 6. As you press the FUNCTION SELECT UP and DOWN arrow pushbuttons, each value listed later in this procedure under "CHECK SETPOINTS ADJUSTABLE VALUES" is displayed. **Determine if the value displayed is correct for the application.**

a) To change the setting of the currently displayed entry, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

b) The portion of the display before the equal sign (=) flashes.

c) Use the FUNCTION SET YES (+) or NO (-) pushbutton to increase or decrease, respectively, the setting.

d) Press the FUNCTION SET ENTER pushbutton.

e) At the "ARE YOU SURE? +-" prompt, press the FUNCTION SET YES (+) pushbutton to store the new value, or the FUNCTION SET NO (-) pushbutton to cancel this operation without changing the setting.

f) Display the next or previous entry using the FUNCTION SELECT UP or DOWN arrow pushbutton.

g) Repeat this procedure for each entry presented.

[ ] 7. When all the adjustable values have been properly set, press the FUNCTION SELECT DOWN arrow pushbutton until "START THE SYSTEM" is displayed.

[ ] 8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 9. At the "ARE YOU SURE? +-" prompt, press the FUNCTION SET YES (+) pushbutton.

[ ] 10. The MCA briefly displays "INITIALIZING..." along with the maximum remaining initialization time in seconds while it is starting the system.

CHECK SETPOINTS Adjustable Values

1.	FLOAT = ##.##V	##.##V = float voltage setting for all Rectifier Modules
2.	TEST/EQ = ##.##V	##.##V = test equalize voltage setting for all Rectifier Modules
3.	SET HVS = ##.##V	##.##V = high voltage shutdown setting for all Rectifier Modules
4.	CURRLIM = #####A	#####A = system current limit setting, current limit circuit on all Rectifier Modules are automatically adjusted to ensure system current does not exceed this value
	CURRLIM = #####MAX	#####MAX = the sum of the maximum capabilities of all Rectifier Modules installed in the system
5.	SYS HV1 = ##.##V	##.##V = system high voltage alarm 1 setting
6.	SYS HV2 = ##.##V	##.##V = system high voltage alarm 2 setting
7.	SYS BOD = ##.##V	##.##V = system battery on discharge alarm setting
8.	SYS 50% (VERYLOVOLT)=##.##V	##.##V = system 50% battery on discharge (very low voltage) alarm setting
9.	SYSCURR = #####A	####A = system current alarm setting
10.	SUB HV = ##.##V	##.##V = subsystem high voltage alarm setting
11.	SUB LV = ##.##V	##.##V = subsystem low voltage alarm setting
12.	SUBCURR = #####A	####A = subsystem current alarm setting
13.	LVD ** = ##.#V	LVD** = number assigned to the low voltage disconnect circuit detected, each low voltage disconnect circuit detected in the system is displayed separately ##.#V = respective low voltage disconnect circuit "disconnect" setting
14.	LV RECON = ##.#V MANUAL RECONNECT	##.#V = reconnect setting for all low voltage disconnect circuits detected, or manual reconnect
15.	TC CAL = ##.##V ANALOG TC OFF TempCmp Hardware	##.##V = calibration voltage value written on battery charge temperature compensation module, or off
16.	DIGITAL TC OFF SLOPE = .###V/ºC TempCmp Hardware	digital temperature compensation off, or slope parameter setting
17.	MAX W/T = ##.##V setting	##.##V = maximum voltage with temperature compensation
18.	MIN W/T = ##.##V	##.##V = minimum voltage with temperature compensation setting

19. HI TEMP 1 = ###ºC HI TEMP 1 IS OFF	###ºC = high temperature 1 alarm setting, or high temperature 1 alarm off (if TXM installed, each temperature probe has an associated alarm)
20. LO TEMP 1 = ###ºC LO TEMP 1 IS OFF	###ºC = low temperature 1 alarm setting, or low temperature 1 alarm off (if TXM installed, each temperature probe has an associated alarm)
21. ****A PLACES = ##	****A = amperage of each type of Rectifier Module, each type of Rectifier Module is displayed separately ## = number of total (filled and empty) shelf positions available for this amperage Rectifier Module
22. START THE SYSTEM	Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. At the "ARE YOU SURE? + -" prompt, press the FUNCTION SET YES (+) pushbutton to start system. Press the FUNCTION SET NO (-) pushbutton to go back and change more setpoints before starting the system. Use the FUNCTION SELECT UP and DOWN arrow pushbuttons to scroll through the list of adjustable values as previously described.

Initially Connecting Low Voltage Disconnect Circuits (if furnished)

If the low voltage disconnect circuit(s) (if furnished) is set for manual reconnect, the battery and system output have to be initially connected to the controlled load(s). (Battery voltage must be above the upper setting of the low voltage disconnect circuit.) If there are active low voltage disconnect alarms, perform the following procedure to initially connect battery and system output to the controlled load(s).

Procedure

[ ] 1. With "## ALARMS ACTIVE" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ALARM LVD ACTIVE".

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until the low voltage disconnect circuit to be reconnected is displayed ("RECONNECT LVD**", **=the designation of the low voltage disconnect circuit).

[ ] 5. To reconnect the low voltage disconnect circuit being displayed, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 6. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The low voltage disconnect circuit reconnects.

[ ] 7. If the system contains additional low voltage disconnect circuits, separately reconnect these by repeating steps 5) through 6).

[ ] 8. When done, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously. You are returned to the beginning of the MCA menu tree.

Configuring the System

Procedure

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "CONFIGURE MENU" is displayed.

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. If the MCA Initialization procedure was performed, go to step 14). If not (or if you want to verify the inventory), proceed with step 5).

[ ] 5. "VERIFY INVENTORY" is displayed. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 6. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "VACANT ****A = ##" is displayed. (****A is the amperage of the Rectifier Module)

[ ] 7. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. "****A PLACES = ##" is displayed, ****A is the amperage of the Rectifier Module. Portion of the display flashes.

[ ] 8. Press the FUNCTION SET YES (+) or NO (-) pushbutton until the value displayed equals the total (filled and empty) number of available mounting positions in the system for this amperage of Rectifier Module, then release the pushbutton.

[ ] 9. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 10. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

[ ] 11. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "VACANT ****A = ##". Repeat steps 7) through 10) for any other amperage Rectifier Modules available positions.

[ ] 12. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "CONFIGURE MENU" is displayed.

[ ] 13. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 14. Press and release the FUNCTION SELECT DOWN arrow pushbutton until "SHARE ALARM OFF" or "SHARE ALARM ON" is displayed. This is the current setting for this feature. To toggle this setting, perform steps 15) and 16). To keep this setting, proceed with step 17).

[ ] 15. To toggle this setting, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 16. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

[ ] 17. Press and release the FUNCTION SELECT DOWN arrow pushbutton until "EMERG STOP ON" or " EMERG STOP OFF" is displayed. This is the current setting for this feature. To toggle this setting, perform steps 18) and 19). To keep this setting, proceed with step 20).

[ ] 18. To toggle this setting, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 19. “ARE YOU SURE? +_" is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

[ ] 20. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until " REMOTE HVS ON" or " REMOTE HVS OFF" is displayed. This is the current setting for this feature. To toggle this setting, perform steps 21) through 22). To keep this setting, proceed with step 23).

[ ] 21. To toggle this setting, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 22. "ARE YOU SURE? +_" is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

[ ] 23. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "DISPLAY ROLL OFF" or "DISPLAY ROLL ON" is displayed. This is the current setting for this feature. To toggle this setting, perform steps 24) and 25). To keep this setting, proceed with step 26).

NOTE! *For Initial Startup and Checkout, "DISPLAY ROLL OFF" is preferred.*

[ ] 24. To toggle this setting, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 25. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

[ ] 26. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "LO SPEED FAN OFF" or "LO SPEED FAN ON" is displayed. This is the current setting for this feature. To toggle this setting, perform steps 27) and 28). To keep this setting, proceed with step 29) or 34).

[ ] 27. To toggle this setting, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 28. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

NOTE! *Do not perform steps 29) through 34) if the system is not equipped with external MCA Audible Alarm relay contacts.*

[ ] 29. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "NAG MINUTES = ##" or "AUDIBLE NAG OFF".

[ ] 30. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "NAG MINUTES =" portion of the display flashes.

[ ] 31. Press the FUNCTION SET YES (+) or NO (-) pushbutton until the value displayed equals the desired MCA audible alarm cutoff reset time period or "AUDIBLE NAG OFF", then release the pushbutton.

[ ] 32. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 33. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

[ ] 34. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "TEST/EQ HRS = ##".

[ ] 35. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "TEST/EQ HRS =" portion of the display flashes.

[ ] 36. Press the FUNCTION SET YES (+) or NO (-) pushbutton until the value displayed equals the desired timed test/equalize period.

NOTE! *To disable the manually initiated timed test/equalize feature, press the FUNCTION SET YES (+) pushbutton until the value goes above 99. "TEST/EQ MAN STOP" is then displayed.*

[ ] 37. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 38. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

[ ] 39. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "AUTO EQ MUL = ##" or "AUTO EQ DISABLED".

NOTE! *For Initial Startup and Checkout, "AUTO EQ DISABLED" is preferred.*

NOTE! *If "AUTO EQ MUL = ##" is displayed, the system is already set for Automatic Equalize. In this case, you can proceed with steps 40) through 43) to change the current setting, or proceed with step 44) if no changes are required.*

NOTE! *If "END AUTO ##.##HR" is displayed, the system is already set for Automatic Equalize, and an Automatic Equalize is in progress. In this case, you can proceed with steps 40) through 43) to cancel the Automatic Equalize in progress and change the current setting, or proceed with step 44) to proceed with the Automatic Equalize in progress and make no changes.*

[ ] 40. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "AUTO EQ MUL =" portion of the display flashes.

[ ] 41. Press the FUNCTION SET YES (+) or NO (-) pushbutton until the desired value is displayed, then release the pushbutton. Note that as you scroll below 1, "AUTO EQ DISABLED" is displayed. Scroll back up to redisplay "AUTO EQ MUL =".

[ ] 42. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 43. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

[ ] 44. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "RELAYTEST = ###SEC".

[ ] 45. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "RELAYTEST =" portion of the display flashes.

[ ] 46. Press the FUNCTION SET YES (+) or NO (-) pushbutton until the value displayed equals the desired timed period for the Alarm Relay Test feature.

[ ] 47. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 48. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

[ ] 49. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Setting Up the MCA Ethernet Option TCP/IP (and SNMP if required) Parameters (Lists 75, 76, 77, and 78 Only)

TCP/IP Parameters

Three settings are required to allow the MCA to communicate on your TCP/IP network. These are...

IP Address (_____) record here

IP Netmask (_____) record here

IP Gateway (_____) record here

These parameters are typically assigned by your Information Technology (IT) department. It is advisable to request this information at the beginning of the installation to give your IT department time to fill your request. Once the above IP addresses are received, record them on this document and perform the appropriate procedure below.

Power System's TCP/IP Network Address (IP Address)

In the format of nnn.nnn.nnn.nnn, where 0 ≤ nnn ≤ 255.

An IP address is a unique identifying number that your computer uses during its time on the internet. Traffic coming from you or going to you is routed based on your IP address, which identifies the unique machine you are on and its place in the internet. For instance, 198.147.241.20 is the IP address of host whitehouse.gov. All packets on the internet destined for whitehouse.gov are sent to this IP address by the Domain Name Service. All traffic coming from this host is identified as such because the packets contain the originating IP address in the packet headers. All routing and traffic on the internet ultimately depends on IP addresses.

Power System's TCP/IP Netmask Address (IP Netmask)

In the format of nnn.nnn.nnn.nnn, where 0 ≤ nnn ≤ 255.

A netmask is a series of bits designed to 'mask' certain portions of an IP address. The standard netmask for a class C network like FlashNet is 255.255.255.0 - basically the last octet, .0, says 'look here for the machine number, the rest (255) is network number'. The primary use for netmasks is in subnetting.

Power System's TCP/IP Gateway Address (IP Gateway)

In the format of nnn.nnn.nnn.nnn, where 0 ≤ nnn ≤ 255.

A gateway is a computer that lies at the intersection of two networks and routes traffic correctly between them, while keeping traffic internal to the two networks separated. A gateway, such as a Cisco router, lies at the border between network1.net and network2.net. It correctly routes traffic bound for the internet out to its destination, while keeping traffic meant for within network1 on the network1.net side of the router and traffic for network2 on the network2.net side.

SNMP PARAMETERS

Additional parameters are set per site requirements for SNMP support.

"Community String"

String of alpha/numeric characters.

An SNMP community is a relationship between an SNMP agent and a set of SNMP managers that defines authentication, access control, and proxy characteristics. The community concept is a local one, defined at the managed system. The managed system establishes one community for each desired combination of authentication, access control, and proxy characteristics. Each community is given a community name, and the management stations.

The GET community name to authenticate GET, GETNEXT, and GETBULK requests.

NOTE! *In this application, only the GET community name can be set.*

"Trap Addresses"

In the format of nnn.nnn.nnn.nnn, where 0 ≤ nnn ≤ 255.

A list of IP addresses to which SNMP Traps will be sent. The machine with this IP address must have appropriate SNMP browser running. SNMP Traps V2 are sent.

Procedure

This procedure is for setting the MCA Ethernet card's IP parameters via the Web Interface. If your Ethernet card was ordered with the SNMP option, steps for setting SNMP parameters are included. It requires that you temporarily change the IP setup on your computer (PC).

NOTE! *Windows 98 or later required to setup network connection.*

This procedure requires a Permission Level of 8. The factory default user name and password provide Level 8 access. (For information about Permission Levels, see the separate Ethernet Card Web Interface User instructions, Section 5982).

Step 1: Record your PC's Network Settings
Record your current network settings for the computer you will be using to set the MCA Ethernet card's IP parameters. You will use these values in step 4.

Step 2: Change your PC's Network Settings
Change your computer's IP parameters to talk to the MCA Ethernet Card using the card's default parameters.

a) 192.168.1.1, set your computer to 192.168.1.2 (IP Address).
b) 255.255.255.0, set your computer to the same (Subnet Mask).
c) 192.168.1.1, set your computer to the same (Gateway).

Step 3: Change the MCA Ethernet Card's Network Settings
Connect the MCA Ethernet card into your company's network. Use Internet Explorer to change the MCA Ethernet card's default IP parameters to the parameters issued by your IT department.
If your PC cannot access the MCA Ethernet card, it may be necessary to bypass your company network by using a "crossover" cable connected directly between your PC and the MCA Ethernet Card.

Step 4: Reset your PC's Network Settings
Reset your computer's IP parameters back to their original values noted in step 1. If using a crossover cable, first reconnect your computer to your company's network and connect the MCA Ethernet card to your company's network.

Step 5: Change the MCA Ethernet Card's SNMP Settings (if equipped with SNMP option)
Log onto the MCA Ethernet card. Open the SNMP settings page. Change SNMP settings and trap settings as required.

Step 6: Access the Power Plant over the Company Network
Via Web Browser: Open your Web browser. Type in the unit's IP address. Enter user name and password in the logon window, and logon.

Expanded Procedure

Step 1: Record your PC's Network Settings

[ ] 1. Open the Control Panel on your computer.

[ ] 2. Select Network Connections.

[ ] 3. Select Local Area Connection.

[ ] 4. Select Properties.

[ ] 5. Highlight Internet Protocol (TCP/IP).

[ ] 6. Select Properties.

[ ] 7. Record the current settings, these may be specific parameters or your computer may be set to automatically obtain these parameters from your company's network.

Obtained IP Address Automatically _____
or

Use the following...
IP Address: _____
Subnet Mask: _____
Default Gateway: _____

[ ] 8. Select **Cancel**.

Step 2: Change your PC's Network Settings

[ ] 1. Open the **Control Panel** on your computer.

[ ] 2. Select **Network Connections**.

[ ] 3. Select **Local Area Connection**.

[ ] 4. Select **Properties**.

[ ] 5. Highlight **Internet Protocol (TCP/IP)**.

[ ] 6. Select **Properties**.

[ ] 7. Select "Use the following IP Address".

[ ] 8. Enter the following.

a) 192.168.1.2, as the IP Address.

b) 255.255.255.0, as the Subnet Mask.

c) 192.168.1.1, as the default Gateway.

[ ] 9. Select **OK**. Note that you may have to reboot your computer for the settings to take effect. Follow any instructions you see on the screen.

Step 3: Change the MCA Ethernet Card's Network Settings

[ ] 1. Connect the MCA Ethernet card's port to your company's network.

[ ] 2. Power up the MCA, if not already powered.

[ ] 3. Open your Web Browser. Type **192.168.1.1** in the Address box. Press **Enter**. The logon window opens.

You may have to change Internet Explorer options to do this. Go to Tools/Internet Options/LAN Settings, then temporarily disable the proxy server. Another option is to select Bypass Proxy Server for local addresses and add 192.168.* under Advanced.

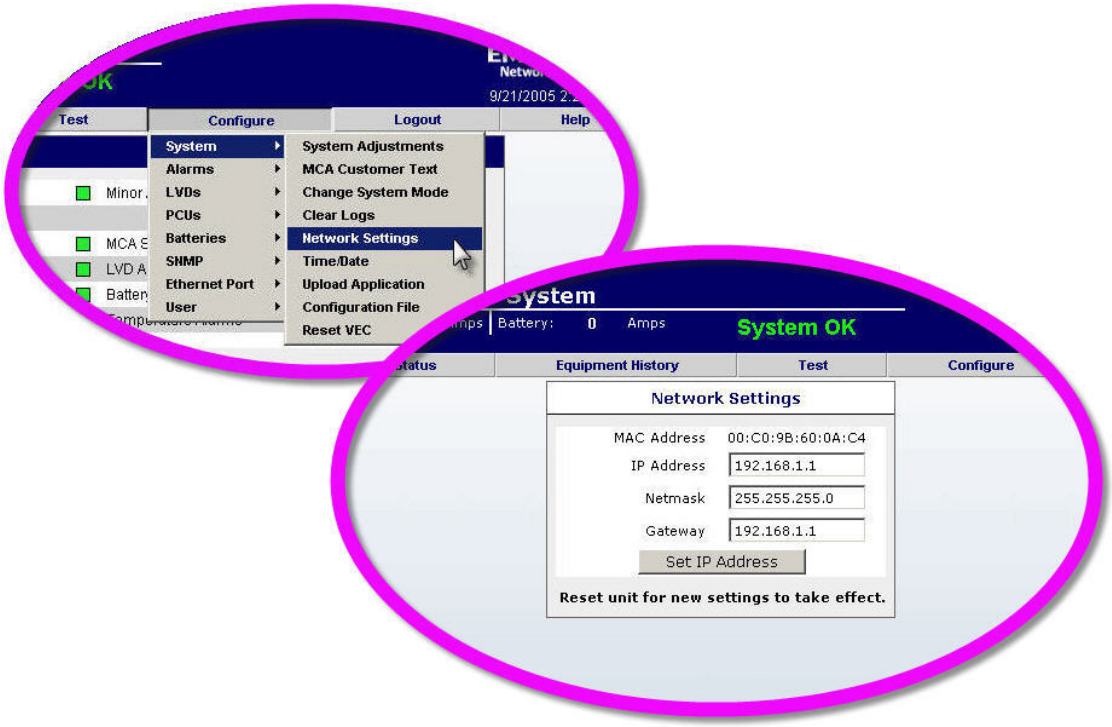
If your PC cannot access the Logon window, it may be necessary to bypass your company network by using a "cross-over" cable connected directly between your PC and the MCA Ethernet card. Repeat this step if necessary.

[ ] 4. Type the default user name and password, then press **Enter**.
User Name: **llp_admin**
Password: **llp_admin**

NOTE! *The user name and password are case-sensitive. For security, the password is not displayed on the computer's screen. You have three attempts to enter a valid user name and password. If both are not entered correctly after three attempts, the browser is redirected to a "Protected Object" message page. A link is provided on that page that will return you to the logon window.*

[ ] 5. If a valid user name and password are entered, the System Status page opens.

[ ] 6. On the toolbar near the top of the System Status web page, select **Configure→System→Network Settings**. The **Network Settings** page opens.

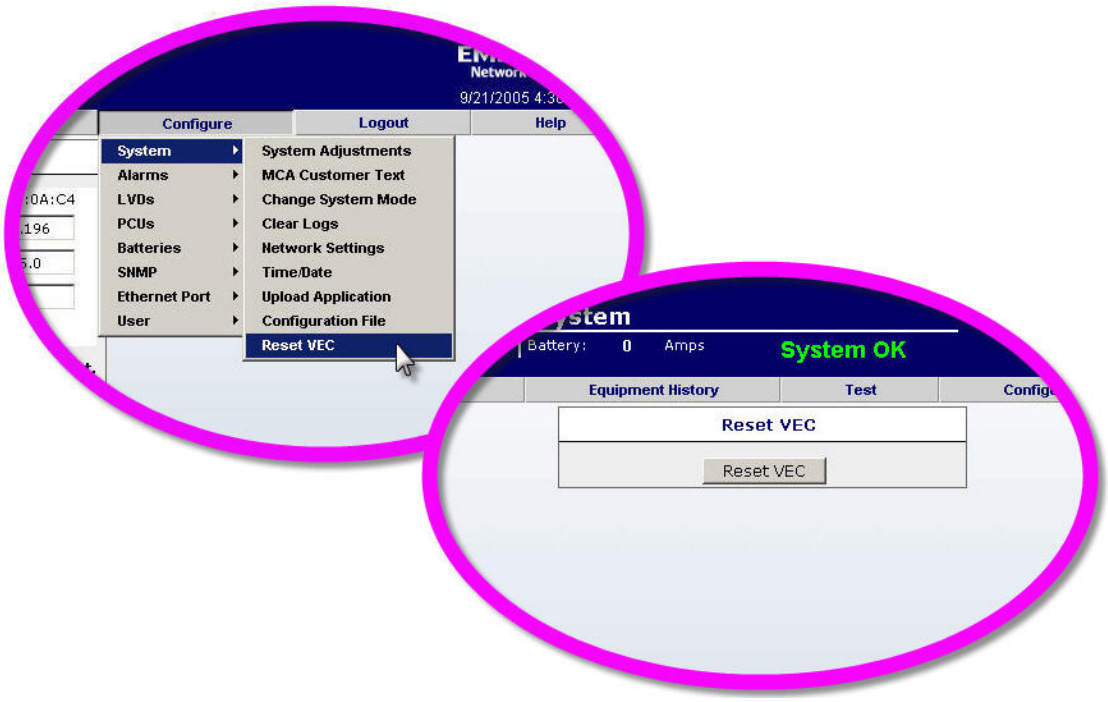


[ ] 7. Enter the parameters issued by your IT department. When the required IP Address, Subnet Mask, and Gateway have been entered, click the **Set IP Address** button. VERIFY WHAT YOU HAVE TYPED, IF IT IS ENTERED INCORRECTLY YOU MAY NOT BE ABLE TO COMMUNICATED WITH THE MCA ETHERNET CARD.

NOTE! *If a new value is unacceptable, an "Invalid Entry" message is displayed.*

[ ] 8. On the toolbar, select **Configure→System→Reset VEC**. The **Reset VEC** page opens.

[ ] 9. Click the **Reset VEC** button. Close your Web Browser.



Step 4: Reset your PC's Network Settings

[ ] 1. If you were using a crossover cable, reconnect your computer to your company's network and connect the MCA Ethernet card's port to your company's network.

[ ] 2. Open the **Control Panel** on your computer.

[ ] 3. Select **Network Connections**.

[ ] 4. Select **Local Area Connection**.

[ ] 5. Select **Properties**.

[ ] 6. Highlight Internet Protocol (TCP/IP).

[ ] 7. Select Properties.

[ ] 8. Set the IP parameters to the original settings recorded at the beginning of this procedure.

[ ] 9. Check the new address settings by opening your Web Browser and entering the new IP address.

Step 5: Change the MCA Ethernet Card's SNMP Settings (if equipped with SNMP option)

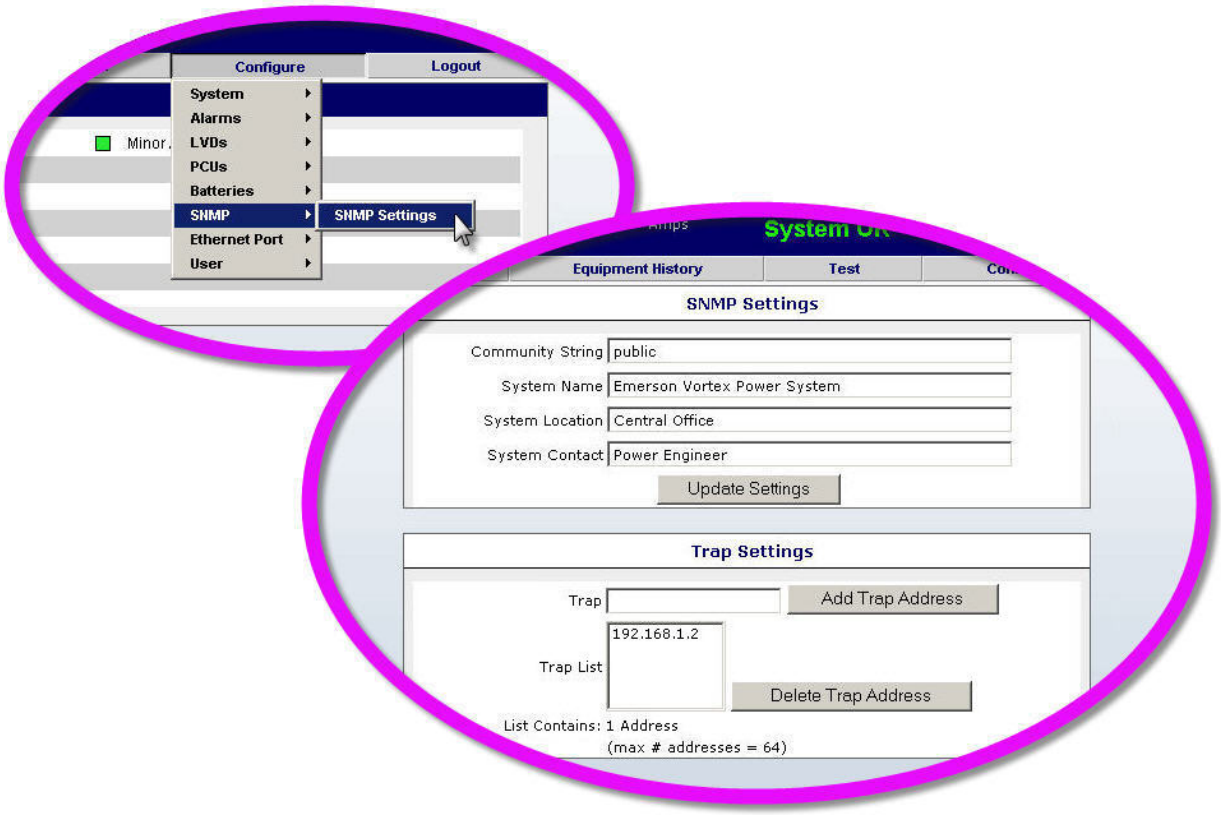
[ ] 1. Open your Web Browser. Type the unit's IP address in the Address box. Press **Enter**. The logon window opens.

[ ] 2. Type the default user name and password, then press **Enter**.
User Name: **llp_admin**
Password: **llp_admin**

NOTE! *The user name and password are case-sensitive. For security, the password is not displayed on the computer's screen. You have three attempts to enter a valid user name and password. If both are not entered correctly after three attempts, the browser is redirected to a "Protected Object" message page. A link is provided on that page that will return you to the logon window.*

[ ] 3. If a valid user name and password are entered, the System Status page opens.

[ ] 4. On the toolbar near the top of the System Status web page, select **Configure→SNMP→SNMP Settings**. The **SNMP Settings** page opens.



[ ] 5. Enter the **SNMP Settings** and click the **Update Settings** button. The screen refreshes and the new settings take effect.

[ ] 6. Add and/or delete traps as necessary. To add, type the Trap Address in **Trap** box and then press **Add Trap Address**. To delete, select the Trap Address from the Trap List and then press **Delete Trap Address**.

Step 6: Access the Power Plant over the Company Network

Via WinLink:

[ ] 1. Add a new MCA in WinLink.

[ ] 2. Set the TCP/IP parameters for this entry.

Set the IP address to the address issued by your IT department.

Set the Port to 2001.

[ ] 3. You can now communicate with the power system over you company's network.

Via Web Browser:

[ ] 1. With your Web browser open, type in the unit's IP address.

[ ] 2. Enter a valid user name and password in the logon window, and logon.

[ ] 3. You can now communicate with the power system over you company's network.

Checking Meter Operation

Procedure

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. "MEASUREMENT MENU" is displayed. Press and release the FUNCTION SET ENTER pushbutton.

a) Requirement: System output voltage is displayed ("SYSTEM ##.##VDC").

[ ] 3. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "SYS LOAD ####A".

a) Requirement: Total system load current is displayed.

[ ] 4. Press and release the FUNCTION SET ENTER pushbutton.

a) Requirement: Load current through the first system load shunt is displayed ("SYS LOAD** ####A").

[ ] 5. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton to display individual load currents through the remaining system load shunts (if furnished and connected to the MCA).

a) Requirement: As the FUNCTION SELECT DOWN arrow pushbutton is pressed and released, load currents through the remaining system load shunts are displayed. When all system shunts are cycled through, "MEASUREMENT MENU" is displayed.

[ ] 6. If "MEASUREMENT MENU" is not displayed, repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until it is.

[ ] 7. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 8. Press and release the FUNCTION SELECT DOWN arrow pushbutton until "PCU LOAD ####A" is displayed.

a) Requirement: Total Rectifier Module load current is displayed.

[ ] 9. Press and release the FUNCTION SET ENTER pushbutton.

a) **Requirement:** Load current of the first Rectifier Module is displayed ("PCU** LOAD ####A").

[ ] 10. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton to display individual load currents of the remaining Rectifier Modules.

a) **Requirement:** As the FUNCTION SELECT DOWN arrow pushbutton is pressed and released, load currents of the remaining Rectifier Modules are displayed. When all Rectifier Modules are cycled through, "MEASUREMENT MENU" is displayed.

[ ] 11. If "MEASUREMENT MENU" is not displayed, repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until it is.

[ ] 12. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 13. Press and release the FUNCTION SELECT DOWN arrow pushbutton until “SUBSYS ##.##VDC” (if subsystem installed) is displayed.

a) **Requirement:** Subsystem output voltage is displayed.

[ ] 14. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display “SUB LOAD ####A” (if subsystem installed).

a) **Requirement:** Total subsystem load current is displayed.

[ ] 15. Press and release the FUNCTION SET ENTER pushbutton.

a) **Requirement:** Load current through the first subsystem load shunt is displayed ("SUB LOAD** ####A") (if subsystem installed).

[ ] 16. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton to display individual load currents through the remaining subsystem load shunts (if subsystem installed).

a) **Requirement:** As the FUNCTION SELECT DOWN arrow pushbutton is pressed and released, currents through the remaining subsystem load shunts are displayed. When all subsystem shunts are cycled through, "MEASUREMENT MENU" is displayed.

[ ] 17. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Checking Adjustment and Calibration Values

Procedure

[ ] 1. Refer to Section for “*MCA System Adjustments*” in the separate User Instructions (Section 6013), and perform the adjustment and calibration procedures detailed to check the value of all customer adjustable system circuits and the calibration settings.

NOTE! *If the MCA Initialization procedure was performed, all adjustments were checked at that time.*

NOTE! *You may skip the adjustment procedures for the alarms and low voltage disconnect circuits. They will be checked and adjusted later in this procedure.*

NOTE! *If TXM (multiple probe concentrator module) is installed, set the 'temperature compensation source' per "MCA System Adjustments"*

[ ] 2. When done, come back and finish this procedure.

Checking MCA Audible Alarm and Audible Alarm Cutoff (if available)

NOTE! *Applies only if power system is equipped with either a List 10 or List 11 MCA.*

Procedure

[ ] 1. Open the external AC disconnect or protective device that supplies power to a Rectifier Module.

a) **Requirement:** Local or External MCA audible alarm sounds (if available).

b) **Requirement:** Other alarms activate. Disregard them here. They will be confirmed in a later check.

[ ] 2. Press and release the ALARM CUTOFF pushbutton.

a) **Requirement:** Local or External MCA audible alarm silences (if available).

b) **Requirement:** MCA "ALARM CUTOFF" indicator goes yellow.

[ ] 3. Wait the pre-programmed MCA audible alarm cutoff reset time interval.

a) **Requirement:** Local or External MCA audible alarm again sounds (if available).

b) **Requirement:** MCA "ALARM CUTOFF" indicator goes out.

[ ] 4. Return the external AC disconnect or protective device to the ON position.

c) **Requirement:** Local or External MCA audible alarm silences (if available).

Checking Manual Test/Equalize and Manually Initiated Timed Test/Equalize

Procedure

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "CONFIGURE MENU" is displayed.

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "TEST/EQ HRS = ##" or "TEST/EQ MAN STOP" is displayed. If "TEST/EQ HRS = ##" is displayed, perform steps 5) through 9). If "TEST/EQ MAN STOP" is displayed, go to step 10).

[ ] 5. Record the value indicated on the display.

[ ] 6. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "TEST/EQ HRS =" portion of the display flashes.

[ ] 7. Press the FUNCTION SET YES (+) pushbutton until the value displayed increases above 99, then release the pushbutton.

a) **Requirement**: "TEST/EQ MAN STOP" is displayed.

[ ] 8. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 9. “ARE YOU SURE? + ” is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

[ ] 10. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

[ ] 11. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 12. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "SET TEST/EQ MODE".

[ ] 13. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 14. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: System output voltage goes to the test/equalize setting.

b) **Requirement**: MCA "TEST/EQ" indicator goes yellow.

c) **Requirement**: External test/equalize alarms activate (if available).

[ ] 15. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

[ ] 16. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 17. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "SET FLOAT MODE".

[ ] 18. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 19. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: System output voltage goes to the float setting.

b) **Requirement**: MCA "TEST/EQ" indicator goes out.

c) **Requirement**: External test/equalize alarms reset (if available).

NOTE! *The following portion of this procedure takes one hour to complete. If you do not want to continue with this procedure, go to step 32).*

[ ] 20. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "CONFIGURE MENU" is displayed.

[ ] 21. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 22. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "TEST/EQ MAN STOP" is displayed.

[ ] 23. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

a) **Requirement**: The display changes to "TEST/EQ HRS = ##", and the "TEST/EQ HRS =" portion of the display flashes.

[ ] 24. Press the FUNCTION SET NO (-) pushbutton until the value displayed is decreased to 1, then release the pushbutton.

[ ] 25. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 26. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

[ ] 27. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

[ ] 28. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 29. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "SET TEST/EQ MODE".

[ ] 30. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 31. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: System output voltage goes to the test/equalize setting.

b) **Requirement: MCA "TEST/EQ" indicator goes yellow.**

c) **Requirement**: External test/equalize alarms activate (if available).

d) **Requirement**: In one hour, the following occurs…

1) **Requirement**: System output voltage goes to the float setting.

2) **Requirement**: MCA "TEST/EQ" indicator goes out.

3) **Requirement**: External test/equalize alarms reset (if available).

[ ] 32. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

[ ] 33. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 34. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "CONFIGURE MENU" is displayed.

[ ] 35. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 36. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "TEST/EQ HRS = ##" is displayed.

[ ] 37. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "TEST/EQ HRS =" portion of the display flashes.

[ ] 38. Press the FUNCTION SET YES (+) pushbutton until the value displayed increases to the value recorded in step 5), then release the pushbutton. If "TEST/EQ MAN STOP" was being displayed in step 5), press the FUNCTION SET YES (+) pushbutton until the value displayed increases above 99.

[ ] 39. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 40. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

[ ] 41. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

a) **Requirement**: MCA displays SYSTEM OK message.

Checking Remote Test/Equalize

Procedure

[ ] 1. Apply a remote test/equalize signal to the system.

a) **Requirement:** System output voltage goes to the test/equalize setting.

b) **Requirement:** MCA "TEST/EQ" indicator goes yellow.

c) **Requirement:** External test/equalize alarms activate (if available).

[ ] 2. Remove the remote test/equalize signal from the system.

a) **Requirement:** System output voltage goes to the float setting.

b) **Requirement:** MCA "TEST/EQ" indicator goes out.

c) **Requirement:** External test/equalize alarms reset (if available).

Checking Remote High Voltage Shutdown

CAUTION! This procedure may interrupt power to the load. Perform this test only during initial startup and checkout of the system.

NOTE! *These procedures require a load to be on the system.*

Procedure

[ ] 1. Apply and remove a remote high voltage shutdown signal to the system.

a) **Requirement:** The high voltage shutdown circuit on all Rectifier Modules activates to shut down the Rectifier Modules. After approximately four seconds, the restart circuit is automatically activated to restore Rectifier Module operation.

b) **Requirement:** MCA “MAJOR” indicator flashes red while the Rectifier Modules are shut down, if battery is connected to the system.

c) **Requirement:** MCA displays "1 Alarm Active" while the Rectifier Modules are shut down, if battery is connected to the system. Additional alarm messages (Rectifier Module fail) are displayed as you scroll through the MCA alarm menu.

d) **Requirement:** External major, rectifier fail, and MCA audible alarms activate (if available) while the Rectifier Modules are shut down.

Checking Emergency Shutdown and Fire Alarm Disconnect

CAUTION! This procedure may interrupt power to the load. Perform this test only during initial startup and checkout of the system, or when a load is not connected to the system.

Procedure

[ ] 1. Apply an emergency shutdown and fire alarm disconnect signal to the system.

a) **Requirement:** The Rectifier Modules inhibit.

b) **Requirement:** MCA “MAJOR” indicator flashes red, if battery is connected to the system.

c) **Requirement:** MCA displays "2 Alarms Active", if battery is connected to the system. Additional alarm messages (Rectifier Module fail and emergency stop) are displayed as you scroll through the MCA alarm menu.

d) **Requirement:** External major, rectifier fail, and MCA audible alarms activate (if available).

[ ] 2. Remove the emergency shutdown and fire alarm disconnect signal from the system. Remove and re-insert the Rectifier Modules.

a) **Requirement:** The Rectifier Modules are restored.

b) **Requirement:** MCA “MAJOR” indicator goes out.

c) **Requirement:** MCA displays SYSTEM OK message.

d) **Requirement:** External major, rectifier fail, and MCA audible alarms reset (if available).

Checking AC Fail Alarm and Rectifier Module Fail Alarm

Procedure

[ ] 1. Open the external AC disconnect or protective device that supplies power to one (or more) of the Rectifier Modules.

a) **Requirement:** Rectifier Module “Protection” indicator goes yellow.

b) **Requirement:** MCA “AC” indicator goes red.

c) **Requirement:** MCA “MINOR” indicator goes red (power removed from one Rectifier Module), or MCA "MAJOR" indicator flashes red (power removed from more than one Rectifier Module).

NOTE! *If there is only one Rectifier Module installed, the "MAJOR" indicator flashes red.*

d) **Requirement:** MCA displays "1 Alarm Active". Additional alarm messages (AC fail) are displayed as you scroll through the MCA alarm menu.

e) **Requirement:** External AC fail, minor or major, rectifier fail, and MCA audible alarms activate (if available).

[ ] 2. Open the external AC disconnect or protective device that supplies power to a second Rectifier Module (individual Rectifier Module feeds only).

a) **Requirement:** Rectifier Module “Protection” indicator goes yellow.

b) **Requirement:** MCA “MINOR” indicator goes out.

c) **Requirement:** MCA “MAJOR” indicator flashes red.

d) **Requirement:** MCA still displays "1 Alarm Active", but additional Rectifier Module fail alarm messages are displayed as you scroll through the MCA alarm menu.

e) **Requirement:** External major, AC fail major, and rectifier fail alarms activate (if available).

[ ] 3. Return both external AC disconnects or protective devices to the ON position.

a) **Requirement:** Rectifier Module “Protection” indicator on both Rectifier Modules go out.

b) **Requirement:** MCA “AC” indicator goes green.

c) **Requirement:** MCA “MAJOR” indicator goes out.

d) **Requirement:** MCA displays SYSTEM OK message.

e) **Requirement:** External AC fail, AC fail major, minor, major, rectifier fail, and MCA audible alarms reset (if available).

Checking Converter Fail Alarms

NOTE! *Applies only if power system is equipped with DC-DC Converters. .*

Procedure

[ ] 1. Remove a Converter Module.

a) **Requirement**: MCA “MINOR” indicator goes red.

b) **Requirement**: MCA displays "1 Alarm Active".

c) **Requirement**: External converter minor and MCA local or external audible alarms activate (if available).

[ ] 2. Remove a second Converter Module.

a) **Requirement**: MCA “MINOR” indicator goes out.

b) **Requirement**: MCA “MAJOR” indicator flashes red.

c) **Requirement**: MCA still displays "1 Alarm Active".

d) **Requirement**: External converter major and major alarms activate (if available).

[ ] 3. Replace both Converter Modules.

Checking Fuse Alarm/Circuit Breaker Alarm

Procedure

[ ] 1. Ensure that all circuit breakers (if installed) are in the ON position.

[ ] 2. Remove an alarm-type fuse from a fuseholder located inside a Distribution Cabinet, and replace with a known open fuse.

a) **Requirement:** MCA “MAJOR” indicator flashes red.

a) **Requirement:** MCA displays "1 Alarm Active". Additional alarm messages (fuse alarm/circuit breaker alarm) are displayed as you scroll through the MCA alarm menu.

b) **Requirement:** External fuse alarm/circuit breaker alarm, major, and MCA audible alarms activate (if available).

[ ] 3. Replace the open fuse with a known good fuse.

a) **Requirement:** MCA “MAJOR” indicator goes out.

c) **Requirement:** MCA displays SYSTEM OK message.

d) **Requirement:** External fuse alarm/circuit breaker alarm, major, and MCA audible alarms reset (if available).

[ ] 4. Perform steps 2) and 3) for each remaining alarm-type fuse located inside the Distribution Cabinet.

[ ] 5. Perform steps 2) through 4) for any additional Distribution Cabinet.

[ ] 6. Remove a distribution fuse (if installed) from the fuseblocks located inside a Distribution Cabinet, and replace with a known open fuse.

a) **Requirement:** The indicator located on the fuseblock goes red.

b) **Requirement:** MCA “MAJOR” indicator flashes red.

c) **Requirement:** MCA displays "1 Alarm Active". Additional alarm messages (fuse alarm/circuit breaker alarm) are displayed as you scroll through the MCA alarm menu.

d) **Requirement:** External fuse alarm/circuit breaker alarm, major, and MCA audible alarms activate (if available).

[ ] 7. Replace the open fuse with a known good fuse.

a) **Requirement:** The indicator located on the fuseblock goes out.

b) **Requirement:** MCA “MAJOR” indicator goes out.

c) **Requirement:** MCA displays SYSTEM OK message.

d) **Requirement:** External fuse alarm/circuit breaker alarm, major, and MCA audible alarms reset (if available).

[ ] 8. Perform steps 6) and 7) for each remaining distribution fuse (if installed) located inside the Distribution Cabinet.

[ ] 9. Perform steps 6) through 8) for any additional Distribution Cabinet.

[ ] 10. Remove an alarm-type fuse from a subsystem (if connected).

a) **Requirement:** MCA "MAJOR" indicator flashes red.

b) **Requirement:** MCA displays "1 Alarm Active". Additional alarm messages (fuse alarm/circuit breaker alarm) are displayed as you scroll through the MCA alarm menu.

c) **Requirement:** External fuse alarm/circuit breaker alarm, major, and MCA audible alarms activate (if available).

[ ] 11. Replace the open fuse with a known good fuse.

a) **Requirement:** MCA "MAJOR" indicator goes out.

b) **Requirement:** MCA displays SYSTEM OK message.

c) **Requirement:** External fuse alarm/circuit breaker alarm, major, and MCA audible alarms reset (if available).

[ ] 12. Perform steps 10) and 11) for each remaining alarm-type fuse located in the subsystem.

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. Electrical trip alarm circuit breakers cannot be easily tested in the field.*

[ ] 13. Place a distribution circuit breaker located inside a Distribution Cabinet (if installed) to the OFF position.

a) **Requirement:** MCA “MAJOR” indicator flashes red.

b) **Requirement:** MCA displays "1 Alarm Active". Additional alarm messages (fuse alarm/circuit breaker alarm) are displayed as you scroll through the MCA alarm menu.

c) **Requirement:** External fuse alarm/circuit breaker alarm, major, and MCA audible alarms activate (if available).

[ ] 14. Place the circuit breaker back to the ON position.

a) **Requirement:** MCA “MAJOR” indicator goes out.

b) **Requirement:** MCA displays SYSTEM OK message.

c) **Requirement:** External fuse alarm/circuit breaker alarm, major, and MCA audible alarms reset (if available).

[ ] 15. Perform steps 13) and 14) for each remaining distribution circuit breaker (if installed) located inside the Distribution Cabinet Assembly.

[ ] 16. Perform steps 13) through 15) for any additional Distribution Cabinet Assembly.

[ ] 17. Place a distribution circuit breaker located on a subsystem (if installed) to the OFF position.

a) **Requirement:** MCA “MAJOR” indicator flashes red.

b) **Requirement:** MCA displays "1 Alarm Active". Additional alarm messages (fuse alarm/circuit breaker alarm) are displayed as you scroll through the MCA alarm menu.

c) **Requirement:** External fuse alarm/circuit breaker alarm, major, and MCA audible alarms activate (if available).

[ ] 18. Place the circuit breaker back to the ON position.

a) **Requirement:** MCA “MAJOR” indicator goes out.

b) **Requirement:** MCA displays SYSTEM OK message.

c) **Requirement:** External fuse alarm/circuit breaker alarm, major, and MCA audible alarms reset (if available).

[ ] 19. Perform steps 17) and 18) for each remaining distribution circuit breaker located on the subsystem.

Checking System High Voltage Alarm 1

Procedure

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".

[ ] 5. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 6. "SYS HV1 = ##.##V" is displayed.

[ ] 7. Record the value indicated on the display.

[ ] 8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SYS HVS =" portion of the display flashes.

[ ] 9. Press the FUNCTION SET NO (-) pushbutton until the value displayed is decreased to below system voltage level, then release the pushbutton.

[ ] 10. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 11. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: MCA "MAJOR" indicator flashes red.

b) **Requirement**: MCA displays a high voltage alarm 1 alarm message. To view, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, then press and release the FUNCTION SET ENTER pushbutton.

c) **Requirement**: External high voltage alarm 1, major, and MCA audible alarms activate (if available).

[ ] 12. If the alarm message was viewed in b) above, press and release the FUNCTION SELECT DOWN arrow pushbutton to display "FUNCTION MENU". Press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed. Press and release the FUNCTION SET ENTER pushbutton. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS". Press and release the FUNCTION SET ENTER pushbutton. "SYS HV1 = ##.##V" is displayed.

[ ] 13. With "SYS HV1 = ##.##V" being displayed, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 14. Press the FUNCTION SET YES (+) pushbutton until the value displayed is increased to the value recorded in step 7) or to the required value for your site, then release the pushbutton.

[ ] 15. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 16. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) Requirement: MCA "MAJOR" indicator goes out.

b) Requirement: External high voltage alarm 1, major, and MCA audible alarms reset (if available).

[ ] 17. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

a) Requirement: MCA displays SYSTEM OK message.

Checking System High Voltage Alarm 2

Procedure

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".

[ ] 5. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 6. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "SYS HV2 = ##.##V".

[ ] 7. Record the value indicated on the display.

[ ] 8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SYS HV2 =" portion of the display flashes.

[ ] 9. Press the FUNCTION SET NO (-) pushbutton until the value displayed is decreased to below system voltage level, then release the pushbutton.

[ ] 10. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 11. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) Requirement: MCA "MAJOR" indicator flashes red.

b) Requirement: MCA displays a high voltage alarm 2 alarm message. To view, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, then press and release the FUNCTION SET ENTER pushbutton.

c) Requirement: External high voltage alarm 2, major, and MCA audible alarms activate (if available).

[ ] 12. If the alarm message was viewed in b) above, press and release the FUNCTION SELECT DOWN arrow pushbutton to display "FUNCTION MENU". Press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed. Press and release the FUNCTION SET ENTER pushbutton. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS". Press and release the FUNCTION SET ENTER pushbutton. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "SYS HV2 = ##.##V".

[ ] 13. With "SYS HV2 = ##.##V" being display, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 14. Press the FUNCTION SET YES (+) pushbutton until the value displayed is increased to the value recorded in step 7) or to the required value for your site, then release the pushbutton.

[ ] 15. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 16. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: MCA “MAJOR” indicator goes out.

b) **Requirement**: External high voltage alarm 2, major, and MCA audible alarms reset (if available).

[ ] 17. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

a) **Requirement**: MCA displays SYSTEM OK message.

Checking System Battery on Discharge Alarm

Procedure

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".

[ ] 5. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 6. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SYS BOD = ##.##V" is displayed.

[ ] 7. Record the value indicated on the display.

[ ] 8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SYS BOD =" portion of the display flashes.

[ ] 9. Press the FUNCTION SET YES (+) pushbutton until the value displayed is increased to above system voltage level, then release the pushbutton.

[ ] 10. 1Press and release the FUNCTION SET ENTER pushbutton.

[ ] 11. “ARE YOU SURE? + ” is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: MCA “MAJOR” indicator flashes red.

b) **Requirement**: MCA displays a battery on discharge alarm message. To view, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, then press and release the FUNCTION SET ENTER pushbutton.

c) **Requirement**: External battery on discharge, major, and MCA audible alarms activate (if available).

[ ] 12. If the alarm message was viewed in b) above, press and release the FUNCTION SELECT DOWN arrow pushbutton to display "FUNCTION MENU". Press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed. Press and release the FUNCTION SET ENTER pushbutton. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS". Press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SYS BOD = ##.##V" is displayed.

[ ] 13. With "SYS BOD = ##.##V" being displayed, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 14. Press the FUNCTION SET NO (-) pushbutton until the value displayed is decreased to the value recorded in step 7) or to the required value for your site, then release the pushbutton.

[ ] 15. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 16. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: MCA "MAJOR" indicator goes out.

b) **Requirement**: External battery on discharge, major, and MCA audible alarms reset (if available).

[ ] 17. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

a) **Requirement**: MCA displays SYSTEM OK message.

Checking System 50% Battery on Discharge (Very Low Voltage) Alarm

Procedure

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".

[ ] 5. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 6. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SYS 50% = ##.##V (VERYLOVOLT = ##.##V)" is displayed.

[ ] 7. Record the value indicated on the display.

[ ] 8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SYS 50% = (VERYLOVOLT =)" portion of the display flashes.

[ ] 9. Press the FUNCTION SET YES (+) pushbutton until the value displayed is increased to above system voltage level, then release the pushbutton.

[ ] 10. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 11. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: MCA "MAJOR" indicator flashes red.

b) **Requirement**: MCA displays a 50% battery on discharge (very low voltage) alarm message. To view, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, then press and release the FUNCTION SET ENTER pushbutton.

c) **Requirement**: External 50% battery on discharge (very low voltage), major, and MCA audible alarms activate (if available).

[ ] 12. If the alarm message was viewed in b) above, press and release the FUNCTION SELECT DOWN arrow pushbutton to display "FUNCTION MENU". Press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed. Press and release the FUNCTION SET ENTER pushbutton. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS". Press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SYS 50% = ##.##V (VERYLOVOLT = ##.##V)" is displayed.

[ ] 13. With "SYS 50% = ##.##V (VERYLOVOLT = ##.##V)" being displayed, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 14. Press the FUNCTION SET NO (-) pushbutton until the value displayed is decreased to the value recorded in step 7) or to the required value for your site, then release the pushbutton.

[ ] 15. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 16. “ARE YOU SURE? + ” is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: MCA “MAJOR” indicator goes out.

b) **Requirement**: External 50% battery on discharge (very low voltage), major, and MCA audible alarms reset (if available).

[ ] 17. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

a) **Requirement**: MCA displays SYSTEM OK message.

Checking System Current Alarm

Procedure

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".

[ ] 5. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 6. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SYS CURR = ####A" is displayed.

[ ] 7. Record the value indicated on the display.

[ ] 8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SYS CURR =" portion of the display flashes.

[ ] 9. Press the FUNCTION SET NO (-) pushbutton until the value displayed is decreased to below system output current level, then release the pushbutton.

[ ] 10. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 11. “ARE YOU SURE? + ” is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: MCA "MINOR" indicator goes red.

b) **Requirement**: MCA displays a system current alarm message. To view, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, then press and release the FUNCTION SET ENTER pushbutton.

c) **Requirement**: External, system current, minor, and MCA audible alarms activate (if available).

[ ] 12. If the alarm message was viewed in b) above, press and release the FUNCTION SELECT DOWN arrow pushbutton to display "FUNCTION MENU". Press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed. Press and release the FUNCTION SET ENTER pushbutton. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS". Press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SYS CURR = ####A" is displayed.

[ ] 13. With "SYS CURR = ####A" being displayed, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 14. Press the FUNCTION SET YES (+) pushbutton until the value displayed is increased to the value recorded in step 7) or to the required value for your site, then release the pushbutton.

[ ] 15. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 16. “ARE YOU SURE? + ” is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: MCA "MINOR" indicator goes out.

b) **Requirement**: External system current, minor, and MCA audible alarms reset (if available).

[ ] 17. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

a) **Requirement**: MCA displays SYSTEM OK message.

Checking Subsystem (if connected) High Voltage Alarm

Procedure

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".

[ ] 5. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 6. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SUB HV = ##.##V" is displayed.

[ ] 7. Record the value indicated on the display.

[ ] 8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SUB HV =" portion of the display flashes.

[ ] 9. Press the FUNCTION SET NO (-) pushbutton until the value displayed is decreased to below system voltage level, then release the pushbutton.

[ ] 10. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 11. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) Requirement: MCA "MAJOR" indicator flashes red.

b) Requirement: MCA displays a subsystem high voltage alarm message. To view, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, then press and release the FUNCTION SET ENTER pushbutton.

c) Requirement: External major and MCA audible alarms activate (if available).

[ ] 12. If the alarm message was viewed in b) above, press and release the FUNCTION SELECT DOWN arrow pushbutton to display "FUNCTION MENU". Press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed. Press and release the FUNCTION SET ENTER pushbutton. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS". Press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SUB HV = ##.##V" is displayed.

[ ] 13. With "SUB HV = ##.##V" being displayed, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 14. Press the FUNCTION SET YES (+) pushbutton until the value displayed is increased to the value recorded in step 7) or to the required value for your site, then release the pushbutton.

[ ] 15. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 16. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: MCA "MAJOR" indicator goes out.

b) **Requirement**: External major and MCA audible alarms reset (if available).

[ ] 17. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

a) **Requirement**: MCA displays SYSTEM OK message.

Checking Subsystem (if connected) Low Voltage Alarm

Procedure

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".

[ ] 5. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 6. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SUB LV = ##.##V" is displayed.

[ ] 7. Record the value indicated on the display.

[ ] 8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SUB LV =" portion of the display flashes.

[ ] 9. Press the FUNCTION SET YES (+) pushbutton until the value displayed is increased to above system voltage level, then release the pushbutton.

[ ] 10. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 11. “ARE YOU SURE? + ” is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: MCA "MAJOR" indicator flashes red.

b) **Requirement**: MCA displays a subsystem low voltage alarm message. To view, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, then press and release the FUNCTION SET ENTER pushbutton.

c) **Requirement**: External major and MCA audible alarms activate (if available).

[ ] 12. If the alarm message was viewed in b) above, press and release the FUNCTION SELECT DOWN arrow pushbutton to display "FUNCTION MENU". Press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed. Press and release the FUNCTION SET ENTER pushbutton. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS". Press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SUB LV = ##.##V" is displayed.

[ ] 13. With "SUB LV = ##.##V" being displayed, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 14. Press the FUNCTION SET NO (-) pushbutton until the value displayed is decreased to the value recorded in step 7) or to the required value for your site, then release the pushbutton.

[ ] 15. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 16. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: MCA "MAJOR" indicator goes out.

b) **Requirement**: External major and MCA audible alarms reset (if available).

[ ] 17. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

a) **Requirement**: MCA displays SYSTEM OK message.

Checking Subsystem (if connected) Current Alarm

Procedure

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".

[ ] 5. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 6. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SUB CURR = ####A" is displayed.

[ ] 7. Record the value indicated on the display.

[ ] 8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SUB CURR =" portion of the display flashes.

[ ] 9. Press the FUNCTION SET NO (-) pushbutton until the value displayed is decreased to subsystem output current level, then release the pushbutton.

[ ] 10. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 11. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: MCA "MINOR" indicator goes red.

b) **Requirement**: MCA displays a subsystem current alarm message. To view, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, then press and release the FUNCTION SET ENTER pushbutton.

c) **Requirement**: External minor and MCA audible alarms activate (if available).

[ ] 12. If the alarm message was viewed in b) above, press and release the FUNCTION SELECT DOWN arrow pushbutton to display "FUNCTION MENU". Press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed. Press and release the FUNCTION SET ENTER pushbutton. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS". Press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SYS CURR = ####A" is displayed.

[ ] 13. With "SUB CURR = ####A" being displayed, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 14. Press the FUNCTION SET YES (+) pushbutton until the value displayed is increased to the value recorded in step 7) or to the required value for your site, then release the pushbutton.

[ ] 15. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 16. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) **Requirement**: MCA "MINOR" indicator goes out.

b) **Requirement**: External minor and MCA audible alarms reset (if available).

[ ] 17. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

a) **Requirement**: MCA displays SYSTEM OK message.

Checking Low Voltage Disconnect (if furnished)

The MCA is designed to prevent loss of power to customer loads caused by inadvertent misadjustment. Because of this feature, the LVD circuits cannot be easily tested in the field, and such testing is not recommended. The following procedure is provided for users who do require acceptance testing of the LVD circuits.

CAUTION! This procedure requires disconnecting battery from the power system. In addition, system output voltage will be reduced to 46 volts, and power to the loads may be interrupted completely during this procedure. Therefore, perform this test only during initial startup and checkout of the system, or when critical loads are not connected.

Disconnecting Batteries

DANGER! In the next step, batteries are an energy source that can produce high amounts of electrical current. NEVER allow a metal object, such as a tool, to contact more than one energized termination at a time, or to simultaneously contact an energized termination and a grounded object. Even a momentary short circuit can cause an explosion resulting in injury. Remove watches, ring and other jewelry, and wear eye protection when working with battery connections. Terminations of live battery cables must be sleeved when not connected.

[ ] 1. Disconnect battery from the power system. To do so, open the external battery disconnect device(s) if available, or disconnect battery cables as required.

Inhibiting LVD

[ ] 1. If the system is equipped with a low voltage disconnect "normal/inhibit" switch, place this switch to the "inhibit" position. This prevents accidental disconnection of battery and system output from the controlled load(s) while performing this procedure.

a) Requirement: The low voltage disconnect "inhibit" indicator illuminates.

Recording and Raising LVD Disconnect Setpoint(s)

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST LVD".

[ ] 5. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 6. "LVD1A = ##.##V" is displayed (if installed). If you are checking the other low voltage disconnect circuits, repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until the respective low voltage disconnect circuit name is displayed (LVD1B, LVD2A, LVD2B, LVD3A, or LVD3B).

NOTE! *For LVD 1, 2, and 3 circuits, the A and B sides must both agree for an actual LVD to take place.*

[ ] 7. Record the value indicated on the display. This is the low voltage disconnect setting for this circuit.

[ ] 8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. Portion of the display flashes.

[ ] 9. Observe the value displayed. Press and hold the FUNCTION SET YES (+) pushbutton. Release the pushbutton when 46.00 volts is displayed.

[ ] 10. With the 46.00 volts being displayed, press and release the FUNCTION SET ENTER pushbutton.

[ ] 11. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

NOTE! *The low voltage disconnect value will not be changed and the adjustment mode will be exited if the FUNCTION SET YES (+) pushbutton is not pressed within 10 seconds of the "ARE YOU SURE? + -" prompt.*

[ ] 12. Repeat steps 6 through 11 for each of the remaining LVD circuits (LVD1B, LVD2A, LVD2B, LVD3A, or LVD3B) in the system.

[ ] 13. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Configuring for Manual Test/Equalize

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

or

With "## ALARMS ACTIVE" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "FUNCTION MENU" is displayed. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "CONFIGURE MENU" is displayed.

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "TEST/EQ HRS = ##" or "TEST/EQ MAN STOP" is displayed.

NOTE! *If "TEST/EQ MAN STOP" is displayed, the system is already set for manual test/equalize. In this case, proceed with step 9).*

NOTE! *If "END TEQ ##.##HRS" is displayed, the system is set for manually initiated timed test/equalize, and a timed test/equalize is in progress. In this case, you can proceed with steps 5) through 8) to cancel the timed test/equalize in progress and change the current setting, or proceed with step 9) to proceed with the timed test/equalize in progress and make no changes.*

[ ] 5. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "TEST/EQ HRS =" portion of the display flashes.

[ ] 6. Press the FUNCTION SET YES (+) pushbutton until the value displayed increases above 99, then release the pushbutton. "TEST/EQ MAN STOP" is displayed.

[ ] 7. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 8. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

[ ] 9. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Placing the System into Test/Equalize Mode

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

or

With "## ALARMS ACTIVE" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "FUNCTION MENU" is displayed. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "SET TEST/EQ MODE".

[ ] 3. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 4. "ARE YOU SURE? + -" is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

[ ] 5. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Testing LVD Disconnect and Reconnect Functions

[ ] 1. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. "ADJUST SYSTEM" is displayed.

[ ] 5. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 6. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "TEST/EQ = ##.##V".

[ ] 7. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "TEST/EQ =" portion of the display flashes.

[ ] 8. Observe the value displayed. Press and hold the FUNCTION SET NO (-) pushbutton. Release the pushbutton when 46.00 volts is displayed.

[ ] 9. With 46.00 volts being displayed, press and release the FUNCTION SET ENTER pushbutton.

[ ] 10. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

NOTE! *The test/equalize voltage will not be changed and the adjustment mode will be exited if the FUNCTION SET YES (+) pushbutton is not pressed within 10 seconds of the "ARE YOU SURE? + " prompt.*

a) Requirement: After a 5-10 second delay, the MCA LVD alarm activates. (Additional alarms may also activate.) To view the alarm message(s), press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, then press and release the FUNCTION SET ENTER pushbutton.

b) Requirement: External LVD alarm activates (if available).

[ ] 11. If the alarm message was viewed in a) above, press and release the FUNCTION SELECT DOWN arrow pushbutton to display "FUNCTION MENU".

[ ] 12. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 13. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUSTMENT MENU".

[ ] 14. Press and release the FUNCTION SET ENTER pushbutton. "ADJUST SYSTEM" is displayed.

[ ] 15. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 16. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "TEST/EQ = ##.##V".

[ ] 17. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "TEST/EQ =" portion of the display flashes.

[ ] 18. Observe the value displayed. Press and hold the FUNCTION SET YES (+) pushbutton. Release the pushbutton when TEST/EQ setpoint previously recorded is displayed.

[ ] 19. With TEST/EQ setpoint previously recorded being displayed, press and release the FUNCTION SET ENTER pushbutton.

[ ] 20. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

a) Requirement: After 10-15 seconds, alarm messages clear.

b) Requirement: After 10-15 seconds, external LVD alarm resets (if available).

[ ] 21. Perform the following steps if the low voltage disconnect circuit is set for manual reconnect. If set for automatic reconnect, there is a 15-20 second delay before the LVD circuits reconnect.

a) With "## ALARMS ACTIVE" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

b) Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ALARM LVD ACTIVE".

c) Press and release the FUNCTION SET ENTER pushbutton.

d) Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until the low voltage disconnect circuit being checked is displayed ("RECONNECT LVD**", **=the designation of the low voltage disconnect circuit).

e) To reconnect the low voltage disconnect circuit being displayed, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

f) "ARE YOU SURE? +-" is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The low voltage disconnect circuit reconnects.

[ ] 22. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

a) Requirement: MCA displays SYSTEM OK message.

Readjusting LVD Disconnect Setpoint(s) to Factory Setting

[ ] 1. With "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.

[ ] 3. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 4. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUST LVD" is displayed.

[ ] 5. Press and release the FUNCTION SET ENTER pushbutton.

[ ] 6. "LVD1A = ##.##V" is displayed (if installed). If you are adjusting the other low voltage disconnect circuits, repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until the respective low voltage disconnect circuit name is displayed (LVD1B, LVD2A, LVD2B, LVD3A, or LVD3B).

[ ] 7. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. Portion of the display flashes.

[ ] 8. Observe the value displayed. Press and hold the FUNCTION SET NO (-) pushbutton. Release the pushbutton when the TEST/EQ setpoint previously recorded is displayed.

[ ] 9. With the desired low voltage disconnect value being displayed, press and release the FUNCTION SET ENTER pushbutton.

[ ] 10. "ARE YOU SURE? + " is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

NOTE! *The low voltage disconnect value will not be changed and the adjustment mode will be exited if the FUNCTION SET YES (+) pushbutton is not pressed within 10 seconds of the "ARE YOU SURE? + -" prompt.*

[ ] 11. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

[ ] 12. Repeat this procedure to set the disconnect value for the other low voltage disconnect circuits installed.

Returning to Float Mode

[ ] 1. To return to float mode, with "SYSTEM OK" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.

[ ] 2. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "SET FLOAT MODE".

[ ] 3. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

[ ] 4. "ARE YOU SURE? + -" is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

CAUTION! DO NOT perform the next step until you verify that there are NO low voltage disconnect alarms active. If the next step is performed when low voltage disconnect alarms are active, battery and system output will disconnect from the controlled load(s).

[ ] 5. If the system is equipped with a low voltage disconnect "normal/inhibit" switch, place this switch to the "normal" position.

a) Requirement: The low voltage disconnect "inhibit" indicator (if furnished) extinguishes.

[ ] 6. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

a) **Requirement:** MCA displays SYSTEM OK message.

[ ] 7. Repeat this procedure for the other low voltage disconnect circuits installed.

Reconnecting Batteries

DANGER! In the next step, batteries are an energy source that can produce high amounts of electrical current. NEVER allow a metal object, such as a tool, to contact more than one energized termination at a time, or to simultaneously contact an energized termination and a grounded object. Even a momentary short circuit can cause an explosion resulting in injury. Remove watches, ring and other jewelry, and wear eye protection when working with battery connections. Terminations of live battery cables must be sleeved when not connected.

[ ] 1. Reconnect battery to the power system. To do so, close the external battery disconnect device(s) if available, or reconnect battery cables as required.

Checking System Status

Procedure: Observe the status of the display and indicators located on the Rectifier Modules, MCA Interface Pad, and Distribution Cabinet. If the system is operating normally, the status of these are as follows.

MCA Interface Pad:

a) Requirement: MCA displays SYSTEM OK message.

b) Requirement: MINOR indicator off.

c) Requirement: MAJOR indicator off.

d) Requirement: AC indicator green.

e) Requirement: TEST/EQ indicator off.

f) Requirement: ALARM CUTOFF indicator off.

Each Rectifier Module:

a) Requirement: POWER indicator green.

b) Requirement: PROTECTION indicator off.

c) Requirement: FAULT indicator off.

Each DC-DC Converter Module (if present):

a) Requirement: POWER indicator green.

b) Requirement: PROTECTION indicator off.

c) Requirement: FAULT indicator off.

Each Distribution Cabinet:

a) Requirement: Low Voltage Disconnect INHIBIT indicator off.

Final Step

Close the front door on each Distribution Cabinet. The door can be shut without turning the captive fasteners.

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