NetSure™

+24 VDC Power System

User Manual (Section 6013), Revision G

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 8.

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.

Battery

Refer to the battery manufacturer documentation for specific battery safety instructions. The following are general guidelines.

WARNING! Correct polarity must be observed when connecting battery leads.

WARNING! Special safety precautions are required for procedures involving handling, installing, and servicing batteries. Observe all battery safety precautions in this manual and in the battery instruction manual. These precautions should be followed implicitly at all times.

WARNING! A battery can present a risk of electrical shock and high short circuit current. Servicing of batteries should be performed or supervised only by properly trained and qualified personnel knowledgeable about batteries and the required precautions.

The following precautions should be observed when working on batteries:

- Remove watches, rings, and other metal objects.
- Eye protection should be worn to prevent injury from accidental electrical arcs.
- Use certified and well maintained insulated tools. Use double insulated tools appropriately rated for the work to be performed. Ensure that wrenches with more than one working end have only one end exposed.
- Do not lay tools or metal parts on top of batteries.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Risk of explosion if battery is replaced with an incorrect type or if polarity is reversed. Recommended to replace batteries with the same manufacturer and type, or equivalent.
- Dispose of used batteries according to the instructions provided with the batteries. Do not dispose of batteries in a fire. They may explode.
- ALWAYS FOLLOW THE BATTERY MANUFACTURER'S RECOMMENDATIONS AND SAFETY INSTRUCTIONS.

DANGER! This equipment may be used in conjunction with lead-acid batteries. Working near lead-acid batteries is dangerous!

In addition to the hazard of electric shock, gas produced by batteries can be explosive and sulfuric acid can cause severe burns.

- Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes, and is toxic.
- Batteries contain sulfuric acid.
- Batteries generate explosive gases during normal operation. Systems containing batteries should never be installed in an airtight room or space. Only install in a ventilated environment.
- 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:

- Follow the recommended PPE requirements per the SDS for the battery to be used.
- 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.

ALERT! Performing maintenance and/or troubleshooting procedures may interrupt power to the loads, if battery reserve is not sufficient.

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:

a) 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:

b) 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.

c) 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.

d) 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.

e) 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.

f) 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.

g) The telephone company may make changes in its communications facilities, equipment, 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

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SYSTEM OVERVIEW

Preface

This document (Section 6013) provides *User Instructions* for NetSure™ Power System Model 700NVBA, Spec. No. 581126000.

For *Installation Instructions*, refer to Section 6012 located in the separate *INSTALLATION MANUAL* and 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).

System Description

A +24V DC @ up to 4000 amperes Power System.

This power system is designed to power a load while charging a negative grounded battery. This power system is capable of operating in a batteryless installation or off battery for maintenance purposes. The power system is designed for operation with the negative output grounded.

The NETSURE 700NVBA DC Power System is a complete integrated power system containing rectifiers (PCUs), converters, intelligent control, metering, monitoring, and distribution. This power system consists of the following components.

- Distribution Cabinet

  The system always includes a minimum of one Distribution Cabinet, which provides DC distribution through fuses and/or circuit breakers.

  Four different sizes of Distribution Cabinets may be ordered to accept from one (1) to four (4) Distribution Bus Panel assemblies. A variety of Distribution Bus Panel assemblies are available that provide combinations of load distribution, battery distribution, low voltage load or battery disconnect, manual battery disconnect, and dual voltage load distribution for use with -48V converters.. The Distribution Cabinet is factory mounted in the relay rack specified when ordered.

  Most of the distribution panels accept either TPS/TLS-type fuse holders or Bullet Nose-type circuit breakers. TPH-type fuses and GJ/218-type circuit breakers are also available, in ratings up to 600 amps.

- Meter-Control-Alarm (MCA) Assembly

  The system contains one MCA. The MCA controls the operation of the Rectifier Modules (PCUs). The MCA also provides power system control, metering, monitoring, and alarm functions.

- Module Mounting Assembly

  The system contains one or more Module Mounting Shelf Assemblies, each of which houses Rectifier Modules (PCUs) and optional DC-DC Converter Modules.

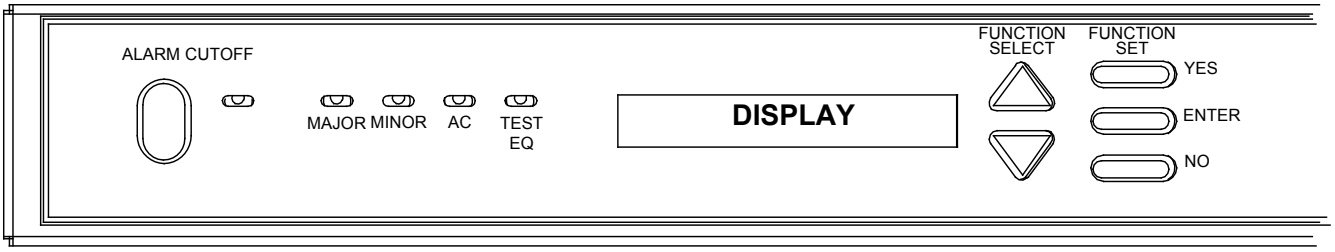
- Rectifier Modules (PCUs)

  The system contains Rectifier Modules (PCUs), which provide load power, battery float current, and battery recharge current during normal operating conditions.

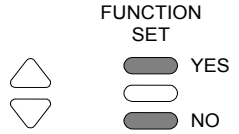
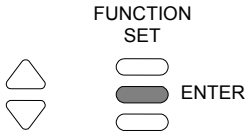
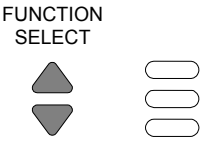
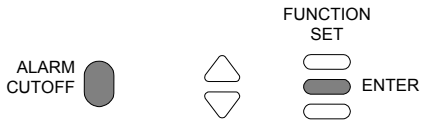
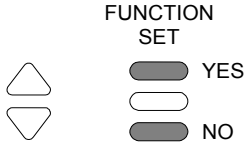
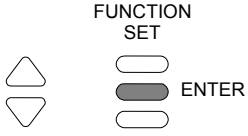
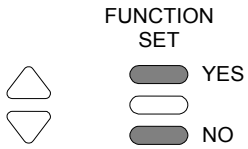
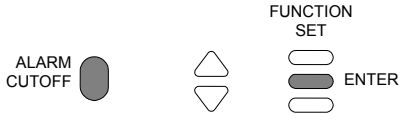
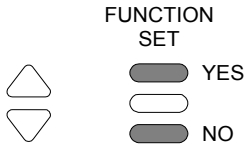
- Optional DC-DC Converter Modules

  Where –48VDC load power is also required, DC-DC Converter Modules are available.

NAVIGATING THE MCA



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		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		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		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.
<u>Changing a Value or Setting</u> 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		
<u>Changing a Control Function</u> 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		

NOTES

Only active alarms are displayed.

Subsystem alarms are not displayed if no subsystem is installed.

Low voltage disconnect alarms are not displayed if no LVDs are installed.

Only installed Rectifier Modules (PCUs) are displayed.

Only installed SYS LOADs are displayed.

Only installed SUB LOADs are displayed.

Only installed LVDs are displayed.

Subsystem entries are not displayed if no subsystem is installed.

Low voltage disconnect entries are not displayed if no LVDs are installed.

The "Adjust LVD" entry is not displayed if no LVDs are installed.

The "CAL SUB" entry is not displayed if no subsystem is installed.

The "RESTORE MFG CAL" entry is displayed only if "CAL SYS" or "CAL SUB" has been changed from its default.

MCA Messages

The following chart provides an explanation of each MCA message appearing on the MCA Menu Tree (Section 6022). The MCA Menu Tree 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. Note that each line in the MCA Menu Tree contains a number. This number is referenced in the following chart.

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
0	SYSTEM OK	Normal Display	NO ALARMS ARE ACTIVE.	No
1	## ALARMS ACTIVE or NOT RUNNING YET! or	Normal Display	THERE ARE ACTIVE ALARMS. ## = number of active alarms. or No Rectifier Modules (PCUs) are communicating with the MCA. or Display has "timed-out".	No
2	ALARM EMERG STOP	Main Alarm Menu	Displays if a Rectifier Module (PCU) emergency shutdown or fire alarm disconnect signal is applied to the system.	No
3	ALARM LVD ACTIVE	Main Alarm Menu	Displays if any low voltage disconnect circuit has disconnected.	No
4	ALARM SYS 50% BOD or ALM VERY LO VOLT or ALARM LO VOLTAGE	Main Alarm Menu	Displays if system voltage decreases to a preset adjustable value, indicating that the battery has been continuously supplying the load and has discharged to approximately half its reserve time.	No
5	ALARM SYSTEM BOD or ALARM LO FLOAT	Main Alarm Menu	Displays if system voltage decreases to a preset adjustable value, indicating that the battery is supplying the load and is discharging.	No
6	ALARM SYSTEM HV1 or ALARM HIGH FLOAT	Main Alarm Menu	Displays if system voltage increases to a preset adjustable value.	No
7	ALARM SYSTEM HV2 or ALARM HI VOLTAGE	Main Alarm Menu	Displays if system voltage increases to a preset adjustable value.	No

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
8	ALARM SUBSYS LV	Main Alarm Menu	Displays if a subsystem voltage source decreases to a preset adjustable value.	No
9	ALARM SUBSYS HV	Main Alarm Menu	Displays if a subsystem voltage source increases to a preset adjustable value.	No
10	ALARM SYSTEM FA	Main Alarm Menu	Displays if any system fuse or circuit breaker opens.	No
11	ALARM SUBSYS FA	Main Alarm Menu	Displays if any subsystem fuse or circuit breaker opens.	No
12	ALM SUBSYS MAJOR	Main Alarm Menu	Displays if a subsystem major alarm occurs.	No
13	ALARM ALL AC OFF	Main Alarm Menu	Displays if AC input voltage to all Rectifier Modules (PCUs) decreases to a preset non-adjustable value.	No
14	ALARM HI AC LINE	Main Alarm Menu	Not implemented in this system.	No
15	ALM ## PCUs FAIL or ALARM MRFA or ALARM 1 RFA or NO PCUs FOUND	Main Alarm Menu	Displays if any Rectifier Module (PCU) fail alarm occurs. ## = number of failed Rectifier Modules (PCUs). or Multiple Rectifier Modules (PCUs) Failed. or 1 Rectifier Module (PCU) Failed. or No Rectifier Modules (PCUs) are communicating with the MCA.	No
15B	ALM PCU## SHARE	Main Alarm Menu	Displays if the Rectifier Module (PCU) is not sharing the load properly. ## = number of Rectifier Module (PCU).	No
15A	ALM TEMP SENSOR	Main Alarm Menu	Displays if any Temperature Sensor alarm occurs.	No
16	ALM SYSTEM CURR	Main Alarm Menu	Displays if system current increases to a preset adjustable value.	No

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
17	ALM SUBSYS CURR	Main Alarm Menu	Displays if subsystem (if connected) current increases to a preset adjustable value.	No
17A	ALM BAT CHG CURR	Main Alarm Menu	Displays if battery recharge current limit is exceeded.	No
18	ALM SUBSYS MINOR	Main Alarm Menu	Displays if a subsystem minor alarm occurs.	No
19	ALARM MCA/SHELF	Main Alarm Menu	Displays if an MCA fail alarm occurs.	No
20	FUNCTION MENU	Main Alarm Menu	Moves you to this menu.	No
21	NORMAL DISPLAY	Main Alarm Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
22	LVD ** ACTIVATED	LVD Alarm Menu	Displays which low voltage disconnect circuit operated (either 1A, 1B, 2A, 2B, 3A, and/or 3B). ** = the designation of the LVD alarm (either 1A, 1B, 2A, 2B, 3A, or 3B).	No
23	RECONNECT LVD **	LVD Alarm Menu	Allows manual reconnection of an activated low voltage disconnect circuit. ** = the designation of the LVD circuit (either 1A, 1B, 2A, 2B, 3A, or 3B). The first activated LVD circuit is displayed. Press the FUNCTION SELECT UP or DOWN arrow pushbutton to display the next or previous activated, respectively, LVD circuit. Press the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously to cause this LVD circuit to reconnect. At the "ARE YOU SURE? + -" prompt, press either the FUNCTION SET YES (+) pushbutton to reconnect, or the FUNCTION SET NO (-) pushbutton to cancel this operation.	Yes, see "System Operating Procedures".
24	MAIN ALARM MENU	LVD Alarm Menu	Moves you back to this menu.	No

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
25	NORMAL DISPLAY	LVD Alarm Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
26	PCU ** FAILURE	PCU Alarm Menu	Displays which Rectifier Module (PCU) failed. ** = the designation of the Rectifier Module (PCU) alarm.	No
27	MAIN ALARM MENU	PCU Alarm Menu	Moves you back to this menu.	No
28	NORMAL DISPLAY	PCU Alarm Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
28A	TEMP SENSOR ** HI	Temperature Alarm Menu	Displays if battery temperature increases to a preset adjustable value. ** = the designation of the temperature probe.	No
28B	TEMP SENSOR ** LO	Temperature Alarm Menu	Displays if battery temperature decreases to a preset adjustable value. ** = the designation of the temperature probe.	No
28C	MAIN ALARM MENU	Temperature Alarm Menu	Moves you back to this menu.	No
28D	NORMAL DISPLAY	Temperature Alarm Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
29	MCA BOARD FAIL	MCA Alarm Menu	Displays if the MCA circuit card failed.	No
30	A/D INPUT FUSE	MCA Alarm Menu	Displays if the MCA "system" or "sense" fuse opens.	No
31	NO SYSTEM VOLTS	MCA Alarm Menu	Displays if no system voltage detected.	No
32	NO SUBSYS VOLTS	MCA Alarm Menu	Displays if no subsystem (if connected) voltage detected.	No

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
33	NO SENSE VOLTS or SENSE VOLT ERROR	MCA Alarm Menu	Displays if no sense voltage detected, or an error is detected between the system voltage and sense voltage values or between these values and the temperature compensation setting.	No
34	SHUNT** NO REPLY or SHUNT** BAD TYPE	MCA Alarm Menu	Displays if bad shunt type detected or shunt communications lost. ** = the designation of the shunt.	No
34A	BAT CL INHIBITED	MCA Alarm Menu	Displays if battery recharge current exceeds Battery Recharge Current Limit setting because the Limit feature is inhibited due to: • Shunt Type alarms are present, or • Shunt No Reply alarms are present, or • a =10% of system capacity mismatch between the Rectifier Module (PCU) output current and the sum of the system and battery shunt currents is present.	No
35	LVD** NO REPLY or LVD** EPROM FAIL or LVD** A/D FAILED or LVD** RELAY FAIL or LVD** NO MCA CMD	MCA Alarm Menu	Displays if low voltage disconnect communications lost, a low voltage disconnect circuit card failed, or low voltage disconnect communications link to MCA broken. ** = the designation of the LVD circuit.	No
36	LVDs INHIBITED	MCA Alarm Menu	Displays if the low voltage disconnect circuits are manually inhibited.	No
37	REMOTE NO REPLY	MCA Alarm Menu	Displays if remote communications lost.	No
38	DISPLAY NO REPLY	MCA Alarm Menu	Displays if the display communications lost.	No

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
38A	TEMP ** NO REPLY	MCA Alarm Menu	Displays if temperature sensor communications lost. ** = the designation of the temperature probe.	No
39	MAIN ALARM MENU	MCA Alarm Menu	Moves you back to this menu.	No
40	NORMAL DISPLAY	MCA Alarm Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
41	MEASUREMENT MENU	Function Menu	Moves you forward to this menu.	No
42	SET TEST/EQ MODE or SET FLOAT MODE or TestEq Switch On	Function Menu	Completing this operation places the system into the float or test/equalize mode as determined by the setting displayed before the "ARE YOU SURE? + -" prompt. or The user tried to set Float Mode while the external test/equalize input switch was on.	Yes, see "System Operating Procedures".
43	ADJUSTMENT MENU	Function Menu	Moves you forward to this menu.	No
44	CONFIGURE MENU	Function Menu	Moves you forward to this menu.	No
45	CALIBRATION MENU	Function Menu	Moves you forward to this menu.	No
46	NORMAL DISPLAY	Function Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
47	PCU## EMERG STOP	PCU Detail Menu	Displays if Rectifier Module (PCU) in Emergency Stop Mode. ## = the designation of the Rectifier Module (PCU).	No
48	PCU## AC FAIL	PCU Detail Menu	Displays if Rectifier Module (PCU) AC fail alarm active. ## = the designation of the Rectifier Module (PCU).	No
49	PCU## HI AC LINE	PCU Detail Menu	Not implemented in this system.	No

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
50	PCU## FAN FAIL	PCU Detail Menu	Displays if Rectifier Module (PCU) fan failed. ## = the designation of the Rectifier Module (PCU).	No
51	PCU## BRKR OFF	PCU Detail Menu	not used in this system	No
52	PCU## HVS ACTIVE	PCU Detail Menu	Displays if Rectifier Module (PCU) in high voltage shutdown. ## = the designation of the Rectifier Module (PCU).	No
53	PCU## A/D FAIL	PCU Detail Menu	Displays if Rectifier Module (PCU) internal A/D circuit failed. ## = the designation of the Rectifier Module (PCU).	No
54	PCU## CONVERTER	PCU Detail Menu	Displays if Rectifier Module (PCU) internal converter circuit failed. ## = the designation of the Rectifier Module (PCU).	No
55	PCU## HIGH TEMP	PCU Detail Menu	Displays if Rectifier Module (PCU) high temperature alarm active. ## = the designation of the Rectifier Module (PCU).	No
56	PCU## OPEN SENSE	PCU Detail Menu	Displays if an external sense lead opens. ## = the designation of the Rectifier Module (PCU).	No
57	PCU## SWITCH OFF	PCU Detail Menu	not used in this system	No
58	PCU## NO REPLY	PCU Detail Menu	Displays if the Rectifier Module's (PCU's) communications link is lost. ## = the designation of the Rectifier Module (PCU).	No
59	PCU ALARM MENU	PCU Detail Menu	Moves you back to this menu.	No
60	NORMAL DISPLAY	PCU Detail Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
61	SYSTEM ###.##VDC	Measurement Menu	Displays system output voltage. ## = value.	No

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
62	SYS LOAD #####A	Measurement Menu	Displays total system load current. ## = value.	No
63	PCU LOAD #####A	Measurement Menu	Displays total Rectifier Module (PCU) load current. ## = value.	No
64	SUBSYS ###.##VDC	Measurement Menu	Displays subsystem output voltage. ## = value.	No
65	SUB LOAD #####A	Measurement Menu	Displays total subsystem load current. ## = value.	No
65A	BAT CHG #####A or BAT CHG CL #####A or BAT DIS #####A	Measurement Menu	Displays total battery charge current, battery charge current limit setting if battery charge current is in current limit, or total battery discharge current. ## = value.	No
65B	T SENSOR ** ###ºC	Measurement Menu	Displays the Sensor Temperature. ###ºC = value. ** = the designation of the temperature probe.	No
66	FUNCTION MENU	Measurement Menu	Moves you back to this menu.	No
67	NORMAL DISPLAY	Measurement Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
68	ADJUST SYSTEM	Adjustment Menu	Moves you forward to this menu.	No
69	ADJUST ALARMS	Adjustment Menu	Moves you forward to this menu.	No
70	ADJUST LVDs	Adjustment Menu	Moves you forward to this menu.	No
71	FUNCTION MENU	Adjustment Menu	Moves you back to this menu.	No
72	NORMAL DISPLAY	Adjustment Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
73	VERIFY INVENTORY	Configure Menu	Moves you to the Inventory Menu.	No

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
73A	SHARE ALARM OFF or SHARE ALARM ON	Configure Menu	Displays the 'Load Share Alarm' feature disabled or enabled.	Yes, see "System Operating Procedures".
73B	EMERG STOP OFF or EMERG STOP ON	Configure Menu	Displays the 'Emergency Stop' feature disabled or enabled.	Yes, see "System Operating Procedures".
73D	REMOTE HVS OFF or REMOTE HVS ON	Configure Menu	Displays the 'Remote High Voltage Shutdown' feature disabled or enabled.	Yes, see "System Operating Procedures".
73C	DISPLAY ROLL OFF or DISPLAY ROLL ON	Configure Menu	Displays the alternating display feature disabled or enabled.	Yes, see "System Operating Procedures".
74	SET PCU ON / OFF	Configure Menu	Moves you to the Rectifier Module (PCU) Enable Menu.	No
74A	LOW SPEED FAN OFF or LOW SPEED FAN ON	Configure Menu	Displays the Rectifier Module (PCU) / Converter Module low speed fan feature disabled or enabled.	Yes, see "System Operating Procedures".
75	NAG MINUTES = ## or AUDIBLE NAG OFF	Configure Menu	Displays the MCA audible alarm cutoff reset time period or that this feature has been disabled. ## = current setting for the Alarm Cutoff Reset Feature (0-15).	Yes, see "System Operating Procedures".

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
76	TEST/EQ HRS = ## or TEST/EQ MAN STOP or END TEQ ##.##HRS	Configure Menu	Displays the timed test/equalize setting (and indicates the manually initiated timed test/equalize feature is enabled). ## = current setting for the manually initiated timed test/equalize feature (1-99). or If the "TEST/EQ HRS = ##" value is increased above 99, "TEST/EQ MAN STOP" is displayed to indicate the manually initiated timed test/equalize feature is disabled and the system must be manually returned to the float mode if placed in the test/equalize mode. or If manually initiated timed test/equalize feature is enabled and the system is placed in the test/equalize mode (via the MCA interface), remaining test/equalize time is displayed. ***Note:*** *When "TEST/EQ MAN STOP" or "END TEQ ##.##HRS" is being displayed, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously to change the "TEST/EQ HRS = ##" setting.*	Yes, see "System Operating Procedures".
76A	AUTO EQ DISABLED or AUTO EQ MUL = ## or END AUTO ##.## HR	Configure Menu	Indicates the auto test/equalize feature is disabled. or Displays the auto test/equalize multiplier value. or Displays remaining auto test/equalize time.	Yes, see "System Operating Procedures".

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
77	RELAYTEST = ###SEC	Configure Menu	Sets the Alarm Relay Test feature's time period.	Yes, see "System Operating Procedures".
77A	SET SPANISH TEXT	Configure Menu	Sets the text to spanish.	Yes
78	FUNCTION MENU	Configure Menu	Moves you back to this menu.	No
79	NORMAL DISPLAY	Configure Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
80	CAL SYS = ###.##V	Calibration Menu	Allows calibration of the display meter for system output voltage reading.	Yes, see "MCA System Adjustments".
81	CAL SUB = ###.##V	Calibration Menu	Allows calibration of the display meter for subsystem output voltage reading.	Yes, see "MCA System Adjustments".
82	RESTORE MFG CAL	Calibration Menu	Returns system voltage calibration and subsystem voltage calibration values back to their factory defaults. When the "CAL SYS" or "CAL SUB" setting has been changed, the setting can be returned to its default value by performing this operation.	Yes, see "MCA System Adjustments".
83	ANALOG TC OFF or TC CAL = ##.##V or TempCmp Hardware	Calibration Menu	not used in this system	--
83A	DIGITAL TC OFF or SLOPE = .###V/ºC or TempCmp Hardware	Calibration Menu	Allows adjusting the system to operate with a battery charge temperature compensation probe or disabling the feature. or The user tried to set the SLOPE value when a temperature compensation module was also present.	Yes, see "MCA System Adjustments".

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
83B	MAX W/T = ##.##V	Calibration Menu	Displays maximum voltage with temperature compensation set point.	Yes, see "MCA System Adjustments".
83C	MIN W/T = ##.##V	Calibration Menu	Displays minimum voltage with temperature compensation set point.	Yes, see "MCA System Adjustments".
83D	TCOMP ON SENSOR1 or TCOMP ON AVERAGE or TCOMP ON HIGHEST	Calibration Menu	Selects the temperature compensation source. Options are 'SENSOR1' when only one temperature probe is used, or 'AVERAGE' or 'HIGHEST' when multiple probes are used.	Yes, see "MCA System Adjustments".
84	FUNCTION MENU	Calibration Menu	Moves you back to this menu.	No
85	NORMAL DISPLAY	Calibration Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
86	SYSLOAD** #####A	System Load Menu	Displays individual load current through a system shunt. ** = designation of the system load shunt. #### = value.	No
87	MEASUREMENT MENU	System Load Menu	Moves you back to this menu.	No
88	NORMAL DISPLAY	System Load Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
89	PCU** LOAD #####A	PCU Load Menu	Displays individual Rectifier Module (PCU) Load Current ** = designation of the Rectifier Module (PCU). #### = value.	No
90	MEASUREMENT MENU	PCU Load Menu	Moves you back to this menu.	No
91	NORMAL DISPLAY	PCU Load Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
92	SUBLOAD** #####A	Subsystem Load Menu	Displays individual load current through a subsystem shunt. ** = designation of the subsystem load shunt. #### = value.	No
93	MEASUREMENT MENU	Subsystem Load Menu	Moves you back to this menu.	No
94	NORMAL DISPLAY	Subsystem Load Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
94A	BAT** CHG #####A or BAT** DIS #####A	Battery Load Menu	Displays individual charge or discharge current through a battery shunt. ** = designation of the battery shunt. #### = value.	No
94B	MEASUREMENT MENU	Battery Load Menu	Moves you back to this menu.	No
94C	NORMAL DISPLAY	Battery Load Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
95	FLOAT = ###.##V	System Adjustment Menu	Displays float voltage set point.	Yes, see "MCA System Adjustments".
96	TEST/EQ = ###.##V	System Adjustment Menu	Displays test/equalize voltage set point.	Yes, see "MCA System Adjustments".
97	SET HVS = ###.##V	System Adjustment Menu	Displays high voltage shutdown set point.	Yes, see "MCA System Adjustments".
98	[Reserved]	--	--	--
99	CURR LIM = ####A or CURRLIM = ####MAX	System Adjustment Menu	Displays system current limit set point. or Displays sum of maximum capabilities of all Rectifier Modules (PCUs) installed.	Yes, see "MCA System Adjustments".

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
99A	BATTLIM DISABLED or BATTLIM = #####A	System Adjustment Menu	Indicates the battery recharge current limit feature is disabled. or Displays battery recharge current limit set point.	Yes, see "MCA System Adjustments".
100	100% CURR: ####A	System Adjustment Menu	This value is only displayed. MCA calculates the value from all Rectifier Modules (PCUs) installed. There is no user adjustment.	No
101	ADJUSTMENT MENU	System Adjustment Menu	Moves you back to this menu.	No
102	NORMAL DISPLAY	System Adjustment Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
103	SYS HV1 = ###.##V or HI FLOAT = ###.##V	Alarm Adjustment Menu	Displays high voltage alarm 1 (high float) alarm set point.	Yes, see "MCA System Adjustments".
104	SYS HV2 = ###.##V or HI VOLTAGE = ###.##V	Alarm Adjustment Menu	Displays high voltage alarm 2 (high voltage) alarm set point.	Yes, see "MCA System Adjustments".
105	SYS BOD = ###.##V or LO FLOAT = ###.##V	Alarm Adjustment Menu	Displays battery on discharge (low float) alarm set point.	Yes, see "MCA System Adjustments".
106	SYS 50% = ###.##V or VERYLOVOLT = ###.##V or LO VOLTAGE = ###.##V	Alarm Adjustment Menu	Displays 50% battery on discharge (very low voltage) (low voltage) alarm set point.	Yes, see "MCA System Adjustments".
107	SYSCURR = #####A	Alarm Adjustment Menu	Displays system current alarm set point.	Yes, see "MCA System Adjustments".
108	SUB HV = ###.##V	Alarm Adjustment Menu	Displays subsystem high voltage alarm set point.	Yes, see "MCA System Adjustments".
109	SUB LV = ###.##V	Alarm Adjustment Menu	Displays subsystem low voltage alarm set point.	Yes, see "MCA System Adjustments".

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
110	SUBCURR = #####A	Alarm Adjustment Menu	Displays subsystem current alarm set point.	Yes, see "MCA System Adjustments".
110A	BAT CHG = #####A	Alarm Adjustment Menu	Displays battery recharge current alarm set point.	Yes, see "MCA System Adjustments".
110B	HI TEMP ** = ###ºC or HI TEMP ** IS OFF	Alarm Adjustment Menu	Displays the high temperature alarm set point or that this feature has been disabled. ###ºC = current setting for the high temperature alarm. ** = the designation of the temperature probe.	Yes, see "MCA System Adjustments".
110C	LO TEMP ** = ###ºC or LO TEMP ** IS OFF	Alarm Adjustment Menu	Displays the low temperature alarm set point or that this feature has been disabled. ###ºC = current setting for the low temperature alarm. ** = the designation of the temperature probe.	Yes, see "MCA System Adjustments".
111	TEST ALM RELAYS or TESTING RELAY ## or Alarm(s) Active	Alarm Adjustment Menu	Activates the alarm relay test feature or indicates this feature is currently in progress. or The user tried to activate this feature when alarm relays were in an alarm state.	Yes, see "System Operating Procedures".
112	ADJUSTMENT MENU	Alarm Adjustment Menu	Moves you back to this menu.	No
113	NORMAL DISPLAY	Alarm Adjustment Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
114	LVD ** = ##.#V	LVD Adjustment Menu	Displays low voltage disconnect circuit disconnect set point. ** = the designation of the LVD circuit (either 1A, 1B, 2A, 2B, 3A, or 3B).	Yes, see "MCA System Adjustments".

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
115	LV RECON = ##.#V or MANUAL RECONNECT	LVD Adjustment Menu	Displays low voltage disconnect circuits reconnect set point or that low voltage disconnect is set for manual reconnect	Yes, see "MCA System Adjustments".
116	ADJUSTMENT MENU	LVD Adjustment Menu	Moves you back to this menu.	No
117	NORMAL DISPLAY	LVD Adjustment Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
118	PCU** TYPE ####A or PCU** TYPE ####+ or NO PCUs FOUND	Inventory Menu	Display of installed Rectifier Modules (PCUs) and their type (Amperage). ** = the designation of the Rectifier Module (PCU). ###A = the amperage rating of the displayed Rectifier Module (PCU). or No Rectifier Modules (PCUs) are communicating with the MCA.	No

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
119	VACANT ****A = ## or ****A PLACES = ##	Inventory Menu	Displays number of Rectifier Module (PCU) mounting positions available for type of Rectifier Module (PCU) (amperage) ***A = the designation of the Rectifier Module (PCU) type. ## = number of positions available for that type of Rectifier Module (PCU). Press the FUNCTION SELECT UP or DOWN arrow pushbutton to display an entry. Press the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously to change the value of the displayed entry. The display changes to "***A PLACES = ##", where *** is the Rectifier Module (PCU) amperage and ## is the total (filled and empty) number of available mounting positions in the system for this amperage Rectifier Module (PCU). Use the FUNCTION SET YES (+) or NO (-) pushbutton to increment or decrement, respectively, the value. Press the FUNCTION SET ENTER pushbutton a second time to lock the value being displayed. At the "ARE YOU SURE? + -" prompt, press either the FUNCTION SET YES (+) pushbutton to accept the new setting, or the FUNCTION SET NO (-) pushbutton to cancel this operation without changing the existing setting.	Yes, see "Initially Starting the System" in the separate *Installation Instructions (Section 6012)*.

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
120	SHUNT** TYPE SYS and SHUNT** TYPE SUB or SHUNT** TYPE BAT or NO SHUNTS FOUND	Inventory Menu	Display of number of system shunts connected, number of subsystem shunts connected, and number of battery shunts connected. ** = the designation of the shunt. or No shunt A/Ds are communicating with the MCA.	No
121	LVD** INSTALLED or NO LVDs FOUND	Inventory Menu	Display of number of low voltage disconnect circuits installed. ** = the designation of the LVD circuit. or No LVDs are communicating with the MCA.	No
121A	ANALOG TC FOUND or T SENSOR ** INST or NO TEMP SENSORS	Inventory Menu	Indicates if an analog battery charge temperature compensation module is installed. or Indicates if a digital battery charge temperature compensation probe is installed. ** = the designation of the temperature probe. or Indicates if temperature compensation is not installed.	No
122	SUBSYS INSTALLED or NO SUBSYS FOUND	Inventory Menu	Indicates if a subsystem is installed or is not installed.	No
123	REMOTE INSTALLED or REMOTE ACTIVE or NO REMOTE FOUND	Inventory Menu	Indicates if remote communications is installed or is not installed. If installed, indicates if a remote communications session is currently active.	No
124	UPDATE INVENTORY or REPLACE ** PCUs? or	Inventory Menu	Allows resetting the inventory count when an inventory item is removed from the system by the user. When an inventory item is removed from the system, an alarm will be	Yes, see "System Troubleshooting and Repair".

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
	PLEASE WAIT...		reported until "VERIFY INVENTORY" is re-entered, and this operation is completed. Example: If a Rectifier Module (PCU) is removed from the system, "PCU** TYPE ###A" will change to reflect this but the PCU will not be removed from the MCA's inventory until "VERIFY INVENTORY" is entered and the "UPDATE INVENTORY" operation is completed. Press the FUNCTION SELECT UP or DOWN arrow pushbutton to display this entry. Press the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously to activate this operation. At the "ARE YOU SURE? + -" prompt, press either the FUNCTION SET YES (+) pushbutton to perform the operation, or the FUNCTION SET NO (-) pushbutton to cancel this operation. or "REPLACE ## PCUs?" is automatically displayed when a new Rectifier Module (PCU) is detected and a PCU no reply alarm is active, or becomes active within two minutes. The message is displayed for 2 minutes. [The message timer is restarted every time a new PCU is detected or a new PCU no reply alarm becomes active.] The timer is terminated and the ALM ## PCUs FAIL message is displayed if the NO (-) pushbutton is pressed. PCUs equal to the number of new PCUs or the number of PCU no reply alarms, whichever is less, are removed from the inventory if the YES (+) pushbutton is pressed or if the timer expires without a push-button being pressed. The MCA	

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
			displays the PLEASE WAIT message while it updates the PCUs in its permanent inventory, and then displays the CURRLIM = #####A message.	
125	CONFIGURE MENU	Inventory Menu	Moves you back to this menu.	No
126	NORMAL DISPLAY	Inventory Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
127	SPECNO #########	Inventory Menu	Displays MCA Configuration (Spec. No.).	No
128	MCA SWV ########	Inventory Menu	Displays MCA software revision number.	No
129	REM SWV ########	Inventory Menu	Displays remote device software revision number.	No

MCA Menu Tree Line No. (Section 6022)	Message Displayed	Associated with...	Definition	Can this value be changed?
130	PCU** ON: SET OFF or PCU** OFF: SET ON or Energy Mgmt. On	PCU Enable Menu	Set Rectifier Module (PCU) On/Off (Local TR Feature) - allows inhibiting operation of specified PCU (Rectifier Module). The first Rectifier Module (PCU) is displayed. Press the FUNCTION SELECT UP or DOWN arrow pushbutton to display the next or previous, respectively, Rectifier Module (PCU). Press the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously to change the TR setting for this Rectifier Module (PCU). At the "ARE YOU SURE? + -" prompt, press either the FUNCTION SET YES (+) pushbutton to accept the new setting, or the FUNCTION SET NO (-) pushbutton to cancel this operation without changing the existing setting. ** = the designation of the Rectifier Module (PCU). Rectifier Modules (PCUs) cannot be turned on or off if energy management is active.	Yes, see "System Operating Procedures".
131	CONFIGURE MENU	PCU Enable Menu	Moves you back to this menu.	No
132	NORMAL DISPLAY	PCU Enable Menu	Moves you to the beginning of the MCA Menu Tree. "SYSTEM OK" or "## ALARMS ACTIVE" is displayed.	No
133-152	"Startup"	Startup Sequence	Startup, see "Initially Starting the System" in the separate *Installation Instructions (Section 6012).*	No

SYSTEM OPERATING PROCEDURES

Rectifier Operating Procedures

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

Converter Operating Procedures

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

WinLink Software User Instructions

Refer to the online Help Files accessed within the WinLink program.

MCA Ethernet Card WEB Interface User Instructions

Refer to the MCA Ethernet Card WEB Interface *User Instructions* (Section 5982). Section 5982 can be accessed from the CD (Electronic Documentation Package) furnished with your system.

Battery Temperature Probe Concentrator Module (TXM)

Battery Temperature Probe Concentrator Module (TXM) Instructions (Section 5940) can be accessed from the CD (Electronic Documentation Package) furnished with your system. Section 5940 is also provided in the hardcopy *System Installation Manua*l.

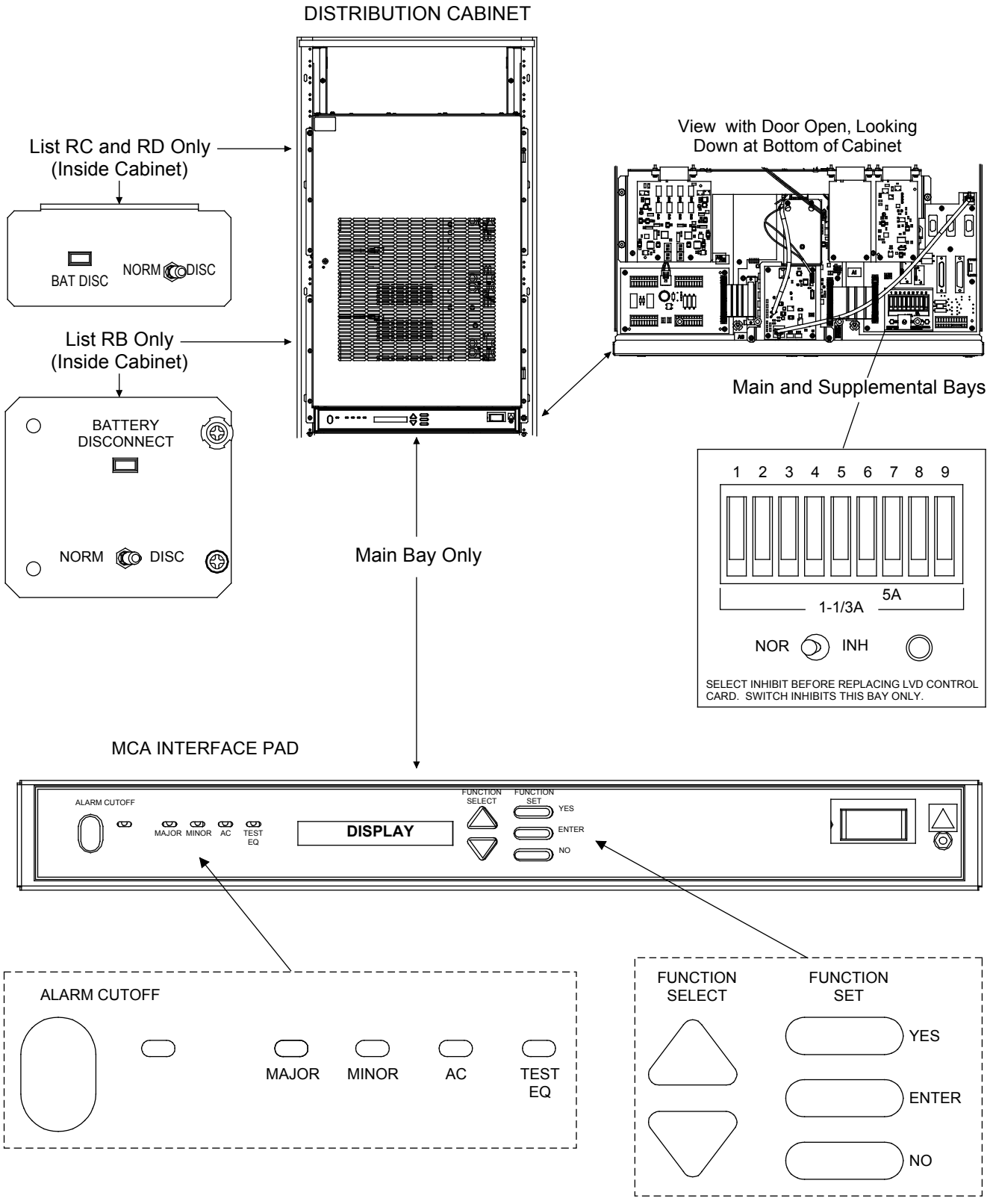
Local Controls and Indicators

Refer to the Rectifier and Converter User Instructions for descriptions of the local controls and indicators located on these units.

Location and Identification

Refer to **Figure 1**.

Figure 1: *Controls and Indicators Locations*



MCA Display

Refer to "Navigating the MCA" for MCA Display descriptions. The display times out (goes back to "SYSTEM OK" or "ALARMS ACTIVE") after a predetermined non-adjustable time period of no user input activity.

MCA Front Panel Accessed Interface Pad

Refer to **Table 1**.

Table 1: *MCA Controls and Indicators(cont'd on next page)*

Control / Indicator	Description
FUNCTION SELECT UP FUNCTION SELECT DOWN (Arrow Pushbuttons)	Moves up and down, respectively, through the list of available entries in the currently displayed menu.
FUNCTION SET ENTER (Pushbutton)	Used to move to another menu, as determined by the currently displayed entry. Also used to lock the displayed setting or value of the currently selected menu entry, when in the adjustment or change setting mode. ***Note:*** *Pressing the ALARM CUTOFF pushbutton and the FUNCTION SET ENTER pushbutton simultaneously, allows the user to enter the adjustment or change setting mode, to change the value or setting of the currently selected menu entry, if available.*
FUNCTION SET YES (+) FUNCTION SET NO (-) (Pushbuttons)	Used to increase or decrease the value of the currently selected menu entry when in the adjustment or change setting mode. ***Note:*** *Pressing the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously moves the user to the "Initial Message" display (beginning).* ***Note:*** *When in the adjustment or change setting mode, depressing the FUNCTION SET YES (+) pushbutton after the "ARE YOU SURE? + -" prompt accepts the new value or setting, depressing the FUNCTION SET NO (-) pushbutton after the "ARE YOU SURE? + -" prompt cancels the adjustment or change setting mode without making any changes.*
ALARM CUTOFF (Pushbutton)	Silences the audible alarm connected to the system. Any new alarms will reactivate the audible alarm. (No function when not equipped with external MCA Audible Alarm relay contacts.) ***Note:*** *Pressing the ALARM CUTOFF pushbutton and the FUNCTION SET ENTER pushbutton simultaneously, allows the user to enter the adjustment or change setting mode, to change the value or setting of the currently selected menu entry, if available.*
ALARM CUTOFF (Indicator)	Illuminates yellow when the MCA audible alarm has been silenced using the ALARM CUTOFF Pushbutton. (No function when not equipped with external MCA Audible Alarm relay contacts.)

Table 1: *MCA Controls and Indicators (cont'd from previous page, cont'd on next page)*

MAJOR(Indicator)	Flashes red if any condition listed below occurs. • AC fail on two or more Rectifier Modules. • Rectifier Module fail alarm activates on two or more Rectifier Modules. • Battery on discharge alarm activates. • 50% battery on discharge (very low voltage) alarm activates. • High voltage 1 alarm activates. • High voltage 2 alarm activates. • High battery ambient temperature alarm activates (if battery charge digital temperature compensation probe installed). • Low battery ambient temperature alarm activates (if battery charge digital temperature compensation probe installed). • Digital temperature compensation probe failure (if battery charge digital temperature compensation probe installed). • Rectifier Module emergency shutdown or fire alarm disconnect signal applied to system. • Both redundant low voltage disconnect circuits activate to disconnect a load (if LVD installed). • Subsystem low voltage alarm activates. • Subsystem high voltage alarm activates. • Subsystem major alarm activates. • One of the following causes an MCA failure: MCA circuit card failure. MCA "system" fuse open. No system voltage detected. No subsystem voltage detected. LVD communications lost, LVD circuit card failure, or LVD communications link to MCA broken (if LVD installed). • If any system or subsystem fuse or circuit breaker opens.

Table 1: *MCA Controls and Indicators (cont'd from previous page)*

MINOR(Indicator)	Illuminates red if any condition listed below occurs. • Rectifier Module fail alarm activates on any single Rectifier Module (except MCA Configuration Spec. No. 534877) or on any Rectifier Module (MCA Configuration Spec. No. 534877 only). • One low voltage disconnect circuit in a redundant pair activates (if LVD installed). • If the system or subsystem over current alarm activates. • Subsystem minor alarm activates. • Battery Charge Current Alarm • Battery Current Limit Inhibited Alarm • One of the following causes an MCA failure: MCA "sense" fuse open. No sense voltage detected. Bad shunt type detected. Shunt communications lost. Remote communications lost. Display communications lost. LVD maintenance inhibit switch is activated (if LVD installed).
AC (Indicator)	Illuminates green if AC input voltage to all Rectifier Modules is greater than the preset non-adjustable low AC input voltage inhibit and less than the preset non-adjustable high AC input voltage inhibit. Illuminates red if AC input voltage to any Rectifier Module decreases below or increases above the respective inhibit value.
TEST/EQ (Indicator)	Illuminates yellow when the system is placed in the test/equalize mode, locally or remotely.

Low Voltage Disconnect NOR/INH Switch and INH Indicator (if low voltage disconnect load contactor is furnished)

Located inside each Distribution Cabinet. Refer to **Figure 1**.

CAUTION! Before returning the NOR/INH switch from the INH position to the NOR position, check the MCA for the presence of low voltage disconnect alarms. If alarms are active, use the MCA to reconnect the low voltage disconnect circuits.

DO NOT return the NOR/INH switch to the NOR position until you verify that there are NO low voltage disconnect alarms active. If the switch is returned to the NOR position when low voltage disconnect alarms are active, battery and system output will disconnect from the controlled load(s).

WARNING! While the NOR/INH locking toggle switch is in the INH position, the battery and system output will not disconnect from the controlled load(s) if battery voltage decreases below the low voltage disconnect setpoint. For maximum battery protection, this switch should NOT be left in the INH position.

Refer to **Table 2**.

Table 2: *Load Low Voltage Disconnect Control and Indicator*

Control / Indicator	Description
NOR/INH (Normal/Inhibit Switch) • NOR (Normal Switch Position) • INH (Inhibit Switch Position)	This is a locking type toggle switch. To operate switch, pull out switch handle and move handle left or right to desired position. Release handle to lock into new position. • For normal low voltage disconnect operation, place this switch in the NOR position. • The low voltage disconnect circuit is disabled and the battery and system output remain connected to the controlled load(s) when this switch is in the INH position. This allows testing, adjusting, or removal of the low voltage disconnect circuit card(s) without disconnection of the load(s). *Note: Placing this switch in the INH position inhibits the LVD function only in cabinet containing this switch. Other cabinets containing LVD contactors or controlling external LVD contactors will continue to operate with normal LVD function.*
Low Voltage Disconnect INH (Inhibit) Indicator	Illuminates when the low voltage disconnect circuit has been disabled through the use of the NOR/INH switch as described above.

Manual Battery Disconnect Switch and Indicator (List RB, RC, RD Only)

Refer to **Table 3**.

Table 3: *Manual Battery Disconnect Control and Indicator*

Control / Indicator	Description
NORM/DISC (Normal/Disconnect Switch) • DISC (Disconnect Switch Position) • NORM (Normal Switch Position)	This is a locking type toggle switch. To operate switch, pull out switch handle and move handle left or right to desired position. Release handle to lock into new position. • Placing the switch in this position causes the associated contactor to open, thus disconnecting battery from the power system and loads. • Returning the switch to this position reconnects battery to the power system and loads.
BAT DISC (Battery Disconnect Indicator)	Illuminates red if the NORM/DISC battery disconnect switch is placed in the DISC position.

External Alarms

Nine (9) Form-C alarm relay contacts are provided. These alarm relays are mapped to MCA alarms as shown in the following chart. Refer to “External Alarm, Reference, and Control Connections” in "Making Electrical Connections" of the separate INSTALLATION INSTRUCTIONS (SECTION 6012) for location and operation of the external alarm contacts. Refer to the following for alarm conditions.

Power System List No.	10	11	12	13
MCA Configuration No.	534876	534877	534878	534879
Relay K1	Major Alarm	Major Alarm	Major Alarm	Major Alarm
Relay K2	Minor Alarm	Minor Alarm	Minor Alarm	Minor Alarm
Relay K3	High Voltage 1 Alarm	High Voltage 1 Alarm	High Voltage 1 Alarm	Test/EQ Mode Indication 2
Relay K4	High Voltage 2 Alarm	Rectifier Module Fail Major Alarm	MCA Fail Alarm	Fuse Alarm
Relay K5	Battery On Discharge Alarm	Battery On Discharge Alarm	Battery On Discharge Alarm	Battery On Discharge Alarm
Relay K6	50% Battery On Discharge Alarm	Rectifier Module Fail Minor Alarm	Very Low Voltage Alarm	AC Fail Major Alarm
Relay K7	AC Fail Alarm	AC Fail Alarm	AC Fail Alarm	AC Fail Alarm
Relay K8	MCA Audible Alarm	MCA Audible Alarm	Fuse Alarm	LVD Alarm
Relay K9	Test/EQ Mode Indication	Fuse Alarm	Rectifier Module Fail Alarm	Test/EQ Mode Indication

1. Major Alarm: Refer to description of the MAJOR alarm indicator for alarm conditions.
2. Minor Alarm: Refer to description of the MINOR alarm indicator for alarm conditions.
3. High Voltage 1 Alarm: Activates if system output voltage increases to a preset adjustable value.
   or
   Test/Equalize Mode Indication 2: Activates if the system is placed in the test/equalize mode, locally or remotely.
4. High Voltage 2 Alarm: Activates if system output voltage increases to a preset adjustable value.
   or
   Rectifier Module Fail Major Alarm: Activates if the Rectifier Module Fail alarm on two or more Rectifier Modules is active. Refer to description of Rectifier Module Fail indicator for alarm conditions.
   or
   MCA Fail Alarm: Activates if the MCA Fail alarm is active. Refer to description of MCA Fail alarm for alarm conditions.
   or
   Fuse Alarm: Activates if any fuse or circuit breaker in the system opens.
5. Battery On Discharge Alarm: Activates if system output voltage decreases to a preset adjustable value, indicating that the battery is supplying the load and is discharging.
6. 50% Battery On Discharge or Very Low Voltage Alarm: Activates if system output voltage decreases to a preset adjustable value, indicating that the battery has been continuously supplying the load and has discharged to approximately half its reserve time.
   or
   AC Fail Major Alarm: Activates if the AC Fail Alarm activates on two or more Rectifier Modules. Refer to description of AC Fail Alarm for alarm conditions.
   or
   Rectifier Module Fail Minor Alarm: Activates if the Rectifier Module Fail alarm on only one Rectifier Module is active. Refer to description of Rectifier Module Fail indicator for alarm conditions.
7. AC Fail Alarm: Activates if AC input drops below the low AC input voltage inhibit or increases above the high AC input voltage inhibit..
8. MCA Audible Alarm: Activates if any alarm condition monitored by the MCA occurs, and is provided for connection to an audible alarm circuit.
   or
   Fuse Alarm: Activates if any fuse or circuit breaker in the system opens.
   or
   LVD Alarm: Activates if any LVD circuit in the system activates.
9. Test/Equalize Mode Indication: Activates if the system is placed in the test/equalize mode, locally or remotely.
   or
   Fuse Alarm: Activates if any fuse or circuit breaker in the system opens.
   or
   Rectifier Module Fail Alarm: Activates if the Rectifier Module Fail alarm on any Rectifier Module is active. Refer to description of Rectifier Module Fail indicator for alarm conditions.

Starting and Stopping System Operation

Rectifier Module Normal Starting Procedure

Procedure

1. Apply input power to the Rectifier Module or insert the Rectifier Module into the shelf.

Rectifier Module Stopping Procedure (Local)

Complete Shutdown

1. Remove input power from the Rectifier Module or remove the Rectifier Module from the shelf.

Local TR Shutdown

NOTE! *When a Rectifier Module (PCU) is shut down via the Local TR Shutdown feature, it must be manually restarted (by turning AC power to the Rectifier Module off then on, or by removing and re-inserting the Rectifier Module). The Local TR Shutdown feature DOES NOT automatically restart Rectifier Modules to deliver current in any operational or alarm state of the DC plant. The Rectifier Module must be manually restarted by navigating the MCA and selecting to turn the Rectifier Module back ON as detailed in the following procedure.*

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. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "SET PCU (Rectifier Module) ON / OFF".
5. Press and release the FUNCTION SET ENTER pushbutton.
6. Repeatedly press and release the FUNCTION SELECT UP or DOWN arrow pushbutton until the Rectifier Module to be stopped using the local TR feature is displayed.
7. With this Rectifier Module being displayed, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.
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.
10. Repeat this procedure to restart the Rectifier Module.

DC-DC Converter Module Normal Starting Procedure

Procedure

1. Insert the DC-DC Converter Module into the shelf.

DC-DC Converter Module Stopping Procedure (Local)

Complete Shutdown

1. Remove the DC-DC Converter Module from the shelf.

Initially Connecting Battery and System Output to the Controlled Load(s) when Low Voltage Disconnect Load Contactor is Furnished and Set for Manual Reconnect

If the low voltage disconnect circuit(s) is set for manual reconnect, and a load contactor is furnished, the battery and system output have to be initially connected to the controlled load(s) when the system is first started or restarted after being shut down. (Battery voltage must be above the upper setting of the low voltage disconnect circuit.) Perform the following procedure to reconnect the low voltage disconnect circuits.

Procedure

1. Refer to **Figure 1** for control and indicator location.
2. With "## ALARMS ACTIVE" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.
3. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ALARM LVD ACTIVE".
4. Press and release the FUNCTION SET ENTER pushbutton.
5. 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).
6. To reconnect the low voltage disconnect circuit being displayed, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.
7. "ARE YOU SURE? +-" is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The low voltage disconnect circuit reconnects.
8. If the system contains additional low voltage disconnect circuits, separately reconnect these by repeating steps 5) through 7).
9. When done, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously. You are returned to the beginning of the MCA menu tree.

Output Voltage Mode of Operation Selection

Placing the System into the Float Mode of Operation

Local Procedure

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.

NOTE! *In the following step, if "SET TEST/EQ MODE" is displayed, the system is already operating in the float mode. DO NOT perform the following steps.*

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.
5. 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 the Test/Equalize Mode of Operation

WARNING! Do not supply equalize output voltage for a longer period than necessary. Prolonged higher battery charge voltage overcharges the battery cells and reduces battery life.

There are four methods of placing the system from the float mode to the test/equalize mode.

Method 1 (Manual Test/Equalize) Procedure

In this method, a user manually places the system into the test/equalize mode via the MCA interface. A user must manually return the system to the float mode via the MCA interface. To invoke method 1, follow the procedures described below.

Setting for Manual Test/Equalize: Set the "TEST/EQ HRS = ##" menu item in the MCA configure menu to above 99. The display changes to "TEST/EQ MAN STOP" to indicate manual test/equalize mode is set. A step-by-step procedure is provided next.

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: Manually place the system into test/equalize mode by navigating to and activating the "SET TEST/EQ MODE" menu item in the MCA function menu. The system is placed in the test/equalize mode and must be manually placed back to the float mode. A step-by-step procedure is provided next.

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.

NOTE! *In the following step, if "SET FLOAT MODE" is displayed, the system is already operating in the test/equalize mode. In this case, DO NOT perform steps 2) through 4), proceed with step 5).*

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.

Returning to Float Mode: To return to float mode, navigate to and activate the "SET FLOAT MODE" menu item in the MCA function menu, as previously described in this section.

Method 2 (Manually Initiated Timed Test/Equalize) Procedure

In this method, a user manually places the system into the test/equalize mode via the MCA interface. The system automatically returns to the float mode after a preset programmable time period (1-99 hours, in increments of one hour). To invoke method 2, follow the procedures described below.

Setting for Manually Initiated Timed Test/Equalize: Set the "TEST/EQ HRS = ##" menu item in the MCA configure menu to a value between 1 and 99. A step-by-step procedure is provided next.

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 HRS = ##" is displayed, the system is already set for manually initiated timed test/equalize. In this case, you can proceed with steps 5) through 8) to change the current setting, or proceed with step 9) if no changes are required.*

NOTE! *If "END TEQ ##.##HRS" is displayed, the system is already 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 (+) or FUNCTION SET NO (-) pushbutton until the desired value is displayed, then release the pushbutton. Note that as you scroll above 99, "TEST/EQ MAN STOP" is displayed. Scroll back down to redisplay "TEST/EQ HRS =".

7. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

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: Manually place the system into test/equalize mode by navigating to and activating the "SET TEST/EQ MODE" menu item in the MCA function menu. The system is

placed in the test/equalize mode for the time period set in "TEST/EQ HRS = ##". The system automatically returns to the float mode when this time period expires. A step-by-step procedure is provided next.

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.

NOTE! *In the following step, if "SET FLOAT MODE" is displayed, the system is already operating in the test/equalize mode. In this case, DO NOT perform steps 2) through 4), proceed with step 5).*

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.

Returning to Float Mode: The system automatically returns to float mode when the "timed test/equalize period" expires.

NOTE! *Navigating to "END TEQ ##.##" of the MCA configure menu displays the hours remaining in the timed test/equalize period.*

NOTE! *Timed test/equalize is canceled and the system is placed in the float mode if any of the following occurs.*

1) Manually placing the system in the float mode by navigating to and activating "SET FLOAT MODE" menu item in the MCA function menu, as previously described in this section.

2) Resetting the "TEST/EQ HRS = ##" value in the MCA configure menu when "END TEQ ##.##HRS" is being displayed, as described in the previous procedure

3) Applying an external test/equalize signal as described in the next procedure.

Method 3 (Automatic Test/Equalize) Procedure

In this method, a user enables the Automatic Equalize feature via the MCA interface. The system is automatically placed in the equalize mode and automatically returns to float mode for the conditions as described below. To invoke method 3, follow the procedures described below.

NOTE! *The automatic equalize feature is intended for use only with wet cell batteries. Using this feature with valve regulated batteries is not recommended.*

Description

This feature can be enabled or disabled by a user via the MCA. The default state is disabled.

The Automatic Equalize feature is a time based function which is controlled by a customer selectable multiplier and by the Battery on Discharge (BOD) alarm setpoint. The MCA's default setting is for a multiplier of zero, which disables the Automatic Equalize feature.

When the Automatic Equalize feature is enabled, if system voltage drops to less than the BOD alarm setpoint, the MCA initiates a timing cycle to measure the discharge time period. The MCA requires at least 15 minutes of continuous BOD alarm in order to prevent nuisance equalization cycles. When system voltage rises to above the BOD alarm setpoint, the MCA ends the discharge timing cycle and (assuming a minimum of 15 minutes has elapsed) places the Rectifier Modules into the equalize mode for a customer selectable multiple of the discharge time period (the discharge time period includes the initial 15 minutes).

The equalize time period can be set for 0 to 15 times the discharge time period, up to a maximum of 300 hours. A zero (0) setting disables the feature.

When the Automatic Equalize feature is enabled, the MCA prevents a user from setting the equalize value lower than the float setpoint. If the equalize value is set first, the MCA automatically sets the Automatic Equalize Multiplier to zero (0), disabling the feature.

Manually setting the system to float or equalize mode cancels the automatic function, if active.

NOTE! *Equalization is only effective if the correct multiplier is entered to allow the battery to charge to capacity. It makes no sense to end the equalize cycle before battery capacity has been restored. To determine the multiplier, load current and system capacity must be known. For example, consider a system with 200 amps of Rectifier Module capacity and 150 amps of load. If there is a 2 hour outage of AC power, 300 amp-hours (150 x 2) will be drained from the battery. When AC power is restored, the battery charge current will be 50 amps (200-150), and it will take at least 6 hours (300/50) to replace the battery capacity. In this scenario, the multiplier must be set greater than 3 for the Automatic Equalize feature to have any effect.*

Enabling and Disabling the Automatic Equalize Feature: To enable, set the "AUTO EQ MUL = ##" menu item in the MCA Configure Menu to a value between 0 and 15. To disable, set the "AUTO EQ MUL = ##" menu item in the MCA Configure Menu to 0. A step-by-step procedure is provided next.

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 "AUTO EQ MUL = ##" or "AUTO EQ DISABLED" is displayed.

NOTE! *If "AUTO EQ MUL = ##" is displayed, the system is already set for Automatic Equalize. In this case, you can proceed with steps 5) through 8) to change the current setting, or proceed with step 9) 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 5) through 8) to cancel the Automatic Equalize in progress and change the current setting, or proceed with step 9) to proceed with the Automatic Equalize in progress and make no changes.*

5. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "AUTO EQ MUL =" portion of the display flashes.
6. Press the FUNCTION SET YES (+) or FUNCTION SET 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 =".
7. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.
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: The MCA automatically does this for the conditions as previously described.

Returning to Float Mode: The MCA automatically does this for the conditions as previously described.

NOTE! *Navigating to "END AUTO ##.##HR" of the MCA Configure Menu displays the hours remaining in an automatic equalize period, if active.*

NOTE! *Auto Equalize is canceled and the system is placed in the float mode if any of the following occurs.*

- *Manually placing the system in the float mode by navigating to and activating "SET FLOAT MODE" menu item in the MCA Function Menu.*
- *Resetting the "AUTO EQ MUL = ##" value in the MCA Configure Menu when "END AUTO ##.##HR" is being displayed, as described in the previous procedure*
- *Applying an external test/equalize signal.*

Method 4 (External Test/Equalize) Procedure

In this method, a user (or external equipment) places the system in the test/equalize mode by applying an external signal to the system. The system returns to the float mode when the external signal is removed. This method overrides the other three methods.

Placing the System into Test/Equalize Mode: Apply system ground to the system's external test/equalize terminal.

Returning to Float Mode: Remove system ground from the test/equalize terminal.

NOTE! *If a manual test/equalize, manually initiated timed test/equalize, or automatic equalize is in process; it is canceled and the system returns to float mode when system ground is removed from the test/equalize terminal.*

Restarting Procedures when Rectifier Module (PCU) is Automatically or Manually Inhibited, Shut down, or Locked Out

Rectifier Module High Voltage Shutdown and Lockout

Turn AC power to the Rectifier Module off or remove the Rectifier Module, wait 5 seconds or more, then turn AC power to the Rectifier Module on or re-insert the Rectifier Module. Refer to the "Troubleshooting" section for a Rectifier Module removal procedure.

Rectifier Module Emergency Shutdown and Fire Alarm Disconnect

Remove the emergency shutdown and fire alarm disconnect signal. Turn AC power to the Rectifier Modules off then on, or remove and re-insert the Rectifier Modules. Refer to the "Troubleshooting" section for a Rectifier Module removal procedure.

Remote On/Off (TR)

Remove the remote on/off (TR) signal from the respective Rectifier Module. The signal can originate via the local MCA Interface Pad.

Restarting a DC-DC Converter Following A High Voltage Shutdown

To restart a DC-DC Converter Module following a high voltage shutdown, remove the Convert Module from the shelf, wait 5 seconds or more, then re-insert the Converter Module. If the Converter Module immediately shuts down a second time or fails to start, a fault condition is indicated, and replacement may be necessary. Refer to the "Troubleshooting" section for replacement information. Refer to the "Troubleshooting" section for a DC-DC Converter Module removal procedure.

Low Voltage Disconnect Reconnect Procedure (WHEN FURNISHED AND SET FOR MANUAL RECONNECT)

If the low voltage disconnect circuit(s) is set for manual reconnect, the battery and system output have to be manually reconnected to the controlled load(s) when the low voltage disconnect circuit activates. (Battery voltage must be above the upper setting of the low voltage disconnect circuit.) Perform the following procedure to reconnect the low voltage disconnect circuits.

Procedure

1. Refer to **Figure 1** for control and indicator location.
2. With "## ALARMS ACTIVE" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton.
3. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ALARM LVD ACTIVE".
4. Press and release the FUNCTION SET ENTER pushbutton.

5. 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).
6. To reconnect the low voltage disconnect circuit being displayed, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.
7. "ARE YOU SURE? +-" is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The low voltage disconnect circuit reconnects.
8. If the system contains additional low voltage disconnect circuits, separately reconnect these by repeating steps 5) through 7).
9. When done, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously. You are returned to the beginning of the MCA menu tree.

Setting Low Voltage Disconnect (IF FURNISHED) for Manual Reconnect

The low voltage disconnect circuit is set for automatic reconnect when a value is selected for the Low Voltage Disconnect "Reconnect" value.

The low voltage disconnect circuit is set for manual reconnect when "MANUAL RECONNECT" is selected as the Low Voltage Disconnect "Reconnect" value, as outlined below.

Procedure

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 "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. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "LVRECON = ##.##V" is displayed.

NOTE! *If "MANUAL RECONNECT" is displayed, low voltage disconnect is already set for manual reconnect. In this case, proceed with step 11).*

7. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "LVRECON =" portion of the display flashes.

8. Observe the value displayed. Press and hold the FUNCTION SET NO (-) pushbutton until "MANUAL RECONNECT" is displayed. Release the pushbutton.
9. With "MANUAL RECONNECT" 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 reconnect 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.

Battery Recharge Current Limit Feature

This feature can be enabled or disabled by a user via the MCA. The default state is disabled. When disabled, the battery recharge current limit setpoint equals the system current limit setpoint. When disabled, the battery recharge current limit setpoint increases and decreases with the system current limit setpoint through Rectifier Module installation, Rectifier Module removal, and manual intervention. If battery recharge current limit is enabled, and the system current limit setpoint is lowered below the battery recharge current limit setpoint; the battery recharge current limit feature is automatically disabled.

This feature requires battery current Shunt PODs to be installed in compatible Battery Stand(s) and connected to the power system. The battery recharge current limit function depends on measurements supplied by the system and by the battery current shunts. It is critical that the output current of all Rectifier Modules is monitored either by battery current or system load shunts connected to the MCA via Shunt PODs.

Description

A Battery Recharge Current Limit value can be set. When set, the maximum current delivered to the batteries is limited to this value. This value can be set from 10% of total system current capacity to the system current limit setting (MCA prevents the user from adjusting this value above the system current limit setting).

When battery recharge current approaches the battery recharge current limit setting, the MCA automatically adjusts the current limit circuit on each Rectifier Module so that this value is not exceeded. The MCA also displays "BAT CHGCL #####A" in the measurement menu.

The MCA will not adjust Rectifier Module current limits to less than the actual measured system load current plus half of the battery recharge current limit setpoint. The MCA will stop adjusting Rectifier Module current limits when battery current falls to half of the battery recharge current limit setpoint or when adjusted Rectifier Module current limits are greater than the actual Rectifier Module output currents by more than half of the battery recharge current limit setpoint.

If a Rectifier Module fails, the MCA automatically resets each remaining Rectifier Modules current limit point to maintain this value. The MCA also insures that the current limit circuit on any Rectifier Module is not set above 105% of its capacity.

Enabling and Disabling the Feature

Refer to "*Enabling, Disabling, and Adjusting the Battery Recharge Current Limit Setting*" in "MCA System Adjustments" for a procedure.

Battery Charge Current Alarm Feature

The MCA displays "ALM BAT CHG CURR" if total battery charge current (as monitored by the battery Shunt PODs) exceeds a preset adjustable value.

The Battery Charge Current Alarm is adjustable from 0 to 60000 amperes. Factory set at 2000, unless otherwise specified.

This feature requires battery current Shunt PODs to be installed in compatible Battery Stand(s) and connected to the power system.

Refer to "*Setting the Battery Charge Current Alarm Value*" in "MCA System Adjustments for a procedure".

Measuring Battery Charge/Discharge Current

This feature requires battery current Shunt PODs to be installed in the system.

The MCA displays total battery current (charge or discharge) and individual battery currents (charge or discharge) from up to sixteen shunts. Total of system, subsystem, and battery shunts cannot exceed sixteen.

Procedure

The Measurement Menu displays either "BAT CHG #####A" for total battery charge current, "BAT CHGCL #####A" if the battery charge is in current limit, or "BAT DIS #####A" for total battery discharge current. You can step the display to indicate the current measured through each battery Shunt POD installed in the system.

Using the Alarm Relay Test Feature

Nine (9) Form-C alarm relay contacts are provided. Relay operation can be tested via an Alarm Relay Test feature. When activated, this feature consecutively places each relay in the alarm state for the programmed time period.

Setting the Alarm Relay Test Feature Time Period

Procedure

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 "RELAYTEST = ###SEC" is displayed.
5. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "RELAYTEST =" portion of the display flashes.
6. Observe the value displayed. Press and hold the FUNCTION SET YES (+) or NO (-) pushbutton until the desired value is displayed. Release the pushbutton.
7. With the desired value being displayed, press and release the FUNCTION SET ENTER pushbutton.
8. “ARE YOU SURE? + -” is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

NOTE! *The relay test period 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.*

9. To return to the beginning of the MCA Logic Tree, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously.

Performing an Alarm Relay Test

Procedure

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 "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 "TEST ALM RELAYS" is displayed.
7. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.
8. “ARE YOU SURE? + -” is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

9. The display changes to "TESTING RELAY 1". Relay 1 is set to the alarm state and should turn in an alarm for the time period previously set. Each relay is consecutively tested in this manner.

NOTE! *You can view your system's MCA Configuration Number by navigating to "SPECNO########" in the MCA "Inventory Menu".*

List 10 MCA
(MCA Configuration Spec. No. 534876):

Relay #1 = Major Alarm
Relay #2 = Minor Alarm
Relay #3 = High Voltage 1 Alarm
Relay #4 = High Voltage 2 Alarm
Relay #5 = Battery On Discharge Alarm
Relay #6 = 50% Battery On Discharge Alarm
Relay #7 = AC Fail Alarm
Relay #8 = MCA Audible Alarm
Relay #9 = Test/Equalize Indication

List 11 MCA
(MCA Configuration Spec. No. 534877):

Relay #1 = Major Alarm
Relay #2 = Minor Alarm
Relay #3 = High Voltage 1 Alarm
Relay #4 = Rectifier Module Fail Major Alarm
Relay #5 = Battery On Discharge Alarm
Relay #6 = Rectifier Module Fail Minor Alarm
Relay #7 = AC Fail Alarm
Relay #8 = MCA Audible Alarm
Relay #9 = Fuse Alarm / Circuit Breaker Alarm

List 12 MCA
(MCA Configuration Spec. No. 534878):

Relay #1 = Major Alarm
Relay #2 = Minor Alarm
Relay #3 = High Voltage 1 Alarm
Relay #4 = MCA Fail Alarm
Relay #5 = Battery On Discharge Alarm
Relay #6 = Very Low Voltage Alarm
Relay #7 = AC Fail Alarm
Relay #8 = Fuse Alarm / Circuit Breaker Alarm
Relay #9 = Rectifier Module Fail Alarm

List 13 MCA
(MCA Configuration Spec. No. 534879):

Relay #1 = Major Alarm
Relay #2 = Minor Alarm
Relay #3 = Test/Equalize Mode 2
Relay #4 = Fuse Alarm / Circuit Breaker Alarm

Relay #5 = Battery On Discharge Alarm
Relay #6 = AC Fail Major Alarm
Relay #7 = AC Fail Alarm
Relay #8 = LVD Alarm
Relay #9 = Test/Equalize Mode 1

10. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Setting MCA Audible Alarm Cutoff Reset Time Period

A local (if equipped with List 71) or external audible alarm may be connected to the power system. This alarm sounds when any alarm condition monitored by the MCA occurs. The alarm can be manually silenced (cutoff) by pressing a local pushbutton. A local indicator illuminates when the audible alarm has been cutoff. The alarm remains silenced for the current alarm condition only. If another alarm condition occurs, the audible alarm again sounds.

A programmable audible alarm cutoff reset feature is provided. Once an audible alarm has been cutoff, it automatically resets (and sounds if the alarm condition is still present) after the time period programmed expires. If the audible alarm is again cutoff while the same alarm condition is still present, the reset feature is inoperable, and the audible alarm remains silenced. If another alarm condition occurs, the audible alarm again sounds.

NOTE! *The audible alarm feature is not available when power system is equipped with a List 12 or List 13 MCA.*

The MCA Audible Alarm Cutoff Reset feature is active when a "NAG MINUTES" value is selected.

The MCA Audible Alarm Cutoff Reset feature is inactive when "AUDIBLE NAG OFF" is selected.

Procedure

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 "NAG MINUTES = ##" or "AUDIBLE NAG OFF" is displayed.

5. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "NAG MINUTES =" portion of the display flashes.

6. Observe the value displayed. Press and hold the FUNCTION SET YES (+) or NO (-) pushbutton until the desired value or "AUDIBLE NAG OFF" is displayed. Release the pushbutton.
7. With the desired value or "AUDIBLE NAG OFF" being displayed, press and release the FUNCTION SET ENTER pushbutton.
8. “ARE YOU SURE? + -” is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

NOTE! *The audible alarm cutoff reset time period 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.*

9. To return to the beginning of the MCA Logic Tree, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously.

Setting Rectifier Module (PCU) / Converter Module Fan Speed Control (Normal and Variable Speed) Feature

Description

The Rectifier Modules and Converter Modulers contain a variable-speed fan control circuit. When ambient temperature drops below a preset non-adjustable value, fan speed is reduced. When the ambient temperature rises above this preset non-adjustable value, normal fan speed is resumed. This allows audible noise to be lowered if thermal conditions permit.

This feature can be enabled or disabled by a user via the MCA. The default state is disabled.

When the variable-speed fan feature is enabled by the MCA, the Rectifier Modules and Converter Modules individually use their internal temperatures to control fan speed. It is therefore possible that, in a system with many Rectifier Modules and Converter Modules and under certain conditions, some fans will be operating at higher speed than others.

Enabling or Disabling the Rectifier Module / Converter Module Variable-Speed Fan Control Feature

Procedure

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 "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 5) through 7). To keep this setting, proceed with step 7).
5. To toggle this setting, 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.
7. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Setting the Alternating Display Feature

The MCA "normal" display can be made to alternate between "System OK", the system voltage, and the Rectifier Module load current.

Enabling or Disabling the Alternating Display Feature

Procedure

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 "DISPLAY ROLL OFF" or "DISPLAY ROLL ON" is displayed. This is the current setting for this feature. To toggle this setting, perform steps 5) through 7). To keep this setting, proceed with step 7).
5. To toggle this setting, 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.
7. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Setting the MCA Load Share Alarm Feature

The MCA Load Share Alarm can be enabled or disabled by the User.

Enabling or Disabling the 'Load Share Alarm' Feature

Procedure

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 "SHARE ALARM OFF" or "SHARE ALARM ON" is displayed. This is the current setting for this feature. To toggle this setting, perform steps 5) through 7). To keep this setting, proceed with step 7).

5. To toggle this setting, 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.

7. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Setting the MCA Emergency Stop Feature

The MCA can be set to enable or disable the Emergency Stop feature. When the feature is disabled, application of an external emergency stop signal has no effect on the system.

Enabling or Disabling the 'MCA Emergency Stop' Feature

Procedure

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 "EMERG STOP ON" or " EMERG STOP OFF" is displayed. This is the current setting for this feature. To toggle this setting, perform steps 5) through 7). To keep this setting, proceed with step 7).
5. To toggle this setting, 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.
7. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Setting the MCA Remote High Voltage Shutdown Feature

The MCA can be set to enable or disable the Remote High Voltage Shutdown feature. When the feature is disabled, application of an external high voltage shutdown signal has no effect on the system.

Enabling or Disabling the ' Remote High Voltage Shutdown ' Feature

Procedure

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 " REMOTE HVS ON" or " REMOTE HVS OFF" is displayed. This is the current setting for this feature. To toggle this setting, perform steps 5) through 7). To keep this setting, proceed with step 7).
5. To toggle this setting, 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.
7. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Accessing the MCA via the Interface Option

Accessing the MCA Remotely via WinLink Software

Modem, RS-232, or RS-232/Modem Interface Option Furnished

Refer to the online Help Files accessed within the WinLink program.

- When accessing the MCA using the modem port of the RS-232/Modem assembly, it is suggested to use the 19200 bits/s setting in WinLink for the MCA's modem port.
- When using the RS-232/Modem MCA Interface Option, the modem port has precedence over the RS-232 port. If someone is using the local port and the modem detects a ring, the local user is automatically logged off. When the call is terminated, the RS-232 port becomes active again and the RS-232 device will have to log back on.

Ethernet Interface Option Furnished

The MCA can be accessed remotely via a network connection. If not previously done, perform the "*Setting Up the MCA Ethernet Option*" procedure in "Initially Starting the System" of the separate INSTALLATION INSTRUCTIONS (SECTION 6012) to program the IP parameters into the MCA Ethernet card.

Refer to the online Help Files accessed within the WinLink program to access the MCA Ethernet card.

Accessing the MCA Remotely via a Web-Browser (if Ethernet Interface Option furnished)

Refer to Section 5982 for User instructions. Section 5982 can be accessed from the CD (Electronic Documentation Package) furnished with your system.

Accessing the MCA Remotely via SNMP (if Ethernet Interface Option with SNMP Interface furnished)

If you installed an MCA Ethernet card that supports SNMP, you will also set the SNMP parameters when you perform the procedure in "Initially Starting the System" of the separate INSTALLATION INSTRUCTIONS (SECTION 6012).

The MCA Ethernet Interface option w/ SNMP provides...

- an Ethernet port for system connection into a TCP/IP network and support for SNMP V2 (Simple Network Management Protocol). Communications to and from the system is accomplished via a MIB (Management Information Browser).
- SNMP Traps for alarms listed on the MCA Menu Tree under the "Alarms Menu".

Management Information Base (MIB) User Interface

The SNMP Interface allows for the control of elements in the system via a user supplied SNMP Manager.

Users must be familiar with their MIB browser and know how to access the information in the SNMP Interface using their browser. They must also be able to obtain a TCP/IP address for the interface and obtain at least one TCP/IP address to which SNMP traps are sent.

The system operates using standard IP SNMPv2 protocols.

To Display Remote Access Password

NOTE! *The default MCA Remote Access Password is VORTEX, in all capital letters.*

Local Procedure

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. "VERIFY INVENTORY" is displayed. Press and release the FUNCTION SET ENTER pushbutton.

5. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "REMOTE INSTALLED" or "REMOTE ACTIVE" is displayed.

6. With "REMOTE INSTALLED" or "REMOTE ACTIVE" being displayed, press and release the ALARM CUTOFF, FUNCTION SELECT UP, and FUNCTION SELECT DOWN pushbuttons simultaneously.

   The Remote Access Password is displayed.

   The display automatically times out, or press the FUNCTION SELECT UP or FUNCTION SELECT DOWN arrow pushbutton to return to the previous display.

Remote Procedure

None

To Move Back to the Beginning of the MCA Logic Tree

Procedure

1. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously.

To View Active Alarms

Procedure

1. With "## ALARMS ACTIVE" being displayed on the MCA Interface Pad, press and release the FUNCTION SET ENTER pushbutton. Refer to the ALARM MENUS in "Navigating the MCA" for additional information.

To View Measurement Parameters

Procedure

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. "MEASUREMENT MENU" is displayed. Press and release the FUNCTION SET ENTER pushbutton. Refer to the MEASUREMENT MENUS in "Navigating the MCA" for additional information.

Viewing System Current Capacity

Procedure

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 "ADJUSTMENT MENU" is displayed.

3. Press and release the FUNCTION SET ENTER pushbutton.

4. "ADJUST SYSTEM" is displayed. Press and release the FUNCTION SET ENTER pushbutton.

5. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "100% Curr: ####A" is displayed. This is the current capacity of the system derived from the combined current capacities of all installed Rectifier Modules.

6. To return to the beginning of the MCA Logic Tree, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously.

Viewing Inventory Items

Procedure

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. "VERIFY INVENTORY" is displayed. Press and release the FUNCTION SET ENTER pushbutton.
5. Press and release the FUNCTION SELECT DOWN and UP arrow pushbuttons to view the various inventory items.
6. To return to the beginning of the MCA Logic Tree, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously.

MCA "Power Down" Mode

The MCA turns off its display and Rectifier Module communications to conserve power when system voltage falls below 40 volts in 48V systems, or 20 volts in 24V systems. Full operation is restored when system voltage recovers to above 47 volts in 48V systems, or 23.5 volts in 24V systems.

To temporarily view system parameters when the MCA is in the "Power Down" mode, press any keypad button. This reactivates the display and communications.

The MCA resumes "Power Down" mode after the MCA is returned to the "Normal Display" position (beginning of MCA Menu Tree).

MCA SYSTEM ADJUSTMENTS

Adjustment Location and Identification

All system alarm and control circuits intended for customer adjustment are accessible via the local MCA Interface Pad. Unless otherwise stated, these circuits have been factory set to the values listed in SAG581126000 (System Application Guide). The SAG can be accessed from the CD (Electronic Documentation Package) provided with your system. If readjustment is necessary, perform the appropriate adjustment procedure detailed in this section.

These adjustments can also be done via WinLink software (if furnished). Refer to the online Help Files accessed within the WinLink program for User Instructions.

Refer to **Figure 1** for local adjustment controls locations.

Adjusting Float Output Voltage

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. "ADJUST SYSTEM" is displayed.
6. Press and release the FUNCTION SET ENTER pushbutton.
7. "FLOAT = ##.##V" is displayed.
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "FLOAT =" portion of the display flashes.
9. Observe the value displayed. This is the float voltage setting for all Rectifier Modules, assuming 50% load. If the system is used with a battery charge digital temperature compensation probe, this value is the float voltage setting at 25°C. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.

NOTE! *The float voltage value is prevented from being adjusted higher than 0.5V below the high voltage shutdown setting. When used with a Battery Charge Digital Temperature Compensation Probe, float voltage is prevented from being adjusted higher than 1V below the high voltage shutdown setting. When used with a Battery Charge Digital Temperature Compensation Probe, float voltage is prevented from being adjusted higher than the Maximum Voltage with Temperature Compensation setting, or lower than the Minimum Voltage with Temperature Compensation setting.*

The MCA is used in various applications, float voltage cannot be adjusted beyond the limits of the Rectifier Module.

10. With the desired float voltage value 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 Rectifier Modules will assume the new value at their prevailing load current.*

NOTE! *The float 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.*

12. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Adjusting Test/Equalize Output Voltage

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. "ADJUST SYSTEM" is displayed.
6. Press and release the FUNCTION SET ENTER pushbutton.
7. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "TEST/EQ = ##.##V".
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "TEST/EQ =" portion of the display flashes.
9. Observe the value displayed. This is the test/equalize voltage setting for all Rectifier Modules, assuming 50% load. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.

NOTE! *The test/equalize voltage value is prevented from being adjusted higher than 0.5V below the high voltage shutdown setting. When used with a Battery Charge Digital Temperature Compensation Probe, test/equalize voltage is prevented from being adjusted higher than the Maximum Voltage with Temperature Compensation setting, or lower than the Minimum Voltage with Temperature Compensation setting.*

The MCA is used in various applications, equalize voltage cannot be adjusted beyond the limits of the Rectifier Module.

10. With the desired test/equalize voltage value 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 Rectifier Modules will assume the new value at their prevailing load current.*

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.*

12. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Adjusting High Voltage Shutdown

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. "ADJUST SYSTEM" is displayed.
6. Press and release the FUNCTION SET ENTER pushbutton.
7. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SET HVS = ##.##V" is displayed.
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SET HVS =" portion of the display flashes.
9. Observe the value displayed. This is the high voltage shutdown setting for all Rectifier Modules. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.

NOTE! *The system will not allow a value higher than 29.75 to be entered. Also, the high voltage shutdown value is prevented from being adjusted lower than 0.5V above the higher of the float or test/equalize setting. When used with a Battery Charge Digital Temperature Compensation Probe, high voltage shutdown is prevented from being adjusted lower than 0.5V above the Maximum Voltage with Temperature Compensation setting.*

The MCA is used in various applications, high voltage shutdown cannot be adjusted beyond the limits of the Rectifier Module.

10. With the desired high voltage shutdown value 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 high voltage shutdown 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. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Adjusting System Current Limit

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. "ADJUST SYSTEM" is displayed.
6. Press and release the FUNCTION SET ENTER pushbutton.
7. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "CURR LIM = ####A" is displayed.
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "CURR LIM =" portion of the display flashes.
9. Observe the value displayed. This is the system current limit setting. Each Rectifier Module's current limit circuit will be automatically adjusted to ensure that system current does not exceed this value. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.

NOTE! *"CURRLIM = ####MAX indicates the sum of the maximum capabilities of all Rectifier Modules installed in the system.*

10. With the desired current limiting value 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 system current limit 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. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Adjusting System High Voltage Alarm 1

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".
6. Press and release the FUNCTION SET ENTER pushbutton.
7. "SYS HV1 = ##.##V" is displayed.
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SYS HV1 =" portion of the display flashes.
9. Observe the value displayed. This is the high voltage alarm 1 setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.
10. With the desired high voltage alarm 1 value 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 high voltage alarm 1 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. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Adjusting System High Voltage Alarm 2

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".
6. Press and release the FUNCTION SET ENTER pushbutton.
7. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "SYS HV2 = ##.##V".
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SYS HV2 =" portion of the display flashes.
9. Observe the value displayed. This is the high voltage alarm 2 setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.
10. With the desired high voltage alarm 2 value 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 high voltage alarm 2 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. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Adjusting System Battery On Discharge Alarm

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".
6. Press and release the FUNCTION SET ENTER pushbutton.
7. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SYS BOD = ##.##V" is displayed.
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SYS BOD =" portion of the display flashes.
9. Observe the value displayed. This is the battery on discharge alarm setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.
10. With the desired battery on discharge alarm value 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 battery on discharge 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. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Adjusting System 50% Battery On Discharge (Very Low Voltage) Alarm

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".
6. Press and release the FUNCTION SET ENTER pushbutton.
7. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SYS 50% = ##.##V (VERYLOVOLT = ##.##V)" is displayed.
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SYS 50% = (VERYLOVOLT =)" portion of the display flashes.
9. Observe the value displayed. This is the 50% battery on discharge (very low voltage) alarm setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.
10. With the desired 50% battery on discharge (very low voltage) alarm value 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 50% battery on discharge (very low voltage) alarm 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. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Adjusting System Current Alarm

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".
6. Press and release the FUNCTION SET ENTER pushbutton.
7. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SYS CURR = ####A" is displayed.
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SYS CURR =" portion of the display flashes.
9. Observe the value displayed. This is the system current alarm setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.
10. With the desired system current alarm value 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 system current alarm 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. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Adjusting Subsystem (If Connected) High Voltage Alarm

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".
6. Press and release the FUNCTION SET ENTER pushbutton.
7. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SUB HV = ##.##V" is displayed.
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SUB HV =" portion of the display flashes.
9. Observe the value displayed. This is the subsystem high voltage alarm setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.
10. With the desired subsystem high voltage alarm value 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 subsystem high voltage alarm 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. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Adjusting Subsystem (If Connected) Low Voltage Alarm

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".
6. Press and release the FUNCTION SET ENTER pushbutton.
7. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SUB LV = ##.##V" is displayed.
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SUB LV =" portion of the display flashes.
9. Observe the value displayed. This is the subsystem low voltage alarm setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.
10. With the desired subsystem low voltage alarm value 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 subsystem low voltage alarm 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. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Adjusting Subsystem (If Connected) Current Alarm

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".
6. Press and release the FUNCTION SET ENTER pushbutton.
7. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "SUB CURR = ####A" is displayed.
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "SUB CURR =" portion of the display flashes.
9. Observe the value displayed. This is the subsystem current alarm setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.
10. With the desired subsystem current alarm value 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 subsystem current alarm 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. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Adjusting Low Voltage Disconnect (If Installed) "Disconnect" Value

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad, unless otherwise stated. Refer to **Figure 1**.

WARNING! Performing the next step inhibits the operation of the low voltage disconnect circuit, and if a load contactor is furnished, prevents disconnection of battery and system output from the controlled load(s) if a low battery voltage condition occurs. Also, if low voltage disconnect battery contactor is furnished, prevents disconnection of battery from the system if a low battery voltage condition occurs.

2. Place the Nor/INH switch to the INH position. This switch is located inside the Distribution Cabinet. The low voltage disconnect INHIBIT indicator illuminates. This prevents accidental disconnection of battery and system output from the controlled load(s) if a load contactor is furnished and accidental disconnection of battery from the system if a low voltage disconnect battery contactor is furnished while performing this procedure.
3. 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.
4. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
5. Press and release the FUNCTION SET ENTER pushbutton.
6. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUST LVD" is displayed.
7. Press and release the FUNCTION SET ENTER pushbutton.
8. "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).
9. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. Portion of the display flashes.
10. Observe the value displayed. This is the low voltage disconnect setting for the circuit being adjusted. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.

NOTE! *The low voltage disconnect circuit is prevented from being adjusted higher than 0.5V below the reconnect voltage setting. If you attempt to do this, a WARNING message is displayed.*

11. With the desired low voltage disconnect value being displayed, press and release the FUNCTION SET ENTER pushbutton.

12. “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.*

13. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.
14. Repeat this procedure to set the disconnect value for the other low voltage disconnect circuits installed.

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) if a load contactor is furnished, and/or battery will disconnect from the system if a low voltage disconnect battery contactor is furnished.

15. Return the Nor/INH switch to the Nor position. The low voltage disconnect INHIBIT indicator extinguishes.
16. Perform the next procedure to set the reconnect value for all low voltage disconnect circuits installed.

Adjusting the Reconnect Value for All Low Voltage Disconnect Circuits Installed

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUST LVD" is displayed.
6. Press and release the FUNCTION SET ENTER pushbutton.
7. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "LVRECON = ##.##V" or "MANUAL RECONNECT" is displayed.
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "LVRECON =" portion of the display flashes.
9. Observe the value displayed. This is the reconnect setting for all low voltage disconnect circuits installed. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.

NOTE! *The reconnect setting is prevented from being adjusted less than 0.5V above the highest of the disconnect values*. If you attempt to do this, a WARNING message is displayed.

NOTE! *For manual reconnect, select "MANUAL RECONNECT". For automatic reconnect, select a value.*

10. With the desired reconnect value 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 reconnect 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. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Calibrating System Output Voltage Reading

NOTE! *THIS PROCEDURE IS NOT RECOMMENDED but may be performed to calibrate system output voltage reading due to lead loss or at actual operating load. PERFORMING THIS PROCEDURE MAY RESULT IN INACCURATE METER READINGS.*

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "CALIBRATION MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. "CAL SYS = ##.##V" is displayed.
6. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "CAL SYS =" portion of the display flashes.
7. Observe the value displayed. This is the system output voltage reading calibration setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.
8. With the desired calibration value being displayed, press and release the FUNCTION SET ENTER pushbutton.
9. “ARE YOU SURE? + -” is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

NOTE! *The system output voltage reading calibration value will not be changed and the calibration mode will be exited if the FUNCTION SET YES (+) pushbutton is not pressed within 10 seconds of the “ARE YOU SURE? + -” prompt.*

10. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Calibrating Subsystem (If Connected) Output Voltage Reading

NOTE! *A subsystem is not provided in this power system. The procedure is included for reference only.*

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "CALIBRATION MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "CAL SUB = ##.##V".
6. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The CAL SUB =" portion of the display flashes.
7. Observe the value displayed. This is the subsystem output voltage reading calibration setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.
8. With the desired calibration value being displayed, press and release the FUNCTION SET ENTER pushbutton.
9. “ARE YOU SURE? + -” is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

NOTE! *The subsystem output voltage reading calibration value will not be changed and the calibration mode will be exited if the FUNCTION SET YES (+) pushbutton is not pressed within 10 seconds of the “ARE YOU SURE? + -” prompt.*

10. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Returning System and Subsystem Output Voltage Reading Calibrations to their Default Values

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "CALIBRATION MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Press and release the FUNCTION SELECT DOWN arrow pushbutton until "SET FACTORY CAL." is displayed.

NOTE! *If the calibration values are at their defaults, this option is not displayed.*

6. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.
7. "ARE YOU SURE? + -" is displayed. Press and release the FUNCTION SET YES (+) pushbutton.

NOTE! *The system and subsystem output voltage reading calibration values will not change to their defaults and the calibration mode will be exited if the FUNCTION SET YES (+) pushbutton is not pressed within 10 seconds of the "ARE YOU SURE? + -" prompt.*

8. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Calibrating Battery Charge Digital Temperature Compensation Slope

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "CALIBRATION MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "DIGITAL TC OFF" or "SLOPE = .### V/°C" is displayed.
6. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "DIGITAL TC OFF" or "SLOPE =" portion of the display flashes.
7. Observe the value displayed. This is the Battery Charge Digital Temperature Compensation slope setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.

NOTE! *Refer to Battery and Equipment Manufacturers' recommendations or site requirements for the value. Note that this is the compensation for the entire battery string, not per battery cell.*

8. With the desired slope value being displayed, press and release the FUNCTION SET ENTER pushbutton.
9. "ARE YOU SURE? + -" is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

NOTE! *The slope 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.*

10. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Calibrating Battery Charge Digital Temperature Compensation Maximum Voltage

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "CALIBRATION MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "MAX W/T = ##.## V" is displayed.
6. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "MAX W/T =" portion of the display flashes.
7. Observe the value displayed. This is the Battery Charge Digital Temperature Compensation maximum voltage setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.

NOTE! *Refer to Battery and Equipment Manufacturers' recommendations or site requirements for the value.*

NOTE! *Maximum Voltage with Temperature Compensation is prevented from being adjusted higher than 0.5V below the High Voltage Shutdown setting, or lower than the float voltage setting.*

The MCA is used in various applications, this setting cannot be adjusted beyond the limits of the Rectifier Module.

8. With the desired maximum voltage with temperature compensation value being displayed, press and release the FUNCTION SET ENTER pushbutton.
9. "ARE YOU SURE? + -" is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

NOTE! *The maximum voltage with temperature compensation 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.*

10. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Calibrating Battery Charge Digital Temperature Compensation Minimum Voltage

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "CALIBRATION MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "MIN W/T = ##.## V" is displayed.
6. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "MIN W/T =" portion of the display flashes.
7. Observe the value displayed. This is the Battery Charge Digital Temperature Compensation minimum voltage setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.

NOTE! *Refer to Battery and Equipment Manufacturers' recommendations or site requirements for the value.*

NOTE! *Minimum Voltage with Temperature Compensation is prevented from being adjusted lower than 0.5V above the Low Voltage Disconnect Reconnect Value setting, or higher than the float voltage setting.*

8. With the desired minimum voltage with temperature compensation value being displayed, press and release the FUNCTION SET ENTER pushbutton.
9. "ARE YOU SURE? + -" is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

NOTE! *The minimum voltage with temperature compensation 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.*

10. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Calibrating Battery Charge Temperature Compensation Source

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "CALIBRATION MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "TCOMP ON SENSor1" or "TCOMP ON AVERAGE" or "TCOMP ON HIGHEST" is displayed.
6. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The display flashes.
7. Observe the value displayed. This is the Battery Charge Temperature Compensation Source setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.
8. With the desired value being displayed, press and release the FUNCTION SET ENTER pushbutton.
9. “ARE YOU SURE? + -” is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.

NOTE! *The Temperature Compensation Source 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.*

10. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Adjusting Battery Ambient High Temperature Alarm (if Battery Charge Digital Temperature Compensation Probe is installed)

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".
6. Press and release the FUNCTION SET ENTER pushbutton.
7. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "HI TEMP ** IS OFF" or "HI TEMP ** = ###°C" is displayed.
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "HI TEMP ** IS OFF" or "HI TEMP ** =" portion of the display flashes.
9. Observe the value displayed. This is the high temperature alarm setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.
10. With the desired high temperature alarm value 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 high temperature alarm 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. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.
13. Repeat this procedure if multiple probes are installed.

Adjusting Battery Ambient Low Temperature Alarm (if Battery Charge Digital Temperature Compensation Probe is installed)

Local MCA Control Panel Adjustment Procedure

1. All controls are located on the MCA Interface Pad. Refer to **Figure 1**.
2. 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.
3. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "ADJUSTMENT MENU" is displayed.
4. Press and release the FUNCTION SET ENTER pushbutton.
5. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "ADJUST ALARMS".
6. Press and release the FUNCTION SET ENTER pushbutton.
7. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "LO TEMP ** IS OFF" or "LO TEMP ** = ###°C" is displayed.
8. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "LO TEMP ** IS OFF" or "LO TEMP ** =" portion of the display flashes.
9. Observe the value displayed. This is the low temperature alarm setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.
10. With the desired low temperature alarm value 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 temperature alarm 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. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.
13. Repeat this procedure if multiple probes are installed.

Enabling, Disabling, and Adjusting the Battery Recharge Current Limit Setting

NOTE! *The Battery Recharge Current Limit feature is active when a "BATTLIM" value is selected, as described in this procedure.*

The Battery Recharge Current Limit feature is inactive when "BATTLIM DISABLED" is selected, as described in this procedure.

Local MCA Control Panel Adjustment Procedure

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 "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. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "BATTLIM = #####A" or "BATTLIM DISABLED" is displayed.
7. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "BATTLIM =" portion of the display flashes.
8. Observe the value displayed. This is the battery recharge current limit setting. Each Rectifier Modules current limit circuit will be automatically adjusted to ensure that battery current does not exceed this value, as described in the *System Operating Procedures* section. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed. Note that as you scroll above the system current limit setting, "BATTLIM DISABLED" is displayed. Scroll back down to redisplay "BATTLIM =".
9. With the desired battery recharge current limit 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 battery recharge current limit 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.

Setting the "Battery Charge Current Alarm" Value

Local MCA Control Panel Adjustment Procedure

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 "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 "BAT CHG = #####A" is displayed.

7. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "BAT CHG =" portion of the display flashes.

8. Observe the value displayed. This is the battery charge current alarm setting. To change this value, press and hold the FUNCTION SET YES (+) or NO (-) pushbutton. Release the pushbutton when the desired value is displayed.

9. With the desired battery charge current alarm 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 battery charge current alarm 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.

Manually Initiated Timed Test/Equalize Feature

Refer to "System Operating Procedures" for an adjustment procedure.

Automatic Test/Equalize Feature

Refer to "System Operating Procedures" for an adjustment procedure.

Alarm Relay Test Feature

Refer to "System Operating Procedures" for an adjustment procedure.

MCA Audible Alarm Cutoff Reset Time Period

Refer to "System Operating Procedures" for an adjustment procedure.

Rectifier Module / Converter Module Fan Speed Control Feature

Refer to "System Operating Procedures" for an adjustment procedure.

Alternating Display Feature

Refer to "System Operating Procedures" for an adjustment procedure.

MCA Load Share Alarm Feature

Refer to "System Operating Procedures" for an adjustment procedure.

MCA Emergency Stop Feature

Refer to *"Operating Procedures"* for an adjustment procedure.

MCA Remote High Voltage Shutdown Feature

Refer to *"Operating Procedures"* for an adjustment procedure.

SYSTEM MAINTENANCE

Admonishments

General Safety

DANGER! SERVICE PERSONNEL MUST FOLLOW APPROVED SAFETY PROCEDURES.

Performing the following procedures may expose service personnel to hazards. These procedures should be performed by qualified service personnel 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.

CAUTION! Performance of the following procedures may interrupt power to the loads, if battery reserve is not sufficient.

System Maintenance Procedures

The maintenance procedures listed in **Table 4** should be performed and recorded at the recommended interval to ensure continual system operation.

The procedures listed in **Table 5** may be performed and recorded at the recommended interval to track system operation. **Table 5** procedures ARE NOT necessary for continual system operation. They are recommended only to provide a service record for the system.

The tables reference specific sections in these User Instructions (Section 6013) or the separate Installation Instructions (Section 6012) that help in performing these procedures.

Table 4: *Maintenance Procedures to be Performed at 6-Month Intervals*

PROCEDURE	REFERENCED IN	COMPLETED (√)
Check Ventilation Openings for Obstructions such as Dust, Papers, Manuals, etc.	--	
Inspect and Tighten All Installer's Connections	Section 6012, *Making Electrical Connections.*	

NOTE! *This table may be reproduced as necessary to record and document system performance.*

Table 5: *Procedures that MAY be Performed at 12-Month Intervals to Track System Operation (cont'd on next page)*

PROCEDURE	REFERENCED IN	VALUE
Measure and Record System Float (Output) Voltage and Compare MCA Display Voltage with Reference Meter	Section 6013, *Navigating the MCA*. (Line #42 to Place in Float Mode, if required) (Line #61 to Measure) (Record also Reference Meter Voltage Connected to System Output Busbars)	
Measure and Record System Test/Equalize (Output) Voltage and Compare MCA Display Voltage with Reference Meter	Section 6013, *Navigating the MCA*. (Line #42 to Place in Test/Equalize Mode) (Line #61 to Measure) (Record also Reference Meter Voltage Connected to System Output Busbars) (Line #42 to Return to Float Mode)	
Measure and Record Total System Current	Section 6013, *Navigating the MCA*. (Line #62)	
Measure and Record Total Rectifier Module Current	Section 6013, *Navigating the MCA*. (Line #63)	
Measure and Record Subsystem (if connected) Output Voltage	Section 6013, *Navigating the MCA*. (Line #64)	
Measure and Record Total Subsystem (if connected) Output Current	Section 6013, *Navigating the MCA*. (Line #65)	

NOTE! *This table may be reproduced as necessary to record and document system performance.*

Table 5: *Procedures that MAY be Performed at 12-Month Intervals to Track System Operation (cont'd from previous page, cont'd on next page)*

PROCEDURE	REFERENCED IN	VALUE
Measure and Record Output Current of Each Individual System Load Shunt	Section 6013, *Navigating the MCA*. (Line #86)	#1
		#2
		#3
		#4
		#5
		#6
		#7
		#8
		#9
		#10
		#11
		#12
		#13
		#14
		#15
		#16

NOTE! *This table may be reproduced as necessary to record and document system performance.*

Table 5: *Procedures that MAY be Performed at 12-Month Intervals to Track System Operation (cont'd from previous page, cont'd on next page)*

PROCEDURE	REFERENCED IN	VALUE
Measure and Record Output Current of Each Individual Rectifier Module (PCU)	Section 6013, *Navigating the MCA*. (Line #89)	#1
		#2
		#3
		#4
		#5
		#6
		#7
		#8
		#9
		#10
		#11
		#12
		#13
		#14
		#15
		#16
		#17
		#18
		#19
		#20
		#21
		#22
		#23
		#24

NOTE! *This table may be reproduced as necessary to record and document system performance.*

Table 5: *Procedures that MAY be Performed at 12-Month Intervals to Track System Operation (cont'd from previous page, cont'd on next page)*

PROCEDURE	REFERENCED IN	VALUE
Measure and Record Output Current of Each Individual Rectifier Module (PCU)	Section 6013, *Navigating the MCA*. (Line #89)	#25
		#26
		#27
		#28
		#29
		#30
		#31
		#32
		#33
		#34
		#35
		#36
		#37
		#38
		#39
		#40
		#41
		#42
		#43
		#44
		#45
		#46
		#47
		#48

NOTE! *This table may be reproduced as necessary to record and document system performance.*

Table 5: *Procedures that MAY be Performed at 12-Month Intervals to Track System Operation (cont'd from previous page, cont'd on next page)*

PROCEDURE	REFERENCED IN	VALUE
Measure and Record Output Current of Each Individual Rectifier Module (PCU)	Section 6013, *Navigating the MCA*. (Line #89)	#49
		#50
		#51
		#52
		#53
		#54
		#55
		#56
		#57
		#58
		#59
		#60
		#61
		#62
		#63
		#64

NOTE! *This table may be reproduced as necessary to record and document system performance.*

Table 5: *Procedures that MAY be Performed at 12-Month Intervals to Track System Operation (cont'd from previous page, cont'd on next page)*

PROCEDURE	REFERENCED IN	VALUE
Measure and Record Output Current of Each Individual Subsystem Load Shunt (if connected)	Section 6013, *Navigating the MCA*. (Line #92)	#1
		#2
		#3
		#4
		#5
		#6
		#7
		#8
		#9
		#10
		#11
		#12
		#13
		#14
		#15
		#16

NOTE! *This table may be reproduced as necessary to record and document system performance.*

Table 5: *Procedures that MAY be Performed at 12-Month Intervals to Track System Operation (cont'd from previous page, cont'd on next page)*

PROCEDURE	REFERENCED IN	VALUE
Measure and Record Output Current of Each Individual Battery Shunt (if connected)	Section 6013, *Navigating the MCA*. (Line #94A)	#1
		#2
		#3
		#4
		#5
		#6
		#7
		#8
		#9
		#10
		#11
		#12
		#13
		#14
		#15
		#16

NOTE! *This table may be reproduced as necessary to record and document system performance.*

Table 5: *Procedures that MAY be Performed at 12-Month Intervals to Track System Operation (cont'd from previous page, cont'd on next page)*

PROCEDURE	REFERENCED IN	VALUE
Record System High Voltage Shutdown Value	Section 6013, *Navigating the MCA*. (Line #97)	
Record System Current Limiting Value	Section 6013, *Navigating the MCA*. (Line #99)	
Record Battery Recharge Current Limit Value	Section 6013, *Navigating the MCA*. (Line #99A)	
Record System High Voltage Alarm 1 (high float) Value or Record and Check System High Voltage Alarm 1 (high float) Value	Section 6013, *Navigating the MCA*. (Line #103) or Section 6012, appropriate procedure in *Initially Starting the System*.	
Record System High Voltage Alarm 2 (high voltage) Value or Record and Check System High Voltage Alarm 2 (high voltage) Value	Section 6013, *Navigating the MCA*. (Line #104) or Section 6012, appropriate procedure in *Initially Starting the System*.	

NOTE! *This table may be reproduced as necessary to record and document system performance.*

Table 5: *Procedures that MAY be Performed at 12-Month Intervals to Track System Operation (cont'd from previous page, cont'd on next page)*

PROCEDURE	REFERENCED IN	VALUE
Record System Battery On Discharge (low float) Alarm Value or Record and Check System Battery On Discharge (low float) Alarm Value	Section 6013, *Navigating the MCA*. (Line #105) or Section 6012, appropriate procedure in *Initially Starting the System*.	
Record System 50% Battery On Discharge (very low voltage) (low voltage) Alarm Value or Record and Check System 50% Battery On Discharge (very low voltage) (low voltage) Alarm Value	Section 6013, *Navigating the MCA*. (Line #106) or Section 6012, appropriate procedure in *Initially Starting the System*.	
Record System Current Alarm Value or Record and Check System Current Alarm Value	Section 6013, *Navigating the MCA*. (Line #107) or Section 6012, appropriate procedure in *Initially Starting the System*.	

NOTE! *This table may be reproduced as necessary to record and document system performance.*

Table 5: *Procedures that MAY be Performed at 12-Month Intervals to Track System Operation (cont'd from previous page, cont'd on next page)*

PROCEDURE	REFERENCED IN	VALUE
Record Subsystem High Voltage Alarm Value (if connected) or Record and Check Subsystem High Voltage Alarm Value (if connected)	Section 6013, *Navigating the MCA*. (Line #108) or Section 6012, appropriate procedure in *Initially Starting the System*.	
Record Subsystem Low Voltage Alarm Value (if connected) or Record and Check Subsystem Low Voltage Alarm Value (if connected)	Section 6013, *Navigating the MCA*. (Line #109) or Section 6012, appropriate procedure in *Initially Starting the System*.	
Record Subsystem Current Alarm Value (if connected) or Record and Check Subsystem Current Alarm Value (if connected)	Section 6013, *Navigating the MCA*. (Line #110) or Section 6012, appropriate procedure in *Initially Starting the System*.	
Record Battery Recharge Current Alarm Value or Record and Check Battery Recharge Current Alarm Value	Section 6013, *Navigating the MCA*. (Line #110A) or Section 6012, appropriate procedure in *Initially Starting the System*.	

NOTE! *This table may be reproduced as necessary to record and document system performance.*

Table 5: *Procedures that MAY be Performed at 12-Month Intervals to Track System Operation (cont'd from previous page, cont'd on next page)*

PROCEDURE	REFERENCED IN	VALUE
Record Low Voltage Disconnect 1A Value (if installed)	Section 6013, *Navigating the MCA*. (Line #114)	
Record Low Voltage Disconnect 1B Value (if installed)	Section 6013, *Navigating the MCA*. (Line #114)	
Record Low Voltage Disconnect 2A Value (if installed)	Section 6013, *Navigating the MCA*. (Line #114)	
Record Low Voltage Disconnect 2B Value (if installed)	Section 6013, *Navigating the MCA*. (Line #114)	
Record Low Voltage Disconnect 3A Value (if installed)	Section 6013, *Navigating the MCA*. (Line #114)	
Record Low Voltage Disconnect 3B Value (if installed)	Section 6013, *Navigating the MCA*. (Line #114)	
Record the Reconnect Value for All Low Voltage Disconnect Circuits Installed	Section 6013, *Navigating the MCA*. (Line #115)	

NOTE! *This table may be reproduced as necessary to record and document system performance.*

Table 5: *Procedures that MAY be Performed at 12-Month Intervals to Track System Operation (cont'd from previous page)*

PROCEDURE	REFERENCED IN	VALUE
Measure and Record Temperature Sensor (if installed) Temperature	Section 6013, *Navigating the MCA*. (Line #65B)	#1 = #2 = #3 = #4 = #5 = #6 = #7 = #8 =
Record High Temperature Alarm Value (if temperature compensation probe installed)	Section 6013, *Navigating the MCA*. (Line #110B)	#1 = #2 = #3 = #4 = #5 = #6 = #7 = #8 =
Record Low Temperature Alarm Value (if temperature compensation probe installed)	Section 6013, *Navigating the MCA*. (Line #110C)	#1 = #2 = #3 = #4 = #5 = #6 = #7 = #8 =
Record Slope Value (if temperature compensation probe installed)	Section 6013, *Navigating the MCA*. (Line #83A)	
Record Maximum Voltage With Temperature Compensation Value (if temperature compensation probe installed)	Section 6013, *Navigating the MCA*. (Line #83B)	
Record Minimum Voltage with Temperature Compensation Value (if temperature compensation probe installed)	Section 6013, *Navigating the MCA*. (Line #83C)	
Record Temperature Compensation Source (if temperature compensation probe installed)	Section 6013, *Navigating the MCA*. (Line #83D)	

NOTE! *This table may be reproduced as necessary to record and document system performance.*

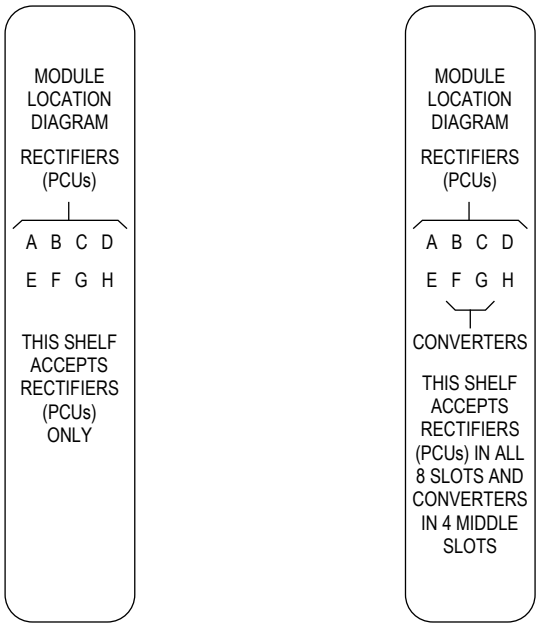
Adding a Rectifier or DC-DC Converter Module to an Existing Shelf

To increase system current capacity, a Rectifier Module (PCU) can easily be added to an existing shelf that contains an empty Rectifier Module mounting position. Likewise, in systems that accept DC-DC Converter Modules, to increase subsystem capacity a DC-DC Converter Module can be added to a shelf that contains an empty Converter Module mounting position. Follow the procedure detailed below.

Rectifier and DC-DC Converter 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 2**.) 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.

Figure 2: *Module Location Diagrams (on the front of each shelf)*



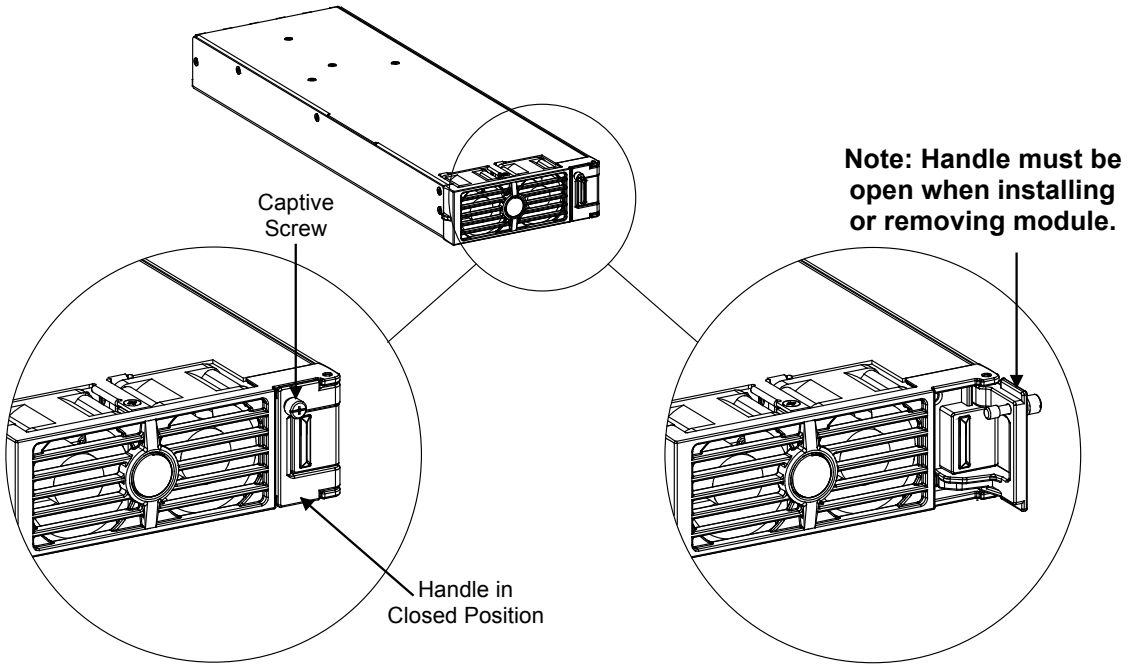
This Shelf Accepts Rectifier Modules Only

This Shelf Accepts Rectifier and DC-DC Converter Modules

NOTE! *Each Rectifier and DC-DC Converter Module locks into the Module Mounting Shelf through a latch located on the right-hand side of the module. The latch and module handle are interactive. Pushing the handle into the module's front panel causes the latch to extend to the locking position; pulling the handle out from the module's front panel causes the latch to retract. See* ***Figure 3*** *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 3: *Handle/Latch Mechanism on the Rectifier or DC-DC Converter Module*



Procedure

1. Unpack the module.
2. Note the model number located on the handle of the 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 2**.
4. If present, remove blank cover panel from the mounting position into which Rectifier or DC-DC Converter Module is to be installed.
5. Place the module into the 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. After the module is physically installed in the mounting shelf, it is ready for operation immediately after power is supplied to it.

Adding a Module Mounting Shelf to the Power System

NOTE! *Apply anti-oxide compound to all mechanical connections.*

Procedure

DANGER! Observe the admonishments located at the beginning of this section.

NOTE! *Refer to* ***Figure 4****,* ***Figure 5****, and* ***Figure 6*** *as this procedure is performed.*

1. On the rear of the new Module Mounting Shelf and the shelf installed directly above it, remove the AC input and DC output covers.
2. On the bottom of the bottom existing shelf in the rack, remove cutouts from the plastic shield as shown in **Figure 4**.
3. Install the new Module Mounting Shelf directly beneath the bottom existing shelf in the rack (no space between units). Use the mounting hardware provided with the shelf.

   Hardware build-up is: 12-24 x 3/4" screw and flat washer, (1) set per side.
   12-24 x 3/4" screw and ground washer, (1) set per side.

   Install the ground washers so the teeth dig into the paint on the mounting angles. Torque all screws to 65 in-lbs.
4. Install the furnished output busbar links as shown in **Figure 5**. Apply electrical anti-oxidizing compound to all busbar mating surfaces.

   Hardware build-up for the connection to the new shelf is:
   1/4-20 x 1" bolt, 1/4" flat washer, 1/4" Belleville lock washer.

   Hardware build-up for the connection to the existing shelf is:
   1/4-20 nut, 1/4" flat washer, 1/4" Belleville lock washer.

   Install the Belleville lock washer so the concave side is towards the busbar. Torque all bolts and nuts to 60 in-lbs.
5. If the New Shelf Accepts DC-DC Converters: Perform the *Procedure for Connecting DC-DC Converter Output Cables* detailed in the next section. Then return here and proceed to the next step.

   If the New Shelf Does Not Accept DC-DC Converters: Proceed to the next step.
6. Plug the CAN bus connector on the cable exiting the top of the new shelf into the mating connector exiting the bottom of the shelf above it.
7. Reinstall the output busbar shield on the rear of all Module Mounting Shelves.
8. Reinstall the AC covers previously removed from the existing shelf.
9. Refer to the Installation Instructions (Section 6012) and connect AC input power to the new shelf.

10. Refer to the previous procedure and install Rectifier Modules and/or DC-DC Converter Modules into the new shelf.

Procedure for Connecting DC-DC Converter Output Cables

NOTE! *If the DC-DC Converter Option is not provided with the expansion shelf, skip this 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 6**. 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 6**.
7. Connect the output jumpers to the converter output terminals as shown in **Figure 6**. Apply electrical anti-oxidizing compound to lug mating surfaces before connecting. Torque as shown in the figure.
8. Install the plastic shield, which 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.
9. Return to Step 6 in the previous procedure.

Figure 4: *Removing Cutouts from Bottom of Existing Shelf in Rack*

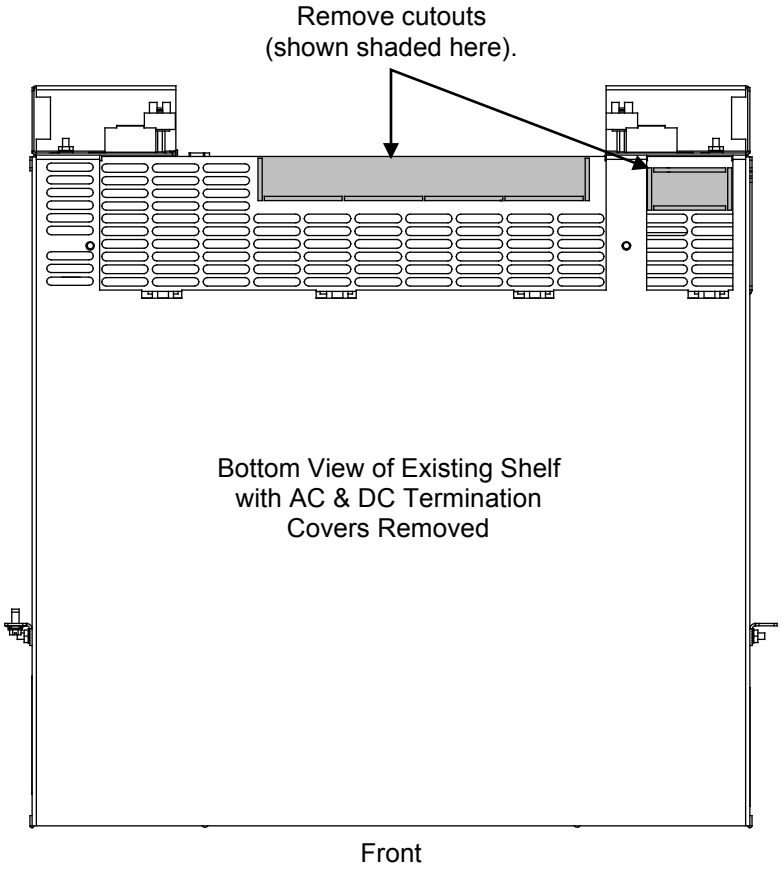


Figure 5: *Installing Output Busbar Links Between Existing Shelf and Add-On Shelf*

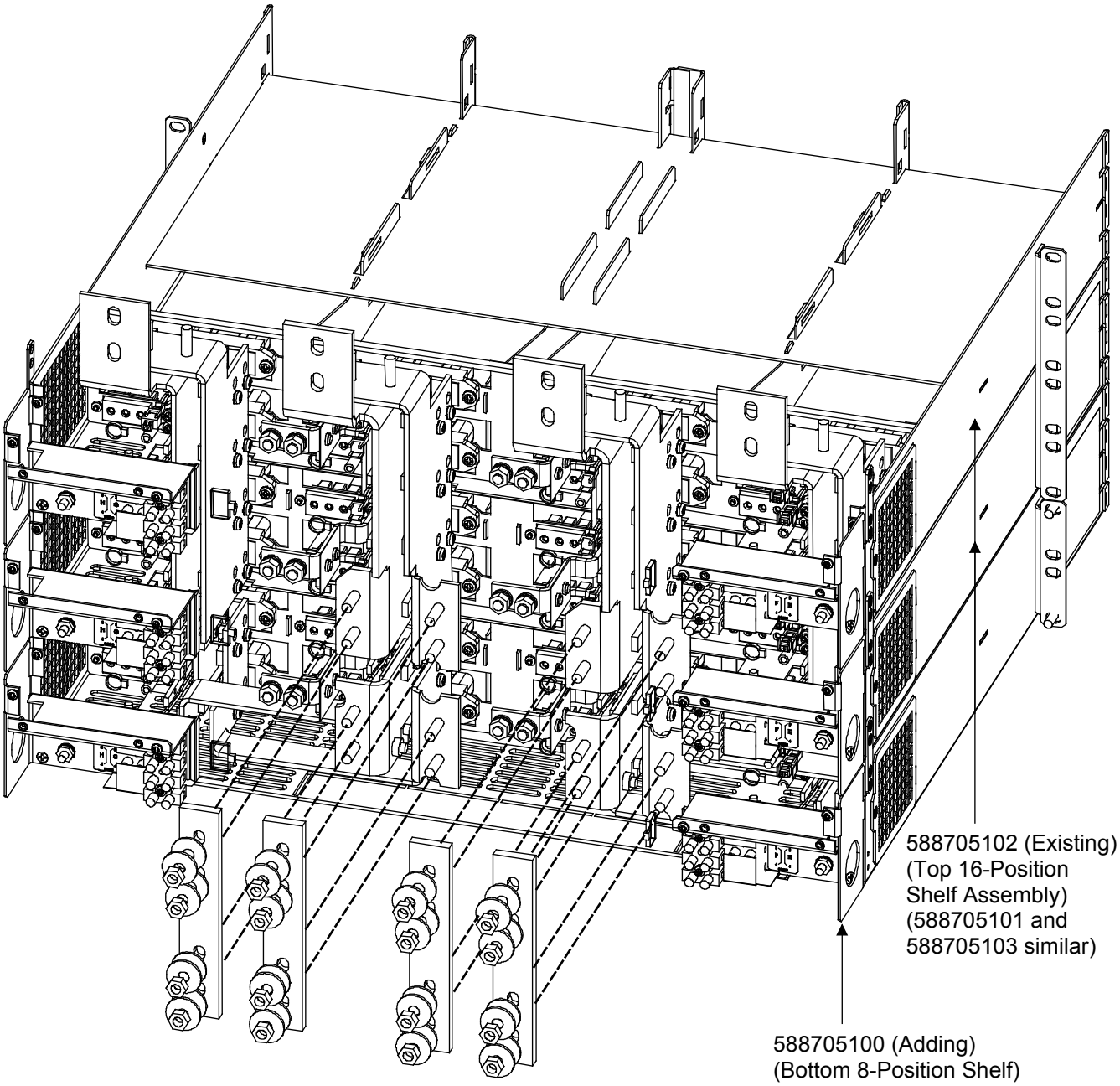
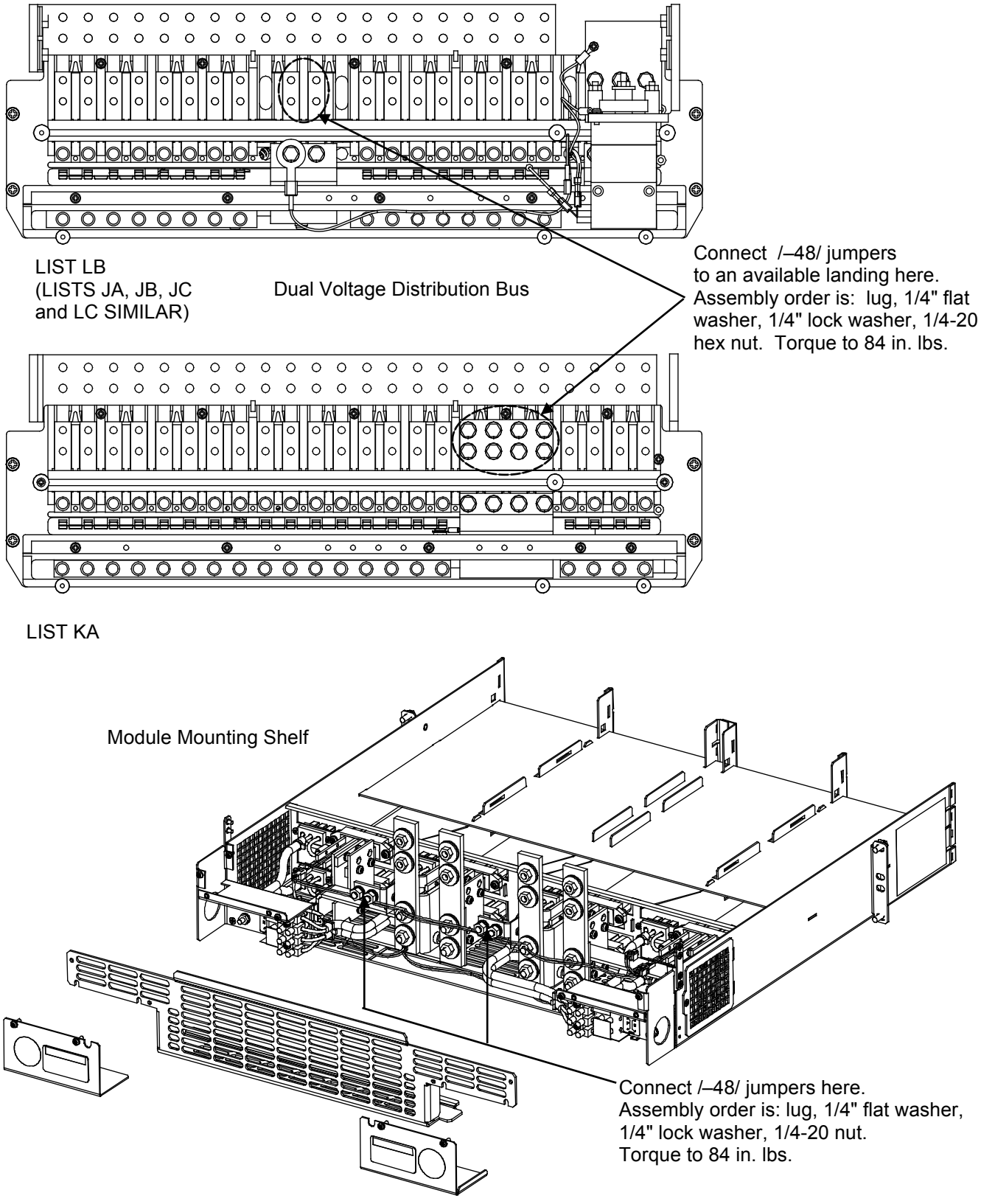


Figure 6: *Installing Converter Output Cables (if required)*



Installing LVD Contactor Bypass Kits P/NS 514910 and 514912

These kits are designed for field installation in a bullet nose type distribution bus assembly equipped with LVD where the LVD function is no longer required. Part No. 514910 bypasses the contactor without removing it. This kit can be installed with power applied to the system. Part No. 514912 replaces the contactor with a busbar. All power sources must be removed from the system prior to installing this kit.

Installing Kit Part No. 514910

This kit consists of the following:

Qty.	Part No.	Description
1	514909	Busbar
4	227640600	Bolt, 1/4-20 x 1”

Perform the following procedure to install the LVD bypass busbar. Refer to **Figure 7** as the procedure is performed.

Procedure

DANGER! Observe the admonishments located at the beginning of this section.

1. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.
2. Remove the four bolts and washers indicated in **Figure 7**. Retain the washers for reuse. The bolts may be discarded.

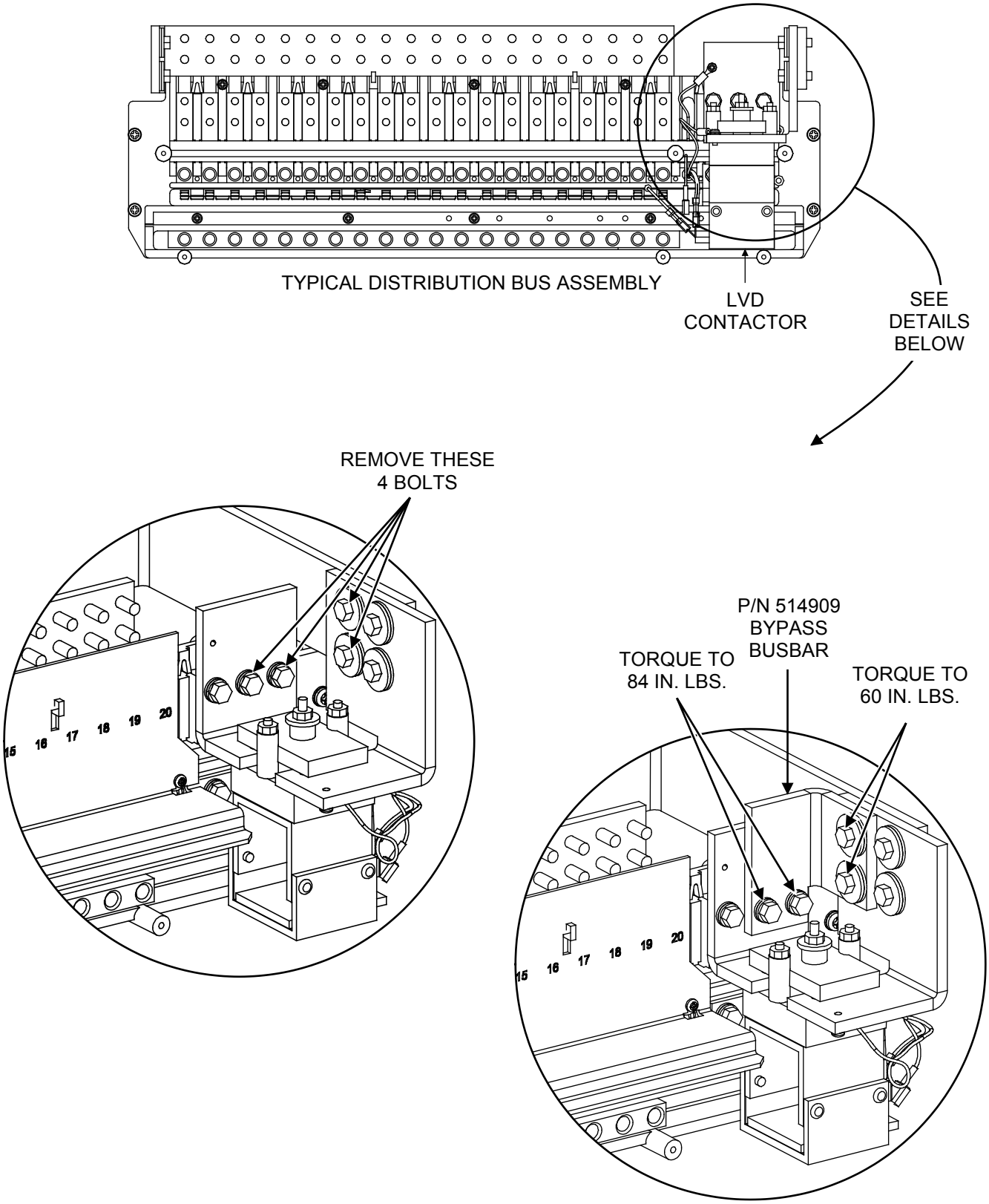
DANGER! Perform the next step to avoid arcing when the busbar is installed.

3. Verify that the LVD contactor is energized (contacts are closed); otherwise arcing may occur when the bypass busbar is installed. As an alternative, remove all loads from the contactor by turning off all circuit breakers or removing all fuses in the distribution row.

NOTE! *In the next step, apply electrical anti-oxidizing compound to busbar mating surfaces.*

4. Place the kit-furnished busbar as shown in **Figure 7**. Secure by installing four kit-furnished bolts (1/4-20 x 1”) and the washers that were removed in a previous step. Recommended torque is 84 inch pounds for the standard (split) lock washers, and 60 inch pounds for the Belleville washers.
5. Ensure all circuit breakers are turned on or fuses installed in the distribution row.
6. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

Figure 7: *Installing Kit P/N 514910*



Installing Kit Part No. 514912

This kit consists of the following:

Qty.	Part No.	Description
1	514911	Busbar
1	167537400	Sleeving, Size 2, 9” long
4	237650200	Plastic cable tie, 3-7/8” x 1/16”

Perform the following procedure to replace the LVD contactor with the bypass busbar. Refer to **Figure 8** as the procedure is performed.

Procedure

DANGER! Observe the admonishments located at the beginning of this section.

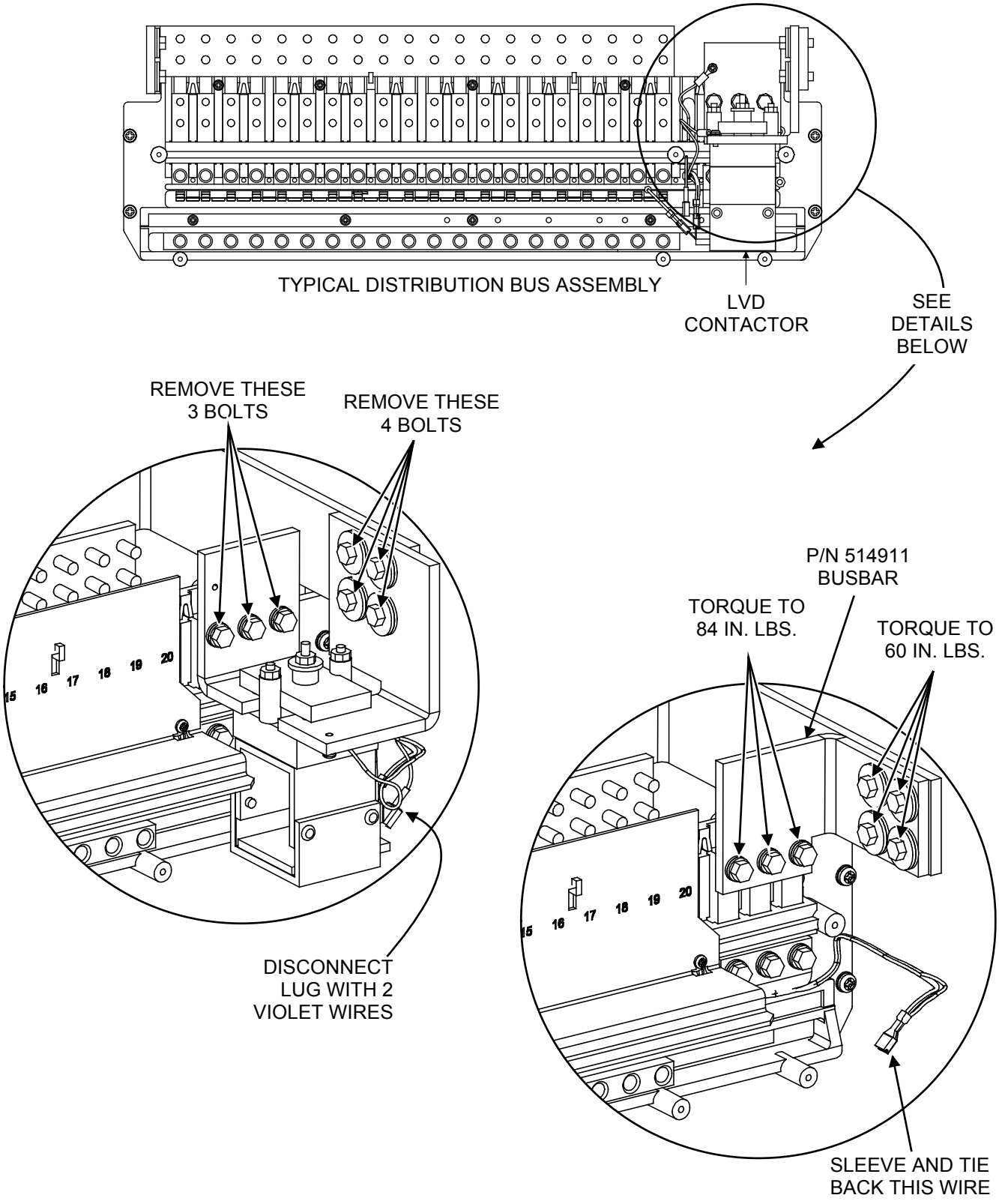
DANGER! All sources of AC and DC power must be completely disconnected from this power system before performing this procedure. Use a meter to verify no DC voltage is present on the system busbars and contactor before proceeding.

1. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.
2. On the side of the contactor body, disconnect the lug that terminates two 22 AWG violet wires. Cut and remove the plastic cable tie that secures these two violet wires to a red/white wire.
3. Use kit-furnished sleeving to insulate the lug that was disconnected in the last step. Secure the sleeving to the wires by applying kit-furnished plastic cable ties. Tie back the wires using kit-furnished plastic cable ties.
4. Remove the seven bolts and washers indicated in **Figure 8**. Remove the contactor. Retain all hardware for reuse.

NOTE! *In the next step, apply electrical anti-oxidizing compound to busbar mating surfaces.*

5. Place the kit-furnished busbar as shown in **Figure 8**. Secure by installing and tightening the seven bolts and 14 washers that were removed in a previous step. Recommended torque is 84 inch pounds for the standard (split) lock washers, and 60 inch pounds for the Belleville washers.
6. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

Figure 8: *Installing Kit P/N 514912*



SYSTEM TROUBLESHOOTING AND REPAIR

Contact Information

Refer to Section 4154 (provided with your customer documentation) for support contact information.

Admonishments

General Safety

DANGER! SERVICE PERSONNEL MUST FOLLOW APPROVED SAFETY PROCEDURES.

Performing the following procedures may expose service personnel to hazards. These procedures should be performed by qualified service personnel 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 allow any tool to 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.

CAUTION! Performing the following procedures may interrupt power to the loads, if battery reserve is not sufficient.

Circuit Cards

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.

Rectifier Module Troubleshooting Procedures

Refer to the Rectifier User Instructions (UM1R243000) for troubleshooting and repair instructions. This document can be accessed from the CD (Electronic Documentation Package) furnished with your system.

Converter Module Troubleshooting Procedures

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

Troubleshooting Information

General

This system is designed for ease in troubleshooting and repair. The various indicators as described in "System Operating Procedures", are designed to isolate failure to a specific element. Once the faulty element has been identified, refer to the next sections, “REPLACEMENT INFORMATION” and "REPLACEMENT PROCEDURES".

The procedures listed in "System Maintenance", can also be used by servicing personnel in identification and/or prevention of trouble symptoms in the system.

Adjustments

If the suspected cause of a trouble symptom is an out of adjustment condition, that particular adjustment setting should be checked or reset using the appropriate adjustment procedure detailed in "MCA System Adjustments". If a failed Rectifier Module, MCA, or Low Voltage Disconnect circuit card is suspected, the adjustment procedures can also be used to verify the setpoints as well as the operation of the Rectifier Module, MCA, or Low Voltage Disconnect circuit card.

MCA Messages

An MCA Menu Tree is provided in the separate *Installation Manual* (and on the CD furnished with your system). Each line in the MCA Menu Tree contains a number. This number is referenced in a chart provided in "Navigating the MCA". This chart provides a description of each line listed on the MCA Menu Tree.

If the MCA displays a system or subsystem alarm message, find the line in the MCA Menu Tree showing this message. For an explanation of this alarm, locate the corresponding MCA Menu Tree Line Number in the chart provided in “Navigating the MCA”.

NOTE! *If the MCA is replaced with an MCA previously used in another power system, the MCA may reflect inventory items not in the current power system and may display alarms. In this case, update the inventory as detailed in this section. Also, if you remove an inventory item (a component) from the power system, you must update the inventory to clear alarms.*

NOTE! *If you remove a Battery Charge Temperature Compensation Probe, alarms are displayed. Manually set the Battery Charge Temperature Compensation feature to off as described in "MCA System Adjustments" to clear the alarms.*

Additional MCA Messages

The following provides a list and descriptions of additional messages the MCA may display.

ARE YOU SURE? +-: MCA presents this query before changing an operating parameter.

TempCmp Hardware: The user tried to set the TC CAL value (line 83 on MCA Menu Tree Section 6022) to a value when a temperature compensation module was not present, or to ANALOG TC OFF when a module was present.

or

The user tried to set the temperature compensation probe's SLOPE value (line 83A on MCA Menu Tree Section 6022) to a value when a temperature compensation probe was not present, or to DIGITAL TC OFF when a probe was present.

NOT RUNNING YET!: This is the normal display (instead of line 1 or 0 on MCA Menu Tree Section 6022) when no Rectifier Modules are communicating with the MCA.

PASSWORD: $$$$$$: Pressing ALARM CUTOFF, FUNCTION SELECT UP, and FUNCTION SELECT DOWN at the same time while viewing REMOTE INSTALLED or REMOTE ACTIVE (line 123 on MCA Menu Tree Section 6022) allows the user to view the remote access password.

TestEq Switch On: The user tried to set Float mode (line 42 on MCA Menu Tree Section 6022) while the external test/equalize input switch was on.

Local Lockout On: The user tried to change an operating parameter while the local lockout jumper was in place.

NO PCUs FOUND: Displayed instead of line 15 or 118 (on MCA Menu Tree Section 6022) when no Rectifier Modules (PCUs) are communicating with the MCA.

NO SHUNTS FOUND: Displayed instead of line 120 (on MCA Menu Tree Section 6022) when no shunt A/D's are communicating with the MCA.

NO LVDs FOUND: Displayed instead of line 121 (on the MCA Menu Tree Section 6022) when no LVDs are communicating with the MCA.

NO TEMP SENSORS FOUND: Displayed instead of line 121A (on MCA Menu Tree Section 6022) when no Temperature Sensors are communicating with the MCA.

Alarm(s) Active: The user tried to enter TEST ALM RELAYS mode (line 111 on MCA Menu Tree Section 6022) when external alarms were active.

Bypass Circuit Card Requirement

A Bypass Circuit Card (P/N 513737) must be 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. Otherwise, the power system will not operate normally.

Updating the Inventory after Changes to the System Have Been Made

When an inventory item is removed from the system, an alarm will be reported until the following procedure is performed.

Example, if a Rectifier Module (PCU) is removed from the system, "PCU** TYPE ###A" will change to reflect this but the Rectifier Module will not be removed from the MCA's inventory until "VERIFY INVENTORY" is entered and the "UPDATE INVENTORY" operation is completed.

Procedure

1. 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. "VERIFY INVENTORY" is displayed. Press and release the FUNCTION SET ENTER pushbutton.
5. Repeatedly press and release the FUNCTION SELECT DOWN arrow pushbutton until "UPDATE INVENTORY" is displayed.
6. With "UPDATE INVENTORY" being displayed, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.
7. “ARE YOU SURE? + -” is displayed. Press and release the FUNCTION SET YES (+) pushbutton.
8. To return to the beginning of the MCA Logic Tree, press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously.

Replacement Information

Replacement Assemblies

When a trouble symptom is localized to a faulty Rectifier Module or circuit card, that particular Rectifier Module or circuit card should be replaced in its entirety. Other than a Rectifier Module fan replacement, no attempt should be made to troubleshoot or repair individual components on any Rectifier Module or circuit card.

Refer to SAG581126000 (System Application Guide) for replacement part numbers. The SAG can be accessed from the CD (Electronic Documentation Package) furnished with your system.

Replacement Cables

Refer to SAG581126000 (System Application Guide) for replacement part numbers. The SAG can be accessed from the CD (Electronic Documentation Package) furnished with your system.

Replacement Procedures

Replacing a Rectifier Module (PCU)

Refer to the Rectifier User Instructions (UM1R243000) for a Rectifier Module replacement procedure. Before replacing any Rectifier Module, note the following.

NOTE! *If a Rectifier Module (PCU) is removed without being replaced, perform the UPDATE INVENTORY procedure found in this section under TROUBLESHOOTING INFORMATION to clear alarms.*

If a Rectifier Module (PCU) is removed and replaced with a different module, alarms are activated for 2 minutes after inserting the new Rectifier Module. The MCA automatically removes the old Rectifier Module from inventory and adds the new Rectifier Module to the inventory. Refer to the following note for further explanation.

NOTE! *The "REPLACE ## PCUs" message is automatically displayed when a new Rectifier Module (PCU) is detected and a PCU no reply alarm is active, or becomes active within two minutes. The message is displayed for 2 minutes and the message timer is restarted every time a new Rectifier Module (PCU) is detected or a new PCU no reply alarm becomes active.*

The timer is terminated and the ALM ## PCUs FAIL message is displayed if the NO (-) pushbutton is pressed.

Rectifier Modules (PCUs) equal to the number of new Rectifier Modules (PCUs) or the number of PCU no reply alarms, whichever is less, are removed from the inventory if the YES (+) pushbutton is pressed or if the timer expires without a pushbutton being pressed. The MCA displays the PLEASE WAIT message while it updates the Rectifier Modules (PCUs) in its permanent inventory, and then displays the CURRLIM = #####A message.

Replacing a Converter Module

Refer to the Converter User Instructions (UM1C24481500) for a Converter Module replacement procedure.

MCA Replacement

The MCA includes three separate circuit cards: the MCA Main Controller, the MCA Power Supply, and the MCA Keypad/Display. The MCA is removed from the Distribution Cabinet as a complete assembly prior to replacing any of these circuit cards. A procedure for removing the MCA assembly for service is provided here. Procedures for replacing each of the circuit cards are also provided.

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

WARNING! Circuit cards used in this equipment contain static-sensitive devices. Read the Static Warning page at the front of this document before performing the following procedure.

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

NOTE! *A flat-blade screwdriver, No. 2 Phillips screwdriver, and 5/16" nut driver are required to perform all the following procedures.*

NOTE! *Refer to* ***Figure 9*** *through* ***Figure 12*** *as this procedure is performed.*

Preparation

1. Observe the admonishments presented at the beginning of this section, and those encountered in this procedure.
2. Performing this procedure may activate external alarms. Do one of the following. If possible, disable these alarms. If these alarms cannot be easily disabled, notify the appropriate personnel to disregard any future alarms associated with this system.

Recording Required MCA Settings

Replacing the MCA Main Controller circuit card WILL result in all MCA settings being returned to their factory default values.

1. If you are replacing the MCA Main Controller circuit card, in **Table 6** and **Table 7**, either manually record all existing MCA settings or record the required settings for your site from your company's DC Plant Set Points specifications (standards).

NOTE! *The MCA configuration can be saved by downloading the configuration using the WinLink software program (if available).*

Table 6: *MCA Basic Settings*

BASIC SETTINGS			
Setting	Factory Default Setting MCA Config. 534876, 534878, and 534879	Factory Default Setting MCA Config. 534877	Required Site Setting
Float Voltage	27.24V	27.00V	
Test/Equalize Voltage	27.24V	27.50V	
High Voltage Shutdown	28.75V	28.50V	
System Current Limit	100% of Rated Full Load	100% of Rated Full Load	
System HV1	27.75V	28.10V	
System HV2	28.25V	28.50V	
System BOD	24.00V	23.50V	
System 50%BOD	23.00V	22.00V	
System Current Alarm	2000A	2000A	
Subsystem HV	50.00V	53.00V	
Subsystem LV	46.00V	44.50V	
Subsystem Current Alarm	2000A	2000A	
LVD 1A	21.0V	21.7V	
LVD 1B	21.0V	21.7V	
LVD 2A	21.0V	21.7V	
LVD 2B	21.0V	21.7V	
LVD 3A	21.0V	21.7V	
LVD 3B	21.0V	21.7V	
LVD Reconnect	24.5V	25.2V	
Digital Temperature Compensation (Slope)	Off (0V/°C)	Off (0V/°C)	
Digital Temperature Compensation (MAX W/T)	28.25V	28.00V	
Digital Temperature Compensation (MIN W/T)	25.00V	25.70V	
Temperature Compensation Source	TCOMP ON SENSOR1	TCOMP ON SENSOR1	
High Battery Ambient Temperature Alarm	Off	Off	
Low Battery Ambient Temperature Alarm	Off	Off	
Number of Available Rectifier Module Mounting Positions	-	-	

Table 7: *MCA Advanced Settings*

ADVANCED SETTINGS			
Setting	Factory Default Setting MCA Config. 534876, 534878, and 534879	Factory Default Setting MCA Config. 534877	Required Site Setting
Alternating Display Feature	Disabled	Disabled	
Rectifier Module Fan Speed Control Feature	Disabled	Disabled	
MCA Audible Alarm Cutoff Reset Time Period	15 Minutes	15 Minutes	
Manually Initiated Timed Test/Equalize Feature	1 Hour	1 Hour	
Automatic Test/Equalize Feature	Disabled	Disabled	
Alarm Relay Test Feature	45 Seconds	45 Seconds	

Powering Down the MCA

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.

DANGER! Performing the next steps exposes service personnel to battery potential. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact any energized electrical termination.

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 the MCA 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.

NOTE! *If distribution Row A (bottom row) in the Distribution Cabinet is equipped with a GJ/218 type circuit breaker in the bottom mounting position, it may be necessary to turn off and remove the circuit breaker to access connector J15 in the next step. If so, reinstall and turn on the circuit breaker after completing all MCA replacement procedures.*

4. Disconnect the locking-type plug from connector J15 at the rear of the MCA Main Controller circuit card. This removes input power to the MCA.

5. With an external voltmeter, verify plant voltage is correct (MCA is powered down at this point).

Removing the MCA Assembly for Service

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

1. These steps require wearing a grounding strap as previously described.
2. Remove the following cables from the MCA Interface Option circuit card (if installed).
   a) Various MCA Interface Options are available, remove any cable(s) connected to the circuit card.
3. Remove the following cables from the Rectifier Shelf Interface circuit card.
   a) Separate the cable connected to the pigtail cable permanently connected to the circuit card.
   b) Disconnect the cable from connector J2.
   c) Disconnect the cable from connector J4.
4. Remove the following cables from the MCA Main Controller circuit card.
   a) Disconnect the cable from connector J8.
   b) Disconnect the cable from connector J9. To do so, grasp the ejector tabs at each end of the connector and pivot outward, forcing the plug out of the connector.
   c) If a Battery Ambient Temperature Probe or TXM is installed, remove the connector from J4.
5. Using a 5/16" nut driver, remove the two hex nuts and ground washers that secure the MCA assembly to the floor of the Distribution Cabinet.
6. Lift the front of the MCA assembly and pull straight out of the Distribution Cabinet. Remove the MCA Assembly to a static-safe work surface.

MCA Power Supply Circuit Card Assembly Replacement Procedure

NOTE! *Refer to* ***Figure 9*** *and* ***Figure 10*** *as this procedure is performed.*

1. Remove the MCA assembly to a static-safe work surface as describe in the *"*Removing *the MCA Assembly for Service"* procedure.

WARNING! Damage to the MCA may result if the next step is not followed.

2. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.
3. 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 from the MCA assembly, and set aside.
4. Remove the ribbon cable permanently connected to the MCA Power Supply circuit card from connector J2 on the rear edge of the MCA Main Controller circuit card.

5. Remove the two Phillips head screws and two hex spacers that secure the MCA Power Supply circuit card to the MCA Main Controller circuit card. Remove the Power Supply circuit card.
6. Position the replacement MCA Power Supply circuit card over its mounting position. Secure by installing and tightening the two Phillips head screws (front) and two hex spacers (rear) previously removed.
7. Connect the ribbon cable permanently connected to the MCA Power Supply circuit card to connector J2 on the rear edge of the MCA Main Controller circuit card.
8. 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.
9. STOP. If no other circuit cards in the MCA assembly are being replaced, continue with the *"Reinstalling the MCA Assembly Following Service"* procedure found later in this section.

MCA Main Controller Circuit Card Assembly Replacement Procedure

NOTE! *Refer to* ***Figure 9****,* ***Figure 10*** *and* ***Figure 11*** *as this procedure is performed.*

1. Remove the MCA assembly to a static-safe work surface as describe in the *"*Removing *the MCA Assembly for Service"* procedure.

WARNING! Damage to the MCA may result if the next step is not followed.

2. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.
3. Refer to **Figure 10**, and 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 from the MCA assembly, and set aside.
4. Remove the ribbon cable permanently connected to the MCA Power Supply circuit card from connector J2 on the rear edge of the MCA Main Controller circuit card.
5. Refer to **Figure 10**, and remove the two Phillips head screws and two hex spacers that secure the MCA Power Supply circuit card to the MCA Main Controller circuit card. Remove the Power Supply circuit card, and set aside.
6. If an MCA Interface Option Assembly (modem, combination modem/RS-232, or RS-485) is present, remove as follows:
   a) Refer to **Figure 9**, and remove the one Phillips head screw that secures the MCA Interface Option Assembly mounting bracket.
   b) Slide the MCA Interface Option Assembly toward the rear of the MCA assembly until connector and plug separate and the mounting stud clears the keyhole slot in the mounting bracket.
   c) For the Combination Modem/RS-232 Interface Assembly only: A ribbon cable extends from the assembly to a front panel-mounted RS-232 connector. Disconnect this cable from the Interface Assembly.

d) Lift the MCA Interface Option Assembly away from the MCA assembly.

7. Locate the ribbon cable that extends from the MCA Main Controller circuit card to the MCA Keypad/Display circuit card. Disconnect the cable plug from connector J1 on the Keypad/Display circuit card.

8. Remove the five screws and two hex spacers securing the MCA Main Controller circuit card to the MCA assembly. Remove the circuit card.

9. Position the replacement MCA Main Controller circuit card over its mounting position, as shown in **Figure 11**. Secure by installing and tightening the five screws and two hex spacers previously removed.

10. If an MCA Interface Option Assembly (modem, combination modem/RS-232, or RS-485) was installed, reinstall as follows:

    a) Position the MCA Interface Option Assembly over the MCA assembly so that the mounting stud on the MCA assembly passes through the keyhole in the MCA Interface Option Assembly mounting bracket.

    b) Slide the MCA Interface Option Assembly toward the front of the MCA assembly until connector and plug mate. Ensure that the mounting engages the keyhole slot in the mounting bracket.

    c) Reinstall the one Phillips head screw that secures the MCA Interface Option Assembly mounting bracket.

    d) For the Combination Modem/RS-232 Interface Assembly only: Reconnect the ribbon cable that extends from the front panel-mounted RS-232 connector to its mating connector on the MCA Interface Option Assembly.

11. Position the MCA Power Supply circuit card over its mounting position, as shown in **Figure 10**. Secure by installing and tightening the two Phillips head screws (front) and two hex spacers (rear) previously removed.

12. Connect the ribbon cable permanently connected to the MCA Power Supply circuit card to connector J2 on the rear edge of the MCA Main Controller circuit card.

13. Reconnect the ribbon cable that extends from the MCA Main Controller circuit card to connector J1 on the MCA Keypad/Display circuit card.

14. 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.

15. STOP. If no other circuit cards in the MCA assembly are being replaced, continue with the *"Reinstalling the MCA Assembly Following Service"* procedure found later in this section.

MCA Keypad/Display Circuit Card Assembly Replacement Procedure

NOTE! *A No. 2 Phillips screwdriver having a minimum shaft length of 10 inches is required for this procedure. If such a screwdriver is not available, you should remove the MCA Main Controller circuit card as describe under "MCA Main Controller Circuit Card Assembly Replacement Procedure" before removing the MCA Keypad/Display circuit card.*

NOTE! *Refer to* ***Figure 9*** *and* ***Figure 12*** *as this procedure is performed.*

1. Remove the MCA assembly to a static-safe work surface as describe in the *"Removing the MCA Assembly for Service"* procedure.

WARNING! Damage to the MCA may result if the next step is not followed.

2. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.
3. 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 from the MCA assembly, and set aside.
4. Remove the two (2) hex spacers that secure the FRONT of the MCA Main Controller circuit card.
5. Loosen but do not remove the three (3) Phillips screws that secure a metal shield over the Keypad/Display circuit card. Slide the shield to the side until the screw heads clear the keyhole slots. Remove the metal shield.
6. Remove the five (5) screws securing the Keypad/Display circuit card. Carefully slide the Keypad/Display circuit card out of the MCA assembly until the ribbon cable connection on the circuit card is accessible.
7. Locate the ribbon cable that extends from the MCA Main Controller circuit card to the MCA Keypad/Display circuit card. Disconnect the cable plug from connector J1 on the Keypad/Display circuit card.
8. Connect the ribbon cable that extends from the MCA Main Controller circuit card to connector J1 on the replacement Keypad/Display circuit card.
9. Position the replacement MCA Keypad/Display circuit card on the MCA assembly. Secure by installing the five (5) previously removed Phillips head screws.
10. Reinstall the previously removed metal shield that covers the Keypad/Display circuit card. Secure by tightening the three Phillip screws.
11. Reinstall the two (2) hex spacers that secure the front of the MCA Main Controller circuit card.
12. 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.
13. STOP. If no other circuit cards in the MCA assembly are being replaced, continue with the *"Reinstalling the MCA Assembly Following Service"* procedure found later in this section.

Reinstalling the MCA Assembly Following Service

DANGER! Performing the next steps exposes service personnel to battery potential. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact any energized electrical termination.

WARNING! Damage to the MCA may result if the next step is not followed.

1. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.
2. Install the MCA assembly into the Distribution Cabinet.
3. Install and tighten the two hex nuts and ground washers that secure the MCA assembly to the floor of the Distribution Cabinet.
4. Reconnect the following cables to the MCA Main Controller circuit card.
   a) Reconnect the cable to connector J8.
   b) Reconnect the ribbon cable extending from the "Interconnect/LVD Inhibit" circuit card to connector J9 on the MCA Main Controller circuit card. Insert fully so that the ejector tabs at each end of the connector pivot inward fully.
   c) If a Battery Ambient Temperature Probe or TXM is installed, reconnect the connector to J4.
5. Reconnect the following cables to the Rectifier Shelf Interface circuit card.
   a) Reconnect the cable to the pigtail cable that is permanently connected to the circuit card.
   b) Reconnect the cable from connector J2.
   c) Reconnect the cable from connector J4.
6. Reconnect the following cables to the MCA Interface Option circuit card (if installed).
   a) Various MCA Interface Options are available, reconnect any cable(s) removed from the circuit card.
7. DO NOT CONNECT THE POWER INPUT PLUG TO J15 AT THIS TIME. Continue with the next procedure to restart the system.

Restarting the System

NOTE! *The MCA is powered by the DC output (either by operating Rectifier Modules or from battery) on the power system busbars. Reconnecting the input power plug to connector J15 will initiate the MCA startup sequence.*

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.*

1. 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

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

2. Connect the power input plug to connector J15 on the MCA Main Controller circuit card. Observe and record the MCA Configuration Spec. No. briefly displayed as the MCA starts.
3. Perform the "MCA INITIALIZATION AND BASIC SETTINGS" and "MCA ADVANCED SETTINGS" procedures detailed later in this document.

In lieu of manually entering new MCA settings, if the old MCA configuration was downloaded via WinLink, upload the configuration.

Final Steps

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 rear. Tighten the two screws.
2. Remove the grounding wrist strap.
3. Close the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.
4. Enable the external alarms, or notify appropriate personnel that this procedure is finished.
5. Ensure that there are no local or remote alarms active on the system.

Figure 9: *Removing the MCA Assembly from Distribution Cabinet*

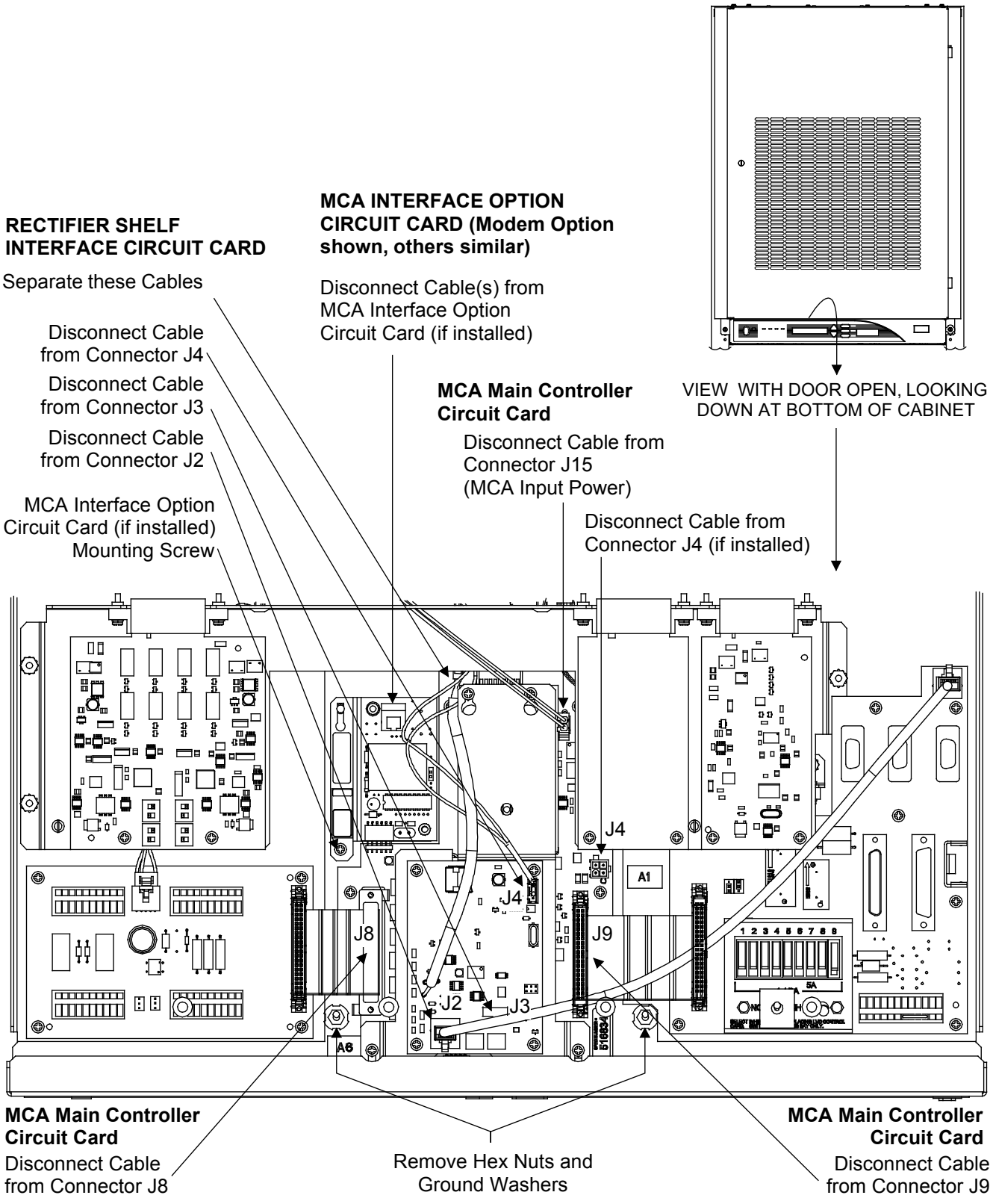


Figure 10: *Replacing MCA Power Supply Circuit Card*

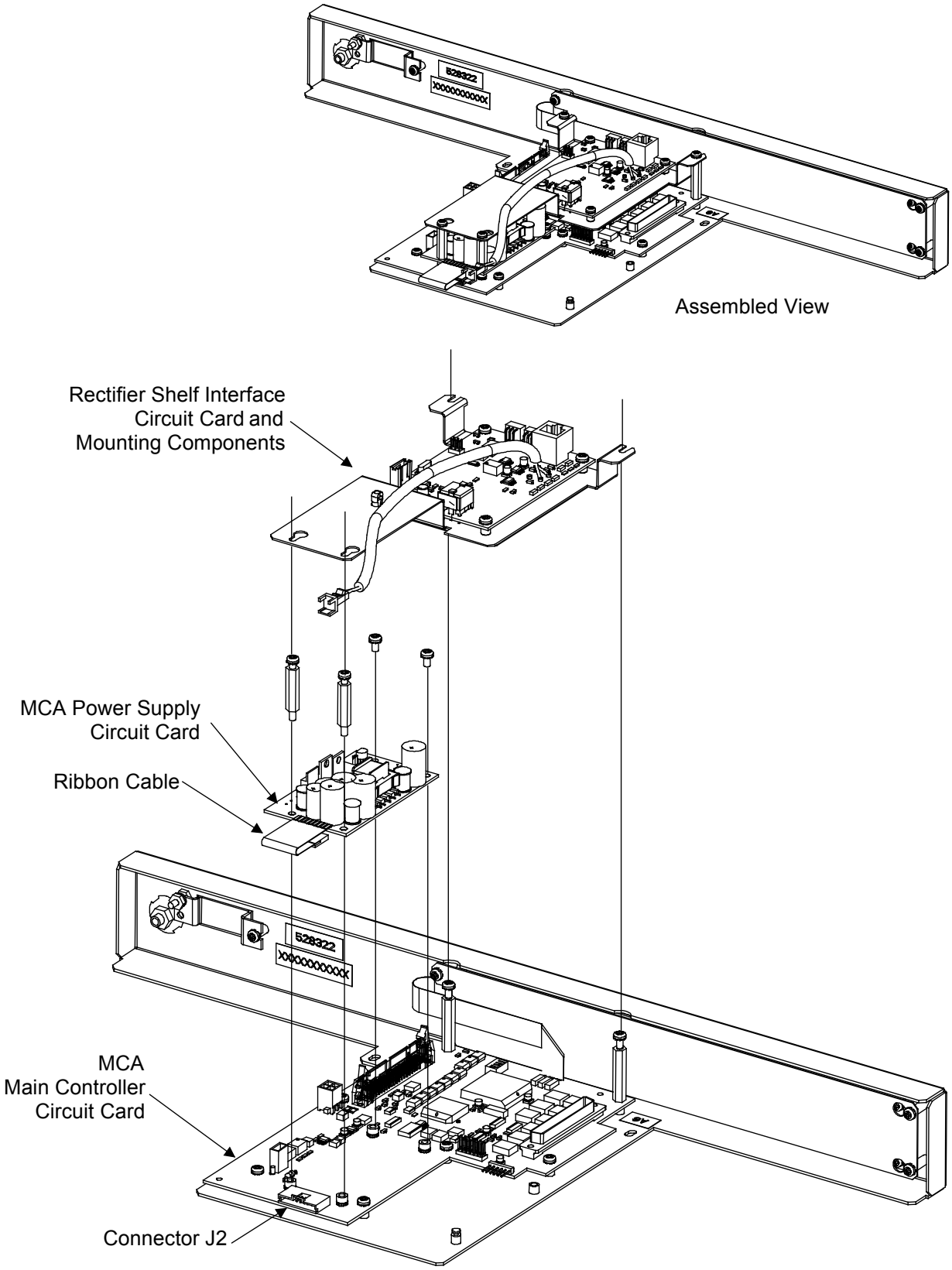


Figure 11: *Replacing the MCA Main Controller Circuit Card*

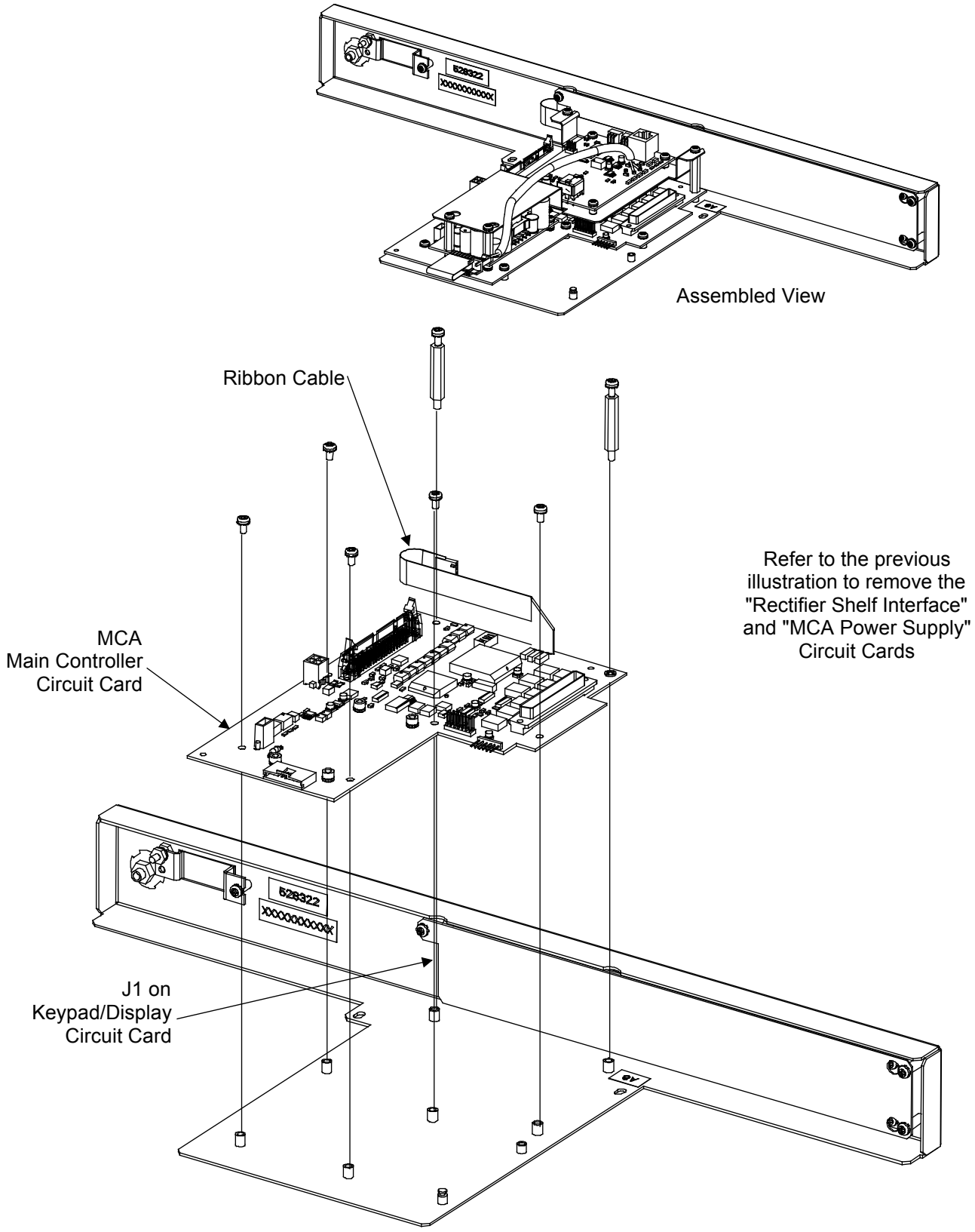
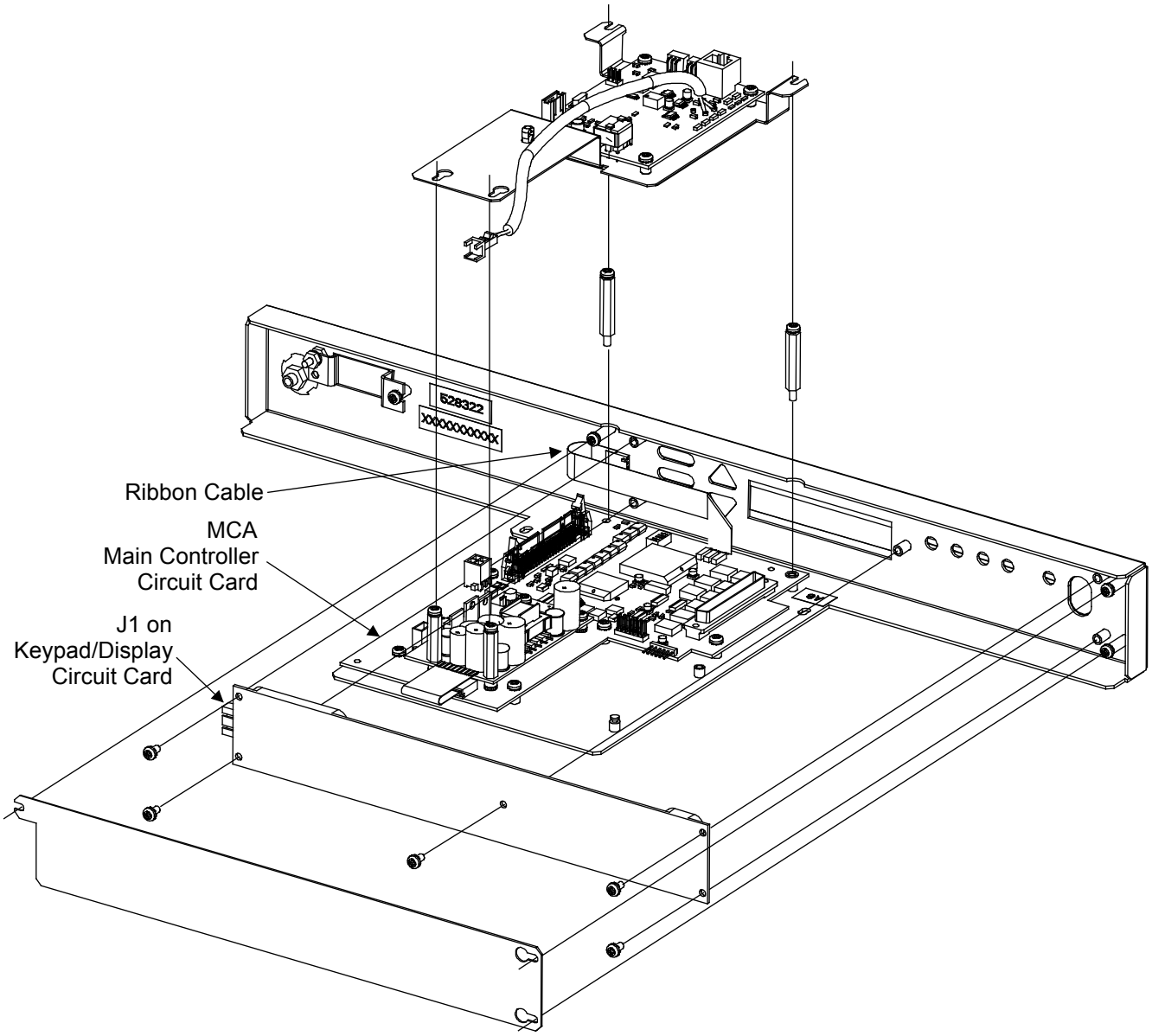


Figure 12: *Replacing the MCA Keypad/Display Circuit Card*



MCA Initialization and Basic Settings

When power is applied to the MCA (by reconnecting the input power plug to connector J15), the MCA initializes. The MCA may…

- briefly display the proper value for the MCA Configuration Spec. No. and System Voltage for two seconds, then continue on.
- display "MUST SET SPEC NO.".
- briefly display 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".

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.
    a) Change these settings to the values recorded in **Table 6** at the beginning of this document.
    b) To change the setting of the currently displayed entry, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.
    c) The portion of the display before the equal sign (=) flashes.
    d) Use the FUNCTION SET YES (+) or NO (-) pushbutton to increase or decrease, respectively, the setting.
    e) Press the FUNCTION SET ENTER pushbutton.
    f) 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.

g) Display the next or previous entry using the FUNCTION SELECT UP or DOWN arrow pushbutton.

h) 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.

"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".

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.

   a) Change these settings to the values recorded in **Table 6** at the beginning of this document.

   b) To change the setting of the currently displayed entry, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

   c) The portion of the display before the equal sign (=) flashes.

   d) Use the FUNCTION SET YES (+) or NO (-) pushbutton to increase or decrease, respectively, the setting.

   e) Press the FUNCTION SET ENTER pushbutton.

   f) 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.

   g) Display the next or previous entry using the FUNCTION SELECT UP or DOWN arrow pushbutton.

   h) 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.

1. Press the FUNCTION SELECT UP or DOWN pushbutton to move to the "System Adjustment Menu". Check all MCA settings per **Table 6**.

"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".

1. Go to the "System Adjustment Menu", and check all MCA settings per **Table 6**.

Procedure 2
(MCA Displays "MUST SET SPEC NO.")

1. 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.*

2. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.
3. At the "ARE YOU SURE? +-" prompt, press the FUNCTION SET YES (+) pushbutton.
4. 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".
5. 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.
    a) Change these settings to the values recorded in **Table 6** at the beginning of this document.
    b) To change the setting of the currently displayed entry, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.
    c) The portion of the display before the equal sign (=) flashes.
    d) Use the FUNCTION SET YES (+) or NO (-) pushbutton to increase or decrease, respectively, the setting.
    e) Press the FUNCTION SET ENTER pushbutton.
    f) 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.
    g) Display the next or previous entry using the FUNCTION SELECT UP or DOWN arrow pushbutton.

h) Repeat this procedure for each entry presented.

6. When all the adjustable values have been properly set, press the FUNCTION SELECT DOWN arrow pushbutton until "START THE SYSTEM" is displayed.
7. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.
8. At the "ARE YOU SURE? +-" prompt, press the FUNCTION SET YES (+) pushbutton.
9. 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.

   a) Change these settings to the values recorded in **Table 6** at the beginning of this document.

   b) To change the setting of the currently displayed entry, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.

   c) The portion of the display before the equal sign (=) flashes.

   d) Use the FUNCTION SET YES (+) or NO (-) pushbutton to increase or decrease, respectively, the setting.

   e) Press the FUNCTION SET ENTER pushbutton.

f) 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.

g) Display the next or previous entry using the FUNCTION SELECT UP or DOWN arrow pushbutton.

h) 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
   CURRLIM = #####MAX
   #####A = system current limit setting, current limit circuit on all Rectifier Modules are automatically adjusted to ensure system current does not exceed this value
   #####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
    ##.##V = maximum voltage with temperature compensation setting

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

20. LO TEMP 1 = ###ºC
    LO TEMP 1 IS OFF
    ###ºC = low temperature 1 alarm setting, or low temperature 1 alarm off

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.

Advanced Settings

Set the following to the settings recorded in **Table 7**.

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 "DISPLAY ROLL OFF" or "DISPLAY ROLL ON" is displayed. This is the current setting for this feature. To toggle this setting, perform steps 5) and 6). To keep this setting, proceed with step 7).
5. To toggle this setting, 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.
7. 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 8) and 9). To keep this setting, proceed with step 10).
8. To toggle this setting, press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously.
9. "ARE YOU SURE? + -" is displayed. Press and release the FUNCTION SET YES (+) pushbutton.
10. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "NAG MINUTES = ##" or "AUDIBLE NAG OFF".
11. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "NAG MINUTES =" portion of the display flashes.
12. Press the FUNCTION SET YES (+) or NO (-) pushbutton until the value displayed equals the desired audible alarm cutoff reset time period or "AUDIBLE NAG OFF", then release the pushbutton.
13. Press and release the FUNCTION SET ENTER pushbutton.
14. "ARE YOU SURE? + -" is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.
15. Press and release the FUNCTION SET DOWN arrow pushbutton to display "TEST/EQ HRS = ##".
16. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "TEST/EQ HRS =" portion of the display flashes.
17. 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.*

18. Press and release the FUNCTION SET ENTER pushbutton.
19. "ARE YOU SURE? + -" is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.
20. Press and release the FUNCTION SELECT DOWN arrow pushbutton to display "AUTO EQ MUL = ##" or "AUTO EQ DISABLED".
21. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "AUTO EQ MUL =" portion of the display flashes.
22. 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 =".
23. Press and release the FUNCTION SET ENTER pushbutton.
24. "ARE YOU SURE? + -" is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.
25. Press and release the FUNCTION SET DOWN arrow pushbutton to display "RELAYTEST = ###SEC".
26. Press and release the ALARM CUTOFF and FUNCTION SET ENTER pushbuttons simultaneously. The "RELAYTEST =" portion of the display flashes.
27. Press the FUNCTION SET YES (+) or NO (-) pushbutton until the value displayed equals the desired timed period for the Alarm Relay Test feature.
28. Press and release the FUNCTION SET ENTER pushbutton.
29. "ARE YOU SURE? + -" is displayed. Press and release the FUNCTION SET YES (+) pushbutton. The display stops flashing.
30. Press and release the FUNCTION SET YES (+) and NO (-) pushbuttons simultaneously, to return to the beginning of the MCA menu tree.

Rectifier Shelf Interface Circuit Card Replacement

A Rectifier Shelf Interface circuit card is installed in each bay. To replace the circuit card perform the following procedure.

Refer to **Figure 13** and **Figure 14** as this procedure is performed.

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

WARNING! Circuit cards used in this equipment contain static-sensitive devices. Read the Static Warning page at the front of this document before performing the following procedure.

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

Procedure

1. Observe the admonishments presented at the beginning of this section, and those encountered in this procedure.
2. Performing this procedure may activate external alarms. Do one of the following. If possible, disable these alarms. If these alarms cannot be easily disabled, notify the appropriate personnel to disregard any future alarms associated with this system.
3. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

DANGER! Performing the next steps exposes service personnel to battery potential. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact any energized electrical termination.

4. 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 the MCA may result if the next step is not followed.

5. Connect an approved grounding strap to your wrist. Attach the other end to a suitable ground.
6. Remove the following cables from the Rectifier Shelf Interface circuit card.
   a) Separate the cable connected to the pigtail cable permanently connected to the circuit card.
   b) Disconnect the cable from connector J2.
   c) Disconnect the cable from connector J3.
   d) Disconnect the cable from connector J4.
7. Refer to **Figure 13** or **Figure 14** and locate the Rectifier Shelf Interface circuit card. Remove the four screws securing the circuit card. Remove the circuit card.

8. Set switches S1 and S2 on the replacement circuit card to the same settings as the circuit card just removed.
9. Position the replacement circuit card over its mounting position, and secure with the screws previously removed.
10. Reconnect the following cables to the Rectifier Shelf Interface circuit card.

e) Reconnect the cable to the pigtail cable that is permanently connected to the circuit card.

f) Reconnect the cable to connector J2.

g) Reconnect the cable to connector J3.

h) Reconnect the cable to connector J4.

11. 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 rear. Tighten the two screws.
12. Remove the grounding wrist strap.
13. Close the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.
14. Enable the external alarms, or notify appropriate personnel that this procedure is finished.
15. Ensure that there are no local or remote alarms active on the system.

Figure 13: *Replacing the Rectifier Shelf Interface Circuit Card in the Main Bay Panel*

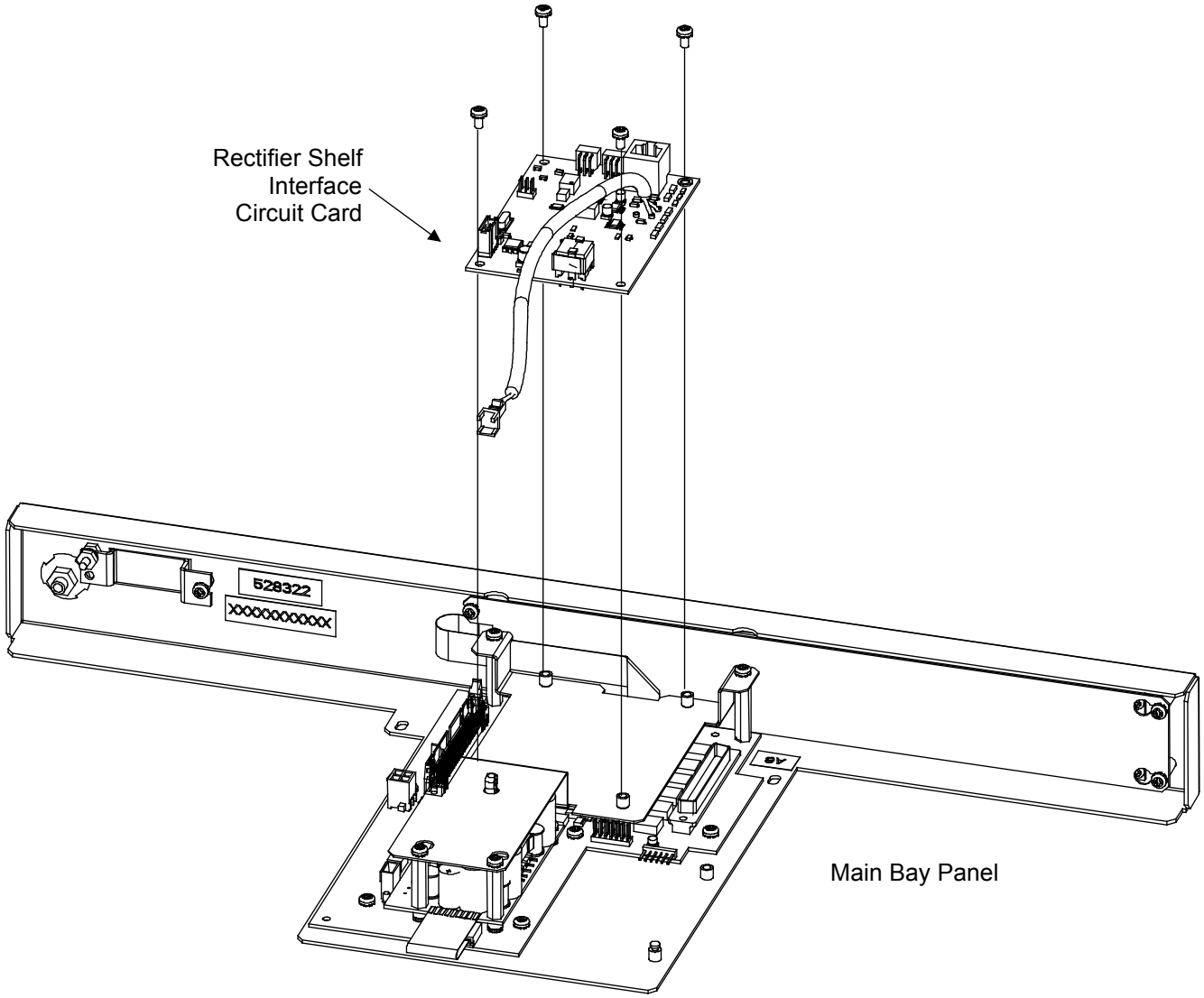
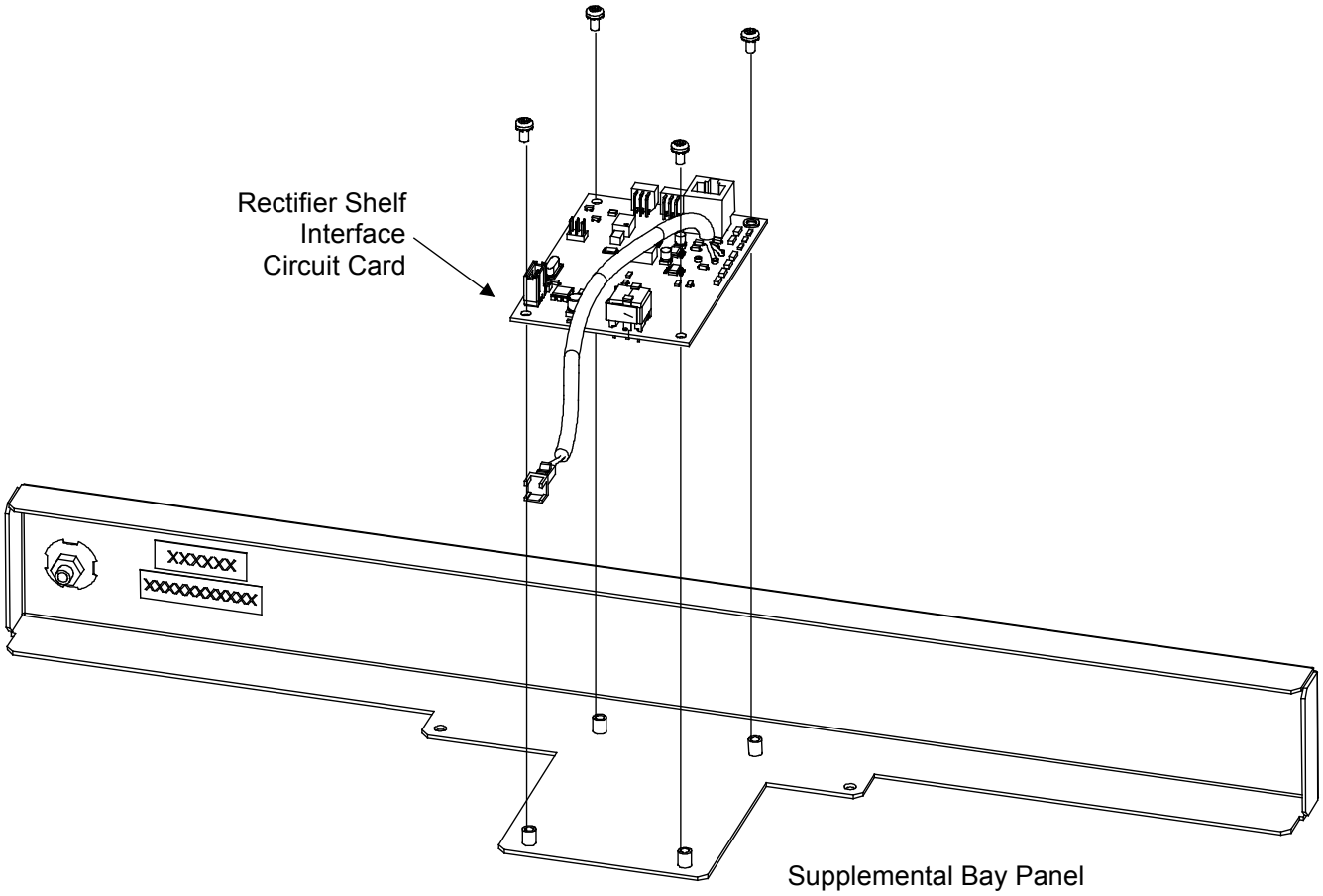


Figure 14: *Replacing the Rectifier Shelf Interface Circuit Card in the Supplemental Bay Panel*



Quad Low Voltage Disconnect Circuit Card Replacement

Refer to **Figure 15** as this procedure is performed.

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

WARNING! Circuit cards used in this equipment contain static-sensitive devices. Read the Static Warning page at the front of this document before performing the following procedure.

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

Procedure

1. Observe the admonishments presented at the beginning of this section, and those encountered in this procedure.
2. Performing this procedure may activate external alarms. Do one of the following. If possible, disable these alarms. If these alarms cannot be easily disabled, notify the appropriate personnel to disregard any future alarms associated with this system.
3. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.
4. 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! Performing the next step inhibits the operation of the low voltage disconnect circuit, and prevents disconnection of battery and system output from the controlled load(s) if a low battery voltage condition occurs.

5. Place the low voltage disconnect NOR/INH switch to the INH position. This switch is located on Interconnect/LVD Inhibit Circuit Card A1. Refer to **Figure 15** for circuit card and switch location. The low voltage disconnect INHIBIT indicator will illuminate. This step prevents accidental disconnection of battery and system output from the controlled load(s) while performing this procedure.
6. Remove fuses D (F4) and E (F5) from the fuseholders located on Interconnect/LVD Inhibit Circuit Card A1. Refer to **Figure 20** for circuit card and fuse location.

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

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

DANGER! Performing the next steps exposes service personnel to battery potential. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact any energized electrical termination.

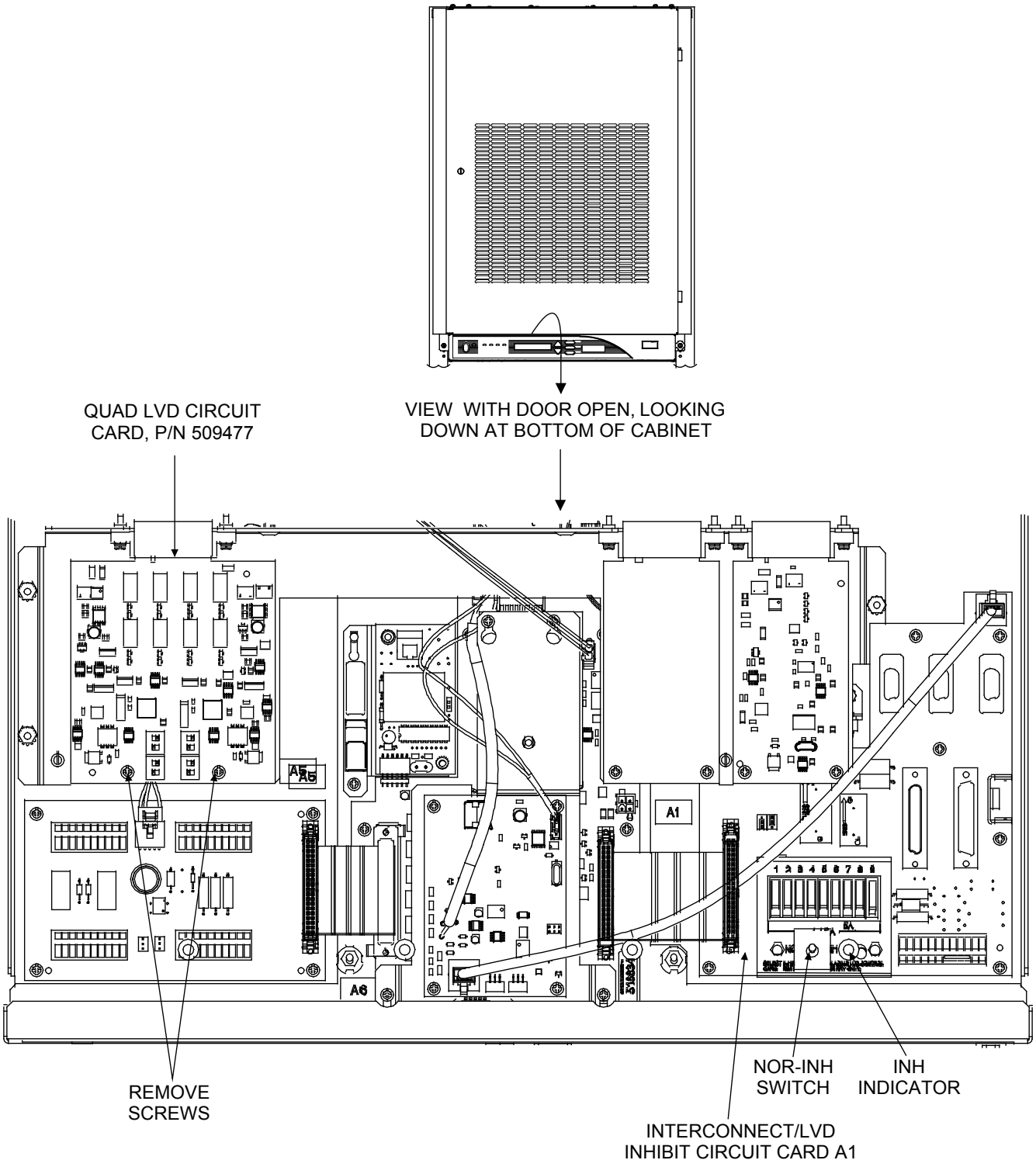
8. Remove the two screws that secure the front edge of the circuit card. Pull the circuit card forward out of the edge connector at the back of the card, and remove from the cabinet.

9. Set "Low Voltage Disconnect Circuit Card Identification Switches" S1-S4 on the replacement circuit card to match the setting on the existing circuit card. You can refer to "Setting Wiring Options" in the separate INSTALLATION INSTRUCTIONS (SECTION 6012) for details.
10. Insert the replacement circuit card into the edge connector previously vacated. Fully seat the card in the connector so that the mounting holes at the front of the card line up with the mounting posts beneath. Install and tighten the two mounting screws at the front edge of the card.
11. Remove the grounding wrist strap.
12. Replace the fuses removed in step 6.
13. Check the MCA for the presence of low voltage disconnect alarms. If alarms are active, use the MCA to reconnect the low voltage disconnect circuits. DO NOT perform the next step until you verify that there are NO Low Voltage Disconnect alarms active.

CAUTION! If the next step is performed when low voltage disconnect alarms are active, battery and system output will disconnect from the controlled load(s).

14. Return the low voltage disconnect NOR/INH switch to the NOR position. The low voltage disconnect INHIBIT indicator extinguishes.
15. 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 rear. Tighten the two screws.
16. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.
17. Enable the external alarms, or notify appropriate personnel that this procedure is finished.
18. Ensure that there are no local or remote alarms active on the system.

Figure 15: *Quad Low Voltage Disconnect Circuit Card Replacement*



Quad Shunt POD Circuit Card Replacement

One Quad Shunt POD Circuit Card, designated A3, (system distribution current monitoring) is located in each Distribution Cabinet. If the Power System includes a subsystem, a second Shunt A/D circuit card, designated A4, (subsystem distribution current monitoring) will also be mounted in the main Distribution Cabinet. To replace either circuit card perform the following procedure.

Refer to **Figure 16** as this procedure is performed.

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

WARNING! Circuit cards used in this equipment contain static-sensitive devices. Read the Static Warning page at the front of this document before performing the following procedure.

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

Procedure

1. Observe the admonishments presented at the beginning of this section, and those encountered in this procedure.
2. Performing this procedure may activate external alarms. Do one of the following. If possible, disable these alarms. If these alarms cannot be easily disabled, notify the appropriate personnel to disregard any future alarms associated with this system.
3. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

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

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

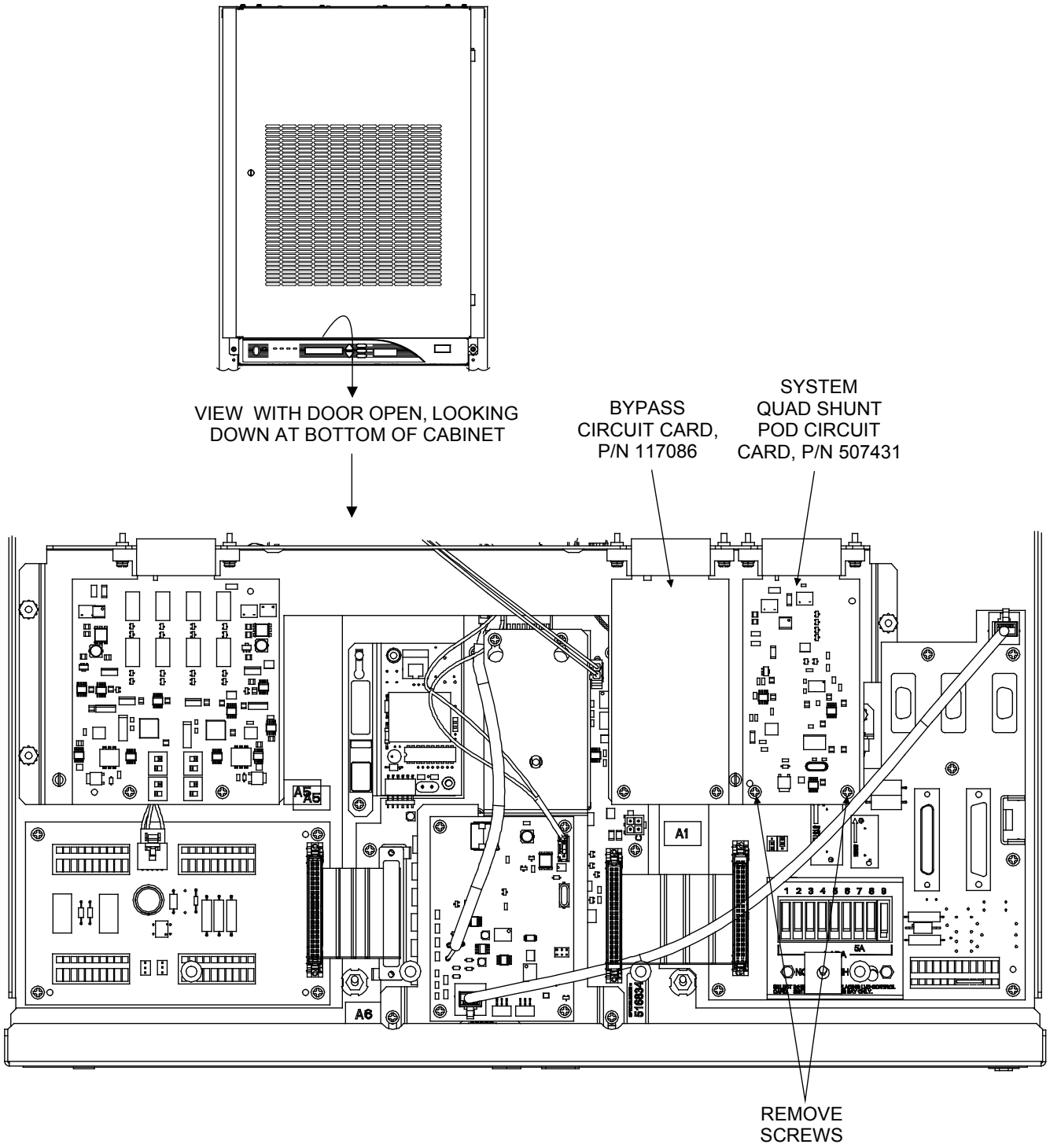
DANGER! Performing the next steps exposes service personnel to battery potential. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact any energized electrical termination.

5. 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.
6. Remove the two screws that secure the front edge of the circuit card. Pull the circuit card forward out of the edge connector at the back of the card, and remove from the cabinet.
7. No adjustments are required on the replacement circuit card prior to installation.
8. Insert the replacement circuit card into the edge connector previously vacated. Fully seat the card in the connector so that the mounting holes at the front of the card line up with the mounting posts beneath. Install and tighten the two mounting screws at the front edge of the card.
9. Remove the grounding wrist strap.

NOTE! *Before performing the next step, ensure that* ***both*** *Quad Shunt POD Circuit Card mounting positions are occupied; either by a Quad Shunt POD Circuit Card or by a Bypass Circuit Card.*

10. 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 rear. Tighten the two screws.
11. Close the Distribution Cabinet front door. The door can be shut without turning the captive fastener.
12. Enable the external alarms, or notify appropriate personnel that this procedure is finished.
13. Ensure that there are no local or remote alarms active on the system.

Figure 16: *System Quad Shunt POD Circuit Card Replacement (Subsystem Circuit Card Replacement Similar)*



Alarm Termination/Audible Alarm Circuit Card Replacement

NOTE! *Applies only if power system is equipped with List 71. Applies only to Main Bay.*

Refer to **Figure 17** as this procedure is performed.

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

WARNING! Circuit cards used in this equipment contain static-sensitive devices. Read the Static Warning page at the front of this document before performing the following procedure.

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

Procedure

1. Observe the admonishments presented at the beginning of this section, and those encountered in this procedure.
2. Performing this procedure may activate external alarms. Do one of the following. If possible, disable these alarms. If these alarms cannot be easily disabled, notify the appropriate personnel to disregard any future alarms associated with this system.
3. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

DANGER! Performing the next steps exposes service personnel to battery potential. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact any energized electrical termination.

4. 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.
5. Carefully identify the wires connected to external alarm connectors J1 through J4. These wires must be connected to the same terminals on the replacement circuit card.

DANGER! In the next step, external alarm wiring may be energized from an external source. DO NOT allow bare wire ends to contact any grounded or energized object.

6. READ THIS ENTIRE STEP AND UNDERSTAND BEFORE PROCEEDING. Remove external alarm wiring from connectors J1 through J4. To do so, for each wire, insert a small flat-blade screwdriver into the square cavity directly behind the wire. Depress the screwdriver until the wire is released and can be pulled out of the terminal block. DO NOT allow bare wire end to contact any grounded or energized object. Isolate the wire end with electrical tape. Repeat for each wire.
7. Disconnect the plug from connector J5 (if present).
8. Disconnect the ribbon cable plug from connector J8. To do so, grasp the ejector tabs at each end of the connector and pivot outward, forcing the plug out of the connector.

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

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

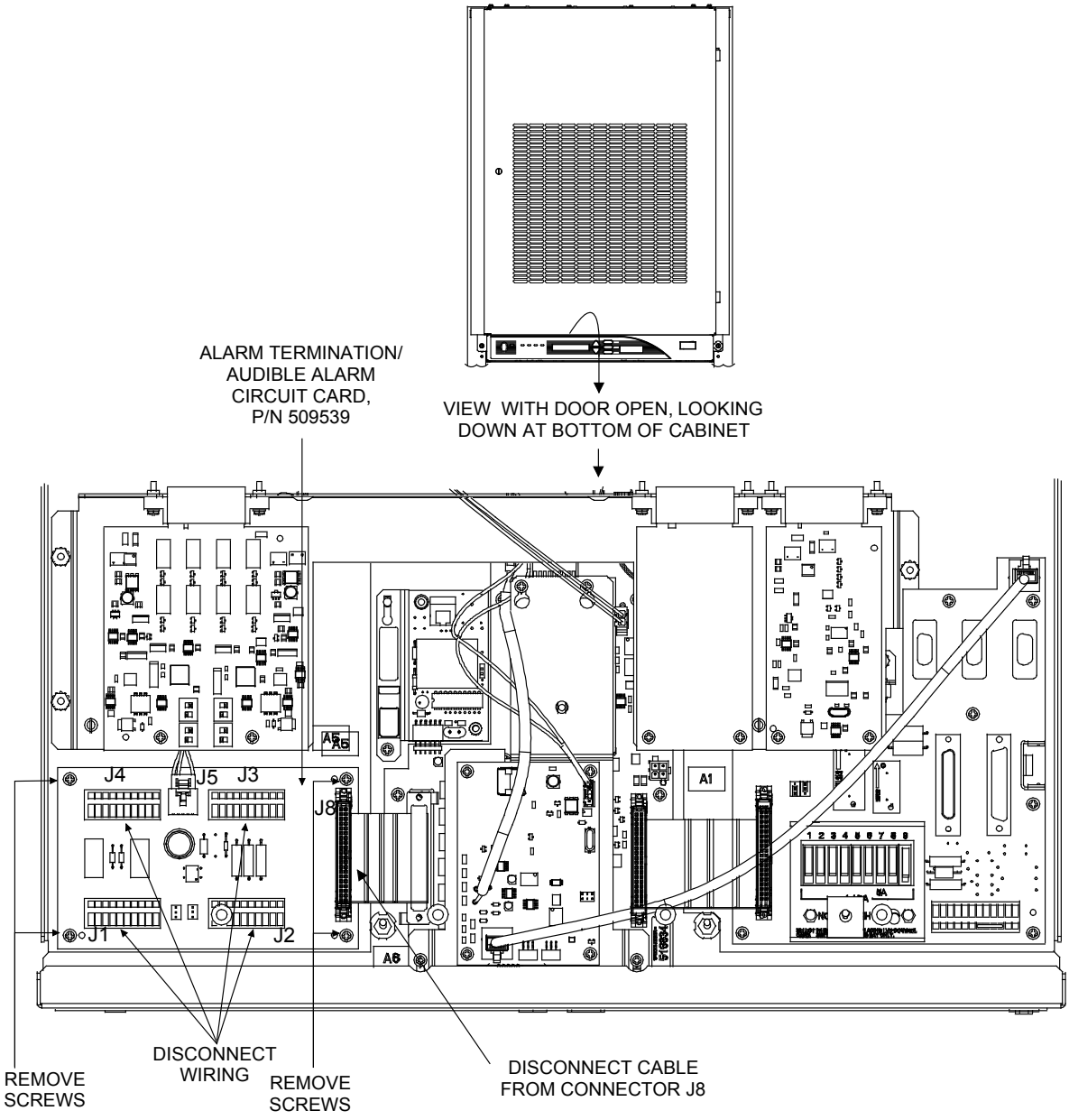
DANGER! Performing the next steps exposes service personnel to battery potential. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact any energized electrical termination.

10. Remove the two screws that secure the front edge of the circuit card. Pull the circuit card forward out of the edge connector at the back of the card, and remove from the cabinet.
11. Set the J10 and J11 (local audible alarm enable/disable) wiring options on the replacement circuit card to match the settings on the existing circuit card. You can refer to "Setting Wiring Options" in the separate INSTALLATION INSTRUCTIONS (SECTION 6012) for details.
12. Insert the replacement circuit card into the edge connector previously vacated. Fully seat the card in the connector so that the mounting holes at the front of the card line up with the mounting posts beneath. Install and tighten the two mounting screws at the front edge of the card.
13. Reconnect the four-pin plug to connector J5 (if present).
14. Reconnect the ribbon cable plug to connector J8. Insert fully so that the ejector tabs at each end of the connector pivot inward fully.
15. Remove the grounding wrist strap.

DANGER! In the next step, external alarm wiring may be energized from an external source. DO NOT allow bare wire ends to contact any grounded or energized object.

16. READ THIS ENTIRE STEP AND UNDERSTAND BEFORE PROCEEDING. Reconnect the external alarm wiring, removed in step 6, to the correct terminals of connectors J1 through J4 as recorded in step 5. To do so, for each wire, remove the electrical tape that was applied to the wire end in a previous step. DO NOT allow bare wire end to contact any grounded or energized object. 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. Repeat for each wire.
17. 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 rear. Tighten the two screws.
18. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.
19. Enable the external alarms, or notify appropriate personnel that this procedure is finished.
20. Ensure that there are no local or remote alarms active on the system.

Figure 17: *Alarm Termination/Audible Alarm Circuit Card Replacement*



Interconnect/LVD Inhibit Circuit Card Replacement

Refer to **Figure 18** as this procedure is performed.

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

WARNING! Circuit cards used in this equipment contain static-sensitive devices. Read the Static Warning page at the front of this manual before performing the following procedure.

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

Procedure

1. Observe the admonishments presented at the beginning of this section, and those encountered in this procedure.
2. Performing this procedure may activate external alarms. Do one of the following. If possible, disable these alarms. If these alarms cannot be easily disabled, notify the appropriate personnel to disregard any future alarms associated with this system.
3. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.

DANGER! Performing the next steps exposes service personnel to battery potential. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact any energized electrical termination.

4. 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.
5. Carefully identify the wires connected to external control terminal block TB1. These wires must be connected to the same terminals on the replacement circuit card.

DANGER! In the next step, control wiring may be energized from an external source. DO NOT allow bare wire ends to contact any grounded or energized object.

6. READ THIS ENTIRE STEP AND UNDERSTAND BEFORE PROCEEDING. Remove control wiring from terminal block TB1. To do so, for each wire, insert a small flat-blade screwdriver into the square cavity directly behind the wire. Depress the screwdriver until the wire is released and can be pulled out of the terminal block. DO NOT allow bare wire end to contact any grounded or energized object. Isolate the wire end with electrical tape. Repeat for each wire.
7. Carefully identify the cables connected to connectors J1, J2, J8, J9 and J10. These cables must be connected to the same connectors on the replacement circuit card.
8. Disconnect the cables from connectors J1, J2, J8, J9 and J10.
9. Disconnect the ribbon cable plug from connector J13. To do so, grasp the ejector tabs at each end of the connector and pivot outward, forcing the plug out of the connector.

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

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

DANGER! Performing the next steps exposes service personnel to battery potential. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact any energized electrical termination.

11. Remove the four screws that secure the circuit card. Pull the circuit card forward out of the edge connector at the back of the card, and remove from the cabinet.
12. Set the following wiring options on the replacement circuit card to match the settings on the existing circuit card:
    - J4 – Internal/External Voltage Sensing/Meter Reading Circuit Card
    - J5 – LVD Jumper
    - J6 – Shunt POD Jumper
    - J7 – Fuse Alarm Polarity Circuit Card

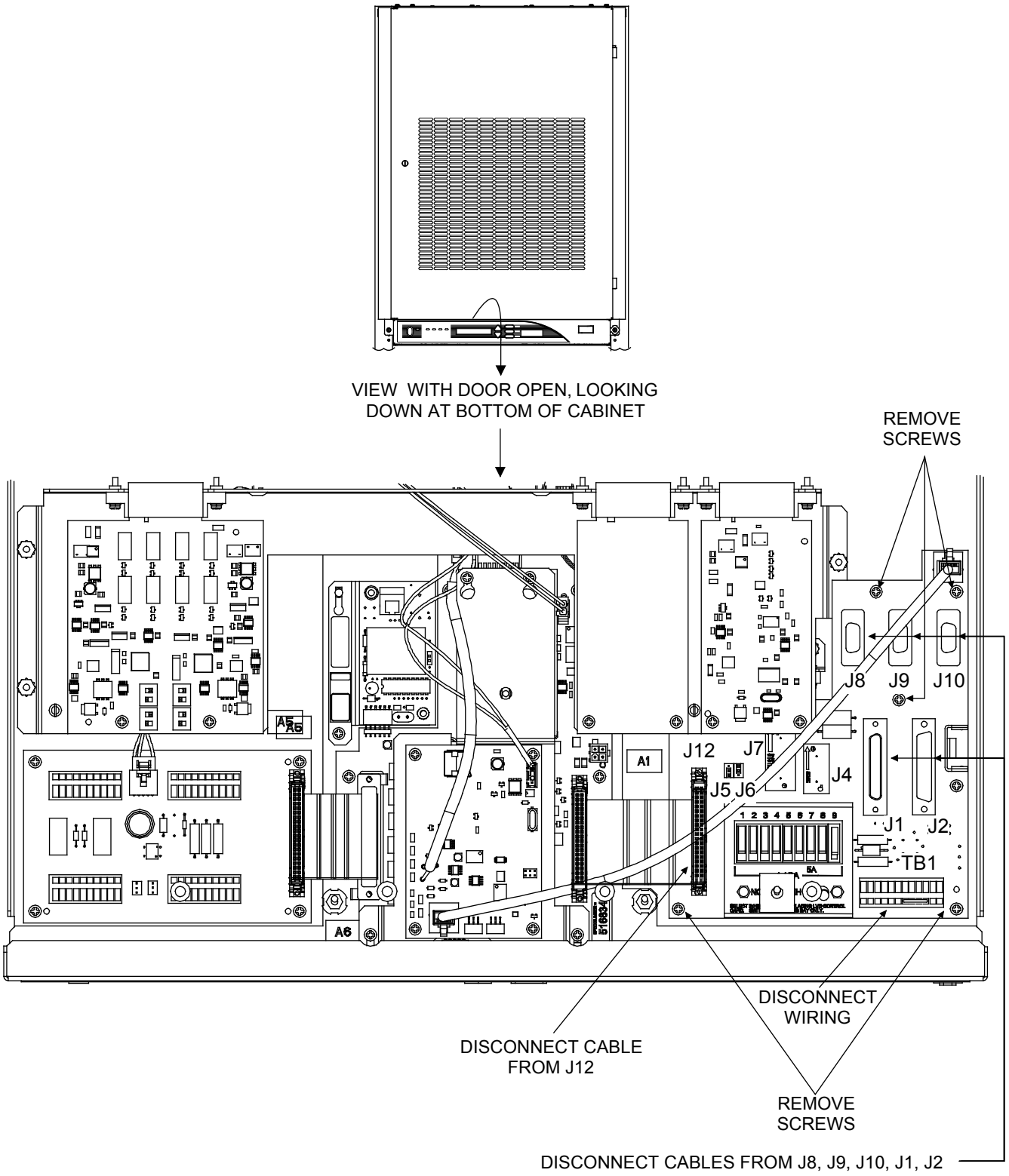
    You can refer to "Setting Wiring Options" in the separate INSTALLATION INSTRUCTIONS (SECTION 6012) for details.
13. Insert the replacement circuit card into the edge connector previously vacated. Fully seat the card in the connector so that the mounting holes at the front of the card line up with the mounting posts beneath. Install and tighten the two mounting screws at the front edge of the card.
14. Reconnect the cables removed in step 8 to the appropriate connectors J1, J2, J8, J9 and J10 as recorded in step 7.
15. Reconnect the ribbon cable plug to connector J13. Insert fully so that the ejector tabs at each end of the connector pivot inward fully.
16. Remove the grounding wrist strap.

DANGER! In the next step, external alarm wiring may be energized from an external source. DO NOT allow bare wire ends to contact any grounded or energized object.

17. READ THIS ENTIRE STEP AND UNDERSTAND BEFORE PROCEEDING. Reconnect the control wiring, removed in step 6, to the appropriate terminals of TB1as recorded in step 5. To do so, for each wire, remove the electrical tape that was applied to the wire end in a previous step. DO NOT allow bare wire end to contact any grounded or energized object. 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. Repeat for each wire.
18. 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 rear. Tighten the two screws.
19. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fastener.

20. Enable the external alarms, or notify appropriate personnel that this procedure is finished.
21. Ensure that there are no local or remote alarms active on the system.

Figure 18: *Interconnect/LVD Inhibit Circuit Card Replacement*



List RD and RE Shunt POD Circuit Card Replacement

One Shunt POD Circuit Card (battery current monitoring) is located within the List RD and RE assembly, which is located on the rear of the Distribution Cabinet. To replace this circuit card perform the following procedure.

Refer to **Figure 19** as this procedure is performed.

WARNING! Circuit cards used in this equipment contain static-sensitive devices. Read the Static Warning page at the front of this manual before performing the following procedure.

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

Procedure

1. Observe the admonishments presented at the beginning of this section, and those encountered in this procedure.
2. Performing this procedure may activate external alarms. Do one of the following. If possible, disable these alarms. If these alarms cannot be easily disabled, notify the appropriate personnel to disregard any future alarms associated with this system.
3. Remove the rear cover of the List RD or RE assembly.

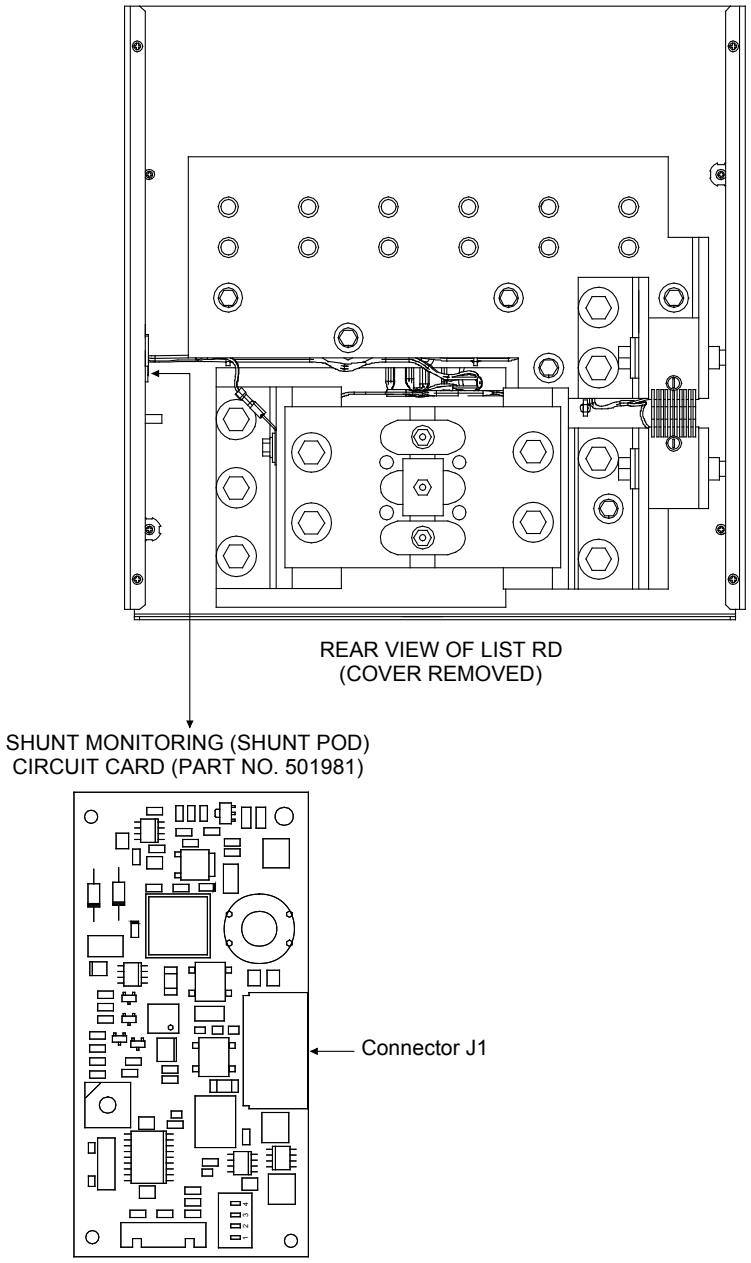
WARNING! Damage to the circuit card may result if the next step is not followed.

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

DANGER! Performing the next steps exposes service personnel to battery potential. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact any energized electrical termination.

5. Unplug the wire harness from connector J1 on the circuit card.
6. Remove the one screw that secures the circuit card. Carefully lift the circuit card from its mounting posts, and remove.
7. Set "Shunt Capacity Selection" and "Shunt POD Identification" Switches S1 and S2 on the replacement circuit card to match the setting on the existing circuit card. You can refer to "Setting Wiring Options" in the separate INSTALLATION INSTRUCTIONS (SECTION 6012) for details.
8. Place the circuit card over its mounting posts and carefully press down at each post until fully seated. Install and tighten the one mounting screw.
9. Remove the grounding wrist strap.
10. Reinstall the rear cover of the List RD or RE assembly.
11. Enable the external alarms, or notify appropriate personnel that this procedure is finished.
12. Ensure that there are no local or remote alarms active on the system.

Figure 19: *Replacing List RD and RE Shunt POD Circuit Card*



Alarm, Reference, and Control Fuse Replacement

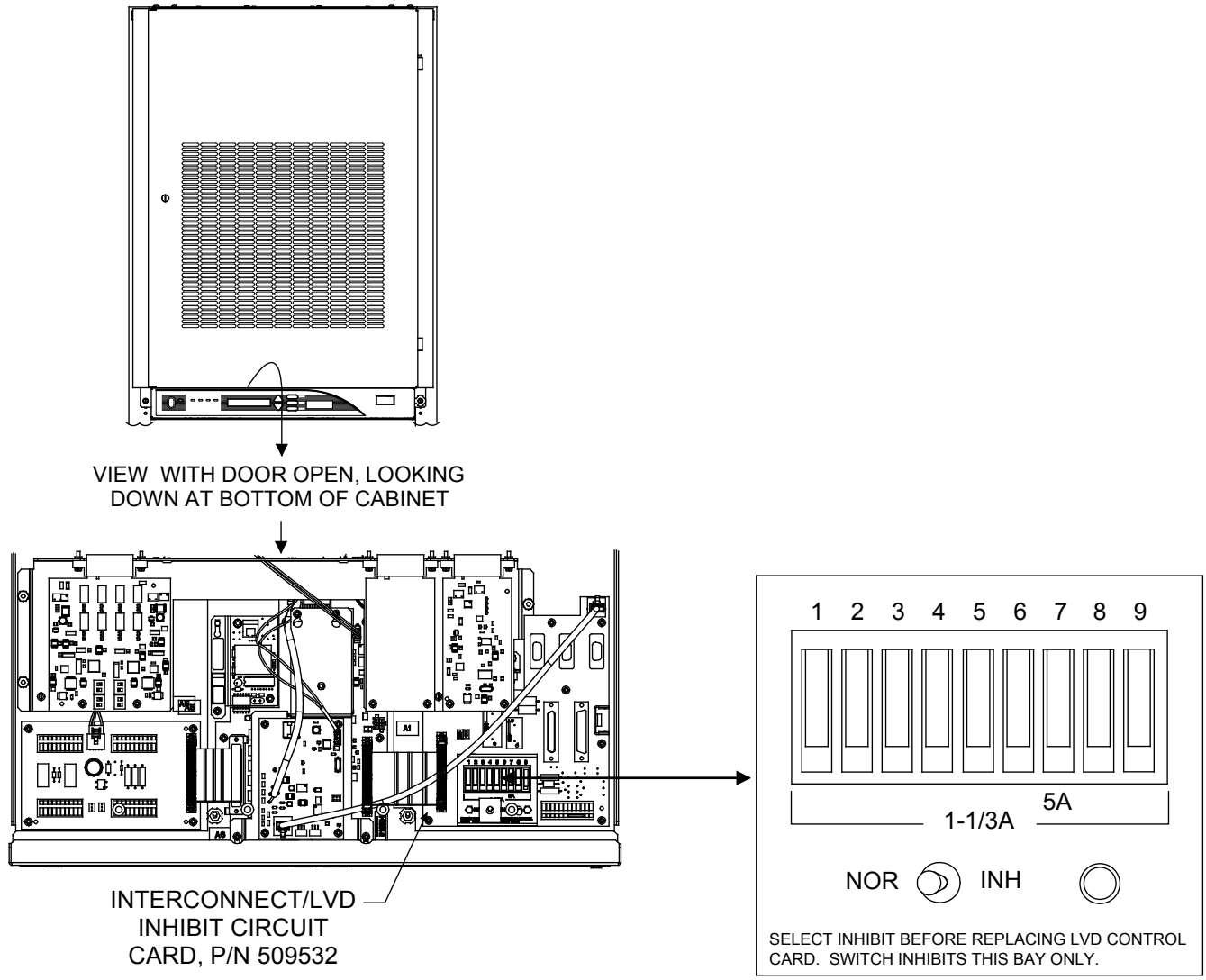
If an alarm, reference, or control fuse opens; replace with the same type and rating, or equivalent. Refer to SAG581126000 for fuse replacement part numbers. Refer to **Figure 20** and **Figure 21** for the location of these fuses. Refer also to the following replacement procedures.

Interface/LVD Inhibit Circuit Card Fuse Replacement Procedure

Fuses are located on the Part No. 509532 Interconnect/LVD Inhibit circuit card as shown in **Figure 20**. This circuit card is located in the Main Bay Distribution Cabinet.

NOTE! *A Part No. 509532 circuit card is located in each Distribution Cabinet. Fuses have a function only on the circuit card located in the main Distribution Cabinet.*

Figure 20: *Location of Replaceable Fuses on Interconnect/LVD Inhibit Circuit Card Part No. 509532*

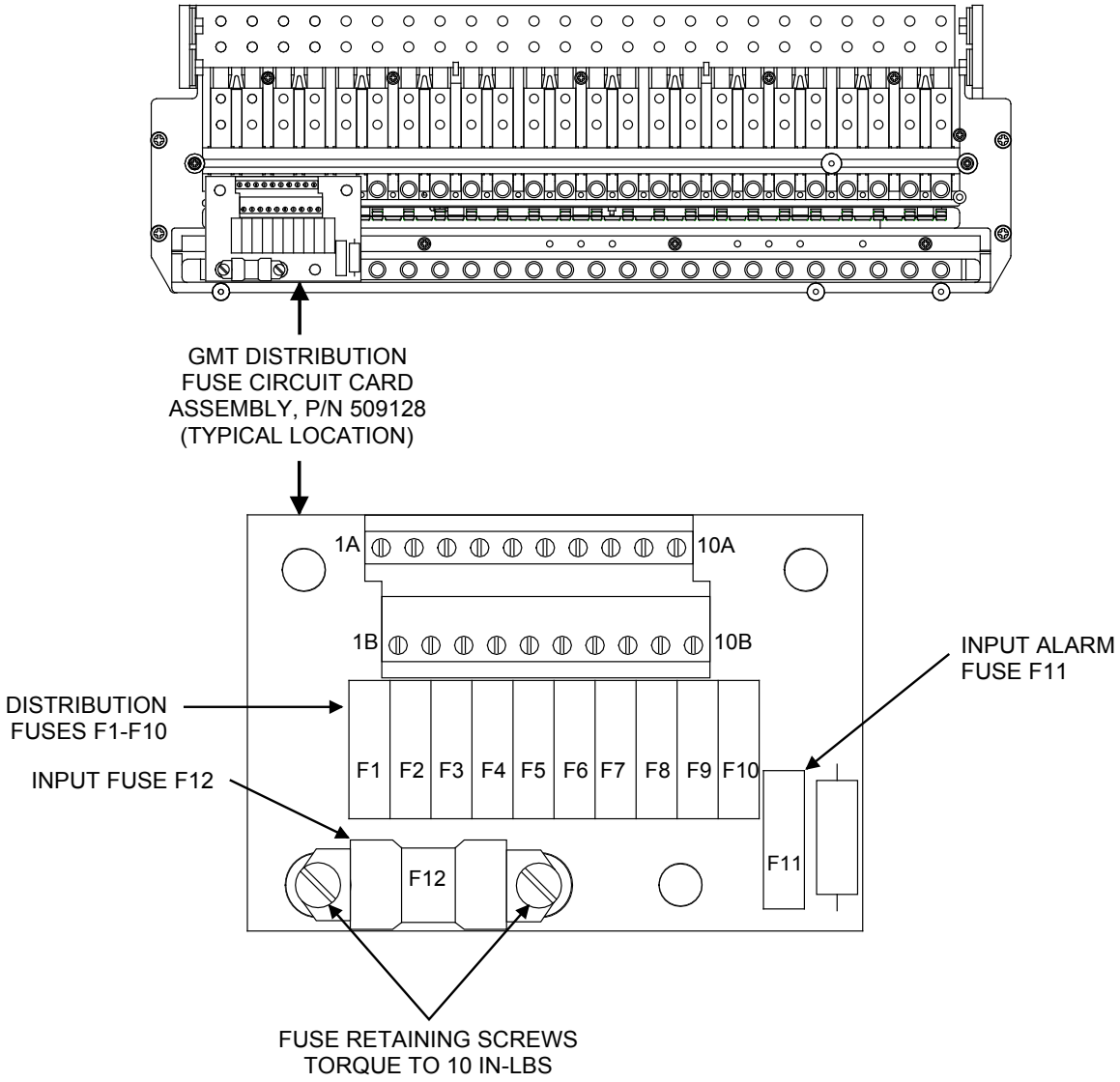


GMT Distribution Fuse Circuit Card Fuse Replacement

In addition to distribution fuses, an input fuse and associated alarm fuse are located on each optional Part No. 509128 GMT-type distribution fuse circuit card as shown in **Figure 21** See SAG581126000 for fuse part numbers. An open alarm fuse F11 indicates that input fuse F12 is open. Replace F12 before replacing F11. Recommended torque for input fuse fastening screws is 10 inch pounds.

DANGER! Hazardous energy is present at input fuse terminals. Use caution not to short either terminal to ground.

Figure 21: *Location of Replaceable Fuses on Optional GMT-Type Distribution Fuse Circuit Card Part No. 509128*

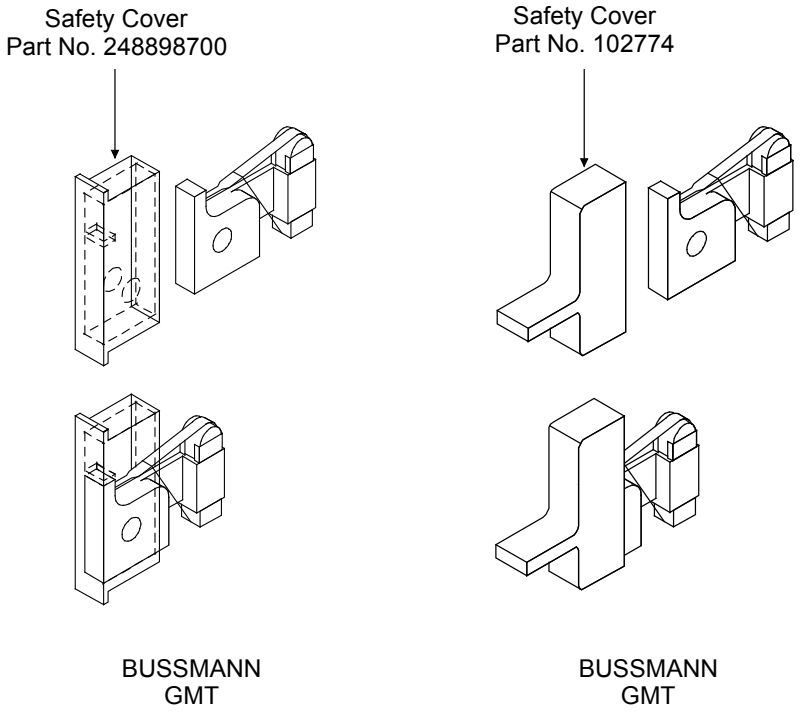


Distribution Device Alarm Fuse Replacement Procedure

NOTE! *If a TPH-type fuse opens, the associated alarm fuse opens. Replace the TPH-type fuse before replacing the alarm fuse. Likewise, if a TPS/TLS-type fuse opens, the associated alarm fuse opens. Replace the TPS/TLS-type fuse before replacing the alarm fuse.*

1. An alarm, reference, or control fuse can be removed by pulling it straight out of the fuseholder.
2. Safety fuse covers are provided for all Bussmann GMT type fuses installed in the system. These covers snap onto the fuses and provide protection from exposed electrical terminations when a fuse opens. Insure that the safety fuse cover is installed after replacing a fuse. Refer to **Figure 22** for installation details.

Figure 22: *Installation of Safety Fuse Covers*



Rectifier Module Fuse Replacement

Each Rectifier Module contains an input and output fuse. These fuses are not customer replaceable. If a fuse opens, replace the entire Rectifier Module. An open fuse causes the unit's Rectifier Module FAIL alarm circuit to activate. The input fuse has a higher amperage rating than the recommended external branch circuit protection.

Replacing a TPS/TLS-Type Fuse

NOTE! *Applies only if power system is equipped with TPS/TLS-type fuses.*

A defective TPS/TLS-type fuse is replaced by removing the fuse carrier from the bullet nose-type fuseholder, and replacing the defective fuse.

Refer to SAG581126000 for part numbers.

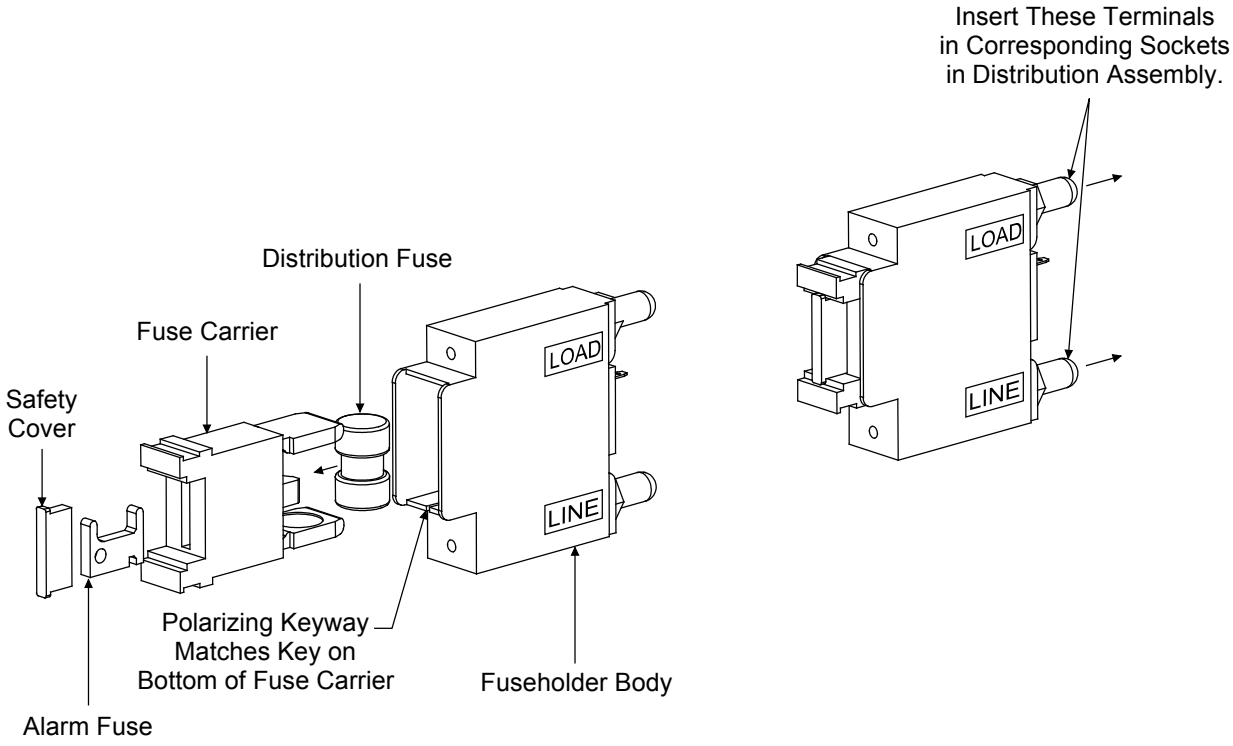
If required, pre-charge any load capacitors before installing a replacement fuse. If the List 79 Pre-charge Assembly is provided, use the furnished clip cord lead to connect to the fuseholder terminals. Then refer to the Pre-Charge Assembly instructions (Section 5823). This document is provided in the document set furnished with your system.

Procedure

NOTE! *Refer to* ***Figure 23*** *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 fuse carrier from the mounted fuseholder body by pulling it straight out.
3. Replace the open fuse with the same type and rating, or equivalent.
4. Replace the alarm fuse located in the front of the fuse carrier. Replace only with a fuse of the same type and rating. Ensure that a plastic safety cover is installed on the alarm fuse.
5. 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.
6. Verify no Fuse Alarms are active.
7. Close the cabinet's front door. The door can be shut without turning the captive fastener.

Figure 23: *Replacement Details for TPS/TLS-Type Fuse in a Bullet Nose Type Fuseholder*



Replacing a Bullet Nose Type Fuseholder

NOTE! *Applies only if power system is equipped with TPS/TLS-type fuses.*

Refer to SAG581126000 for part numbers.

Procedure

NOTE! *Refer to* ***Figure 23*** *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 fuse carrier from the mounted fuseholder body by pulling it straight out.
3. Gently rock the defective fuse holder up and down while pulling firmly outward until the fuse holder is free from the distribution assembly.

WARNING! If the following procedure is not followed, the fuseholder may be damaged.

4. 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 assembly. Push fuseholder in firmly until fully seated.
5. 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.
6. Verify no Fuse Alarms are active.
7. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fasteners.

Replacing a TPH-Type Fuse

NOTE! *Applies only if power system is equipped with TPH-type fuses.*

Defective TPH-type fuses are replaced by opening the fuseholder and replacing the defective fuse.

Replace also the alarm fuse associated to this fuse as previously explained.

Refer to SAG581126000 for part numbers.

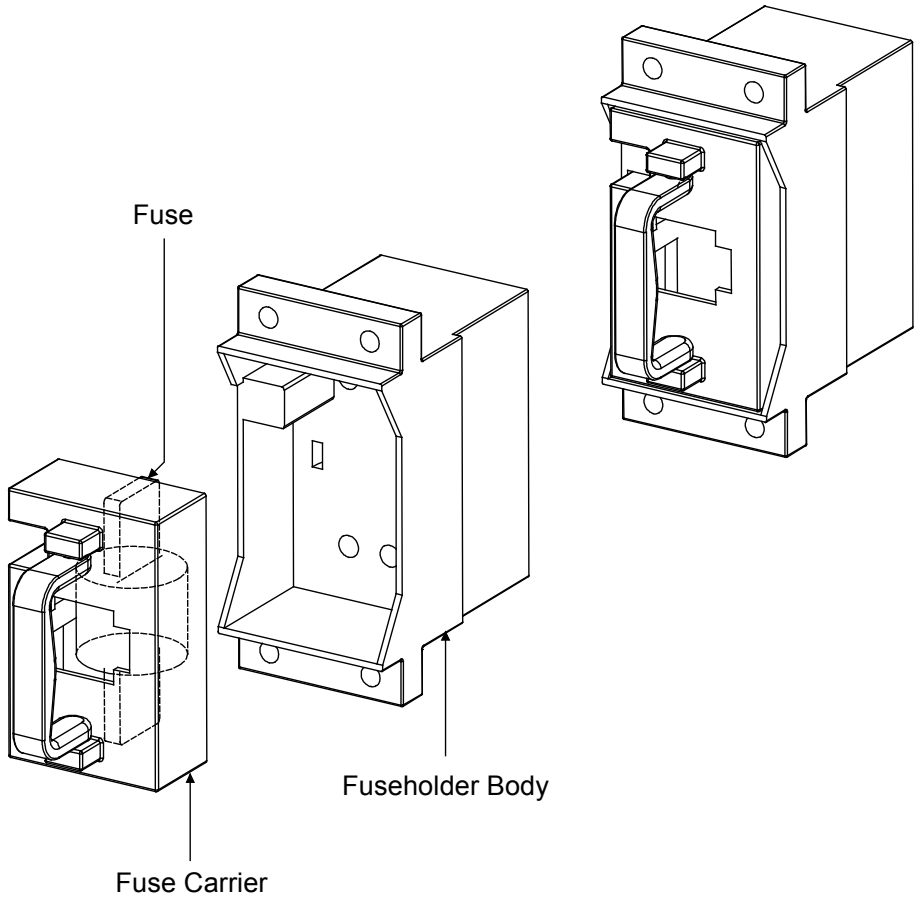
When required, use the List 79 capacitor Pre-charge Assembly to initially charge DC load capacitors prior to installing a distribution fuse. A clip cord is provided for connecting to the circuit breaker or fuseholder terminals. For operating information, refer to the Pre-Charge Assembly instructions (Section 5823). These instructions are provided in the document set furnished with your system.

Procedure

NOTE! *Refer to* ***Figure 24*** *as this procedure is performed.*

1. Remove the fuse carrier from the fuseholder body by grasping its handle and pulling straight out.
2. Remove the fuse from the fuse carrier.
3. Replace the open fuse with the same type and rating, or equivalent. Install the fuse into the fuse carrier. When done, push the fuse carrier securely back into the fuseholder body.
4. On the distribution row, locate the open alarm fuse associated with the TPH-type fuse being replaced. Replace the alarm fuse with a Bussmann GMT 1/4 ampere alarm fuse. Part No. 248610200.
5. Safety fuse covers are provided for all Bussmann GMT type fuses. These covers snap onto the fuses and provide protection from exposed live contacts when a fuse opens. Re-install the safety fuse cover after replacing any GMT type fuse. Refer to **Figure 22** for safety fuse cover installation details.

Figure 24: *Replacing a TPH-Type Fuse*



Replacing a Bullet Nose Type Circuit Breaker

NOTE! *Applies only if power system is equipped with Bullet Nose type circuit breakers.*

Refer to SAG581126000 for part numbers.

Procedure

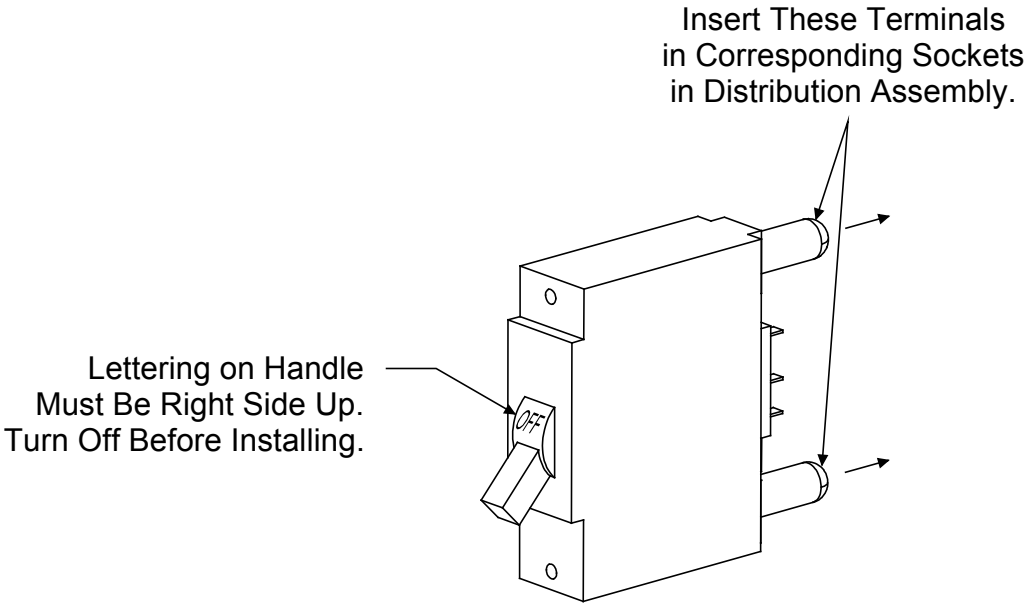
NOTE! *Refer to* ***Figure 25*** *as this procedure is performed.*

1. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.
2. Operate the defective circuit breaker to the OFF position.
3. Gently rock the defective circuit breaker up and down while pulling outward until the breaker is free.
4. Ensure that the circuit breaker is in the OFF position, and is of the correct rating.

CAUTION! In the next step, the circuit breaker alarm will operate incorrectly if the circuit breaker is installed upside down.

5. 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 assembly. Push circuit breaker in firmly until fully seated in the distribution assembly.
6. Operate the replacement circuit breaker to the ON position.
7. Verify no Circuit Breaker Alarms are active.
8. Close the front door of the Distribution Cabinet. The door can be shut without turning the captive fastener.

Figure 25: *Replacing a Bullet Nose Type Circuit Breaker*



Replacing a Distribution Bus Assembly, All Lists except RA, RB, RC, RD, and RE

Refer to SAG581126000 for distribution assembly part numbers.

DANGER! All sources of AC and DC power must be completely disconnected from this power system before performing this procedure. Use a voltmeter to verify no DC voltage is present on the system busbars before proceeding.

When performing the following procedure, refer to the appropriate detail of **Figure 26** for your distribution bus assembly as shown in **Table 8**.

Table 8:

Distribution Bus Assembly List No.	See **Figure 26** Detail
AA, AM, JA, JB, JC, JD, KA, LB, LC	A
EA	B
NA	C
BA, CA, LB, LC	D
AB, AC, CB, CD	E
AD, AE, CE, CF	F
NB	G
AG, AJ, CG, CJ	H
NC	J
ND	K
GB	L
AK	M
AL	N

Removing the Distribution Assembly

From Rear (or top as required):

1. For 2-, 3-, and 4-row Distribution Cabinets Only: Remove the access cover(s) from the rear of the Distribution Cabinet, if present.
2. For Lists EA, GB, NA, NB, ND Only: Disconnect link busbar from system busbar (1 bolt for List EA—2 bolts each for Lists GB, NA, NB, ND).
3. For 2-, 3-, and 4-row Distribution Cabinets Only: Disconnect the 9-pin alarm and control harness connector from the mating plug on the main system wire harness (two connectors on Lists AD, AE, CE, and CF).

From Front:

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

2. For all lists equipped with a plastic shield over the circuit breakers or fuseholders (all bullet nose assemblies), loosen (2) screws holding the shield, slide shield upwards and remove.
3. Disconnect all load wiring from the circuit breaker or fuse positions. If necessary, refer to the separate INSTALLATION INSTRUCTIONS (SECTION 6012) for connection locations.
4. On assemblies equipped with a ground busbar, remove all load return wiring from the ground busbar. If necessary, refer to the separate INSTALLATION INSTRUCTIONS (SECTION 6012) for connection locations.
5. For Lists JA, JB, JC, JD, KA, LB, and LC Only: Disconnect Subsystem Input wiring (–48V) from distribution bus assembly as shown at SUBSYSTEM INPUT JUMPERS in the appropriate detail of **Figure 26**.
6. For All Bullet Nose Assemblies: Remove circuit breakers and fuseholders from distribution bus assembly.
7. For Each GJ/218 Circuit Breaker Present: Remove circuit breaker far enough to reach alarm and control wiring on back. Note the connection order of alarm and control wires so they can be reconnected correctly later in the procedure. Disconnect alarm wires and, if present, shunt wires, from back of circuit breakers. Then remove circuit breaker.
8. For List AJ or CJ Only: Follow shunt leads from the rear of the distribution assembly to their point of termination. Note the order in which leads are connected. Disconnect the leads at that end. Leads will be removed with the Distribution Buss Assembly.
9. For Each TPH Fuse Present: If not replacing the fuse, remove fuse carrier from the fuseholder. Remove the fuse from the fuse carrier.
10. Disconnect the distribution assembly input busbar from the system busbar (two busbars on Lists AD, AE, CE, and CF) as shown at SYSTEM BUSBAR CONNECTION in the appropriate detail of **Figure 26**. For List ND only, remove the link busbar from the cabinet.
11. On assemblies equipped with a ground busbar, disconnect the distribution assembly ground busbar from the system ground busbar (two busbars on Lists AD, AE, AL, CE, and CF) as shown at GROUND BUSBAR CONNECTION in the appropriate detail of **Figure 26**.
12. For 1-Row Cabinets Only: Remove 4 screws that secure distribution assembly to cabinet. Carefully pull distribution assembly from cabinet until the 9-pin alarm and control harness connector and mating plug on the main system wire harness are accessible. Disconnect the connector from the plug. Remove distribution assembly from the cabinet.
13. For 2-, 3-, and 4-row Distribution Cabinets Only: Remove 4 screws that secure distribution assembly to cabinet. Remove distribution assembly.

Installing the Distribution Assembly

NOTE! *In the following procedure, before making busbar-to-busbar connections, apply a thin coating of electrical anti-oxidizing compound to the mating surfaces of the busbars.*

From Front:

1. For 1-Row Cabinets Only: Install assembly into cabinet until the 9-pin alarm and control harness connector and mating plug on the main system wire harness can be connected. Connect the mating

plug and connector. Position the distribution assembly, and secure to the Distribution Cabinet with 4 screws. Check to ensure no wires are pinched.

2. For 2-, 3-, and 4-row Distribution Cabinets Only: Install assembly into cabinet and secure with 4 screws. Check to ensure no wires are pinched.
3. For All Except List ND: Connect distribution assembly input busbar to system busbar (two busbars on Lists AD, AE, CE, and CF) as shown at SYSTEM BUSBAR CONNECTION in the appropriate detail of **Figure 26**.
4. For List ND Only: Install the linking busbar previously removed, and connect to system busbar as shown at SYSTEM BUSBAR CONNECTION in the appropriate detail of **Figure 26**.
5. On assemblies equipped with a ground busbar, connect distribution assembly ground busbar to system ground busbar (two busbars on Lists AD, AE, AL, CE, and CF) as shown at GROUND BUSBAR CONNECTION in the appropriate detail of **Figure 26**.

WARNING! In the next step, observe correct polarity; otherwise equipment damage will result.

6. For Lists JA, JB, JC, JD, KA, LB, and LC Only: Reconnect Subsystem Input wiring (–48V) to distribution bus assembly as shown at SUBSYSTEM INPUT JUMPERS in the appropriate detail of **Figure 26**.
7. On assemblies equipped with a ground busbar, reconnect all load return wiring to the ground busbar. Refer to the separate INSTALLATION INSTRUCTIONS (SECTION 6012) for recommended torque.
8. Reconnect all load wiring to the circuit breaker or fuse positions. Refer to the separate INSTALLATION INSTRUCTIONS (SECTION 6012) for recommended torque.
9. For All Bullet Nose Assemblies: Install circuit breakers and fuseholders into distribution bus assembly.
10. For all lists equipped with a shield over the circuit breakers or fuseholders (all bullet nose assemblies), position the shield and slide downwards on screws. Tighten screws.
11. For All GJ/218 Circuit Breakers: Connect alarm wires and, if present, shunt wires, to back of circuit breaker. Then mount circuit breaker to its busbars. Recommended torque is 84 inch pounds.
12. For List AJ or CJ Only: Route shunt lead from the rear of the Distribution Bus Assembly to the intended point of termination. Connect shunt leads in the order previously noted. Form leads for best fit, and secure with plastic cable ties as required.
13. For All TPH Fuses Only: Install the fuse. See Replacing *a TPH-Type Fuse* in this section.

From Rear (or top as required):

1. For 2-, 3-, and 4-row Distribution Cabinets Only: Connect the 9-pin alarm and control connector to the mating plug on the main system wire harness (two connectors on Lists AD, AE, CE, and CF).
2. For Lists EA, GB, NA, NB, ND Only: Connect link busbar to the distribution assembly busbar (1 bolt for List EA—2 bolts each for Lists GB, NA, NB, ND). Torque bolts to 180 in lbs.
3. For 2-, 3-, and 4-row Distribution Cabinets Only: If access cover(s) were removed from the rear of the Distribution Cabinet, install covers.

Restarting the Power System

1. Reconnect DC and AC power to Power System.
2. Start the Power System. Refer to "Initially Starting the System" in the separate INSTALLATION INSTRUCTIONS (SECTION 6012) for a startup procedure.
3. Verify no Fuse Alarms are active.
4. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fasteners.

Figure 26: *(Detail A) Replacing List JA (List AA, AM, JB, JC, JD, KA, LB and LC Similar)*

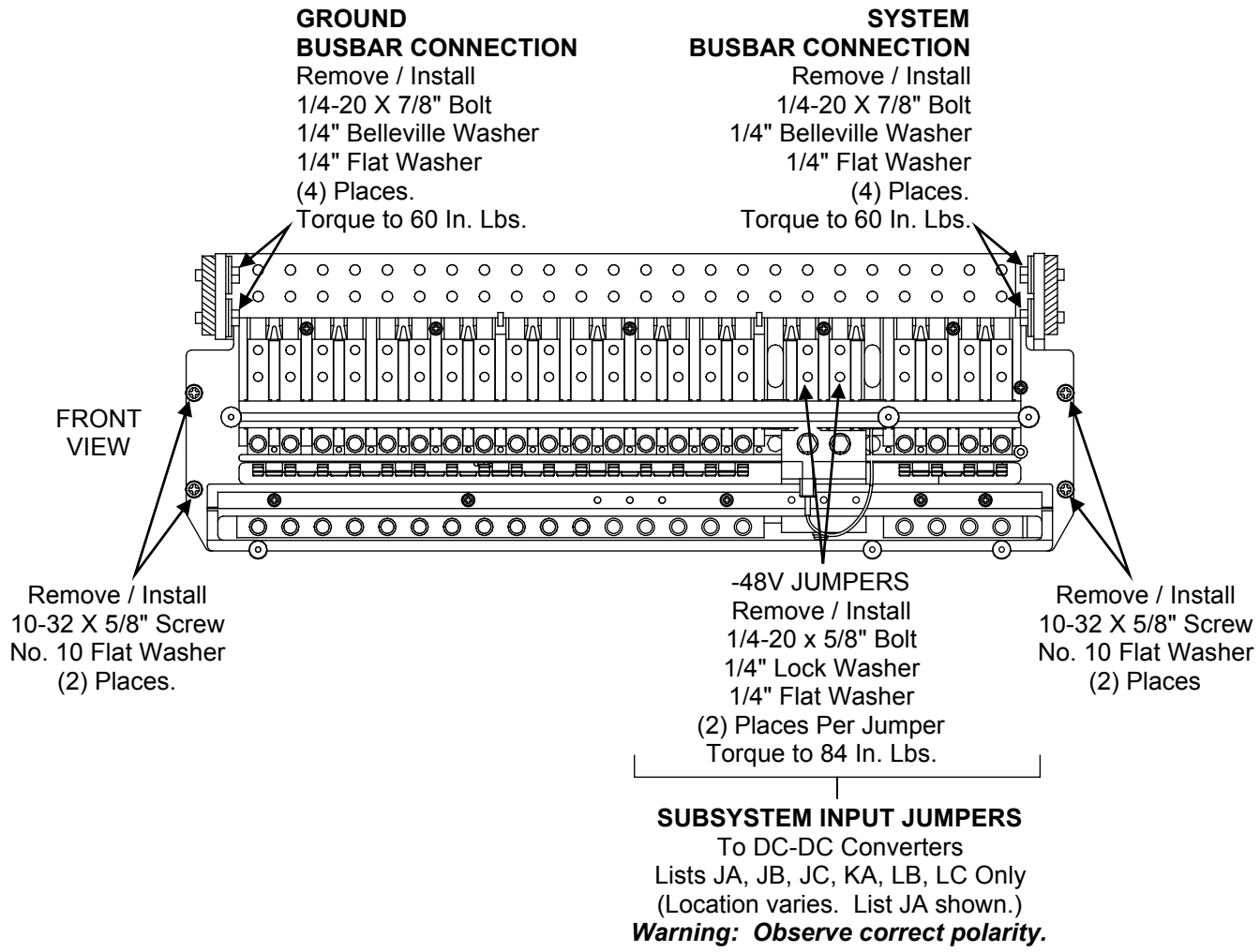


Figure 26: *(Detail B) Replacing List EA*

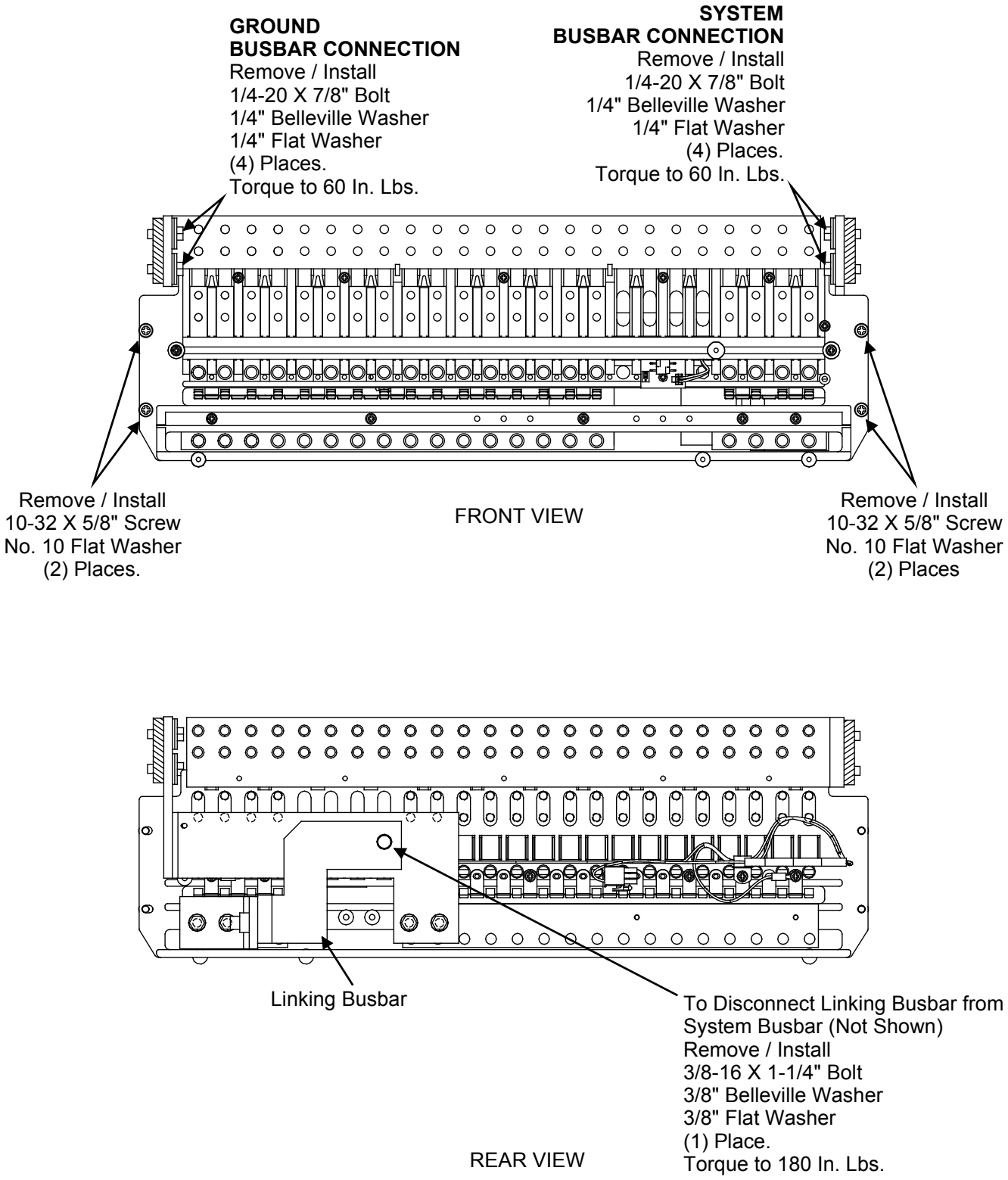


Figure 26: *(Detail C) Replacing List NA*

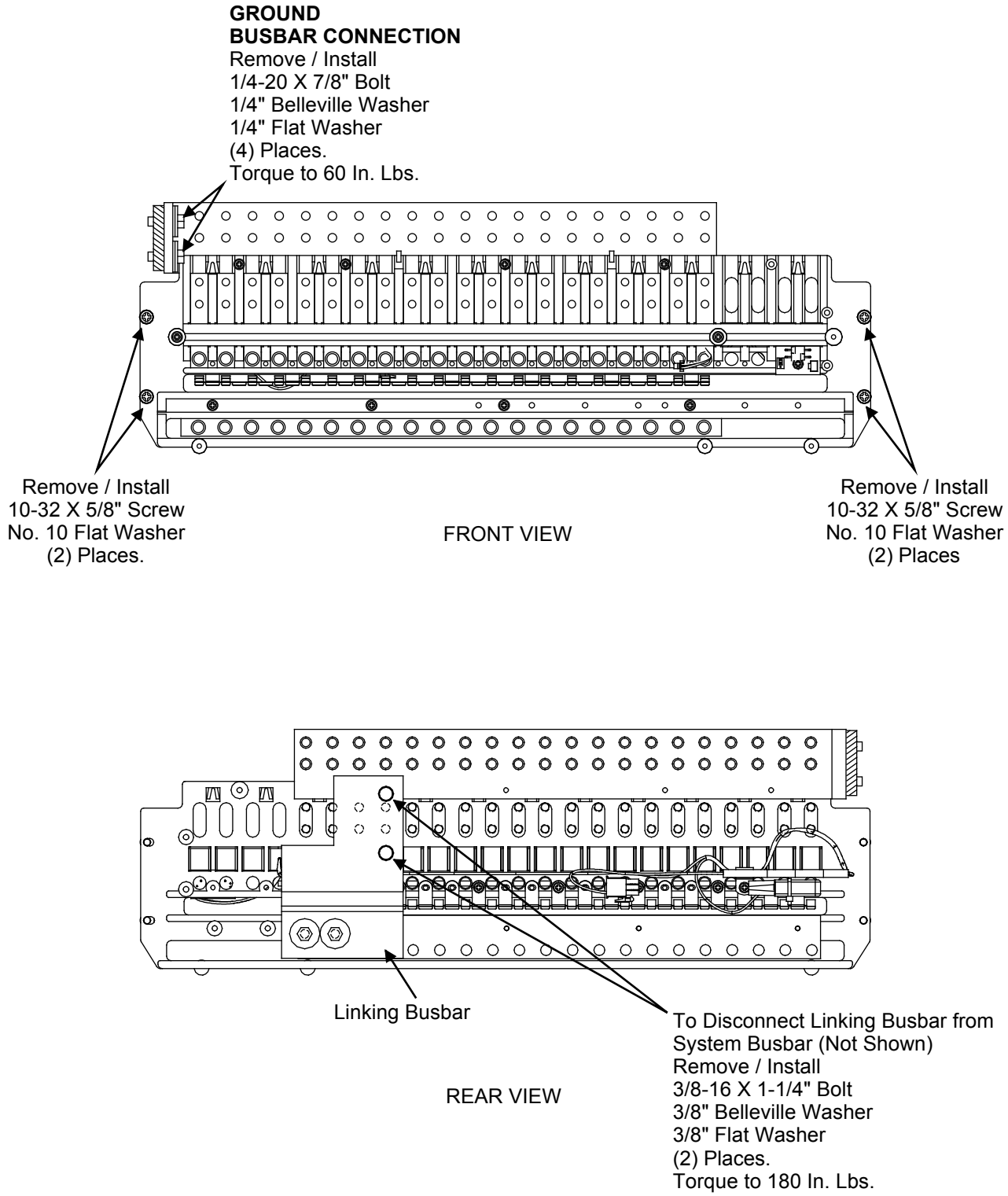


Figure 26: *(Detail D) Replacing List LB (List BA, CA, and LC Similar)*

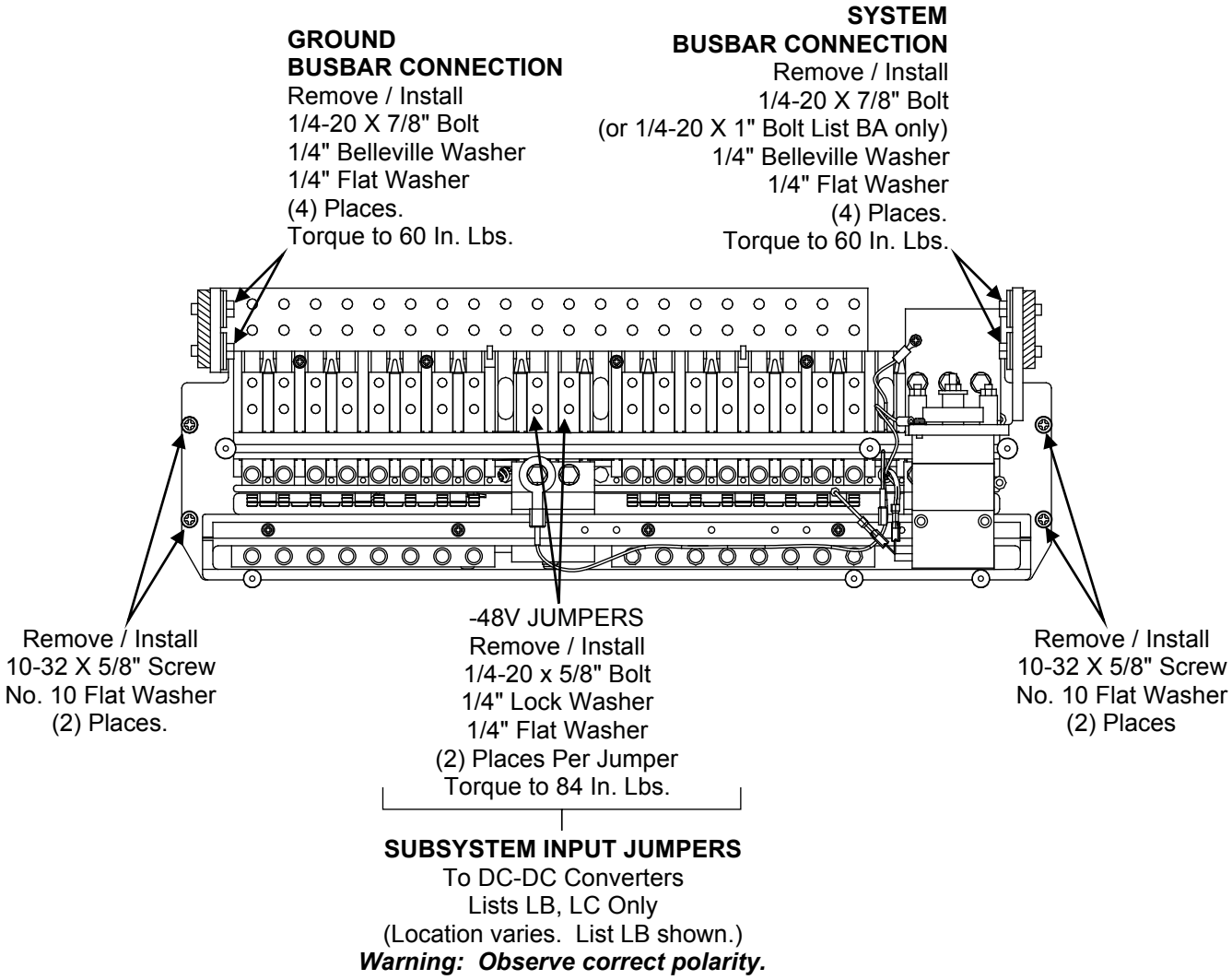


Figure 26: *(Detail E) Replacing List CB (Lists AB, AC, and CD Similar)*

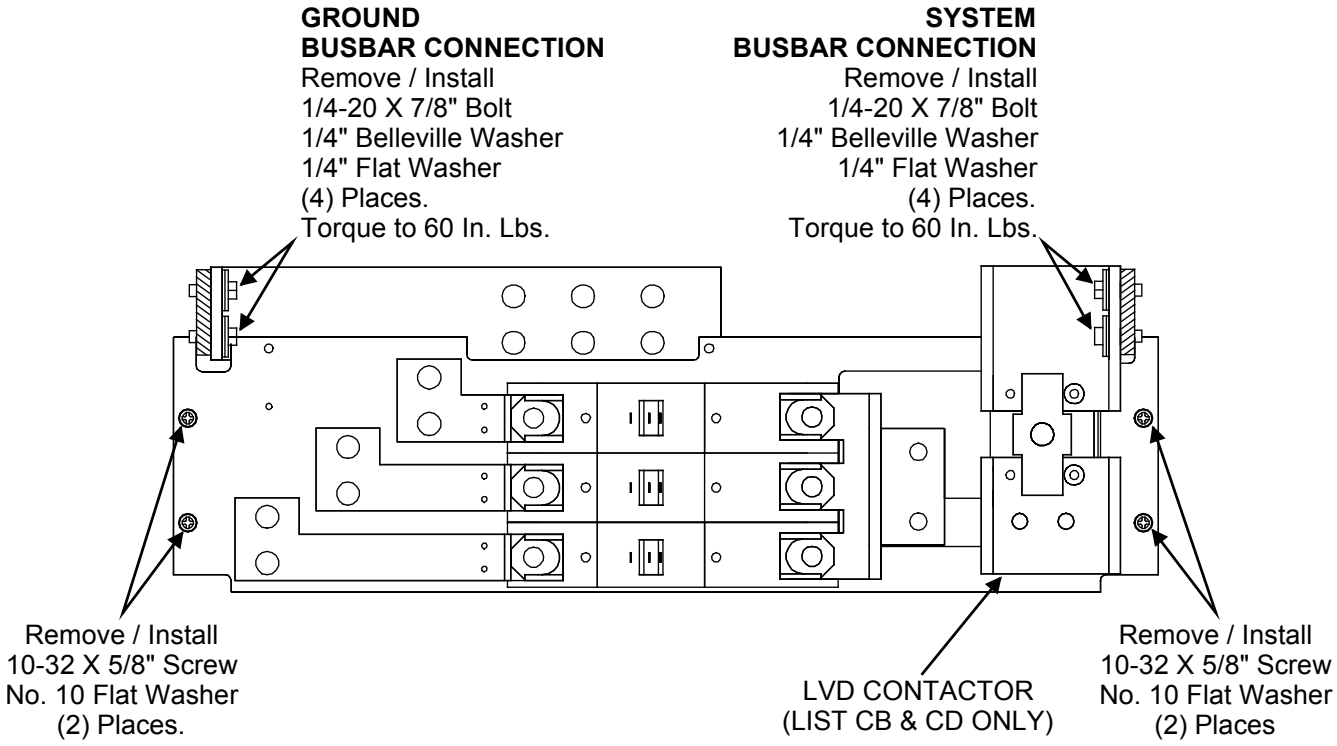


Figure 26: *(Detail F) Replacing List CE (Lists AD, AE, and CF Similar)*

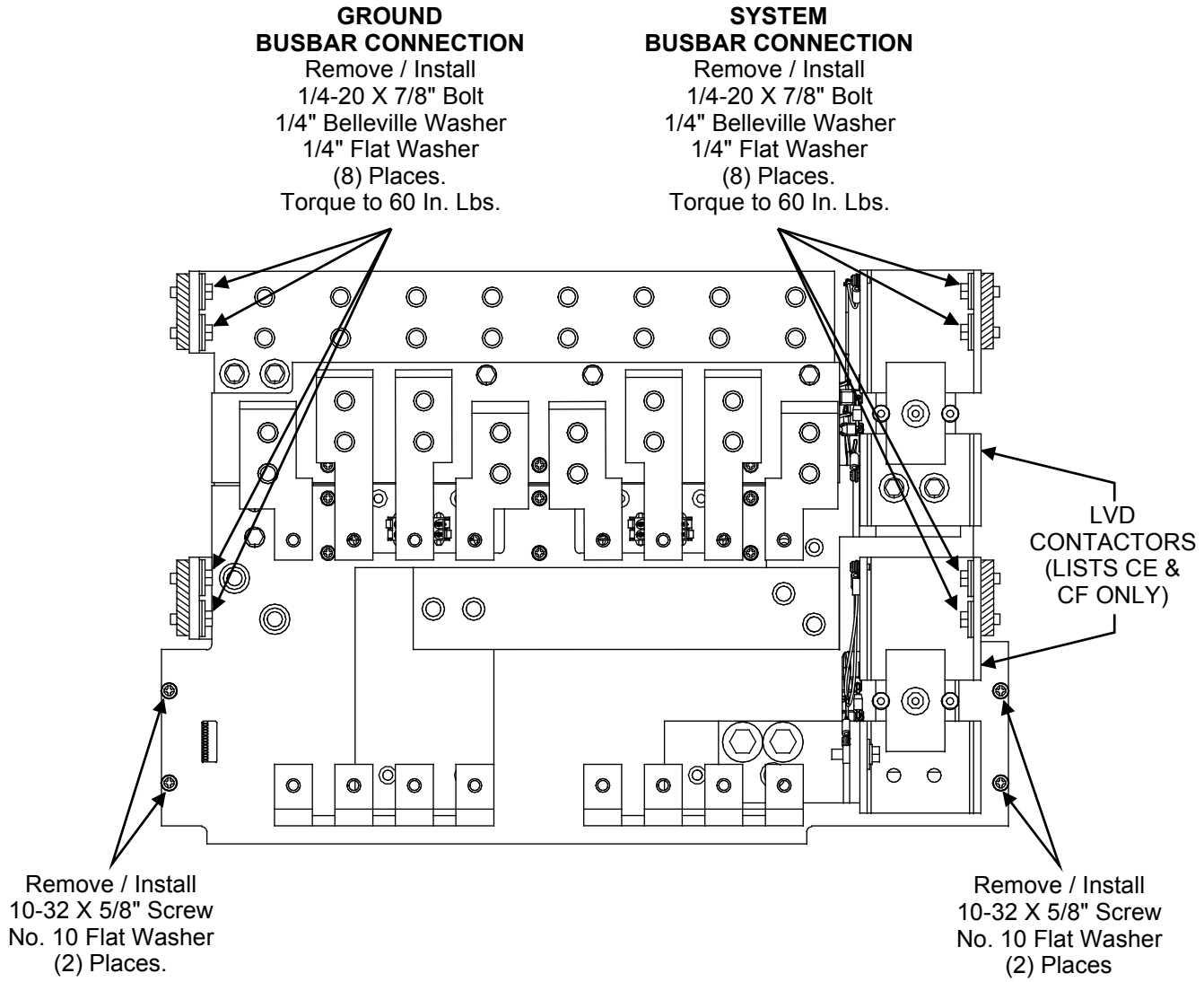
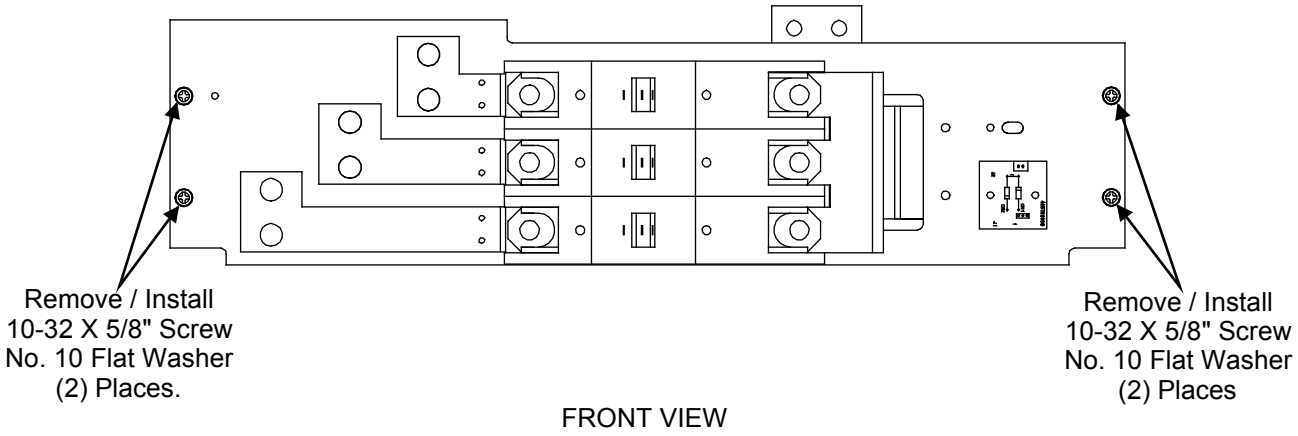


Figure 26: *(Detail G) Replacing List NB*



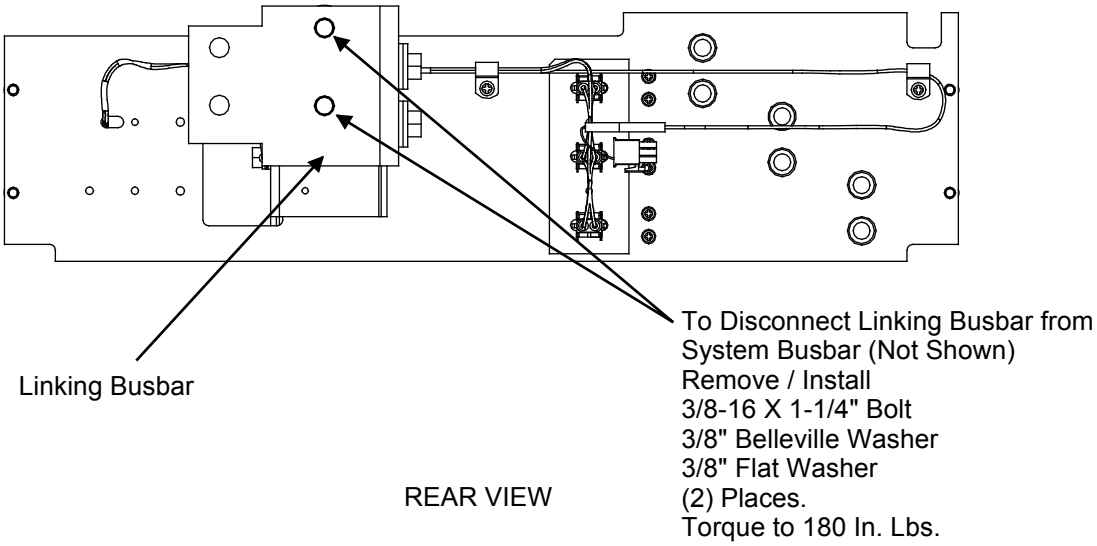


Figure 26: *(Detail H) Replacing List CG (List AG, AJ, and CJ Similar)*

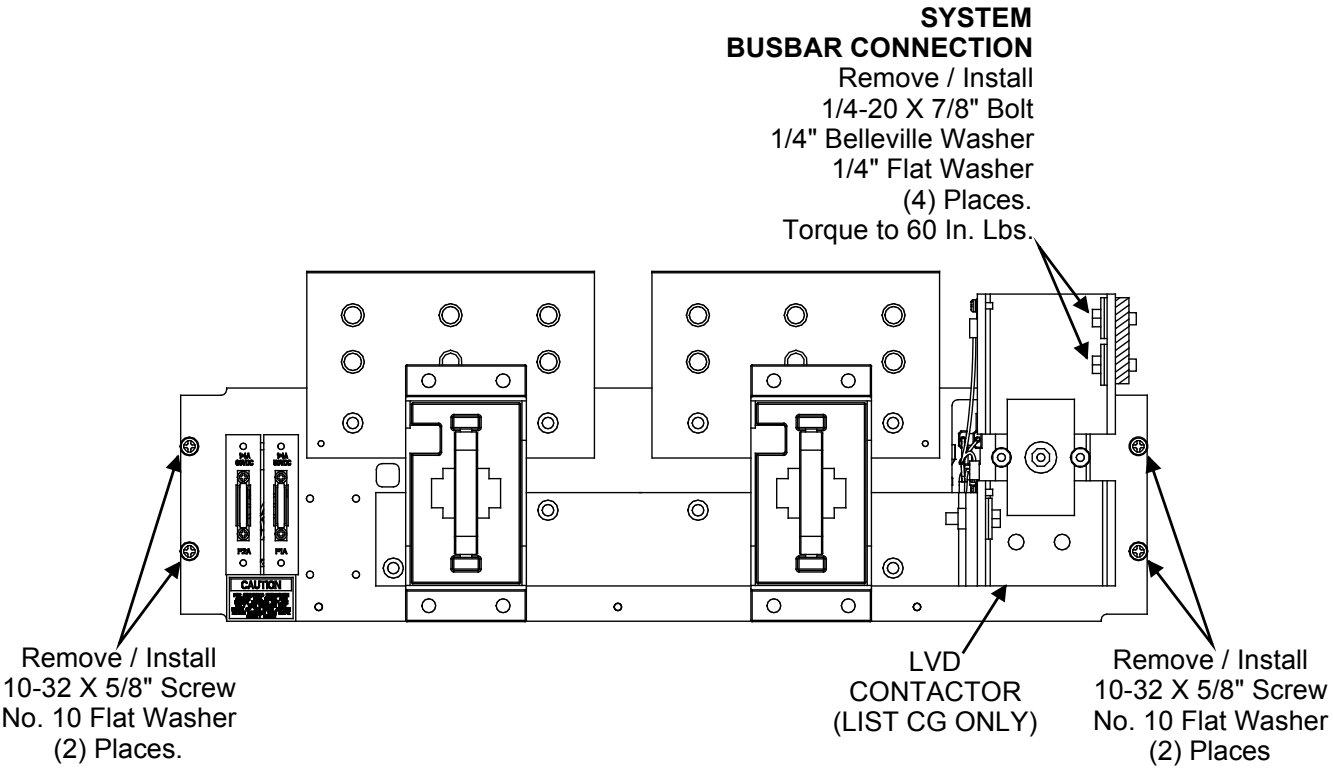


Figure 26: *(Detail J) Replacing List NC*

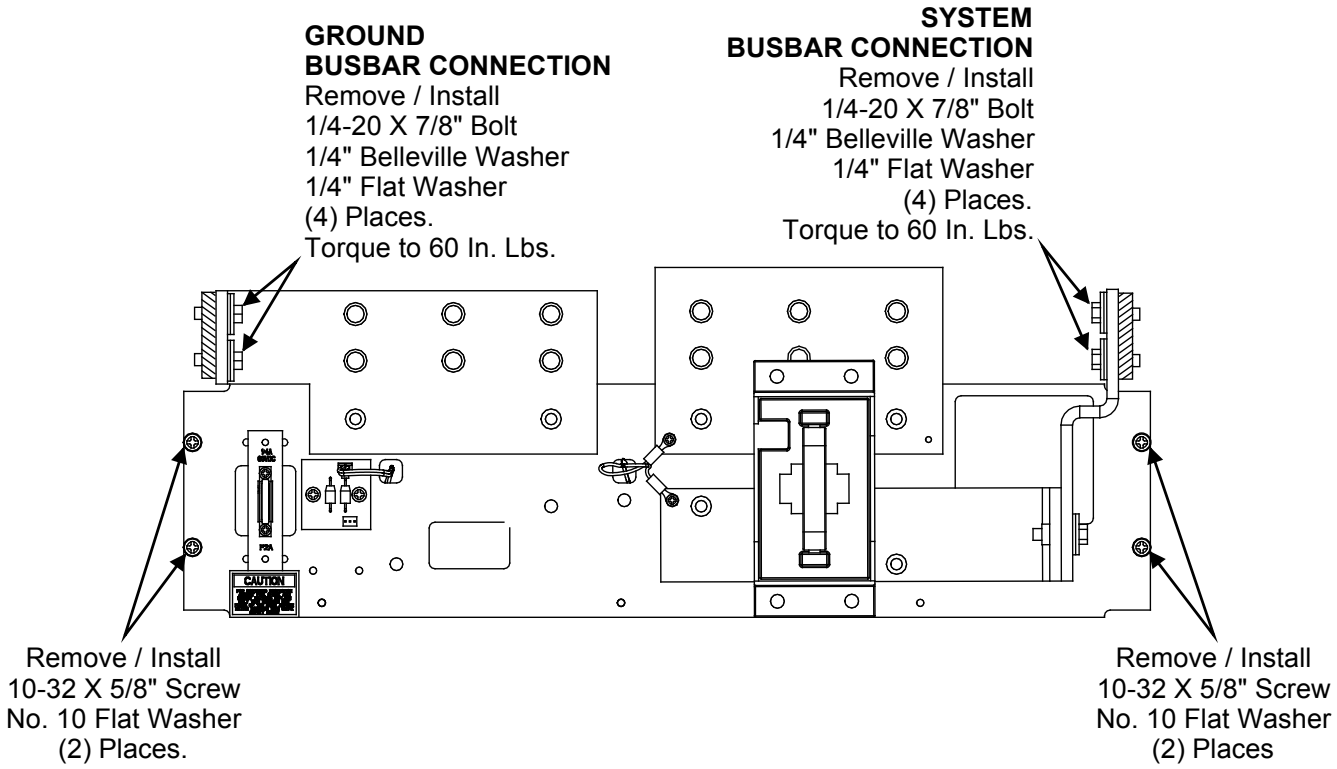


Figure 26: *(Detail K) Replacing List ND*

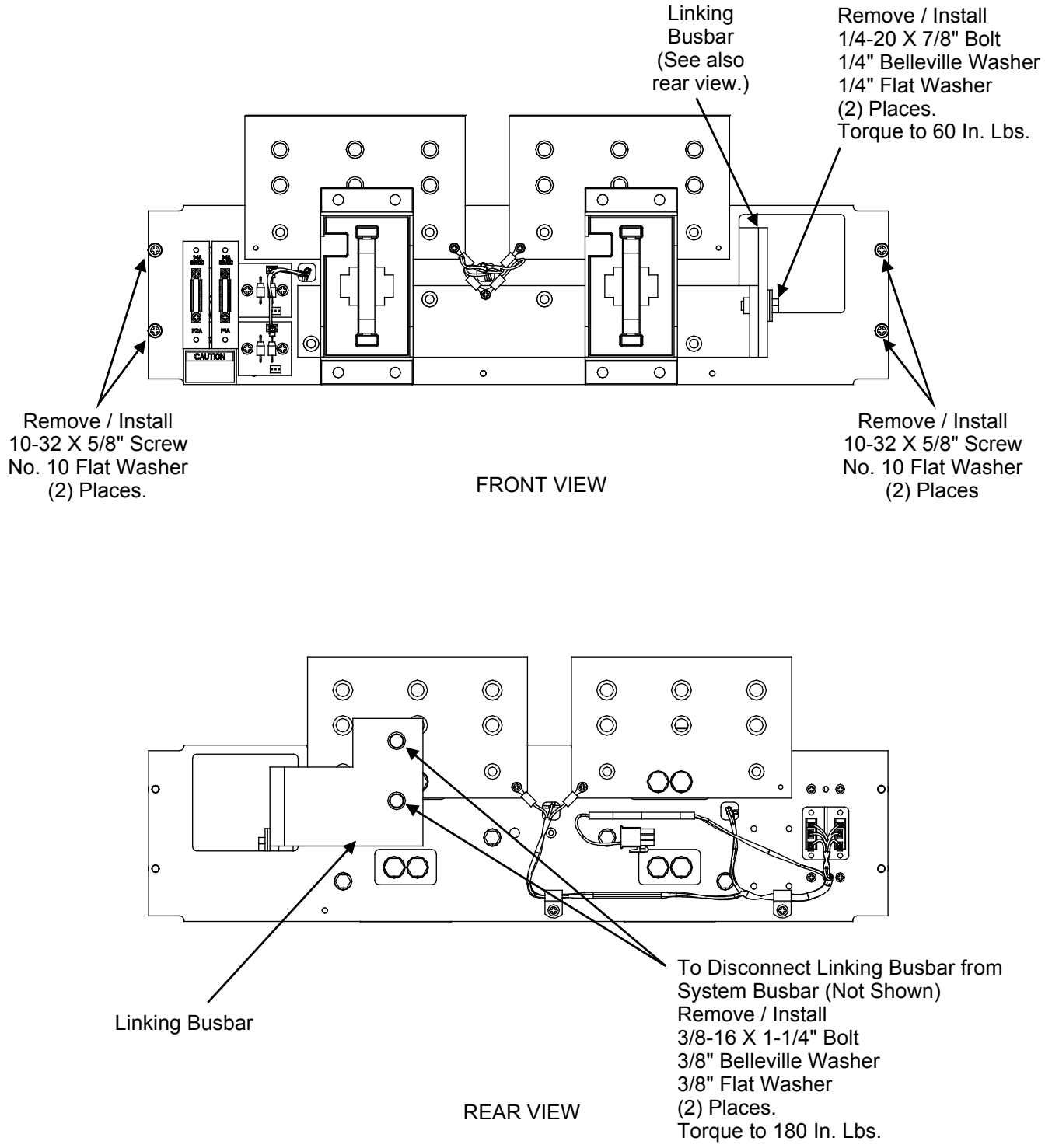
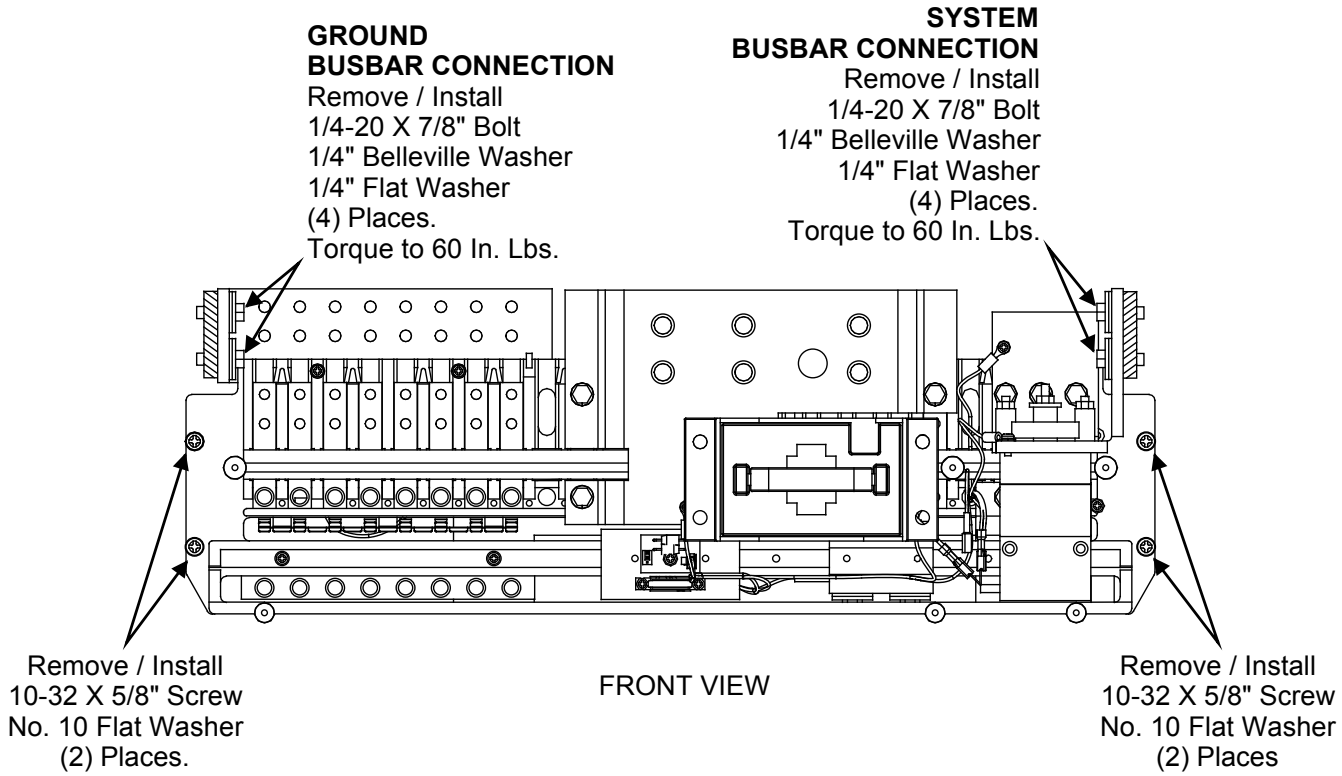


Figure 26: *(Detail L) Replacing List GB*



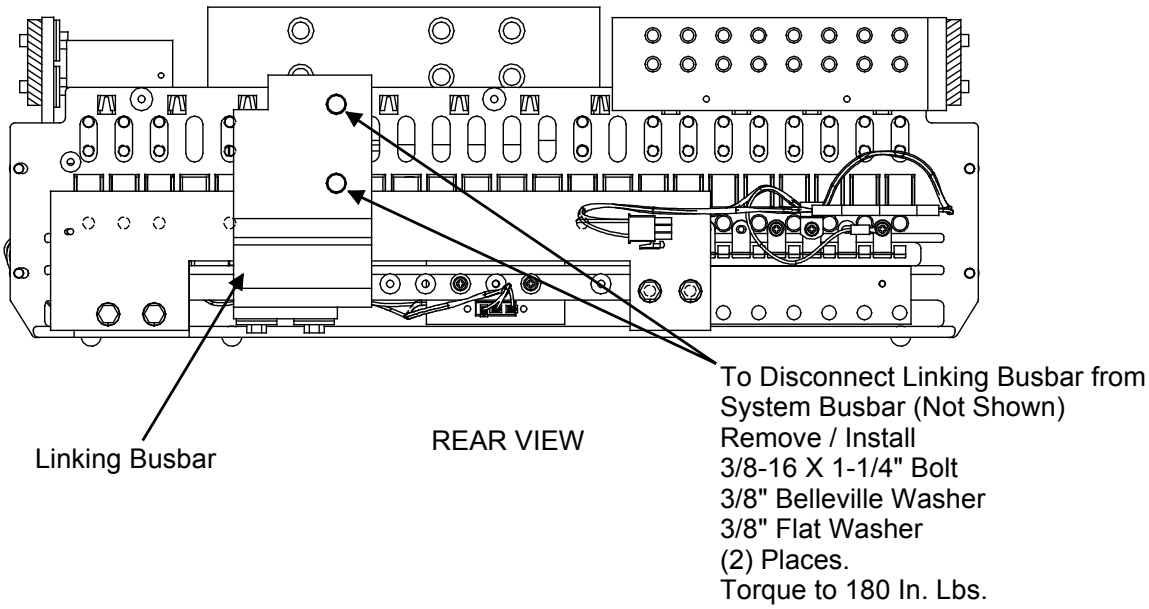


Figure 26: *(Detail M) Replacing List AK*

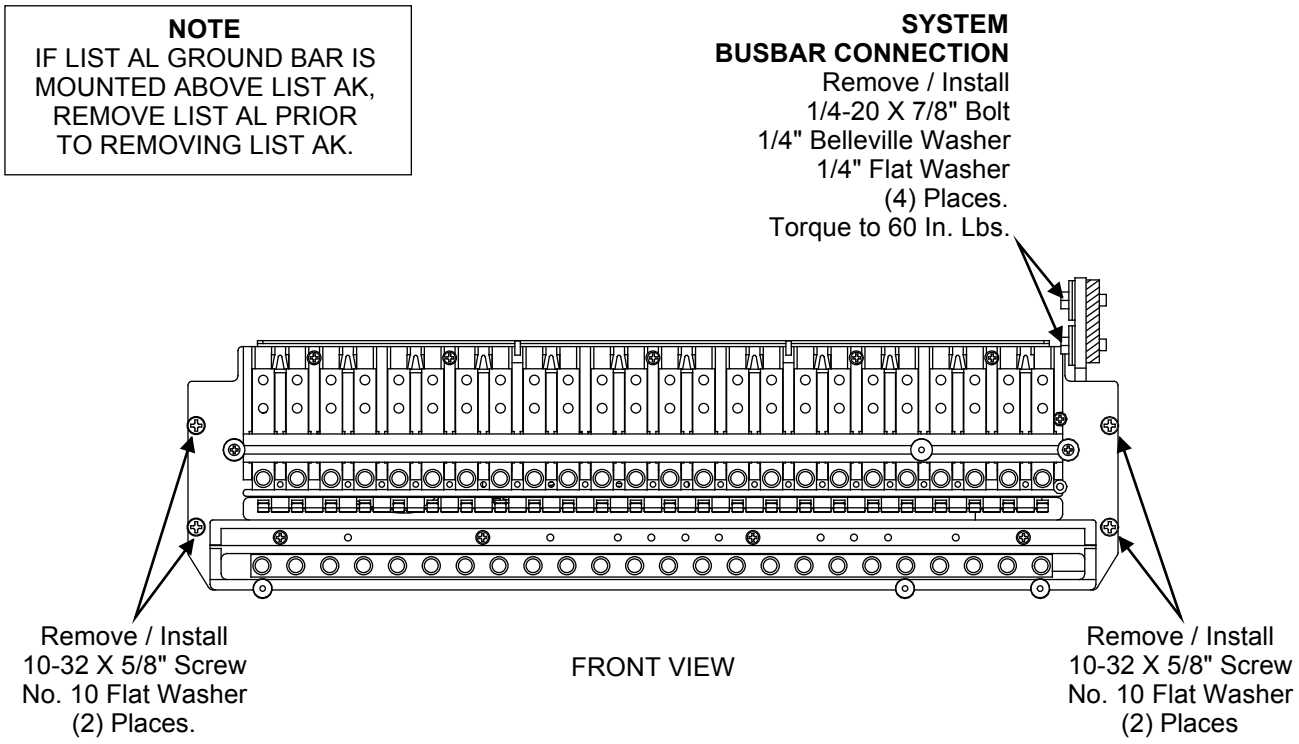
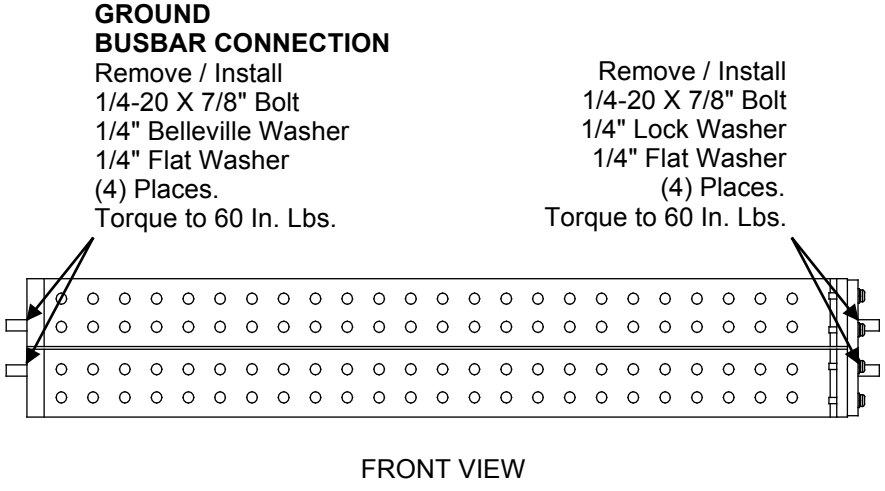


Figure 26 *(Detail N) Replacing List AL*



Replacing a List RA, RB Battery Disconnect Contactor

Refer to SAG581126000 for contactor part numbers.

When performing the following procedure, refer to **Figure 27**.

Removing the Contactor

DANGER! All sources of AC and DC power must be completely disconnected from this power system before performing this procedure. Use a voltmeter to verify no DC voltage is present on the system busbars before proceeding.

1. Open the Distribution Cabinet's front door by turning and holding the captive fastener in the counterclockwise position.
2. Disconnect all battery wiring from the Contactor Assembly input busbar. If necessary, refer to the separate INSTALLATION INSTRUCTIONS (SECTION 6012) for connection locations.
3. Disconnect the Contactor Assembly linking busbar from the system busbar as shown at SYSTEM BUSBAR CONNECTION in **Figure 27**.
4. Loosen but do not remove (1) 12-24 x 1/2" mounting screw at bottom of contactor mounting plate, as shown in **Figure 27**.
5. Remove (2) 12-24 x 1/2" mounting screws at top of contactor mounting plate, as shown in **Figure 27**.
6. Lift the Contactor Assembly up off bottom mounting screw. Remove the assembly far enough to access the terminals on the side of the coil body. Note the positions of the wire connections so that they can be correctly reconnected later in the procedure. Disconnect the lug that terminates (1) Violet and (1) Violet/White wire. Remove the Contactor Assembly to a work surface.
7. Disconnect from the coil body the lug that terminates (1) Red/White wire.
8. Note the orientation of the contactor with respect to the input and linking busbars. Remove the hardware that secures the input and linking busbars to the contactor.

Installing the New Contactor

NOTE! *In the following procedure, before making busbar-to-busbar connections, apply a thin coating of electrical anti-oxidizing compound to the mating surfaces of the busbars.*

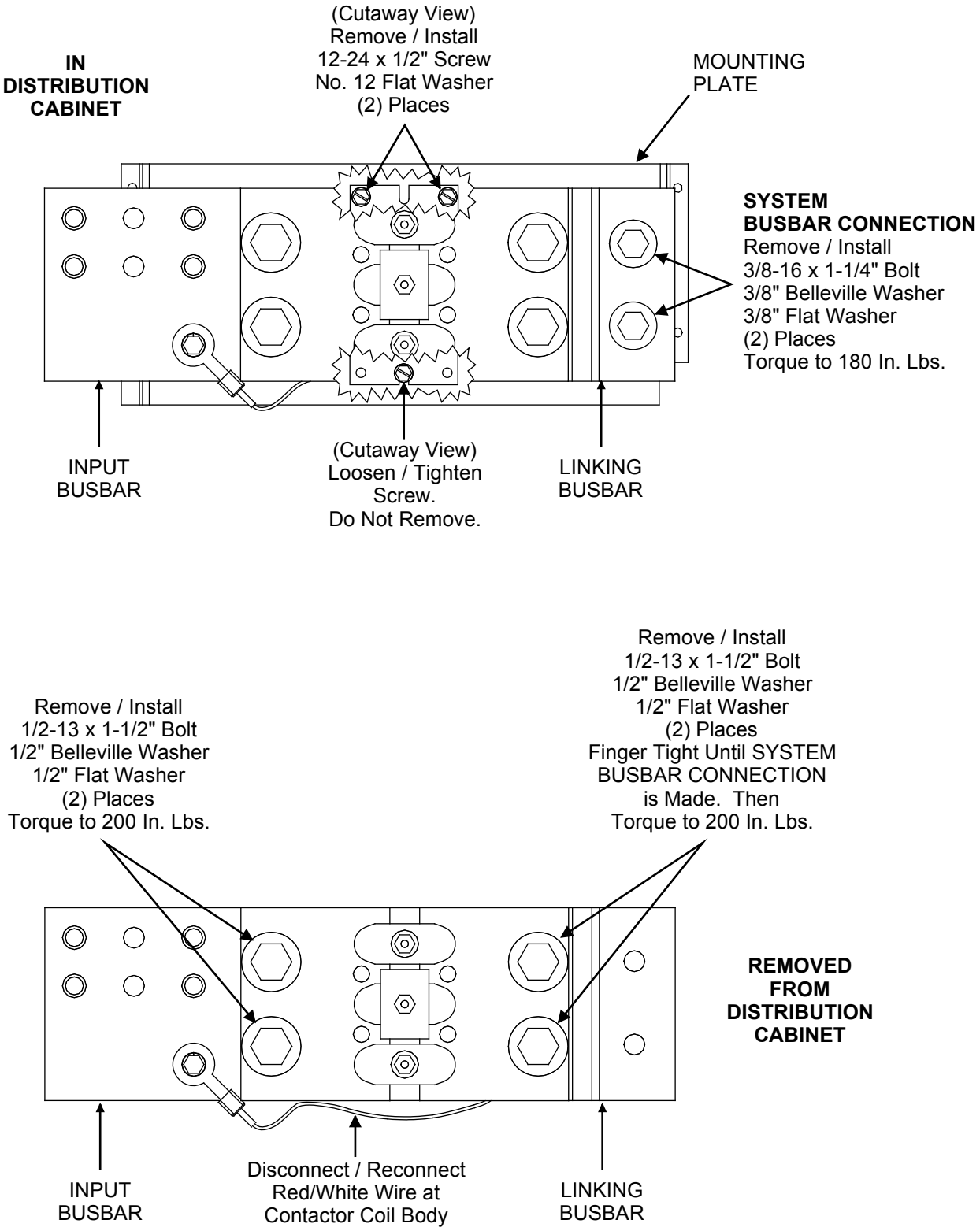
1. Install the linking and input busbars on the new contactor. First, apply a thin coating of electrical anti-oxidizing compound to the mating surfaces of the busbars. Tighten the bolts as specified in **Figure 27**.
2. Connect to the coil body the lug that terminates (1) Red/White wire.
3. Install the Contactor Assembly into the Distribution Cabinet far enough for the (1) Violet and (1) Violet/White wire removed in Step 6 to reach the terminals on the coil body. Connect the lug that terminates the two wires to the terminal on the coil body.
4. Position the Contactor Assembly on its mounting plate, and lower over the bottom mounting screw.
5. Install (2) 12-24 x 1/2" mounting screws at top of contactor mounting plate, as shown in **Figure 27**.
6. Tighten the lower mounting screw.

7. Reconnect the Contactor Assembly linking busbar to the system busbar as shown at SYSTEM BUSBAR CONNECTION in **Figure 27**. Tighten the bolts as specified in the figure.
8. Reconnect all battery wiring to the Contactor Assembly input busbar. Refer to the separate INSTALLATION INSTRUCTIONS (SECTION 6012) for connection locations and recommended torque.

Restarting the Power System

1. Reconnect DC and AC power to Power System.
2. Start the Power System. Refer to "Installing Rectifier Modules and Initially Starting the System" in the separate INSTALLATION INSTRUCTIONS (SECTION 6012) for a startup procedure.
3. Verify no alarms are active.
4. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fasteners.

Figure 27: *Replacing List RA, RB Contactor*



Replacing a List RC, RD, RE Battery Disconnect Contactor

Refer to SAG581126000 for contactor part numbers.

When performing the following procedure, refer to **Figure 28**.

Removing the Contactor

DANGER! All sources of AC and DC power must be completely disconnected from this power system before performing this procedure. Use a voltmeter to verify no DC voltage is present on the system busbars before proceeding.

1. Remove the contactor rear access cover. To do so, loosen but do not remove the four screws that secure the cover. Slide the cover up and remove. Refer to **Figure 28** for screw location.
2. Remove the four (4) 3/8-16 x 1-1/4" bolts and associated washers from the contactor. Slide contactor back until wiring on contactor is accessible. Refer to **Figure 28**.
3. Disconnect the four (4) wires on the auxiliary switch, and the two (2) wires on the coil body. Refer to **Figure 29**. Remove the contactor.

Installing the New Contactor

NOTE! *In the following procedure, before making busbar-to-busbar connections, apply a thin coating of electrical anti-oxidizing compound to the mating surfaces of the busbars.*

1. Connect the six (6) wires to the replacement contactor as shown in **Figure 29**.
2. Place the contactor in position, and secure by installing the 3/8" hardware as shown in **Figure 28**. Torque as shown in the figure.
3. Reinstall the contactor rear access cover. Tighten the four screws.

Restarting the Power System

1. Reconnect DC and AC power to Power System.
2. Start the Power System. Refer to "Installing Rectifier Modules and Initially Starting the System" in the separate INSTALLATION INSTRUCTIONS (SECTION 6012) for a startup procedure.
3. Verify no alarms are active.
4. Close the Distribution Cabinet's front door. The door can be shut without turning the captive fasteners.

Figure 28: *List RC Contactor Replacement Details (List RD and RE Similar)*

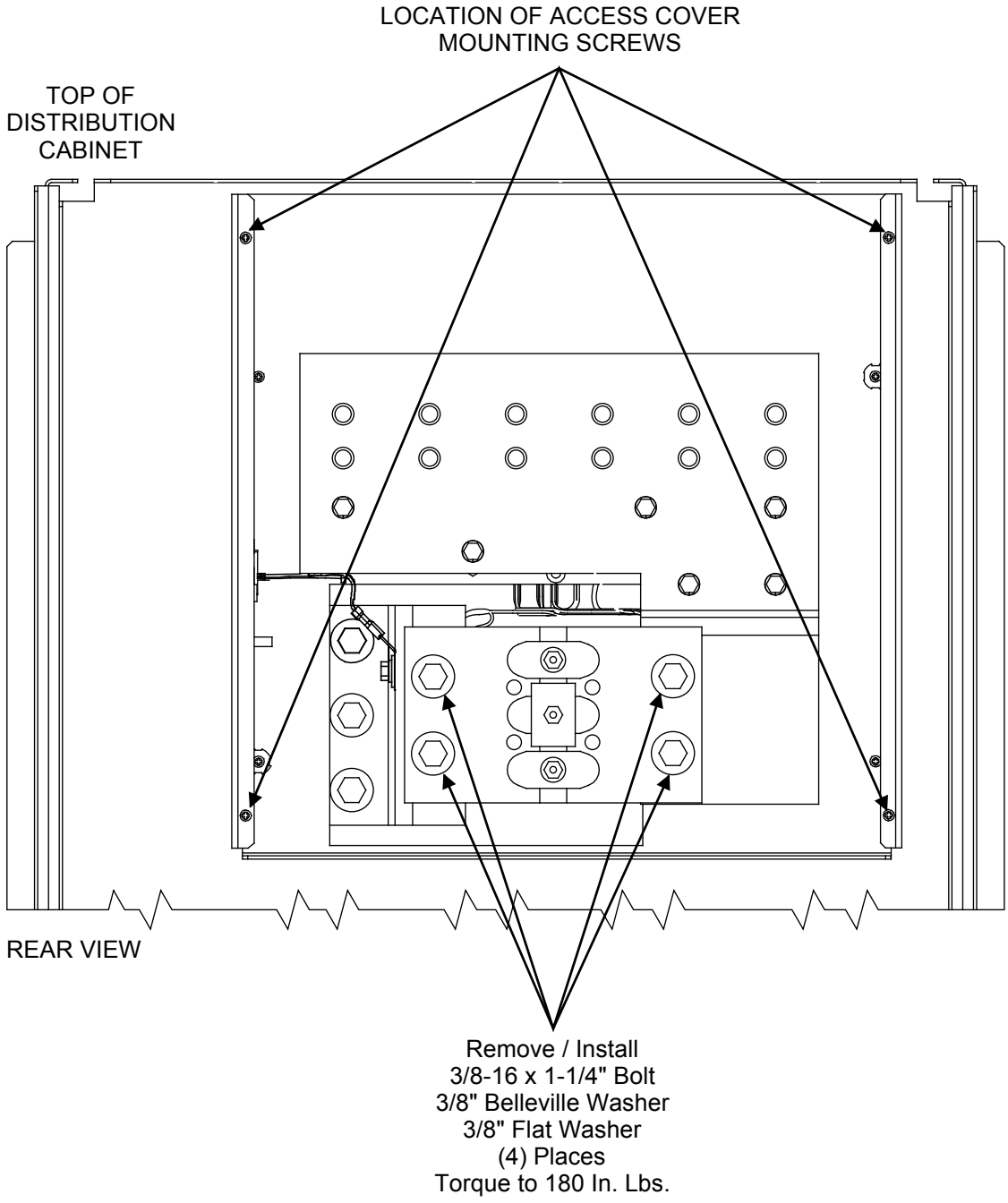
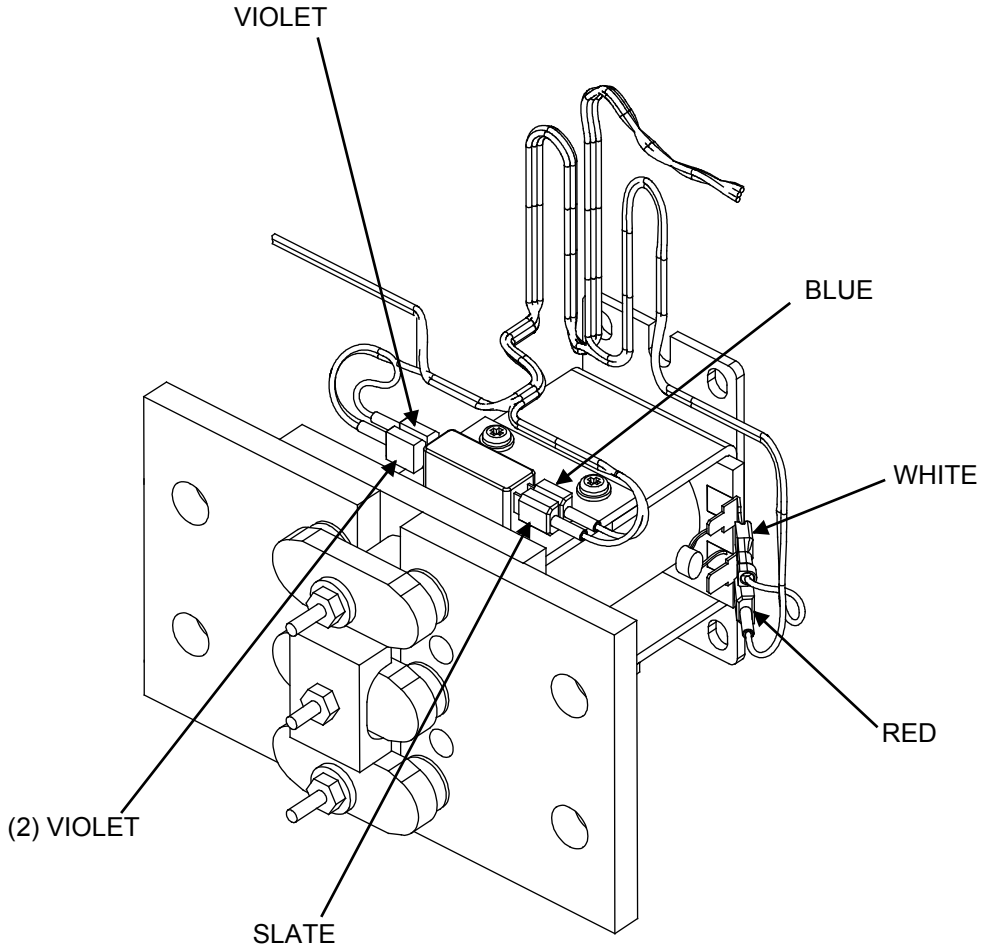


Figure 29: *List RC Contactor Replacement Details (List RD and RE Similar)*



Adding a Battery Charge Digital Temperature Compensation Probe to a Previously Operated System

This procedure details the steps to add a Battery Charge Digital Temperature Compensation Probe to a system that has been previously started, configured, and checked.

Procedure

1. Refer to “Installing System Components” of the separate INSTALLATION INSTRUCTIONS (SECTION 6012), and mount the Battery Charge Digital Temperature Compensation Probe near the batteries.
2. Refer to “Making Electrical Connections” of the separate INSTALLATION INSTRUCTIONS (SECTION 6012), and connect the Battery Charge Digital Temperature Compensation Probe to connector J4 located on the MCA Main Controller circuit card in the Main Bay Distribution Cabinet. The MCA automatically detects the probe and adds it to the inventory without any alarms. The default slope setting is DIGITAL TC OFF.
3. Refer to “MCA System Adjustments”, and set the following digital battery charge temperature compensation parameters: SLOPE, MAX W/T, and MIN W/T.
4. Refer to “MCA System Adjustments”, and set the following alarm parameters: HI TEMP and LO TEMP.
5. Verify that battery charge temperature compensation has begun by comparing the SYSTEM voltage reading versus the FLOAT setting. Depending on the battery ambient temperature, the SYSTEM voltage should be higher or lower than the FLOAT setting by the amount of slope V/ºC (note that SYSTEM voltage will also vary from the FLOAT setpoint depending on the load).

NOTE! *At 25ºC, the battery charge temperature compensated SYSTEM voltage equals the FLOAT voltage setting.*

NOTE! *If the probe is disconnected or fails, a major alarm (local and extended) activates and the system returns to the FLOAT voltage setting.*

Removing a Battery Charge Digital Temperature Compensation Probe from a Previously Operated System

This procedure details the steps to remove a Battery Charge Digital Temperature Compensation Probe to a system that has been previously started, configured, and checked.

Procedure

1. In the Calibration menu, set the SLOPE = .### V/°C to DIGITAL TC OFF. Temperature Compensation stops and the System returns to the FLOAT voltage setting.
2. Remove the probe. The Major Alarm activates. Update inventory to clear this alarm, as described in this section.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