NetSure™ 5100 Series

-48 VDC Power System

User Manual (UM582137200), Revision F

Specification Number: 582137200
Model Number: 5100

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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

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.
- Verify that no current will flow when the battery is connected or disconnected by opening battery disconnects (if available) or adjusting the system to match battery voltage.
- 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.

CUSTOMER DOCUMENTATION PACKAGE

This document (UM582137200) provides *User Instructions* for the NetSure™ 5100 Series -48 VDC Power System: Model 5100, Spec. No. 582137200.

The complete Customer Documentation Package consists of…

NetSure™ -48 VDC Power System Installation Manual

- Power System Installation Instructions: IM582137200

NetSure™ -48 VDC Power System User Manual

- Power System User Instructions: UM582137200

NetSure™ NCU Controller User Manual

- NCU Controller User Instructions: UM1M830BNA

USB Drive with All Customer Documentation

- Power System Installation Instructions: IM582137200
- Power System User Instructions: UM582137200
- Power System "System Application Guide": SAG582137200
- NCU Controller User Instructions: UM1M830BNA
- Rectifier Instructions: UM1R482000e3
- Engineering Drawings
  - SD582137200
  - T582137200
- Also provided on the USB drive is a controller configuration drawing and the controller configuration files loaded into the controller as shipped.

SYSTEM DESCRIPTION

-48 VDC @ up to 150 Amperes Power System

The NetSure™ 5100 DC Power System is an integrated power system containing rectifiers, intelligent control, metering, monitoring, and distribution.

This power system is designed to power a load while charging a positive 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 positive output grounded.

The NetSure 5100 consists of the following components mounted in a 19" or 23" wide relay rack or cabinet rack. Wall mounting options are also available.

Controller

NCU (NetSure Control Unit): The controller provides power system control (including optional low voltage battery disconnect [LVBD] and low voltage load disconnect [LVLD] control), rectifier control (including a charge control function), metering functions, monitoring functions, local/remote alarm functions, and

connections for binary inputs and programmable relay outputs via a controller interface board. The controller also supports rectifier temperature compensation if the system is equipped with a temperature probe(s). Temperature probe(s) may also be designated to monitor ambient temperature and/or battery temperature. The controller also provides data acquisition, system alarm management, and advanced battery and energy management. The controller contains a color TFT display and keypad for local access. The controller provides an Ethernet port and comes with comprehensive webpages for remote access. The controller has optional SNMP v3 capability for remote system management. The controller supports software upgrade via its USB port. Refer to the NCU Controller Instructions (UM1M830BNA) for more information.

Rectifier Modules

The system contains rectifier modules, which provide load power, battery float current, and battery recharge current during normal operating conditions. Refer to the Rectifier Instructions (UM1R482000e3) for more information.

Distribution Unit

Various distribution unit options are available. See SAG582137200 for descriptions. The distribution unit can be equipped with an optional Low Voltage Battery Disconnect (LVBD) or Low Voltage Load Disconnect (LVLD) contactor. The distribution unit provides DC distribution through circuit breakers and/or fuses.

OPERATING PROCEDURES

Controller and Rectifier

For operation instructions on these units, refer to the following documents.

- NCU Controller Instructions (UM1M830BNA)

NOTE! *The controller's default "User Name" is "admin" and the default "Password" is "640275".*

- Rectifier Instructions (UM1R482000e3)

ESTOP Function

If an ESTOP switch is wired to the IB2 Controller Interface Board, customer-furnished system ground applied to terminal Digital Input #8 (+) activates the ESTOP function. The ESTOP function shuts down and locks out the rectifiers and opens the LVD's. When the ESTOP signal is removed, LVD's close after the "LVD Reconnect Delay" has elapsed (customer configurable via the controller) (if battery is present or after the rectifiers are restarted). To restart the rectifiers, turn input power to the rectifiers OFF, wait 30 seconds or more (until the LEDs on the modules extinguish), then turn input power to the rectifiers ON.

Controller Battery Charge Current Limit Feature

Functionality: After a failure of the input source (commercial AC) or when some battery cells are permanently damaged, the current to the batteries can be quite extensive. To avoid overheating or further damages to the battery, the controller can be programmed to limit the battery current to a preset level by limiting the charging voltage of the rectifiers. Should the battery current still exceed a higher preset value, an alarm is issued.

The controller limits the current going to the batteries based on the "Battery Current Limit" set point which is a percentage of the battery capacity in C10. For example, 0.1C10 would mean 10% of the battery capacity.

Refer to the NCU Controller Instructions (UM1M830BNA) to program this feature. Battery charge current is limited to the value set in the controller, as long as battery voltage is above 47 VDC.

Local Controls and Indicators

Controller and Rectifier

Refer to the controller and rectifier instructions for descriptions of the local controls and indicators located on these units.

MAINTENANCE

System Maintenance Procedures

It is recommended to perform the maintenance procedures listed in **Table 1** every 6 months to ensure continual system operation.

Table 1: *Maintenance Procedures to be Performed at 6-Month Intervals*

Procedure	Referenced In
Check ventilation openings for obstructions such as dust, papers, manuals, etc.	--
Inspect and tighten all installer's connections.	IM582137200

Adding a Rectifier

To increase system current capacity, a rectifier module can easily be added if an empty rectifier module mounting position is available.

Refer to Rectifier Instructions UM1R482000e3 for a rectifier installation procedure.

Installing a Field Expansion Rectifier Shelf

DANGER! Adhere to the “Important Safety Instructions” presented at the front of this document.

NOTE! *Refer to* ***Figure 1*** *and* ***Figure 2*** *as this procedure is performed.*

Procedure

1. Remove the rear shield from the main module mounting assembly. This shield will not be re-used.
2. When the main module mounting assembly is configured with the front AC option, replace the mounting angle on the left side (as viewed from the front) of the expansion module mounting assembly with the longer mounting angle shipped loose with the expansion module mounting assembly.
3. Install the expansion module mounting assembly directly below the main module mounting assembly. Use the mounting hardware provided with the expansion module mounting assembly. See **Figure 1**. Refer also to **Figure 1** for hardware build-up and recommended torque.

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

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

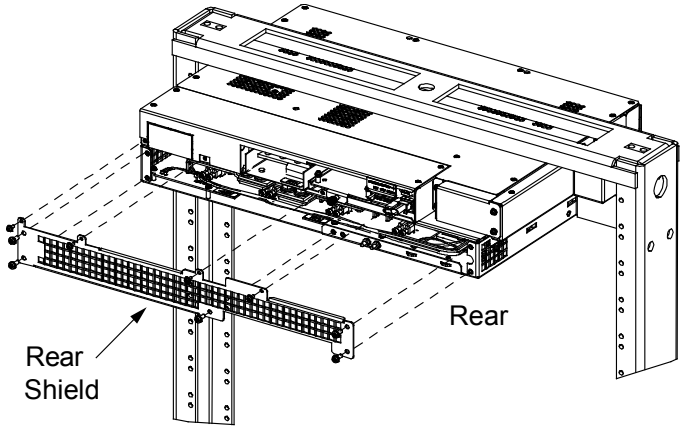
- All paint must be removed from the front surface of each equipment rack rail where it mates with a shelf-mounting bracket, so that good metal-to-metal contact can be established between the shelf and rack.
- The shelf-to-rack mating surfaces must be cleaned.
- Electrical anti-oxidizing compound must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

4. Remove the rear shield from the expansion module mounting assembly.

NOTE! *Apply electrical anti-oxidizing compound to busbar mating surfaces before performing the next step.*

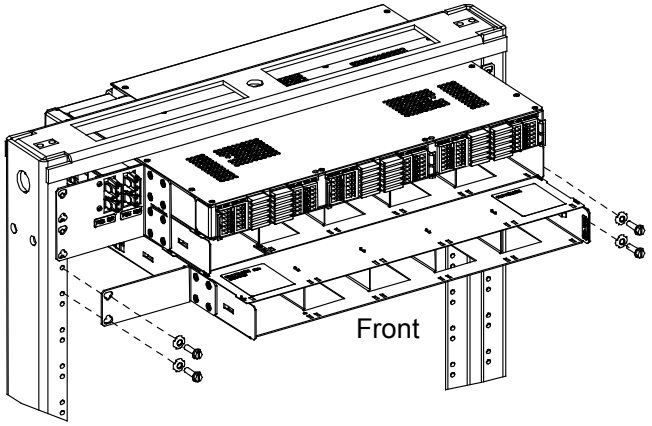
5. Remove the hardware from the main module mounting assembly's -48V and return busbars.
6. Loosen the hardware from the expansion module mounting assembly's -48V and return busbars.
7. Slide the busbars provided with the expansion module mounting assembly into position. These busbars are installed between the busbar studs on the expansion module mounting assembly and the busbar studs on the main module mounting assembly. Secure these busbars to the expansion module mounting assembly with the hardware provided with the expansion module mounting assembly. Secure these busbars to the main module mounting assembly with the hardware provided with the main module mounting assembly. Refer to **Figure 1** for hardware build-up and torque.
8. Disconnect the cable coming from the distribution unit that is connected to the left side (as viewed from the rear) connector on the main module mounting assembly. Connect this cable to the left side (as viewed from the rear) connector on the expansion module mounting assembly. See **Figure 2**.
9. Connect the cable provided with the expansion module mounting assembly between the left side (as viewed from the rear) connector on the main module mounting assembly and the right side (as viewed from the rear) connector on the expansion module mounting assembly. See **Figure 2**.
10. Install the new rear shields supplied with the expansion module mounting assembly to the rear of the main module mounting assembly. See **Figure 1**.
11. Re-install the busbar shield previously removed from the expansion module mounting assembly. See **Figure 1**.
12. Refer to the Power System Installation Instructions (IM582137200) and connect input power to the expansion module mounting assembly.
13. Refer to the Power System Installation Instructions (IM582137200) and install rectifier modules into the expansion module mounting assembly as required.

Figure 1: *Installing a Field Expansion Rectifier Shelf (cont'd on next page)*



23" Front AC Option Shown.
19" Rear AC Option Similar.

1. Remove rear shield from the main module mounting assembly. This shield will not be reused.

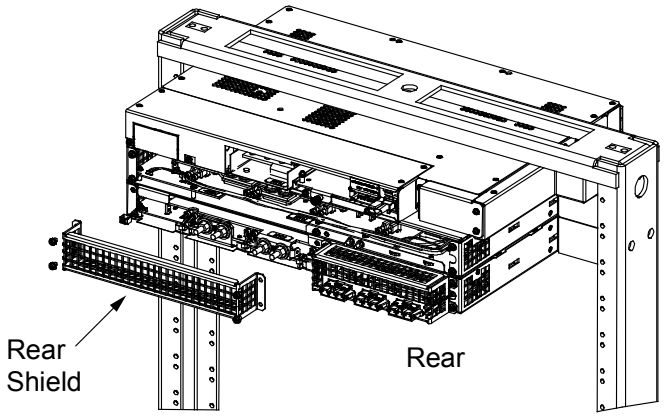


2. When the main module mounting assembly is configured with the front AC option, replace the mounting angle on the left side of the expansion module mounting assembly with the longer mounting angle shipped loose with the expansion module mounting assembly.

3. Install the expansion module mounting assembly into the rack.

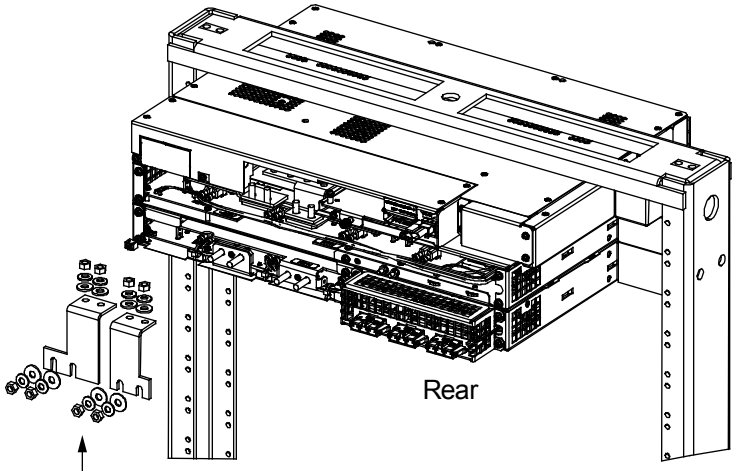
   MOUNTING HARDWARE
   12-24 x 3/4" Thread Forming Hex Head Screw
   No. 10/12 Ground Washer
   Torque: 65 in-lbs.

   Install the ground washers so the teeth make contact with the metal on the mounting angles.



4. Remove rear shield from the expansion module mounting assembly.

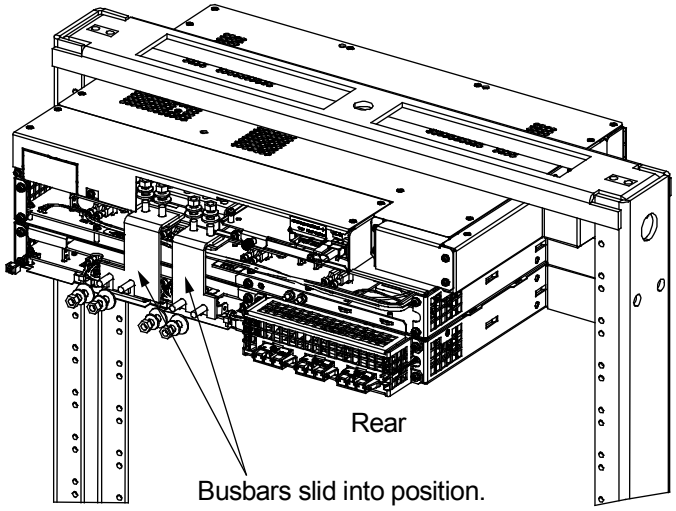
Figure 1: *Installing a Field Expansion Rectifier Shelf (cont'd from previous page, cont'd on next page)*



5. Install the busbars provided with the expansion module mounting assembly between the shelves. Torque to52 in-lbs.

   Do this by removing the hardware from the main shelf busbars, loosening the hardware on the expansion shelf busbars, and sliding the busbars into position.

   Apply electrical anti-oxidizing compound to busbar mating surfaces.



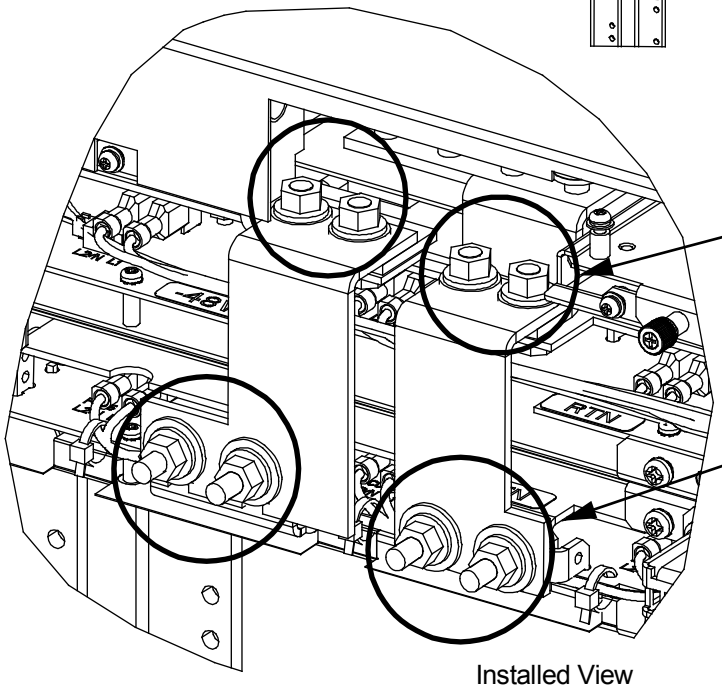
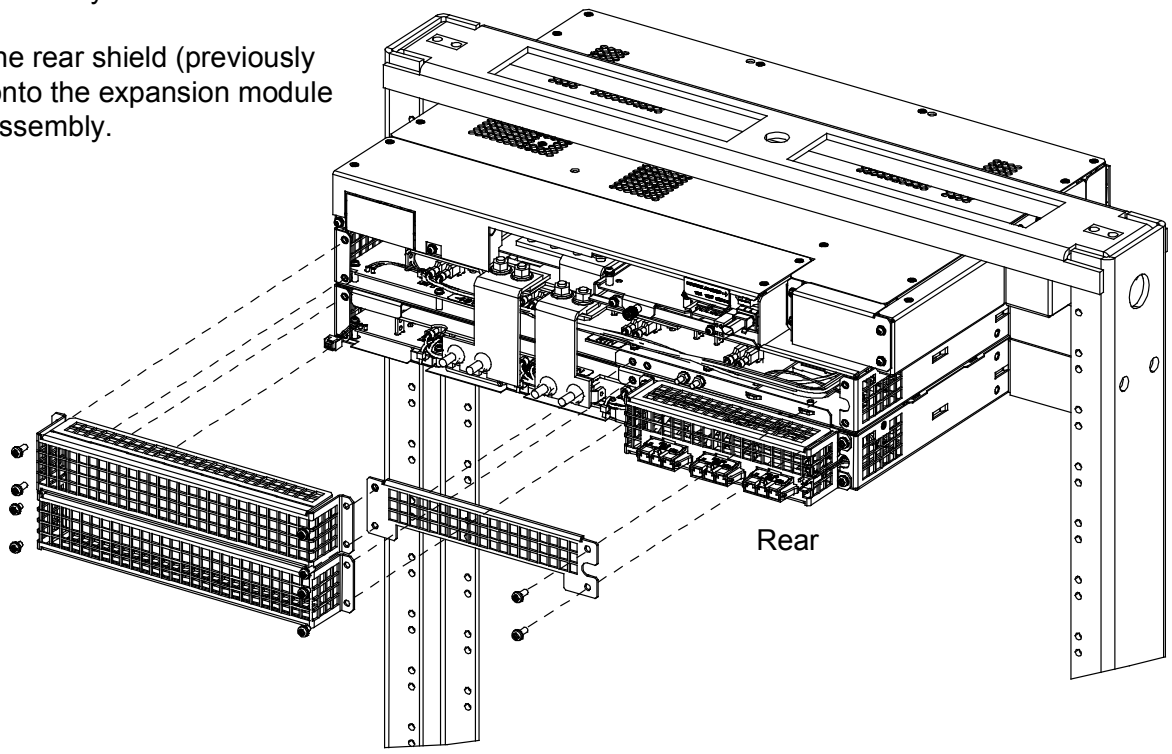


Figure 1: *Installing a Field Expansion Rectifier Shelf (cont'd from previous page)*

6. Install the new rear shields supplied with the expansion module mounting assembly to the main module mounting assembly.

7. Re-install the rear shield (previously removed) onto the expansion module mounting assembly.



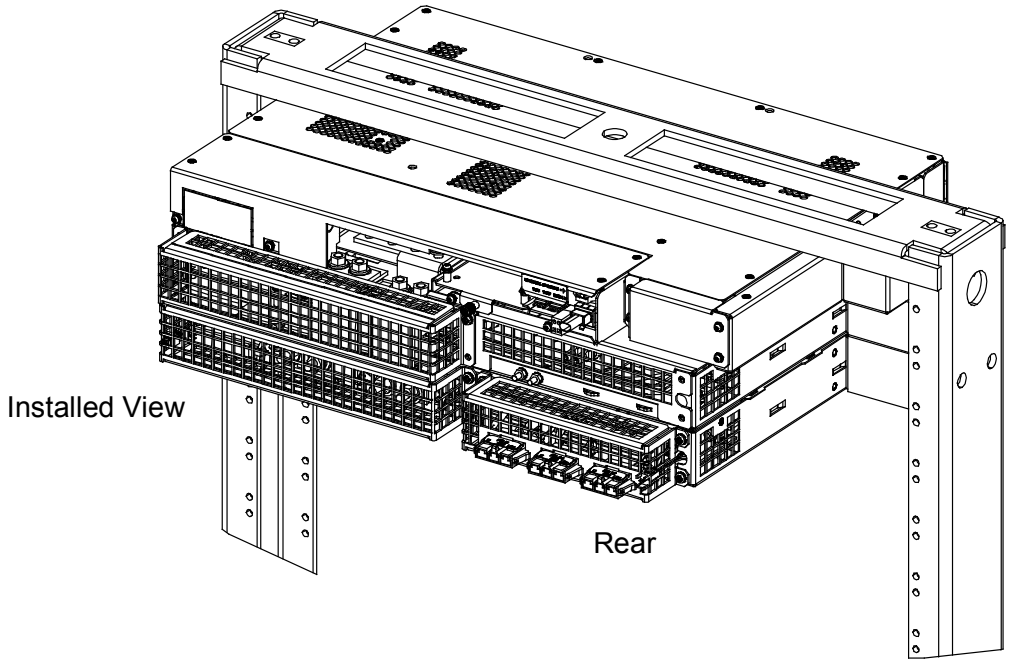
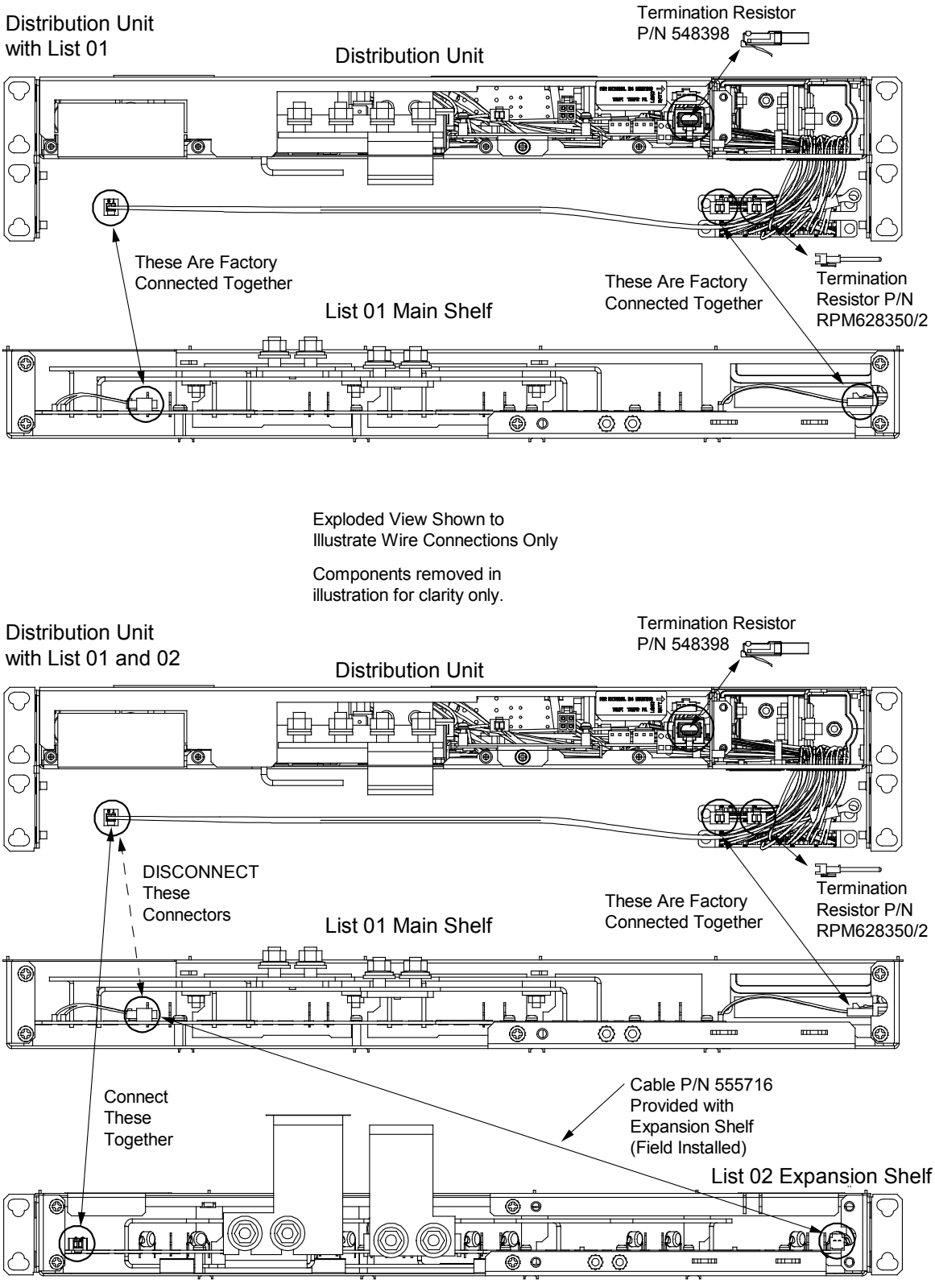


Figure 2: *Installing a Field Expansion Rectifier Shelf - Controller CAN Bus*



TROUBLESHOOTING AND REPAIR

Contact Information

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

Controller and Rectifier

For troubleshooting and repair instructions on these units, refer to the following documents.

- NCU Controller Instructions (UM1M830BNA)
- Rectifier Instructions (UM1R482000e3)

Controller Configuration

If any controller configuration settings were changed, refer to the NCU Controller Instructions (UM1M830BNA) and save a copy of the configuration file. This file can be used to restore the controller settings, if required, at a later date.

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

System Troubleshooting Information

This system is designed for ease in troubleshooting and repair. The various indicators as described in “Local Controls and Indicators” on page 11 and in the controller and rectifier instructions are designed to isolate failure to a specific element. Once the faulty element has been identified, refer to “Replacement Information” on page 18 and “Replacement Procedures” on page 18.

Troubleshooting Alarm Conditions on the Controller

The controller displays alarm conditions as listed in the “Resolving Alarms” section of the controller’s User Manual. Programmable external alarm relays are also available. Refer to the System Installation Instructions (IM582137200) and the Controller Configuration Drawing (C-drawing) supplied with your power system documentation for your alarm relay configurations.

The controller’s Active Alarm and Alarm History submenus allow the User to view alarm details. Refer to the NCU Controller Instructions (UM1M830BNA) to access these menus.

Checking the Controller’s Current Limit Point after Adding or Removing a Rectifier

If a rectifier module is added; the respective current limit point in amps will automatically increase to maintain the same percentage. For example, if the current limit was set to 100% of combined capacity and a rectifier module is added, the new current limit setpoint will be 100% of the combined capacity including the new rectifier module.

If a rectifier module is removed from the system (and the Rect Comm Fail is cleared), the current limit point will remain unchanged unless the capacity of the remaining rectifiers is not sufficient to maintain this current limit point. If that happens, the current limit point will automatically decrease to the maximum (121% of the remaining rectifiers).

It is recommended that the current limit point be checked whenever a rectifier is added to or removed from the power system.

When setting total rectifier current limit, the set point to each rectifier is the total set point divided by the number of rectifiers. For example, if the system contains five rectifiers and the current limit is set to 150 amps then each rectifier has a current limit set point of 30 amps. If one or more rectifiers are removed or fails it will take several seconds for the individual set points to the remaining rectifiers to be reset. In the example given, if one rectifier is removed the current limit set point will drop to 120 amps (30 amps times four remaining rectifiers) until the controller can send updated set points to the remaining rectifiers. This takes a couple communication cycles (several seconds) after which each rectifier would have a new set point of 37.5 amps for a total of 150 amps. The total current limit of the rectifiers should not be set such that the loss of the redundant rectifiers will cause this temporary set point to drop below the actual maximum expected load. If batteries are used on the rectifier output, the batteries should support the load until the current limit set points can be re-established due to loss of a rectifier.

Refer to the NCU Controller Instructions (UM1M830BNA) for a procedure.

Clearing a Rectifier Communications Fail Alarm after Removing a Rectifier

If a rectifier module is removed from the system, a rectifier communications failure alarm is generated. If the rectifier module will not be replaced, the alarm should be cleared.

Refer to the NCU Controller Instructions (UM1M830BNA) for a procedure.

Clearing a Rectifier Lost Alarm

If the controller resets while a rectifier communications fail alarm is active, the rectifier communications fail alarm is replaced with a rectifier lost alarm.

Refer to the NCU Controller Instructions (UM1M830BNA) for a procedure to clear the alarm.

Replacement Information

Replacement Assemblies

When a trouble symptom is localized to a faulty rectifier, controller, or system circuit card; that particular device or circuit card should be replaced in its entirety. No attempt should be made to troubleshoot or repair individual components on any rectifier, controller, or circuit card.

Refer to System Application Guide SAG582137200 for replacement part numbers.

Replacement Procedures

DANGER! Adhere to the “Important Safety Instructions” presented at the front of this document.

Replacing a Rectifier

Refer to the Rectifier Instructions (UM1R482000e3) for a rectifier replacement procedure. Refer also to “System Troubleshooting Information” on page 17.

The rectifier being replaced is assigned by the NCU the lowest available identification number. If desired, you can change the identification number, see “Configuring the NCU Identification of Rectifiers” in the separate Power System Installation Manual (IM582137200).

Replacing the NCU Controller

Refer to the NCU Controller Instructions (UM1M830BNA) for a controller replacement procedure.

Replacing a Distribution Device

Replace distribution devices with the same type and rating. Refer to System Application Guide SAG582137200 for part numbers.

Replacing a GMT Distribution Fuse

Procedure

1. Refer to **Figure 3** and replace the fuse. Ensure a safety fuse cover is installed on the replacement fuse, as shown in **Figure 4**.
2. Verify no alarms are active.

Replacing a Bullet Nose Circuit Breaker

Procedure

1. Operate the defective circuit breaker to the OFF position.
2. Gently rock the defective circuit breaker back and forth while pulling firmly outward until the breaker is free from the distribution unit.
3. Ensure that the replacement circuit breaker is in the OFF position, and is of the correct rating.
4. Orient the replacement circuit breaker as shown in **Figure 5** or **Figure 6**. Insert the terminals on the rear of the circuit breaker into their corresponding sockets on the distribution unit. Ensure the alarm contact on the back of the circuit breaker makes contact with the alarm terminal on the distribution unit. Push distribution device in firmly until fully seated in the distribution unit.
5. Operate the replacement circuit breaker to the ON position.
6. Verify no alarms are active.

Figure 3: *GMT Distribution Fuse Replacement (List BA, BC, BF, LC, NA, NC, NF)*

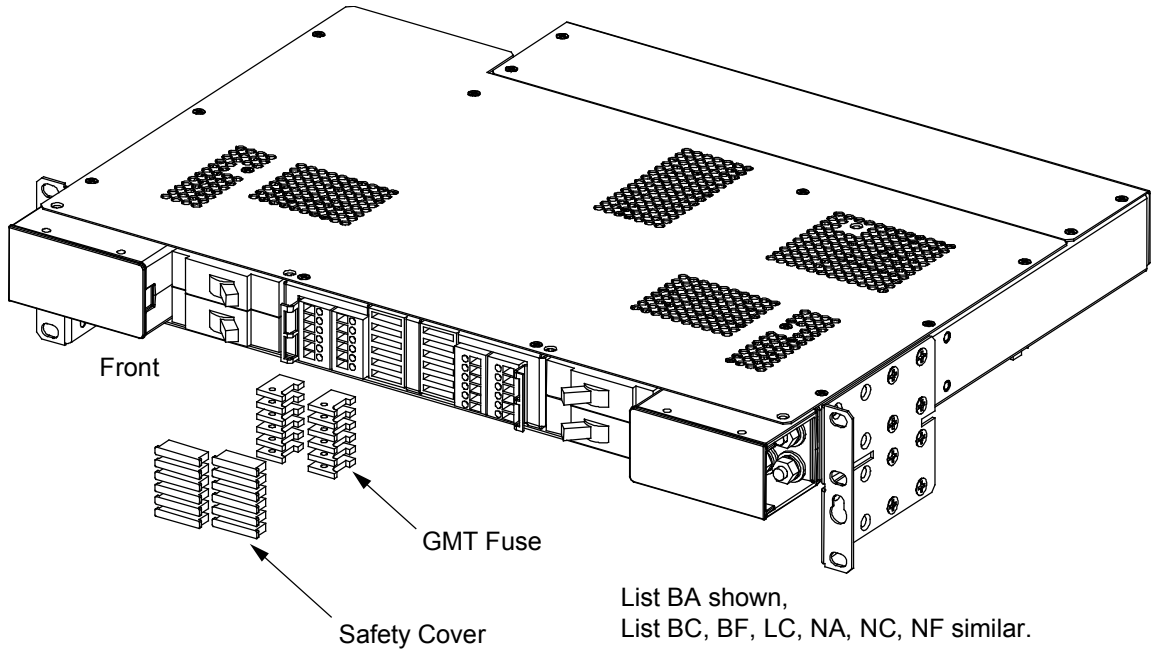


Figure 4: *Installation of Safety Fuse Covers*

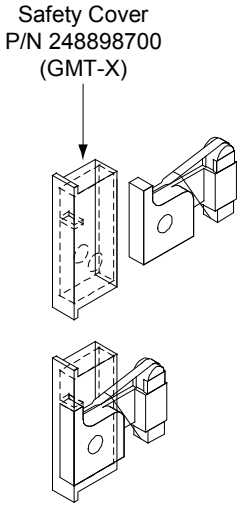
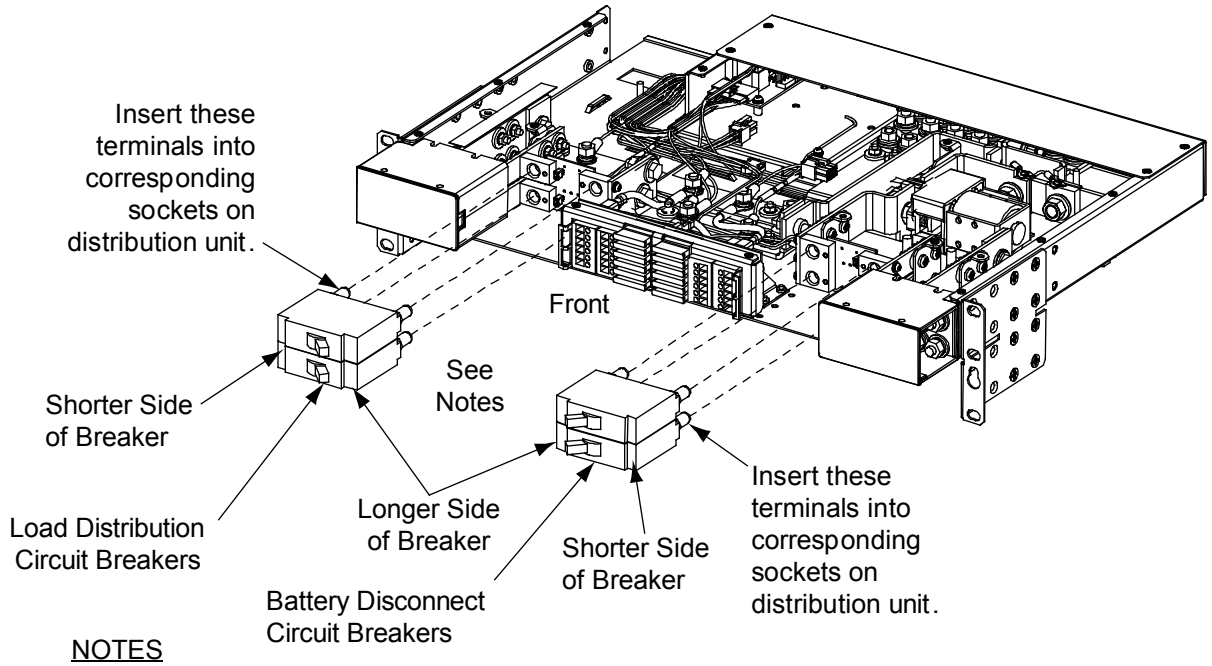


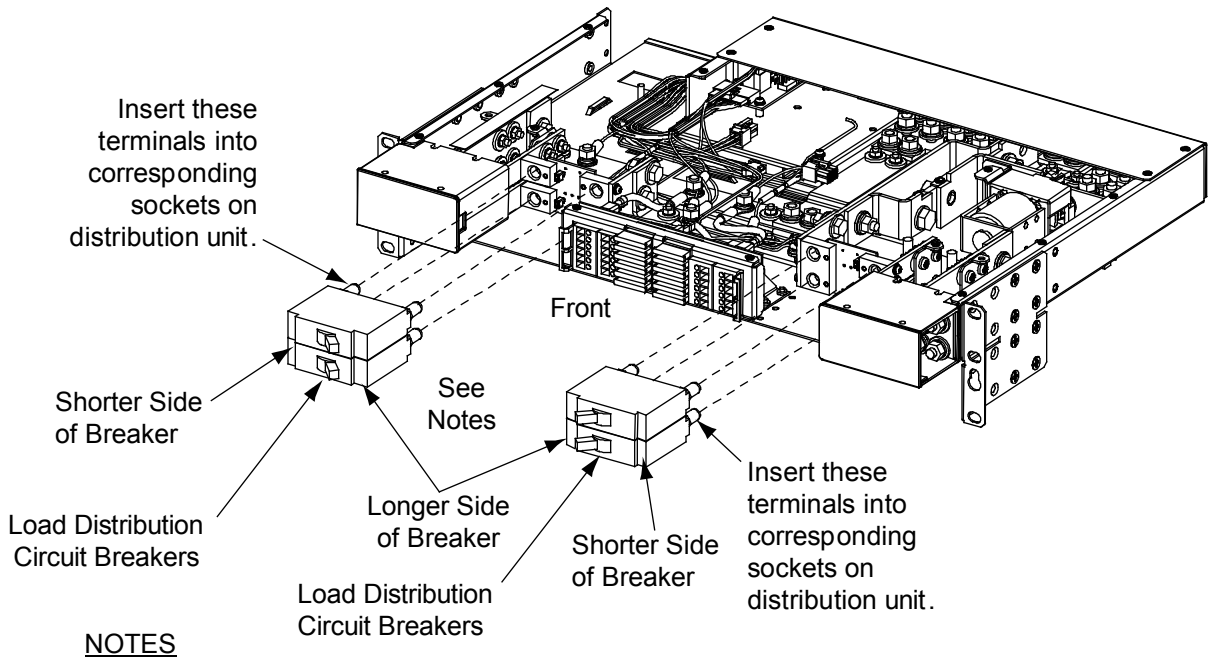
Figure 5: *Replacing a Bullet Nose Circuit Breaker (List BA, NA)*



NOTES

1. Turn circuit breaker off before installing.
2. When installing breakers, orient breaker so that when in off position the handle is towards the center (as shown in the illustration).
3. List BA shown, List NA similar.
4. Components removed in illustration for clarity only.

Figure 6: *Replacing a Bullet Nose Circuit Breaker (List BC, LC, NC)*



NOTES
1. Turn circuit breaker off before installing.
2. When installing breakers, orient breaker so that when in off position the handle is towards the center (as shown in the illustration).
3. List BC shown, List LC, NC similar.
4. Components removed in illustration for clarity only.

Circuit Card Replacement Procedures

DANGER! Adhere to the "Important Safety Instructions" presented at the front of this document.

WARNING! Circuit cards used in this power system contain static-sensitive devices. Read the Static Warning at the front of this document before performing any of the following procedures.

General

The following circuit card replacement procedures can be performed with the system operating. Refer to **Figure 7** for circuit card locations.

Replacing the System Interface Circuit Card

Procedure

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

1. 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 while the procedure is being performed.

WARNING! Damage to the circuit card 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. Remove the rear/top cover from the distribution unit to access the circuit card.
4. Carefully label the connectors plugged into the circuit card. These connectors must be plugged into the same connectors on the replacement circuit card.
5. Unplug all connectors plugged into the circuit card.
6. Remove the circuit card from the distribution unit by removing the screws securing it.
7. In this step, ensure you do not intermix the old and replacement circuit cards. Set the shorting jumper on the replacement circuit card to match the location on the old circuit card. Jumper settings are documented in the "Setting Jumper and Switch Options" section of the Power System Installation Instructions (IM582137200).
8. Orient the replacement circuit card over its mounting position, and secure with the screws removed from the old circuit card.
9. Plug all connectors removed from the old circuit card into the same position on the replacement circuit card.
10. Reinstall the rear/top cover to the distribution unit.
11. Remove the grounding wrist strap.
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.

Replacing the IB2 (Controller Interface Board) (if furnished)

Procedure

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

1. 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 while the procedure is being performed.

WARNING! Damage to the circuit card 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. Loosen the screw securing the slide out tray on the rear of the distribution unit. Slide the tray out to access the circuit card.
4. Carefully label the wires connected to the customer connection terminal blocks on the circuit card. These wires must be connected to the same terminals on the replacement circuit card.

5. Carefully label the connectors plugged into the circuit card. These connectors must be plugged into the same connectors 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. Remove the external wiring from the customer connection terminal blocks. DO NOT allow the bare wire end to contact any grounded or energized object. Isolate the wire end with electrical tape. Repeat for each wire to be removed.
7. Unplug all connectors plugged into the circuit card.
8. Remove the circuit card from the distribution unit by removing the screws securing it to the slide out tray.
9. In this step, ensure you do not intermix the old and replacement circuit cards. Set the switch on the replacement circuit card to the same setting as the old circuit card. Switch settings are documented in the "Setting Jumper and Switch Options" section of the Power System Installation Instructions (IM582137200).
10. Orient the replacement circuit card over its mounting position, and secure with the screws removed from the old circuit card.
11. Plug all connectors removed from the old circuit card into the same position 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.

12. Reconnect the external wiring to the correct terminals on the customer connection terminal block. First remove the electrical tape that was applied to the bare wire end in a previous step. DO NOT allow the bare wire end to contact any grounded or energized object. After securing the wire, gently tug on the wire to ensure that it cannot be pulled out of the terminal block. Repeat for each wire to be reconnected.
13. Reinstall the slide out tray and secure by tightening the screw.
14. Remove the grounding wrist strap.
15. Enable the external alarms, or notify appropriate personnel that this procedure is finished.
16. Ensure that there are no local or remote alarms active on the system.

Replacing the IB4 Board (if furnished)

Procedure

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

1. 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 while the procedure is being performed.

WARNING! Damage to the circuit card 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. Loosen the screw securing the slide out tray on the rear of the distribution unit. Slide the tray out to access the circuit card.
4. Carefully label the connectors plugged into the circuit card. These connectors must be plugged into the same connectors on the replacement circuit card.
5. Unplug all connectors plugged into the circuit card.
6. Remove the circuit card from the distribution unit by removing the screws securing it to the slide out tray.
7. Orient the replacement circuit card over its mounting position, and secure with the screws removed from the old circuit card.
8. Plug all connectors removed from the old circuit card into the same position on the replacement circuit card.
9. Reinstall the slide out tray and secure by tightening the screw.
10. Remove the grounding wrist strap.
11. Reboot the NCU.

    Local Menu Navigation:
    At the Main Screen, press ENT and ESC at the same time to reboot the NCU Controller.

    Web Menu Navigation:
    Advance Settings Menu / SW Maintenance Tab / Reboot Controller button.
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 7: *Circuit Card Locations*

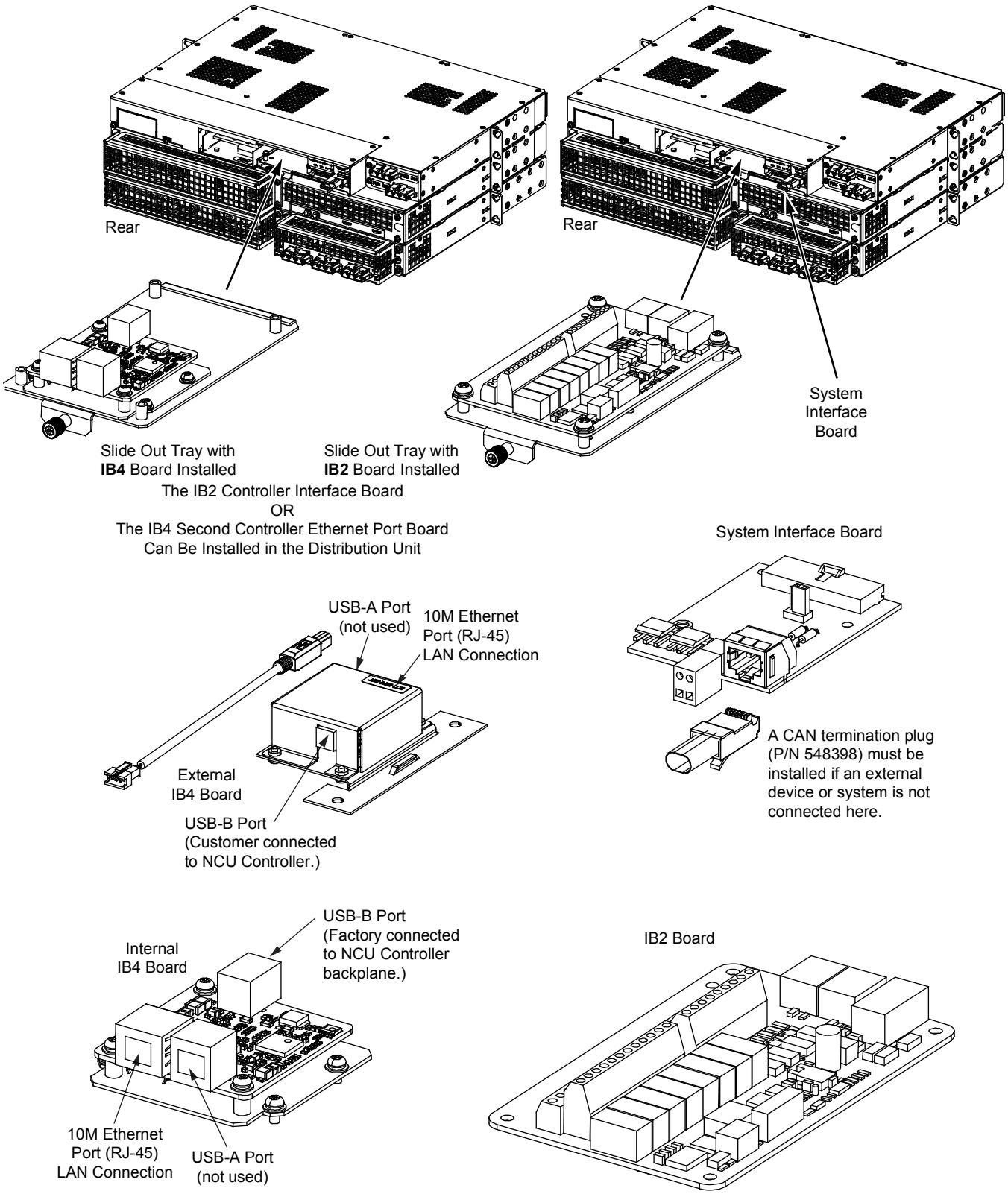
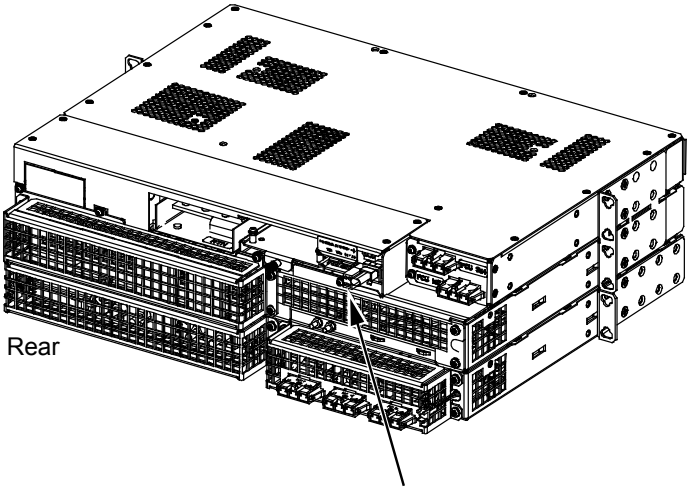
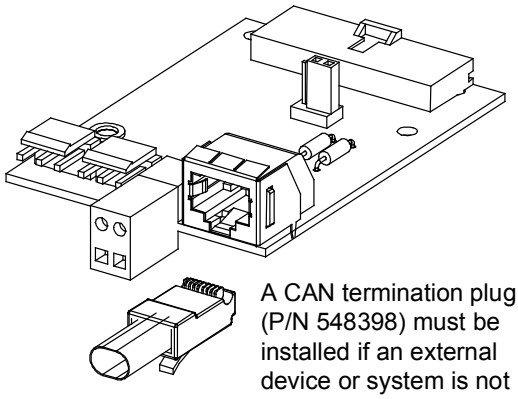


Figure 8: *System Interface Circuit Card Replacement*

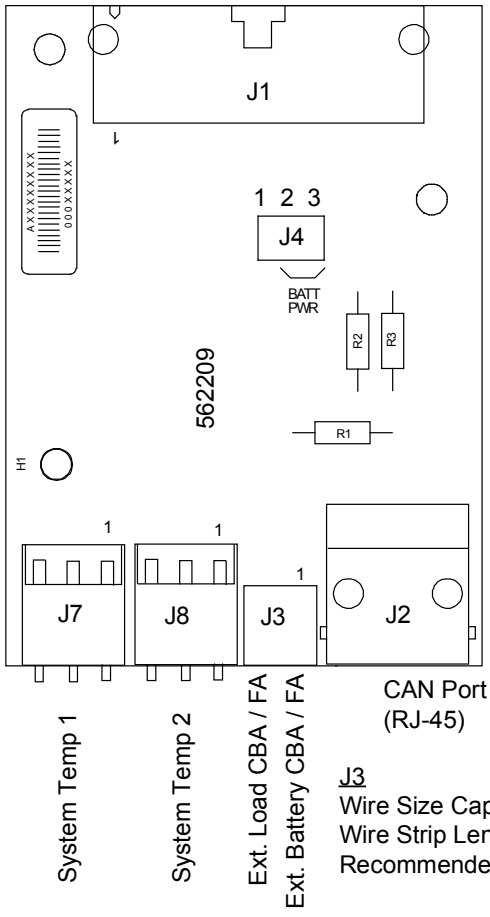


System Interface Board

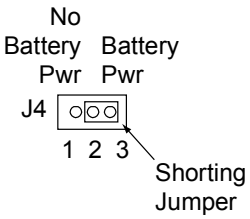


A CAN termination plug (P/N 548398) must be installed if an external device or system is not connected here.

System Interface Board P/N 562209

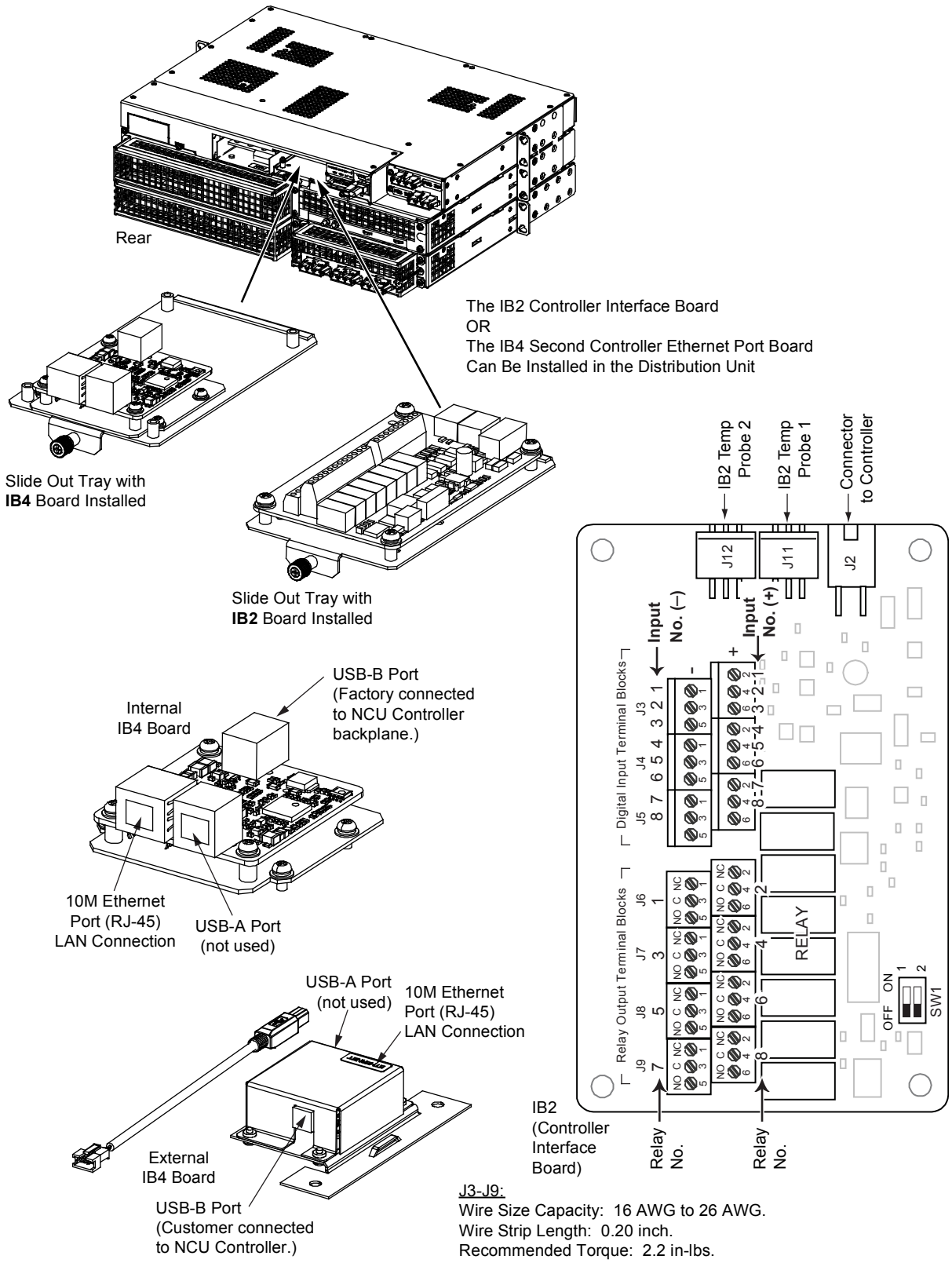


J4
Selects to power controller from "Battery Power" or not if a battery LVD contactor is furnished.



J3
Wire Size Capacity: 16 AWG to 30 AWG.
Wire Strip Length: 0.32 inch.
Recommended Torque: 2.3 in-lbs.

Figure 9: *IB2 or IB4 Circuit Card Replacement*



J3-J9:
Wire Size Capacity: 16 AWG to 26 AWG.
Wire Strip Length: 0.20 inch.
Recommended Torque: 2.2 in-lbs.

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