

Lucent Technologies
Bell Labs Innovations



Installation Guide for Galaxy Power Systems

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Installation Guide
for Galaxy Power Systems

Notice:

Every effort was made to ensure that the information in this document was complete and accurate at the time of printing. However, information is subject to change.

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1 Introduction

Product Documentation

This Installation Guide

This Installation Guide (Select Code 167-792-157) provides instructions for installing Lucent Technologies Galaxy Power Systems that use 595A Series or 595B Series (48V/200A), 596A Series (48V/50A), or 596B Series (24V/100A) rectifiers.

Related Product Manuals

GPS 2424

Ordering Guide	H569-437
Manufacturing Drawings	ED83142-30 (AC) ED83143-30 (DC) J85582E-1 (System)
Wiring Diagram	T83314-30
User's Guide	167-792-159

GPS 4812

Ordering Guide	H569-436
Manufacturing Drawings	ED83142-30 (AC) ED83143-30 (DC) J85582E-1 (System)
Wiring Diagram	T83314-30
User's Guide	167-792-161

GPS 4848/100

Ordering Guide	H569-434
Manufacturing Drawings	ED83142-30 (AC) ED83143-30 (DC) J85582C-1 (System)
Wiring Diagram	T83314-30
User's Guide	167-792-155

Product Documentation, continued

Galaxy Millennium Controller

Manufacturing Drawing	J85501K-1
Wiring Diagram	T83413-30
Product Manual	167-792-180

Galaxy Vector Controller

Wiring Diagram	T83314-30
Product Manual	167-792-112

Galaxy RC Controller

Manufacturing Drawing	J85501H-1
Wiring Diagram	T83386-30
Product Manual	167-792-170

Galaxy SCF Controller

Manufacturing Drawing	J85501F-1
Wiring Diagram	T83217-30
Product Manual	167-792-110

Remote Peripheral Monitoring System

Manufacturing Drawing	J85501G-1
Wiring Diagram	T83275-30
Schematic Drawing	SD-83275-01
Product Manual Select Code	167-790-063

EasyView Software

Product Manual	193-104-105
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Customer Assistance Contacts

Customer Training Lucent Technologies offers customer training on many Power Systems products. For information call 1-972-284-2163. This number is answered from 8:00 a.m. until 4:30 p.m., Central Time Zone (Zone 6), Monday through Friday.

Customer Service For customers in the United States, Canada, Puerto Rico, and the US Virgin Islands, call 1-800-THE-1PWR (1-800-843-1797). Services provided through this contact include initiating the spare parts procurement process for out of service emergencies, ordering Lucent Technologies documents, and providing other product and service information.

For other customers worldwide, call 001-972-840-0382. This number is answered from 8:00 a.m. until 4:30 p.m., Central Time Zone (Zone 6), Monday through Friday.

Technical Support Technical support for Lucent Technologies customers is available around the world during the normal product warranty period and also while specific contractual agreements extend this service.

For customers in the United States, Canada, Puerto Rico, and the US Virgin Islands, call 1-800-CAL-RTAC (1-800-225-7822) to contact a product specialist to answer your technical questions and assist in troubleshooting problems.

For other customers worldwide, contact your local field support center or your sales representative to discuss your specific needs.

Product Repair and Return Repair and return service is provided for Lucent Technologies customers around the world.

For customers in the United States, Canada, Puerto Rico, and the US Virgin Islands, call 1-800-255-1402 for information on returning of products for repair.

For other customers worldwide, contact your sales representative to discuss your particular circumstances.

Customer Assistance Contacts, continued

Warranty Service For domestic warranty service, contact your Warranty Service Manager (WSM). For international warranty service, contact your sales representative.

On-Line Power Systems Product Manuals For Lucent Technologies users logging in from inside the corporate firewall, the address of the “Power Systems On-Line Product Manuals” page is <http://www.cic.lucent.com/lineage.html>.

For customers logging in from outside the firewall, the address is <http://www.lucent8.com/lineage.html>. The annual subscription fee for access to this site is \$25. To obtain a password, follow the instructions on-line or call 1-888-Lucent8 (1-888-582-3688). When prompted for an order number, enter or say “167-790-010.”

On-Line Power Systems Software Upgrades EasyView software upgrades are on-line at <http://www.lucent.com/networks/power/software.html>.

2 *Safety*

Safety Statements

Please read and follow all safety instructions and warnings before installing, maintaining, or repairing a Galaxy Power System. Reference the individual module product manuals for additional safety statements specific to the modules.

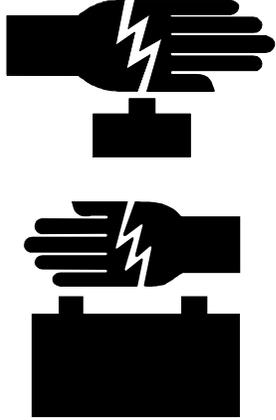
- The Galaxy Power System is Underwriters Laboratories (UL) Listed per Subject Letter 1801, DC Power Distribution Centers for Telecommunications Equipment, and VDE Licensed to EN60950 (H569-436 and H569-437 only). Rectifiers are individually UL Recognized and/or CSA Certified to UL1950 and CSA C22.2 No. 234/950. Rectifiers are also approved to IEC-950/EN60950 by an EC Notified Body and have outputs classified as SELV.
- Install only in restricted access areas (dedicated equipment rooms, equipment closets, or the like) in accordance with articles 110-16, 110-17, and 110-18 of the U.S. National Electric Code (NEC), ANSI/NFPA No. 70, and pursuant to applicable local codes.
- Use this equipment in a controlled environment (an area where the humidity is maintained at levels that cannot cause condensation on the equipment, the contaminating dust is controlled, and the steady-state ambient temperature is within the range specified). GPS 4848/100 has been evaluated for use in a continuous ambient temperature up to 40°C. Short-term excursions to 45°C are acceptable. GPS 2424 and GPS 4812 have been evaluated for use in a continuous ambient temperature of up to 45°C.
- Do not install this equipment over combustible surfaces.
- Fuses/circuit breakers may not be provided with the equipment. Refer to the Galaxy Power System documentation for the proper hardware. **Use only the parts specified in the Galaxy Power System (GPS) documentation.** Installing fuses or circuit breakers not specified for use in this equipment may result in injury to service personnel or equipment damage.

Safety Statements, continued

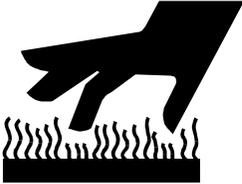
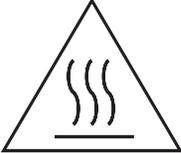
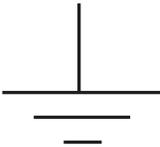
- For installations in the U. S. or Canada, use Listed/Certified compression connectors to terminate Listed/Certified field-wire conductors where required. For all installations, apply the appropriate connector to the correct size conductor as specified by the connector manufacturer, using only the connector manufacturer's recommended tooling or tooling approved for that connector. If the proper connector for the country of installation is not provided, obtain appropriate connectors and follow manufacturer's and all local requirements for proper connections. Follow all national and local rules and regulations when making field connections.
- Torque electrical connections to the values specified on labels or in the product documentation.
- Battery input cables must be dressed to avoid damage to the conductors (caused by routing around sharp edges or routing in areas where wires could get pinched) and undue stress on the connectors.
- Either external fuses or external circuit breakers must be sized as required by the National Electric Code (NEC) and/or local codes. Refer to the equipment ratings to assure rating of equipment will not exceed 80% of the value of the protector chosen. Refer to the system T-drawing (wiring diagram) for recommended circuit protection for the different options.
- The ac input distribution has been evaluated for connection of minimum 90°C conductors sized according to the US National Electrical Code using the 90°C ampacity tables. Torque electrical connections to the values specified on labels or in the product documentation.
- Provide an accessible ac disconnect/protection device to remove ac power from the equipment in the event of an emergency. This device must open all poles and be connected together. When connecting to 3-wire plus neutral supply systems, the neutral must be readily earthed at the supply, i.e., this equipment is not intended to be connected to IT supply systems.
- Electricity produces magnetic fields that can affect implanted medical electronic devices, such as pacemakers. The strength of the magnetic field depends on the amount of current in the circuit, as well as other conditions (such as number of conductors, placement, and distance from the conductor). DC power and distribution systems, including the batteries, that are typically used in telecommunications utility rooms can operate at high current levels. Personnel with electronic medical devices need to be aware of their restrictions when working around electricity.

Warning Statements and Safety Symbols

The symbols may sometimes be accompanied by some type of statement; e.g., “Hazardous voltage/energy inside. Risk of injury. This unit must be accessed only by qualified personnel.”

	<p>This symbol identifies the need to refer to the equipment instructions for important information.</p>
	<p>These symbols (or equivalent) are used to identify the presence of hazardous ac mains voltage.</p>
	<p>This symbol is used to identify the presence of hazardous ac or dc voltages. It may also be used to warn of hazardous energy levels.</p>
	<p>One of these two symbols (or equivalent) may be used to identify the presence of rectifier and battery voltages. The symbol may sometimes be accompanied by some type of statement, for example: “Battery voltage present. Risk of injury due to high current. Avoid contacting conductors with uninsulated metal objects. Follow safety precautions.”</p>

Warning Statements and Safety Symbols, continued

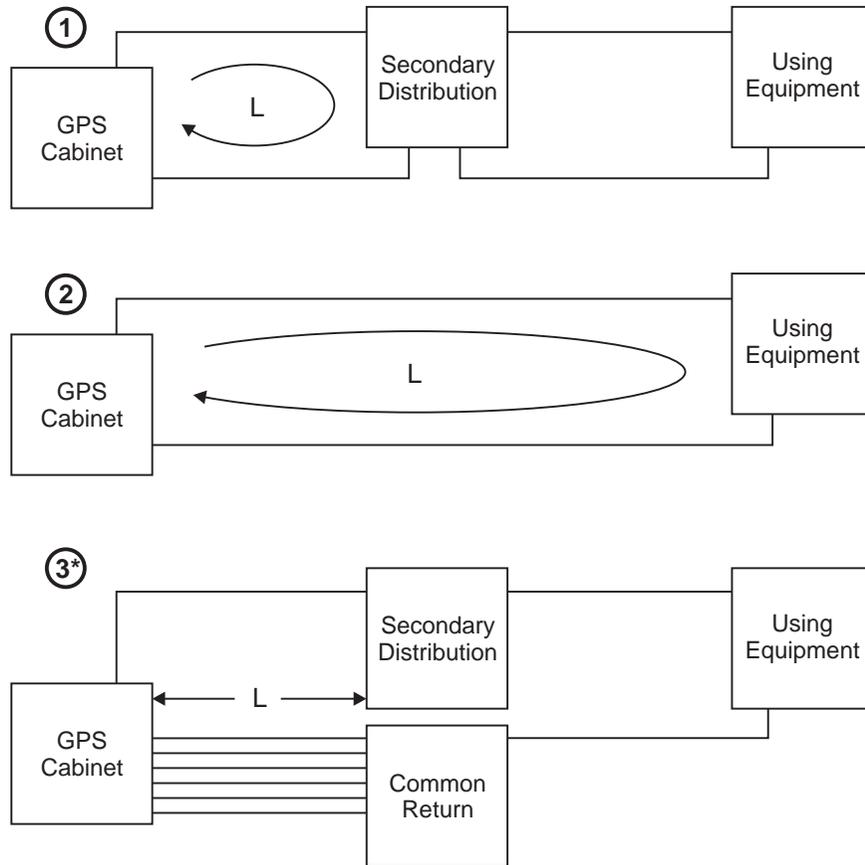
 A black silhouette of a hand reaching down towards a series of vertical wavy lines representing flames or a hot surface.	<p>This symbol is used to identify the presence of a hot surface. It may also be accompanied by a statement explaining the hazard. A symbol like this with a lightning bolt through the hand also means that the part is or could be at hazardous voltage levels.</p>
 A black triangle containing three vertical wavy lines, representing heat or a hot surface.	<p>This symbol may also be used to identify the presence of a hot surface. The marked item should not be touched without taking care.</p>
 A black circle containing a vertical line that meets a horizontal line, which is above another horizontal line, representing a protective safety earth ground.	<p>This symbol is used to identify the protective safety earth ground for the equipment.</p>
 A vertical line meeting a horizontal line, which is above another horizontal line, representing other bonding points within the equipment.	<p>This symbol is used to identify other bonding points within the equipment.</p>
 A black circle containing a white silhouette of a person's head wearing safety glasses.	<p>This symbol is used to identify the need for safety glasses and may sometimes be accompanied by some type of statement, for example: "Fuses can cause arcing and sparks. Risk of eye injury. Always wear safety glasses."</p>

Precautions

When working on or using this type of equipment, the following precautions should be noted:

- The Galaxy Power System must be installed, serviced, and operated only by skilled and qualified personnel who have the necessary knowledge and practical experience with electrical equipment and who understand the hazards that can arise when working on this type of equipment.
- The Galaxy Power System may be powered by multiple ac inputs. Make sure that the appropriate circuit protection device for each ac input being serviced is disconnected before servicing the equipment.
- The short circuit current capacity of the battery input to the dc distribution panel is 10,000 amperes.
- If batteries are connected to the Galaxy Power System, disconnecting the ac alone will not necessarily remove power to the equipment. Make sure the equipment is not also powered by the batteries or the batteries are not connected to the output of the equipment.
- High leakage currents may be possible on this type of equipment. Make sure the equipment is properly safety earth grounded before connecting power.
- Hazardous energy and voltages are present in the Galaxy Power System and on the interface cables that can shock or cause serious injury. Exercise care and follow all safety warnings and practices when servicing this equipment.
- Load cables must be sized in accordance with the cable lengths shown in Table 2-A and Figure 2-1 to keep short circuit currents less than the interrupt ratings of dc protectors in each panel (as shown in Table 2-B).

Precautions, continued



*This configuration is not recommended by Lucent Technologies.

Figure 2-1: Short Circuit Current Calculations

Precautions, continued

Note: Provide cable run lengths as least as long as the minimum length indicated in Table 2-A to assure that the short circuit currents are less than the interrupt current rating of the fuse or circuit breaker chosen.

1. Find the interrupt current rating of the chosen fuse or circuit breaker from Table 2-B.
2. See Table 2-A for the minimum length (L) for the engineered cable size to be run at the interrupt rating found in Step 1.

A minimum cable length for a given cable size and protector type must be used to ensure proper short circuit protection in the case of a bolted fault.

Table 2-A: Cable Run Lengths

Cable Size	Minimum Length "L" Required to Limit the Current to an Interrupt Rating of:		
	100KA	25KA	10KA
10 GA (6mm ²)	--	--	5 feet
8 GA (10 mm ²)	--	--	8 feet
6 GA (16 mm ²)	--	5 feet	12 feet
4 GA (25 mm ²)	--	8 feet	19 feet
2 GA (35 mm ²)	3 feet	12 feet	30 feet
1/0 GA (50 mm ²)	5 feet	19 feet	--
2/0 GA (70 mm ²)	6 feet	24 feet	--
4/0 GA (120 mm ²)	10 feet	38 feet	--
(2) 4/0 GA ((2) 120 mm ²)	19 feet	76 feet	--
(3) 4/0 GA ((3) 120 mm ²)	29 feet	113 feet	--
350 MCM	17 feet	63 feet	--
(2) 350 MCM	32 feet	125 feet	--
(3) 350 MCM	47 feet	188 feet	--

Precautions, continued

Table 2-B: Interrupt Current Ratings for Fuses and Circuit Breakers

Description	ED83143-30 Groups	Interrupt Current Rating (amps)
Large circuit breakers	1, 2, 3, 4, 5, 6, 101, 102, 103, 104, 105, 106	25,000
Small plug-in circuit breakers	11, 12, 13, 14, 111, 112, 113, 114	10,000
Small bullet-style circuit breakers	15, 115	10,000
Large fuse	51, 52, 151, 152	100,000
Medium fuse	53, 153	100,000
Small plug-in fuse	11, 12, 13, 14, 111, 112, 113, 114	100,000
DIN-style fuses	Not available from Lucent Technologies. Contact fuse or circuit breaker manufacturer.	
DIN-style circuit breakers	Not available from Lucent Technologies. Contact fuse or circuit breaker manufacturer.	

Precautions, continued

- In addition to proper job training and safety procedures, the following are some basic precautions that should always be used:
 - Batteries may be connected in parallel with the output of the rectifiers. Turning off the rectifiers will not necessarily remove power from the bus. Make sure the battery power is also disconnected and/or follow safety procedures while working on any equipment that contains hazardous energy/voltage.
 - Use **only** properly insulated tools.
 - Remove all metallic objects (key chains, glasses, rings, watches, or any other jewelry).
 - Wear safety glasses.
 - Test circuits before touching.
 - Lock out and tag any circuit breakers/fuses when possible to prevent accidental turn on.
 - Be aware of potential hazards before servicing equipment.
 - Identify exposed hazardous electrical potentials on connectors, wiring, etc. (note the condition of these circuits, especially any wiring).
 - Use care when removing or replacing any covers; avoid contacting any circuits.

Note: Refer to Section 15, *Power Up and Installation Completion*, for precautions and proper methods for handling rectifiers and converters.

Special Installation Notes

German

Installationsanleitung (Installation Instructions)

- Eingangsspannung (Voltage):
200-240 phase to phase or phase to neutral (H569-436, H569-437)
200-240, 380-480 (H569-434)
- Eingangsstrom (Current):
120A max., 20A/rectifier (H569-436, H569-437)
300A max. (H569-434)
- Nennfrequenz (Frequency):
50/60Hz
- Abmessungen sind nur zur referenz:
(Dimensions are for reference only)
600mm x 500mm (H569-436, H569-437)
600mm x 600mm (H569-434)
- Max. Umgebungstemperatur:
(Max. operation temperature)
45°C (113°F)
- Achtung: Für kontinuierlichen Feuerschutz sollte die Sicherung nur mit einer des gleichen Types ersetzt werden.
(Warning: For continued protection against fire replace with same type and rating of fuse)
- Das Schaltnetzteil ist ein Gerät der Schutzklasse I
(Power Supply is a Class I Equipment)

Special Installation Notes, continued

- German, continued***
- Ausgangsspannungen und -strome
(Output Voltage and Current)

	Ausgangsspannungen	und -strome
H569-434	-48	4800
H569-436	-48	1200
H569-437	+24	2400

- Das Gerät darf nur in Räumen mit beschränktem Zutritt aufgestellt werden.
(Nur ausgebildetes Personal) (Restricted access)
- Das Gerät muß mindestens mit einer Anschlußleitung 4 x mm oder 5 x mm versehen sein.
(Suitable for 4 conductor or 5 conductor systems)
- Das Gerät hat keinen eigenen Ausschalter, es muß daher mit einem Ein- und Ausschalter im Versorgungskreis versehen sein.
(Mains disconnect switch required in the installation)
- Das Gerät hat kein Brandschutzgehäuse es darf daher nur auf nicht brennbaren Untergrund aufgestellt werden. (Beton, Metall usw.)
(No fire enclosure, non-combustible floor)
- Das Gerät wird fest am Boden installiert (siehe weitere Anleitung)
(Must be bolted to the floor)
- Modellnummer H569-436, H569-437:
Beim Aufstellen des Gerätes ist darauf zu achten das alle Anforderungen gemäß EN60950 eingehalten werden.
(Evaluated to EN60950)

Special Installation Notes, continued

Spanish

Notas especiales para instalaciones en países de habla hispana

Instrucciones de instalación (Installation Instructions)

- Voltaje (Voltage):
200-240, 350-415 (H569-436, H569-437)
200-240, 380-480 (H569-434)
- Corriente (Current):
120A máx., 20A/rectificador (H569-436, H569-437)
300A máx. (H569-434)
- Frecuencia (Frequency):
50/60Hz
- Las dimensiones son únicamente para referencia:
(Dimensions are for Reference only)
600mm x 500mm (H569-436, H569-437)
600mm x 600mm (H569-434)
- Temperatura máxima de operación: (Max. operation temperature)
45°C (113°F)
- Advertencia:
Para una protección continua contra incendios, reemplace por el mismo tipo y clasificación de fusible. (Warning: For continued protection against fire replace with same type and rating of fuse.)
- La fuente de alimentación es un equipo clase I (Power Supply is a Class I Equipment)
- Voltaje y corriente de salida (Output Voltage and Current)
- (Acceso restringido) (Restricted access)
 - Adecuado para sistemas de 4 conductores o de 5 conductores.
(Suitable for 4 conductor or 5 conductor systems)
 - Se requiere un interruptor de desconexión de la línea principal en la instalación (Mains disconnect switch required in the installation.)
 - Sin cabina contra incendios, suelo no combustible (No fire enclosure, non-combustible floor)
 - Debe estar anclado al piso (Must be bolted to the floor)
 - Número de modelo H569-436, H569-437: Evaluado en EN60950 (Evaluated to EN60950)

3 *Getting Started*

Tools and Hardware

You will need the following tools and hardware to install the Galaxy Power System:

- Material-handling equipment to unload the cabinet at the installation site, remove from shipping container, and set in final position [minimum lifting capacity: 900 lbs. (410Kg)] Note: Use the equipment weights and dimensions as a guideline for choosing material-handling equipment.
- Drill and drill bits to install floor anchors
- 3/16-inch (5mm) Allen-head wrench (provided)
- **Insulated** hand tools
- Screw drivers (flat-blade and Phillips)
- Wire cutters and stripper
- Torque wrenches (see Table 3-A)
- 35-513 in-lbs (4-58 N·m)

Sockets:

<u>Metric</u>	<u>English Equivalent</u>	<u>Hardware</u>
8mm	5/16"	M5
10mm	--	M6
13mm	1/2"	M8
17mm	11/16"	M10
19mm	3/4"	M12
--	3/8"	1/4"
--	9/16"	3/8"

Tools and Hardware, continued

- Crimp tools
 - 22-16 gauge
 - 10-500 MCM (5-120mm²)
- Jeweler's screwdriver
- Digital multimeter (DMM) with 0.05% accuracy on dc scale
- Load box (100 amperes @ 24V)
- Load box (200 amperes @ 48V)
- Laptop or personal computer (PC) loaded with Windows 3.1 or later (optional)
- ESD wrist strap*

*Equipment is ESD sensitive. It is required that an ESD wrist strap be worn during installation and repair.

Torque Settings for Hardware

Table 3-A: Torque Settings for Hardware

Metric		
Screw Size	Torque (Nm)	Torque (in-lbs)
M2	0.24	2
M2.5	0.48	4
M3	0.9	8
M3.5	1.4	12
M4	2	18
M5	4	35
M6	7	62
M8	18	160
M10	34	300
M12	58	513
English		
Screw Size	Torque (Nm)	Torque (in-lbs)
6-32	1.1	10
8-32	2.3	20
10-32	2.8	25
12-24	4	35
1/4-20	7	65
5/16-18	15	135

Unpacking

Before opening the packaging, carefully inspect the outside in the presence of shipping personnel for signs of damage. Carefully open the packaging to verify that the contents are complete and undamaged. If damaged, follow the shipping carrier's procedure for filing a damage claim. If the equipment must be returned, it should be repacked in the original shipping crate.

Location

Before continuing, verify that the following conditions exist at the installation site:

- Floor is conditioned¹ and clean.
- Batteries and associated stands are in place.
- Cable rack not supported by cabinets is in place.
- Job Site Documentation is available that details cabinet locations, dc distribution assignments, and Remote Peripheral Monitoring System module location and assignment.

¹Refers to removal of any combustible flooring, e.g., carpet, wood, etc.

4

System Electrical Architecture Overview

Introduction

This section is a basic system overview of the architecture of Galaxy Power Systems. The overview provides information about the connections and physical considerations of the systems that must be understood before the installation process begins.

The GPS individual cabinets may be connected together in two basic architectures, distributed or centralized, to form systems. These two architectures contain the same basic modules, but are arranged in different cabinet configurations.

Single cabinet systems are considered neither distributed nor centralized.

Single Cabinet System

Available in both half-height and full-height configurations, the single cabinet systems are illustrated in Figure 4-1.

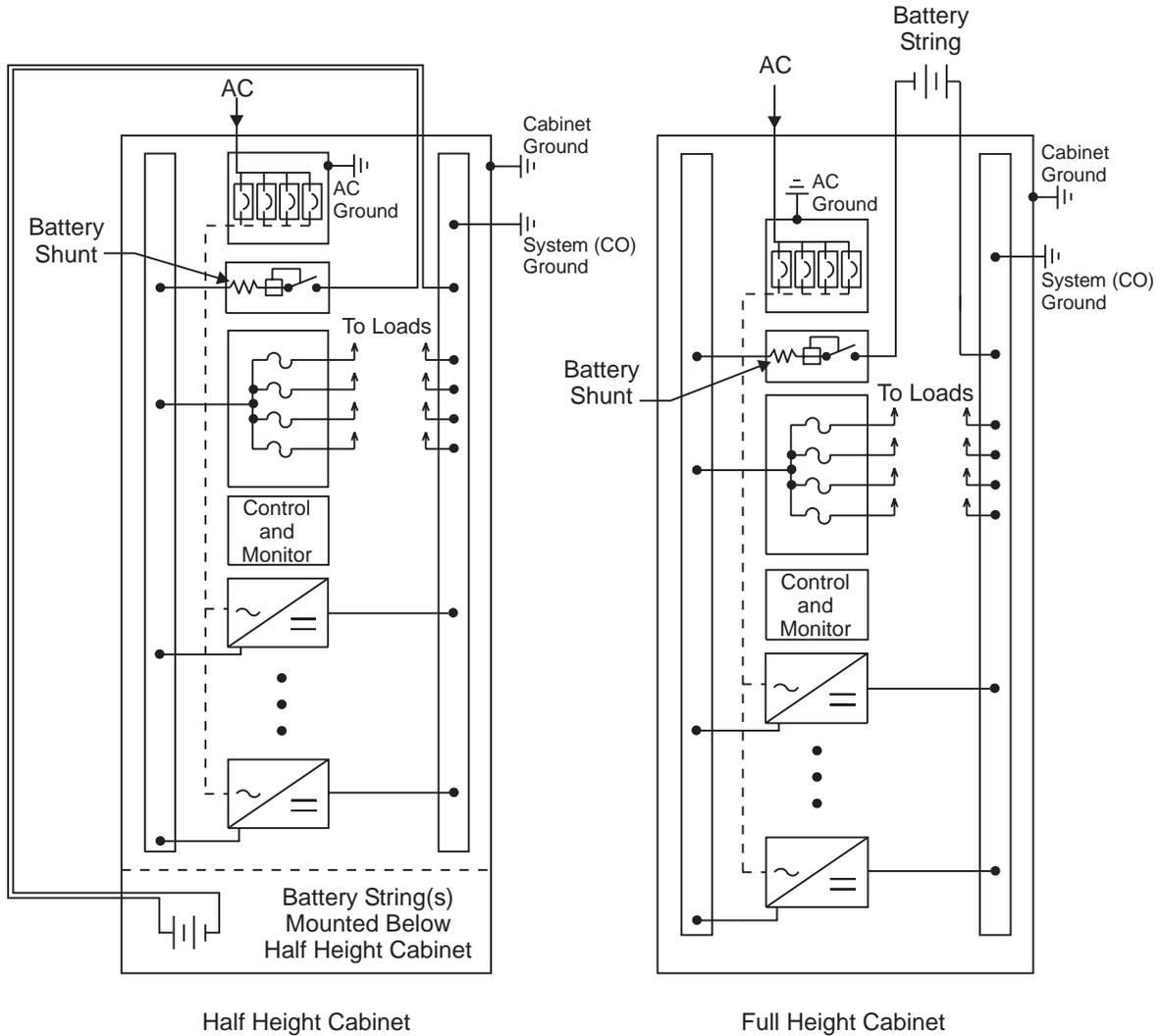


Figure 4-1: Single-Cabinet Configurations

Distributed Architecture

A distributed architecture is best thought of as small systems combined together to form a much larger system. Each small system (cabinet) contains an entire dc power system that includes ac input, rectifiers, battery connection modules (with external batteries), and dc distribution modules.

The dc power generated by the rectifiers and supported by the batteries in a given cabinet will approximately equal the dc power distributed to the loads from that cabinet. The dc power of each cabinet is electrically interconnected so that power may be shared (up to 1200A) between the cabinets. This sharing allows the system of cabinets to handle imbalances in cabinet loads (due to improper sizing or to rectifier or battery module failure).

Distributed architecture is summarized as follows: Each cabinet (system) generates and distributes all the dc power it needs but is able to borrow, or give up, power (up to 1200A) from other cabinets in the system. Growth of the system is accomplished by adding another cabinet (system) and interconnecting it to the original cabinets (system).

Multiple-cabinet configurations are shown in Figure 4-2 (two-cabinet configuration) and Figure 4-3 (three-cabinet (or more) configuration).

Distributed Architecture, continued

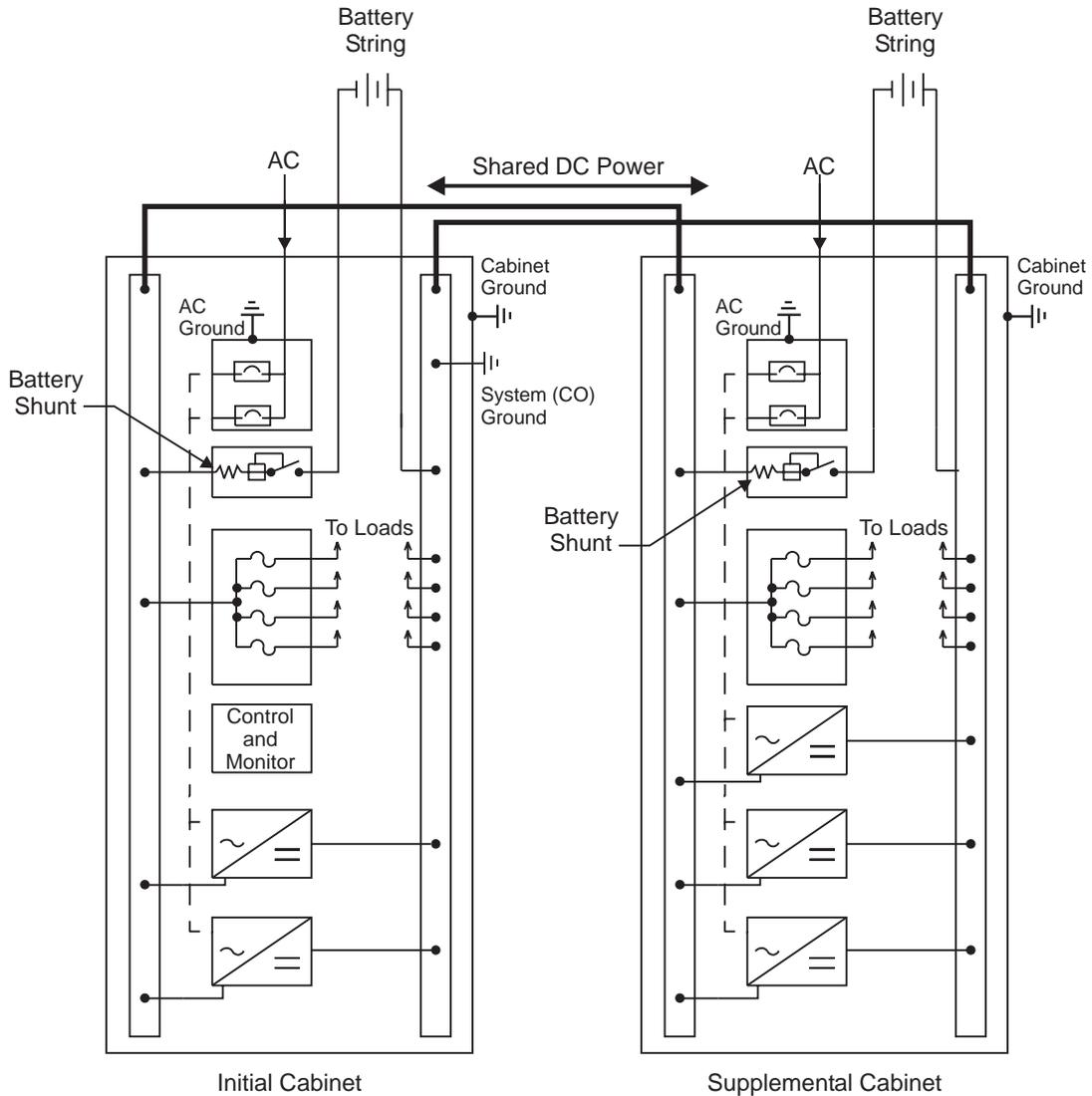


Figure 4-2: Two-Cabinet Configuration, Distributed Architecture

Distributed Architecture, continued

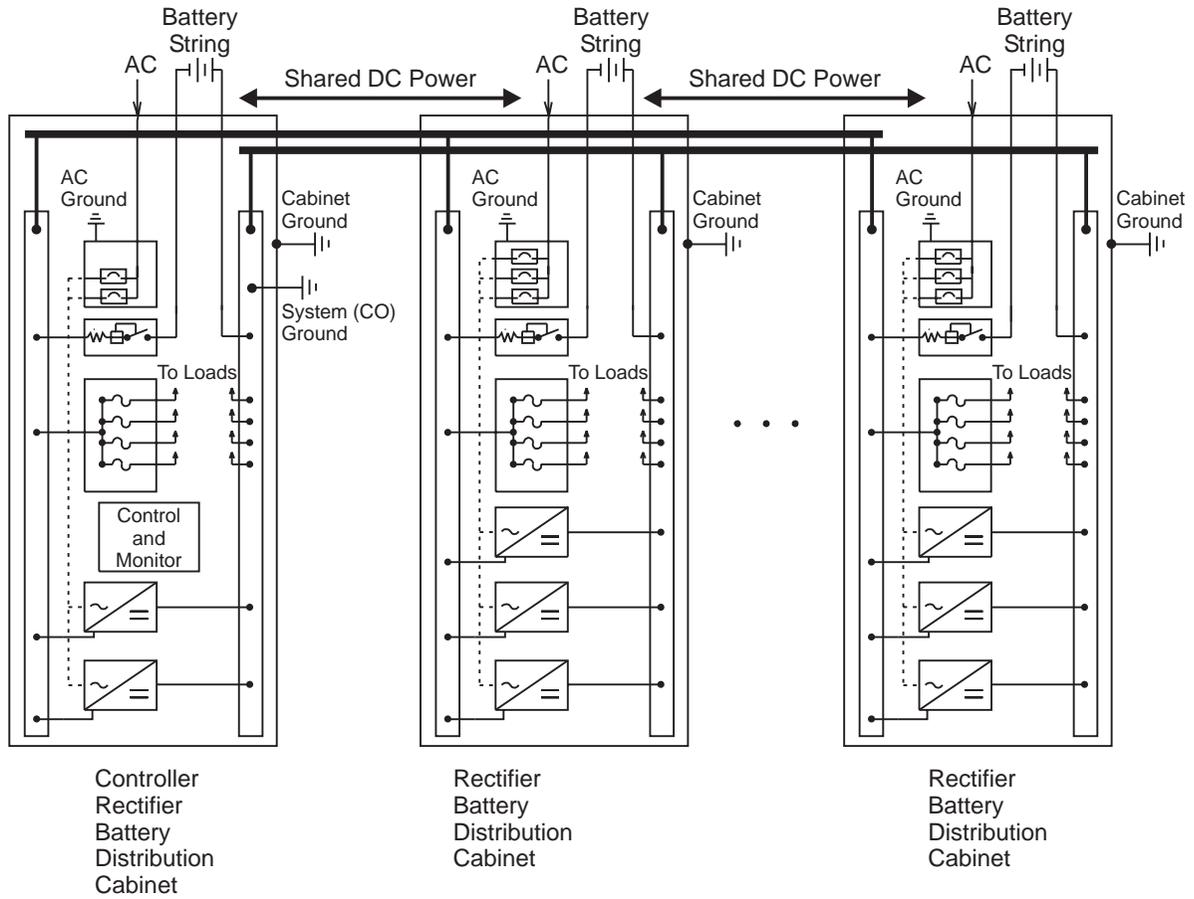


Figure 4-3: Three-Cabinet (or more) Configuration, Distributed Architecture

Centralized Architecture

The centralized architecture is best thought of as all the rectifiers and all the batteries in the system connected together at a central point and then taken from that central point to the distribution modules and then in turn to the system loads. Since all the system power is brought together at a central point, the central point must be sized for the ultimate capacity of the system. Growth of the system is accomplished by adding rectifiers (either to an existing cabinet or in a new cabinet), adding distribution panels (either to an existing cabinet or in a new cabinet), and adding batteries.

Figure 4-4 illustrates the centralized architecture.

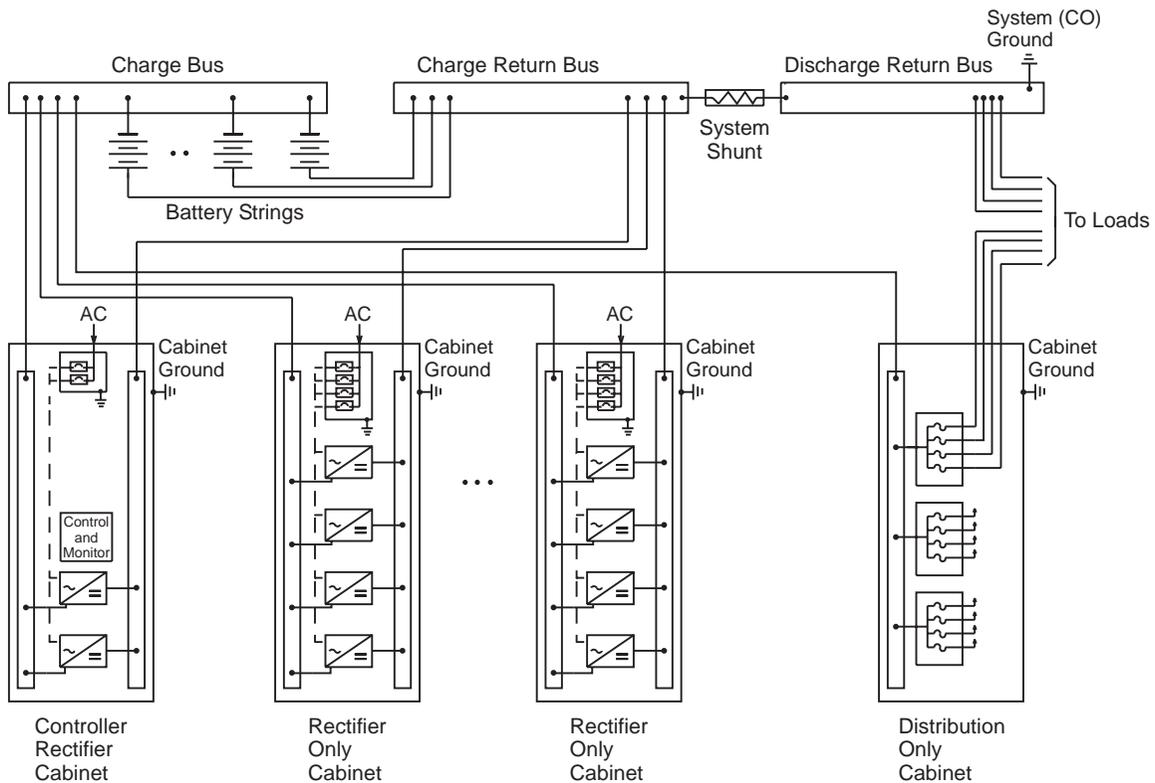


Figure 4-4: Centralized Architecture

5 *Cabinet Floor Mounting and Battery Stand Connection*

Refer to the following figures for the procedures in this section:

Figure No.	Illustrates
5-1	Footprint for Galaxy Power System (GPS) without a battery stand
5-2	Footprint for European battery stand
5-3	Half-height cabinet on a European battery stand
5-4	Footprint for 12IR125/12IR125LP battery stand
5-5	Half-height cabinet on a 12IR125 battery stand
5-6	Half-height cabinet on a 12IR125LP (Low Profile) battery stand
5-7	Footprint for 2VR375 battery stand
5-8	Half-height cabinet on a 2VR375 battery stand
5-9	Footprint for 2VR250 battery stand
5-10	Half-height cabinet on a 2VR250 battery stand
5-11	Half-height cabinet on a Unigy module assembly
5-12	Details of the cabinet installation procedure
5-13	Central office ground for full-height cabinet
5-14	Central office ground for half-height cabinet
5-15	Cable rack arrangements

Cabinet Installation

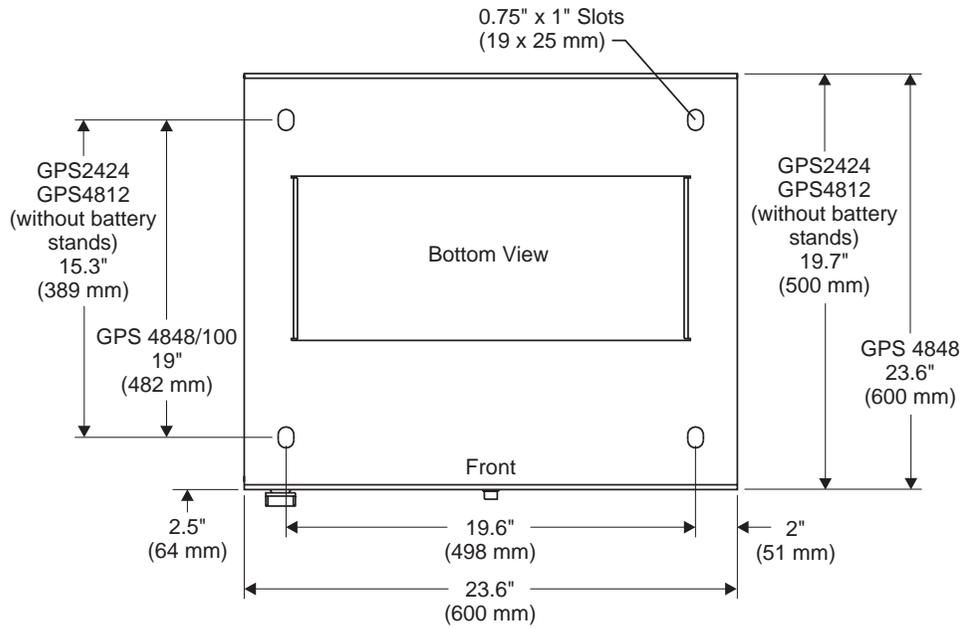


Figure 5-1: Footprint for a Galaxy Power System Without a Battery Stand

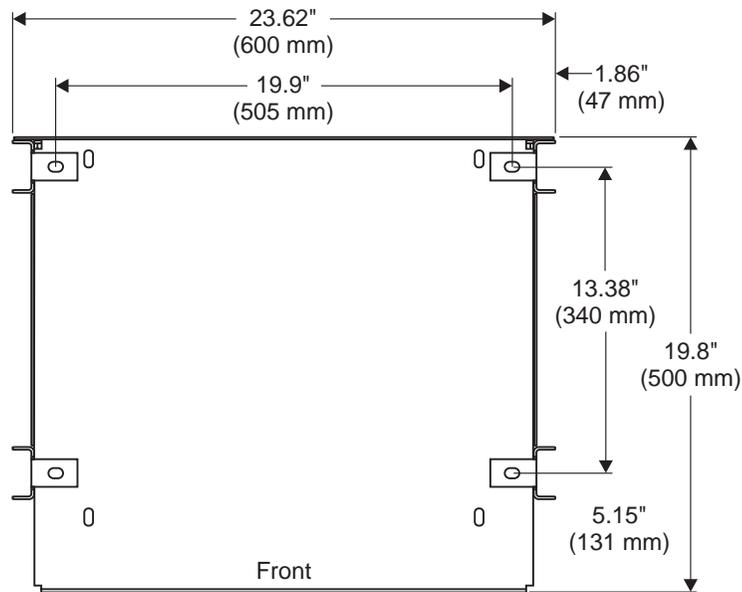


Figure 5-2: Footprint for a European Battery Stand

Cabinet Installation, continued

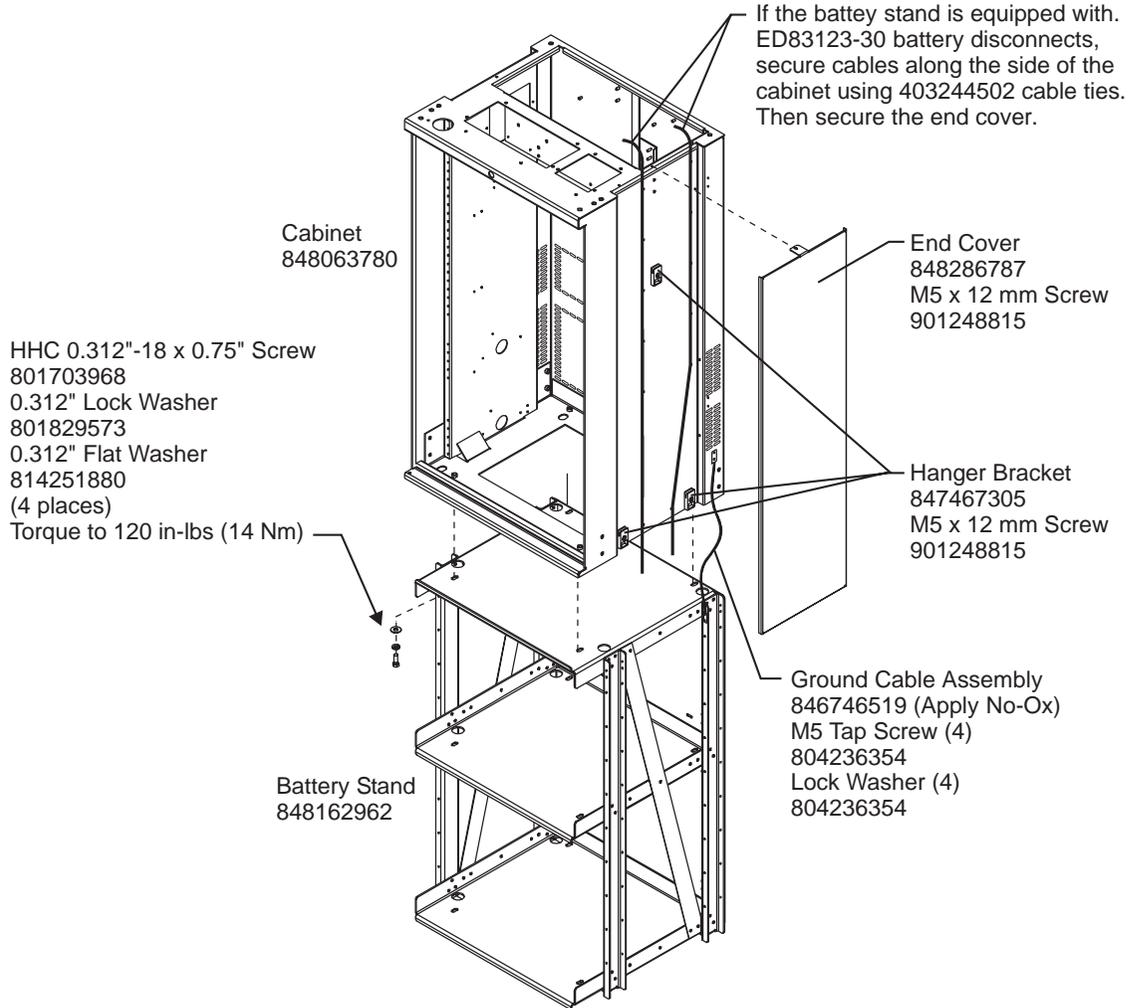


Figure 5-3: Half-Height Cabinet on a European Battery Stand

Cabinet Installation, continued

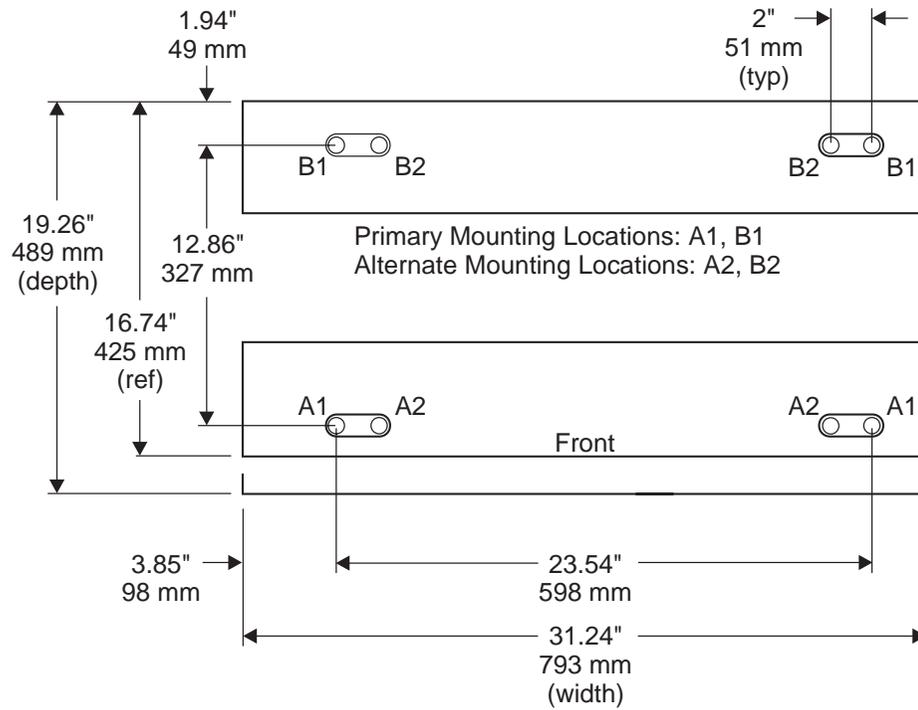


Figure 5-4: Footprint for a 12IR125/12IR125LP (Low Profile) Battery Stand

Cabinet Installation, continued

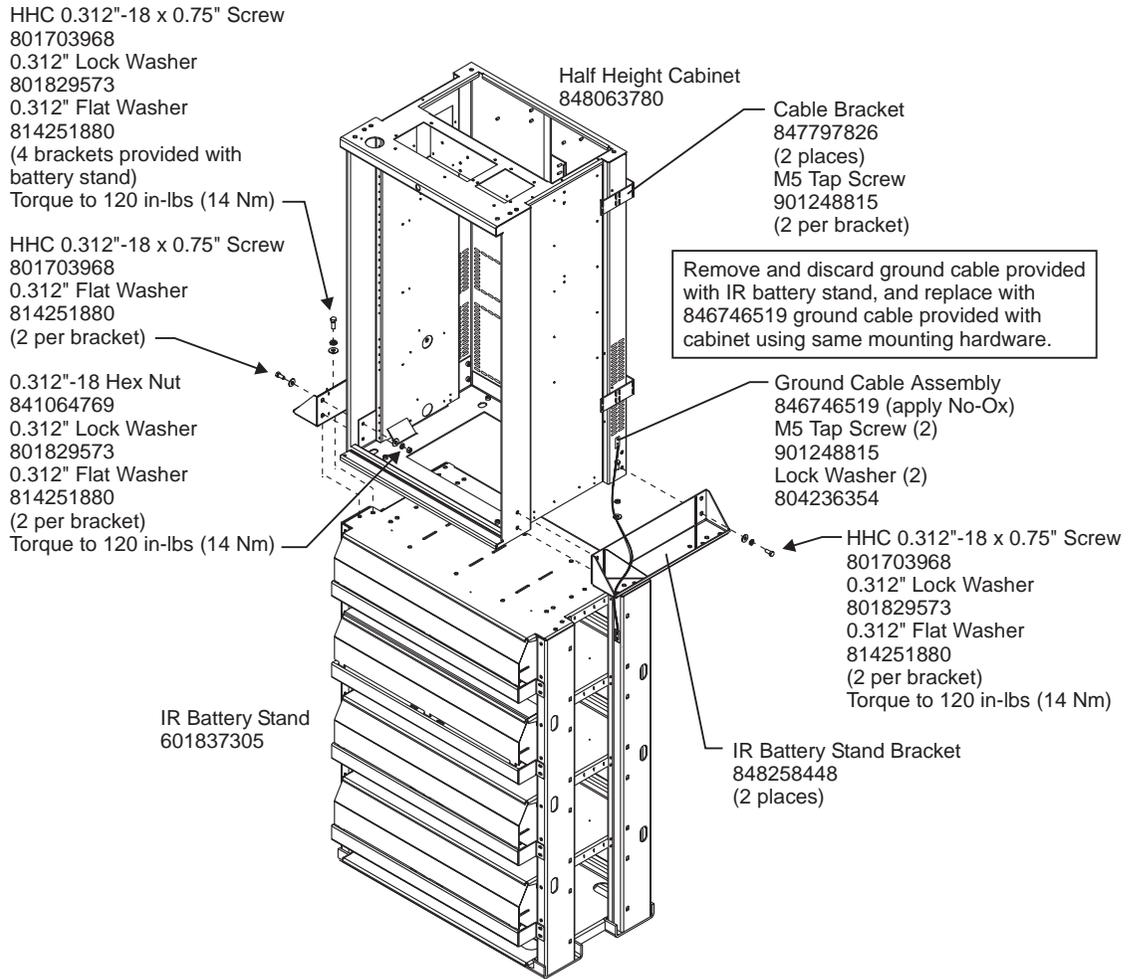


Figure 5-5: Half-Height Cabinet on a 12IR125 Battery Stand

Cabinet Installation, continued

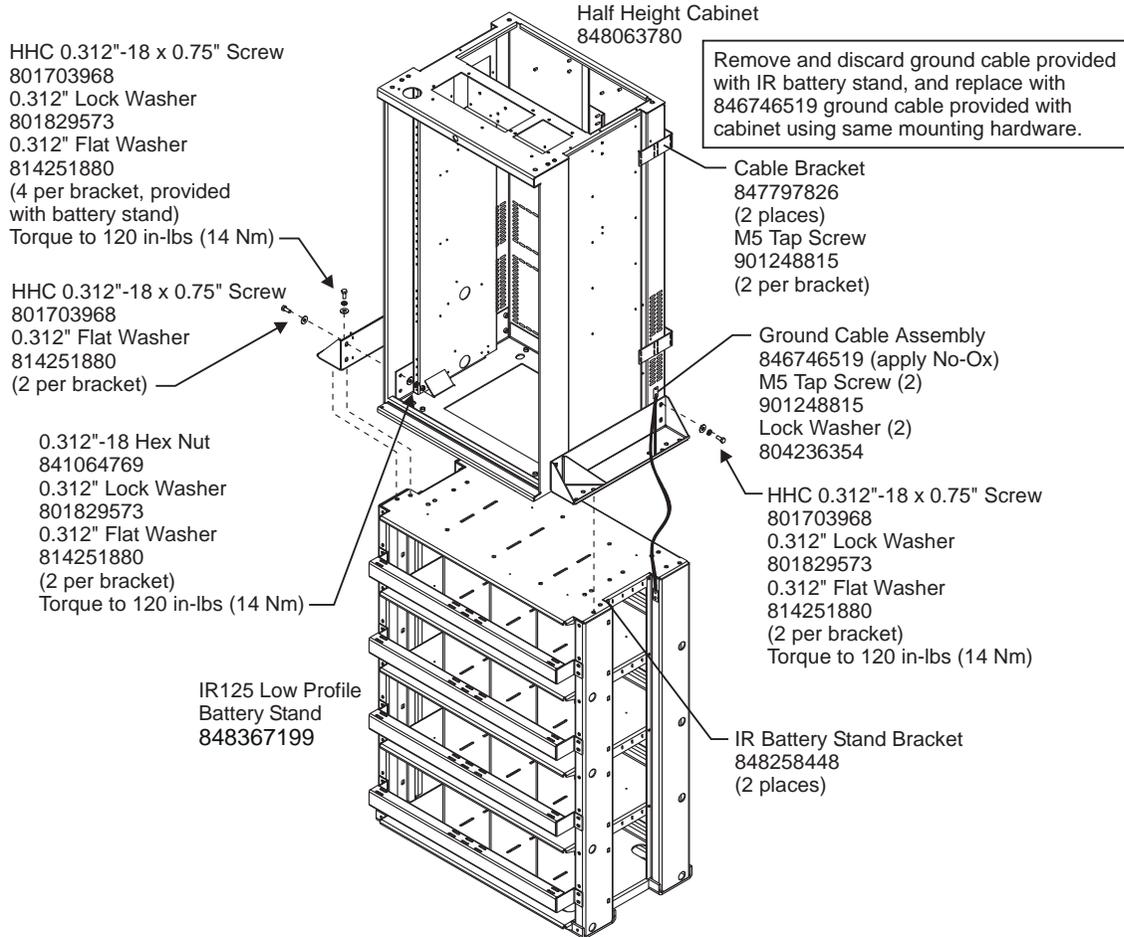


Figure 5-6: Half-Height Cabinet on a 12IR125LP (Low Profile) Battery Stand

Cabinet Installation, continued

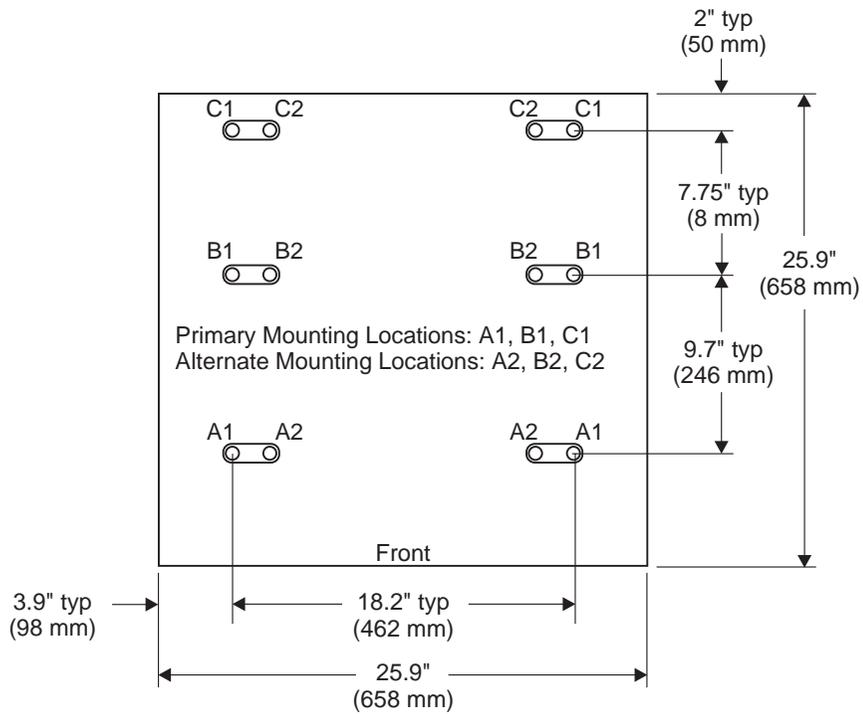
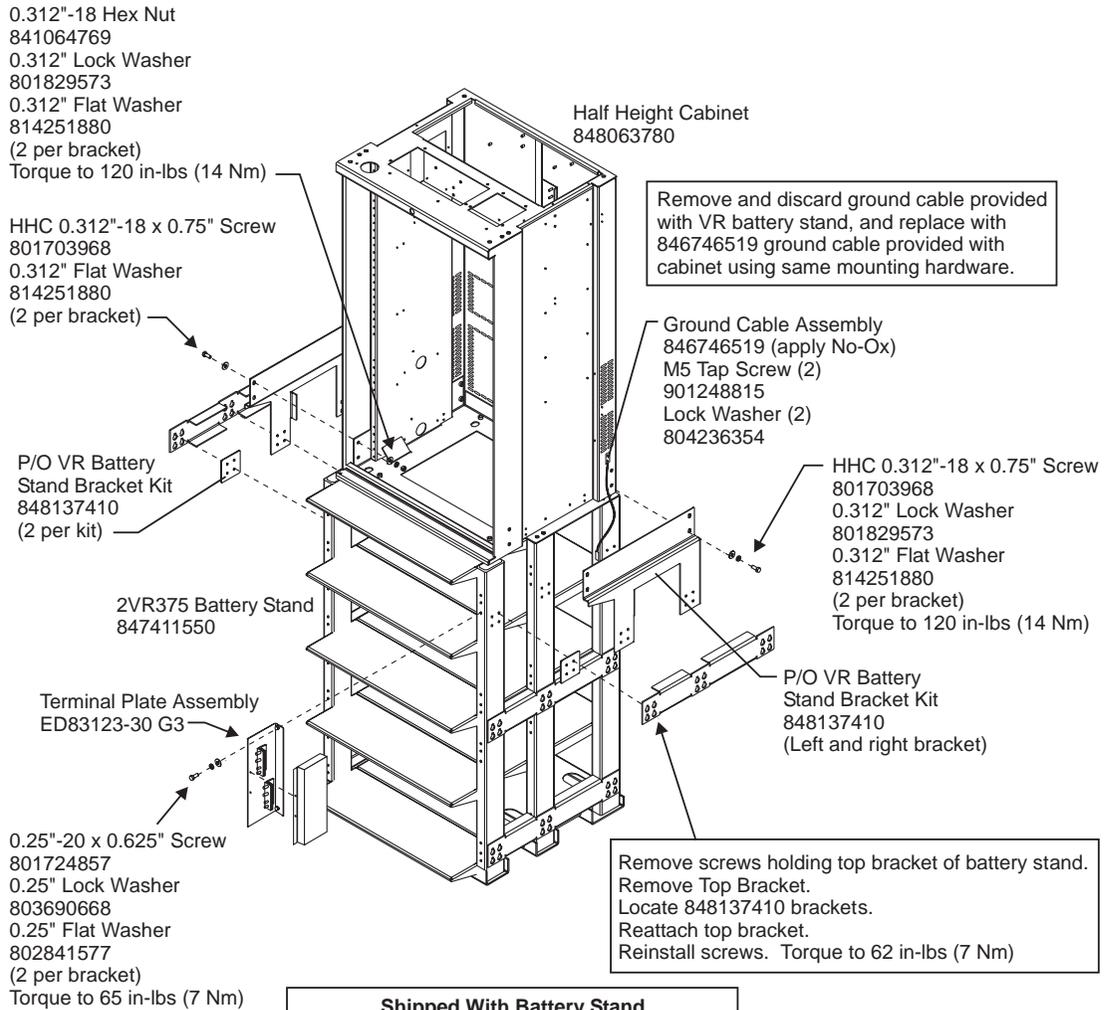


Figure 5-7: Footprint for a 2VR375 Battery Stand

Cabinet Installation, continued



Shipped With Battery Stand		
Comcode	Description	Qty
846808772	Retainer	2
846808780	Retainer	2
846808798	Clear Cover	2
846898708	Template	1
840059844	PHM 10-32 x 7/16" Screw	8
802497545	#10 Flat Washer	8
801256165	HHC 0.25"-20 x 3/4" Screw	16
803690668	0.25" Lock Washer	16
801098963	0.25" Flat Washer	16

Figure 5-8: Half-Height Cabinet on a 2VR375 Battery Stand

Cabinet Installation, continued

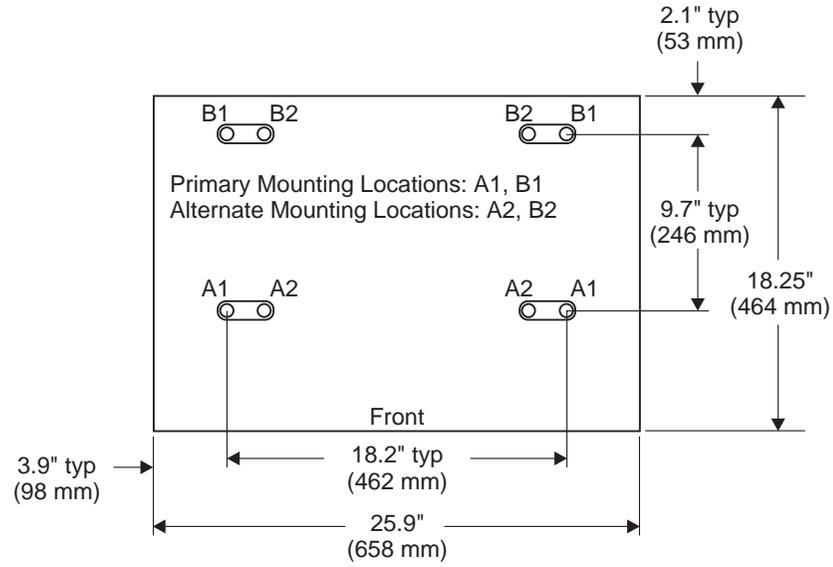
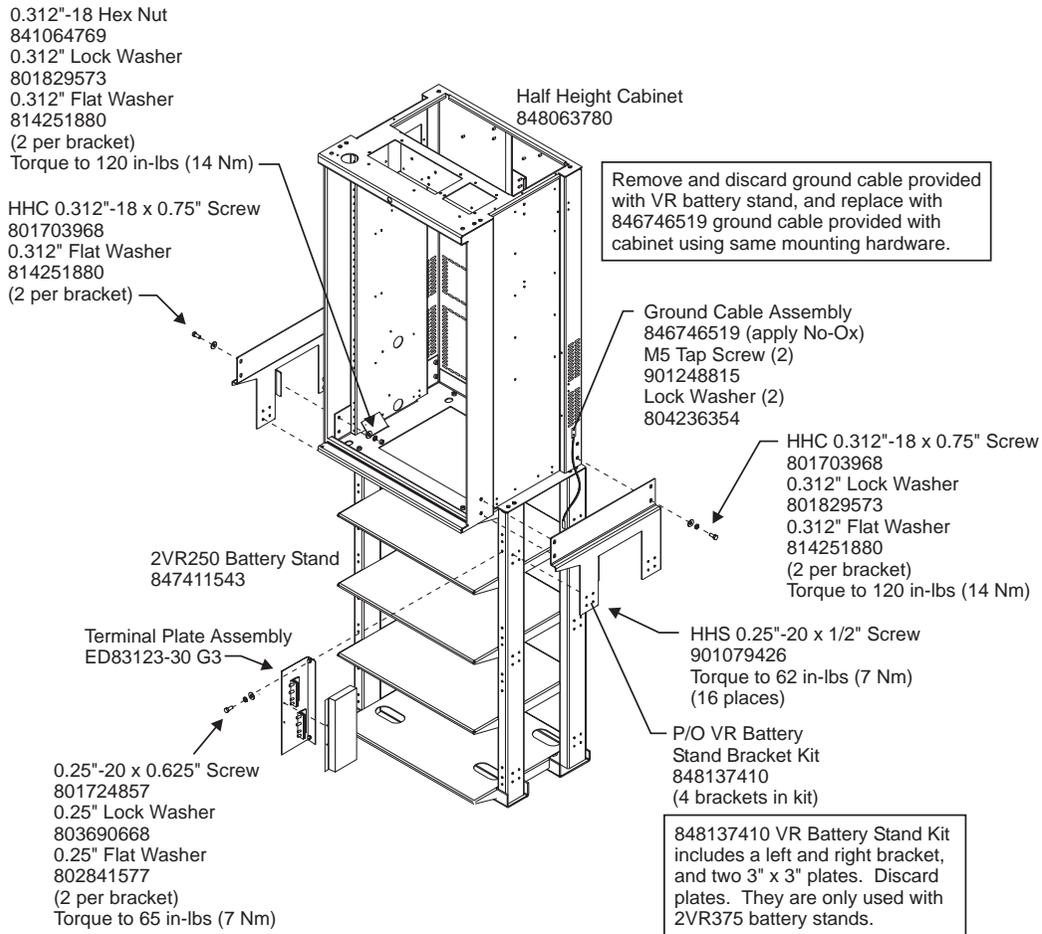


Figure 5-9: Footprint for a 2VR250 Battery Stand

Cabinet Installation, continued



Shipped With Battery Stand		
Comcode	Description	Qty
846808772	Retainer	2
846808780	Retainer	2
846808798	Clear Cover	2
846736841	Template	1
840059844	PHM 10-32 x 7/16" Screw	8
802497545	#10 Flat Washer	8
801256165	HHC 0.25"-20 x 3/4" Screw	16
803690668	0.25" Lock Washer	16
801098963	0.25" Flat Washer	16

Figure 5-10: Half-Height Cabinet on a 2VR250 Battery Stand

Cabinet Installation, continued

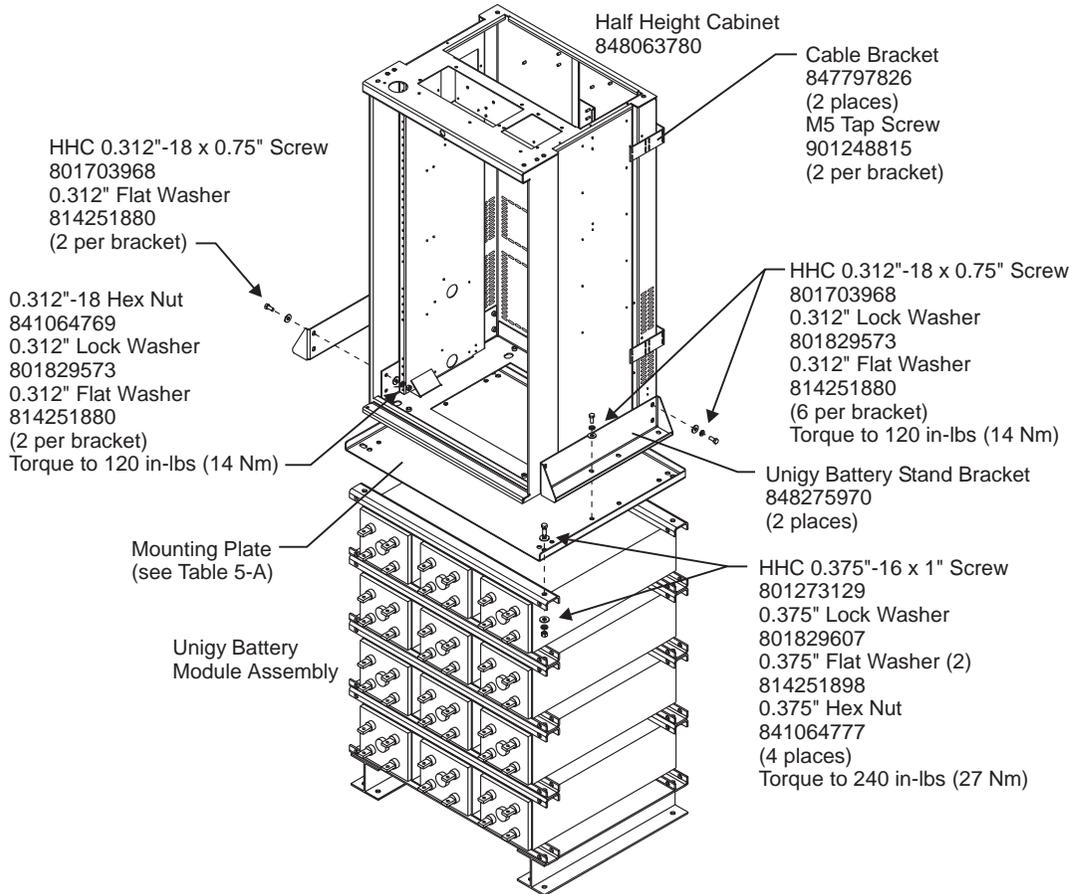


Figure 5-11: Half-Height Cabinet on a Unigy Battery Module Assembly

Cabinet Installation, continued

Mounting Plates for Unigy Batteries

Table 5-A: Mounting Plates for Unigy Batteries

Module Type	Capacity, 8-hour Rate	Comcode
6A-75-9 3A-75-17 3A-75-19	12V, 310Ah 6V, 630Ah 6V, 700Ah	848275509
6A-75-11 3A-75-21 3A-75-23	12V, 390Ah 6V, 785Ah 6V, 865Ah	848275517
6A-75-13 3A-75-25 3A-75-27	12V, 470Ah 6V, 945Ah 6V, 1025Ah	848275533
6A-75-15 3A-75-29 6A-75-31	12V, 550Ah 6V, 1100Ah 6V, 1175Ah	848275558
3A-85-33	6V, 1400Ah	848299673

Cabinet Installation, continued

Mounting Specifications

Table 5-B: GPS Mounting Specifications

Seismic Zone(s)	Comcode	Anchor Type (HILTI)	Hole Size	Wrench	Torque	
0, 1	847135720	(4) 3/8" drop in	1/2" bit 1-9/16" deep	--	85 in-lbs (7.1 ft-lbs)	9.6 N·m
0, 1	847135712	(4) 3/8" self drill	--	--	85 in-lbs (7.1 ft-lbs)	9.6 N·m
0, 1, 2	847135662	(4) 1/2" drop-in	5/8" bit 2" deep	3/4"	216 in-lbs (18 ft-lbs)	24.5 N·m
0, 1, 2	847135654	(4) 1/2" self drill	--	3/4"	216 in-lbs (18 ft-lbs)	24.5 N·m
0, 1, 2, 3, 4	847532678	(4) 12mm cap bolts	18mm 100mm deep	19mm	720 in-lbs (60 ft-lbs)	81.6 N·m
4*	847221074	(4) 16mm cap bolts	24mm 125mm deep	30mm	1800 in-lbs (150 ft-lbs)	204 N·m
*IR Battery Stand only						

Cabinet Installation, continued

Procedure

Refer to Figure 5-12 for this procedure.

Cabinet Installation	
Step	Action
1	Using a drill bit, drill anchor holes to the depths specified in Table 5-B.
2	Locate the cabinet in position using two or four anchor bolts and hold-down washers.
3	Shim under cabinet corners to level.
4	Torque anchors as specified in Table 5-B.
5	Secure cabinets together using the hardware provided.

Note: See H569-407 for more details.

Cabinet Installation, continued

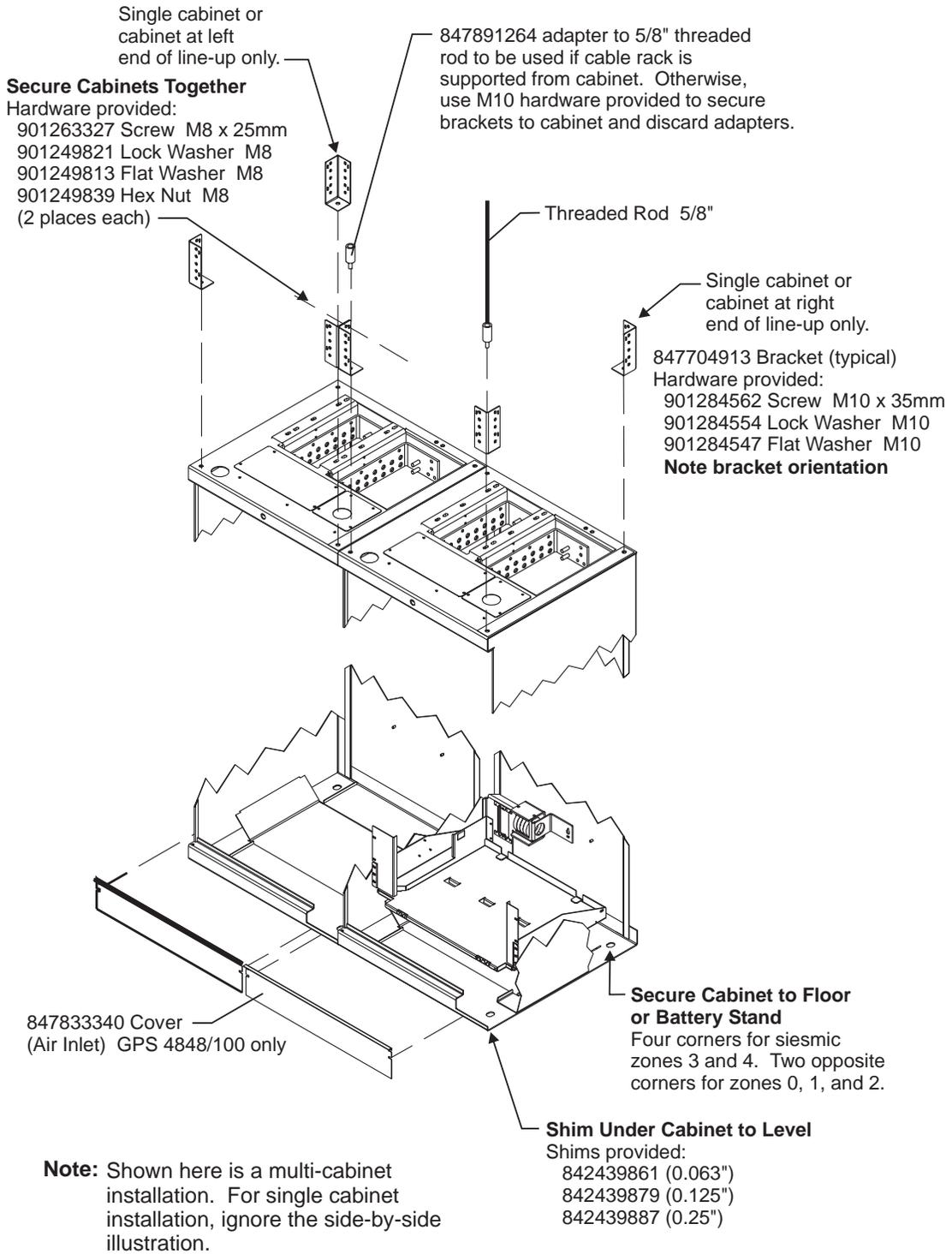


Figure 5-12: Cabinet Installation Procedure

Cabinet Ground and Central Office Ground

Cabinet Ground Procedure

The next step is to ground the cabinet framework. Local grounding practices will determine the grounding method and the size of cable connected to the cabinet. A 2-gauge pigtail, as shown in Figures 5-13 and 5-14, is provided for this purpose.

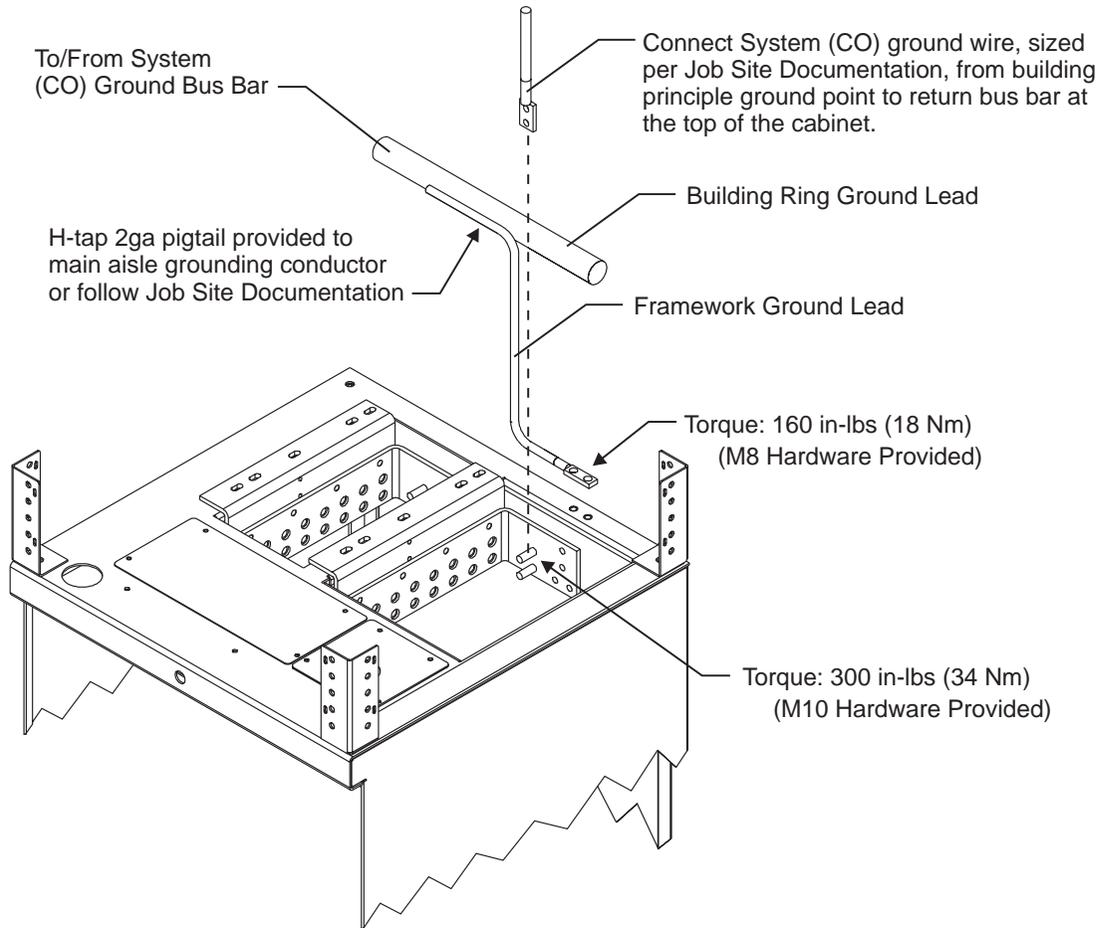
Cabinet Ground	
Step	Action
1	Run and connect the framework ground lead as shown in Figure 5-13 or 5-14.
2	Torque connection as specified in Figure 5-13 or 5-14.

Central Office Ground Procedure

The system ground should be connected to the building's principal ground point (Central Office Ground). The conductor size must conform to local standards. Connection to the power system is through the M10 studs located on the distribution return bus. See Figure 5-13 (full-height cabinet) or 5-14 (half-height cabinet) to locate the studs.

Central Office Ground (for Distributed Architecture Only) <i>Note: Follow local practice for Centralized Architecture.</i>	
Step	Action
1	Run and connect the system ground lead to the initial cabinet return bus. This connection will connect the return side of the dc system to earth ground.
2	Torque connections as specified in Figure 5-13 or 5-14.

Cabinet Ground and Central Office Ground, continued

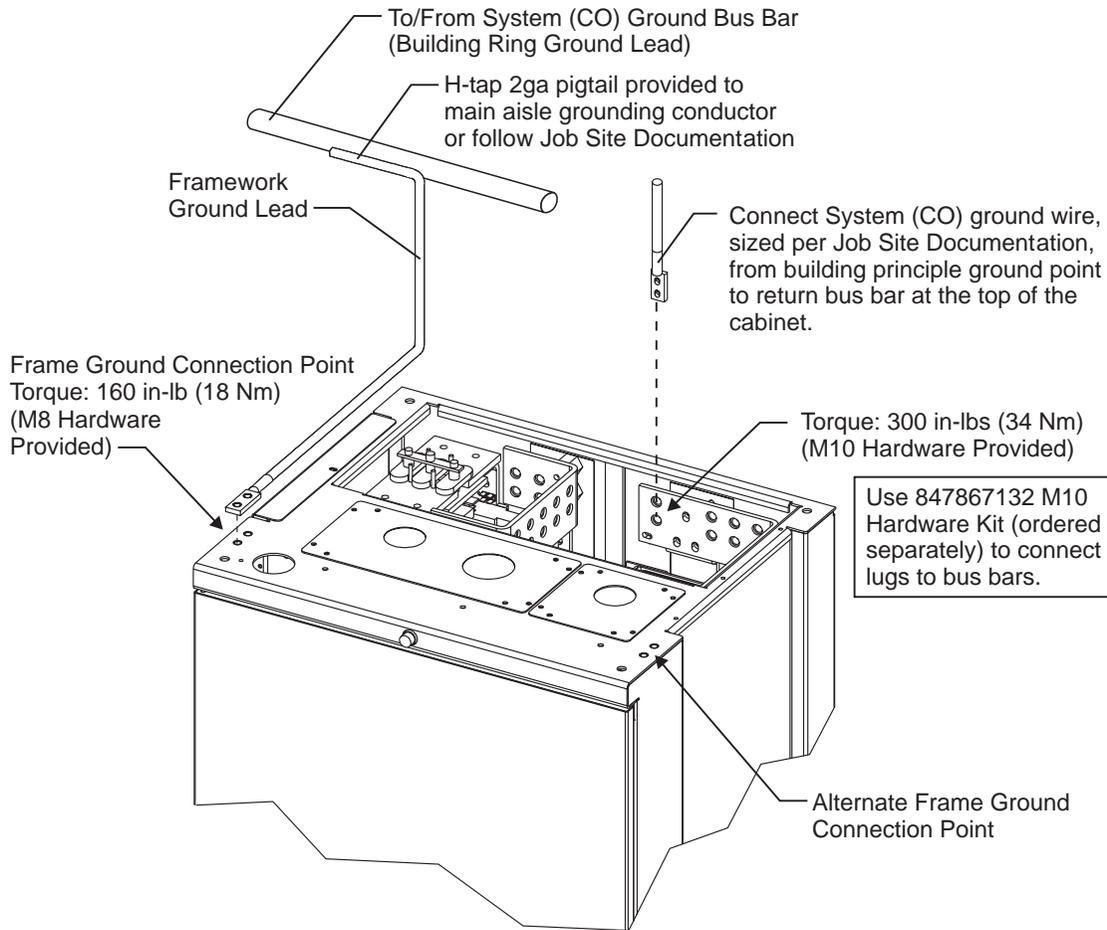


System (CO) Ground Lugs and Hardware

Lug Comcode	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
406338665	2	--	35	Provided: (2) M10 Nuts (2) M10 Lock Washers (2) M10 Flat Washers
407726041	--	2	--	
405348228	1/0	--	50	
405348236	2/0	1/0	70	
406032725	--	2/0	--	
405348521	4/0	--	--	
405347923	--	4/0	120	
407890748	350	--	--	
407890763	--	350	--	
407850833	500	--	--	
407890755	--	500	--	
406335141	750	--	--	
407890730	--	750	--	

Figure 5-13: Full-Height Cabinet and System Central Office Ground

Cabinet Ground and Central Office Ground, continued



System (CO) Ground Lugs and Hardware

Lug Comcode	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
406338665	2	--	35	Provided: (2) M10 Nuts (2) M10 Lock Washers (2) M10 Flat Washers
407726041	--	2	--	
405348228	1/0	--	50	
405348236	2/0	1/0	70	
406032725	--	2/0	--	
405348521	4/0	--	--	
405347923	--	4/0	120	
407890748	350	--	--	
407890763	--	350	--	
407850833	500	--	--	
407890755	--	500	--	
406335141	750	--	--	
407890730	--	750	--	

Figure 5-14: Half-Height Cabinet and System Central Office Ground

Recommended Cable Rack Layout

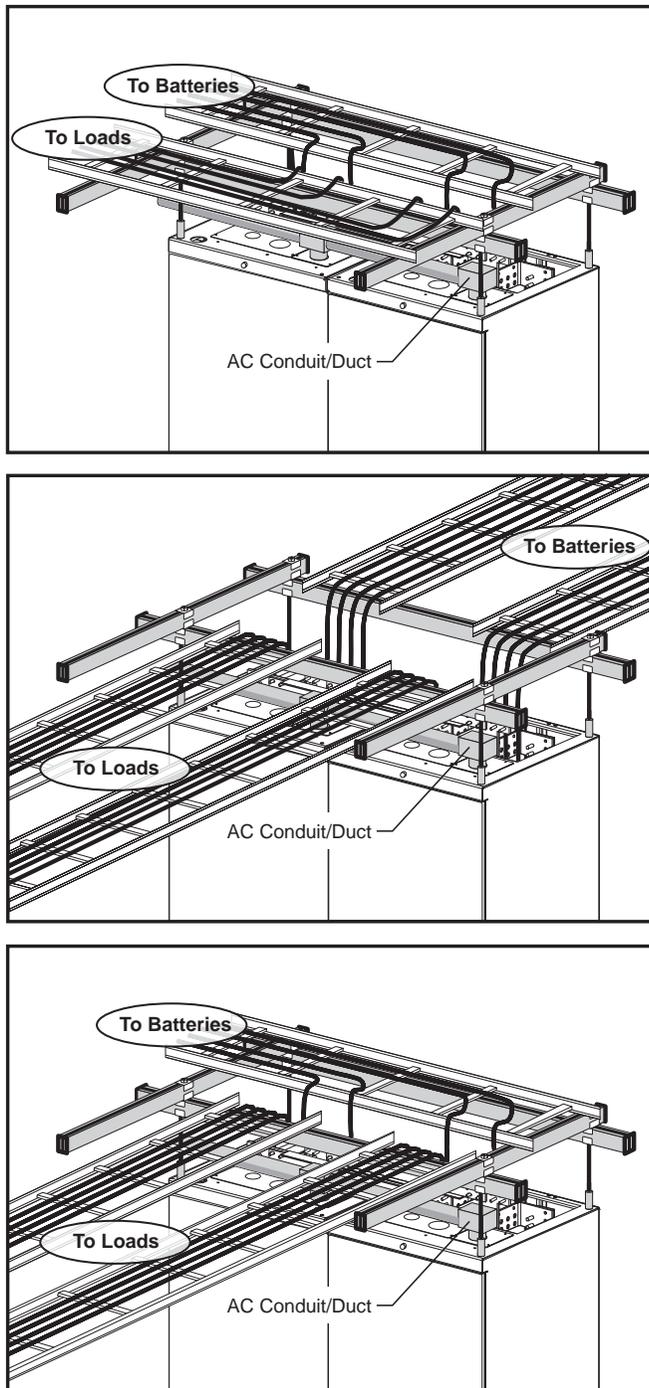


Figure 5-15: Various Cable Rack Arrangements

6 ***Centralized or Distributed Architecture Connections***

Multiple-Cabinet Installations

Special Requirements

This section covers the special requirements for multiple-cabinet installations. These are:

- Centralized Architecture
 - DC power connections to central bus bar
 - Remote voltage sense (regulation) and system shunt for the Millennium, RC, SCF, and Vector controllers
- Distributed Architecture
 - Intercabinet dc power bus connections
- All Types
 - Intercabinet alarm and serial bus connections

Centralized Architecture

Introduction

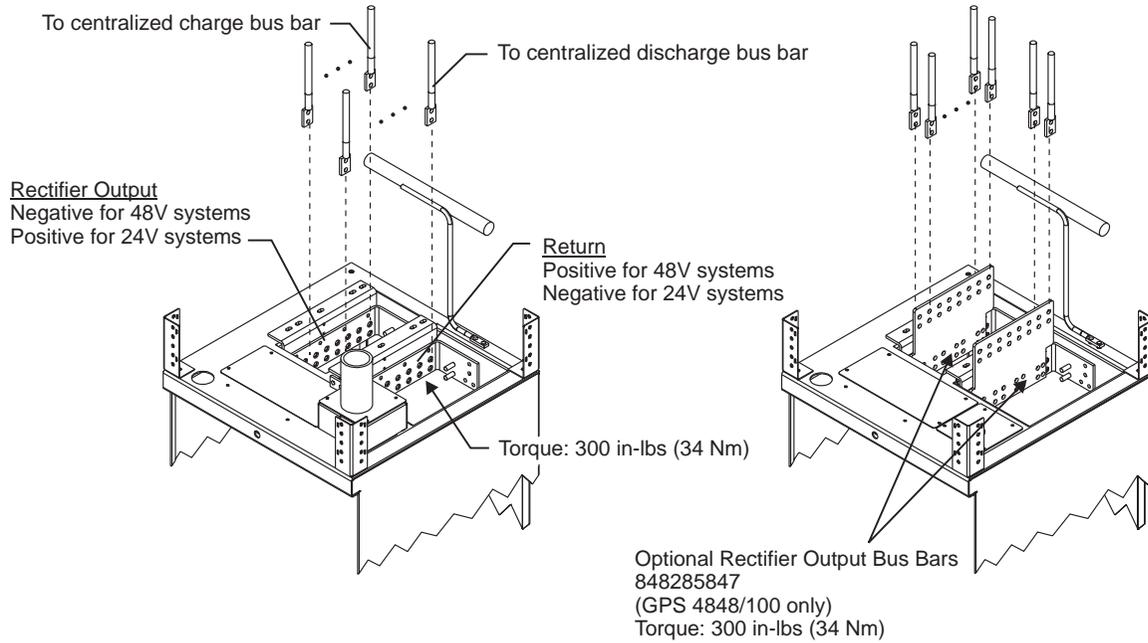
This section covers the field assembly for Centralized Architecture (H569-434 G2). For Distributed Architecture (H569-434 G1, all H569-437 Groups, and all H569-436 Groups), skip these procedures.

DC Power Connections to Central Bus Bar

Refer to Figure 6-1 for this procedure.

DC Power Connections to Central Bus Bar	
Step	Action
1	Install optional plates if more than 8 connections are needed. (See Figure 6-1.)
2	Run and connect new wires from positive and negative bus bars in each cabinet to charge and charge return centralized bus bars located outside the equipment. Note: In centralized architectures all return wires from the load must be terminated to the external discharge return bus. These return wires may <i>not</i> be terminated in the cabinet.

Centralized Architecture, continued



Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
405348228	Bat/Rtn	1/0	--	50	847867132 (One or two required per connection.)
405348236	Bat/Rtn	2/0	1/0	70	
406021725	Bat/Rtn	--	2/0	--	
405348251	Bat/Rtn	4/0	--	--	
405347923	Bat/Rtn	--	4/0	120	
407890763	Bat/Rtn	350	--	--	
407890748	Bat/Rtn	--	350	--	

Figure 6-1: DC Power Connections to Centralized Bus Bars

Centralized Architecture, continued

Remote Voltage Sense and System Shunt for Galaxy Millennium Controller

These procedures convert the Galaxy Millennium Controller to external battery sense (voltage sense at the central charge and discharge buses) and a single system shunt for load current.

Refer to Figure 6-2 for these procedures.

Remote Voltage Sense for Galaxy Millennium Controller	
Step	Action
1	Cut the regulation wires that run from the controller to the rear bus bars in the cabinet (RB and RG, Slate and Black wires, respectively).
2	Remove and discard the ends of the wires that run to the cabinet bus bars.
3	Run new wires from the central bus bars; butt splice to the cut wires that remain connected to the controller. Note: If central bus bars have LVBD, sense leads must be on the rectifier side of the contactor.

System Shunt for Galaxy Millennium Controller	
Step	Action
1	Run new wires (installer provided) from the system shunt to connection points M1 (SH-) and M2 (SH+) on the BLJ board. Caution: Do not remove White and Violet wires that are already connected from M1 and M2 to the controller. Adding the new wires to the same points completes the connection between the system shunt and the controller.

Centralized Architecture, continued

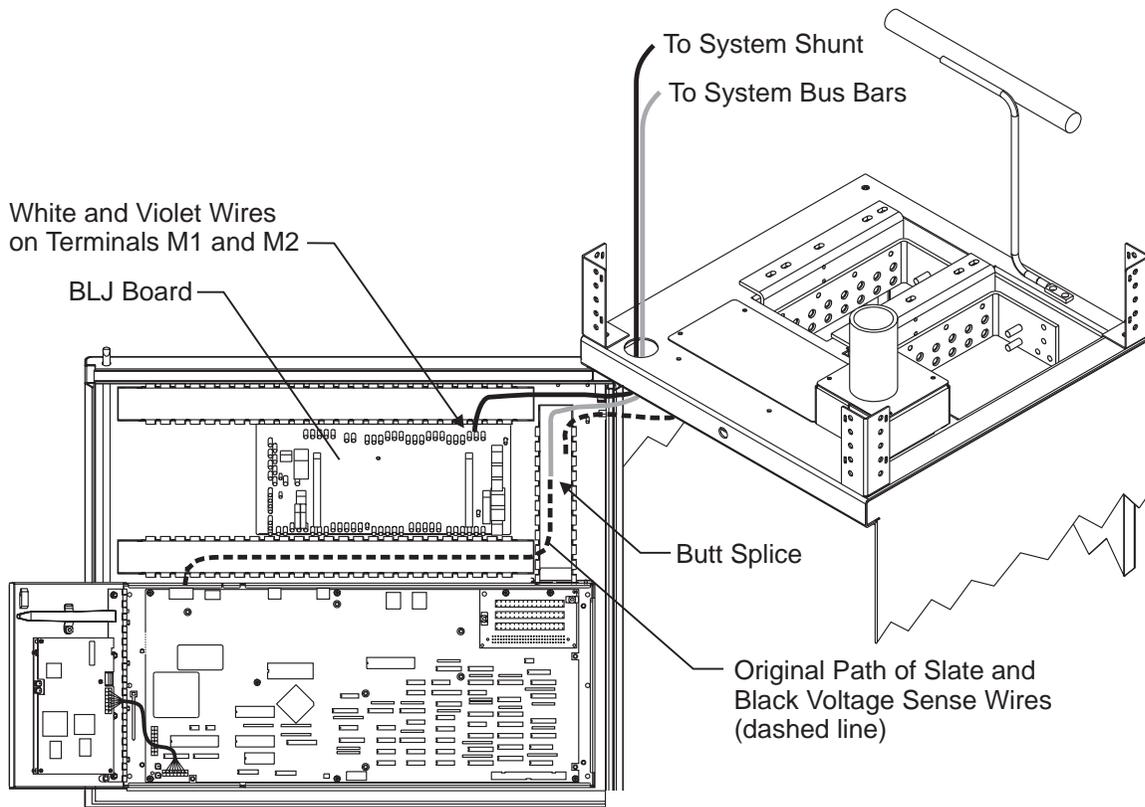


Figure 6-2: System Shunt and Remote Voltage Sense for Galaxy Millennium Controller

Centralized Architecture, continued

Remote Voltage Sense and System Shunt for Galaxy RC Controller

These procedures convert the Galaxy RC Controller to external battery sense (voltage sense at the central charge and discharge buses) and a single system shunt for load current.

Refer to Figure 6-3 for these procedures.

Remote Voltage Sense for Galaxy RC Controller	
Step	Action
1	Cut the regulation wires that run from the controller to the rear bus bars in the cabinet (RB and RG, Slate and Black wires, respectively).
2	Remove and discard the ends of the wires that are still connected to the cabinet bus bars.
3	Run new wires (installer provided) from the central bus bars; butt splice to the cut wires that remain connected to the controller. Note: If central bus bars have LVBD, sense leads must be on the rectifier side of the contactor.

Note: White (SH-) and Violet (SH+) wires have been factory installed with a butt splice and are in the wireway for making the system shunt connection.

System Shunt for Galaxy RC Controller	
Step	Action
1	Run new wires (installer provided) from system shunt to the butt splice in the wireway.

Centralized Architecture, continued

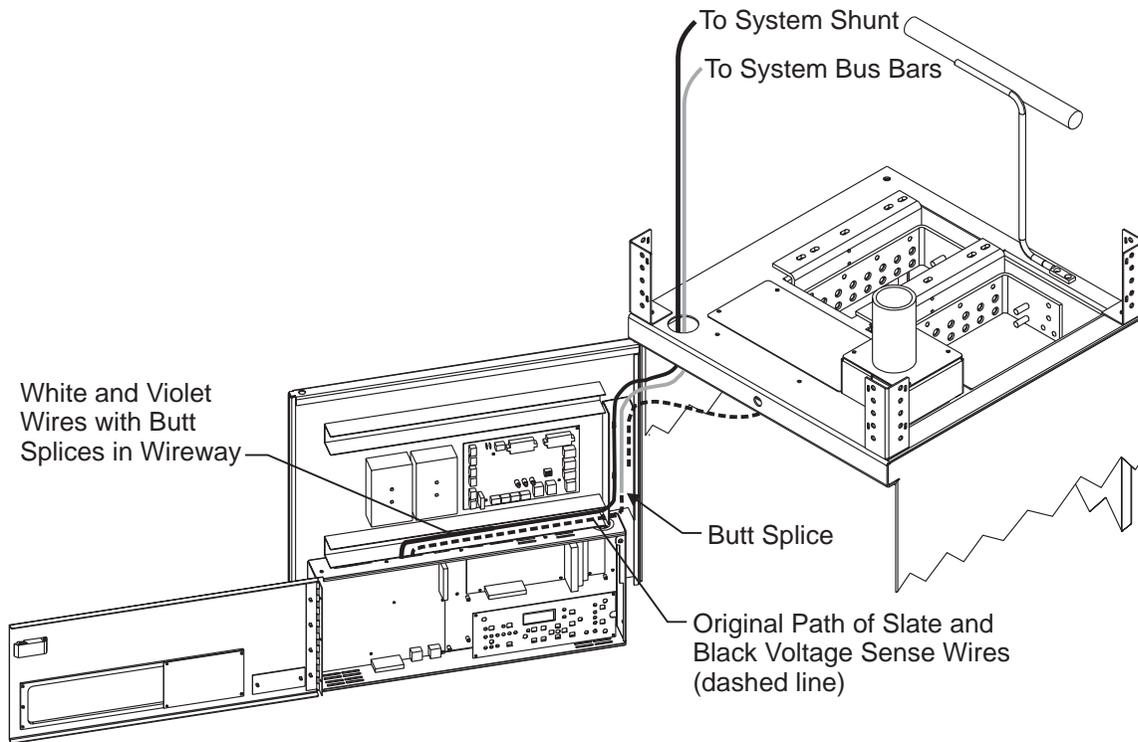


Figure 6-3: System Shunt and Remote Voltage Sense for Galaxy RC Controller

Centralized Architecture, continued

Remote Voltage Sense and System Shunt for Galaxy SCF Controller

These procedures convert the Galaxy SCF Controller to external battery sense (voltage sense at the central charge and discharge buses) and a single system shunt for load current.

Refer to Figure 6-4 for these procedures.

Remote Voltage Sense for Galaxy SCF Controller	
Step	Action
1	To access the wiring, remove plug-in circuit packs that are mounted to the right in the controller.
2	Remove the regulation wires (Slate and Red) that run from the controller's terminal block TB1 on the BJB board to the cabinet bus bars.
3	Run new wires (installer provided) from the central bus bars to TB1 on the BJB board, pin 9 for Reg Bat (-), pin 4 for Reg Grd (+). Note: Installer must provide terminals for making this connection. Note: If central bus bars have LVBD, sense leads must be on the rectifier side of the contactor.

System Shunt for Galaxy SCF Controller	
Step	Action
1	Run new wires (installer provided) from the system shunt to TB1 on the BJB board, pin 1 for SH (+), pin 2 for SH (-). Note: Installer must provide terminals for making this connection.

Centralized Architecture, continued

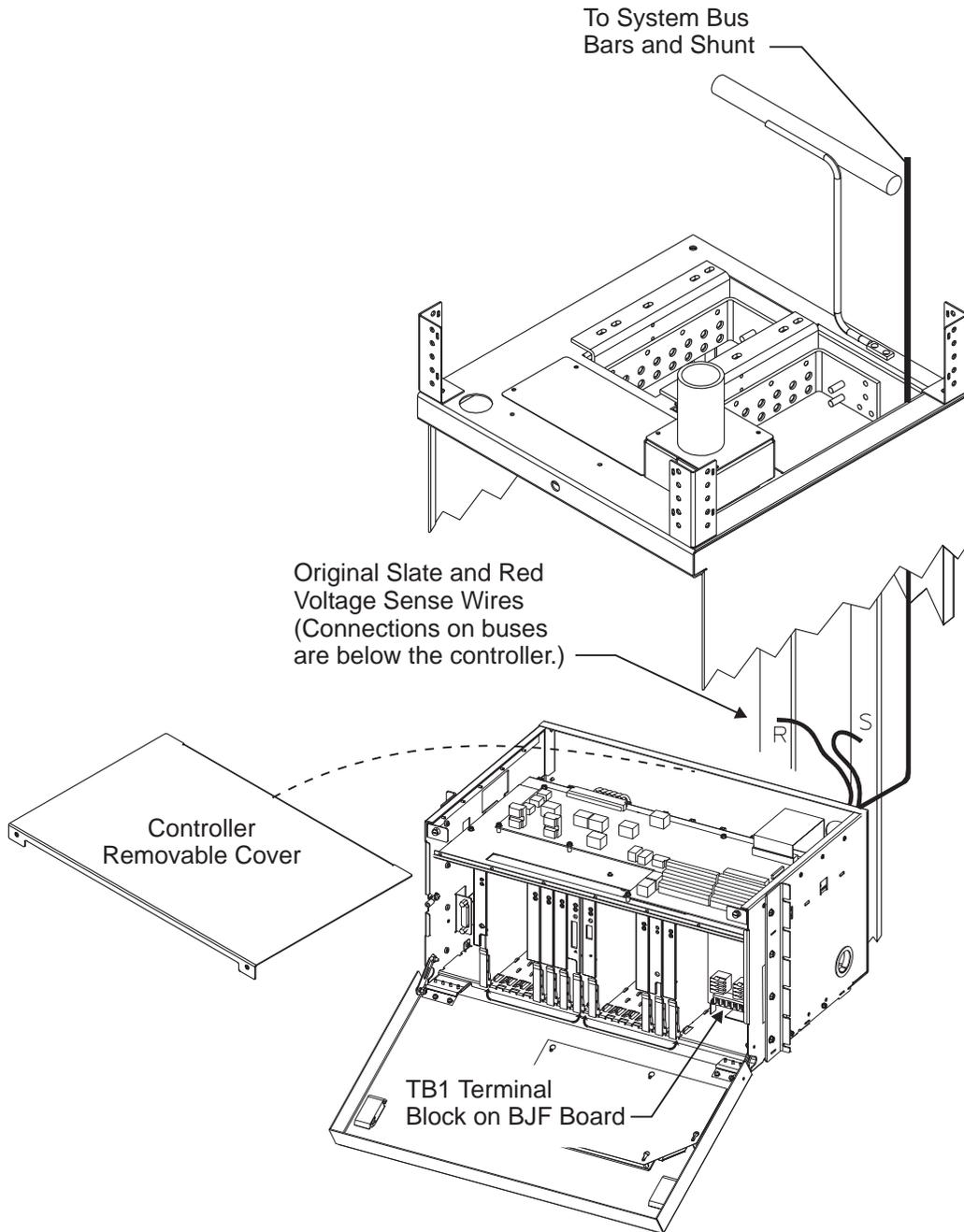


Figure 6-4: System Shunt and Remote Voltage Sense for Galaxy SCF Controller

Centralized Architecture, continued

Remote Voltage Sense and System Shunt for Galaxy Vector Controller

These procedures convert the Galaxy Vector Controller to external battery sense (voltage sense at the central charge and discharge buses) and a single system shunt for load current.

Refer to Figure 6-5 for these procedures.

Remote Voltage Sense for Galaxy Vector Controller	
Step	Action
1	Remove the regulation wires that run from the BLJ terminals on the controller (V1+ and V1-, Yellow and White wires) to the cabinet bus bars.
2	Run new wires (installer provided, 22-gauge maximum with 3A in-line fuses required) from the central bus bars to the BLJ terminals (V1+ and V1-). Note: If central bus bars have LVBD, sense leads must be on the rectifier side of the contactor.

System Shunt for Galaxy Vector Controller	
Step	Action
1	Remove shunt wires that have been factory connected to the BLJ terminals (SH1+ and SH1-, White and Black wires).
2	Retrieve current limiting resistors from the removed wireset.
3	Placing resistors near the shunt, connect a resistor to each of the shunt sense terminals.
4	Run new wires (installer provided, 22-gauge maximum) from the newly-installed shunt resistors to the BLJ terminals (SH1+ and SH1-).

Centralized Architecture, continued

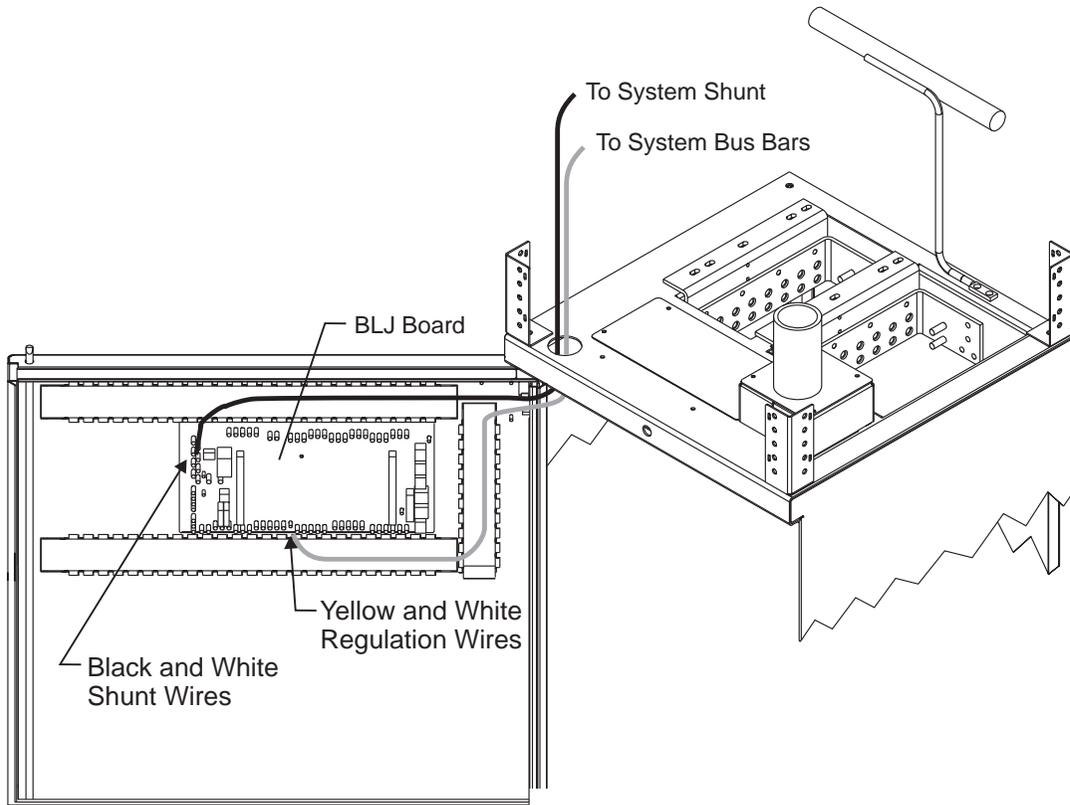


Figure 6-5: System Shunt and Remote Voltage Sense for Galaxy Vector Controller

Distributed Architecture

Intercabinet DC Power Bus Connections

Refer to Figure 6-6 for this procedure.

Intercabinet DC Power Bus Connections	
Step	Action
1	Install the intercabinet bus bars as shown.
2	Install the bus bar shield as shown.
3	Torque connections as specified in Figure 6-6.

Distributed Architecture, continued

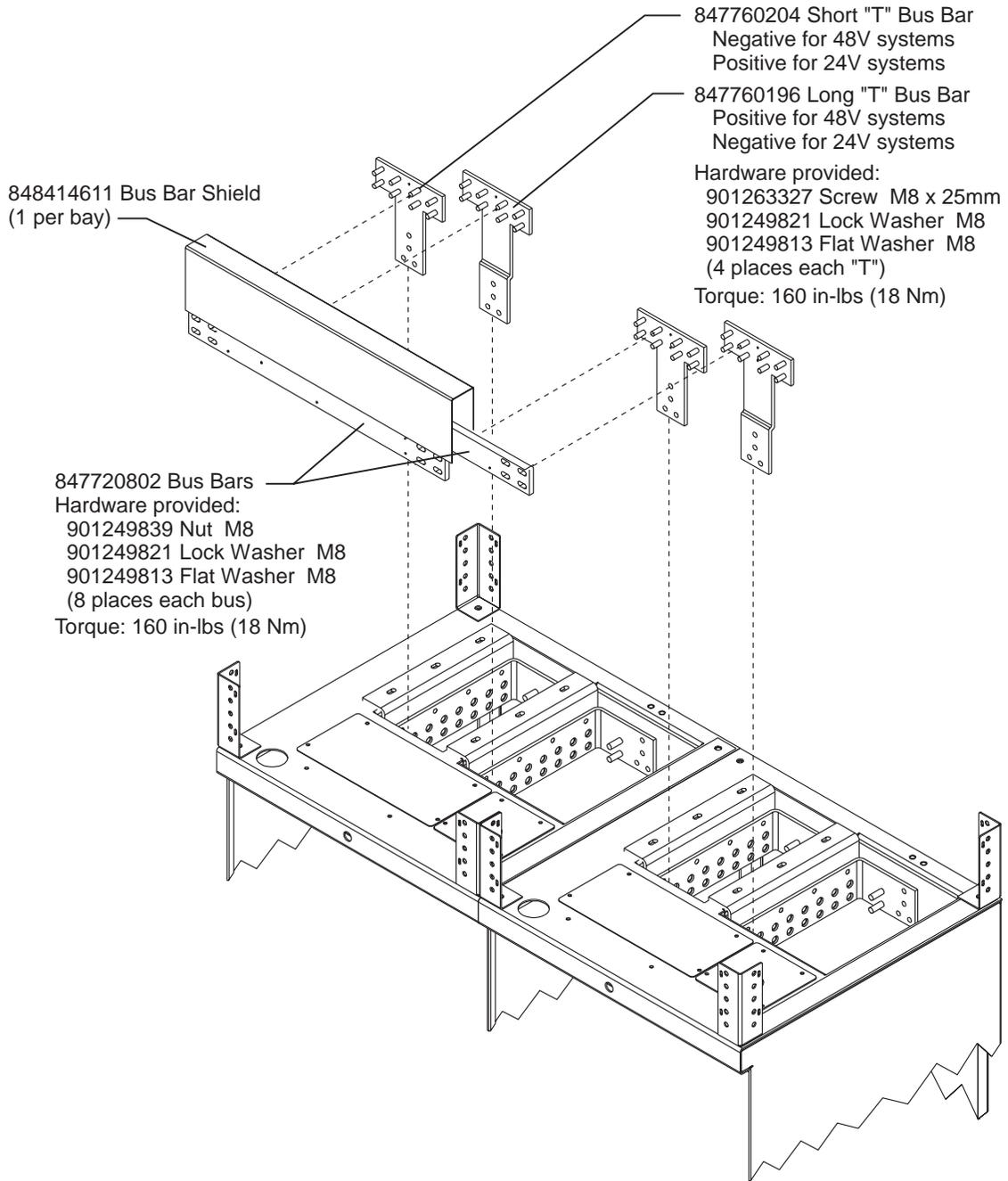


Figure 6-6: Distributed Architecture Intercabinet DC Power Bus Connections (Full-Height Cabinets Only)

Intercabinet Alarm and Serial Bus Connections

Introduction

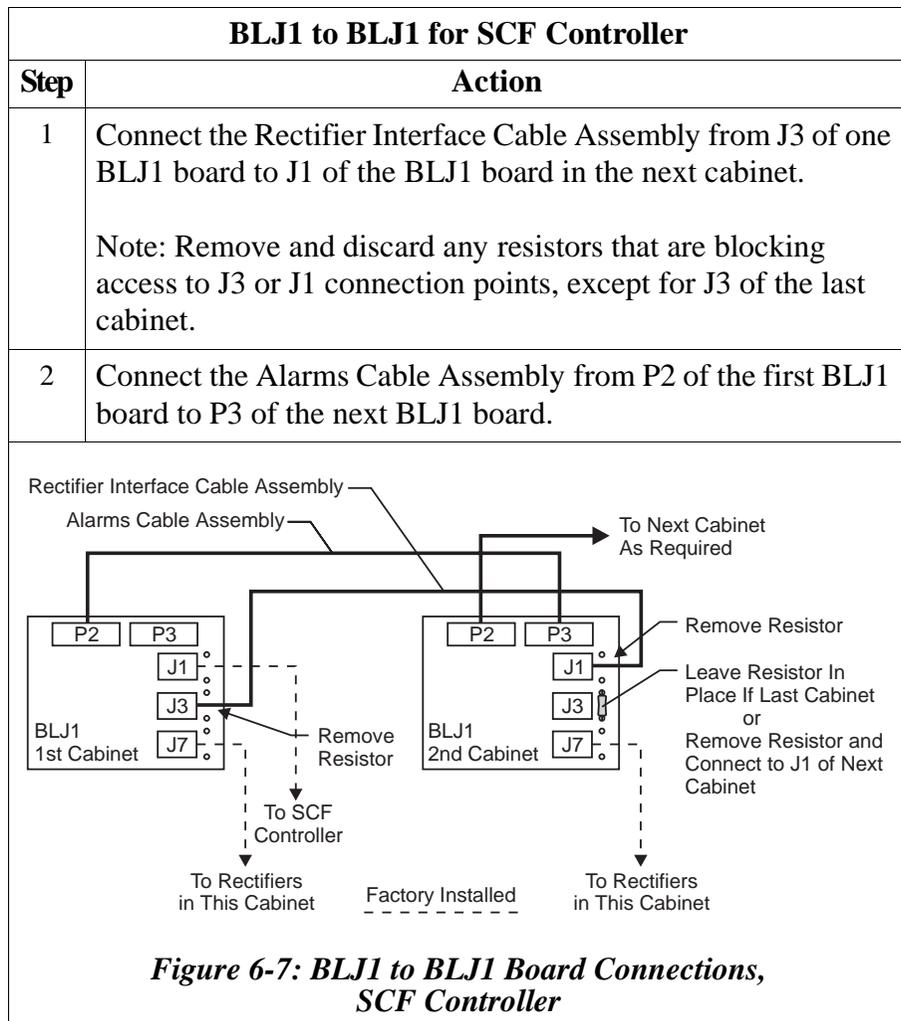
The alarm and serial bus connections are made by making daisy-chain connections from the BLJ board in one cabinet to the BLJ board in the next cabinet.

BLJ1 to BLJ1 for SCF Controller

Note: Manufacture of the BLJ1 board has been discontinued. This information is included for those customers who have equipment containing the BLJ1.

The cables used in this procedure are:

- Rectifier Interface Cable Assembly 847690799 (10 feet)
(provided with cabinet)
- Alarms Cable Assembly 847837911
(provided with cabinet)



Intercabinet Alarm and Serial Bus Connections, continued

**BLJ2/3 to BLJ2/3
(SCF or
Millennium
Controller)**

The cable used in this procedure is:

- Rectifier Interface Cable Assembly 847690799 (10 feet)
(provided with cabinet)

BLJ2/3 to BLJ2/3 (SCF or Millennium Controller)	
Step	Action
1	<p>Connect the Rectifier Interface Cable Assembly from J5 of one BLJ2/3 board to J6 of the BLJ2/3 board in the next cabinet.</p> <p>Note: Remove and discard any resistors that are blocking access to J6 or J5 connection points, except for those in J5 of the last cabinet.</p>
<p style="text-align: center;">Figure 6-8: BLJ2 or BLJ3 Board Connections, SCF or Millennium Controller</p>	
<i>Continued on next page.</i>	

Intercabinet Alarm and Serial Bus Connections, continued

**BLJ2/3 to BLJ2/3
(SCF or Millennium
Controller),
continued**

BLJ2/3 to BLJ2/3 (SCF or Millennium Controller), continued					
Step	Action				
2	Set the DIP switch on the BLJ2/3 board for the bay ID number. (Factory default is Bay 1.)				

Bay ID	S1.1	S1.2	S1.3	S1.7	S1.8
1	0	0	0	0	0
2 (shown)	0	0	1	0	0
3	0	1	0	0	0
4	0	1	1	0	0
5	1	0	0	0	0
6	1	0	1	0	0
7	1	1	0	0	0
8	1	1	1	0	0
9	0	0	0	0	1
10	0	0	1	0	1
11	0	1	0	0	1
12	0	1	1	0	1
13	1	0	0	0	1
14	1	0	1	0	1
15	1	1	0	0	1
16	1	1	1	0	1
17	0	0	0	1	0
18	0	0	1	1	0
19	0	1	0	1	0
20	0	1	1	1	0
21	1	0	0	1	0
22	1	0	1	1	0
23	1	1	0	1	0
24	1	1	1	1	0
25	0	0	0	1	1
26	0	0	1	1	1
27	0	1	0	1	1
28	0	1	1	1	1
29	1	0	0	1	1
30	1	0	1	1	1
31	1	1	0	1	1
32	1	1	1	1	1

S1.7, S1.8: Bay ID
S1.6: Unused
S1.4, S1.5: Shunt Size*
S1.1 - S1.3: Bay ID

S1.4	S1.5	Shunt Size (Amps)*
0	0	1000
0	1	600 (shown)
1	0	150
1	1	1500

*Shunt size settings for distributed architecture only.

Figure 6-9: Setting the Bay ID Number for the SCF or Millennium Controller

Intercabinet Alarm and Serial Bus Connections, continued

BLJ3 to BLJ3 (Vector Controller)

Note: This procedure is for the **Vector Controller only**.

The cable used in this procedure is:

- Rectifier Interface Cable Assembly 847690799 (10 feet)
(provided with cabinet)

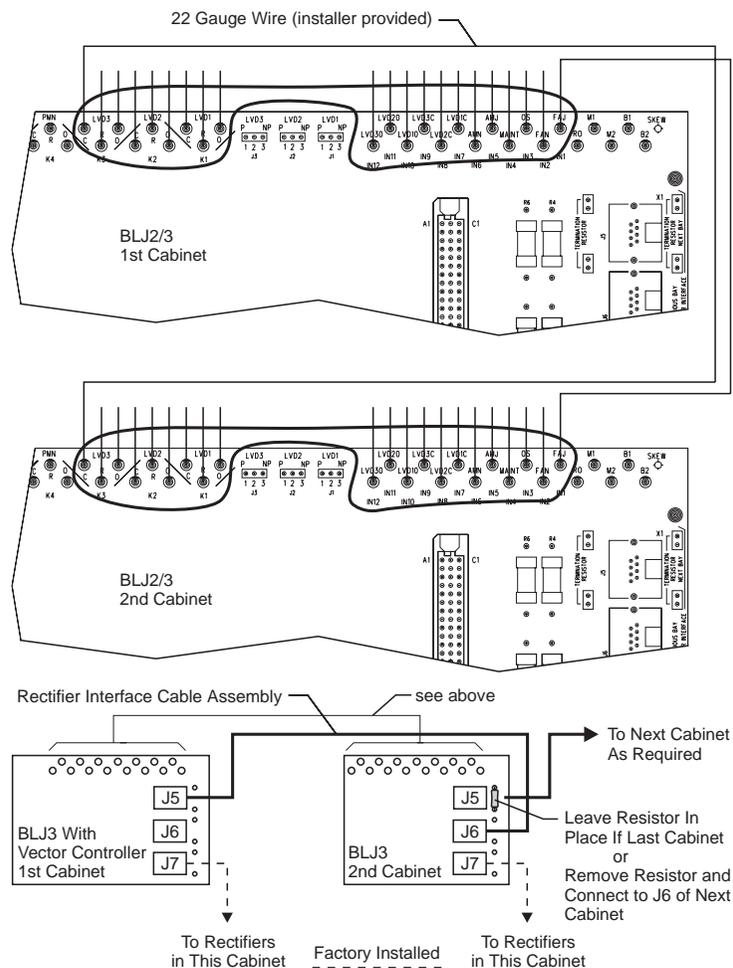
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Intercabinet Alarm and Serial Bus Connections, continued

BLJ3 to BLJ3 (Vector Controller), continued

BLJ3 to BLJ3 (Vector Controller)	
Step	Action
1	Using 22-gauge wire (installer provided), make discrete alarm connections from designated terminals on one BLJ3 board to corresponding terminals on the BLJ3 board in the next cabinet.
2	Connect the Rectifier Interface Cable Assembly from J5 of one BLJ3 board to J6 of the BLJ3 board in the next cabinet.

Note: Remove and discard any resistors that are blocking access to J6 or J5 connection points, except for those in J5 of the first cabinet and J6 of the last cabinet.



**Figure 6-10: BLJ3 to BLJ3 Board Connections,
Vector Controller**

7

AC Connection and Wiring

Safety

Read Section 2, *Safety*, carefully before connecting ac to the Galaxy Power System.

Reference Information

Refer to the following figures for the procedures in this section.

Figure 7-1	Attaching AC Conduit to H569-434
Figure 7-2	Attaching AC Conduit to H569-436 or H569-437
Figure 7-3	Rectifier Positions
Figure 7-4	ED83142-30 Group 2 (H569-4343 G22) AC Input Panel (for 595A Series Rectifier)
Figure 7-5	ED83142-30 Group 3/10/11 (H569-434 G20) AC Input Panel (for 595B Series Rectifier)
Figure 7-6	ED83142-30 Group 4 (H569-434 G21 or G23) AC Input Panel (for 595A Series or 595B Series Rectifiers)
Figure 7-7	ED83142-30 Group 5 (H569-434 G24, G25, G26, or G 27) AC Input Panel (for 595A Series or 595B Series Rectifiers)
Figure 7-8	ED83142-30 Group 6/6M (H569-436/H569-437 G71H, G73F, G74H, or G74F) AC Input Panel (for 596A Series or 596B Series Rectifiers)
Figure 7-9	ED83142-30 Group 7 (H569/436/H569-437 G72F) AC Input Panel (for 596A Series or 596B Series Rectifiers)
Figure 7-10	ED83142-30 Group 8 or 9 (H569-436 G76H, G77F, G78F, or G79F; H569-437 G76H or G77F) AC Input Panel (for 596A Series or 596B Series Rectifiers)
Figure 7-11	Wire Termination for ED83142-30 Group 8 or 9 (H569-436 G76H, G77F, G78F, or G79F; H569-437 G76H or G77F)
Figure 7-12	ED83142-30 (H569-434 G70) Group 10 AC Input Panel (for 595A Series Rectifiers)
Figure 7-13	ED83142-30 Group 11 (H569-434 G71) AC Input Panel (for 595A Series Rectifiers)
Figure 7-14	Neutral AC Input for ED83142-30 Group 6 or 7 (H569-436 G71H, G72F, or G73F; H569-437 G71H, G72F, or G73F)

Wire Sizing and Ampacity

Table 7-A: Wire Sizing and Ampacity

Standard Ga	Metric (mm²)	NEC Table 310-16 75°C (A)
10	6	35
8	10	50
6	16	65
4	25	85
2	35	115
1/0	50	150
2/0	70	175
4/0	120	230

AC Input Schemes

595 Rectifiers (48V, 200A)

The 595 rectifiers operate from either 380-480Vac 3-phase input (595A Series) or 200-240Vac 3-phase input (595B Series) at a frequency of 50/60 Hertz and produce 48Vdc output.

The system supports three ac schemes:

- Single bulk 3-wire (3-phase): The panel is factory equipped to distribute the appropriate connections to the rectifiers through circuit breakers.
- Dual bulk 3-wire (3-phase): The panel is factory equipped to distribute the appropriate connections to the rectifiers through circuit breakers.
- Multiple 3-wire (3-phase): Connected directly to the terminal strips, which then distribute the ac power to the rectifiers. One feed for each rectifier, external circuit overload protection, must be provided by customer.

596 Rectifiers (24V, 100A and 48V, 50A)

The 596 rectifiers operate from 200-240Vac power at a frequency of 50/60 Hertz and produce dc output (596A Series, 48Vdc; 596B Series, 24Vdc). The ac power may be phase-to-phase or phase-to-neutral, as long as the correct voltage range is provided to the rectifier.

The system supports two ac input schemes:

- A single bulk 3-wire (3-phase) or 4-wire (3-phase + neutral) can be brought into the ac panel located in the cabinet. The panel is factory equipped to have either a phase-to-phase or phase-to-neutral distribution to each rectifier through a two-pole ac circuit breaker. Jumpers can be ordered to field modify the phase-to-phase panel to have a phase-to-neutral distribution to each rectifier through a two-pole ac circuit breaker.
- A 2-wire (phase-to-phase or phase-to-neutral) feed for each rectifier is brought into a terminal strip located in the cabinet. The terminal strip provides distribution to each rectifier. External circuit overload protection must be provided by the customer.

Note: All wire sizes are based on the US National Electric Code.

AC Cable Routing

Caution: Follow all local codes and practices when performing the steps to connect ac to the power system.

AC Cable Routing	
Step	Action
1	Clearly label the main ac circuit breaker panel, stating that installers are working in the ac cabling.
2	Check that all ac circuit breakers are turned OFF.
3	Route the ac cables to the cabinet as required by local building codes.
4	At the cabinet, route the ac cables through the access hole(s) in the top of the cabinet. The ac box extender can be used to create more cabling space.
5	Install terminal lugs (if applicable) to cables.

Connecting AC Conduit

GPS 4848/100

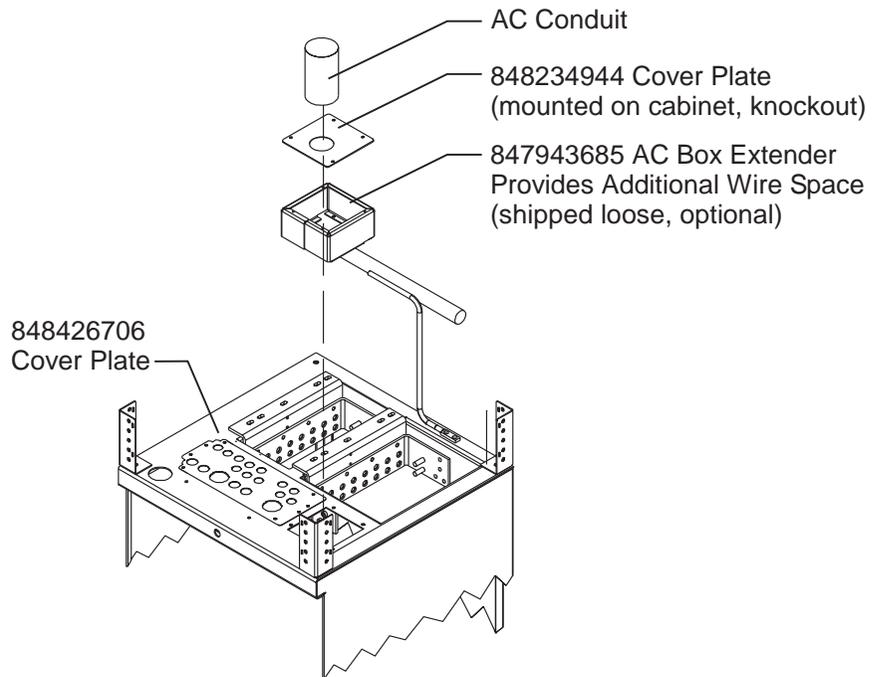


Figure 7-1: Attaching AC Conduit to H569-434

Connecting AC Conduit, continued

GPS 2424 or GPS
4812

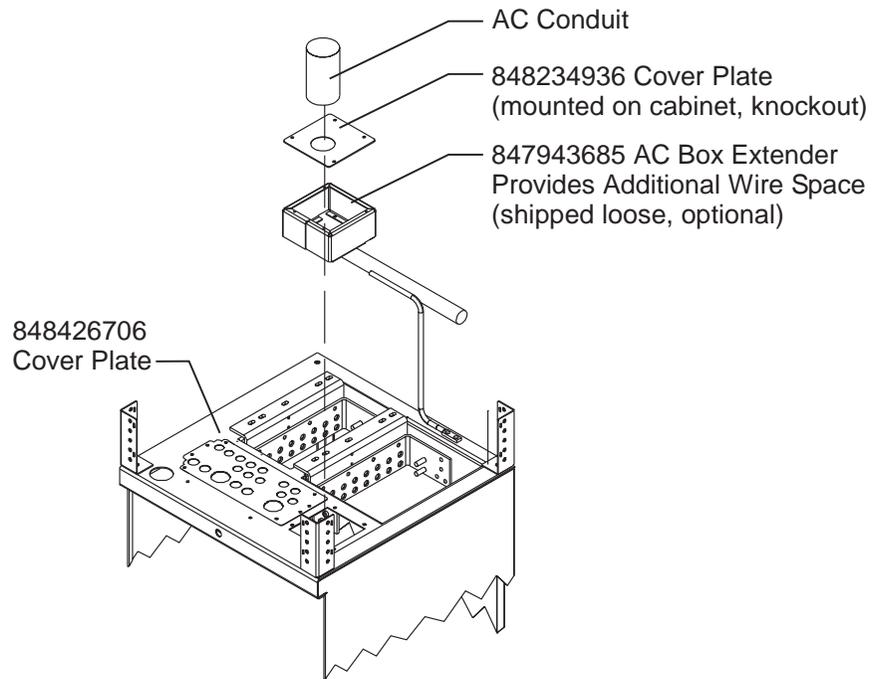


Figure 7-2: Attaching AC Conduit to H569-436 or H569-437

Rectifier Positions

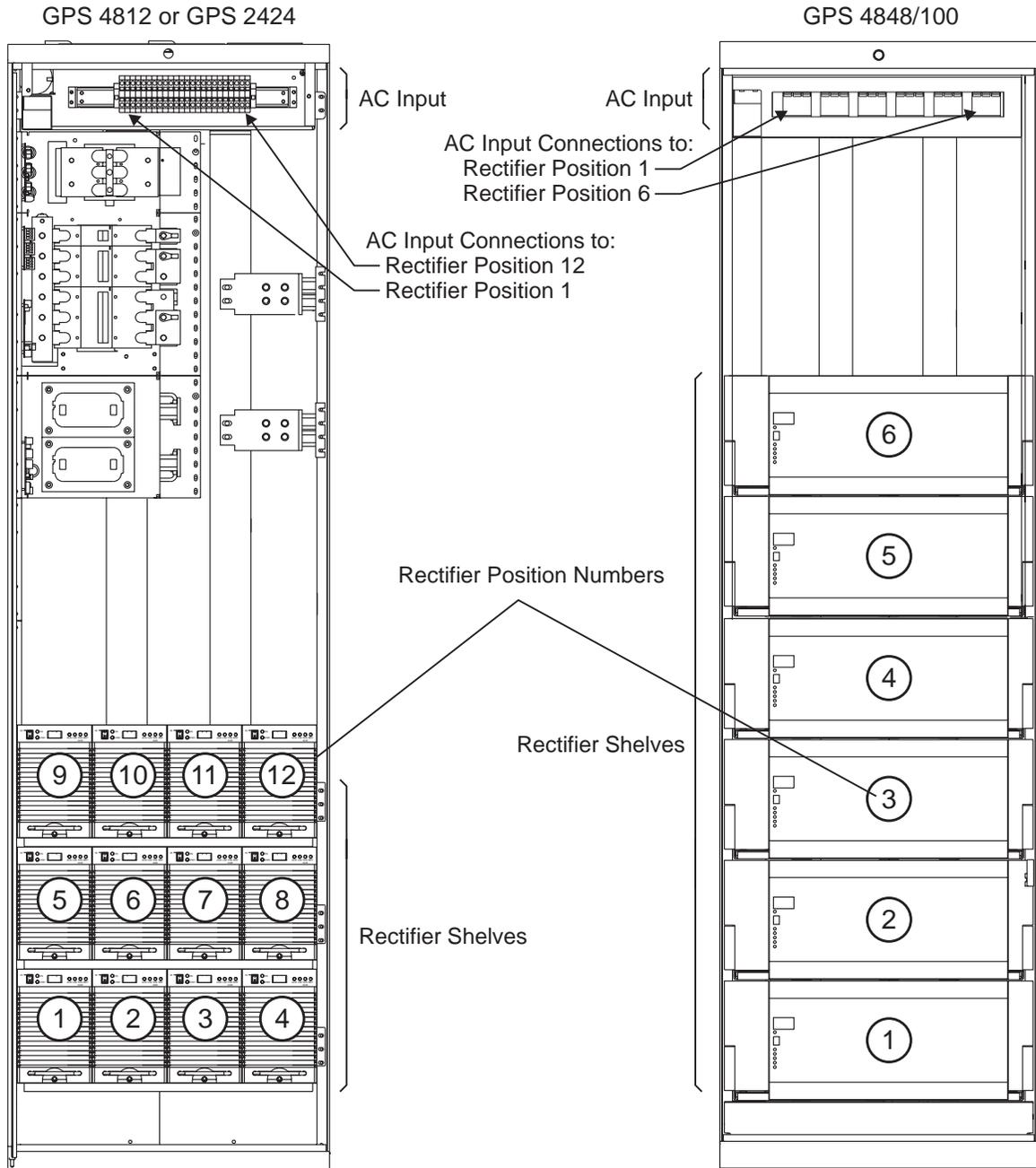


Figure 7-3: Rectifier Positions

AC Input Panels Cross Reference

Table 7-B: AC Panels Cross Reference

Description	ED83142-30	H569-434 GPS4848/100	H569-436 GPS4812	H569-437 GPS2424
Circuit Breakers: 4 rectifiers, 208/240Vac	3	20	--	--
Circuit Breakers: 6 rectifiers, 208/240Vac	4	21	--	--
Circuit Breakers: 4 rectifiers, 480Vac, 22KIC	2	22	--	--
Circuit Breakers: 6 rectifiers, 480Vac, 22KIC	4	23	--	--
Circuit Breakers: 4 rectifiers, 480Vac, 65KIC	10	70	--	--
Circuit Breakers: 6 rectifiers, 480Vac, 65KIC	11	71	--	--
Terminal Strip: 4 rectifiers, 208/240Vac	5	24	--	--
Terminal Strip: 6 rectifiers, 208/240Vac	5	25	--	--
Terminal Strip: 4 rectifiers, 480Vac	5	26	--	--
Terminal Strip: 6 rectifiers, 480Vac	5	27	--	--
Distribution Only, Distributed Architecture	None	28	--	--
Distribution Only, Centralized Architecture	None	29	--	--
Circuit Breakers: Half-Height, P-P	6	--	71H	71H
Circuit Breakers: Full-Height, P-P	7	--	72F	72F
Circuit Breakers: Full-Height, P-P	6	--	73F	73F
Circuit Breakers: Half-Height, P-N	6M	--	74H	74H
Circuit Breakers: Full-Height, P-N	6M	--	74F	74F
Terminal Strip: 8 Rectifiers, Half-Height	8	--	76H	76H
Terminal Strip: 12 Rectifiers, Full-Height	9	--	77F	77F
Terminal Strip: 16 Rectifiers, Full-Height	9	--	78F	--
Terminal Strip: 8 Rectifiers, Full-Height	8	--	79F	--
Distribution Only	None	--	28	28

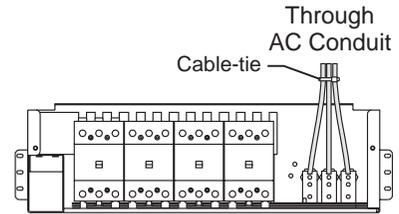
Figures 7-4 through 7-13 illustrate the ac input panels.

AC Input Panels

Wiring Options

1 Input at 100A, 380 VAC 3 Phase, 3 Wire Service 4 Rectifiers		1 Input at 80A, 480 VAC 3 Phase, 3 Wire Service 4 Rectifiers	
Wire	(3) 2 ga (1) 6 ga ground	Wire	(3) 2 ga (1) 8 ga ground
Panel Board Breaker	(1) 125A 3-Pole	Panel Board Breaker	(1) 100A 3-Pole
Conduit Size	(1) 1 1/2" (THHN 75C min)	Conduit Size	(1) 1 1/2" (THHN 75C min)

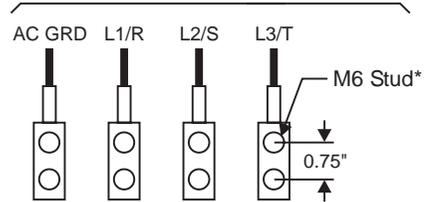
Cable Routing



Provided

Lug	Qty	Comcode	Part
8 ga	1	406338343	WP91412 L103
6 ga	1	406338442	WP91412 L110
2 ga	3	406338673	WP91412 L122

Connections To AC Service



*Torque to 62 in-lbs (7 Nm)

**Figure 7-4: ED83142-30 Group 2 (H569-4343 G22)
AC Input Panel (for 595A Series Rectifier)**

AC Input Panels, continued

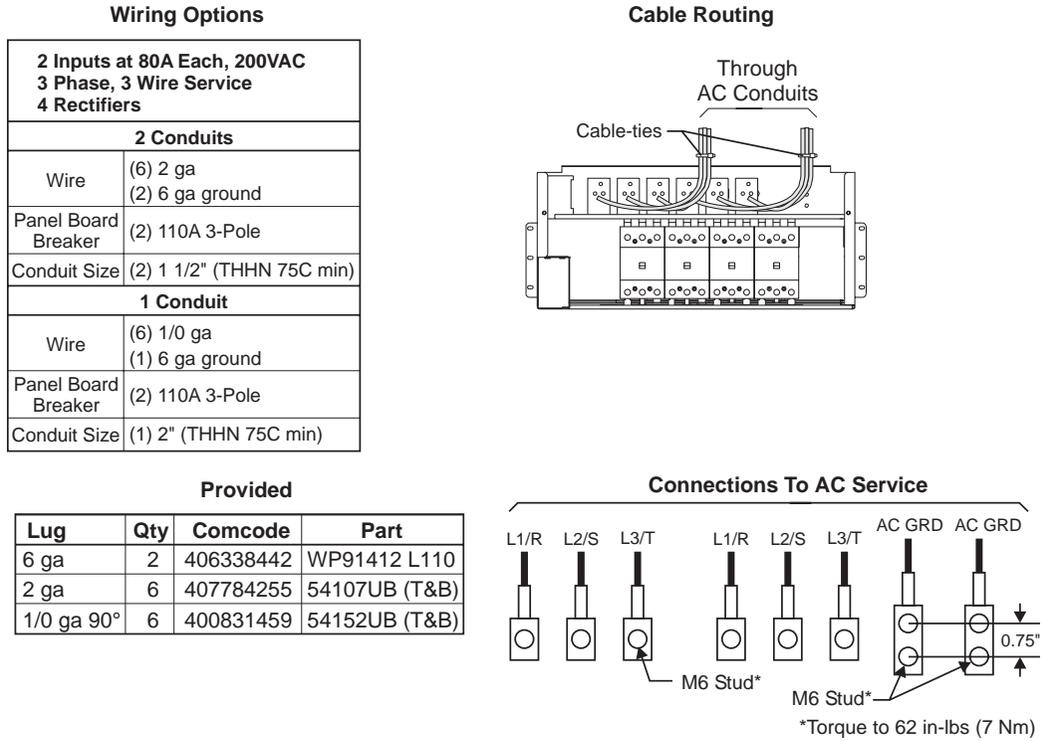


Figure 7-5: ED83142-30 Group 3 (H569-434 G20)
AC Input Panel (for 595B Series Rectifier)

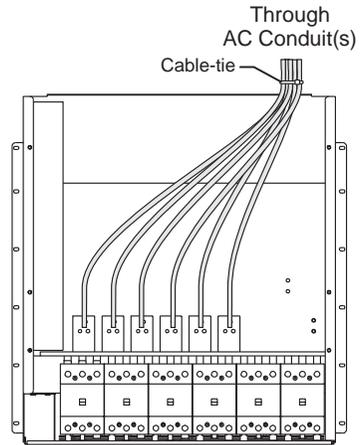
AC Input Panels, continued

Wiring Options

2 Inputs at 75A Each, 380 VAC or 60A Each, 480 VAC 3 Phase, 3 Wire Service 6 Rectifiers	
Wire	(6) 2 ga (1) 8 ga ground
Panel Board Breaker	(2) 90A 3-Pole
Conduit Size	(1) 1 1/2" (THHN 75C min)

2 Inputs at 120A Each, 200 VAC 3 Phase, 3 Wire Service 6 Rectifiers	
Wire	(6) 2/0 (2) 6 ga ground
Panel Board Breaker	(2) 175A 3-Pole
Conduit Size	(2) 2" (THHN 75C min)

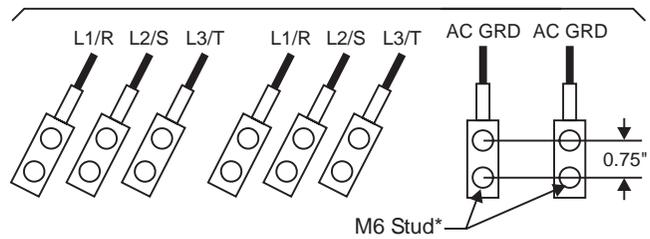
Cable Routing



Provided

Lug	Qty	Comcode	Part
8 ga	1	406338343	WP91412 L103
6 ga	2	406338442	WP91412 L110
2 ga	6	406338673	WP91412 L122
2/0 ga	6	406338764	WP91412 L130

Connections To AC Service



*Torque to 62 in-lbs (7 Nm)

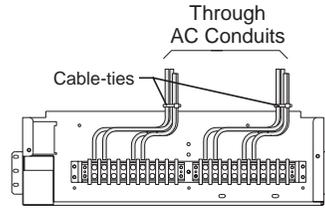
**Figure 7-6: ED83142-30 Group 4 (H569-434 G21 or G23)
AC Input Panel (for 595A Series or 595B Series Rectifiers)**

AC Input Panels, continued

Wiring Options

4 Inputs at 40A Each, 200 VAC 3 Phase, 3 Wire Service 4 Rectifiers (H569-434 G24)		6 Inputs at 40A Each, 200 VAC 3 Phase, 3 Wire Service 6 Rectifiers (H569-434 G25)	
2 Conduits		3 Conduits	
Wire	(12) 6 ga (2) 8 ga ground	Wire	(18) 6 ga (3) 8 ga ground
Panel Board Breaker	(4) 50A 3-Pole	Panel Board Breaker	(6) 50A 3-Pole
Conduit Size	(2) 1 1/2" (THHN 75C min)	Conduit Size	(3) 1 1/2" (THHN 75C min)
4 Conduits		6 Conduits	
Wire	(12) 6 ga (4) 8 ga ground	Wire	(18) 6 ga (6) 8 ga ground
Panel Board Breaker	(4) 50A 3-Pole	Panel Board Breaker	(6) 50A 3-Pole
Conduit Size	(4) 3/4" (THHN 75C min)	Conduit Size	(6) 3/4" (THHN 75C min)
4 Inputs at 25A Each, 380 VAC or 20A Each, 480 VAC 3 Phase, 3 Wire Service 4 Rectifiers (H569-434 G26)		6 Inputs at 25A Each, 380 VAC or 20A Each, 480 VAC 3 Phase, 3 Wire Service 6 Rectifiers (H569-434 G27)	
1 Conduit		1 Conduit	
Wire	(12) 6 ga (1) 8 ga ground	Wire	(18) 6 ga (1) 8 ga ground
Panel Board Breaker	(4) 30A 3-Pole	Panel Board Breaker	(6) 30A 3-Pole
Conduit Size	(1) 1 1/2" (THHN 75C min)	Conduit Size	(1) 2" (THHN 75C min)
2 Conduits		2 Conduits	
Wire	(12) 8 ga (2) 8 ga ground	Wire	(12) 8 ga (2) 8 ga ground
Panel Board Breaker	(4) 30A 3-Pole	Panel Board Breaker	(6) 30A 3-Pole
Conduit Size	(2) 1" (THHN 75C min)	Conduit Size	(2) 1 1/2" (THHN 75C min)
4 Conduits		6 Conduits	
Wire	(12) 10 ga (4) 8 ga ground	Wire	(18) 10 ga (6) 8 ga ground
Panel Board Breaker	(4) 30A 3-Pole	Panel Board Breaker	(6) 30A 3-Pole
Conduit Size	(4) 3/4" (THHN 75C min)	Conduit Size	(6) 3/4" (THHN 75C min)

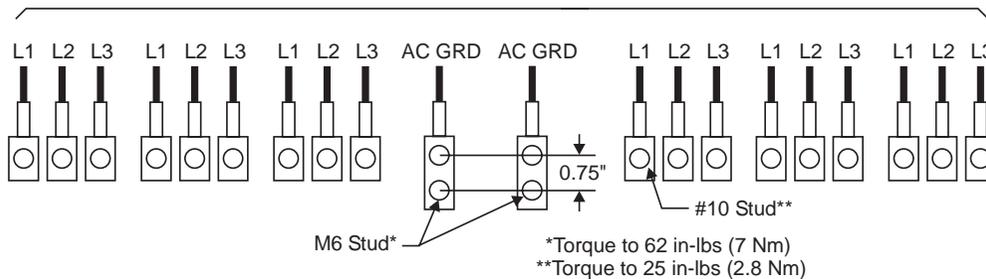
Cable Routing



Provided

Lug	Qty	Comcode	Part
10 ga	18	406338145	WP91412 L93
8 ga	6	406338343	WP91412 L103
8 ga	18	405347402	WP91412 L1
6 ga	18	407334671	WP91412 L171

Connections To AC Service



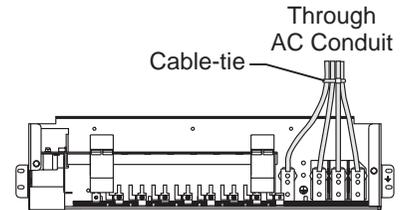
**Figure 7-7: ED83142-30 Group 5
(H569-434 G24, G25, G26, or G 27)
AC Input Panel (for 595A Series or 595B Series Rectifiers)**

AC Input Panels, continued

Wiring Options

1 Input at 100A, 200 VAC 3 Phase, 3 Wire Service 8 Rectifiers		1 Input at 60A, 350-415 VAC 3 Phase, 4 Wire Service 8 Rectifiers	
Wire	(3) 2 ga (1) 6 ga ground	Wire	Follow Local Codes
Panel Board Breaker	(1) 125A, 3 pole	Panel Board Breaker	(1) 125A, 4 pole
Conduit Size	(1) 1 1/2" (THHN 75C min)	Conduit Size	Follow Local Codes

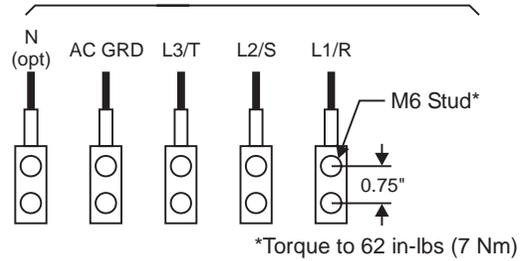
Cable Routing



Provided

Lug	Qty	Comcode	Part
6 ga	1	406338442	WP91412 L110
2 ga	3	406338673	WP91412 L122

Connections To AC Service



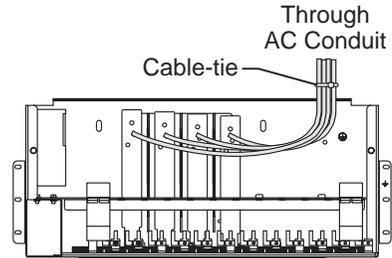
**Figure 7-8: ED83142-30 Groups 6/6M
(H569-436/H569-437 G71H, G73F, G74H, or G74F)
AC Input Panel (for 596A Series or 596B Series Rectifiers)**

AC Input Panels, continued

Wiring Options

1 Input at 120A, 200 VAC 3 Phase, 3 Wire Service 12 Rectifiers		1 input at 80A, 350-415 VAC 3 Phase, 4 Wire Service 12 Rectifiers	
Wire	(3) 1/0 (1) 6 ga ground	Wire	Follow Local Codes
Panel Board Breaker	(1) 150A, 3 pole	Panel Board Breaker	(1) 150A, 4 pole
Conduit Size	(1) 1 1/2" (THHN 75C min)	Conduit Size	Follow Local Codes

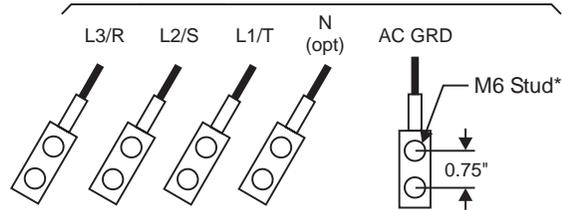
Cable Routing



Provided

Lug	Qty	Comcode	Part
6 ga	1	406338442	WP91412 L110
1/0 ga 45°	4	406424506	WP91412 L139

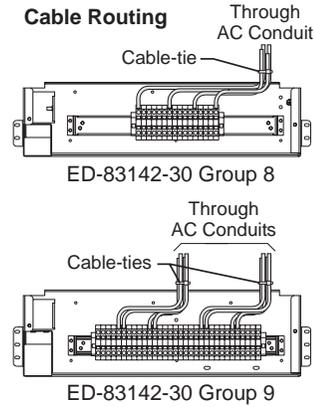
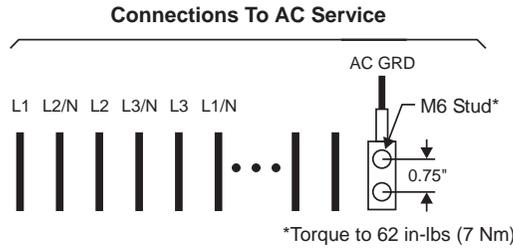
Connections To AC Service



*Torque to 62 in-lbs (7 Nm)

**Figure 7-9: ED83142-30 Group 7 (H569/436/H569-437 G72F)
AC Input Panel (for 596A Series or 596B Series Rectifiers)**

AC Input Panels, continued



Wiring Options

8 Inputs at 20A Each, 200 VAC Single Phase, 2 Wire Service 8 Rectifiers (H569-436 G76H or G79F, H569-437 G76H)		12 Inputs at 20A Each, 200 VAC Single Phase, 2 Wire Service 12 Rectifiers (H569-436 G77F, H569-437 G77F)		16 Inputs at 20A Each, 200 VAC Single Phase, 2 Wire Service 16 Rectifiers (H569-436 G78F)	
1 Conduit		1 Conduit		1 Conduit	
Wire	(16) 8 ga (1) 8 ga ground	Wire	(24) 6 ga (1) 8 ga ground	Wire	(32) 8 ga (1) 8 ga ground
Panel Board Breaker	(8) 25A 2-Pole	Panel Board Breaker	(12) 25A 2-Pole	Panel Board Breaker	(16) 25A 2-Pole
Conduit Size	(1) 1 1/2" (THHN 75C min)	Conduit Size	(1) 2" (THHN 75C min)	Conduit Size	(1) 2" (THHN 75C min)
8 Conduits		2 Conduits		2 Conduits	
Wire	(16) 10 ga (8) 8 ga ground	Wire	(24) 8 ga (2) 8 ga ground	Wire	(32) 8 ga (2) 8 ga ground
Panel Board Breaker	(8) 25 or 30A 2-Pole	Panel Board Breaker	(12) 25 A 2-Pole	Panel Board Breaker	(16) 25 A 2-Pole
Conduit Size	(8) 3/4" (THHN 75C min)	Conduit Size	(2) 1 1/2" (THHN 75C min)	Conduit Size	(2) 1 1/2" (THHN 75C min)
2 Conduits, 25A Circuit Breaker		12 Conduits		16 Conduits	
Wire	(16) 10 ga (2) 8 ga ground	Wire	(24) 10 ga (12) 8 ga ground	Wire	(32) 10 ga (16) 8 ga ground
Panel Board Breaker	(8) 25A 2-Pole	Panel Board Breaker	(12) 25 or 30A 2-Pole	Panel Board Breaker	(16) 25 or 30A 2-Pole
Conduit Size	(2) 3/4" (THHN 75C min)	Conduit Size	(12) 3/4" (THHN 75C min)	Conduit Size	(16) 3/4" (THHN 75C min)
2 Conduits, 30A Circuit Breaker		3 Conduits, 25A Circuit Breaker		4 Conduits, 25A Circuit Breaker	
Wire	(16) 8 ga (2) 8 ga ground	Wire	(24) 10 ga (3) 8 ga ground	Wire	(32) 10 ga (4) 8 ga ground
Panel Board Breaker	(8) 30A 2-Pole	Panel Board Breaker	(12) 25A 2-Pole	Panel Board Breaker	(16) 25A 2-Pole
Conduit Size	(2) 1" (THHN 75C min)	Conduit Size	(3) 3/4" (THHN 75C min)	Conduit Size	(4) 3/4" (THHN 75C min)
Provided		3 Conduits, 30A Circuit Breaker		4 Conduits, 30A Circuit Breaker	
Lug	Qty	Comcode	Part	Wire	(24) 8 ga (3) 8 ga ground
ED-83142 Group 8					
8 ga	8	406338343	WP91412 L103	Panel Board Breaker	(12) 30A 2-Pole
ED-83142 Group 9					
8 ga	16	406338343	WP91412 L103	Conduit Size	(3) 1" (THHN 75C min)
				Panel Board Breaker	(16) 30A 2-Pole
				Conduit Size	(4) 1" (THHN 75C min)

Figure 7-10: ED83142-30 Group 8 or 9 (H569-436 G76H, G77F, G78F, G79F; H569-437 G76H, G77F) AC Input Panel (for 596A Series or 596B Series Rectifiers)

AC Input Panels, continued

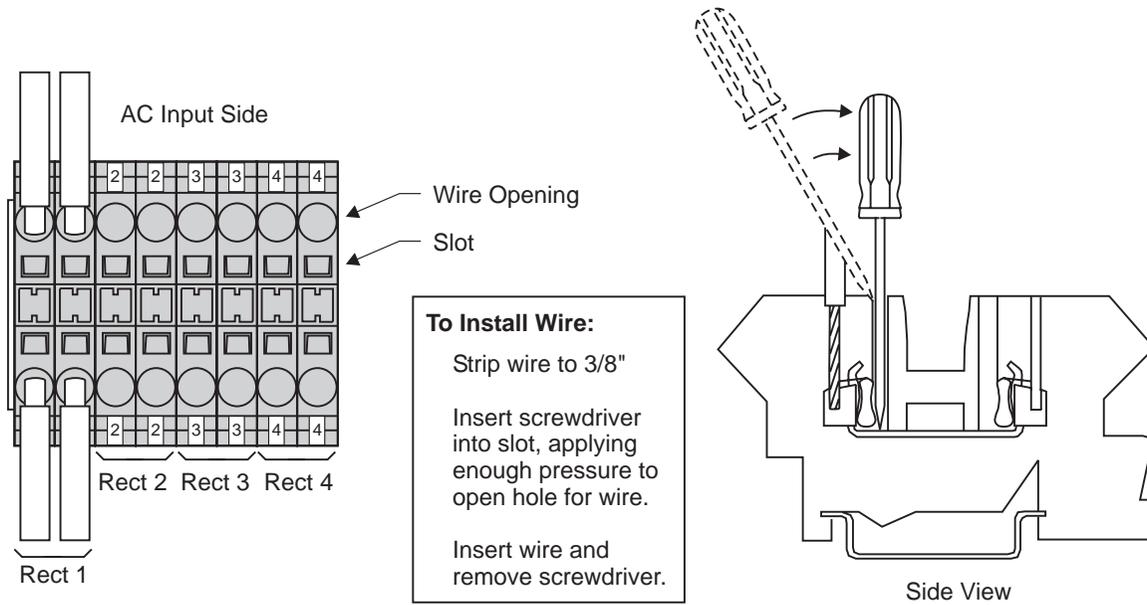


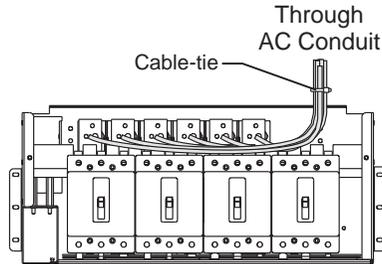
Figure 7-11: Wire Termination for ED83142-30 Group 8 or 9 (H569-436 G76H, G77F, G78F, or G79F; H569-437 G76H or G77F)

AC Input Panels, continued

Wiring Options

2 Inputs at 50A Each, 380 VAC or 40A Each, 480 VAC	
3 Phase, 3 Wire Service	
4 Rectifiers	
Wire	(6) 2 ga (1) 8 ga ground
Panel Board Breaker	(2) 80A 3-Pole
Conduit Size	(1) 1 1/2" (THHN 75C min)

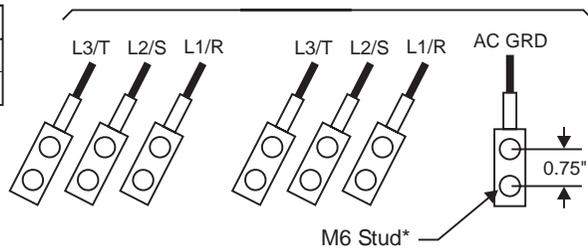
Cable Routing



Provided

Lug	Qty	Comcode	Part
8 ga	1	406338343	WP91412 L103
2 ga 90°	6	407784255	54107UB (T&B)

Connections To AC Service



*Torque to 62 in-lbs (7 Nm)

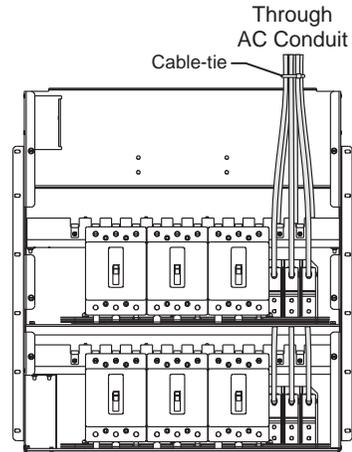
**Figure 7-12: ED83142-30 Group 10 (H569-434 G70)
AC Input Panel (for 595A Series Rectifiers)**

AC Input Panels, continued

Wiring Options

2 Inputs at 75A Each, 380 VAC or 60A Each, 480 VAC 3 Phase, 3 Wire Service 6 Rectifiers		1 Input at 150A, 380 VAC or 120A, 480 VAC 3 Phase, 3 Wire Service 6 Rectifiers (Requires use of 848517272 cable assembly)	
Wire	(6) 2 ga (1) 8 ga ground	Wire	(3) 4/0 ga (1) 6 ga ground
Panel Board Breaker	(2) 90A 3-Pole	Panel Board Breaker	(1) 200A 3-Pole
Conduit Size	(1) 1 1/2" (THHN 75C min)	Conduit Size	(1) 2" (THHN 75C min)

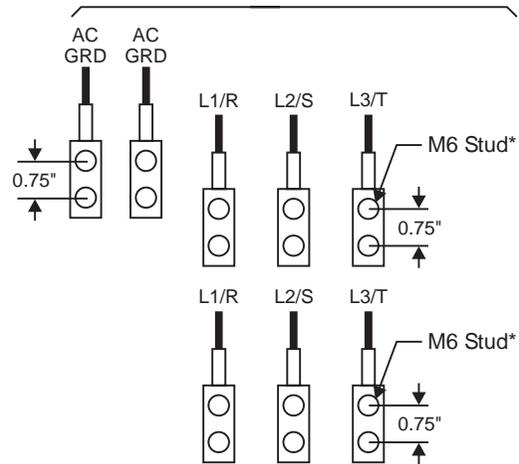
Cable Routing



Provided

Lug	Qty	Comcode	Part
8 ga	1	406338343	WP91412 L103
6 ga	1	406338442	WP91412 L110
2 ga	6	406338673	WP91412 L122

Connections To AC Service



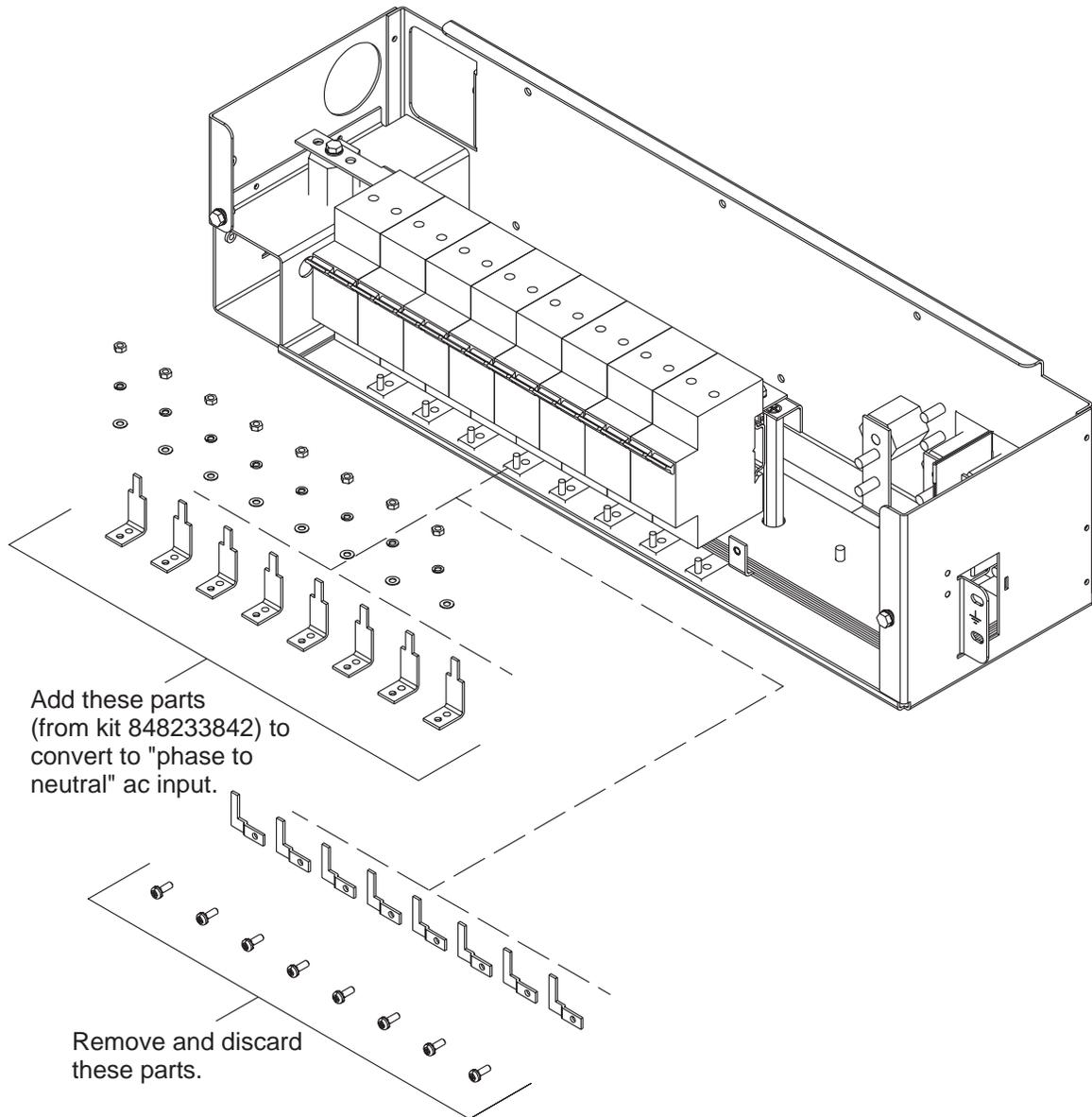
*Torque to 62 in-lbs (7 Nm)

**Figure 7-13: ED83142-30 Group 11 (H569-434 G71)
AC Input Panel (for 595A Series Rectifiers)**

Changing the AC Panel for Neutral ED83142-30 Group 6 or 7

For Group 6 or Group 7 only:

When connecting to an ac source where neutral is required to get the correct voltage to the rectifier, the ac panel must be converted from a phase-to-phase rectifier connection to a phase-to-neutral connection. Refer to Figure 7-14 for the required changes to the ac panel.



**Figure 7-14: Neutral AC Input for ED83142-30 Group 6 or 7
H569-436/H569-437 G71H, G72F, or G73F**

Completing the AC Connection

Completing the AC Connection	
Step	Action
1	Terminate earth ground to the appropriate termination point. Terminate lines 1, 2, 3, and neutral (if provided) to the appropriate termination points.
2	Verify that there are no shorts or bad contacts in the service cables.
3	Turn the main ac circuit breaker ON.
4	Use an ac voltmeter to check that the proper phase-to-phase or phase-to-neutral ac voltage is present at the input to the ac panel.
5	Replace the ac panel front cover. If the ac panel is equipped with rectifier circuit breakers, mark the ac panel front cover label with rectifier position numbers (they may already be factory-marked). See Figure 7-3.
6	Do not turn the rectifier circuit breakers ON.
7	Turn OFF the main ac circuit breaker.

8 *DC Distribution Assembly and Connections*

Overview

DC (load) distribution panels offer either fuses (US or DIN styles) or circuit breakers (US or DIN styles). Both fuse and circuit breaker panels have protectors from 1 - 600 amperes to satisfy a wide range of distribution needs. Some of the larger protectors (100 amperes and above) have load monitoring shunts in each load protector path. When using remote peripheral monitoring modules (RPMs) with the Galaxy SCF or Millennium Controller, measurement of these loads is available for history and sizing.

The dc distribution panels may be equipped with a ground return bar for connecting the load returns internal to the cabinet, or external ground return bars may be used.

Most panels are available with a low voltage load disconnect (LVLD) contactor for load-shedding applications.

Each panel is equipped with an alarm card that communicates to the controller any operated fuse or circuit breaker and provides a visual LED that indicates an operated protector.

Note: Panels for dc distribution are white; battery connection panels are blue.

 **Warning**

Turn off dc breaker and remove dc fuses before making connections.

DC Distribution Panels Cross Reference

Table 8-A: DC Distribution Panels Cross Reference

Description	ED83143-30	H569-434 GPS4848/100	H569-436 GPS4812	H569-437 GPS2424
6" Small CB/Fuse	11/111	40, 50, 40A, 50A	40A, 40B, 50A, 50B	40A, 40B, 50A, 50B
6" Small CB/Fuse with LVLD	13/113	45, 45A, 55, 55A	40C, 40D, 50C, 50D	40C, 40D, 50C, 50D
9" Small CB/Fuse	12/112	41, 51, 41A, 51A	41A, 41B, 51A, 51B	41A, 41B, 51A, 51B
9" Small CB/Fuse with LVLD	14/114	46, 46A, 56, 56A	41C, 41D, 51C, 51D	41C, 41D, 51C, 51D
6" Large CB	2/102	42, 42A, 106, 106A, 107, 107A, 108, 108A, 109, 109A	42A, 42B	42A, 42B
6" Large CB with LVLD	3/103	47, 47A	42C, 42D	42C, 42D
12" Large CB	1/101	43, 43A, 101, 101A, 102, 102A, 103, 103A, 104, 104A	43A, 43B	43A, 43B
12" Large CB with LVLD	4/104	43B, 43C	43C, 43D	43C, 43D
9" Large CB	5/105	48, 48A, 110, 110A, 111, 111A, 112, 112A, 113, 113A	44A, 44B	44A, 44B
9" Large CB with LVLD	6/106	48B, 48C	44C, 44D	44C, 44D
6" Bullet CB	15/115	95, 95A	45A, 45B	45A, 45B
6" Medium Fuse	53/153	52, 52A	52A, 52B	52A, 52B
9" Large Fuse	51/151	53, 53A	53A, 53B	53A, 53B
9" Large Fuse with LVLD	52/152	57, 57A	53C, 53D	53C, 53D
6" Small DIN CB	26/126	60, 60A	60A, 60B	60A, 60B
6" Small DIN CB with LVLD	20/120	60B, 60C	60C, 60D	60C, 60D
6" Large DIN CB	25/125	61, 61A	61A, 61B	61A, 61B
6" Large DIN CB with LVLD	27/127	61B, 61C	61C, 61D	61C, 61D
6" 10X38 DIN Fuse	24/124	65, 65A	65A, 65B	65A, 65B
6" 10X38 DIN Fuse with LVLD	28/128	65B, 65C	65C, 65D	65C, 65D
6" 14X51 DIN Fuse	23/123	66, 66A	66A, 66B	66A, 66B
6" 14X51 DIN Fuse with LVLD	29/129	66B, 66C	66C, 66D	66C, 66D
6" NH00 Fuse	22/122	67, 67A	67A, 67B	67A, 67B
6" NH2 Fuse	21/121	68, 68A	68A, 68B	68A, 68B
3" Blank Panel	JD	93	93	93
6" Blank Panel	JA	90	90	90
9" Blank Panel	JB	91	91	91
12" Blank Panel	JC	92	92	92

Note: Group numbers less than 100 are -48Vdc, and greater than 100 are +24Vdc.

Connecting Loads

Cable Routing Strategy

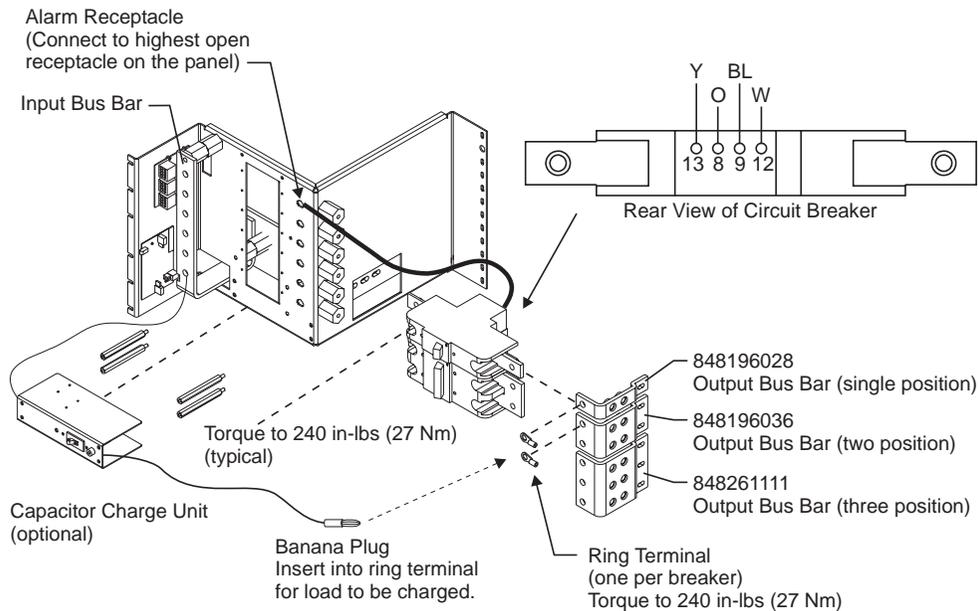
As with any power system, cabinet positioning with respect to cable racks, batteries, and the ac service is very important in order to ensure easy installation, proper maintenance, and graceful growth of the system in the future.

Each cabinet is arranged to separate ac leads from dc leads to minimize electrical noise transmitted to the load. Run ac cable in an ac conduit mounted above the front of the cabinet. Route dc leads along a cable rack above the back of the cabinet.

Capacitor Charge Unit

ED83143-30 Group 1 may also be equipped with a Capacitor Charge Unit (refer to Figure 8-1 to mount this unit on the panel).

To use the Capacitor Charge Unit, follow the instructions silk-screened on the unit.



Circuit Breakers			
Comcode	Amps	Description	Pos.
108312794	125	KS22012 L13 e/w L104	1
108312802	175	KS22012 L15 e/w L104	1
108312810	225	KS22012 L17 e/w L104	1
108312828	300	KS22012 L43 e/w L104	2
108312836	400	KS22012 L44 e/w L104	2
108312844	500	KS22012 L45 e/w L104	3
108312851	600	KS22012 L46 e/w L104	3

Figure 8-1: Installation of Large Circuit Breakers and Capacitor Charge Unit

Connecting Loads, continued

Mounting Large Circuit Breakers

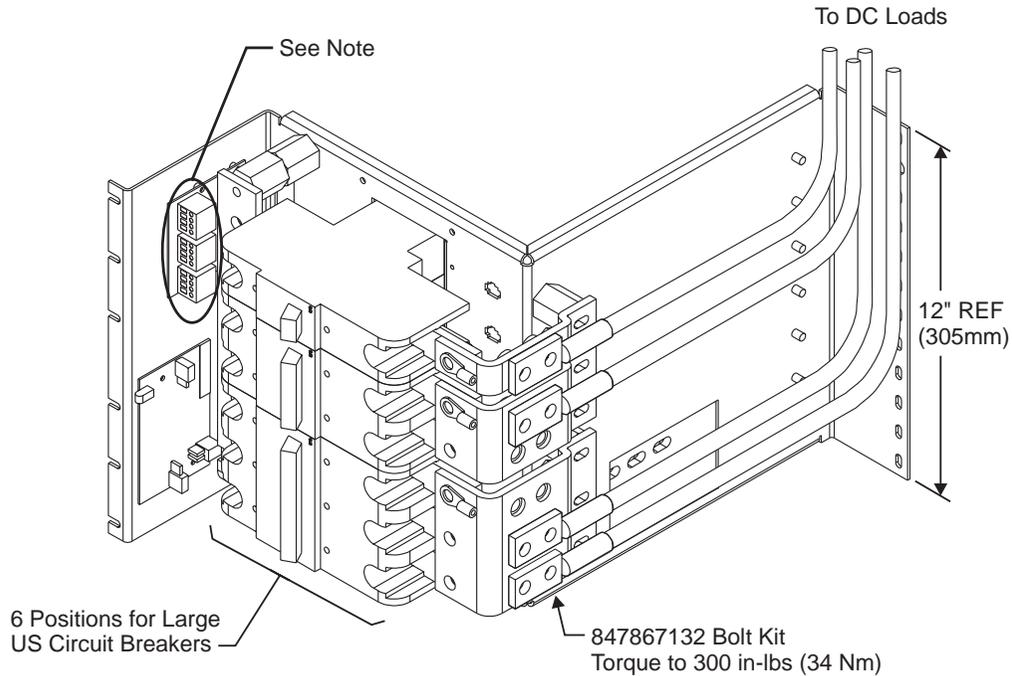
The circuit breakers for ED83143-30 Groups 1, 2, 3, 4, 5, 6, 101, 102, 103, 104, 105, and 106 may need to be mounted. See Figure 8-1 for the installation procedure. Figures 8-2, 8-3, and 8-4 provide detailed views of these dc distribution panels.

Note: ED83143-30 Groups 5, 6, 105, and 106 are the same as shown in Figure 8-1, except they have one less circuit breaker position.

Caution: Turn OFF breaker before beginning procedure.

Mounting Large Circuit Breakers	
Step	Action
1	Install alarm wires and load shunt wires to circuit breaker. Plug cable onto the highest open receptacle on the panel.
2	Secure the breaker to the input bus bar with the 3/8" hardware provided.
3	Secure the output bus bar to the plastic standoffs with the M6 screws provided.
4	Secure the breaker to the output bus bar with the 3/8" hardware provided.
5	Place the ring terminal provided between the bus bar and the securing hardware.

Connecting Loads, continued



Large Circuit Breakers for Groups 1, 4, 101, and 104			
Comcode	Size (A)	Breaker Positions	Wire Ga (min)
108312794	125	1	2
108606732	150	1	1/0
108312802	175	1	2/0
108312810	225	1	4/0
108312828	300	2	(2) 4/0*
108312836	400	2	(2) 4/0*
108312844	500	3	(2) 4/0*
108312851	600	3	(3) 4/0*

*Wires must be the same length and terminated at a common point at each end.

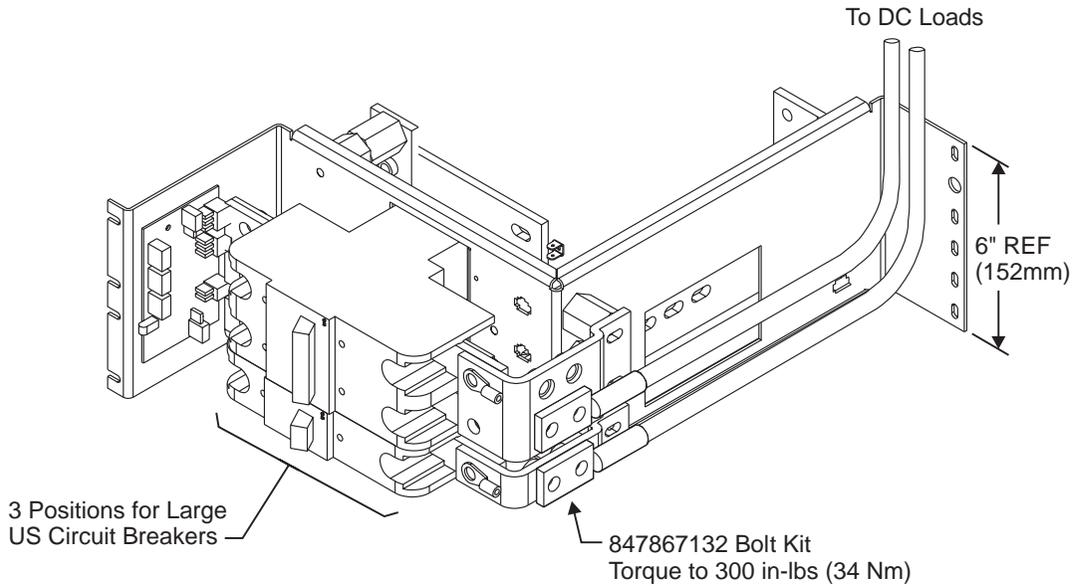
Note

To bypass 100k current limiting resistors provided for proper connection to Lucent RPMs, move jumper straps (3) to the "Bypass" position on the PWB. This will allow shunt monitoring connection to non-Lucent equipment. Protection for wiring must be provided by the user when current limiting resistors are bypassed.

Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
For 1, 2, or 3-position breakers (double-hole load and return lugs)					
406338665	load	2	--	35	847867132
	rtn	2	--	35	
405348228	load	1/0	--	50	
	rtn	1/0	--	50	
405348236	load	2/0	1/0	70	
	rtn	2/0	1/0	70	
406021725	load	--	2/0	--	
	rtn	--	2/0	--	
405348251	load	4/0	--	--	
	rtn	4/0	--	--	
405347923	load	--	4/0	120	
	rtn	--	4/0	120	

Figure 8-2: ED83143-30 Groups 1, 4, 101, and 104 DC Distribution Panel

Connecting Loads, continued



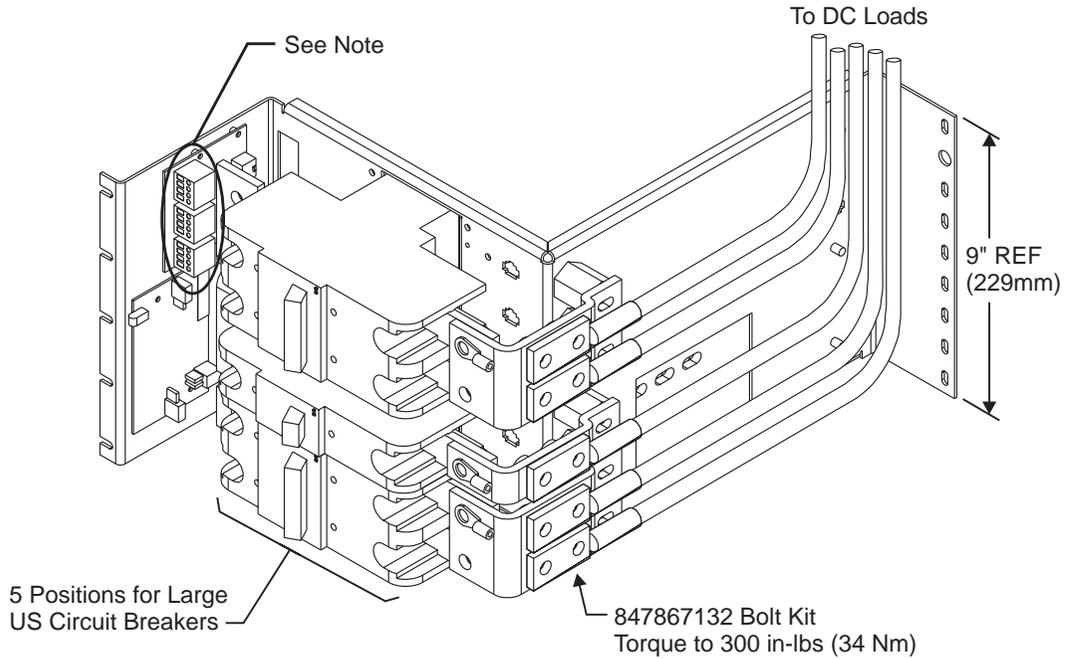
Large Circuit Breakers for Groups 2 and 102			
Comcode	Size (A)	Breaker Positions	Wire Ga (min)
108312794	125	1	2
108606732	150	1	1/0
108312802	175	1	2/0
108312810	225	1	4/0
108312828	300	2	(2) 4/0*
108312836	400	2	(2) 4/0*
108312844	500	3	(2) 4/0*
108312851	600	3	(3) 4/0*

*Wires must be the same length and terminated at a common point at each end.

Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
For 1, 2, or 3-position breakers (double-hole load and return lugs)					
406338665	load	2	--	35	847867132
	rtn	2	--	35	
405348228	load	1/0	--	50	
	rtn	1/0	--	50	
405348236	load	2/0	1/0	70	
	rtn	2/0	1/0	70	
406021725	load	--	2/0	--	
	rtn	--	2/0	--	
405348251	load	4/0	--	--	
	rtn	4/0	--	--	
405347923	load	--	4/0	120	
	rtn	--	4/0	120	

Figure 8-3: ED83143-30 Groups 2, 3, 102, and 103 DC Distribution Panel

Connecting Loads, continued



Large Circuit Breakers for Groups 5, 6, 105, and 106			
Comcode	Size (A)	Breaker Positions	Wire Ga (min)
108312794	125	1	2
108606732	150	1	1/0
108312802	175	1	2/0
108312810	225	1	4/0
108312828	300	2	(2) 4/0*
108312836	400	2	(2) 4/0*
108312844	500	3	(2) 4/0*
108312851	600	3	(3) 4/0*

*Wires must be the same length and terminated at a common point at each end.

Note

To bypass 100k current limiting resistors provided for proper connection to Lucent RPMs, move jumper straps (3) to the "Bypass" position on the PWB. This will allow shunt monitoring connection to non-Lucent equipment. Protection for wiring must be provided by the user when current limiting resistors are bypassed.

Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
For 1, 2, or 3-position breakers (double-hole load and return lugs)					
406338665	load	2	--	35	847867132
	rtn	2	--	35	
405348228	load	1/0	--	50	
	rtn	1/0	--	50	
405348236	load	2/0	1/0	70	
	rtn	2/0	1/0	70	
406021725	load	--	2/0	--	
	rtn	--	2/0	--	
405348251	load	4/0	--	--	
	rtn	4/0	--	--	
405347923	load	--	4/0	120	
	rtn	--	4/0	120	

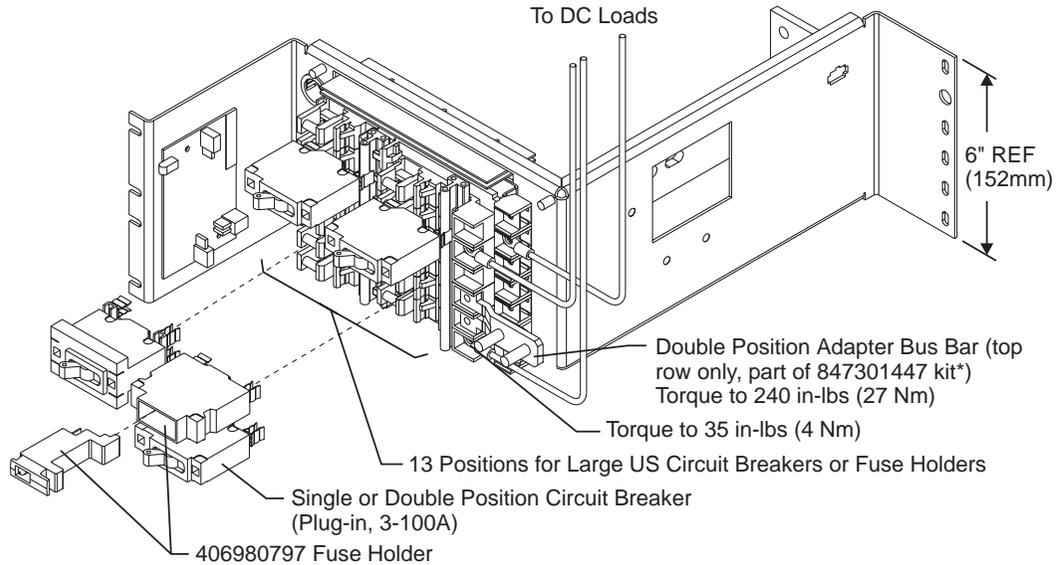
Figure 8-4: ED83143-30 Groups 5, 6, 105, and 106 DC Distribution Panel

Connecting Loads, continued

Mounting Small Plug-in Circuit Breakers and Fuses

Mounting Small Plug-in Circuit Breakers and Fuses	
Step	Action
1	Turn off circuit breakers. Ensure no fuses are installed in fuse holders.
2	Snap circuit breakers or fuse holders onto panel. Circuit breakers and fuses may be mixed on the same panel.

Connecting Loads, continued



Plug-in Circuit Breakers for Groups 11, 13, 111, and 113			
Comcode	Size (A)	Breaker Positions	Wire Ga (min)
407098417	3	1	10
407098425	5	1	10
407098433	10	1	10
407098458	15	1	10
407098474	20	1	10
407098482	25	1	10
407098490	30	1	10
407245448	40	1	8
407098516	45	1	8
407098524	50	1	8
407098532	60	2	6
407098540	70	2	6
407098557	80	2	4
407098565	90	2	4
407098573	100	2	2

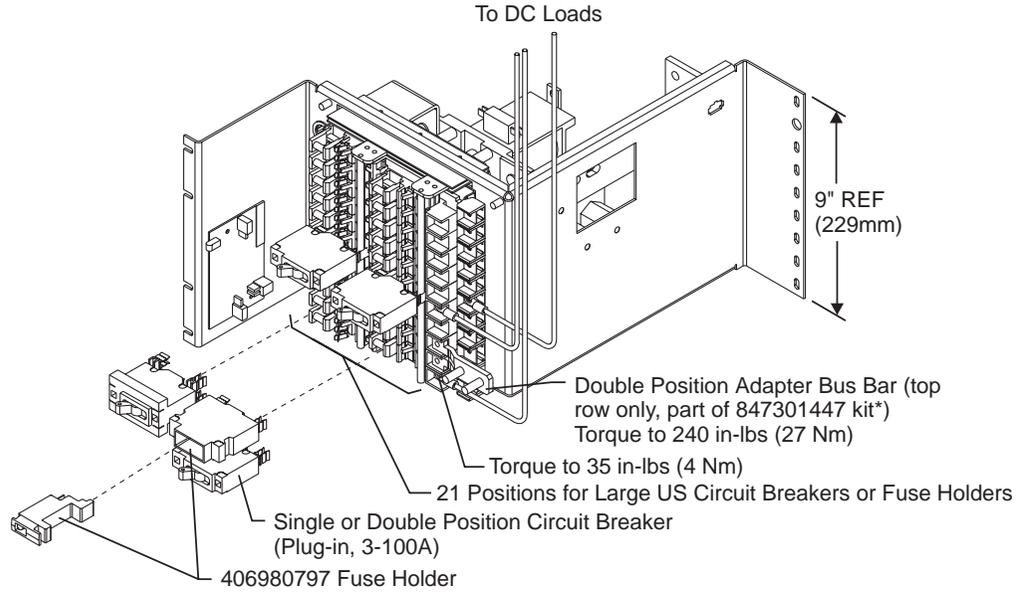
Plug-in Fuses for Groups 11, 13, 111, and 113			
Comcode	Size (A)	Fuse Positions	Wire Ga (min)
406980797	holder	--	--
407006329	5	1	10
407006337	10	1	10
407006345	15	1	10
407006352	20	1	10
407006360	25	1	10
407006378	30	1	10

Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
For 1-position breakers or fuses (single-hole load, double-hole return lugs)					
406338145	load	10	10	5	provided
405356171	rtn	10	10	5	848187050
405347402	load	8	8	8	provided
405348178	rtn	8	8	8	848187050
407334671	load	6	6	14	provided
406338400	rtn	6	6	14	848187050
405347543	load	4	4	20	provided
405347576	rtn	4	4	20	848187050
848155818	Saddle jumper to allow 2-position 60 and 70 amp breakers to be used with single-hole lugs.				
For 2-position breakers (double-hole load and return lugs)					
847301702	load	6	6	14	provided
	rtn	6	6	14	847867124
847659620	load	4	4	20	provided
	rtn	4	4	20	847867124
847301447	load	2	--	35	provided
	rtn	2	--	35	847867124
848111175	load	--	2	--	provided
	rtn	--	2	--	847867124

*847301447 Kit Also Includes:		
Qty	Comcode	Description
1	405348202	WP91412 L54 Terminal for connecting 1/4" holes
1	406338665	WP91412 L121 Terminal for connecting 3/8" holes
2	901252726	10 32 x 7/16" Screw with conical washer (SEMS)
2	841064777	0.375-16 Nuts
2	814251880	0.375 Flat washers
2	801829607	0.375 Lock washers
2	901062570	WP91767 L5 1/2" Tubing, 2 inches long

Figure 8-5: ED83143-30 Groups 11, 13, 111, and 113 DC Distribution Panel

Connecting Loads, continued



Plug-in Circuit Breakers for Groups 12, 14, 112, and 114			
Comcode	Size (A)	Breaker Positions	Wire Ga (min)
407098417	3	1	10
407098425	5	1	10
407098433	10	1	10
407098458	15	1	10
407098474	20	1	10
407098482	25	1	10
407098490	30	1	10
407245448	40	1	8
407098516	45	1	8
407098524	50	1	8
407098532	60	2	6
407098540	70	2	6
407098557	80	2	4
407098565	90	2	4
407098573	100	2	2

Plug-in Fuses for Groups 12, 14, 112, and 114			
Comcode	Size (A)	Fuse Positions	Wire Ga (min)
406980797	holder	--	--
407006329	5	1	10
407006337	10	1	10
407006345	15	1	10
407006352	20	1	10
407006360	25	1	10
407006378	30	1	10

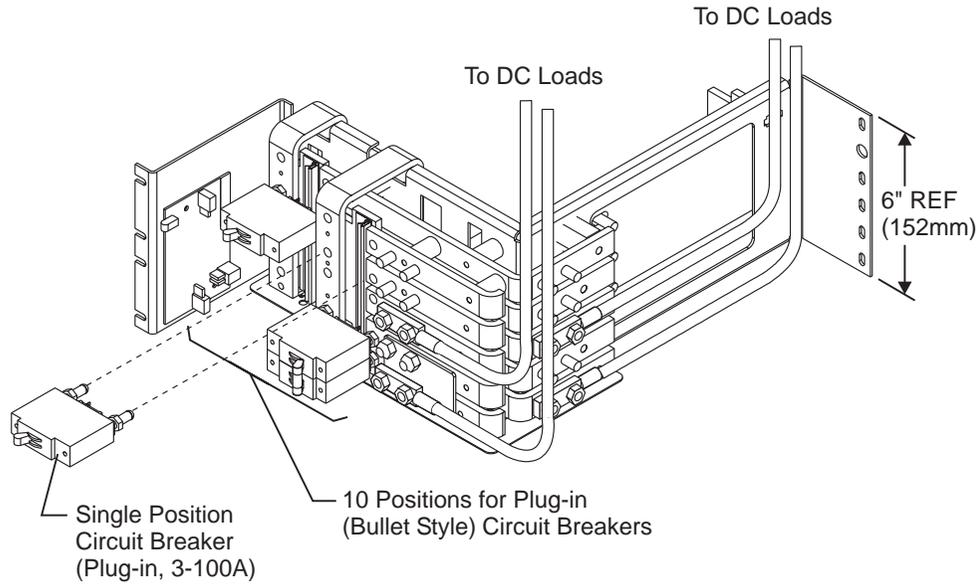
Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
For 1-position breakers or fuses (single-hole load, double-hole return lugs)					
406338145	load	10	10	5	provided
405356171	rtn	10	10	5	848187050
405347402	load	8	8	8	provided
405348178	rtn	8	8	8	848187050
407334671	load	6	6	14	provided
406338400	rtn	6	6	14	848187050
405347543	load	4	4	20	provided
405347576	rtn	4	4	20	848187050
848155818	Saddle jumper to allow 2-position 60 and 70 amp breakers to be used with single-hole lugs.				
For 2-position breakers (double-hole load and return lugs)					
847301702	load	6	6	14	provided
	rtn	6	6	14	847867124
847659620	load	4	4	20	provided
	rtn	4	4	20	847867124
847301447	load	2	--	35	provided
	rtn	2	--	35	847867124
848111175	load	--	2	--	provided
	rtn	--	2	--	847867124

*847301447 Kit Also Includes:		
Qty	Comcode	Description
1	405348202	WP91412 L54 Terminal for connecting 1/4" holes
1	406338665	WP91412 L121 Terminal for connecting 3/8" holes
2	901252726	10 32 x 7/16" Screw with conical washer (SEMS)
2	841064777	0.375-16 Nuts
2	814251880	0.375 Flat washers
2	801829607	0.375 Lock washers
2	901062570	WP91767 L5 1/2" Tubing, 2 inches long

Figure 8-6: ED83143-30 Groups 12, 14, 112, and 114 DC Distribution Panel

Connecting Loads, continued

Small Bullet-Style Circuit Breakers



Plug-In Bullet Style Circuit Breakers for Groups 15, 16, 115, and 116			
Comcode	Size (A)	Breaker Positions	Wire Ga (min)
407998137	3	1	10
407998145	5	1	10
407998152	10	1	10
407998160	15	1	10
407998178	16	1	10
407998186	20	1	10
407998194	25	1	10
407998202	30	1	10
407998210	45	1	8
407998228	50	1	8
407998236	60	1	6
407998244	70	1	6
407998251	80	1	4
407998269	90	1	4
407998277	100	1	2
405185353	125	2	2
405185346	150	2	1/0

Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
For 1-position breakers (double-hole load and return lugs)					
407890771	load/rtn	10	10	5	848408266
406338269	load/rtn	8	8	8	
406332841	load/rtn	6	6	14	
406332940	load/rtn	4	4	20	
407726041	load/rtn	--	2	--	
406335665	load/rtn	2	--	35	
For 2-position breakers (double-hole load and return lugs)					
848407623	load/rtn	1/0	--	50	848407623
		2/0	1/0	70	
		--	2/0	--	

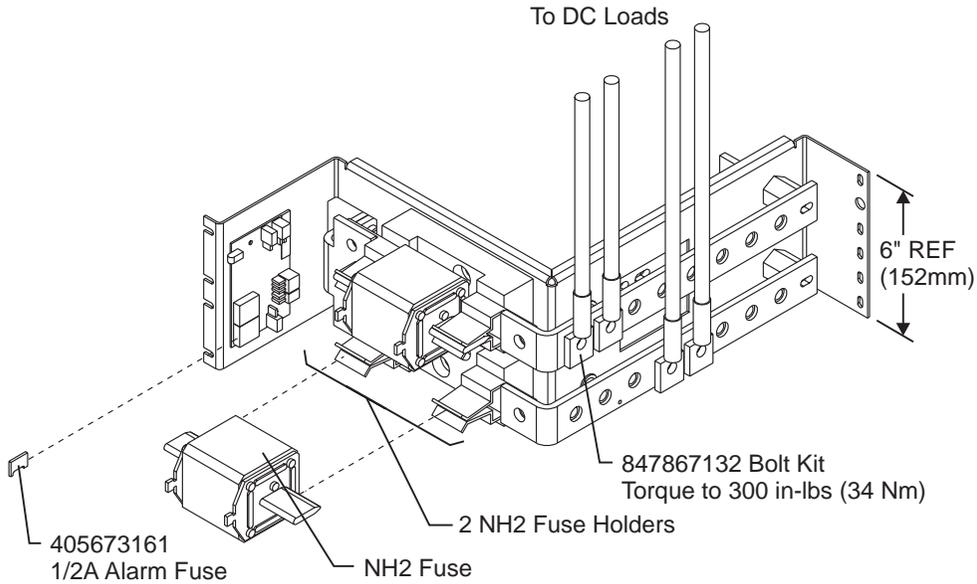
Use 90° C wire minimum. Separation of breakers is recommended (when possible.) Panel is rated for list 2 drain (battery discharge) of 510A total (255A per row.)

List 2 drain for all circuit breakers not to exceed 73% of rating.

Figure 8-7: ED83143-30 Groups 15, 16, 115, and 116 DC Distribution Panel

Connecting Loads, continued

DIN-Style Fuses

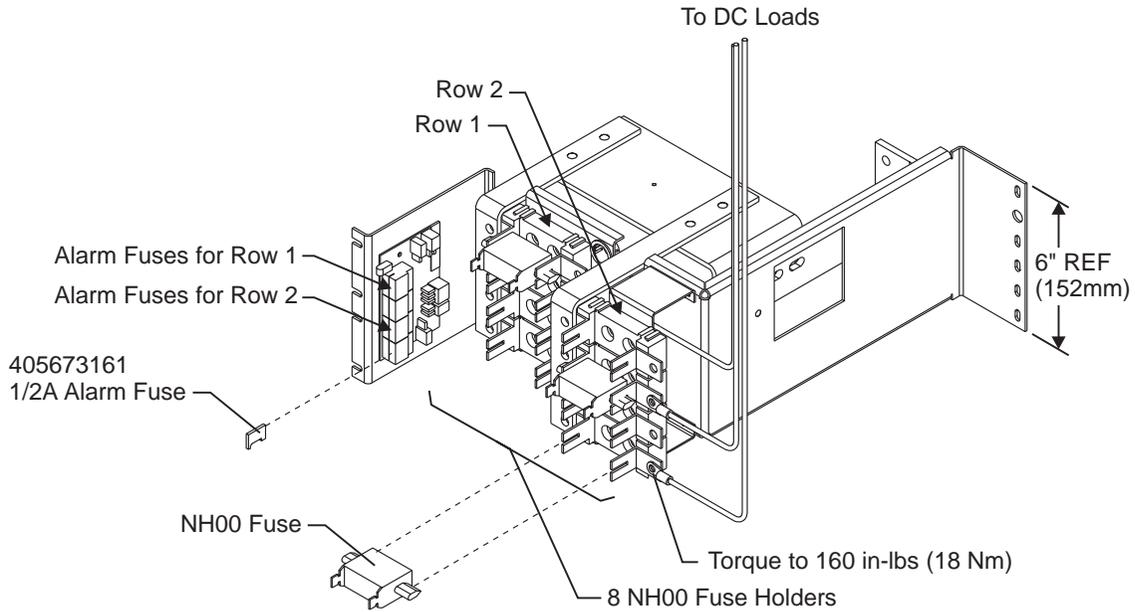


NH2 DIN Fuses for Groups 21 and 121	
Comcode	Size (A)
405673161	0.5A Alarm Fuse
Fuses must be provided by the customer. Panels are agency approved with Class gL - Class gG fuses.	

Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
406338640	load	2	--	35	847867132
406338665	rtn	2	--	35	
405348210	load	1/0	--	50	
405348228	rtn	1/0	--	50	
405347717	load	2/0	1/0	70	
405348236	rtn	2/0	1/0	70	
405347790	load	--	2/0	--	
406021725	rtn	--	2/0	--	
405348244	load	4/0	--	--	
405348251	rtn	4/0	--	--	
406021741	load	--	4/0	120	
405347923	rtn	--	4/0	120	

Figure 8-8: ED83143-30 Groups 21 and 121 DC Distribution Panel

Connecting Loads, continued

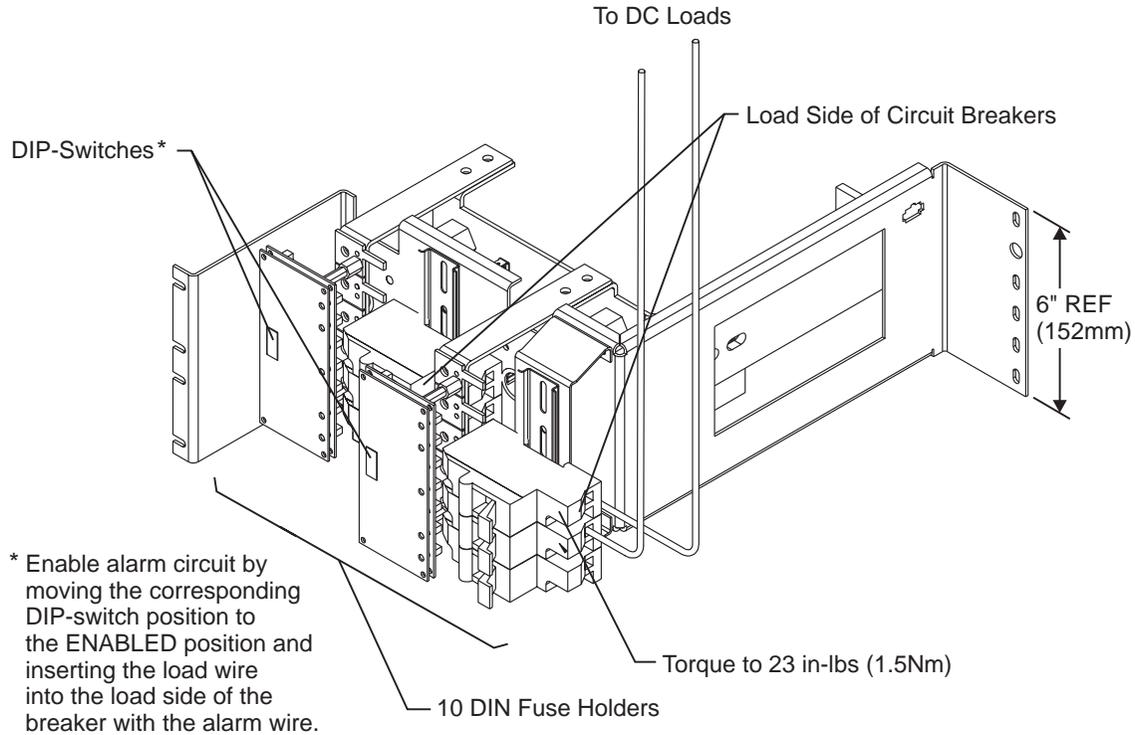


NH00 DIN Fuses for Groups 22 and 122	
Comcode	Size (A)
405673161	0.5A Alarm Fuse
Fuses must be provided by the customer. Panels are agency approved with Class gL - Class gG fuses.	

Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
406338210	load	8	8	8	provided
	rtn	8	8	8	847867124
406338376	load	6	6	14	provided
	rtn	6	6	14	847867124
406338483	load	4	4	20	provided
	rtn	4	4	20	847867124
406338616	load	2	--	35	provided
	rtn	2	--	35	847867124
407334697	load	--	2	--	provided
	rtn	--	2	--	847867124
406434514	load	1/0	--	50	provided
	rtn	1/0	--	50	847867124
406338822	load	2/0	1/0	70	provided
	rtn	2/0	1/0	70	847867124
406434076	load	--	4/0	--	provided
	rtn	--	4/0	--	847867124
406338772	load	--	4/0	--	provided
	rtn	--	4/0	--	847867124
406434167	load	--	4/0	120	provided
	rtn	--	4/0	120	847867124

Figure 8-9: ED83143-30 Groups 22 and 122 DC Distribution Panel

Connecting Loads, continued

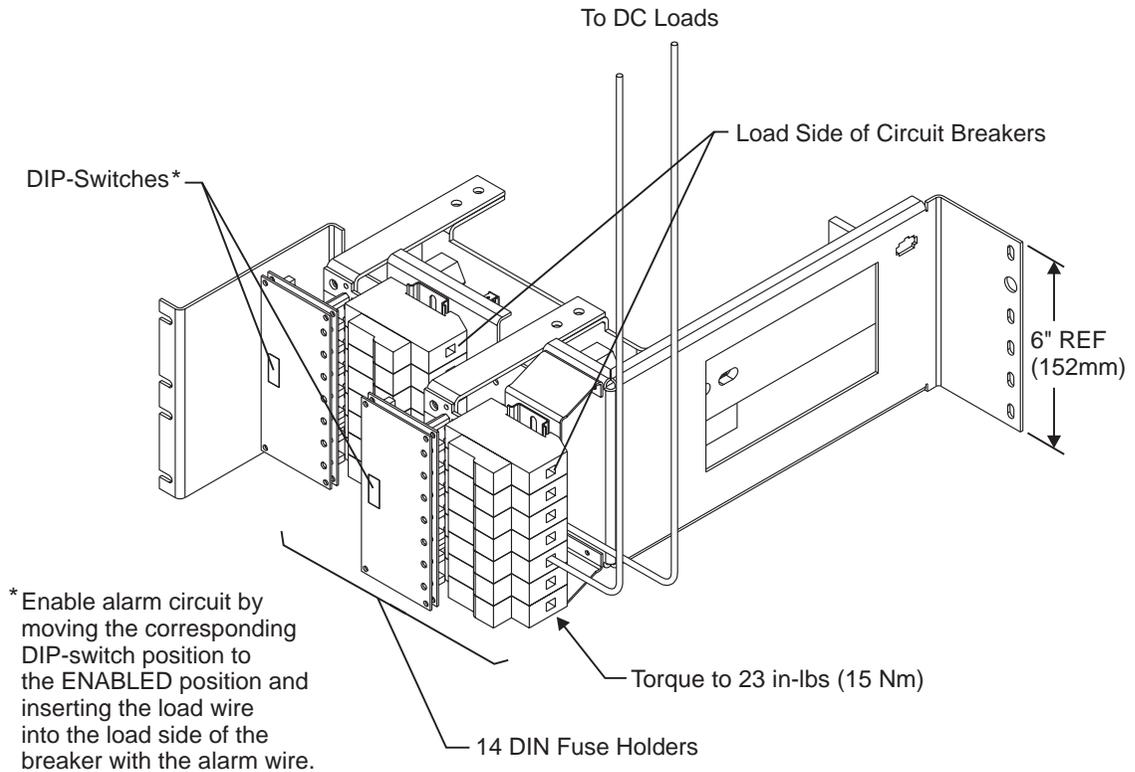


DIN Fuses for Groups 23, 27, 123, and 127	
Fuse	Agency Approved With
DIN Fuse 14 x 51	Class gL - Class gG
Fuses must be provided by the customer.	

Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
none req'd	load	10	10	5	none req'd
405356171	rtn	10	10	5	848187050
none req'd	load	8	8	8	none req'd
406338210	rtn	8	8	8	847867124
none req'd	load	6	6	14	none req'd
406338376	rtn	6	6	14	847867124
none req'd	load	4	4	20	none req'd
406338483	rtn	4	4	20	847867124
none req'd	load	2	--	35	none req'd
406338616	rtn	2	--	35	847867124
none req'd	load	--	2	--	none req'd
407334697	rtn	--	2	--	847867124

Figure 8-10: ED83143-30 Groups 23, 27, 123, and 127 DC Distribution Panel

Connecting Loads, continued



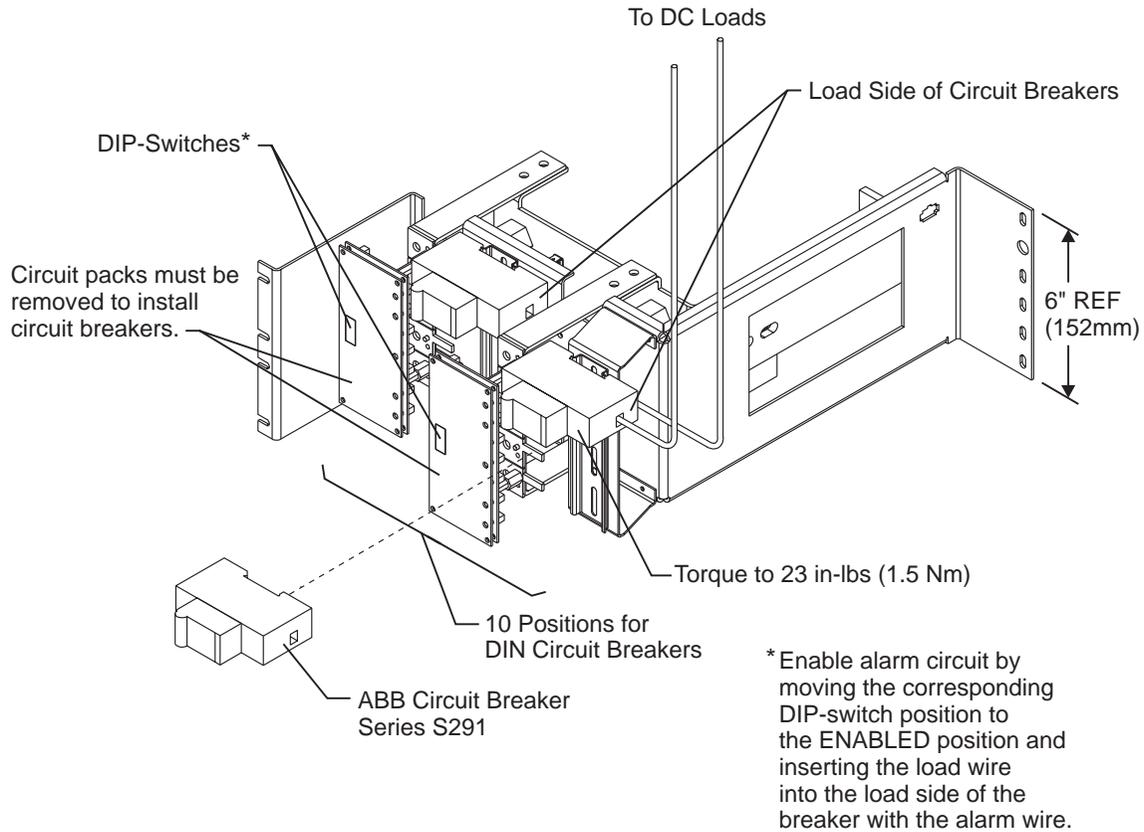
DIN Fuses for Groups 24, 28, 124, and 128	
Fuse or Circuit Breaker	Agency Approved With
DIN Fuse 10 x 38	Class gL - Class gG
Fuses must be provided by the customer.	

Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
none req'd	load	10	10	5	none req'd
405356171	rtn	10	10	5	848187050
none req'd	load	8	8	8	none req'd
406338210	rtn	8	8	8	847867124
none req'd	load	6	6	14	none req'd
406338376	rtn	6	6	14	847867124
none req'd	load	4	4	20	none req'd
406338483	rtn	4	4	20	847867124
none req'd	load	2	--	35	none req'd
406338616	rtn	2	--	35	847867124
none req'd	load	--	2	--	none req'd
407334697	rtn	--	2	--	847867124

Figure 8-11: ED83143-30 Groups 24, 28, 124, and 128 DC Distribution Panel

Connecting Loads, continued

DIN-Style Circuit Breakers

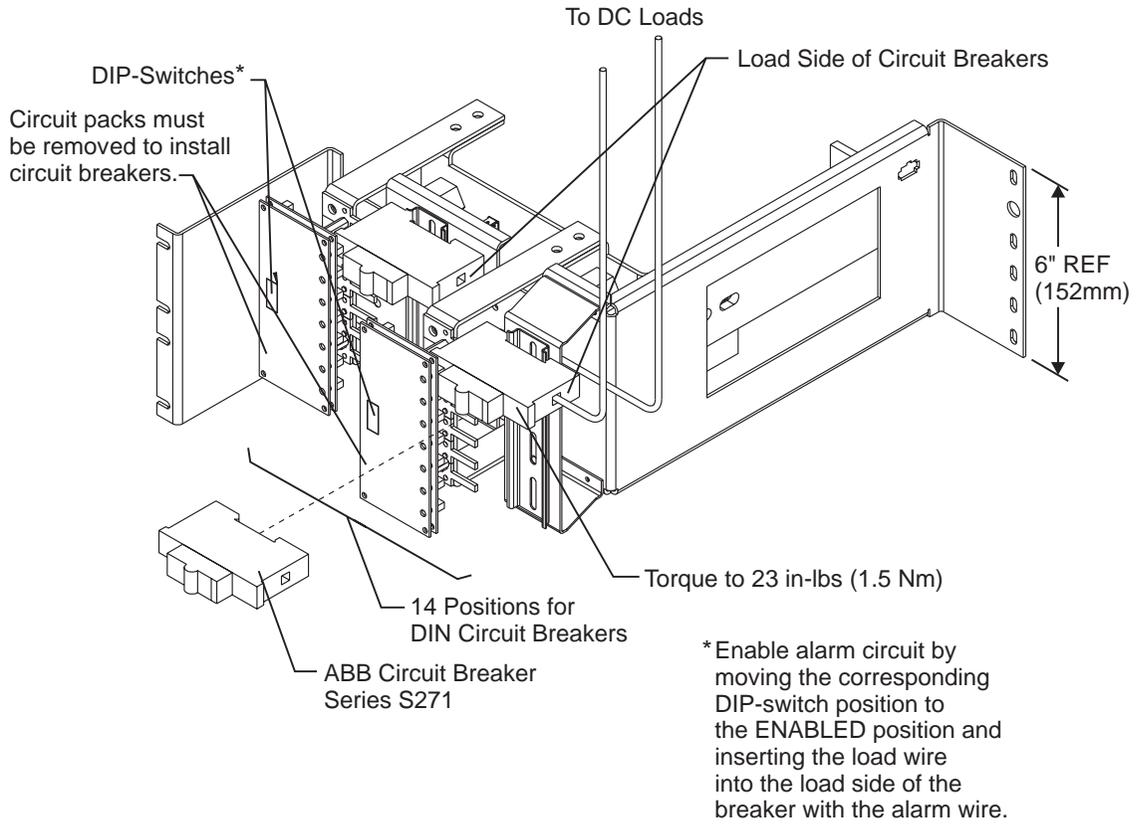


DIN Fuses for Groups 25, 29, 125, and 129	
Fuse or Circuit Breaker	Agency Approved With
Circuit Breaker 80 - 125A	ABB 290 Series
Fuses must be provided by the customer.	

Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
none req'd	load	10	10	5	none req'd
405356171	rtn	10	10	5	848187050
none req'd	load	8	8	8	none req'd
406338210	rtn	8	8	8	847867124
none req'd	load	6	6	14	none req'd
406338376	rtn	6	6	14	847867124
none req'd	load	4	4	20	none req'd
406338483	rtn	4	4	20	847867124
none req'd	load	2	--	35	none req'd
406338616	rtn	2	--	35	847867124
none req'd	load	--	2	--	none req'd
407334697	rtn	--	2	--	847867124

Figure 8-12: ED83143-30 Groups 25, 29, 125, and 129 DC Distribution Panel

Connecting Loads, continued



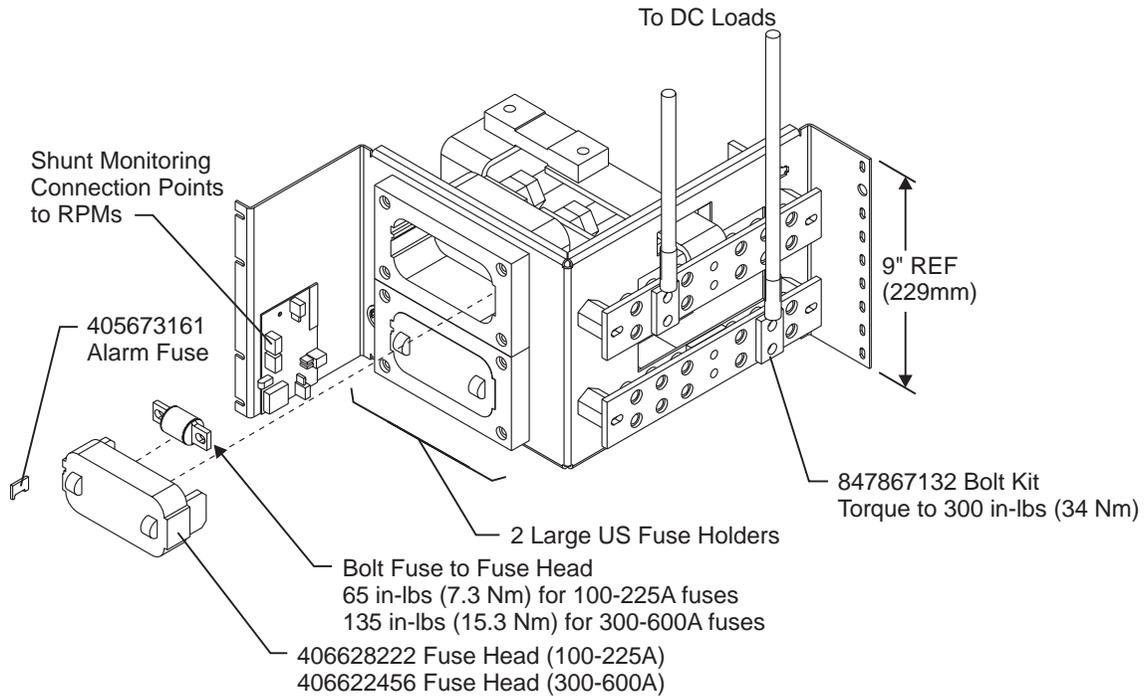
DIN Fuses for Groups 20, 26, 120, and 126	
Fuse or Circuit Breaker	Agency Approved With
Circuit Breaker 1 - 63A	ABB 270 Series
Fuses must be provided by the customer.	

Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
none req'd	load	10	10	5	none req'd
405356171	rtn	10	10	5	848187050
none req'd	load	8	8	8	none req'd
406338210	rtn	8	8	8	847867124
none req'd	load	6	6	14	none req'd
406338376	rtn	6	6	14	847867124
none req'd	load	4	4	20	none req'd
406338483	rtn	4	4	20	847867124
none req'd	load	2	--	35	none req'd
406338616	rtn	2	--	35	847867124
none req'd	load	--	2	--	none req'd
407334697	rtn	--	2	--	847867124

Figure 8-13: ED83143-30 Groups 20, 26, 120, and 126 DC Distribution Panel

Connecting Loads, continued

Large Fuses



Large Fuses for Groups 51, 52, 151, and 152		
Comcode	Size (A)	Wire Ga (min)
406628222	70-250A Head	
405673161	0.5A Alarm Fuse	
406794776	70	6
406794784	100	2
406794792	150	1/0
406794818	200	4/0
406794982	225	4/0
406794842	250	4/0
406622456	300-600A Head	
405673161	0.5A Alarm Fuse	
406794867	300	(2) 4/0*
406794875	400	(2) 4/0*
406794883	500	(2) 4/0*
406794891	600	(3) 4/0*

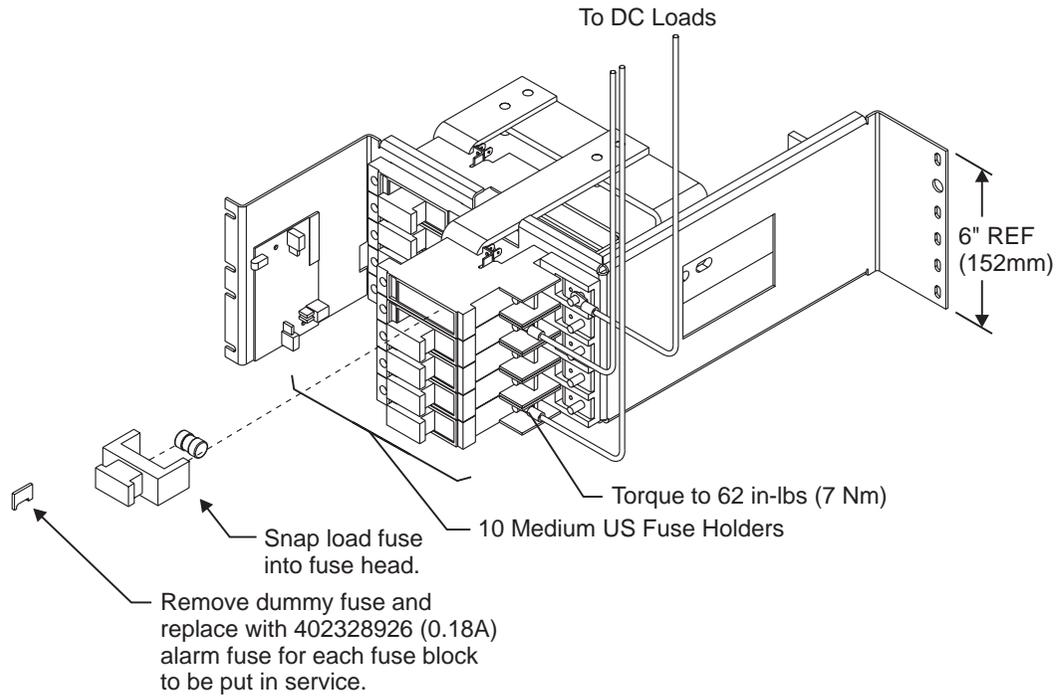
*Wires must be the same length and terminated at a common point at each end.

Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
406332841	load	6	6	14	847867132
	rtn	6	6	14	
406332940	load	4	4	20	
	rtn	4	4	20	
406338665	load	2	--	35	
	rtn	2	--	35	
405348228	load	1/0	--	50	
	rtn	1/0	--	50	
405348236	load	2/0	1/0	70	
	rtn	2/0	1/0	70	
406021725	load	--	2/0	--	
	rtn	--	2/0	--	
405348251	load	4/0	--	--	
	rtn	4/0	--	--	
405347923	load	--	4/0	120	
	rtn	--	4/0	120	

Figure 8-14: ED83143-30 Groups 51, 52, 151, and 152 DC Distribution Panel

Connecting Loads, continued

Medium Fuses



Medium Fuses for Groups 53 and 153		
Comcode	Size (A)	Wire Ga (min)
402328926	0.18A Alarm Fuse	
406700567	3	10
406700583	5	10
406700591	6	10
406700609	10	10
406700617	15	10
406700625	20	10
406700633	25	10
406700641	30	10
406700658	40	8
406700674	50	8
406700682	60	6
406700690	70	6

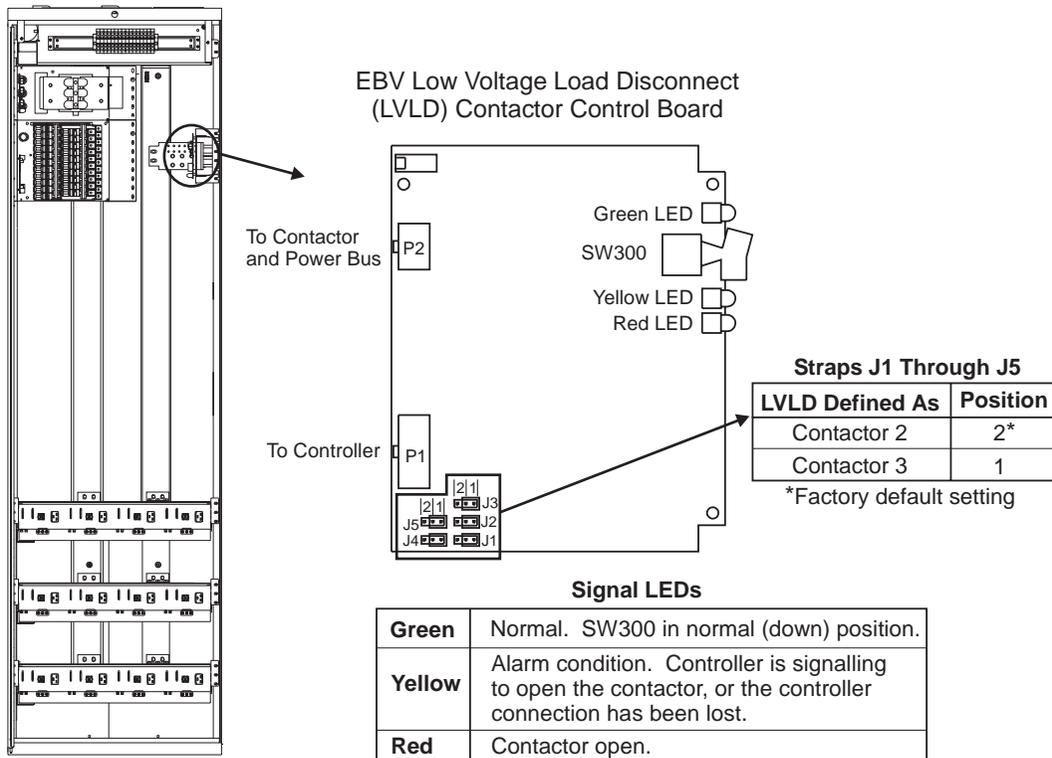
Lugs and Hardware					
Lug Comcode	Type	Std Wire Ga (Class B)	Flex Wire Ga (Class I)	Metric Wire Size (mm ²)	Hardware Kit (Grade 2)
406338152	load	10	10	5	provided
405356171	rtn	10	10	5	848187050
405356189	load	8	8	8	provided
405348178	rtn	8	8	8	848187050
405347436	load	6	6	14	provided
406338400	rtn	6	6	14	848187050
405347543	load	4	4	20	provided
405347576	rtn	4	4	20	848187050
405348186	load	2	--	35	provided
405348202	rtn	2	--	35	848187050
405347659	load	--	2	--	provided
405347683	rtn	--	2	--	848187050

Figure 8-15: ED83143-30 Groups 53 and 153 DC Distribution Panel

Low Voltage Disconnect Feature

EBV Circuit Pack

If the distribution panels are equipped with an Low Voltage Load Disconnect (LVLVD) feature, an EBV circuit pack is also provided. The EBV circuit pack is factory set to operate as Contactor 2 as defined by the controller. If instructed in the Job Site Documentation to set some or all of the Low Voltage Load Disconnects to operate as Contactor 3, all the straps for that EBV need to be moved, as shown in Figure 8-16. This will allow the LVLVDs defined as “2” (those not changed) to operate at different voltage levels than those defined as “3” (those that are changed). These voltage levels will be set during the controller setup.



Manual Contactor Control Switch

SW300	Contactor State
Down	Under controller control (normal position, shown)
Up	Contactor forced closed

Note Board Orientation.

This switch is not meant to be used to permanently override the LVLVD function. It is only to be used temporarily while servicing or testing the equipment.

When powering up the system from an ac failure, SW300 must be in the down position.

Figure 8-16: EBV Circuit Pack for Load Disconnect

9 *Converters*

Introduction

In This Section

This section covers the installation of the optional converter carrier and the connection of the converter ground reference to the system ground *for the GPS 2424 only*.

Installing the Converter Carrier

Refer to Figures 9-1 and 9-2 for the following procedure.

Installing the Converter Carrier	
Step	Action
1	<p>Install converter carrier into the right-most position of the top rectifier shelf (597A, 597B carriers). (See Figure 9-1.)</p> <p>Note: If installing two carriers, connect the 848254654 cable assembly to the first carrier and install the first carrier as described below. Then, connect the cable to the second carrier and install the second carrier as described below. (See Figure 9-2.)</p>
2	<p>Tighten carrier onto shelf with 3/16-inch Allen wrench, which has been provided.</p>
3	<ul style="list-style-type: none">• If this is the first carrier installed, it has been factory set to the correct ID number, and no action is required on the Converter Interface Card (CIC) to set the ID number.• The ID numbers must be set when a second carrier is installed. Proceed to the “Setting the CIC ID” procedure.
4	<p>Do not install the converter cards at this time. See Section 15.</p>

Installing the Converter Carrier, continued

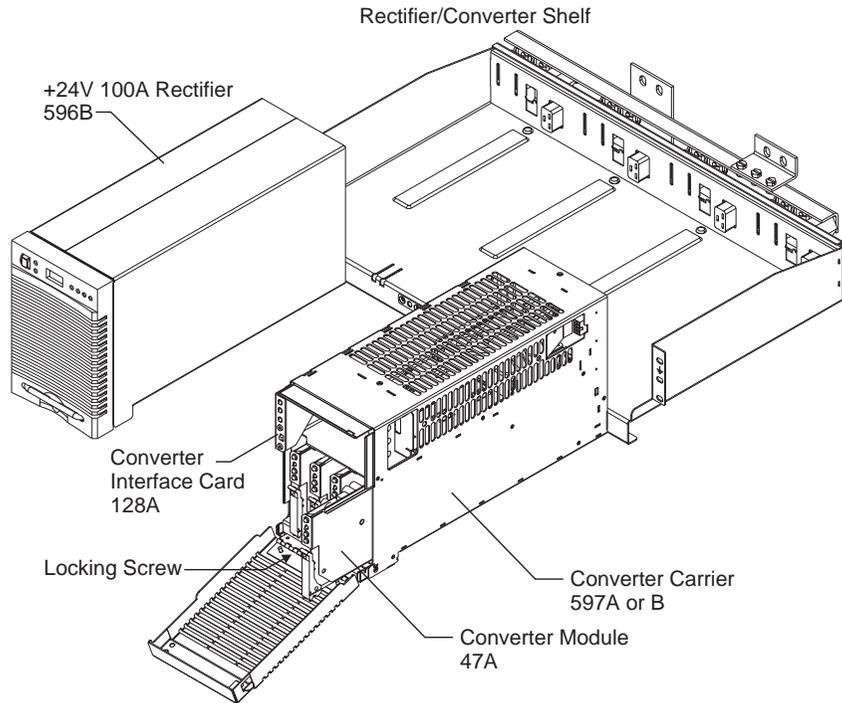


Figure 9-1: Converter Position

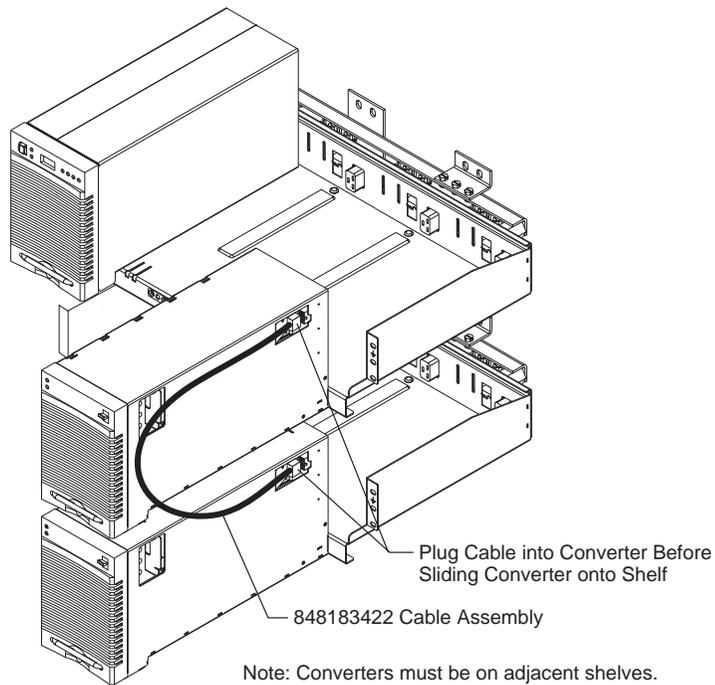
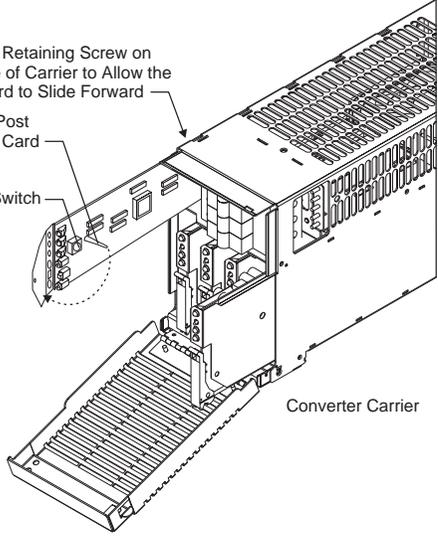


Figure 9-2: Installing a Second Carrier

Setting the CIC ID

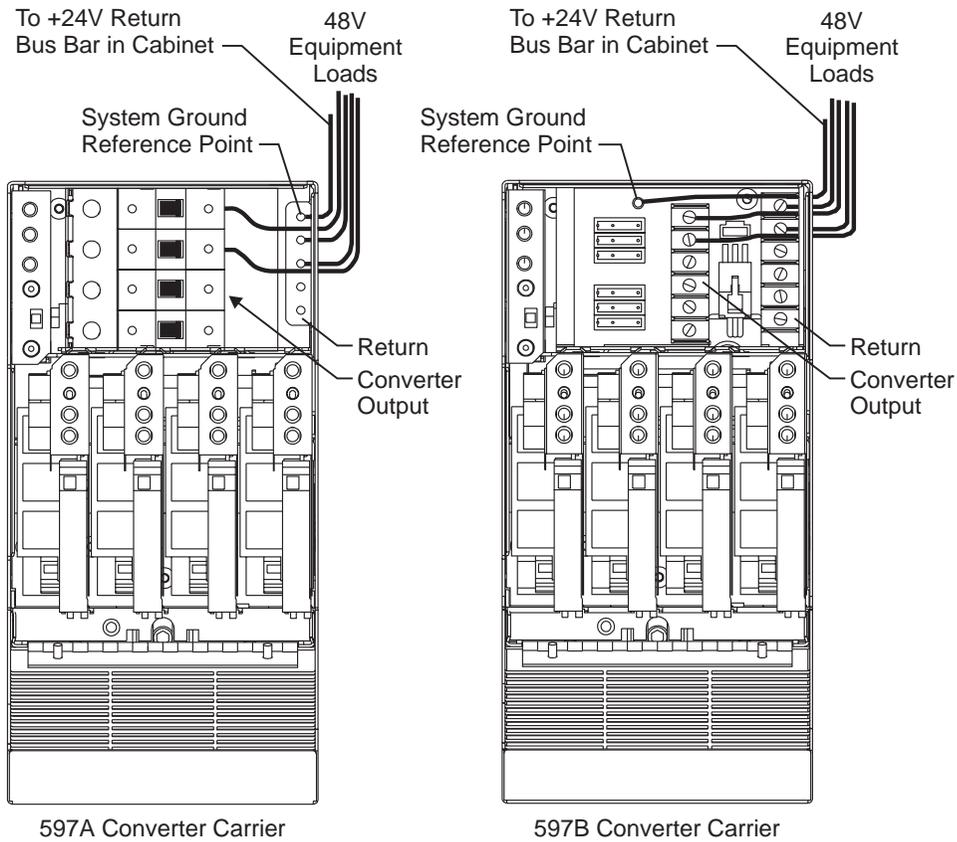
Setting the CIC ID																
Step	Action															
1	Remove the CIC card from the carrier. On the front side of the CIC (component side), the cover is scored so that the CIC ID switch may be exposed.															
2	Set the ID switch to "1." See Figure 9-3.															
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Remove Retaining Screw on Left Side of Carrier to Allow the CIC Board to Slide Forward</p> <p>Squeeze Retaining Post to Release Insulator Card</p> <p>Lift Insulator Card to Access Converter ID Switch</p> <table border="1" style="margin: 10px auto;"> <caption>Converter ID Switch Settings</caption> <thead> <tr> <th>ID1</th> <th>Carrier Number</th> <th>Converter Numbers</th> </tr> </thead> <tbody> <tr> <td></td> <td>1</td> <td>1 - 4</td> </tr> <tr> <td></td> <td>2</td> <td>5 - 8</td> </tr> <tr> <td></td> <td>3</td> <td>9 - 12</td> </tr> <tr> <td></td> <td>4</td> <td>13 - 16</td> </tr> </tbody> </table> </div> <div style="text-align: center;">  </div> </div>		ID1	Carrier Number	Converter Numbers		1	1 - 4		2	5 - 8		3	9 - 12		4	13 - 16
ID1	Carrier Number	Converter Numbers														
	1	1 - 4														
	2	5 - 8														
	3	9 - 12														
	4	13 - 16														
<p>Figure 9-3: Setting the CIC ID Switch</p>																
3	Do not install the converter cards at this time. See Section 15.															

Converter Wiring

Refer to Figures 9-4, 9-5, and 9-6 for the following procedure.

Converter Wiring	
Step	Action
1	Connect the system ground reference wire from the distribution to the return bus bar in the cabinet. (See Figures 9-4 and 9-5.)
2	For 597A converter carrier only, install the required number of load circuit breakers, leaving them in the OFF position. (See Figure 9-6.) For 597B converter carrier, do not install the fuses at this time. See Section 15.
3	Connect the 48V load and return wires from the converter carrier to the using equipment. (See Figure 9-4 for converter carrier connection.)
4	Do not install the converter cards at this time. See Section 15.

Converter Wiring, continued



Lugs and Wire					
Lug Comcode	Type	Std Wire Ga (Class B)	Metric Wire Size (mm ²)	Hardware	Note
405854837	bat	14 - 16	2	provided	1
	rtn	14 - 16	2	provided	
405813072	bat	18 - 22	1	provided	
	rtn	18 - 22	1	provided	1
System (CO) Ground					
405854837	rtn	14	2	provided	2

Notes:

1. Lugs are not required for circuit breaker connections on the 597A converter carrier.
2. Connect the system ground reference lead from the connection point shown, to the closest point on the 24V RTN bus bar in the bay. Lug C72 996510384 may be used for this purpose.

Figure 9-4: Converter Connection for System Ground

Converter Wiring, continued

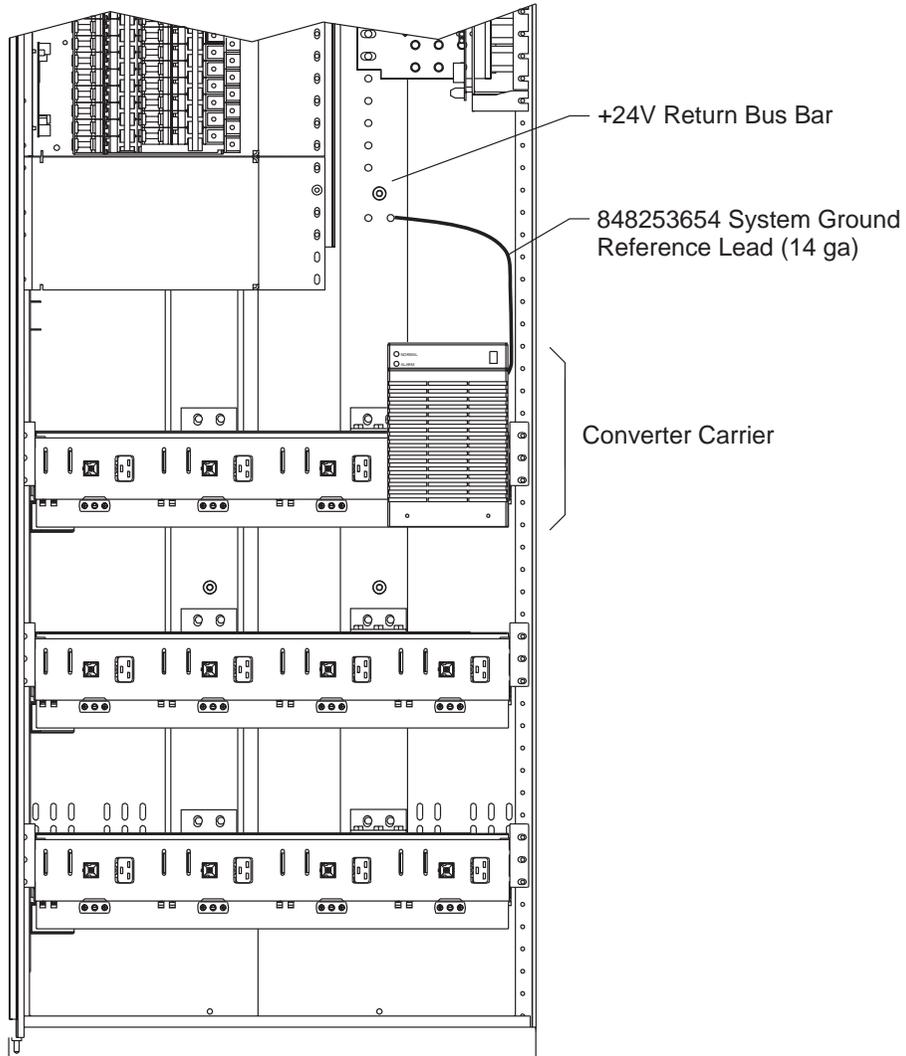


Figure 9-5: Connection Point for System Ground Wire

Converter Wiring, continued

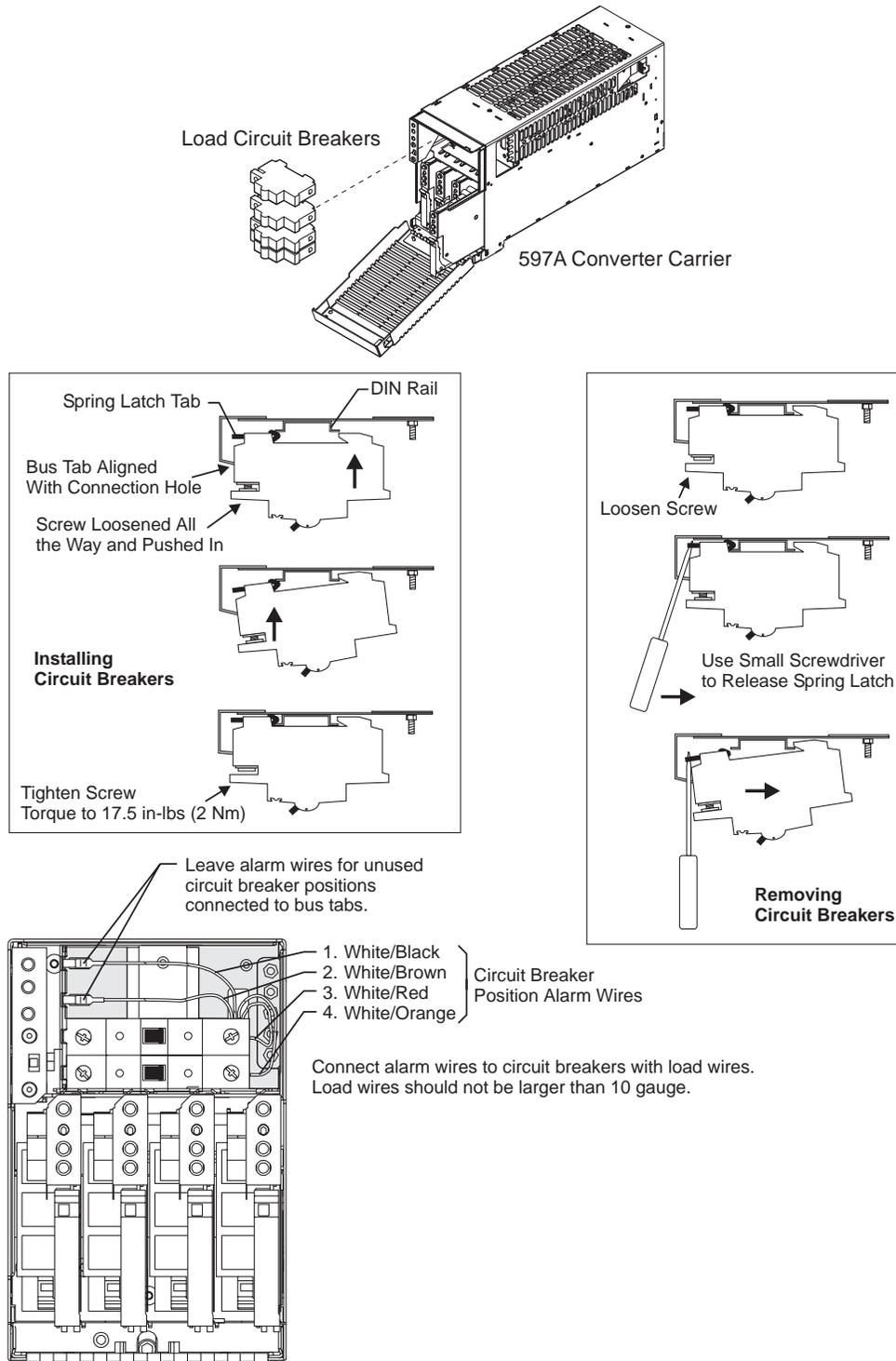


Figure 9-6: Installation of Load Circuit Breakers into 597A Converter Carrier

10 Remote Peripheral Monitoring

Overview

Note: The Remote Peripheral Monitoring feature is not available on the Galaxy Vector Controller.

RPM Modules

The Remote Peripheral Monitoring measurement and control modules provide data acquisition and control functions for a power environment. System capacity is added in a modular fashion with measurement and control modules. Each measurement module consists of six input channels and one temperature channel. A temperature module has seven channels to measure the temperature of seven different points in the system. A control module provides three separate control relays. The modules, which communicate back to the controller, are physically connected in a daisy-chain bus configuration. The user can program various alarm and control functions with the modules when used with a Galaxy controller.

Table 10-A lists the RPM modules.

Table 10-A: RPM Modules and Connection Units

Module Type(s)	Module Code(s)	Connection Unit Comcode
Control Relay	214A	108298456
Voltage (0-3Vdc)	221A	108298431
Voltage (0-16Vdc)	221B	108298498
Voltage (0-70Vdc)	221C	108469503
Voltage (0-200Vdc)	221D	108469479
Shunt	221F	108469461
Transducer	221J	108469495
Binary	222A	108298449
Temperature	223T	108274242

Overview, continued

Current Limiting Resistors

Current limiting resistors (100K-ohm) are required for the measurement inputs of the voltage, current, and binary modules. Comcode 847540424 current limiting resistor assemblies are available for connections that do not already have them. All shunts (load and battery) and some voltage points that are provided with the GPS cabinet already have current limiting resistors; check T-83314-30 for resistor presence.

For the 214A Control Relay module, the maximum relay contact voltage is 110Vdc and maximum current is 0.3Adc. Wiring depends on the voltage, current, local building codes, and various other characteristics of the controlled point.

Mounting Locations

Figure 10-1 shows possible mounting locations for the RPMs.

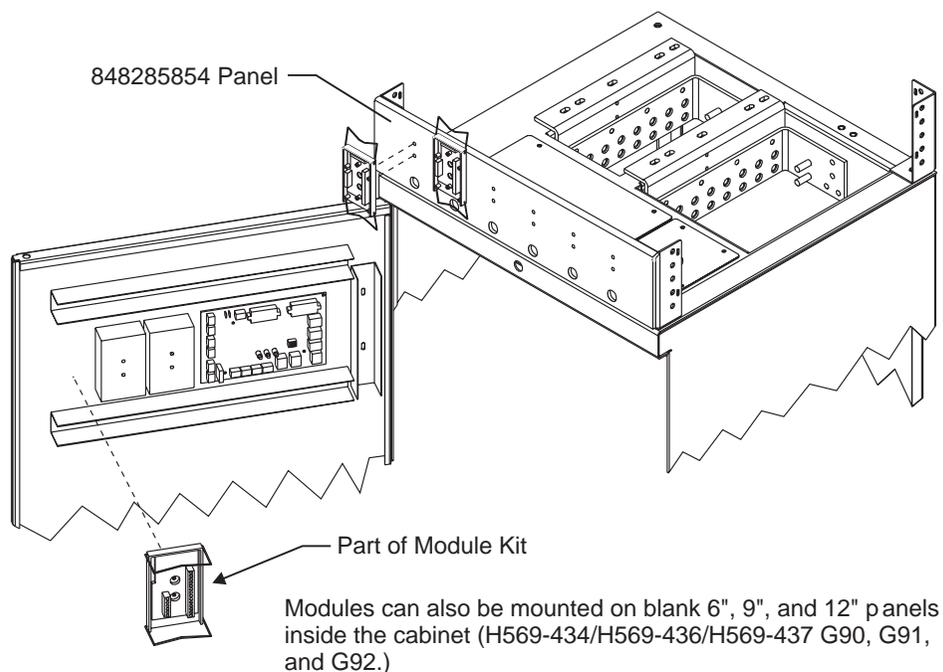


Figure 10-1: Possible RPM Mounting Locations

RPM Installation

RPM Installation	
Step	Action
1	Make required equipment connections (except for the temperature input) to the connection units as shown in Figures 10-2, 10-3, and 10-4. Correct polarity must be maintained. Cable is provided by installer; length should not exceed 100 ohms per wire.
2	Route the wires connected to the module through the open-faced bottom of the connection unit. Place a cable tie through the opening at the bottom of the connection unit and around the connected wires for strain relief. (See Figures 10-2, 10-3, and 10-4.)
3	In the connection units, TB102 is used for communications input/output. Use shielded twisted pair cable (comcode 407377704) to wire the communications bus as shown in Figure 10-5. Polarity is not essential for the input/output communications bus wiring (except for shield).
4	To verify that no shorts exist between any of the three cable connections (blue, white, or shield) on the final bus module, place a terminating resistor (560 ohm, comcode 405298308) in the socket of the final bus module for each of the three buses. Measure the resistance across the blue and white wires of the module containing the terminating resistor. The resistance measurement should be in the range of 560-600 ohms.
<i>Continued on next page.</i>	

RPM Installation, continued

RPM Installation, continued	
Step	Action
5	<p>Using a jeweler's screwdriver, set the address on each module before it is attached to the connection unit. (See Figure 10-6.) Secure each module to the connection unit with the two clips provided. Write the connected equipment description and module address on the label on the front of the module.</p> <p style="text-align: center;">Caution</p> <p>Each module requires a unique address for proper communications between the module and controller. All addresses are valid except 00. No two modules should have the same address! The unique address is set via two switches (SW1 - Hi and SW2 - Low) located on the remote peripheral monitoring module. The switch display numbers/letters are in hexadecimal. For example:</p> <p>SW1-Hi = D SW2-Low = 8 (The HEX address is D8)</p>
6	<p>Connect from the first module back to the controller interface circuit pack as shown in Figure 10-5. Wrap each bus wire twice through one of the supplied 406712968 inductor beads prior to its termination at the controller.</p> <p>Note: Use only one inductor bead for each bus.</p>
7	<p>Using the circuit pack installation guide corresponding to the Galaxy controller, install the bus controller circuit pack. Follow instructions provided in the controller documentation for initiating communications between the controller and the modules.</p>

RPM Installation, continued

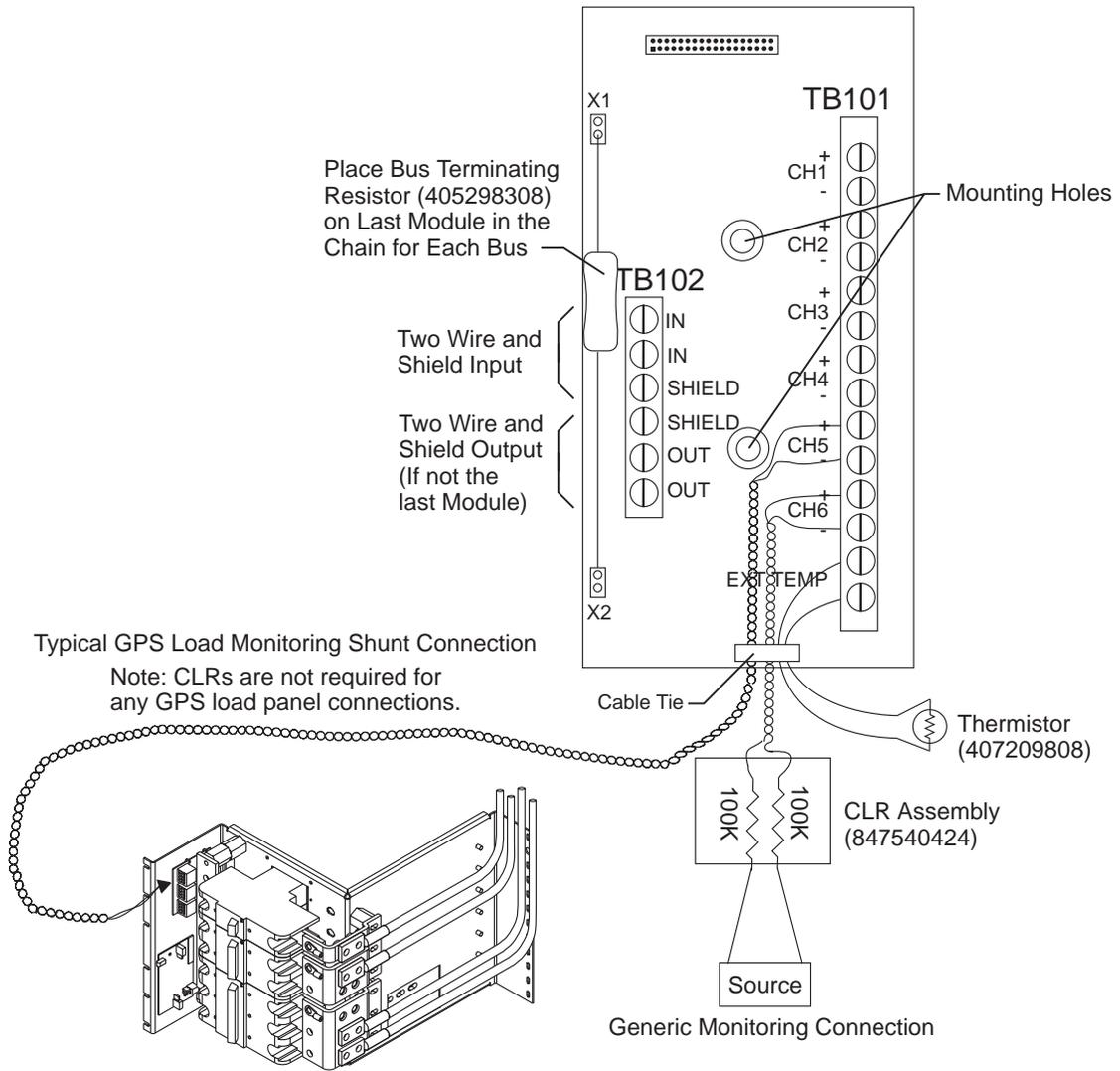


Figure 10-2: Connection of Voltage (221A/B/C/D), Shunt (221F), Transducer (221J), and Binary (222A) Modules

RPM Installation, continued

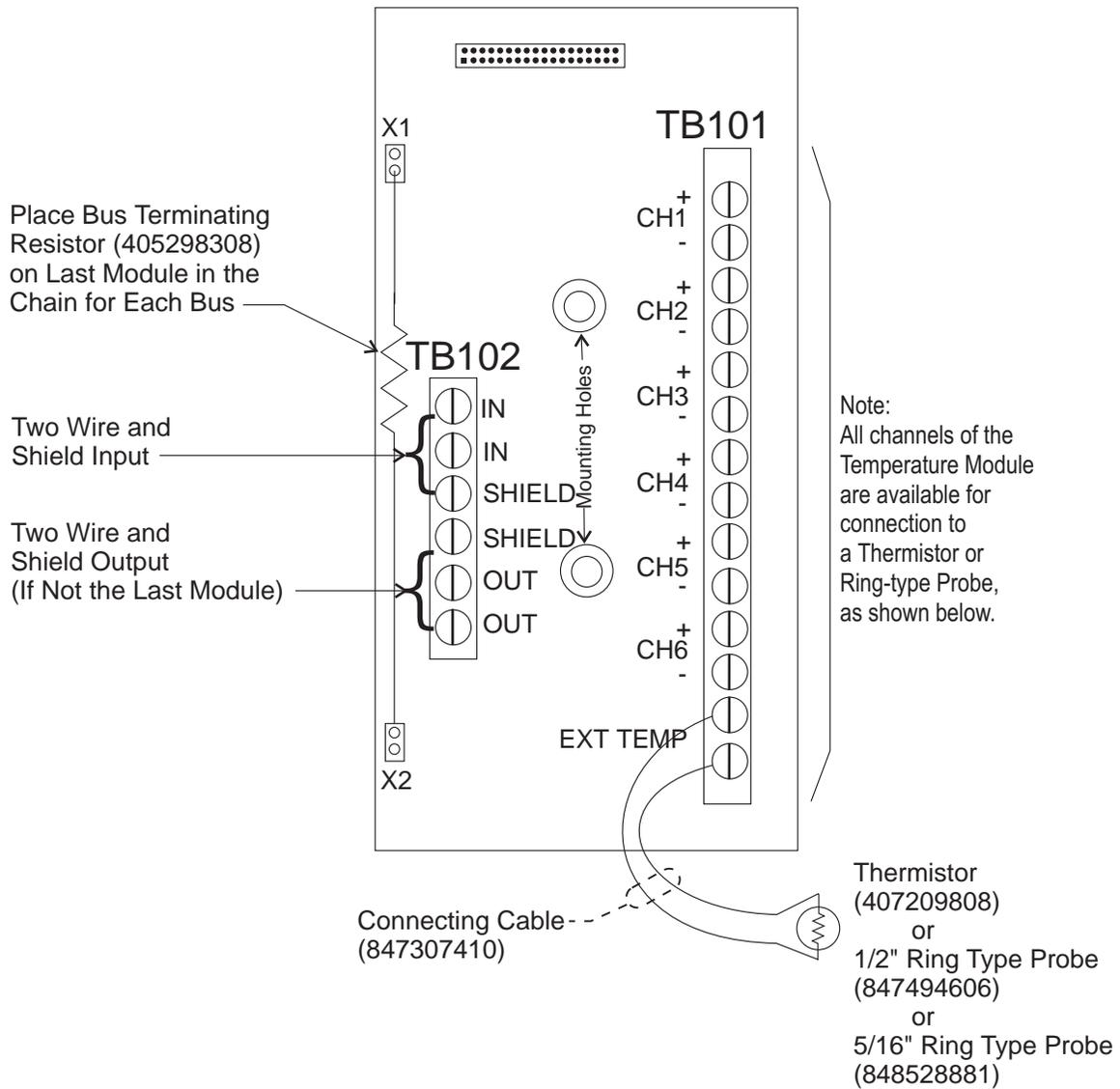


Figure 10-3: Connection of Temperature Module (223T)

RPM Installation, continued

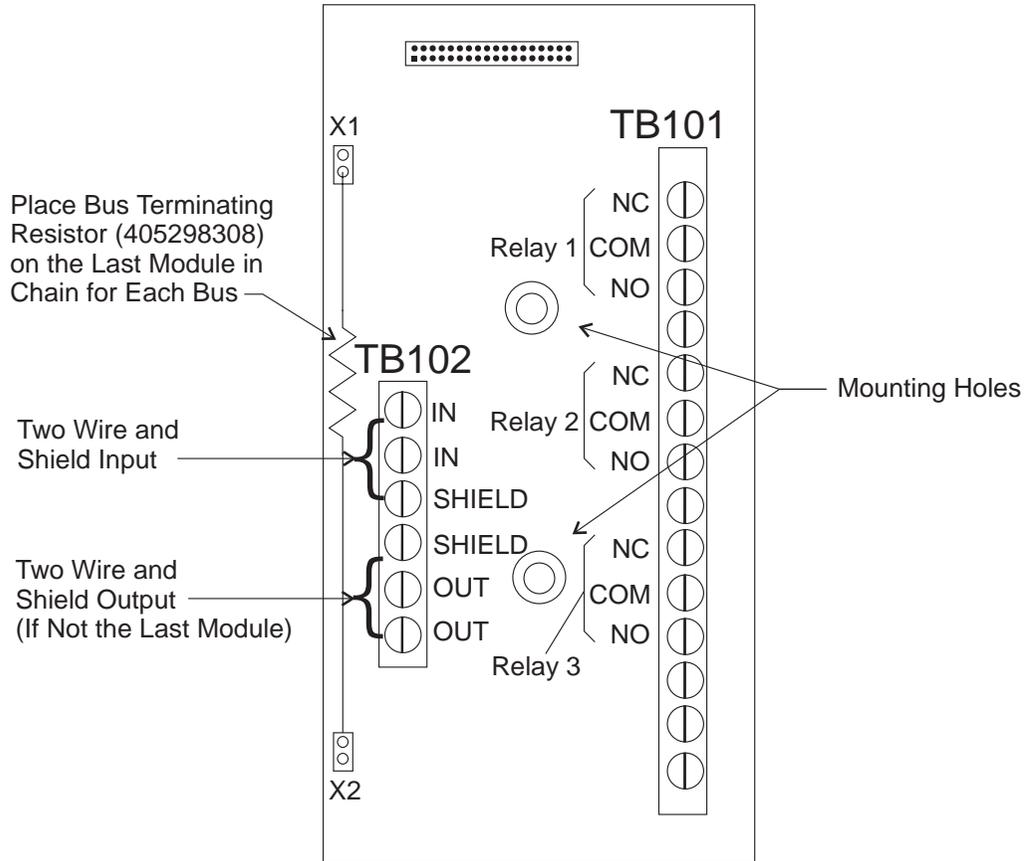
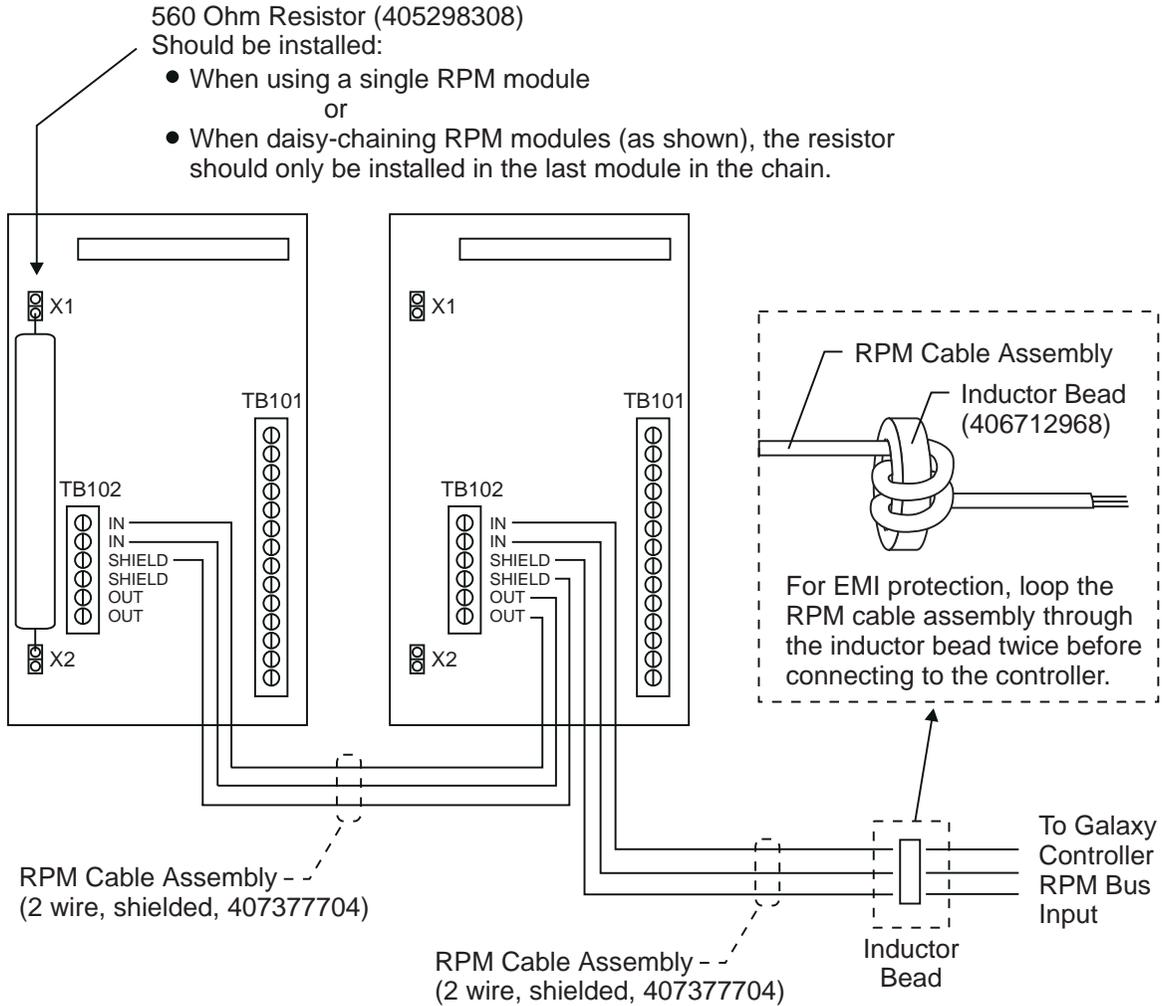


Figure 10-4: Connection of Control Relay Module (214A)

RPM Installation, continued



Up to 95 RPM modules can be daisy-chained on a single bus as shown, provided that the bus length, from the controller to the last RPM in the chain, is 100 meters or less. For bus lengths between 100 meters and 300 meters (maximum bus length), the number of RPMs on that bus must be reduced. See the RPM product manual (167-790-063).

Figure 10-5: Connection to the Controller (All Modules)

RPM Installation, continued

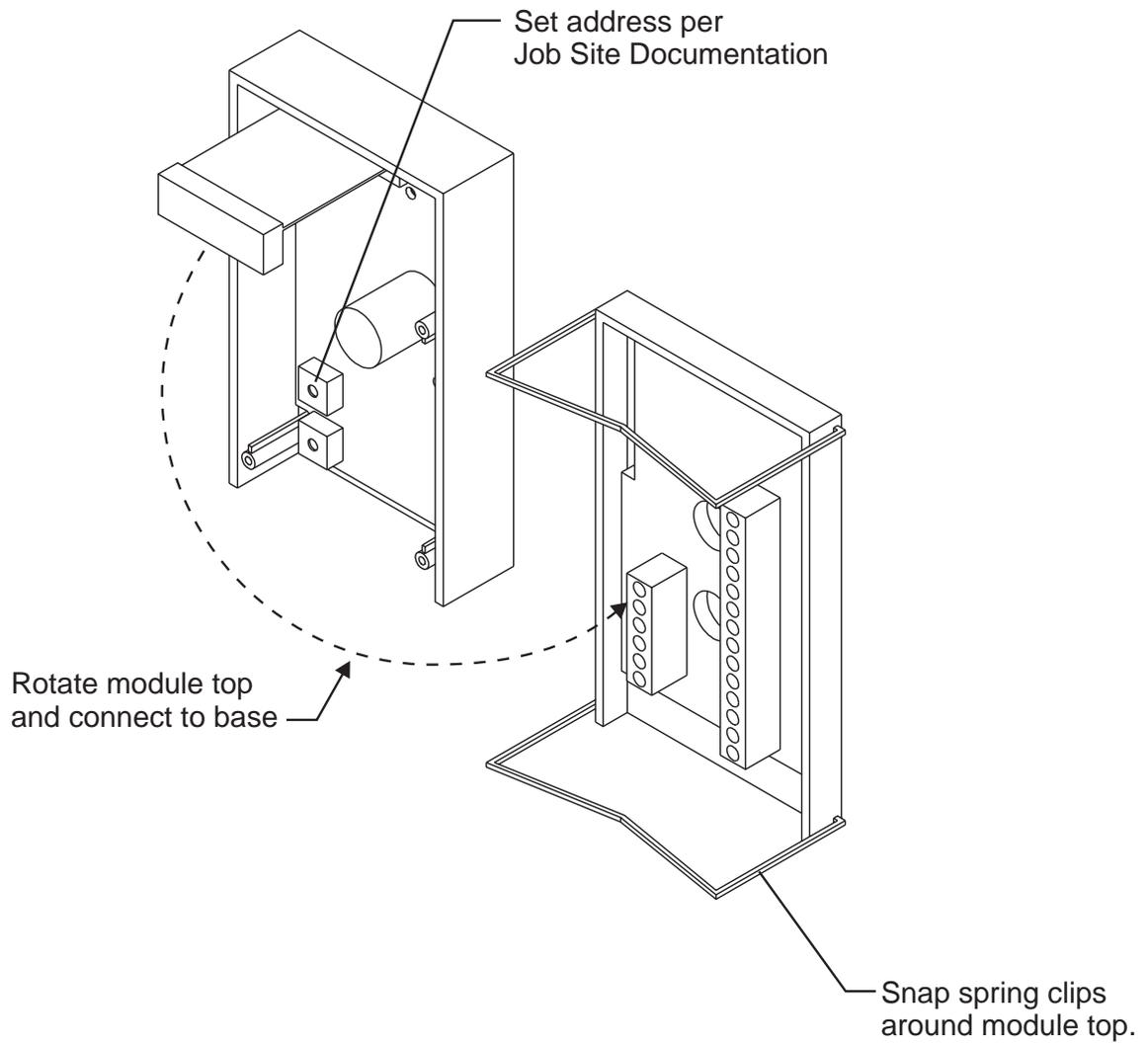


Figure 10-6: RPM Module Assembly

11 Battery Connection Panels

Connecting and Disconnecting Batteries

Note For Centralized Architectures, skip this section.

Overview Battery strings or sections may be connected to the cabinet through contactors and a shunt, fuses and a shunt, circuit breakers and a shunt, or a shunt only. The shunts in each battery connection panel are required to obtain a system load reading. The contactor, fuse, and circuit breaker panels are equipped with alarm cards that report back to the controller if the battery section is taken off the system bus. Charge and discharge current can be read from the front panel of the Galaxy controller when battery section shunts are properly wired and programmed.

Disconnect voltage levels on contactor panels are controlled by the Galaxy controller. Fuses and circuit breakers provide only overload protection for current into or out of the batteries. They do not provide short circuit current protection of the batteries since they are located in the cabinet and not at the batteries. They do, however, provide a convenient way to disconnect the batteries from the system bus for maintenance.

Note: Panels for battery connection are blue; dc distribution panels are white.

Battery Connection Panels Cross Reference

Table 11-A: Battery Connection Panels Cross Reference

Description	ED83143-30	H569-434 GPS4848/100	H569-436 GPS4812	H569-437 GPS2424
LVBD: (2) 500A Contactors	32/132	30	30	30
LVBD: 1200A Contactor	31/131	31	31	31
1500A Shunt	30/130	32	--	--
No Battery Section	None	33	33F	33F
(2) NH3 Fuses	41/141	34	34	34
(1) NH3 Fuse	42/142	35	35	35
LVBD: 1200A Contactor, (2) NH3 Fuses	31/131, 43/143	80	80	80
LVBD: 1200A Contactor, (4) NH3 Fuses	31/131, (2) 43/143	81	81	81
LVBD: 1200A Contactor, (6) NH3 Fuses	31/131, (3) 43/143	82	82	82
OLE with Contactor	60	37	37F	--
OLE	61	38	38F	--
600A Shunt	34/134	--	84H	84H
1000A Shunt	35/135	--	85F	85F
LVBD: 800A Contactor	33/133	--	36H	36H
Note: Group numbers less than 100 are -48Vdc and greater than 100 are +24Vdc				

The illustrations shown in this section are:

Figure 11-1 H569-434 Options

Figure 11-2 H569-436 Options

Figure 11-3 H569-437 Options

Battery Connection Panel Options

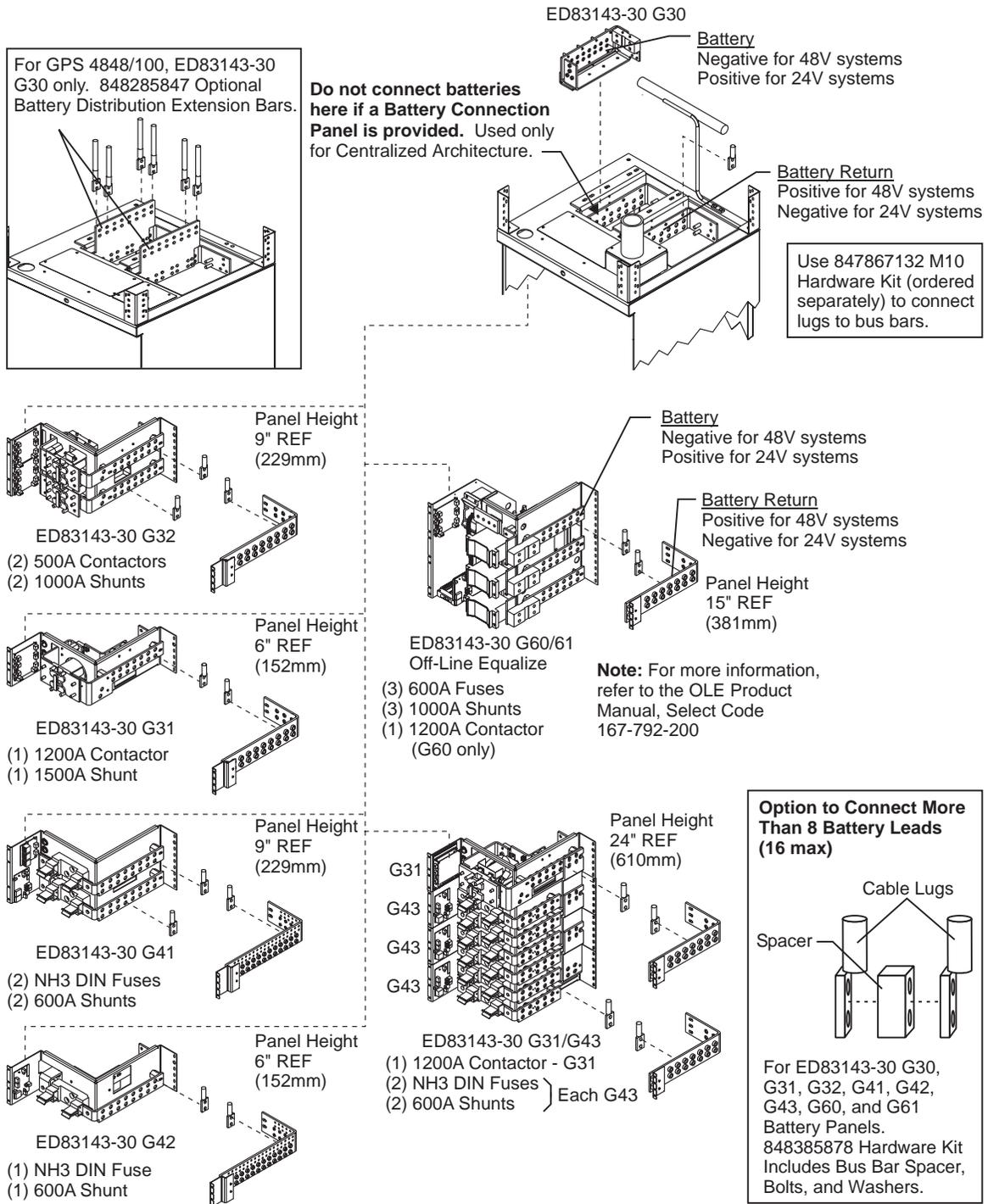


Figure 11-1: H569-434 Battery Connection Panel Options

Battery Connection Panel Options, continued

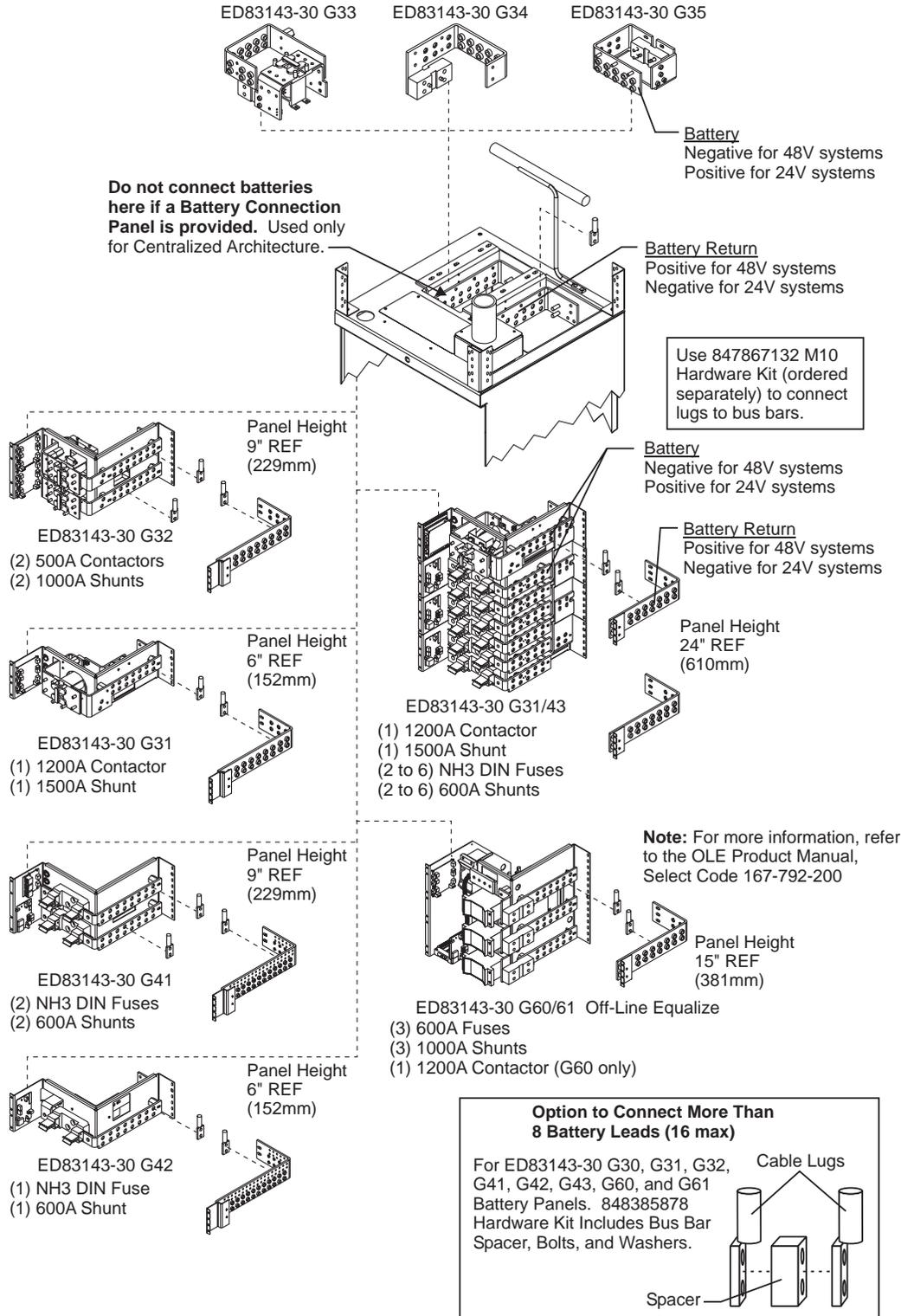


Figure 11-2: H569-436 Battery Connection Panel Options

Battery Connection Panel Options, continued

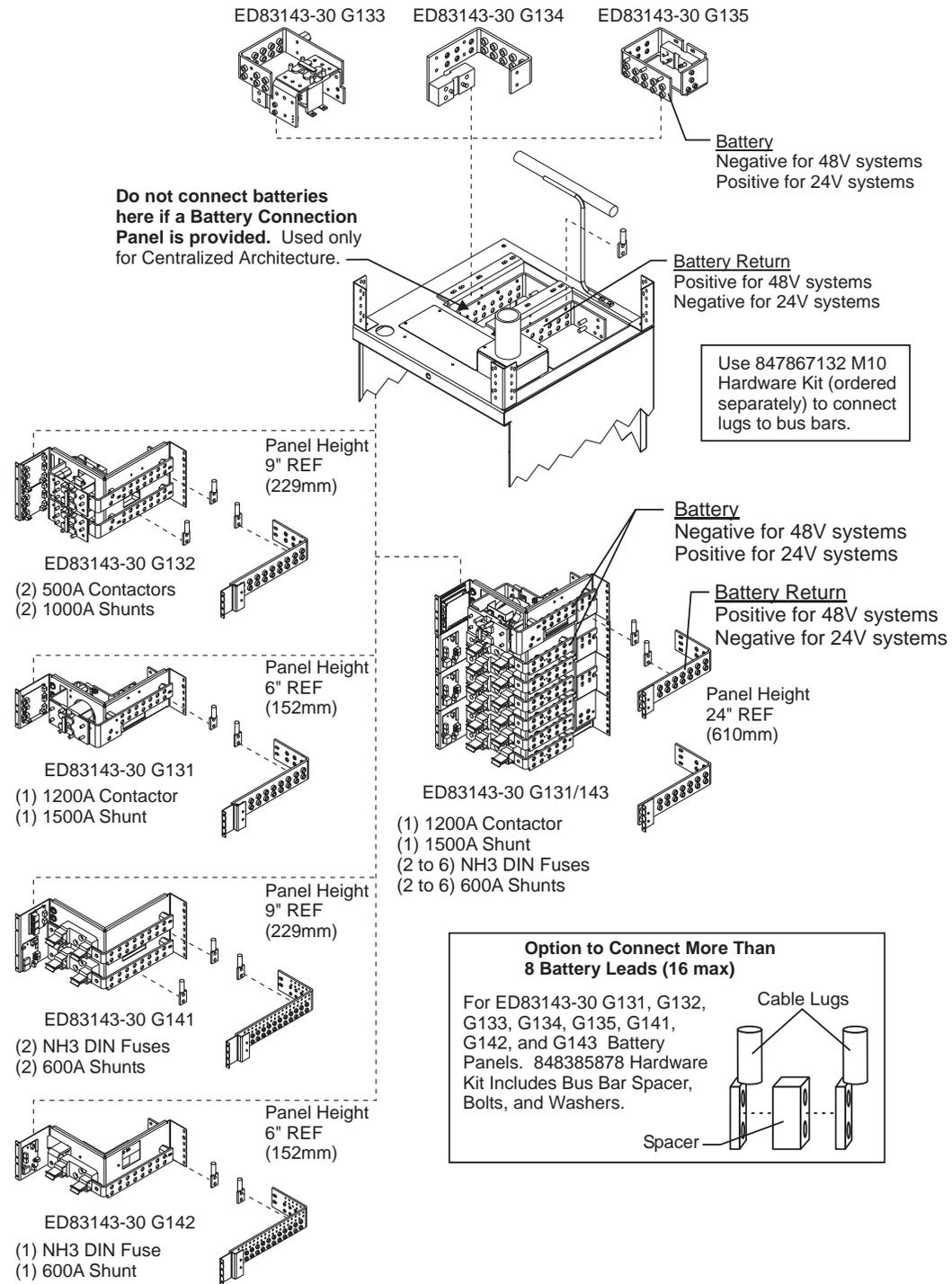


Figure 11-3: H569-437 Battery Connection Panel Options

Connecting (+) and (-) Conductors

+24-volt Systems

Battery (+) conductors are connected to the bus bar ends of the battery fuse holders, contactors, or shunts. Battery (-) conductors are connected to the battery return bus. See Figure 11-3 to locate the battery connection panels and battery return bus. Also see Figures 4 and H3 in the T83314-30 drawing for additional information.

-48-volt Systems

Battery (-) conductors are connected to the exposed bus bar ends of the battery fuse holders, contactors, or shunt. Battery (+) conductors are connected to the battery return bus. See Figures 11-1 and 11-2 to locate the battery connection panels and battery return bus. Also see Figures 4 and H3 in the T83314-30 drawing for additional information.

Installing Battery Connection Panels

Follow these guidelines for making connections during this procedure:

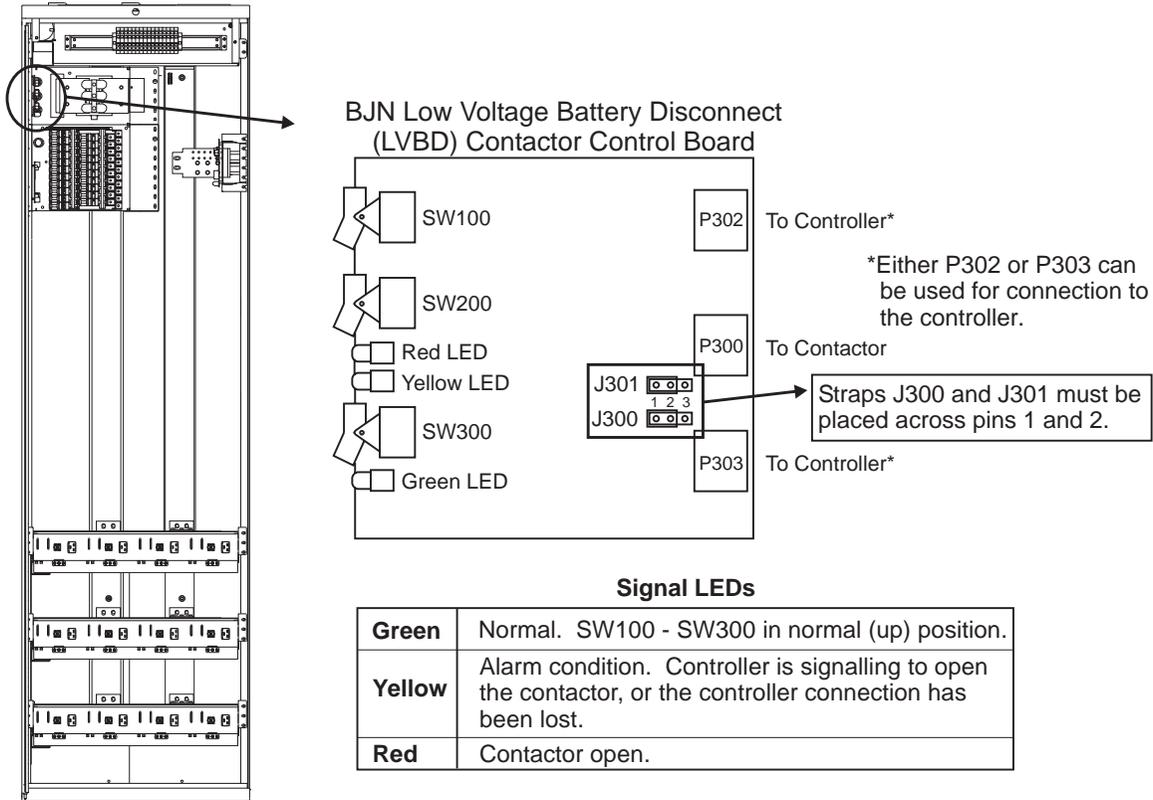
- For all battery connection panels, connect the first wire lead toward the back of the cabinet.

- On the panel with two bus bars, use the back four mounting locations on the top bus. On the lower bus bar, use the front four locations.

Installing Battery Connection Panels	
Step	Action
1	Before making any battery connections: a. Verify that the battery fuses and alarm fuses are not installed . b. If the panel is equipped with contactors, place the forced-off switches (SW100 and SW200) on the BJB board in the forced OPEN position. See Figure 11-4 or 11-5.
2	Verify that all ac and dc protectors are OFF .
3	Terminate the appropriate conductors with terminal lugs as required. Use heat shrink insulating sleeves over any exposed lug shanks as necessary.
4	Connect the cabinet end of the battery cables to the fuse holders and return bus. Next connect the battery end of the cables. Tape the terminal lugs as required for safety during installation. If a battery contactor or fuse is not being used to keep the batteries off the bus, do not connect the leads at the batteries.
5	Use a dc voltmeter to check the voltages at the fuse holders, contactors, battery bus, and return bus. Verify the polarity.
6	If the battery connection panel is equipped with contactors, do not place the forced-off switches (SW100 and SW200) on the BJB board in the NORMAL position at this time. See Figure 11-4 or 11-5.

Contactor Control Board

Full-Height Cabinet



Manual Contactor Control Switch

SW100*	SW200*	SW300	Contactor State
Up	Up	Up	Under controller control (normal position, shown)
x	x	Down	Contactor forced closed
Down	Down	Up	Contactor forced open

x - Switch position doesn't matter

*SW100 and SW200 are redundant switches. If either switch is up, the controller will determine the contactor state. If both switches are not in the up position however, the green LED will not be lit.

Note Board Orientation.

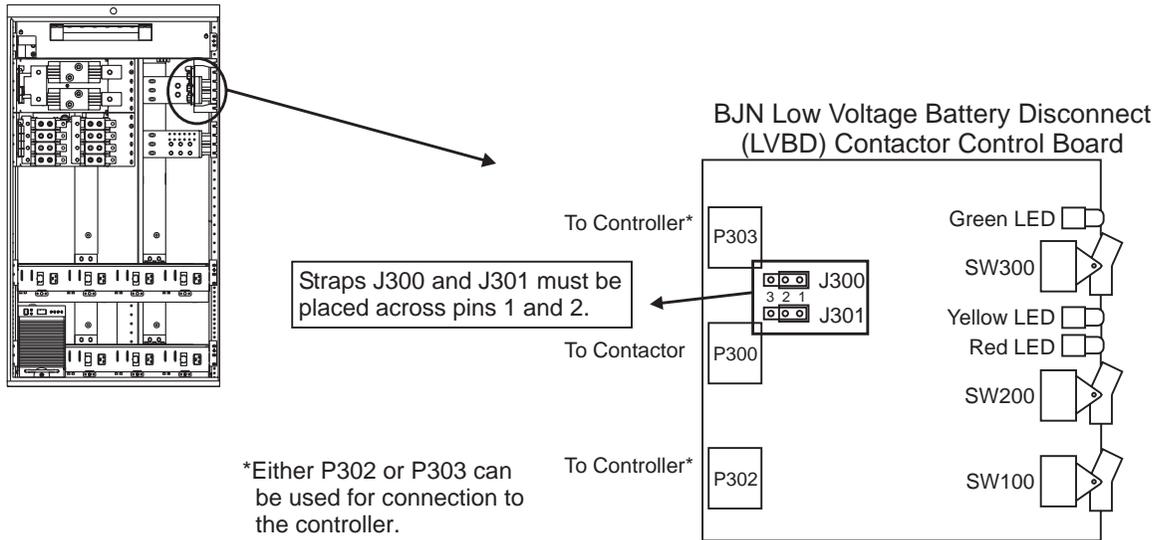
These switches are not meant to be used to permanently override the LVBD function. They are only to be used temporarily while servicing or testing the equipment.

When powering up the system from an ac failure, switches must be in the up position.

Figure 11-4: BJD Low Voltage Battery Disconnect Contactor Control Board (Full-Height Cabinet)

Contactor Control Board, continued

Half-Height Cabinet



Signal LEDs

Green	Normal. SW100 - SW300 in normal (up) position.
Yellow	Alarm condition. Controller is signalling to open the contactor, or the controller connection has been lost.
Red	Contactor open.

Manual Contactor Control Switch

SW100*	SW200*	SW300	Contactor State
Down	Down	Down	Under controller control (normal position, shown)
x	x	Up	Contactor forced closed
Up	Up	Down	Contactor forced open

x - Switch position doesn't matter

*SW100 and SW200 are redundant switches. If either switch is up, the controller will determine the contactor state. If both switches are not in the up position however, the green LED will not be lit.

Note Board Orientation.

These switches are not meant to be used to permanently override the LVBD function. They are only to be used temporarily while servicing or testing the equipment.

When powering up the system from an ac failure, switches must be in the up position.

Figure 11-5: BJD Low Voltage Battery Disconnect Contactor Control Board (Half-Height Cabinet)

Battery and Alarm Fuses

If the battery connection panel is equipped with battery fuses and alarm fuses, **do not** install them at this time; the battery fuses should be installed after batteries have been connected.

Note: The batteries will be connected in Section 15, *Power Up and Installation Completion*.

12

Thermal Probe and 210E Connections

Introduction

This section provides procedures for installing thermal probes or 210E Thermal Probe Multiplexer modules in Millennium and Vector controller systems.

Galaxy Power Systems must be installed, serviced, and operated only by skilled and qualified personnel who have the necessary knowledge and practical experience with electrical equipment and who understand the hazards that can arise when working on this type of equipment. Refer to the controller manuals for additional connections.

Caution

<p>Wear grounded antistatic wrist straps when installing thermal probes or 210E modules. The wrist strap must contact the skin and is not to be worn over clothing.</p>

Cable Letter Codes

Table 12-A lists the cable letter codes that correspond to the installation options in Figures 12-1, 12-2, and 12-3.

Table 12-A: Cable Letter Codes

Ⓐ	847307410	10 ft-long cable to connect probe to BLJ or Vector
	848314563	16 ft-long cable to connect probe to BLJ or Vector
Ⓑ	848152989	8 ft-long cable to connect probe to Millennium
Ⓒ	848153003	8 ft-long cable to connect 210E to Millennium
Ⓓ	848302048	8 ft-long cable to connect 210E to BIC or Vector
Ⓔ	847550175	9 ft-long cable to connect probe to 210E
	847548468	17.5 ft-long cable to connect probe to 210E
Ⓕ	847050010	paddle probe
	847494606	.25 in-diameter ring probe
	848194221	.312 in-diameter ring probe
	848202743	.50 in-diameter ring probe
Ⓖ	847900180	10 ft-long 210E power cable with in-line fuse
Ⓗ	108354390	Battery reserve thermal probe and 85 ft-long wire to connect to SCF
Ⓒ or Ⓓ	848532420	8 ft-long extender cable (see Figure 12-4)

Connecting Thermal Probe Cable Assembly

SCF Controller

This procedure is for connecting thermal probe cable assemblies to the BLJ board and/or SCF controller.

Note: To enable slope thermal compensation, a probe must be connected to the SCF. To enable reserve time prediction, cable **H** must be connected to the SCF.

Connect probes according to one of the options shown in Figure 12-1.

Note: Refer to Table 12-A for alpha designations in Figure 12-1.

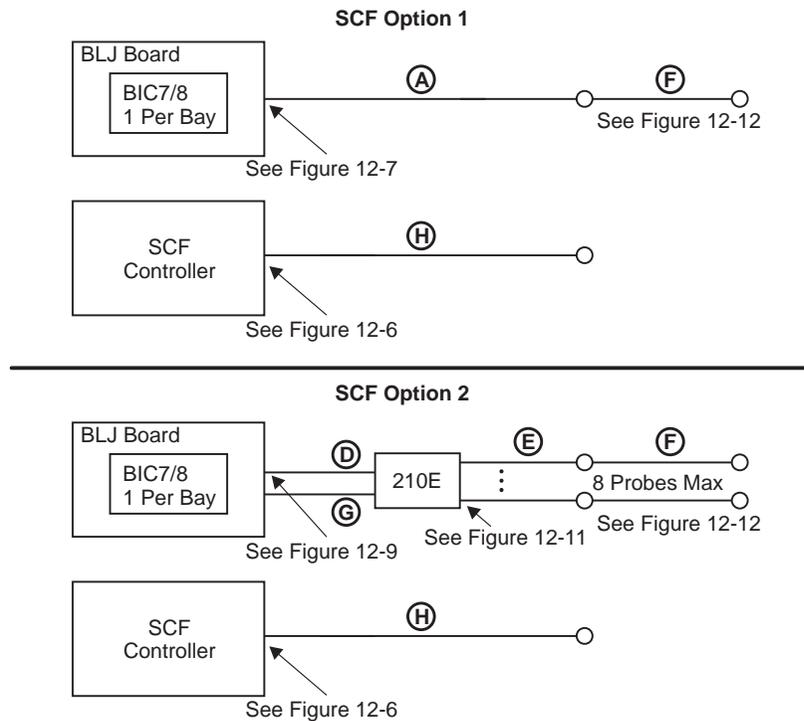


Figure 12-1: SCF Controller Wiring Options

Connecting Thermal Probe Cable Assembly, continued

Millennium Controller

This procedure is for connecting thermal probe cable assemblies to the BLJ board and/or Millennium controller.

Note: To enable slope thermal compensation, a probe must be connected to the Millennium. To enable reserve time prediction, cable **B** must be connected to the Millennium.

Connect probes according to one of the options shown in Figure 12-2.

Note: Refer to Table 12-A for alpha designations in Figure 12-2.

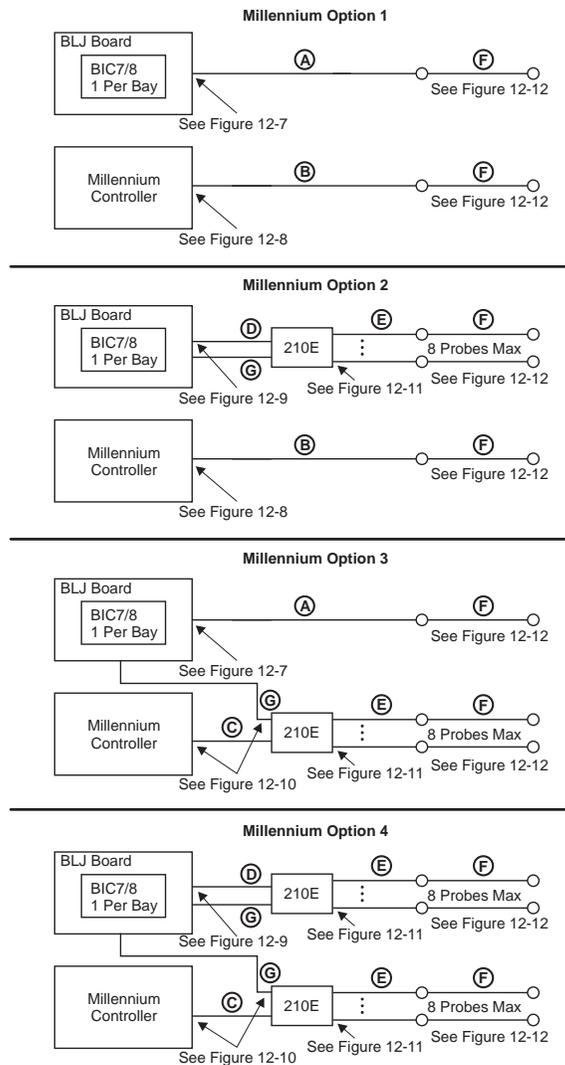


Figure 12-2: Thermal Probe Cable Assemblies Connection to Millennium Controller

Connecting Thermal Probe Cable Assembly, continued

Vector Controller Connect probes according to one of the options shown in Figure 12-3.

Note: Refer to Table 12-A for alpha designations in Figure 12-3.

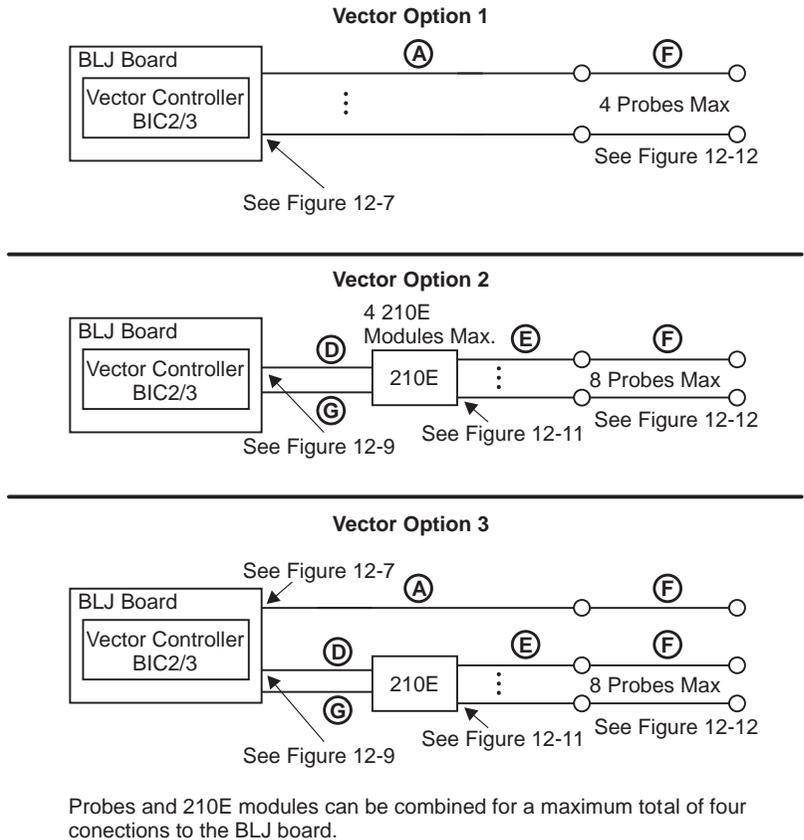


Figure 12-3: Thermal Probe Cable Assembly Connection With Vector Controller

Wiring Schematic for Extender Cable

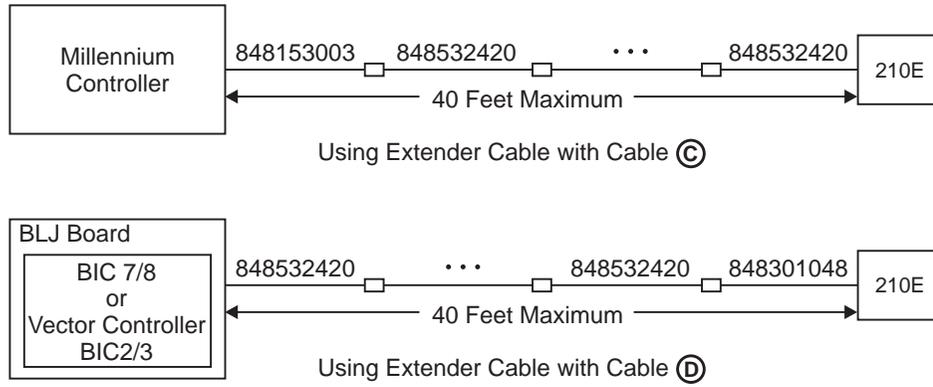


Figure 12-4: Wiring Schematic for Extender Cable

Cable Routing

Thermal monitoring connections to the controller are made through the BLJ board located on the cabinet door. Cables are then routed to the lower cable guide as shown in Figure 12-5, then to thermal probe locations or to externally located 210E modules.

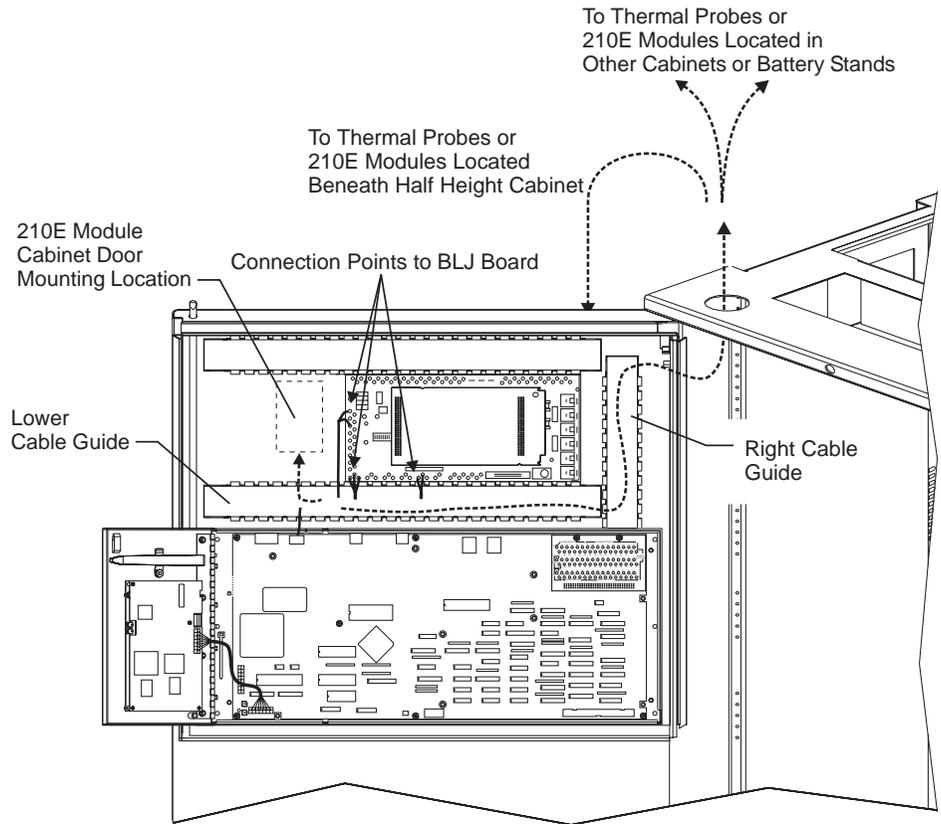


Figure 12-5: Thermal Probe and 210E Cable Routing

Connecting Thermal Probes

SCF Controller

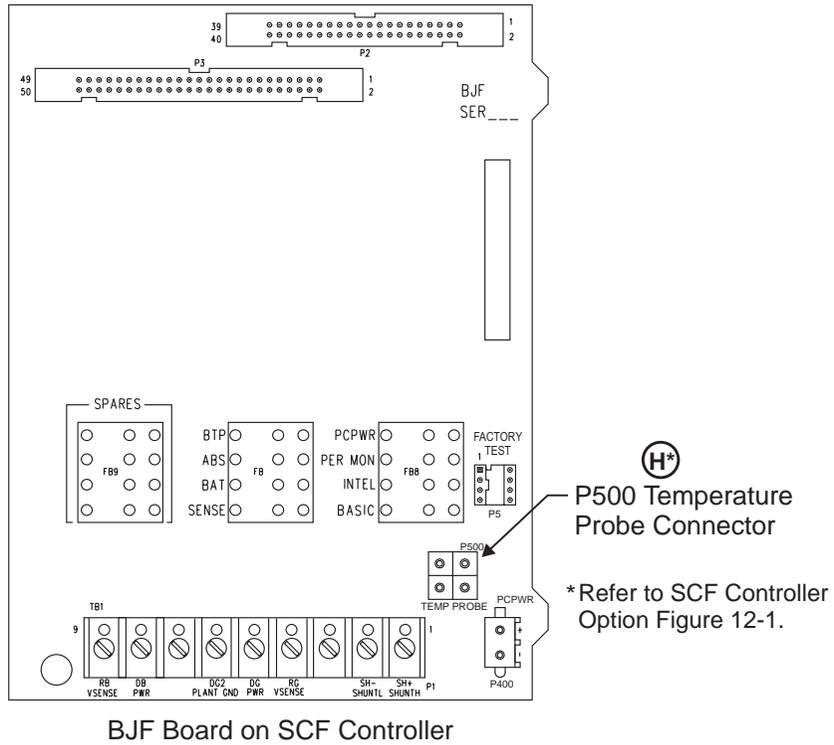


Figure 12-6: Thermal Probe Connection to SCF Controller

Connecting Thermal Probes, continued

BLJ Board

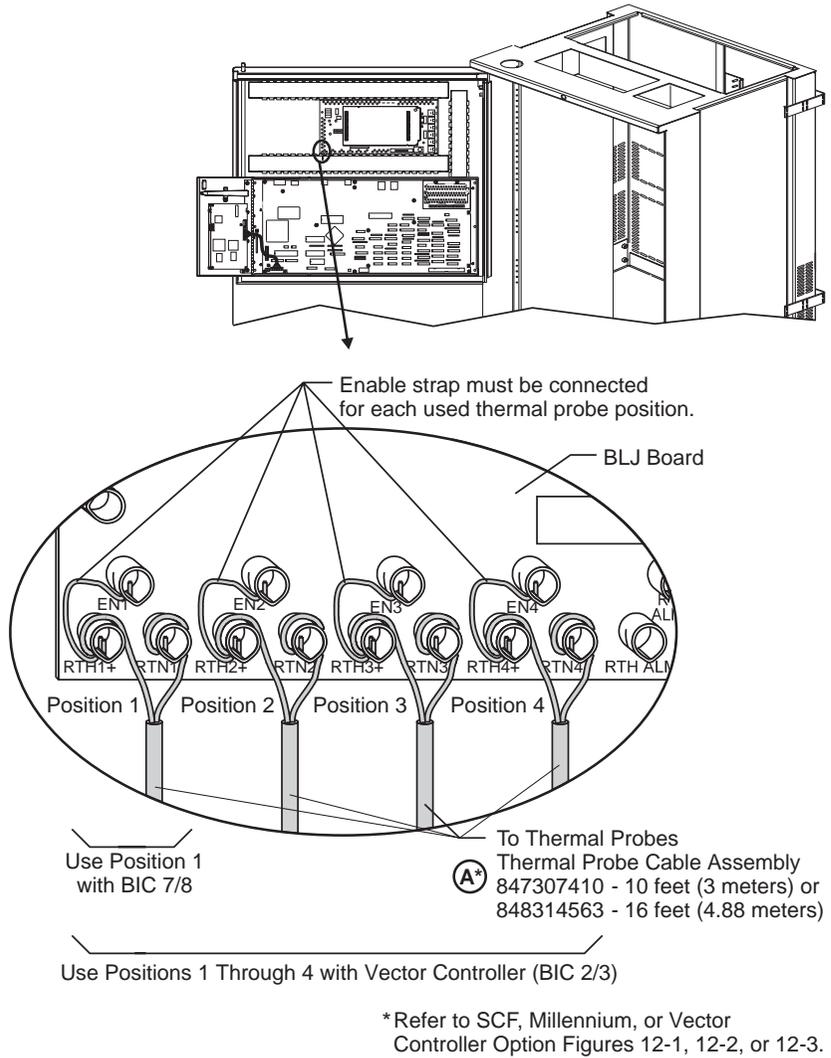
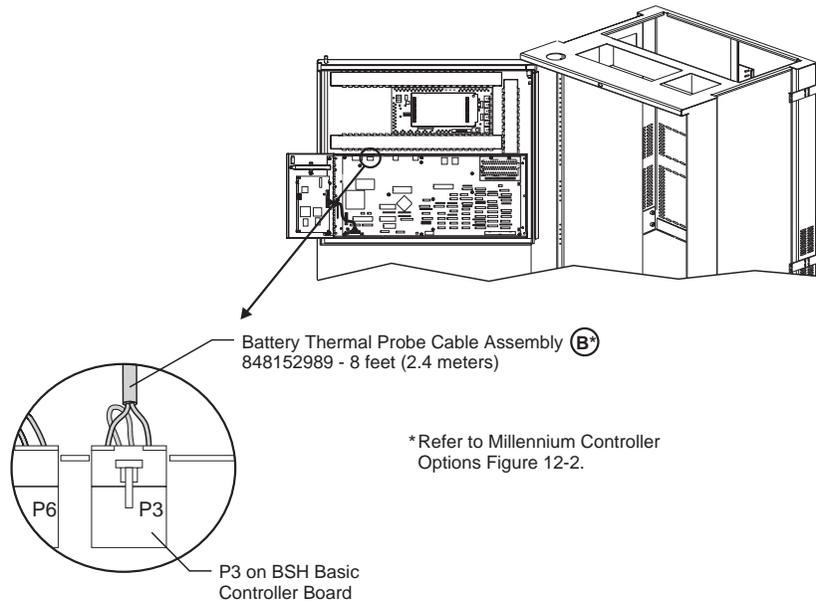


Figure 12-7: Thermal Probe Connection to BLJ Board

Connecting Thermal Probes, continued

Millennium Controller



**Figure 12-8: Thermal Probe Connection to Millennium
Controller**

Connecting a 210E Module to the Controller or BLJ Board

Thermal probes can be connected to a 210E module that will monitor the temperature of the probes and provide the highest temperature to its output. (See 210E product manual, Select Code 157-010-202, for more details.)

Each 210E module requires two connections to the BLJ board:

- The Power Cable Assembly 847900180 supplies fused system voltage to the 210E module. Connection is made to the ABS and DG terminals of the BLJ board. Multiple ABS and DG terminals are available as required.
- The Alarm and Signal Cable Assembly connects to the BLJ board using cable assembly 848302048 or 848153003 to the controller.

Note: The order of connections is not important, but it should be noted that alarms will be generated if a 210E module is connected to the controller and powered up with no thermal probes connected.

Connecting a 210E Module to the Controller or BLJ Board, continued

Connecting a 210E Module to the Controller or BLJ Board	
Step	Action
1	Connect the Power Cable Assembly (847900180) to the ABS and DG terminals of the BLJ Terminal Board. See Figure 12-9.
2	Connect the Alarm and Signal Cable Assembly to the BLJ board using cable assembly 848302048 (see Figure 12-9) or 848153003 to the BSH board on the Millennium (see Figure 12-10).

Note: The length of the 848302048 cable assembly is 8 feet (2.4 meters). The cable assembly can be cut to a shorter length if mounting the 210E module on the bay door.

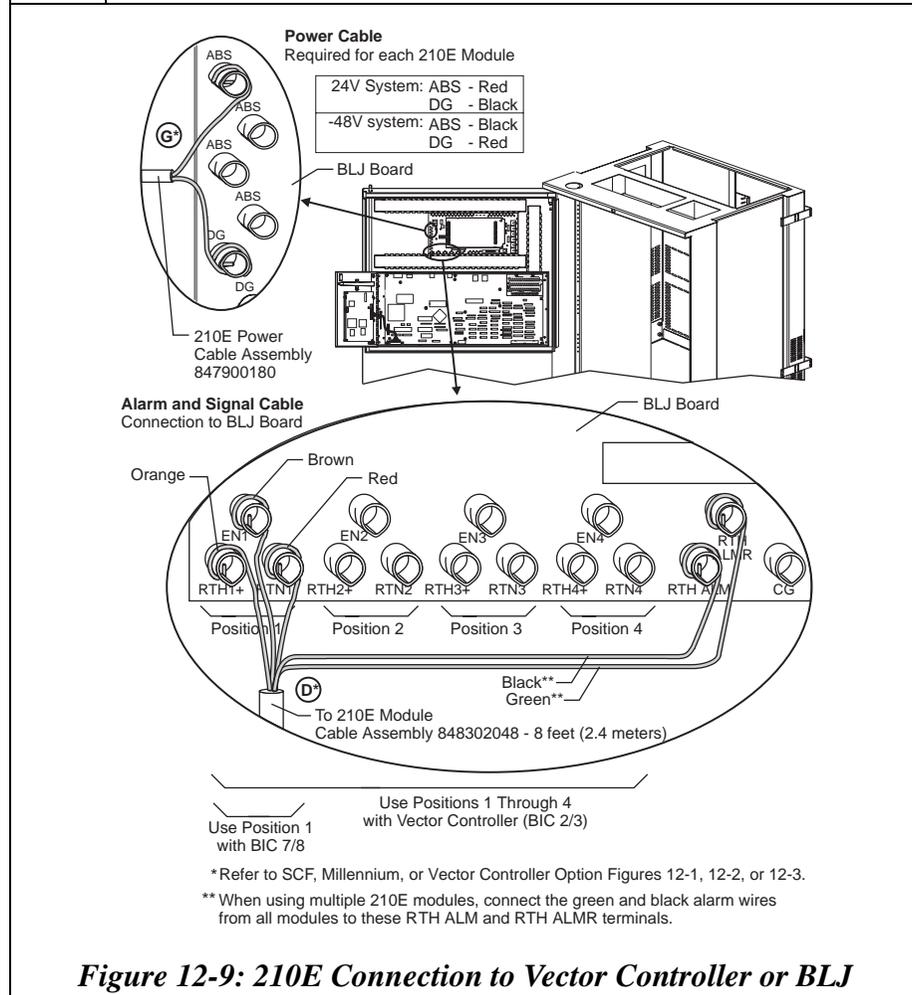


Figure 12-9: 210E Connection to Vector Controller or BLJ

Connecting a 210E Module to the Controller or BLJ Board, continued

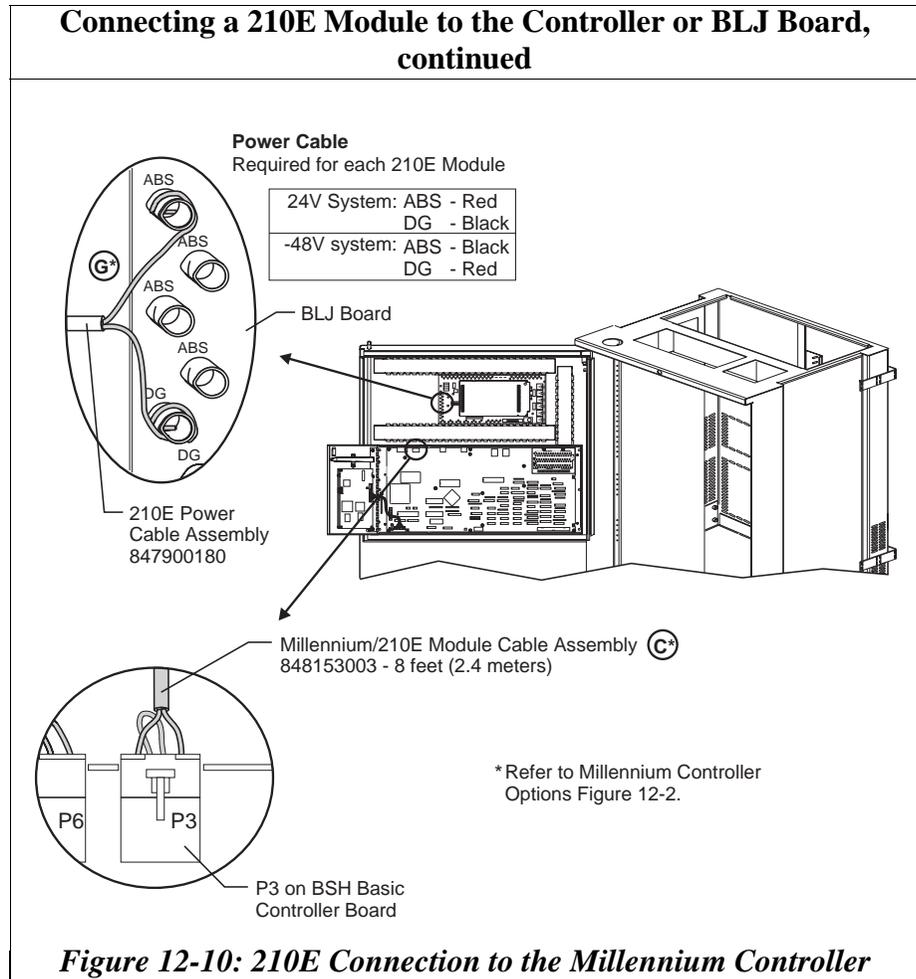
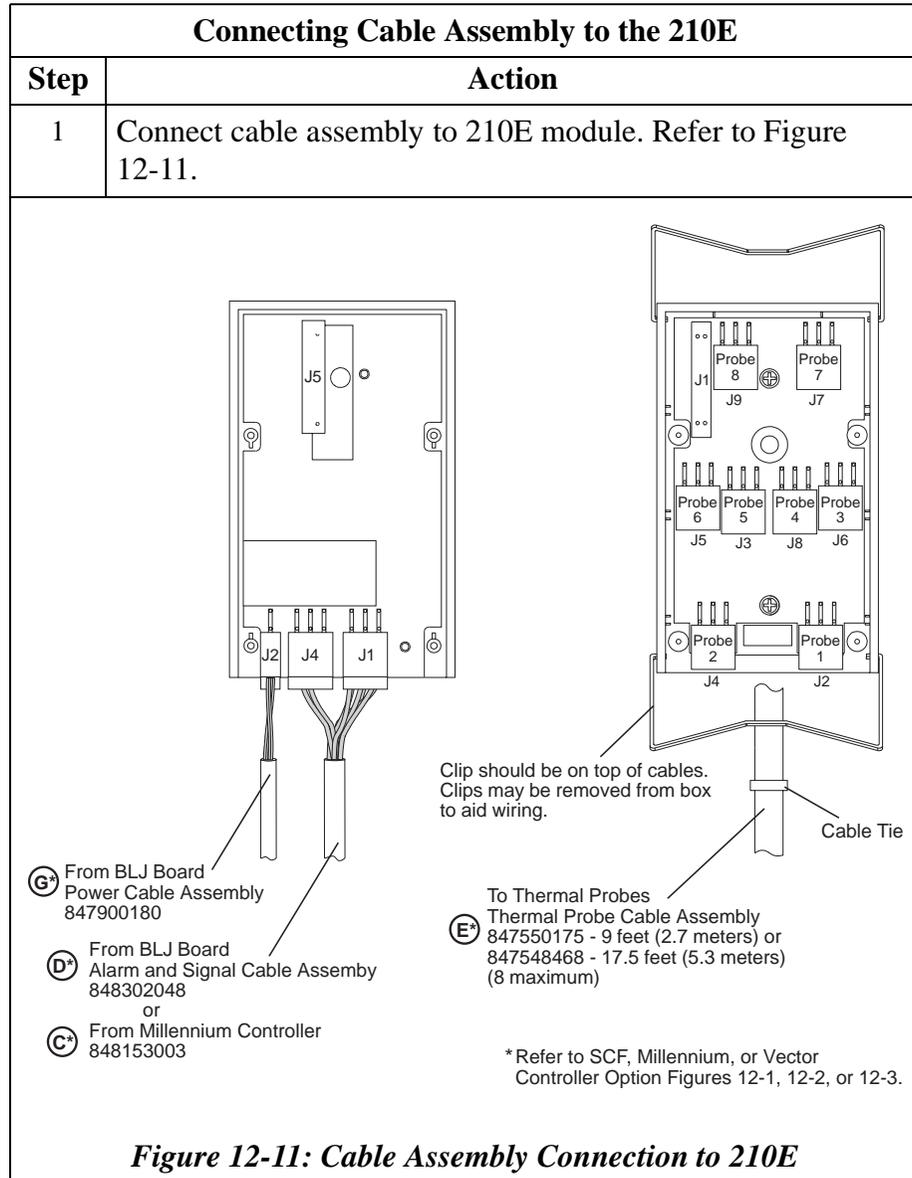


Figure 12-10: 210E Connection to the Millennium Controller

Connecting Cable Assembly to the 210E

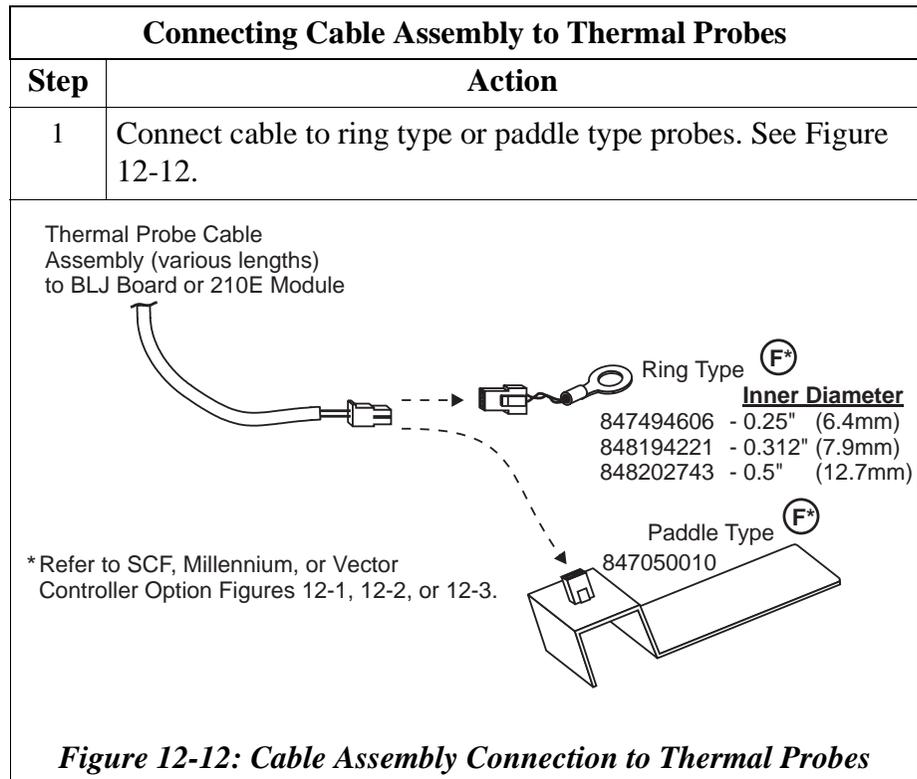


Connecting Cable Assembly to Thermal Probes

This procedure is for connecting the thermal probe cable assembly to thermal probes.

Two types of thermal probes are currently available (see Figure 12-12):

- Ring type, which connects directly to a battery terminal
- Paddle type, which is inserted between adjacent batteries



13 Fascia Cover Installation

Introduction

This section provides the installation procedure for the fascia covers. The covers are optional on centralized architecture.

Installing the Fascia Covers

Refer to Figure 13-1 for an illustration of this procedure.

Installing the Fascia Covers	
Step	Action
1	Install fascia covers (provided) around top of cabinet lineup, using four 8-32 nuts (also provided).

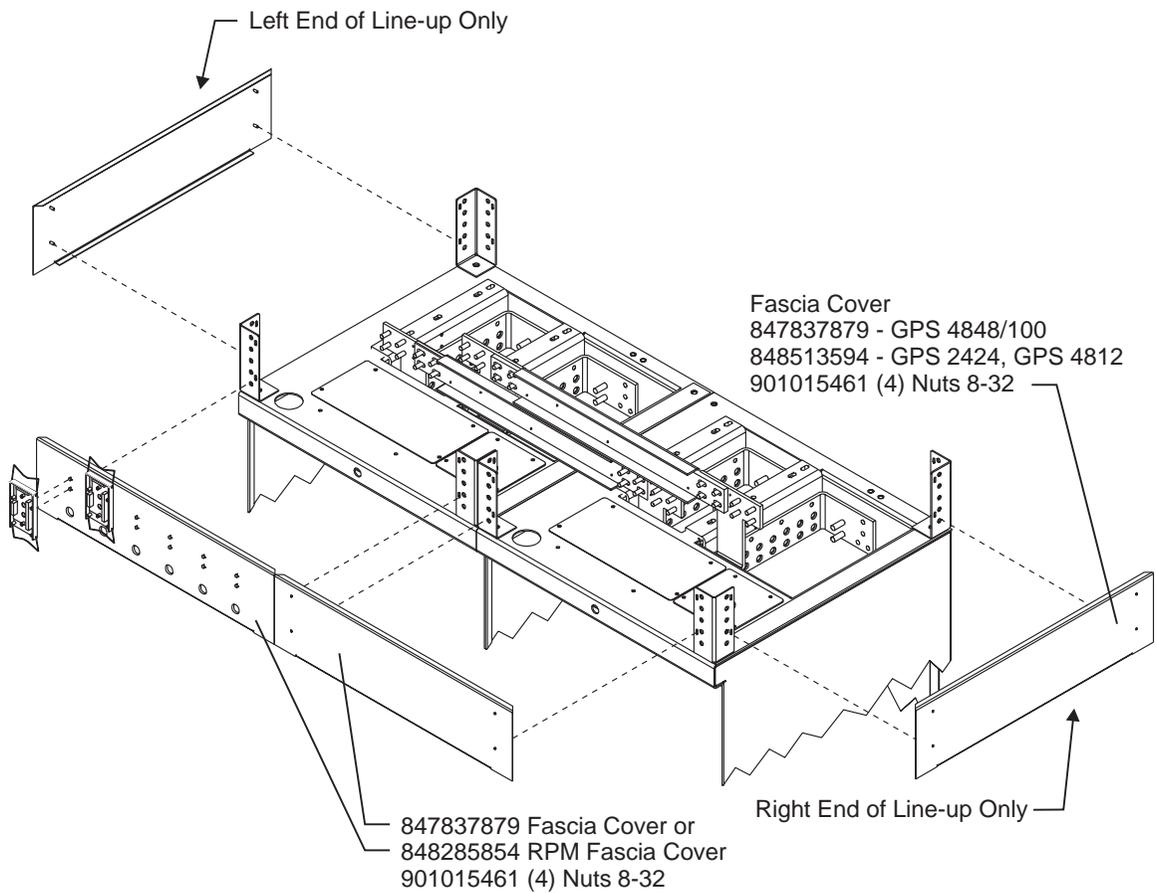


Figure 13-1: Fascia Cover Installation

14 ***Connection of Office Alarms***

Introduction

This section explains the installation procedure to connect the office alarms.

Controller Alarm Connections

Connecting Office Alarms	
Step	Action
1	<p>Choose the appropriate illustration from the following list:</p> <ul style="list-style-type: none">• Figure 14-1: Galaxy Millennium Controller with Insulation Displacement Alarm Board• Figure 14-2: Galaxy Millennium Controller with Wire Wrap Alarm Board• Figure 14-3: Galaxy RC Controller Alarm Connection• Figure 14-4: Galaxy SCF Controller Alarm Connection• Figure 14-5: Galaxy Vector Controller with Insulation Displacement Alarm Board
2	<p>Route wires (installer provided, 22-gauge maximum) from the office alarm block back to the controller by following the numbered sequence of steps on the illustration.</p>

Controller Alarm Connections, continued

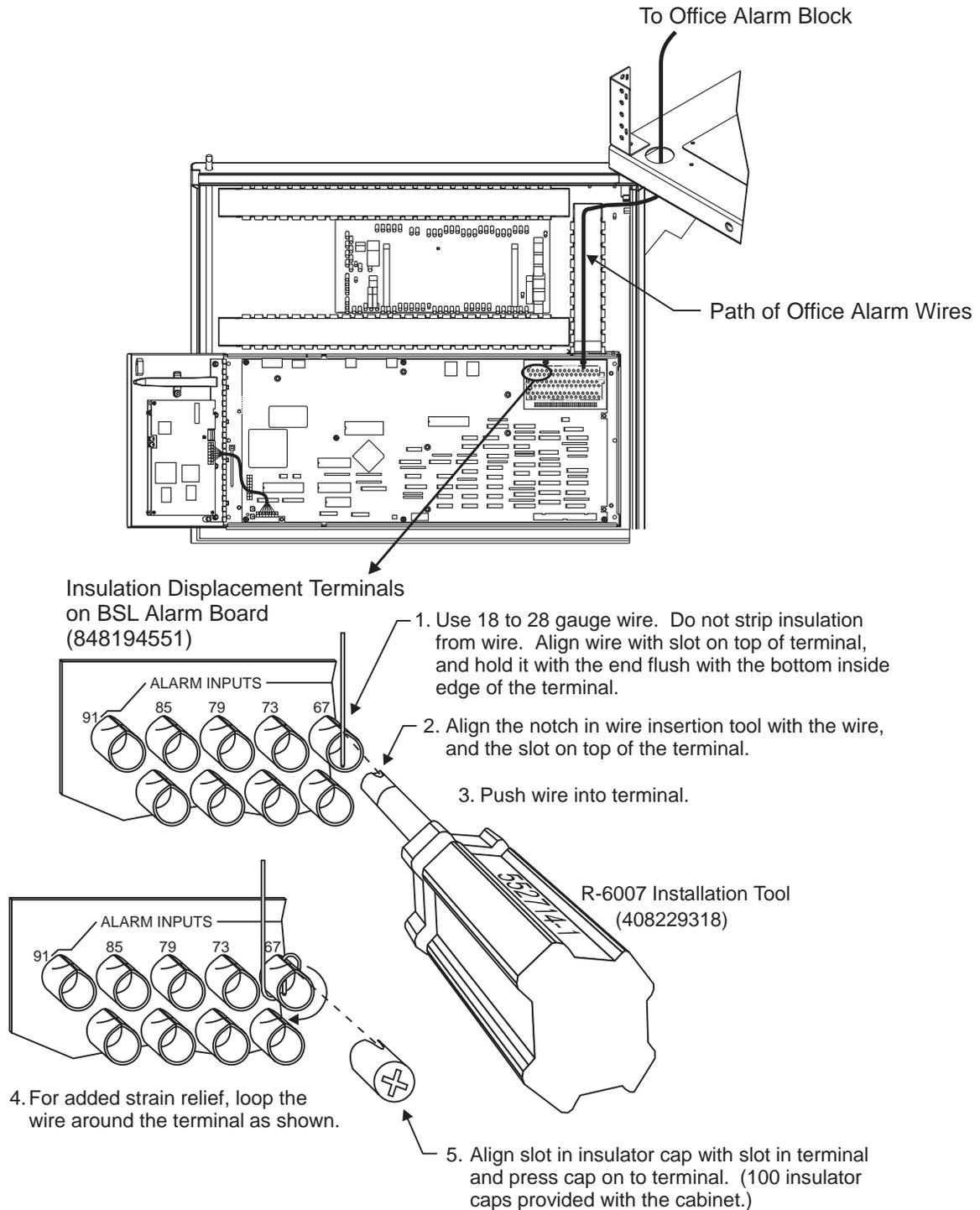


Figure 14-1: Galaxy Millennium Controller with Insulation Displacement Alarm Board

Controller Alarm Connections, continued

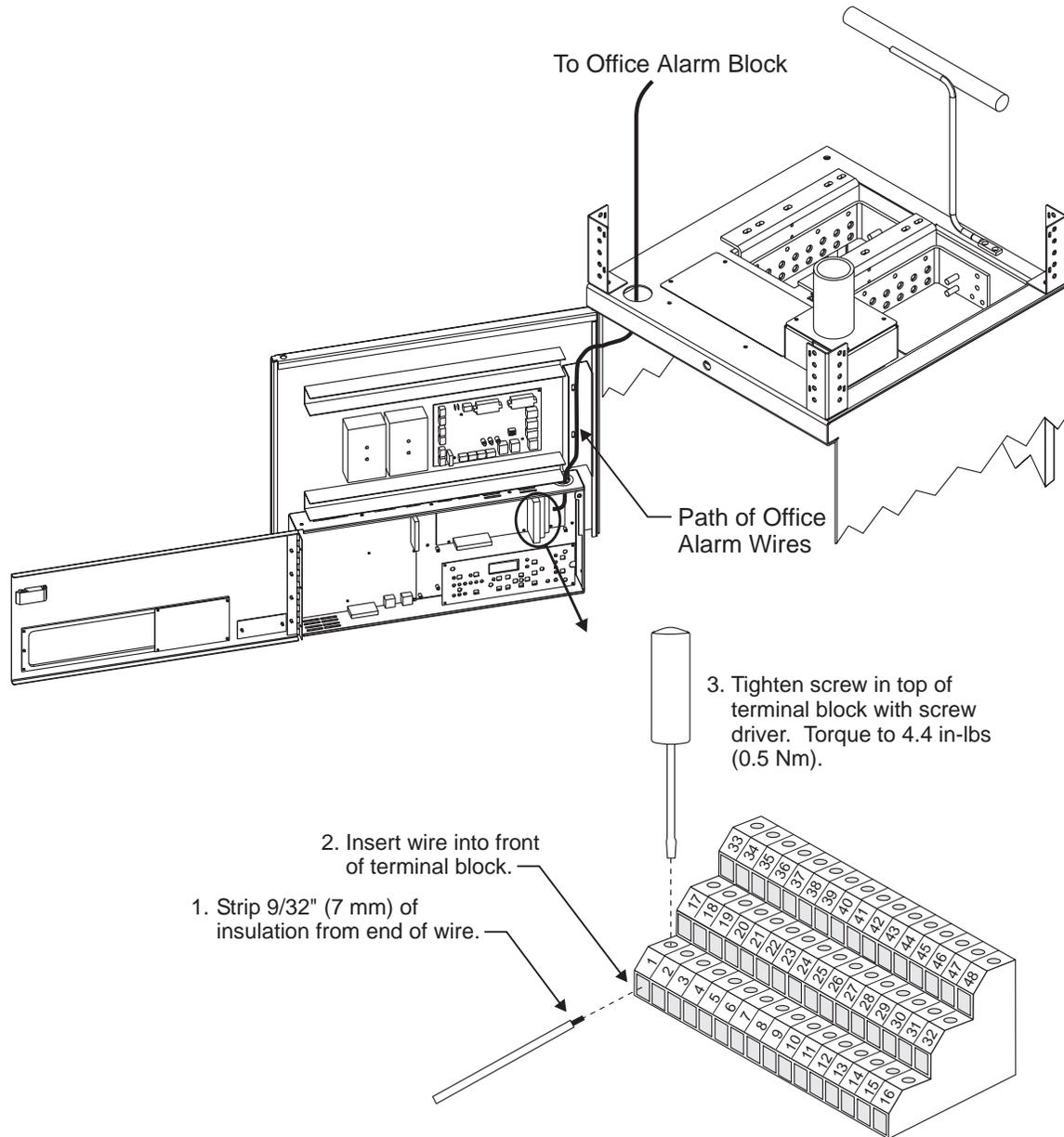


Figure 14-3: Galaxy RC Controller Alarm Connection

Controller Alarm Connections, continued

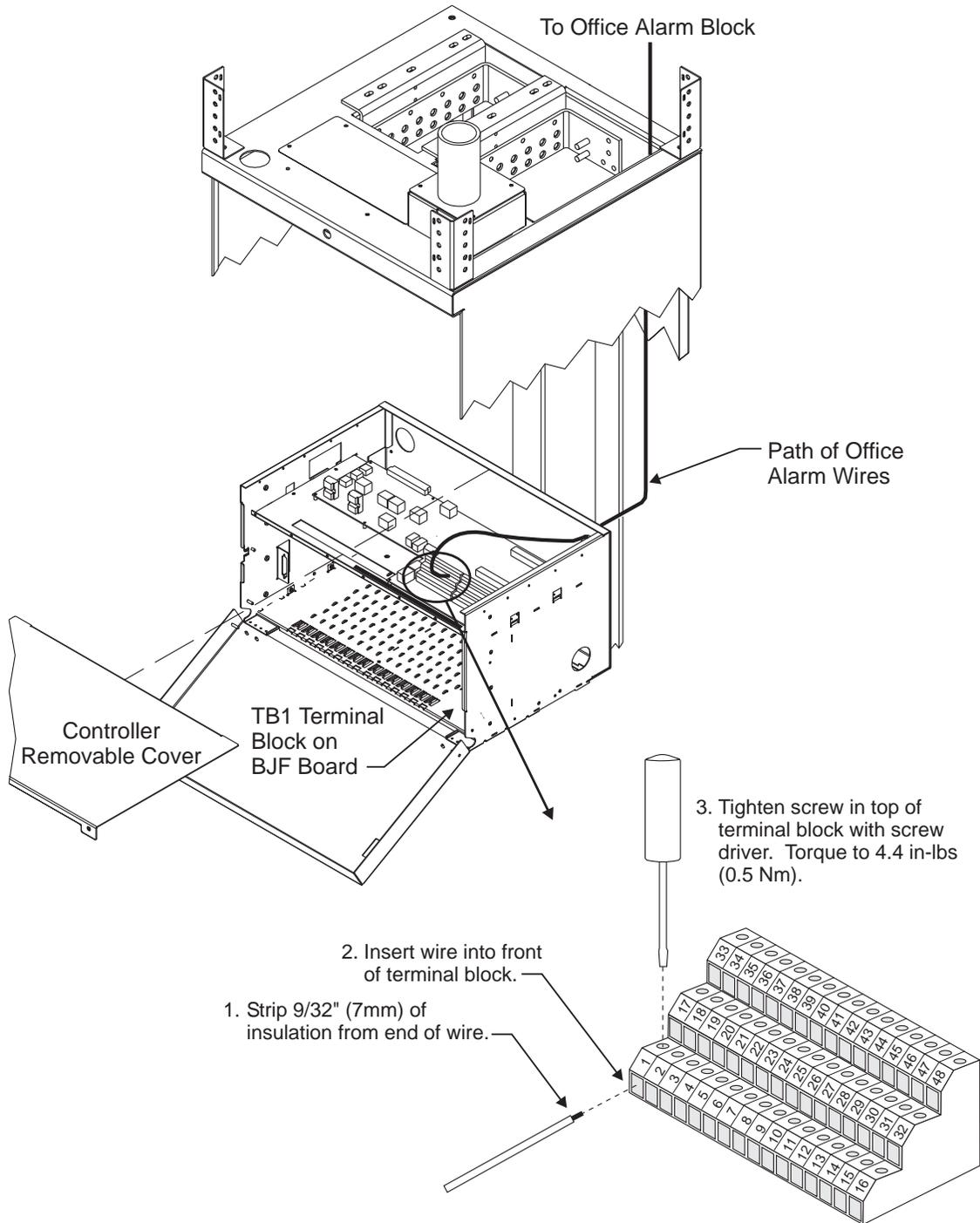


Figure 14-4: Galaxy SCF Controller Alarm Connection

Controller Alarm Connections, continued

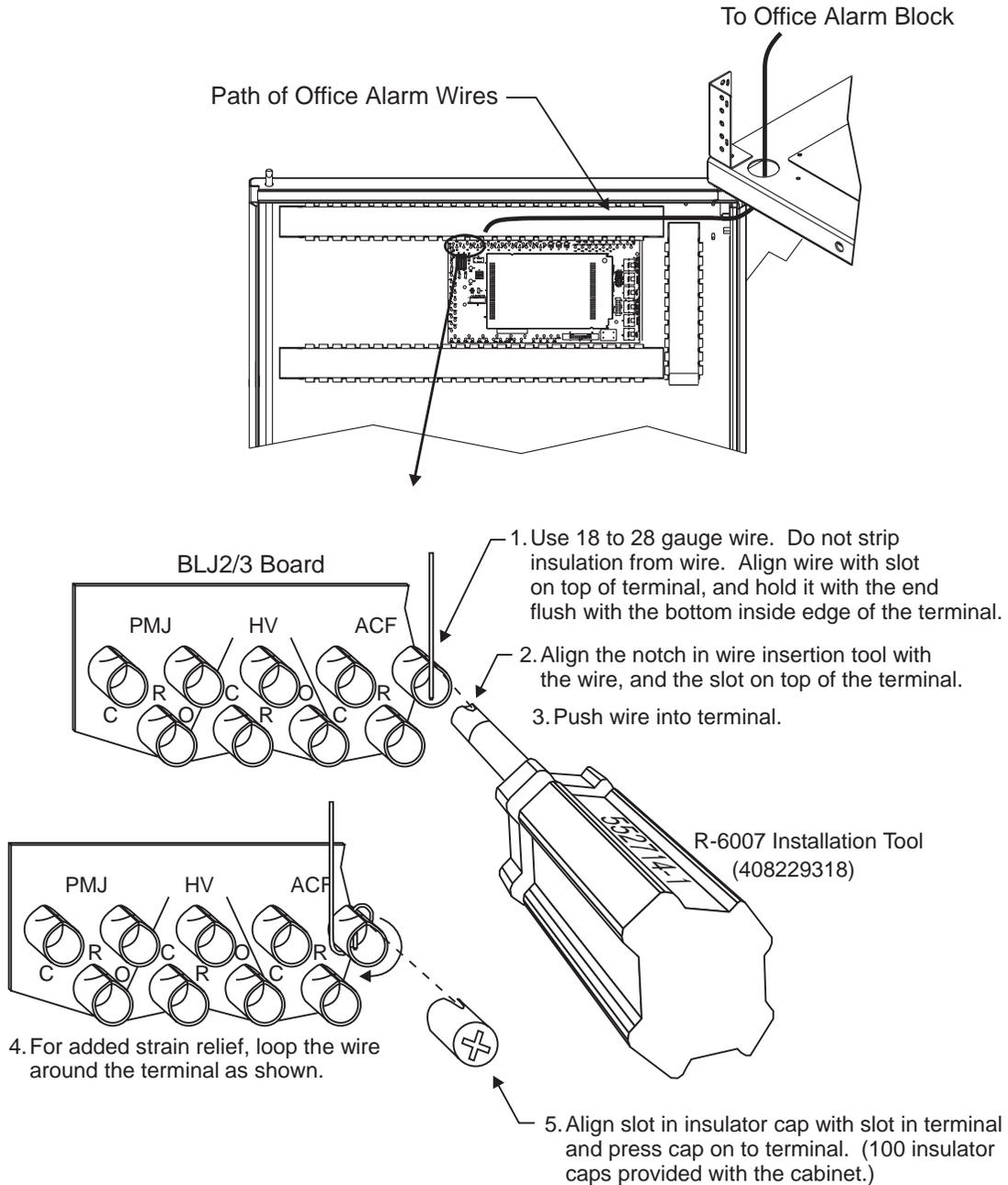


Figure 14-5: Galaxy Vector Controller With Insulation Displacement Alarm Board

15 Power Up and Installation Completion

Initial System Checkout and Preparation for Power Up

Before Installing Converters and Rectifiers

Prior to installing converters (if equipped) and rectifiers, verify that the correct ac voltage is present at the ac connectors in the rectifier shelves. Note: Disregard if this was done as part of the “AC Connection and Wiring” procedure.

Safety Reminder

Some of the following procedures are performed while ac voltage is present at the cabinet; **exercise extreme caution** and observe all precautions described in the safety section of this product manual.

Controller Front Panels

Illustrations

Refer to the following figures for illustrations of the controller front panels:

- Figure 15-1 Millennium Controller
- Figure 15-2 Rectifier Controller (RC)
- Figure 15-3 Galaxy System Controller Front Access (SCF)
- Figure 15-4 Vector Controller

Controller Front Panels, continued

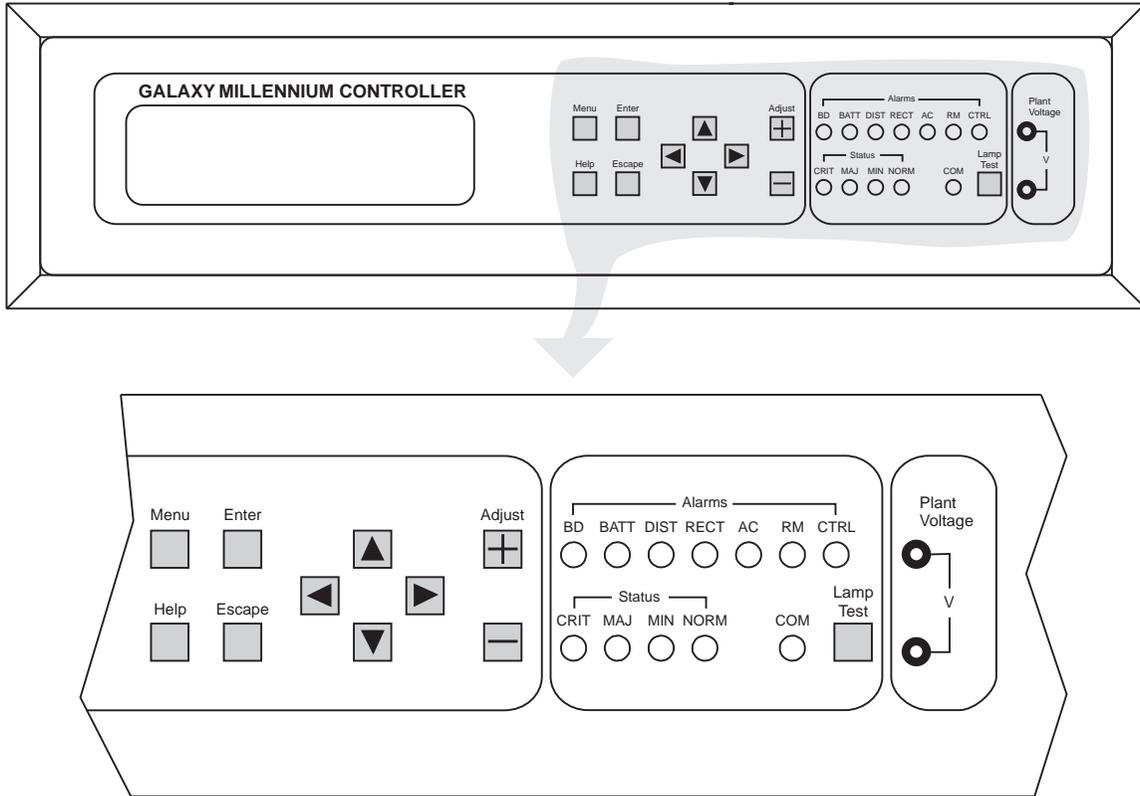


Figure 15-1: Galaxy Millennium Controller Front Panel

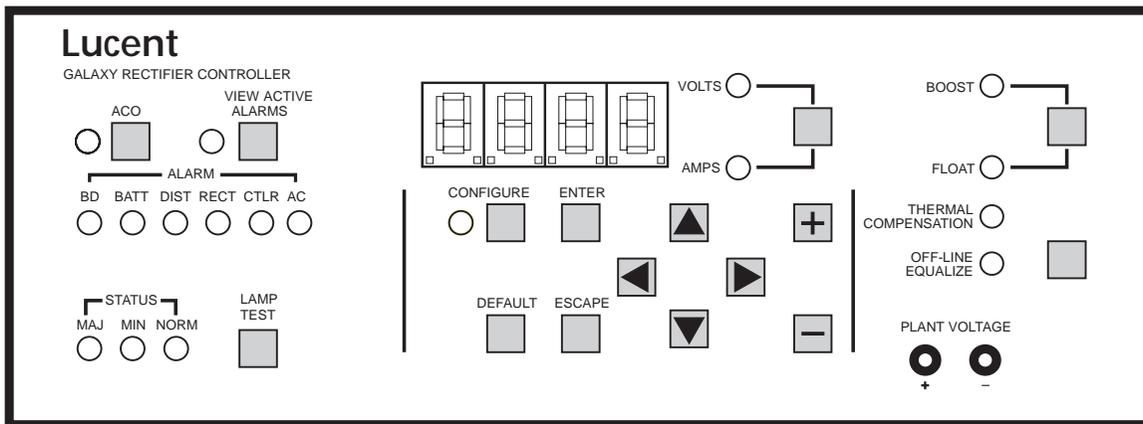


Figure 15-2: Galaxy RC Controller Front Panel

Controller Front Panels, continued

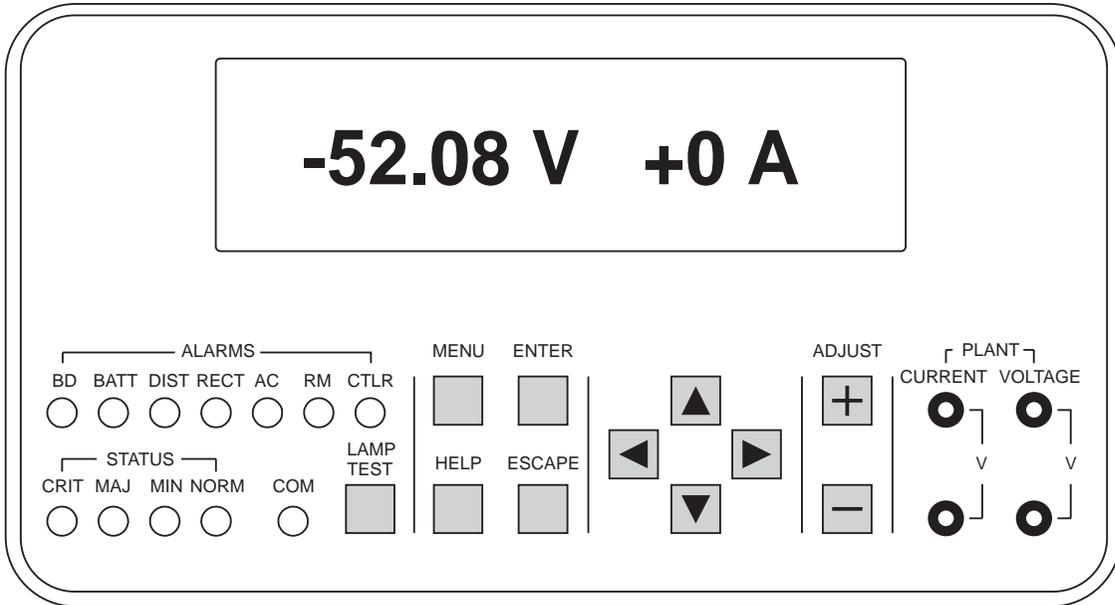


Figure 15-3: Galaxy SCF Controller Front Panel

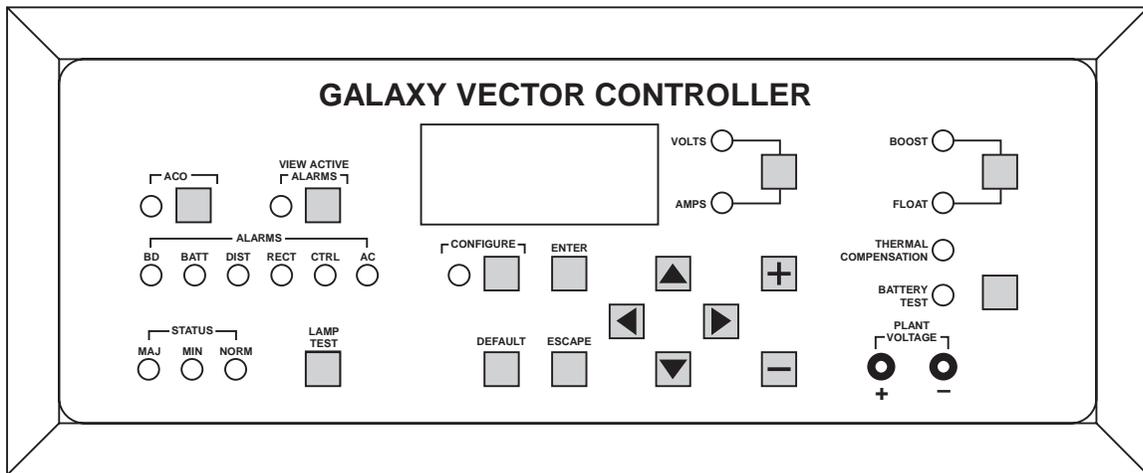


Figure 15-4: Galaxy Vector Controller Front Panel

Initial Power Up of the System

Initial Power Up of the System	
Step	Action
1	<p>To turn up the system while using the factory default firmware and software loaded in the Galaxy controller, proceed as follows:</p> <p style="text-align: center;"> Warning</p> <p>Before proceeding with the initial power up of the system, verify:</p> <ul style="list-style-type: none"> • Batteries are disconnected from the system bus. • The ac source circuit breakers are turned OFF. • The system ac and dc load circuit breakers/fuses are OFF or removed.
2	<p>Install a rectifier in slot one. See Figure 15-5.</p> <p style="text-align: center;"> Caution</p> <p>Rectifier is heavy (up to 75 lbs.) See precaution in Figure 15-5.</p> <ol style="list-style-type: none"> a. Verify that the control switch on the front of the rectifier is in the standby (STBY) position; for 595 rectifiers, verify that the output circuit breaker is also OFF. b. Place the rectifier on the appropriate shelf assembly. Note: Install rectifiers vertically, starting at the bottom left side of the shelf assembly and working <i>up</i> and <i>left to right</i> (if applicable). c. Carefully slide the rectifier toward the rear of the shelf assembly. Push until the unit is seated. d. Gently pushing against the right side of the rectifier, use a 5mm (3/16-inch) Allen-head wrench (T-handle) to turn the recessed locking screw clockwise to secure the rectifier to the shelf.
<i>Continued on next page.</i>	

Initial Power Up of the System, continued

Initial Power Up of the System, continued	
Step	Action
3	<p>Install converter cards. The cards “click” into place inside the carrier. See Figure 15-5.</p> <p>Note: Converters are optional equipment.</p>
4	Turn ON the control switch on the converters, if equipped.
5	Turn ON the ac source circuit breaker and the ac circuit breaker for the installed rectifier.
6	Turn ON the rectifier’s power switch; close its output breaker, if equipped.
7	Verify that the converters, if equipped, and rectifier turn ON.
8	<p>Verify that the controller and the optional contactor control boards power up.</p> <p>Note: Red LEDs will light on BJN and LVBD cards.</p>
9	If the controller has alpha-character capability, verify that the text on the display is in English. If Spanish text is required, follow instructions on the Help menu to make the change.
10	If the controller has intelligent cards, activate the memory backup battery by pulling out the shipping tab.
11	<p>Verify the following:</p> <ul style="list-style-type: none"> • Green LEDs are illuminated on the rectifier, converters, and LVLD and LVBD contactor control boards. • The system voltage is 26.04 volts (24V system) or 52.08 volts (48V system). • The system current is zero. • The controller’s RECT and MAJ LEDs illuminate. • The controller’s audible alarm (if equipped) is sounding. • The controller display indicates one warning.
<i>Continued on next page.</i>	

Initial Power Up of the System, continued

Initial Power Up of the System, continued	
Step	Action
12	<p>Turn OFF the controller's audible alarm (if equipped).</p> <p>Note: This alarm will retire on its own after the rectifier ID is set in Step 13.</p>
13	<p>To set the rectifier slot ID number, follow these steps:</p> <ol style="list-style-type: none">a. Depress and hold the rectifier's power switch in the UP position for approximately five seconds. The number displayed will begin to blink, indicating that a new ID can be set.b. To set the ID, depress and release the switch until the desired ID number is reached.c. Once the desired ID number is reached, continue to hold the switch depressed until the display stops blinking. The new ID number is now set. <p>Note: Abandoning this process before the display stops blinking will default the ID to the last number set.</p>
14	<p>Follow Step 2 to install the remaining rectifiers, and follow Step 13 to set their ID numbers.</p>
15	<p>Verify that the system voltage again reads 26.04 volts (or 52.08 volts).</p>

Initial Power-Up of the System, continued

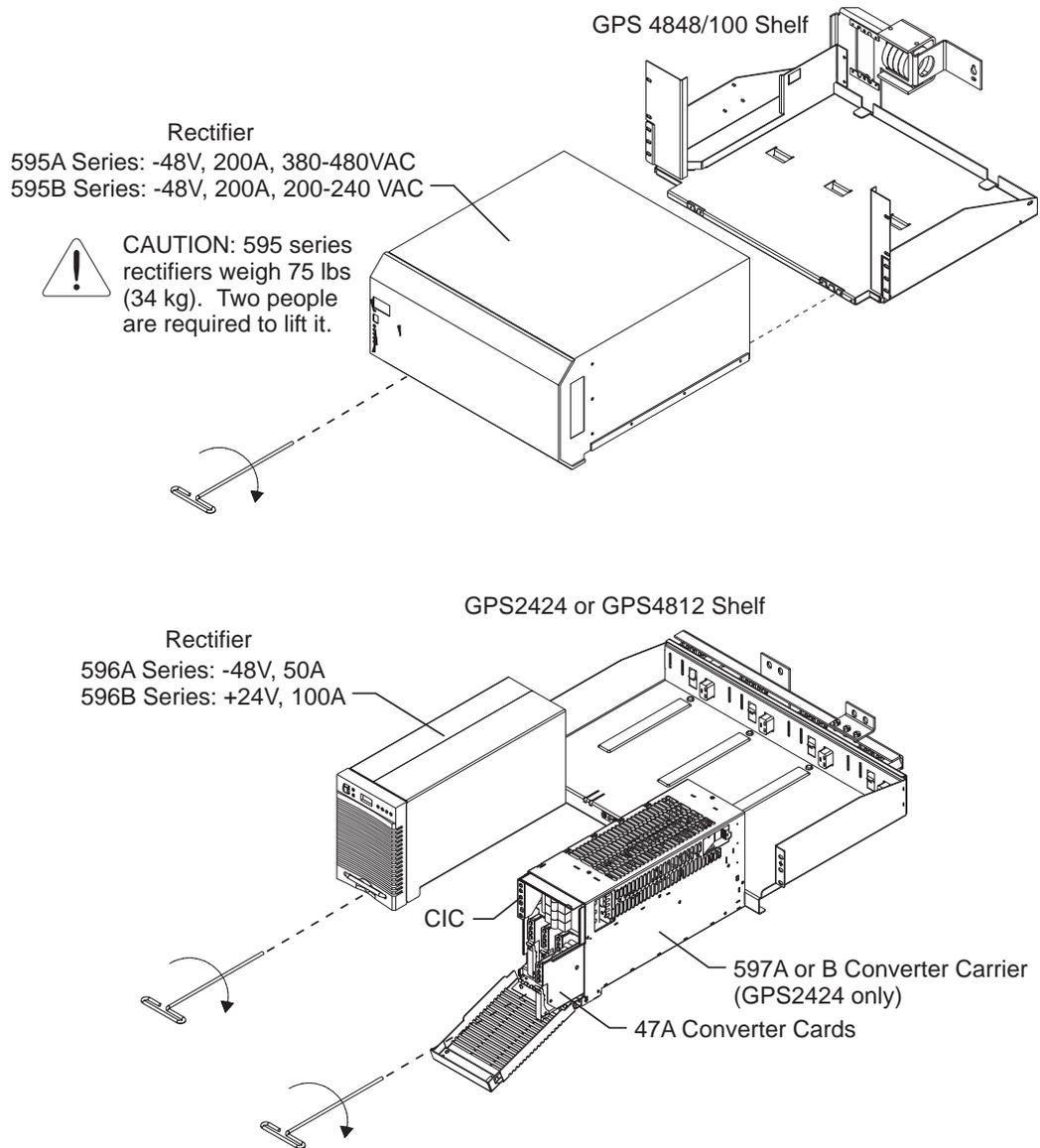


Figure 15-5: Installing Rectifiers and Converters

Lamp Test

Lamp Test	
Step	Action
1	Depress LAMP TEST on the controller display.
2	<p>Verify that the LEDs on the rectifiers, converters, and controller illuminate.</p> <p>Note: The green NORMAL LEDs will remain illuminated on the rectifiers, converters (optional), controller, LVBD and LVLD contactor control boards (optional), and the remote peripheral monitoring modules (optional). The other controller LEDs will extinguish after several seconds, and the remaining system LEDs will extinguish within approximately 10 seconds.</p>

Voltage Calibration

Voltage Calibration	
Step	Action
1	Using a calibrated digital voltmeter (DVM), measure the system voltage from the front panel voltage test jacks.
2	<p>If the voltage on the controller display does not match the DVM reading, adjust the controller display. To move to the correct screen to make the adjustment, follow the appropriate procedure below:</p> <ul style="list-style-type: none"> • Galaxy SCF and Millennium controllers, press the following key sequence: Main → Config → Plant → Enter Move to ADJ PLV on the menu. • Galaxy RC and Vector controllers, use the following key sequence: Config → Up arrow key (until FPC is on the display) → Enter
3	Use the ADJUST keys to calibrate the system voltage to match the reading of the DVM. Press ENTER to use the new calibrated system voltage. Press the ESCAPE key until the default screen is displayed. Verify that the system voltage reading reflects the new value.

Setting the System Float Voltage

Setting the System Float Voltage	
Step	Action
1	Enter the appropriate key sequence: <ul style="list-style-type: none">Galaxy SCF and Millennium controllers: Main → Config → Rect Mngr → Enter (Basic) Main → Config → Rect Mngr → Rect Oper → Enter (Intelligent)Galaxy RC and Vector controllers: Config → Up arrow key (until FSP is on the display) → Enter
2	Verify that the HFV, HVSD, and SHVSD alarm thresholds are set above the float voltage to be specified in Step 3.
3	Use the adjust keys to set the system float voltage.

Setting the System Shunt

Setting the System Shunt	
Step	Action
1	<p>Enter the appropriate key sequence:</p> <ul style="list-style-type: none">Galaxy SCF and Millennium controllers: Menu → Config → Plant → Shunt Type → EnterGalaxy RC and Vector controllers: Config → Up arrow key (until <i>Styp</i> is on the display) → Enter
2	<p>Select the Shunt type: None, Load, or Battery.</p> <ul style="list-style-type: none">Distributed Architecture, select:<ul style="list-style-type: none">– “None” for the SCF or Millennium controller.– “2” for the RC or Vector controller.Centralized Architecture, select:<ul style="list-style-type: none">– “Load” for the SCF or Millennium controller.– “1” for the RC or Vector controller.
<i>Continued on next page.</i>	

Setting the System Shunt, continued

Setting the System Shunt, continued	
Step	Action
3	<p>Set the shunt size for centralized architecture systems (the size is factory-set for distributed architecture systems).</p> <ul style="list-style-type: none">Galaxy SCF and Millennium controllers: Menu → Config → Plant → Shunt mV → use <+> and <-> keys to scroll through available values → Enter Menu → Config → Plant → Shunt I → use <+> and <-> keys to scroll through available values → EnterGalaxy RC and Vector controllers: Config → Up arrow key (until SHIA is on the display) → enter value between 1 and 9999 amps (default is 800) → Enter

Setting the Low-Voltage Battery Disconnect Feature

Setting the LVBD Feature	
Step	Action
1	<p>To enable LVBD, enter the appropriate key sequence:</p> <ul style="list-style-type: none">Galaxy SCF and Millennium controllers: Main → Config → LVD (Basic) or Low V Disc (Intelligent) → Contactor 1 → Type-Battery → EnterGalaxy RC and Vector controllers: Config → Up arrow key (until CltY is on the display) → 2 (battery) → Enter <p>Note: The LVBD configuration must be set. No alarm lights will show if this is not set.</p>
<i>Continued on next page.</i>	

Setting the Low-Voltage Battery Disconnect Feature, continued

Setting the LVBD Feature, continued	
Step	Action
2	<p>The default thresholds are:</p> <ul style="list-style-type: none"> Galaxy SCF and Millennium controllers: <p>disconnect voltage: +22V (for +24V systems) or -44V (for -48V systems)</p> <p>reconnect voltage: +24V (for +24V systems) or -48V (for -48V systems)</p> Galaxy RC and Vector controllers: <p>disconnect voltage: +21V (for +24V systems) or -43.20V (for -48V systems)</p> <p>reconnect voltage: +22.20V (for +24V systems) or -44.40V (for -48V systems)</p> <p>To set the thresholds to other values, enter the appropriate key sequence:</p> <ul style="list-style-type: none"> Galaxy SCF and Millennium controllers: <p>Main → Config → LVD (Basic) or Low V Disc (Intelligent) → Contactor 1 → Type-Battery → Change Thresholds → Enter</p> Galaxy RC and Vector controllers: <p>Config → Up arrow key (until <i>CILd</i> for disconnect voltage or <i>CILr</i> for reconnect voltage is on the display) is on the display) → Enter</p> <p>Note: The factory default on all battery contactors in the system is hardwired as Contactor 1. This cannot be changed.</p>

Setting the Low-Voltage Load Disconnect Feature

Setting the LVLD Feature	
Step	Action
1	<p>To enable LVLD, enter the appropriate key sequence:</p> <ul style="list-style-type: none">Galaxy SCF and Millennium controllers: Main → Config → LVD (Basic) or Low V Disc (Intelligent) → Contactor 2 → Type-Load → EnterGalaxy RC and Vector controllers: Config → Up arrow key (until C2tY is on the display) → 1 (load) → Enter <p>Note: The LVLD configuration must be set. No alarm lights will show if this is not set.</p>
<i>Continued on next page.</i>	

Setting the Low-Voltage Load Disconnect Feature, continued

Setting the LVLVD Feature, continued	
Step	Action
2	<p>The default thresholds are:</p> <ul style="list-style-type: none"> Galaxy SCF and Millennium controllers: <p>disconnect voltage: +22V (for +24V systems) or -44V (for -48V systems)</p> <p>reconnect voltage: +24V (for +24V systems) or -48V (for -48V systems)</p> Galaxy RC and Vector controllers: <p>disconnect voltage: +21V (for +24V systems) or -43.20V (for -48V systems)</p> <p>reconnect voltage: +22.20V (for +24V systems) or -44.40V (for -48V systems)</p> <p>To set the thresholds to other values, enter the appropriate key sequence:</p> <ul style="list-style-type: none"> Galaxy SCF and Millennium controllers: <p>Main → Config → LVD (Basic) or Low V Disc (Intelligent) → Contactor 2 → Type-Load → Change Thresholds → Enter</p> Galaxy RC and Vector controllers: <p>Config → Up arrow key (until C2Ld for disconnect voltage or C2Lr for reconnect voltage is on the display) → Enter</p> <p>Note: The factory default on all load contactors in the system is hardwired as Contactor 2. This can be changed to Contactor 3 to allow some contactors to open at a different threshold. To change, move jumpers on the contactor drive boards as shown in Figure 8-16. Then set the Contactor 3 configuration and thresholds as described above.</p>

Connecting Batteries

 **Caution:** Review and observe precautions outlined in Section 2, *Safety*, before proceeding.

Connecting Batteries	
Step	Action
1	Turn the system OFF. Turn the rectifiers to STBY. Open the rectifier circuit breakers and system load circuit breakers, if equipped.
2	Connect the batteries to the system. Choose the appropriate method: <ul style="list-style-type: none">• Install the battery fuses and alarm fuses, or• Close the battery circuit breakers, or• Set the battery contactor board switches from forced open to normal state, or• Connect the remaining battery conductors. (See Figures 15-6 and 4-1 through 4-4.)
3	Turn the system ON. Turn ON all rectifiers. Close the rectifier output circuit breakers (if equipped).
4	Observe that all rectifiers share the battery charging load current. When this current stabilizes or drops to a level equal to several amperes per string, proceed to the next section.

Connecting Batteries, continued

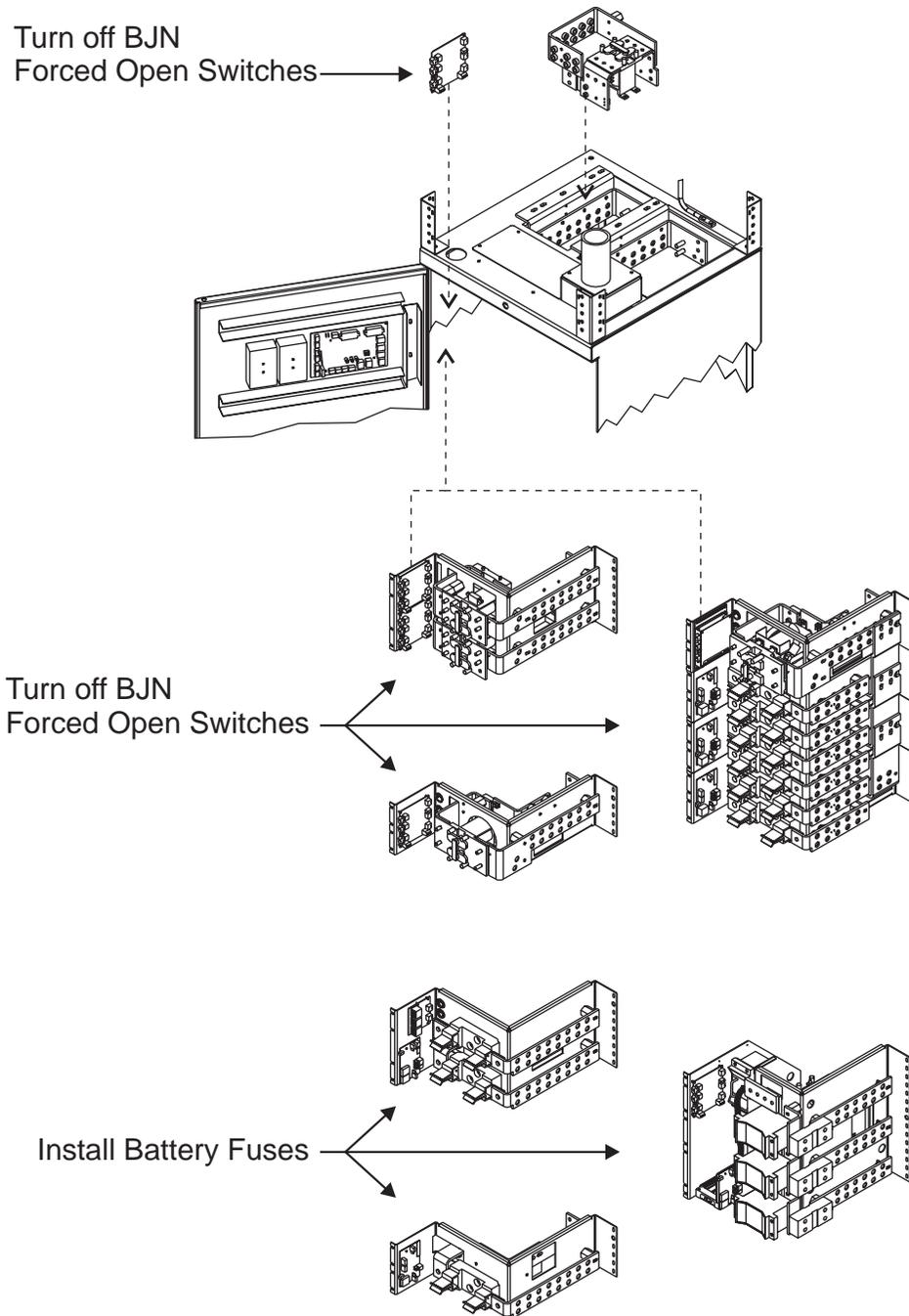


Figure 15-6: Battery Connection Panel

Testing Rectifiers and Load Share

Testing Rectifiers and Load Share	
Step	Action
1	Turn all rectifiers to STBY.
2	Connect a resistive load box (proper voltage) to the system's positive and negative bus bars.
3	Verify that the system load is less than 50 amperes.
4	Increase the system load to 50 amperes.
5	Turn ON all the rectifiers; after approximately 60 seconds, verify that the load is divided equally among all the rectifiers (within 2 amperes).
6	Reduce the system load. Verify that the rectifiers continue to share the load.
7	Remove system load.

Testing Temperature Compensation (Optional Feature)

Testing Temperature Compensation (Optional)	
Step	Action
1	Enter the appropriate key sequence: <ul style="list-style-type: none">Galaxy SCF and Millennium controllers: Main → Config → Bat Mngr → STC → EnterGalaxy RC and Vector controllers: Config → Up arrow key (until <i>btAt</i> is on the display) → Enter
2	Enable the slope thermal compensation feature, if installed.
3	Verify that the battery threshold configurations are set at values that will enable the test to perform properly.
4	If thermal probes are installed, heat one of the probes to simulate a battery operating at high temperature.
5	Verify that the system voltage is reduced from the nominal float voltage value as the thermal probe is heated.
6	Allow the thermal probe to cool and verify that the system voltage returns to the nominal value.

Testing Additional Alarms

Alarm operation may be verified while the system operates at float voltage.

Testing Additional Alarms	
Step	Action
1	Turn OFF the ac circuit breaker of rectifier #1. Verify that the AC and MIN alarm LEDs illuminate, the rectifier displays ACF, and the controller alarms screen indicates AC FAIL : G01 (SCF and Millennium controllers) or rFA: (Vector and RC controllers).
2	Turn ON the ac circuit breaker of rectifier #1. Verify that the rectifier starts and the alarms retire.
3	Turn converter #1 (if equipped) from ON to STBY. Verify that the REC-MIN alarm LEDs illuminate and the controller alarms screen indicates CONVERTER FAILURE : C01 (SCF and Millennium controllers) or CFA: (Vector and RC controllers).
4	Turn converter #1 ON and verify that the converter starts and the alarm retires.
5	Simulate a load circuit breaker alarm by shorting the alarm contacts on the circuit breakers or inserting an operated alarm fuse. For ED83143-30 G1-6 (101-106), add a jumper from the hot bus to the FAJ input signal on the associated BNL1 (P4-1) or BNL7 (P5-6) alarm card. Verify that the DIST and MAJ alarm LEDs illuminate and the controller alarms screen indicates EXTERNAL FUSE MAJOR (SCF and Millennium controllers) or FAJ (Vector and RC controllers).

Testing the BD Alarm and High Voltage Shutdown

For additional information about the High Voltage Shutdown feature and test, consult the Galaxy controller product manual.

Testing the BD Alarm and High Voltage Shutdown	
Step	Action
1	Set the system load to 25 amperes.
2	Turn all rectifiers to STBY.
3	As the system voltage drops, observe that the BD alarm activates at the programmed BD threshold.
4	Turn ON a single rectifier after the BD activates. Observe that the BD retires as the system voltage rises above the BD threshold.
5	Turn ON the remaining rectifiers and increase the system load until all rectifiers have a minimum of 25 amps. Increase the system voltage to the HV level. (The HV factory default is 27.5V or 55.0V.) Verify that the rectifiers shut down.
6	Immediately after the rectifiers shut down, return the system to the float voltage. Verify that the rectifiers restart.

Galaxy SCF or Millennium Controller System Alarm Test

The Alarm Test provides a means of testing the operation of any or all of the system alarm relays and their wiring to the connected alarm system. The test cannot be performed if any alarms are active. In addition, Rectifier HVSD (High Voltage Shut Down) and RFA (Rectifier Fail Alarm) tests can be included. For additional information, consult the appropriate Galaxy controller product manual.

Galaxy SCF or Millennium Controller System Alarm Test	
Step	Action
1	Connect all office alarm wiring from the controller's office alarm terminal block to the office alarm monitoring system.
2	<p>Enable the Alarm Test feature.</p> <p>Note: Both the Galaxy SCF and Millennium controllers have factory hardware and software switches to enable the alarm test feature.</p> <p>a. Hardware:</p> <ul style="list-style-type: none"> • For the SCF controller, enable a DIP switch on the BJB board. • For the Millennium controller, enable a DIP switch on the BSH board. <p>b. Software:</p> <ul style="list-style-type: none"> • For both the SCF and Millennium controllers, use the following key sequence to get to the menu with the software switch: <p style="text-align: center;">Menu → Config → Alarm → TEST ALA : ON (H,S)</p>
3	<p>Once the Alarm Test feature has been enabled:</p> <ul style="list-style-type: none"> • For the SCF controller, press the "Alarm Test" switch on the BJB board to start the Alarm Test. • For the Millennium controller, use the front panel key sequence Menu → Maint Oper → Alarm Test → Enter to start the Alarm Test.

Connecting to Load

The system is ready to connect to equipment loads. Install or turn on load protectors when needed.

16 *Upgrading a GPS 4848 System to a GPS 4848/100 System*

A GPS 4848/100 system is capable of producing 10,000 amperes of dc power. Systems in the field can be upgraded to have this capability.

For a system to produce more than 4800 amperes, the following are required:

- Controller software version 7.1.0 (or later)
- BLJ3 1:3 (or later) terminal board in cabinets with IDs above 8
- BIC8 (or later) bay interface card in cabinets with IDs above 8
- 595A2 or 595B2 (or later) rectifiers for rectifier IDs above 24

To upgrade an existing system, replace parts as needed until the above requirements are met. Parts may be ordered from the H569-434 GPS 4848/100 Ordering Guide.

