Product Manual
H569-418

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Lucent Technologies
Battery Switch Bay

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

General

This product manual describes the H569-418 Battery Switch Bay which adds battery disconnects, boost charging and off-line equalization charging to new or existing Lineage® 2000 battery plants. The H569-418 Battery Switch Bay is shown in Figure 1-1. The bay accommodates up to five 1200 ampere or 2000 ampere switch and fuse panels and four optional control panels.

Battery Disconnect

Each switch and fuse panel provides a method for disconnecting a battery string from the battery plant and provides overcurrent protection to ensure safety in case of accidental short circuits.

Operations and maintenance personnel may need to isolate a battery string from the rectifiers and the load during emergencies or for routine maintenance procedures. Two typical maintenance procedures are boost charging and equalizing a battery string. Optional control panels on the Battery Switch Bay provide a method to recharge all strings in the battery plant quickly by boost charging and to equalize a battery string off-line.

Boost Charging

Battery strings normally float at 2.17 to 2.25 volts per cell times the number of cells in the string. For a 24-cell string, this equates to 52.08 to 54.00 volts. To recharge the cells quickly following an outage, the string may be raised to 57.0 volts, providing each cell with 2.375 volts. This increased voltage, called the **boost voltage**, causes the battery recharge current to remain at higher levels for a longer period of time, thereby forcing charge into the battery more quickly. Boost charging enables the battery string to be available more rapidly if another AC failure occurs shortly after the first outage.

In order to provide the boost feature, the rectifiers in the battery plant must have a Float/Boost switch for activating the boost locally and a potentiometer for adjusting the output boost voltage manually.

Battery String Equalization

Frequent discharging of batteries can cause a gradual spread in the distribution of the individual cell voltages of the string. The spread is called "dispersion" and can cause the cells with the lowest voltage in the string to become discharged to levels much lower than that of other cells in the string. Rectifiers provide the total string with a tightly regulated voltage, but do nothing to ensure balance between the individual cells in the string. If the cells with the lowest voltages are discharged too deeply, their voltages can actually reach zero and possibly reverse during discharge. Reversal will prevent proper recharging of the string and cause irreversible damage to the reversed cells.

A battery string is **equalized** by raising the string voltage to a very high level to ensure that the cell with the lowest voltage receives an adequate charge. Cell voltages as high as 2.70 volts are applied to the string to ensure that the cells with the lowest voltage are raised sufficiently to recharge to full capacity. The string voltage (24 cells x 2.70 volts/cell = 64.8 volts) is higher than the load will accept; therefore, the battery string must be isolated from the load before equalizing can be initiated. This is commonly referred to as "Off-Line Equalizing" (OLE) and is intended for flooded cell batteries only.

The OLE feature is compatible with the Galaxy, MCS, CCS, ECS-6U, or ECS-12U Lucent Technologies controllers and the 400 ampere ferroresonant rectifier (J85503C-3 or J85603C-2). The rectifier and each battery string are connected to the battery plant through the switches in the Battery Switch Bay. Each battery string and the rectifier may be switched to an off-line bus to equalize the battery string.

Documentation

This document (157-005-103) includes a general product description, basic features and options, ordering information, and installation information. It is part of a set of documentation developed to assist engineering and installation personnel. The following documents provide additional product information:

- H569-418 Battery Switch Bay Drawing
- ED83134-30 Switch and Fuse Assembly Drawings
- T-83207-30 Wiring Drawings
- SD-83207-01 Schematic Drawings

Features

The Battery Switch Bay provides the following features:

- The Battery Switch Bay distributes and switches either +/- 24 volt dc or 48 volt dc power.
- A maximum of five ED83134-30 switch and fuse panels can be configured in a single bay.
- An Alarm and Interlock Panel option monitors up to six ED83134-30 panels to provide alarms and to ensure that no more than one battery string is disconnected from the plant at any time.
- Boost Charge and Off-Line Equalize options simplify battery maintenance and reduce charging time for flooded batteries.
- The Battery Switch Bay provides front access to fuses and switches.
- Each switch and fuse unit has individual indicating fuses. Audible alarm and fuse alarm LED are available with Alarm and Interlock Panel option.
- The transparent cover guards against accidental contact with hazardous voltages while allowing clear view of the unit.
- 50 mV shunts in each unit monitors current.
- The Battery Switch Bay provides remote and local indication of switch status.
- Rear access cabling accommodates up to 24 (8 per terminal) 750 MCM conductors to each switch.

Technical Support

Technical support for Lucent Technologies equipment is available to customers around the world.

USA, Canada, Puerto Rico, and the US Virgin Islands

On a post-sale basis, **during the Product Warranty period,** our Technical Support telephone number 1-800-CAL RTAC (1-800-225-7822) provides coverage during normal business hours. Product Specialists are available to answer your technical questions and assist in troubleshooting problems. For out-of-hours EMERGENCIES, the 800 number will put you in touch with a Regional Technical Assistance Center Engineer via our 24 hour a day, 7 day per week Help Desk.

When Technical Support is required in **the Post-Warranty Period**, the service may be billable unless you hold an extended warranty or contractual agreement.

Central and South America

If you need product technical support, contact your local Field Support/Regional Technical Assistance Center or contact your sales representative who will be happy to discuss your specific needs.

Europe, Middle East, and Africa

If you need product technical support, contact your local Field Support/Regional Technical Assistance Center or contact your sales representative who will be happy to discuss your specific needs.

Asia Pacific Region

If you need product technical support, contact your local Field Support/Regional Technical Assistance Center or contact your sales representative who will be happy to discuss your specific needs.

Product Repair and Return

Repair and return service for Lucent Technologies equipment is available to customers around the world.

USA, Canada, Puerto Rico, and the US Virgin Islands

For information on returning of products for repair, customers may call 1-800-255-1402 for assistance.

Central and South America

If you need to return a product for repair, your sales representative will be happy to discuss your individual situation.

Europe, Middle East, and Africa

If you need to return a product for repair, your sales representative will be happy to discuss your individual situation.

Asia Pacific Region

If you need to return a product for repair, your sales representative will be happy to discuss your individual situation.

Customer Service

For customer service, any other product or service information, or for additional copies of this manual or other Lucent Technologies documents, call 1-800-THE-1PWR (1-800-843-1797). Specify the select code number for manuals, or drawing number for drawings. Contact your regional customer service organization or sales representative for information regarding spare parts.

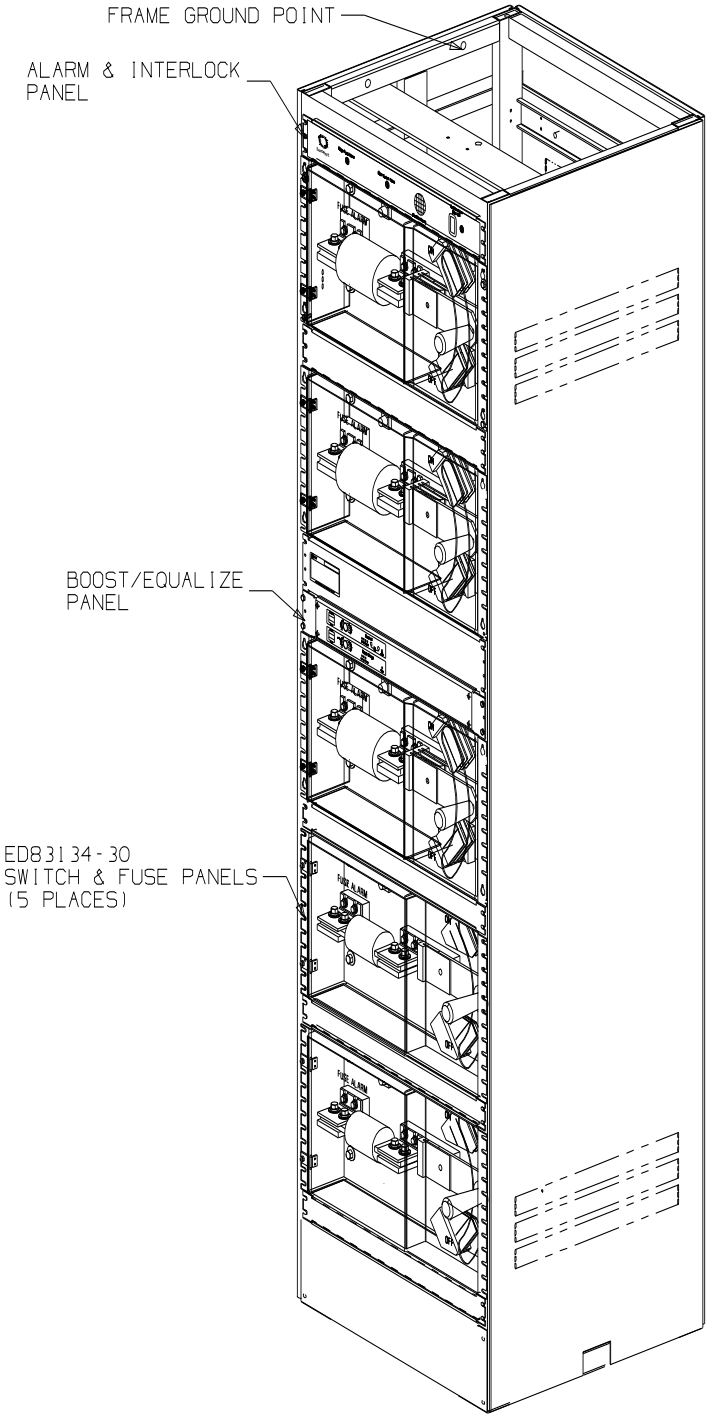


Figure 1-1: Battery Switch Bay (H569-418)

2 Ordering

Ordering Information

The Battery Switch Bay is ordered using the Group (G) numbers on the H569-418 drawing. Group 1 is the main group that provides the framework, anchor bolts, removable rear cover, and space for up to five switch and fuse panels. The remaining groups are supplementary groups that can be ordered in addition to the main group to customize the bay to meet your specific requirements. Section 3 describes each group.

Each group can be ordered separately or as "Equipped With" (E/W) items. This means that they are ordered in addition to the main group and will be installed at the factory. If these groups are ordered as separate items, they will be shipped to you in separate containers to be assembled during installation.

Table 2-A provides a summary of the H569-418 Group structure.

Table 2-A: Ordering Information for H569-418 Battery Switch Bay

Description	Group
Provides a 86.6 x 23.62 x 25.31 inch cabinet equipped with removable rear cover See notes 4, 8.	1
Provides one removable side cover for the cabinet See note 11.	10
Provides one 1200 ampere switch and fuse unit (ED83134-30 Group 1) See note 7.	A

Table 2-A: Ordering Information for H569-418 Battery Switch Bay

Provides one 2000 ampere switch and fuse unit (ED83134-30 Group 2) See note 7.	B
Same as Group B but equipped with safety interlock feature (ED83134-30 Group 3) See notes 5, 7.	C
Provides an Alarm and Interlock Panel (AIP) (-48 volt applications) See note 5.	D
Provides a Boost Charge Panel See note 6.	E
Provides a Boost Charge equipped with off-line Equalize Panel and an off-line Equalize Bus (-48 volt applications) See notes 6, 9.	F
Provides an off-line Equalize Panel and an off-line Equalize Bus (-48 volt applications) See notes 6, 9.	G
Provides two 6" blank panels to mount in unoccupied switch positions See note 4.	H
Equipment in addition to Group A, B, or C to provide one 600 amp dc fuse See note 2.	J
Equipment in addition to Group A, B, or C to provide one 800 amp dc fuse See note 2.	K
Equipment in addition to Group A, B or C to provide one 1000 amp dc fuse See note 2.	L
Equipment in addition to Group A, B or C to provide one 1200 amp dc fuse See note 2.	M

Table 2-A: Ordering Information for H569-418 Battery Switch Bay

Equipment in addition to Group B or C to provide one 1500 amp dc fuse See note 2.	N
Equipment in addition to Group B or C to provide one 1600 amp dc fuse See note 2.	P
Equipment in addition to Group B or C to provide one 2000 amp dc fuse See note 2.	Q

Notes:

1. The maximum, input current for the switch and fuse unit shall be 1200 amperes for group A and 2000 amperes for groups B and C.
2. Engineer shall order DC rated fuses from groups J through Q. One fuse is required for each group A, B, or C ordered. Order fuse with each panel as shown in note 8. Spare fuses should be ordered by comcode as shown in Table 2-B. Engineer shall order spare indicating fuses per 100203389.

Table 2-B: Spare Fuses

Comcode	Fuse Size (amperes)
407146109	600
407189711	800
407146117	1000
407146125	1200
407146133	1500
407146141	1600
407146158	2000

3. Engineer shall furnish all terminal lugs and mounting hardware for connecting to the input and output bus of each switch and fuse panel. See Table 2-C. Other terminal lugs or M10 metric hardware may be substituted. Hole pattern on each bus is 0.420 inch on 1.00 inch centers.

Table 2-C: Terminal Lugs and Mounting Hardware

Recommended Double Hole Terminal Lugs for Terminating to Input and Output Bus Bars						
KS-5482 Wire	**KS-20921 Wire**	**WP-91412 List**	**Comcode**	**Bolt Size**	**Centers**	**Die**
4/0	-	59	405348251	0.375	1.0	purple
-	4/0	27	405347923	0.375	1.0	yellow
350	-	61	405348277	0.375	1.0	red
-	350	86	406021915	0.375	1.0	
500	-	63	405348293	0.375	1.0	brown
-	500	165	406434241	0.375	1.0	pink
750	-	135	406335141	0.375	1.0	black
-	750	170	406434290	0.375	1.0	yellow
Recommended Mounting Hardware						
Bolt Size	**Comcode**	**Qty**	**Description**			
0.375	801472846	2	Screw, HHC.375-16 X 1.25			
0.375	814251898	4	Washer, pln			
0.375	801829607	2	Washer, spg			
0.375	841064777	2	Nut, hex			

4. The group 1 cabinet has five positions for mounting group A, B, or C panels. Group H provides cover panels that should be ordered for each unoccupied position to prevent exposure to high current bus bars and cables.

5. Group D provides audible and visible alarms for fuse failures or operated switches on Group A, B, or C panels. It also provides a panel interlock circuit to prevent more than one group C switch from being operated at the same time. Group D monitors up to six switch and fuse panels.

6. Only one boost charge panel (group E) or one equalize panel may be ordered per bay (group G). If both features are required, order one group F.

7. One group 1 cabinet accommodates a combination of up to five group A, B, or C panels. Unless otherwise specified, panels will be mounted from the top position down with group C panels mounted above group A or B panels, Group B panels mounted above group A panels and common panels with larger fuses mounted above panels with smaller fuses.

8. The battery switch bay should be ordered as H569-418 group 1 equipped with (E/W) supplementary groups. A sample order for a switch bay containing (2) side covers,

(2) 1200 ampere switches, (1) 2000 ampere switch, (2) sets of blank covers, (1) alarm panel, (1) boost charge panel equipped with off-line equalize, (2) 1200 ampere fuses and (1) 2000 ampere fuse would be formatted as follows:

Item	Qty	Description
1	1	H569-418 G-1 -48V Battery Switch Bay E/W
	2	G-10
	2	G-A
	2	G-M
	1	G-B
	1	G-Q
	2	G-H
	1	G-D
	1	G-F

9. When the off-line equalize feature is ordered per group F or G, the engineer must order control cables to connect the equalize panel to a ferroresonant rectifier and controller.

Table 2-D: Off-Line Equalize Control Cables

Rectifier	**Code**	**Cable**
400A, 60 Hz	J85503C-3	H285-226 L-57 **H285-226 L-65
400A, 50 Hz	*J85603C-2	H285-226 L-57 **H285-226 L-65
Controller	**Code**	**Cable**
Galaxy	J85501F-1	H285-226 L-66
MCS	J85501A-2	H285-226 L-59
CCS	J85501A-3	H285-226 L-59
ECS-6U	J85501E-1	H285-226 L-58
ECS-12U	J85501E-2	H285-226 L-58

Note: Cable length must be specified for each cable ordered.

* The J85603C-2 rectifier requires a 330C interface board (comcode 107199192) and a 208F1 control board (comcode 107199184) for the OLE to work properly. Ensure that these boards are present in the 400 ampere, 50Hz rectifiers used with the OLE feature. If missing, order them using the comcodes listed above.

**When paired with Galaxy controller.

10. To order group D, E, F, or G separately, order by comcode.

Table 2-E: Comcodes for Groups D through G

Unit	Group	Comcode
Alarm and Interlock Panel	D	407238476
Boost Charge Panel	E	407211861
Boost Charge and Equalize Panel	F	407211879
Equalize Panel	G	407211911

11. Group 1 provides a rear cover for the cabinet. To enclose the cabinet completely, order two side covers. Each group 10 provides one side cover. If multiple cabinets are positioned side by side, side covers between bays are not required.

3 Product Description

General

The H569-418 Battery Switch Bay consists of 1200 ampere and 2000 ampere switch and fuse panels and optional control panels. The specific application determines the combination of panels in a system. This section describes the components of the Battery Switch Bay and their functions.

Switch and Fuse Panels

Group A, B and C panels are the basic switch and fuse units. Each one supports different functions. All three panels include the following:

- Limit switches
- An indicator fuse
- A shunt
- A manual two-pole switch

Limit switches monitor the on-line/off-line status of each switch. An indicating fuse monitors the status of the main fuse. A terminal strip located on the rear of the panel provides access to the status signals for remote monitoring and local alarming. All connections for cabling and monitoring are made from the rear of the panel.

The Group A and B panels are identical except for the ampacity of the conducting components. The Group A panel is rated for 1200 amps and accepts fuses from 600 amperes to 1200 amperes. The Group B and C panels are rated for 2000 amperes and accept fuses up to 2000 amperes.

The Group C panel, however, has an extra feature which provides an automatic electromechanical stop that prevents the switch from being opened under certain conditions.

Alarm and Interlock Panel

Group D on the Battery Switch Bay is an Alarm and Interlock Panel (AIP). The AIP, shown in Figure 3-1, is used with Group A, B, or C panels to provide the audible and visible office alarms listed below.

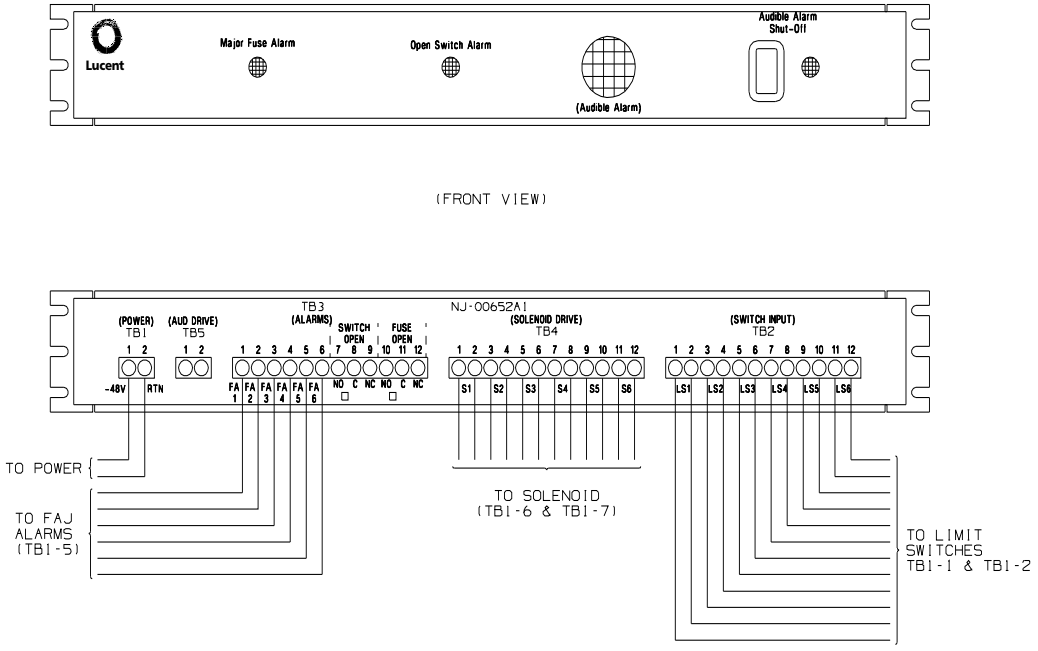


Figure 3-1: Alarm and Interlock Panel (Group D)

AIP Indications

- The fuse alarm indicator is a red LED labeled “Major Fuse Alarm” and lights when a fuse has operated.
- The open switch alarm Indicator is a yellow light labeled “Open Switch Alarm” and lights when a switch has operated.
- The audible buzzer indicates that a major fuse alarm or an open switch alarm has occurred.
- The audible buzzer shut-off switch disables the buzzer and lights a yellow LED labeled “Audible Alarm Shut-off.”

In addition, when the AIP is used with Group C panels, it prevents more than one battery string from being disconnected from the plant bus at any given time, thus ensuring the availability of dc reserve power. The AIP is located at the top of the frame and receives input signals from the limit switches in the Group C panels. When it senses that a switch is open, it sends a signal to the remaining Group C panels to activate the locks. A minor switch open alarm is issued, and visible and audible indicators remind the operator to close the switch. Each Group C panel has an override momentary switch that releases the lock in emergency situations.

Boost Charge Panel

The H569-418 Group E is the stand alone boost charge panel (BCP). Boost charging is a system feature since the load and all batteries see the boost charge voltage. The BCP activates the equalize mode of the rectifiers through the plant controller to reduce battery charging time after a discharge.

The BCP may be operated in a manual, timed manual or automatic mode. In the manual modes, the operator selects the duration of the boost charge and activates the system. When the time period has elapsed, the BCP signals the controller to return the rectifiers to float mode. For the automatic mode, the BCP monitors the plant controller for a battery on discharge (BD) status. The BCP times the BD period and activates the equalize mode depending on the length of the BD. Again, the system returns to the float mode after the specified boost period.

Boost Charge Unit Feature Summary

- The BCP operates with the Galaxy, CCS, MCS, or ECS family of Lucent Technologies controllers, the 400 ampere ferroresonant rectifier and all switch mode rectifiers.
- The BCP has the ability to accept a Reserve On-Line signal (RO) from the engine and prevent the rectifiers from operating in the boost mode while the battery plant is on engine.
- The BCP has the ability to accept both the Power Minor (PMN) and Power Major (PMJ) alarms and prevent the rectifiers from operation in the boost mode.
- Failure of the BCP will disable the boost feature. If the unit is in the boost charge mode when it fails, it will force all rectifiers back to “float.”

- Boost charge can be initiated either by automatic or manual means. The operational parameters of the panel can be set on the unit.

Front Panel Indications

- A yellow LED labeled “Bst” lights whenever the BCP sends the signal for the plant to go into the boost mode.
- A green LED labeled “NORMAL” lights whenever the BCP is either in the boost mode or the float mode.
- A red LED labeled “Fail” lights when the BCP has failed. When the red LED is lit, the green LED is not.

Front Panel Switches

- A three-position, momentary switch when operated will place the plant in either the float or boost mode.
- A twelve-position rotary switch labeled “Boost Time (Hours)” performs the manual and timed boost functions.

Programming Switches

- A four-position DIP switch, labeled “Option,” is located on the rear of the unit. Positioning the first DIP switch in the “ON” position disables the auto-boost function. For the auto-boost mode, this switch must be in the “OFF” position. Positioning the second DIP switch in the “ON” position allows for +24 volt boost charge operation. The other two positions are not used.
- An eight-position DIP switch labeled “Constant” is located on the rear of the unit. Placing a single switch in the “ON” position will set “N” to the corresponding number for the following algorithm: For example, if DIP switch 6 is on, the boost time will be six times as long as the period during which the batteries were on discharge.

  BOOST TIME = (BD TIME) x N

  where N= 1, 2, 3, 4, 5, 6, 7, or 8

Input Signals and Output Signals

The BCP has three connectorized, screw down terminal blocks located in the back of the unit.

- Terminal TB1 is for the input power.

- Terminal TB2 is for the input signals; Battery on Discharge (BD), Power Minor (PMN), and Power Major (PMJ) alarms and Reserve On-Line (RO) status.
- Terminal TB3 is for the output signals listed below:
  - BCP fail alarm (Galaxy/MCS/CCS
  - BCP fail alarm (ECS
  - BCP boost status
  - BCP ON (ECS
  - BCP OFF (ECS
  - BCP ON-OFF (Galaxy/MCS/CCS)

Off-Line Equalize Panel

The H569-418 Group G is a stand alone off-line equalize (OLE) panel for ferroresonant type rectifiers. The OLE monitors the battery switches and a designated off-line charging rectifier switch for off-line indicators. Once the OLE determines that the battery and rectifier are ready, the OLE assumes control of the rectifier and activates the equalize mode. The OLE returns the rectifier to the float mode after the selected time has elapsed. The operator reconnects the battery and the rectifier to the plant bus and the plant controller resumes control of the rectifier. The plant controller still receives any alarms from the rectifier during the process.

Off-line equalize requires communication among the plant controller, the rectifiers and the Battery Switch Bay. To provide off-line equalize, at least one rectifier must be connected through a Group A or B panel so that it can be switched from the plant bus to the equalize bus as necessary. All battery strings must be connected through a Group A, B or C panel. The type of panel is selected based on the ampere-hour capacity of the battery and the features desired. The equalize bus is created by connecting the off-line terminal posts of the panels together with cable of the appropriate size. When the rectifier and a battery string are switched to the off-line position, the OLE is activated.

Equalize Panel Features

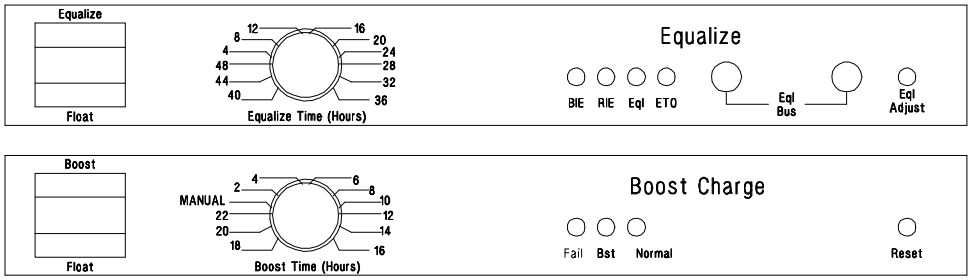
- The equalize panel will operate with the Galaxy, CCS, MCS, ECS-6U, or ECS-12U Lucent Technologies controllers and the J85603C-2 or J85503C-3 400 Ampere Ferro Rectifiers.

- The equalize function can only be initiated if the battery string and the designated rectifier have been isolated from the load.
- The equalize panel is used to interface the controller to the designated equalize rectifier in the plant. As such, the equalize panel will:
  1. Provide the rectifier with a voltage, via the remote sense leads, to allow the rectifier output to increase to the desired equalize voltage.
  2. Manage the signal flow between the rectifier and the controller during the equalize period.
  3. Time the equalize period.
  4. Provide equalize control and status to the field maintenance personnel.

Front Panel Indicators

- A yellow LED labeled “BIE” (Battery In Equalize) indicates that a battery string has been placed “off line” and is ready for Off-Line Equalization.
- A yellow LED labeled “RIE” (Rectifier In Equalize) indicates that the designated rectifier of the plant has been taken off line and is available for equalize charging of the battery string in BIE.
- A yellow LED labeled “Eql” indicates that a string of batteries is being equalized via the designated equalize rectifier of the plant.
- A yellow LED labeled “ETO” indicates that a battery string was placed in the equalize mode for a specific time period and that time period has expired. That battery string can now be placed back on line and another string equalized or the rectifier can be placed back into “normal” service.

The H569-418 Group F is a combination of the BCP and the OLE. It provides all of the features and functions of the individual panels into a single panel. The panel is shown in Figure 3-2.



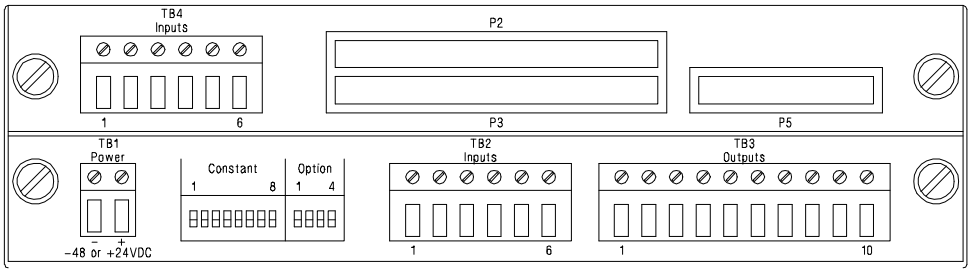


Figure 3-2: Boost Charge E/W OLE Panel (Group F)

4 Installation

General

This section outlines a sequence for installing a Battery Switch Bay and a sequence for testing the integrity of the installation.

Installation Tools and Hardware

You will need the following tools and hardware to install the H569-418 Battery Switch Bay:

- Material handling equipment to unload cabinet at site, remove from shipping container, and set in final position Minimum lifting capacity: 900 lb (410 kg)
- Drill to bore 18 mm holes for floor anchors (12 mm anchors provided)
- Cable racks and associated hardware
- Input and output cables and terminal lugs
- Crimping tools and dies for connectors
- Hand tools: 1/8 inch flat-blade screw driver, wire cutters and stripper, sockets and torque wrenches (8mm, 9/16 inch or 17mm, 13mm, and 19mm), and a crowbar
- M10 or 3/8 inch bolts, washers, lockwashers and nuts for connecting terminal lugs to bus bars
- Digital multimeter (DMM)
- Control cables for connecting off-line equalize panel to 400A rectifier and to the plant controller
- 18 and 22 gauge stranded wire for connecting input and output wiring to control panels

Frame Installation and Ground

Figure 4-1 shows the cabinet footprint. The cabinet is 25.31" (643 mm) wide and 23.62" (600 mm) deep. It has four 0.75 inch by 1.00 inch holes for anchoring it to concrete floors. The H569-418 is shipped with four 12 mm, heavy duty anchors with torque cap bolts and hold-down washers. Figure 4-2 shows the typical floor mounting detail for concrete floors. Other types of floor construction may require other mounting methods

1. Using an 18 mm drill bit, drill anchor holes 4 inches (102mm) deep.
2. Locate cabinet in position using four anchor bolts and hold-down washers.
3. Torque anchors to a maximum of 60 ft-lbs (86.4 Nm) using a 19 mm wrench or socket
4. The next step is to ground the cabinet framework. Local grounding practices will determine what type of grounding method is used and the size of the cable connected to the cabinet. Figure 1-1 shows the location of this connection. Use an M8 bolt and a single-hole terminal lug for this connection.

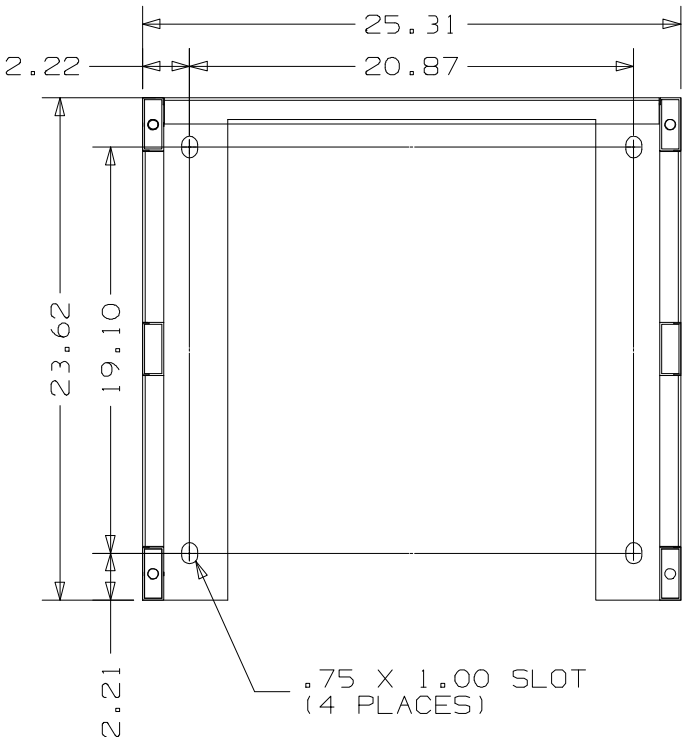


Figure 4-1: Cabinet Footprint

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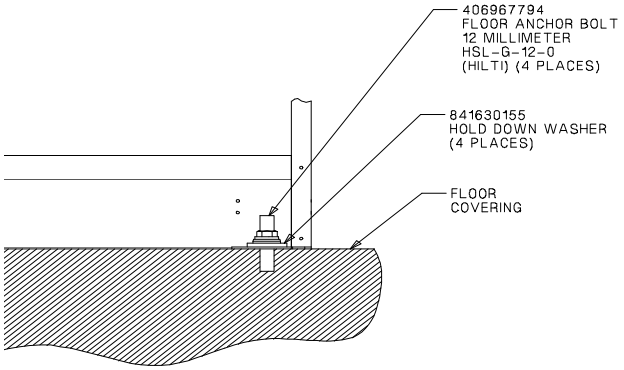

Figure 4-2: Floor Mounting Detail

Switch and Fuse Panel Wiring

Switch and Fuse Panels

Figure 4-3 shows the 1200 ampere switch and fuse panel. Each panel includes a main fuse, an indicating fuse, a shunt, a manual two-pole switch and two microswitches that signal whether the switch is in the ON or OFF position.

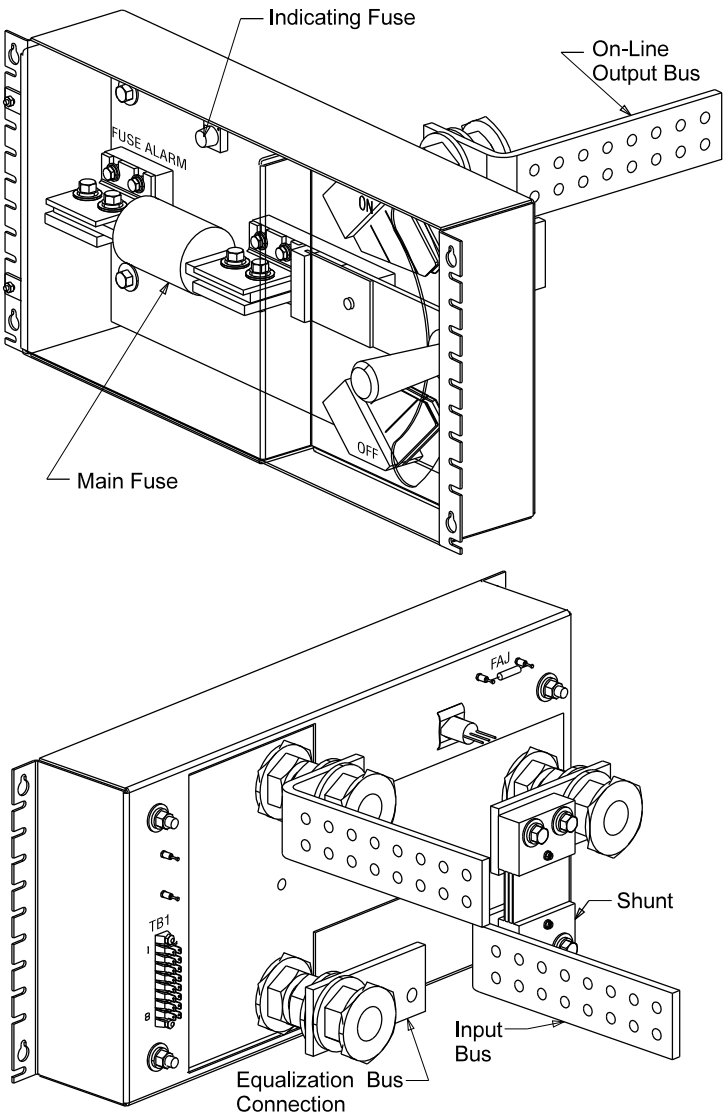

Figure 4-3: 1200A Switch and Fuse Panel

The microswitches provide a contact closure when the switch is moved from the ON position to the OFF position. Terminal block (TB1) provides access to these signals.

An indicating alarm fuse monitors the status of the main fuse. If the main fuse operates, the indicating fuse also operates, sending an alarm signal through a current limiting resistor to terminal TB1-5. Replacement fuse comcodes are listed in Section 2.

Shunt

Each panel has a current monitoring shunt on the input bus of the switch. The shunt ratings are either 1200 ampere or 2000 ampere at 50 millivolts. The millivolt signal is measured at two screw terminal connectors on the shunt. 18 gauge wire should be used to connect these shunt leads to the monitoring equipment.

Interlock Feature

H569-418 Group C provides a switch and fuse panel per ED83134-30 Group 3. These panels have an additional feature which allows only one switch in a cabinet to be operated at a time. An override switch on each panel releases the lock in emergencies. The panel locks may only be activated by using the optional Alarm and Interlock Panel. This panel is described in paragraph "Alarm and Interlock Panel Wiring and Test."

TB1 Terminal Strip

The following table summarizes the connections on the TB1 terminal strip.

Table 4-A: TB1 Connections

TB1 Pin	Function
1 2	Signal that switch is not in ON position
3 4	Signal that switch is in OFF position
5	Fuse alarm signal
6 7	Signal from AIP to activate locks

The terminals on TB1 accept 1/4 inch FASTON receptacles (comcode 901143479; AMP part number 2-520184-2). All wiring from the terminal block should be 18 to 22 gauge wire. If the AIP is ordered as part of the Battery Switch Bay, connections between TB1 and the AIP will be factory wired.

If these signals will be monitored by an external monitoring system, connect the TB1-5 terminal of each panel in the cabinet and run a single lead to the monitoring equipment to indicate fuse alarms. Likewise, connect all TB1-1 terminals together and all TB1-2 terminals together. Run a single set of leads to the monitoring equipment for an open switch indication.

Input/Output Bus Bars

Each battery string is connected to the battery plant through a switch and fuse panel. Connect cable from the battery string to the input bus and from the top (ON) output bus to the battery plant. The specific application determines the size and number of cables. Table 2-C lists terminal lugs and mounting hardware for these connections. The bus bars are sized for the following maximum number of terminal lugs mounted back to back.

Table 4-B: Number of Terminal Lugs

Switch Size	Cable Size	
	4/0	750 MCM
1200A	16 lugs	8 lugs
2000A	20 lugs	12 lugs

The terminal lugs are double-hole on 1 inch centers. M10 hardware may be substituted for 3/8 inch hardware as required. Torque all connections to 240 in-lbs (29 Nm) using 9/16 inch or 17 mm wrench or socket.

Alarm and Interlock Panel Wiring and Test

The Alarm and Interlock Panel (AIP) is factory wired to each switch and fuse panel in the cabinet.

Input Power

The AIP does not contain internal fusing. Therefore, input power to the AIP must be provided via a miscellaneous fuse panel.

CAUTION

The input power is polarity sensitive. Determine the polarity of the power leads prior to connecting input power to the unit.

Connect the “battery” (-) lead to TB1-1. Connect the return lead to TB1-2. The input fuse shall have a rating no greater than 1.33 amperes.

Auxiliary Buzzer Input

The AIP has a continuous audible buzzer which indicates the presence of a major fuse alarm or an open switch alarm. This buzzer may be used for other external alarms by connecting an external isolated contact closure to the auxiliary buzzer input at TB5.

External Alarms The AIP provides two form-C contact closures for external alarms. One closure indicates when a switch has been opened; the second, that a battery fuse has cleared. TB3 provides access to these contacts on pins 7-9 and 10-12, respectively.

Test The following is a step-by-step test procedure for the AIP:

1. Move battery switch associated with battery string #1 to the OFF position and verify the following:
   a. Open Switch Alarm Indicator LED is illuminated.
   b. Audible Alarm Buzzer provides audible indication of alarm.
   c. Solenoid Interlocks are activated. (Group C panels only)
2. Move battery switch #1 back to the ON position. (For Group C panel applications, push the emergency override push-button before activating the switch.) Verify the following:
   a. Open Switch Alarm Indicator LED is extinguished.
   b. Audible Alarm Buzzer is deactivated.
   c. Solenoid Interlocks are retracted. (Group C panels only)
3. Repeat Steps 1 and 2 for all remaining battery switches in the bay.
4. Insert a blown indicating fuse into the battery switch associated with battery string #1 and verify the following:
   a. Major Fuse Alarm Indicator LED is illuminated
   b. Audible Alarm Buzzer provides audible indication of alarm
5. Replace blown fuse with a good fuse and verify the following:
   a. Major Fuse Alarm Indicator LED is extinguished
   b. Audible Alarm Buzzer is deactivated
6. Repeat Steps 4 and 5 for all remaining battery switches in the bay.
7. Perform Step 1. Push Audible Alarm Shut-Off push-button and verify the following:

a. Audible Alarm Buzzer is deactivated

b. Audible Alarm Shut-Off LED is illuminated

8. Perform Step 2 and verify the following:

   a. Audible Alarm Shut-Off LED is extinguished.

Boost Charge Panel Wiring and Test

Traditionally, Lucent Technologies has used the term "equalize" where others, particularly in international markets, have used the term "boost." Therefore, to avoid confusion, when the boost charge feature is ordered, labels (comcode 847467305) are provided to change designations on the rectifiers and ECS controllers as follow:

Table 4-C: Labels

Unit	From	To
Float/Equalize Switch	FLT/EQ	FLT/Bst
Potentiometer	Equal Adj	Bst Adj
ECS Control panel LEDs	Eq	Bst

Set the boost voltage on each rectifier. Use the "Bst Adj" potentiometer on each rectifier to set the voltage per the plant requirement (normally 2.0 volts above the float voltage).

Frame Ground

The BCP must be connected to frame ground to function properly.

1. Connect the frame ground by attaching an 18 gauge wire to the #8 stud on the rear of the mounting plate. Use the star lock washer between the lug and the mounting plate.
2. Connect the other end to the frame using a star lock washer between the lug and the frame. Frame ground may be connected at the factory.

When wiring the BCP, connect alarm leads to the BCP before connecting them to alarm-generating equipment. All wiring from the controller should be 22 gauge minimum and routed inside wire ducts to the BCP.

RO Alarm Connections

The following table shows alarm input connections for Reserve On-Line (RO) alarms (if supplied). An engine generates this type of alarm which prevents the rectifier from operating in the boost charge mode while the battery plant is on engine reserve. The specific alarm connection depends upon the engine being used.

Table 4-D: Reserve On-Line (RO) Alarm Connections

Number of Leads	Lead	BCP
1	Battery (-)	TB2-6
1	RTN (+)	TB2-5
2	Isolated Relay Contacts	TB2-6 TB2-5

PMJ and PMN Alarms from MCS/CCS

Both the MCS and CCS controllers require internal strapping in order for the BCP to register both Power Major (PMJ) and Power Minor (PMN) alarms. These strapping options are listed in the table below.

Table 4-E: MCS/CCS Strapping Options for PMJ and PMN Alarms

Alarm	From	Designation	To	Designation
PMJ	TB1-38	PMJR	TB1-21	ABS0
PMN	TB2-3	DG from E6	TB1-34	PMNR

PMJ and PMN connections between the MCS or CCS controller and the BCP are shown in the table below.

Table 4-F: MCS/CCS Connections to the BCP for PMJ and PMN Alarms

Alarm	Lead	MCS/CCS	BCP
PMJ	Battery (-)	TB1-37	TB2-4
PMN	RTN (+)	TB1-33	TB2-3

PMJ and PMN Alarms from ECS

The ECS controller also requires internal strapping in order for the BCP to register both Power Major (PMJ) and Power Minor (PMN) alarms. These strapping options are shown in the table below.

Table 4-G: ECS Strapping Options for PMJ and PMN Alarms

Alarm	From	To
PMJ	TB104-5	-48V batt
PMN	TB103-5	Disch Grd

PMJ and PMN connections between the ECS controller and the BCP are shown in the table below.

Table 4-H: ECS Connections to the BCP for PMJ and PMN Alarms

Alarm	Lead	ECS	BCP
PMJ	Battery (-)	TB104-6	TB2-4
PMN	RTN (+)	TB103-6	TB2-3

BD Alarm Connections

Battery on Discharge (BD) alarm connections between the Galaxy, MCS, CCS, or ECS controller and the BCP are shown in the table below.

Table 4-I: Controller Connections to the BCP for BD Alarm

Controller	Lead	Connection	BCP
Galaxy, MCS, or CCS	RTN (+)	TB1-28	TB2-1
ECS	RTN (+)	TB102-3	TB2-1

Output Signals

Relay contacts provide the boost charge output signals for the Galaxy, MCS, CCS, and ECS controllers.

Table 4-J: BCP Output Connections for MCS or CCS

Output Signal	BCP	MCS/CCS
BCP Fail	TB3-1	TB1-20
Boost Charge Signal	TB3-3 and TB3-4	TB1-3 and TB1-4
To Remote Monitor	TB3-9 and TB3-10	To Remote Monitor

Table 4-K: BCP Output Connections for ECS

Output Signal	BCP	ECS
BCP Fail	TB3-2	TB101-5
Boost Charge Start	TB3-5 and TB3-6	TB101-6 and TB101-2
Boost Charge Stop	TB3-7 and TB3-8	TB101-7 and TB101-2
To Remote Monitor	TB3-9 and TB3-10	To Remote Monitor

The points TB3-9 and 10 on the BCP are used to provide a BCP status signal to an external monitoring system. If the contacts are open, the BCP is in "float;" if the contacts are closed, the BCP is in "Boost."

Input Power

The BCP does not contain internal fusing. Therefore, input power must be provided via a miscellaneous fuse panel.

CAUTION

The input power is polarity sensitive. Determine the polarity of the power leads prior to connecting input power to the unit.

Table 4-L: BCP Input Power

-48V	Battery (-)	TB1-1
	RTN (+)	TB1-2
+24V	Battery (+)	TB1-2
	RTN (-)	TB1-1

The input fuse shall be rated 1.33 amperes maximum. For + 24 volt operation, set the second DIP switch, labeled "OPTION," on the four-position DIP switch to the "ON" position.

Note

The 24V option is not available with the H569-418 Group F OLE/BCP.

BCP Installation Check

Follow the procedure below to verify installation of the Boost Charge Panel (BCP).

1. Set the OPTION switch SW1 to OFF, if the CONSTANT switch is to be set.
2. Set the CONSTANT switch (N in the boost charge equation in Section 3) to a number between 1 and 8.
3. Ensure that the "Boost Time" switch is in the MANUAL position.
4. Depress the RESET switch. **WAIT 10 seconds before continuing.**
5. After 10 seconds, place the "Boost/Float" switch into the "boost" position and release. The following should happen:
   a. The "Boost" (yellow) LED will light.
   b. On the plant controller, the plant voltage reading should increase to the predetermined boost level.
6. Depress the "Boost/Float" switch to the FLOAT position and release. The "Boost" LED should extinguish.

If these things don't happen, review connections.

Off-Line Equalize Panel Wiring and Test

You will need to designate one switch and fuse panel as the rectifier equalize switch. The remaining switches are for the battery strings. Figure 4-4 shows a diagram of all the required connections.

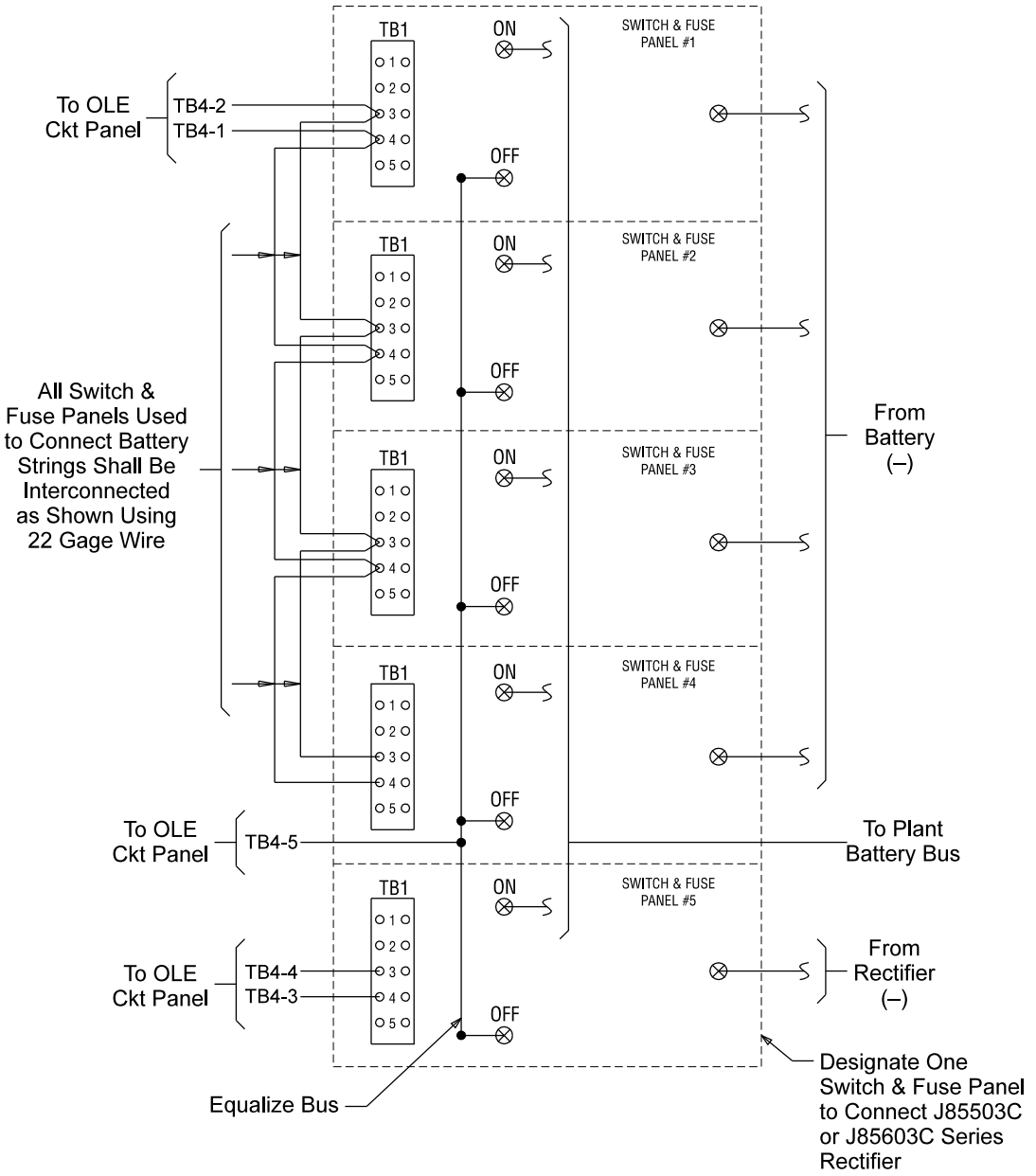

Figure 4-4: Switch and Fuse Panel Wiring for OLE

Equalization (OLE) Panel Set Up

Using the wire set provided (comcode 847542248), connect all TB1-3 together and all TB1-4 together on battery string switch and fuse panels as shown. Connect TB1-3 and TB1-4 from one battery string switch and fuse panel to the OLE. Then connect TB1-3 and TB1-4 from the rectifier switch and fuse panel to the OLE. Finally, make the connection between the equalize bus bar and the OLE.

Frame Ground

The OLE must be connected to frame ground to function properly.

1. Connect the frame ground by attaching an 18 gauge wire to the #8 stud on the rear of the mounting plate. Use the star lock washer between the lug and the mounting plate.
2. Connect the other end to the frame using a star lock washer between the lug and the frame. Frame ground may be connected at the factory.

When wiring the OLE, connect alarm leads to the OLE before connecting them to alarm-generating equipment. All wiring from the controller should be 22 gauge minimum and routed inside wire ducts to the OLE.

Wiring

The OLE panel works only with -48V systems. It will operate with the Galaxy, CCS, MCS, ECS-6U, or ECS-12U controllers and the J85603C-2 and J85503C-3 400 ampere ferroresonant rectifiers. Control cables to the controller and rectifier are described in Section 2.

A summary of OLE input connections is shown in the table below.

Table 4-M: OLE Panel Connections

From	To	Designation
P2	Galaxy, MCS,CCS, ECS-6U, ECS-12U	Controller Interface Cable
P3 and P5	400A ferroresonant rectifier	Rectifier Control Cable
TB4-1 and TB4-2	TB1-3 and TB1-4 First battery switch	Battery in Equalize (BIE)
TB4-3 and TB4-4	TB1-3 and TB1-4 Rectifier Switch	Rectifier in Equalize (RIE)
*TB4-5	Equalize Bus	(-) Rectifier Sense
*TB4-6	Charge Return Bus of Plant	(+) Rectifier Sense
CAUTION: These sense leads are polarity sensitive. Determine the polarity of the power leads prior to connecting the unit.		

Connections to TB4 should be 22 gauge (minimum). TB4-5 and 4-6 provide the rectifier with a voltage via the remote sense leads to allow the rectifier output to increase to the desired equalize voltage. The other signals on TB4 indicate that the battery string and rectifier are connected.

400A Rectifier Set-Up

The rectifier control cables from the OLE panel to the 400 ampere rectifier are cables with a 40-pin and a 16-pin connector (see Table 2-D). These connectors terminate on P5A and P12A of the CM4 (330C) interface board inside the rectifier door. (See Figure 4-5.) The H285-226 L57 cable 16-pin connector has two flying leads labeled E13 and E14. These leads are connected on the CM2 (208F1) control board. **These cables do not require any modification.**

Set DIP switches S1.1 and S1.2 on the 329A fuse board to O (open).

CAUTION

With the S1.1 and S1.2 set to O, the rectifier's internal sense is disabled. Do not operate rectifier without control cables connected.

If your battery plant is equipped with J85603C-2 400 ampere, 50 Hz rectifiers, verify that the rectifier is equipped with a 330C interface board (comcode 107199192) and a 208F1 control board (comcode 107199184). If not order them and install these two boards in order for the equalize feature to work properly.

Set DIP switch S2.9 and S2.10 on CM2 control board to O(open) to regulate the voltage at the output terminals of the rectifier (local sense).

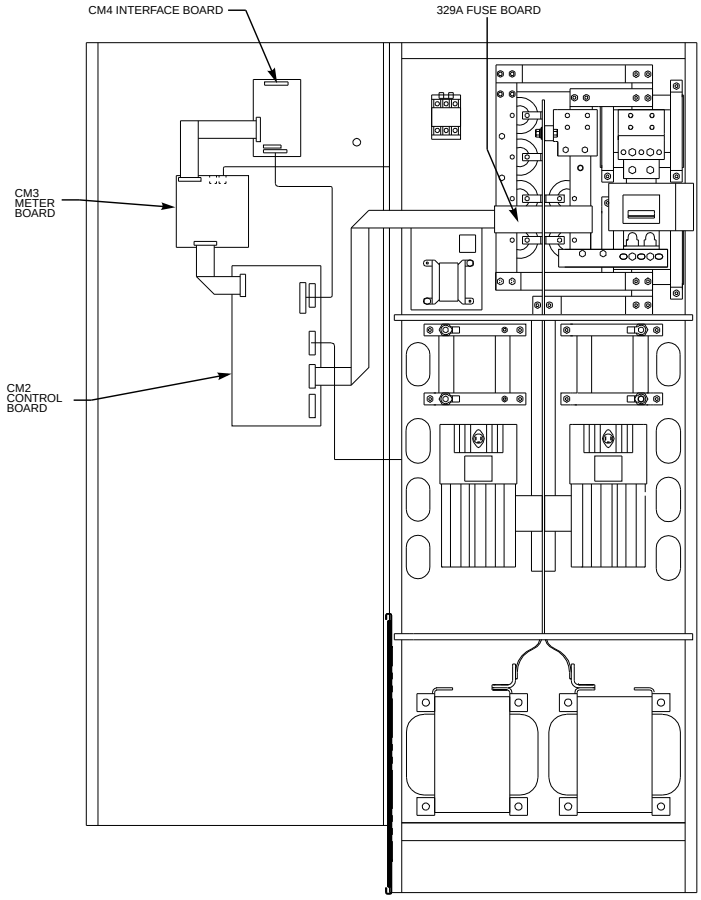

Figure 4-5: 400-ampere Rectifier

Input Power The OLE does not contain internal fusing. Therefore, input power must be provided via a miscellaneous fuse panel.

CAUTION

The input power is polarity sensitive. Determine the polarity of the power leads prior to connecting input power to the unit.

Table 4-N: OLE Input Power

-48V	Battery (-)	TB1-1
	RTN (+)	TB1-2

The input fuse shall be rated 1.33 amperes maximum.

The BCP/OLE combination panel per H569-418 Group F has one input power connection that the two units share.

Setting Equalize Voltage

Note

The plant float voltage should be set between -48.0V and -58.0V.

1. Switch a battery string to the equalize bus. The BIE LED should light.
2. Switch the designated rectifier to the equalize bus. The RIE LED should light.

Note

If these two steps are reversed, the BIE and RIE LEDs will flash alternately. Reset the rectifier and battery switches; then restart the procedure.

3. Push the three-position switch toward the Equalize position. The "Eql" LED should light.
4. Set the digital multimeter (DMM) to the appropriate DC voltage range and insert the probes into the test jacks of the OLE. Observe the voltage on the DMM and set the equalize voltage using a small slotted screw driver to turn the "Eql Adjust" screw.
5. Depress the three-position Equalize switch to "Float." Place the battery and rectifier back to normal operation; all Equalize LEDs should extinguish.

OLE Installation Check Procedure

Follow the procedure below to verify installation of the Off-Line Equalize (OLE) Panel.

1. Start equalize.
   a. Switch battery string to be equalized to the equalize bus.
   b. Switch Rectifier to equalize bus. (BIE and RIE will flash if these two steps are reversed.)

c. Set Equalize timer to desired position.

d. Activate Equalize switch.

2. Stop Equalize.

   a. Depress Equalize switch to “Float.”

   b. Monitor string voltage until string voltage is greater than -58VDC. (Voltages from -48VDC to -57VDC are greater than -58VDC.)

   c. Switch Rectifier to battery bus.

   d. If BIE and RIE are flashing, the equalization bus is less than -58VDC.

   e. If BIE and RIE are not flashing, switch battery string to battery bus.

3. Follow this procedure to equalize the remaining battery strings.

Side and Rear Cover Installation

The final procedure after installing the cabinet is securing the side and rear covers. Figure 4-6 shows how the covers are connected to the cabinet. The rear cover is furnished with the cabinet. Side covers are ordered per Group 10. If multiple cabinets are positioned side-by-side, side covers between the cabinets are not required.

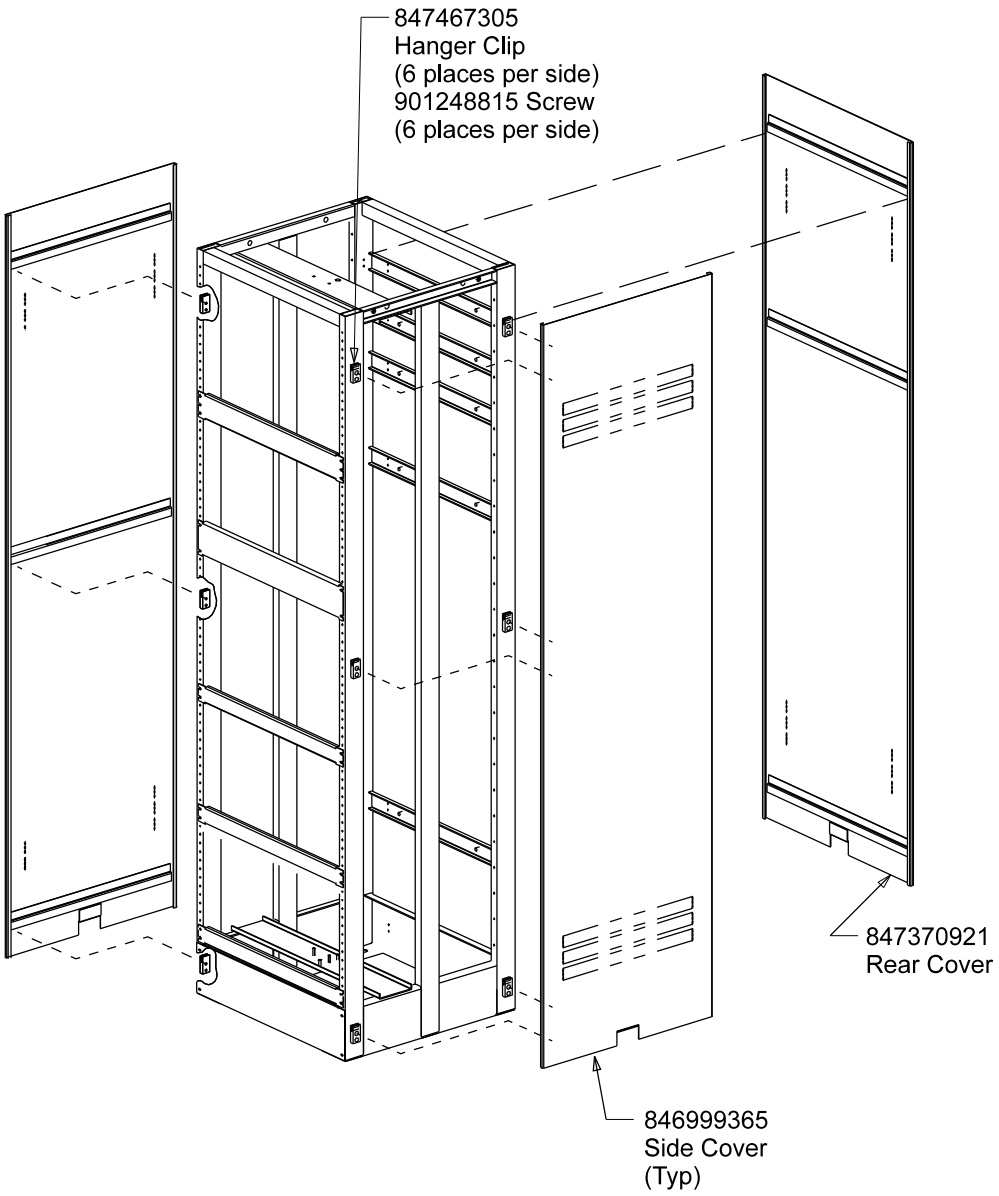

Figure 4-6: Side and Rear Cover Installation

Using an 8 mm or 5/16 inch nut driver, attach six plastic clips and six mounting screws to the side of each cabinet as shown. The blue side covers are then hooked onto the clips to enclose the system.

Fuse Replacement

The front access design of the Group A, B and C panels makes replacing blown fuses easy. Make sure that the switch has been moved to the OFF position.

CAUTION

Input post (left side) is connected to battery. Voltage on input post can kill. Extreme caution must be exercised when replacing fuses to prevent injury and short-circuiting panel.

1. Remove the protective cover from the Switch and Fuse unit to access the fuse.
2. Loosen bolts using a 19 mm socket or wrench and remove the blown fuse and install a spare fuse.
3. Replace blown 1/2 amp indicating fuse. Fuse alarms should be retired.
4. Once the cover is secured, the switch can be placed on-line safely. **Always use caution when switching as arcing may occur.**

Audible alarms will sound from the AIP for fuse failure and whenever a switch is moved from the “ON” position. The same sound will be heard for either alarm if the AIP is being used. Inspect the associated switch and fuse units visually to determine the nature of the alarm. A blown fuse will be evident by the indicating fuse. If there no blown fuses and the alarm has been issued, a switch must have been opened or taken off its fully seated position. Always be sure the switch is fully seated in the “ON” or “OFF” position. Partial seating can cause excess heating between the conducting parts.

If the AIP is not used, the fuse alarm will come from the controller in another nearby bay. Again, the indicating fuses will show which fuse has blown. If a failure is detected in a Group D, E, F, or G panels, the entire panel must be replaced. To do so, disconnect the wiring to the suspect panel and remove the panel from the bay.

5 Product Warranty

A. Seller warrants to Customer only, that:

1. As of the date title to Products passes, Seller will have the right to sell, transfer, and assign such Products and the title conveyed by Seller shall be good;
2. Upon shipment, Seller's Manufactured Products will be free from defects in material and workmanship, and will conform to Seller's specifications or any other agreed-upon specification referenced in the order for such Product;
3. With respect to Vendor items, Seller, to the extent permitted, does hereby assign to Customer the warranties given to Seller by its Vendor of such Vendor Items, such assignment to be effective upon Customer's acceptance of such Vendor Items. With respect to Vendor items recommended by Seller in its specifications for which the Vendor's warranty cannot be assigned to Customer, or if assigned, less than Sixty (60) days remain of the Vendor's warranty or warranty period when the Vendor's items are shipped to Customer or when Seller submits its notice of completion of installation if installed by Seller, Seller warrants that such Vendor's items will be free from defects in material and workmanship on the date of shipment to Customer. In such an event, the applicable Warranty Period will be sixty (60) days.

B. The Warranty Period listed below is applicable to Seller's Manufactured Products furnished pursuant to this Agreement, unless otherwise stated:

Warranty Period

Product Type	New Product	Repaired Product or Part*
Central Office Power Equipment**	24 Months	6 Months

* The Warranty Period for a repaired Product or part thereof is as listed or, in the case of Products under Warranty, is the period listed or the unexpired term of the new Product Warranty Period, whichever is longer.

** The Warranty Period for Products ordered for Use in Systems or equipment Manufactured by and furnished by Seller is that of the initial Systems or equipment.

C. If, under normal and proper use during the applicable Warranty Period, a defect or nonconformity is identified in a Product and Customer notifies Seller in writing of such defect or nonconformity promptly after Customer discovers such defect or nonconformity, and follows Seller's instructions regarding return of defective or nonconforming Products, Seller shall, at its option attempt first to repair or replace such Product without charge at its facility or, if not feasible, provide a refund or credit based on the original purchase price and installation charges if installed by Seller. Where Seller has elected to repair a Seller's Manufactured Product (other than Cable and Wire Products) which has been installed by Seller and Seller ascertains that the Product is not readily returnable for repair, Seller will repair the Product at Customer's site.

   With respect to Cable and Wire Products manufactured by Seller which Seller elects to repair but which are not readily returnable for repair, whether or not installed by Seller, Seller at its option, may repair the cable and Wire Products at Customer's site.

D. If Seller has elected to repair or replace a defective Product, Customer shall have the option of removing and reinstalling or having Seller remove and reinstall the defective or nonconforming Product. The cost of the removal and the reinstallation shall be borne by Customer. With respect to Cable and Wire Products, Customer has the further responsibility, at its expense, to make the Cable and Wire Products accessible for repair or replacement and to restore the site. Products returned for repair or replacement will be accepted by Seller only in accordance with its instructions

and procedures for such returns. The transportation expense associated with returning such Product to Seller shall be borne by Customer. Seller shall pay the cost of transportation of the repair or replacing Product to the destination designated by Customer within the Territory.

E. The defective or nonconforming Products or parts which are replaced shall become Seller's property.

F. If Seller determines that a Product for which warranty service is claimed is not defective or nonconforming, Customer shall pay Seller all costs of handling, inspecting, testing, and transportation and, if applicable, traveling and related expenses.

G. Seller makes no warranty with respect to defective conditions or nonconformities resulting from actions of anyone other than Seller or its subcontractors, caused by any of the following: modifications, misuse, neglect, accident, or abuse; improper wiring, repairing, splicing, alteration, installation, storage, or maintenance; use in a manner not in accordance with Seller's or Vendor's specifications or operating instructions, or failure of Customer to apply previously applicable Seller modifications and corrections. In addition, Seller makes no warranty with respect to Products which have had their serial numbers or month and year of manufacture removed, altered, or with respect to expendable items, including, without limitation, fuses, light bulbs, motor brushes, and the like.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. CUSTOMER'S SOLE AND EXCLUSIVE REMEDY SHALL BE SELLER'S OBLIGATION TO REPAIR, REPLACE, CREDIT, OR REFUND AS SET FORTH ABOVE IN THIS WARRANTY.

6 Appendix

Battery Switch Bay Specifications

Electrical Specifications	Nominal Output Voltage	-48 VDC or +24 VDC
	Boost Charge Circuit	-48 VDC or +24 VDC
	Equalize Circuit	-48VDC only
	Alarm and Interlock Unit	-48VDC only
	Operating Voltage Range (Float or Equalize)	-65VDC to +65 VDC
	Output Current Rating (Group A switch)	1200 amperes per switch
	Output Current Rating (Group B & C switches)	2000 amperes per switch
	Fuse Type	UL Class L fuses
	Fuse Ratings	600-2000 amperes
	Shunt Ratings	1200 and 2000 amperes @ 50 mV
Physical Specifications	Depth:	23.62 in (600 mm)

Width:	25.31 in (642 mm)
Height:	86.60 in (2200 mm)
Maximum Weight (with 5 Group B or C switches):	approximately 800 lb (364 kg)

7 Glossary

AIP	Alarm Interface Panel
BCP	Boost Charge Panel
BD	Battery on Discharge
BIE	Battery in Equalize
Bst	Boost
Comcode	A Lucent Technologies 9-digit part number
ETO	Equalize Time Out
E/W	Equipped with
LED	Light-Emitting Diode
OLE	Off-Line Equalize
PMJ	Power Major Alarm

PMN Power Minor Alarm

RIE Rectifier in Equalize

RO Reserve On-Line

RTAC Regional Technical Assistance Center

UL Underwriters' Laboratories; a safety agency