Pulsar Plus Controller Family
Product Manual

Product Manual
CC848815341
Issue 8
May 2019

Notice:
The information, specifications, and procedures in this manual are subject to change without notice. Lineage Power assumes no responsibility for any errors that may appear in this document.

Table of Contents

Table of Figures

Table of Tables

This page is intentionally blank.

Introduction

Pulsar Plus Family Controllers

Overview

The Pulsar Plus family of controllers is comprised of the Pulsar Plus, Pulsar Edge, and Phoenix controllers.

This manual covers the Pulsar Plus and Phoenix controllers.

These controllers were developed for both indoor and outdoor cabinet power applications.

Modular hardware and software design of the controllers allow for easy customization for specific applications.

Controllers provide control and alarm monitoring functions over several communication interfaces including a standard RS-485 digital serial interface that interconnects system rectifiers, converters, and other peripherals. Compatible rectifiers include NE, CP, NP, EP, IP, and 59X series.

Local and remote access is provided.

Features are factory configured to industry standard defaults to minimize the setup process in the field.

Customer specified factory default configuration is also available.

Key Features

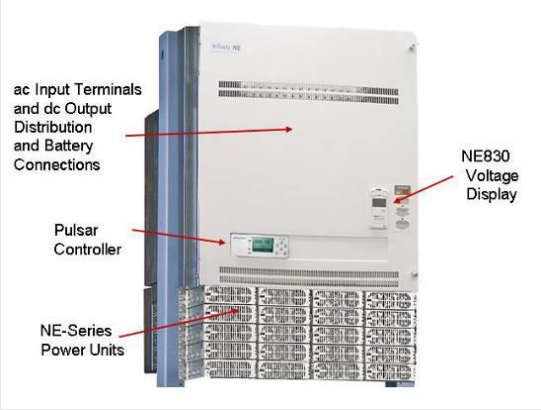
- Modular design allows different packaging alternatives: a single power slot positions of the rectifier shelf, mounting to a cabinet or distribution door, and 1U rack-mount option
- Easily field replaceable
- Standard or customer specific factory defaults supported
  - Support of more than one factory default
- Supports dual voltage plants, with rectifiers and converters
  - Auto-sensing dual voltage (both voltages and both currents displayed on front panel)
- Power Unit control and management
  - Centralized settings for converter and rectifier output set-point voltages.
  - Up to 60 NE power modules (Rectifiers and converters)
  - Up to 32 CP rectifiers
- Extensive Battery Management features
  - Management of four independent Low Voltage Disconnects (LVDs)
    - Up to eight contactors can be assigned to contactor interface IDs
    - Load disconnects operated by low voltage, low voltage and/or time delay, remote command, or external control signal
    - Battery disconnect operated by voltage threshold, voltage threshold and/or time, remote command, high battery temperature, or Emergency Power Off (EPO) signal
  - Battery recharge current limit feature
  - Low and high temperature voltage compensation
    - Independent adjustable slopes

    - Step function
  - Manual and automatic Boost charging
  - Manual, remote test, and periodic discharge test capability
    - Reserve time calculations with configurable threshold
    - Manual time threshold for pass/fail criteria
  - 1-Wire monitoring
  - Up to six ES771 Mid-string voltage monitors (configurable mid-string imbalance alarm)
  - Up to sixteen battery thermal probes (configurable temperature alarm)
- Alarm management of 24V and 48V DC distribution
  - User defined thresholds
- Front accessible 64x128 LCD with control pad and intuitive menu navigation system
  - Available front panel PIN (password) access feature
  - Alarm severity sensitive display back-light (LEDs on Phoenix controllers)
  - Voltage Test Jacks for both DC busses
  - Three separate configurable assignable LED indicators (18 on Phoenix controllers)
- Built-in audible alarm and test feature
- 10 configurable alarm outputs with manual alarm test features
- 10 configurable binary inputs
- Integrated 10/100Base-T Ethernet for local port or for Network remote monitoring
  - SNMP, TCP/IP, SMTP, HTTP, Telnet, FTP, and utilizes Dynamic Host Configuration Protocol (DHCP)
  - Compatible with standard browsers (MS Internet Explorer)
- Event history log
- Rectifier Group Standby/ Hold-off mapping (generator/AC load minimization)

Applications

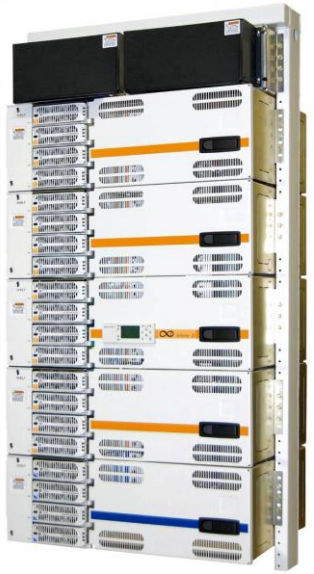
The Pulsar Plus controller family has applications in Infinity NE, Infinity P2, the Compact Power (CP) Line, EPS, and previous generation power systems. Following are product depictions utilizing the various configurations of the controller. These applications utilize the NE843A slot controller and the NE843C, NE843E, and NE843P door/panel mounted controllers. Consult appropriate system manuals, technical field support or your local sales representative for more details on these or other power systems.

Infinity NE and P2 Systems



Infinity NE-M Selectable Power System
(Pulsar Plus NE843E)

Infinity NE-S Power System
(Pulsar Plus NE843E)



Infinity NE-D Distributed Power System
(Pulsar Plus NE843E)

Infinity P2 Power System
(Phoenix NE843P)

Figure 1: Infinity NE and P2 Power Systems

The Pulsar Plus NE843A slot controller is inserted into the left-most position of the rectifier shelf. This position in the shelf allows access to all I/O. The panel/door-mounted Pulsar Plus NE843C/NE843E/NE843P controllers are typically installed at the factory, but can also be ordered separately for spares or integrated into custom systems.

The following pictures depict the Pulsar Plus controller in the EPS and Compact Power systems. These include two slot controllers, EP843D and the CP843A, and the 1U rack-mount controller applicable in 19" and 23" frames. The Pulsar Plus controllers provide a front panel DB9 or RJ45 Craft port for local terminal access using RS-232. A front panel position is reserved for a second RJ45 Ethernet connection in the near future.

Compact Power Systems

EPS2400 Power System
(Pulsar Plus EP843D)

Compact Power Shelf
(Pulsar Plus NE843G)

Compact Power Shelf
(Pulsar Plus CP843A)

Figure 2: Compact Power Systems

Product Description

Overview

Introduction

Lineage Power System rectifiers accept alternating current (ac) power and rectify it to produce direct current (dc) power for powering external equipment (loads). Converters accept the dc output from rectifiers or other sources and convert it to various regulated output dc levels also needed for powering external equipment (loads). Batteries, generators, and UPS are used to provide backup power when ac is lost. When batteries are used, they are connected in parallel for additional capacity along with the rectifier outputs through appropriate breakers and contactor disconnects. DC power is distributed through distribution panels with various protectors and contactors. These rectifiers, converters, backup systems, and distribution are all managed by the controller. The following figure depicts a generic representation of the system controller and its relationship in a power system. The components depicted and their associated features as they relate to the system controller will be discussed in this manual.

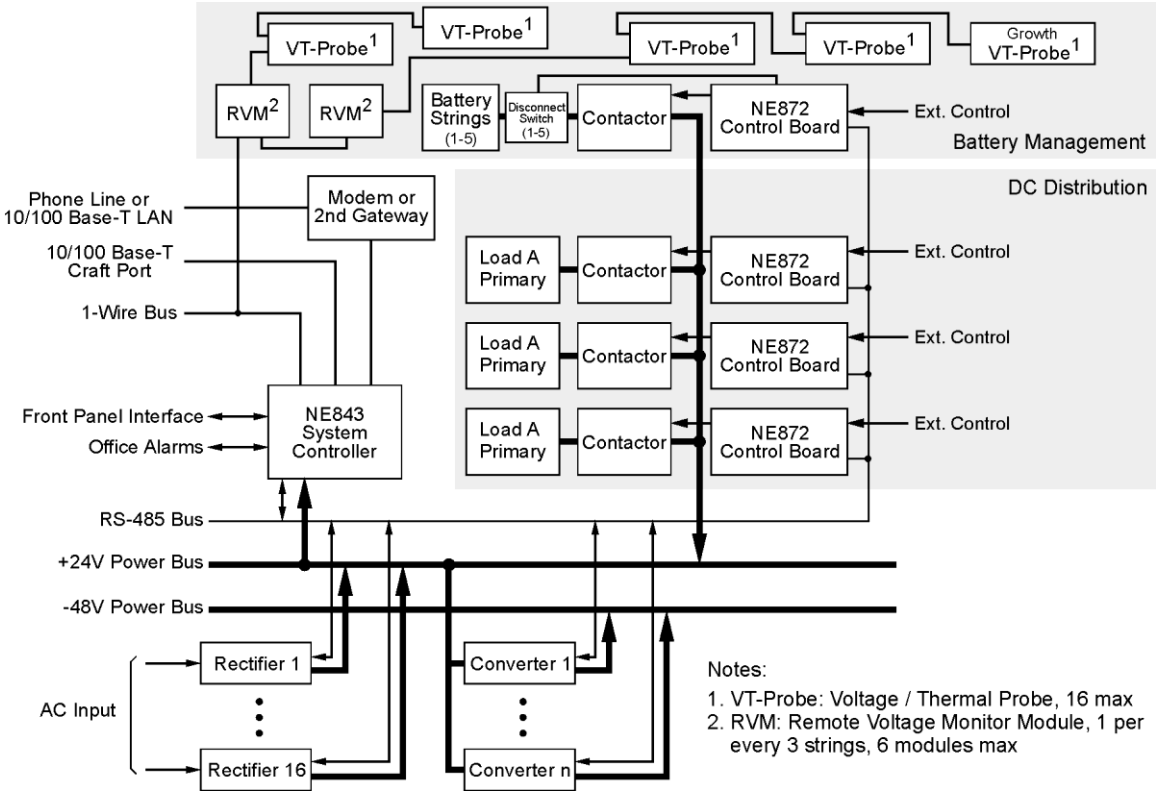


Figure 3: General Power System Block Diagram

Configurations

The main “843” microprocessor board comprises the Pulsar Plus family controllers. These controllers are designed to fit a variety of systems and applications. Input and output wiring is connectorized to allow swift disconnect and attachment to and from the unit. There are several different configuration options for the controllers. The “843” board is designed to fit in NE and CP power slots can be quickly installed or removed entirely from a power position with the use of an integrated latch. Controllers can also be ordered as a direct door or panel mount controller. Within these different physical configurations there are available integrated options that include items such as a modem or a second Ethernet port. For slot controllers, these options must be ordered and pre-installed at the factory. Options for door/panel mount controllers can be added in the field.

The following figure is a block diagram of the basic components of the Pulsar Plus NE843A slot controller. Controller options that mount directly to a door or panel do not require the small internal connection board used to interface with the backplane. As an example, the NE843_CONA shown below is the interconnect board used in the Pulsar Plus NE843A slot controller for interfacing to the NE shelf’s backplane.

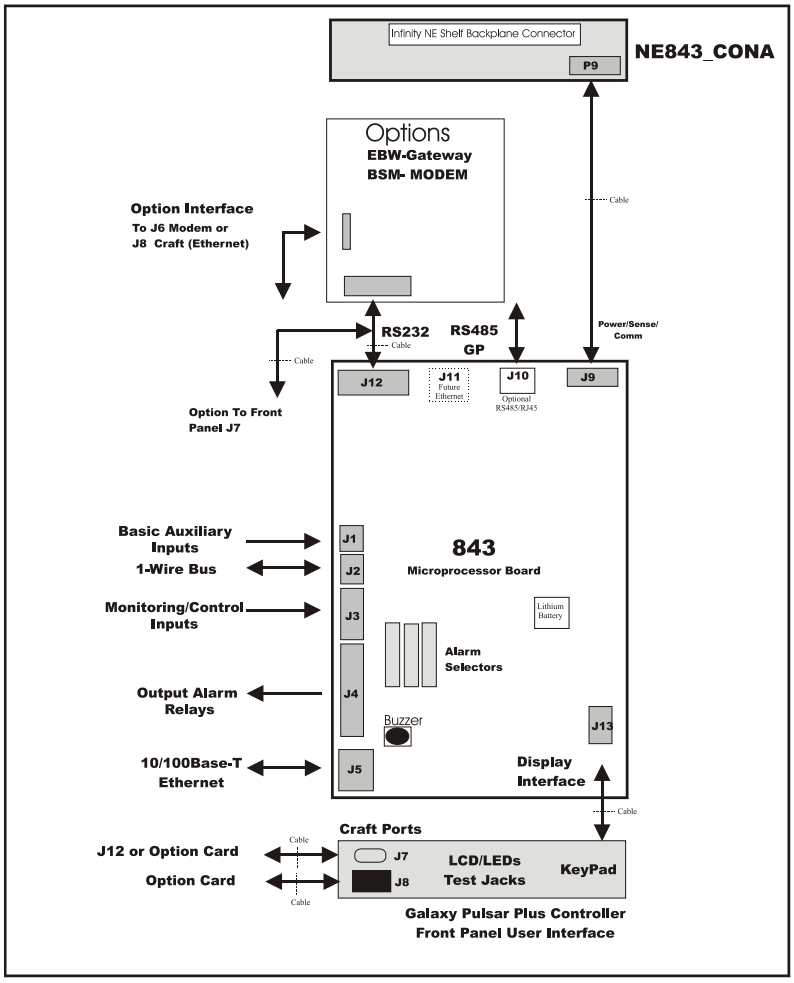


Figure 4: Generic Block Diagram of Pulsar Plus NE843A Controller

A listing of the controller options is defined in this section. A brief description is provided for each configuration. These are the basic configurations that are available from the factory. Always consult the controller ordering guide (PULSAR-AD) and respective sales contacts to ensure the most complete and up to date listing. The naming convention used for the Pulsar Plus product family and its options are factory orderable is:

ZZ 843 A D - XXX - YYY

Where;

ZZ	This identifies the product family of Pulsar Plus 843 controller. (Valid IDs are NE, CP, and EP)
A	This identifies the controller form factor option (A=Shelf/Slot packaging, C=NE Millennium Door-Mount, D= DTAG Front Access, E=Standard Door-Mount, G=1U 19”/23” Frame, P=Phoenix Front Panel Door Mount)
D	This identifies a controller of the same form factor but manufactured with a different component configuration or board options (Blank = Standard)
XXX	These characters identify which Craft port option is installed (RJC=Cisco RJ45 serial craft port with no board options, RJ5= Standard TIA RJ45 with no board options installed, Blank= DB9 serial craft port no board options installed)
YYY	This identifies a customer or application specific software configuration version of the controller (Blank = Standard). These codes are specifically assigned to a customer or an application that defaults can clearly be predefined to minimize field configuration. Consult appropriate sales personnel for additional information.

The following table identifies the configurations presently available or near availability for the controller product family. The slot controllers provide input/output connections at the side of the chassis. An RJ11 port for an optional modem connection is also provided. If the modem function is not included in the configuration, this port will be covered. The NE843A also provides access to an RJ45 receptacle for a additional Ethernet connection in the future as well as a standard DB-9 interface for a serial connection. Depending on the controller configuration and product availability, these ports may or may not be covered and made unavailable. The information included in the “Description” column provides a brief description about the availability of these ports for each particular configuration.

Table 1 Pulsar Plus Controller Family Product Options		
Configuration	**Comcode[1]**	**Description**
NE843A	CC109128402	NE Slot controller with no options • Front panel has: — RS-232 available (not covered); RJ45 not present (covered) • RJ11 for phone on side not present (covered)
NE843A_M3	CC109140522	NE Slot controller with BSM3 internal modem • Front panel has: • RS-232 available (not covered); RJ45 not present (covered) • RJ11 for phone on side available (not covered) • BSM3 internally powered from NE843A
CP843A	CC109129895	CP Slot controller with no options • Front panel has no I/O. • RS-232 craft port made available on the side, No second RJ45 (dual Ethernet) • RJ11 for phone on side not present (covered)
NE843E	CC109142056	Door/panel mount controller with no options • Front panel has: • RS-232 available through DB9 (not covered); Second RJ45 not present (covered) • RJ11 for phone on side not present (covered)
NE843P		Phoenix III Front Panel door/panel mount controller with no options • Front panel has: • RS-232 available through DB9 (covered); Second RJ45 not present (covered)
EP843D	CC109133427	DTAG (PSU4815) system controller - Front Access, 300mm • Front panel has: • RS-232 available through DB9 (not covered); Second RJ45 not present (covered) • Front Access to all I/O
NE843G	CC109139358	19" 1U Rack-mount controller - DB-9 • Front panel has: • RS-232 available through DB-9 (not covered); Second RJ45 not present (covered) • Rear Access to all I/O
NE843G_RJC	CC109142064	19" 1U Rack-mount controller - RJ45 • Front panel has: • RS-232 available through RJ45 connector (not covered); Second RJ45 not present (covered) • Rear Access to all I/O

[1] Some options may still be under development. Please consult sales and technical field support for further inquiry.

Getting Started – Installation, Start-Up, and Basic Configuration

Warning	Review and follow the entire **Safety** Section before beginning the installation process. Observe all warnings and labels on the equipment. Install, service, and operate this equipment only by professional, 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. Hazardous energy and voltages may be present in the system, system components, and on the interface cables that may shock or cause serious injury or death if safety precautions are ignored.
Caution	All tools and test equipment must be insulated in an approved manner. Proper ESD protection is required in order to prevent ESD damage to the equipment.

Preparation

This section outlines the sequence for installing and quickly configuring the slot-controllers into a power system like the Infinity NE-S as well as connecting up the NE843G rack-mount controller to a Compact Power system. Infinity NE-M, NE-D, Infinity P2 and other similar systems shipped from the factory utilize the NE843C, NE843E, and NE843P door/panel-mounted controllers which are typically installed at the factory. Installation of these units will not be discussed in detail. Information will be provided on the input and output of the controllers to help aid in customization or replacement in the field.

Installation Tools

You will need the following tools to install and test the Infinity NE System:

- Wire cutters and strippers
- Heat shrink gun
- 5/16-inch (8 mm) hex driver
- 1/4-inch hex driver
- Digital meter with an accuracy of ±0.02%
- Screw drivers (flat-blade and Phillips)
- ESD wrist strap
- Assortment of socket wrenches and drivers
- Test cable
- Protective canvas
- Insulating rubber mat
- Windows-based personal computer laptop (PC) and cable to connect the PC communications port to the local port of the controller OR a CAT5 LAN cable.

Wiring Guidelines

- All electrical connections must be made using the proper crimping tools and dies and must be torqued to standard or specified values.

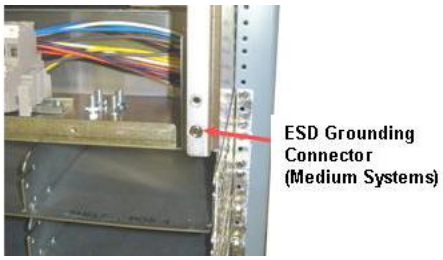
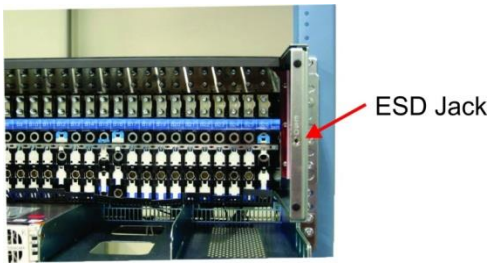
Packaging

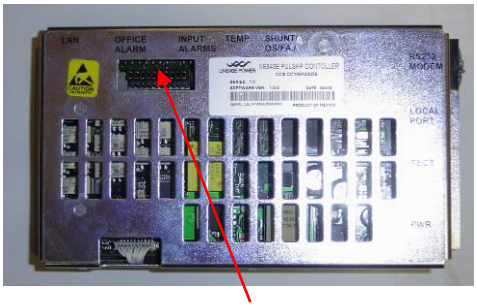
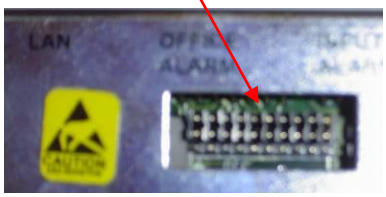
- All packages must be opened with a box cutter with the blade minimally exposed so that only the sealing tape is cut.
- Save all packaging material until the system has been powered up and all parts are operating within specifications. The shipping package may be used to return defective parts.

Install and Configure Slot/Door-Mount Controllers

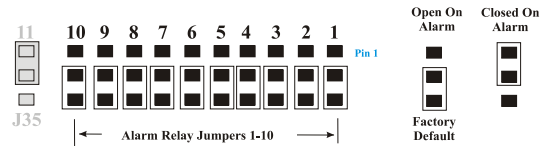
The controller is available factory installed into a door/panel of a power system, supplied as a removable slot controller, or provided as 1U frame mount controller. All these controllers utilize the same main microprocessor board. All functions, inputs, and outputs described are applicable to all controller configurations. The differences in the controllers are due the nuances of the front panel and physical packaging. The NE843A, CP843A, and EP843D Slot controllers are very similar as are the NE843C, NE843E, and Ne843P. The NE843A, NE843C, and NE843P will be described. Information for the NE843G will also be provided since its package is the most different.

Before power is applied, some basic configuration may be required that is applicable to all configurations.

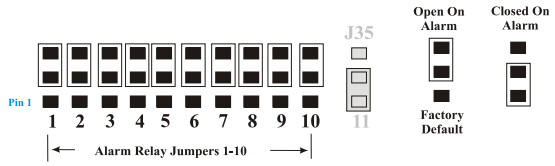
<table>
<tr><th colspan="3">Install and Configure Slot/Door-Mount Controllers</th></tr>
<tr><th>Step</th><th colspan="2">Action</th></tr>
<tr><td rowspan="2">1</td><td colspan="2">Connect for ESD Prevention</td></tr>
<tr><td>NE843C/NE843E/NE843P
Attach an ESD wrist strap or equivalent to the ESD grounding connector on right hand side of the inside of the frame in the medium system. Visible after door is opened.
 
</td><td>NE843A/CP843A/EP843D
Attach an ESD wrist strap or equivalent to the ESD grounding connector inside the distribution panel in front of the battery landings or another convenient location.
 
</td></tr>
<tr><td rowspan="2">2</td><td colspan="2">Configuring Individual Alarm Output Contact Type– “Close” on or “Open” on alarm
The factory default configuration for all alarm outputs is “Open” on alarm. If this acceptable go to Step 4 otherwise continue.</td></tr>
<tr><td>Locate configuration jumpers for alarm relays on door-mounted controller. Each of the 10 output alarm jumpers is visible.</td><td>Locate configuration jumpers for alarm relays on slot-mounted controller. Lift the sliding cover on the top to access each of the 10 output alarm jumpers.</td></tr>
</table>

Install and Configure Slot/Door-Mount Controllers	
Step	**Action**
	 **Alarm Relay Jumpers**   

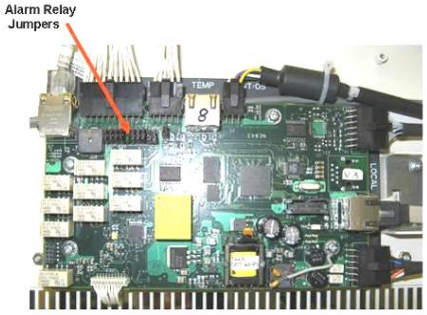
Install and Configure Slot/Door-Mount Controllers	
Step	**Action**
3	**Configure alarm relays to "Open" or "Close" on alarm as required**: Jumpers 1-10 select the contact type provided at alarm connector J4 for each of the ten alarms. Carefully move and verify each of respective configuration jumpers to achieve the desired contact type: "Open On Alarm" or "Closed On Alarm" position. Use of an insulated tool is suggested. Return the sliding cover on the slot-controller when configuration is complete. Note: the same control board is utilized in all controller applications. However, the appearance of the jumpers may seem different because of its orientation in the different packages. Use the following along with labeling on the controller to assist in setting the jumpers.



Slot Controllers - NE843A/CP843A/ED843D



Door Mount Controllers - NE843C/NE843E/NE843P



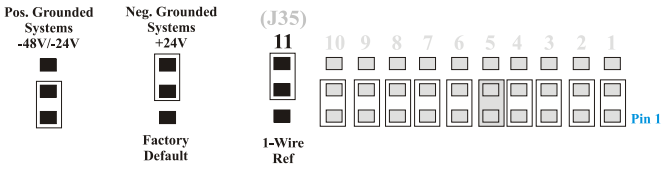
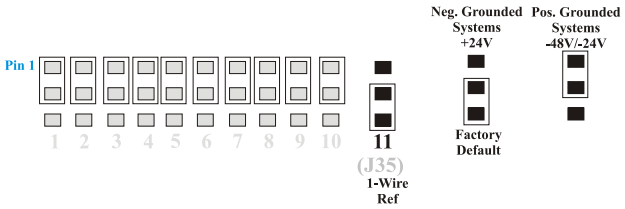
Microprocessor Board - Integrated into all controllers

Each jumper corresponds to one alarm relay and each relay output can be configured independently. The following table contains the alarms along with the factory default alarm assignments to user relays R1-R7. Utilize the web or EasyView interface to reassign any of the alarm outputs to specific alarm events or to change the severity of the alarms.

Install and Configure Slot/Door-Mount Controllers	
Step	**Action**

Jumper Number	Signal Name	Table 2 Controller Standard Defaults Door Mounted	
		Pulsar Plus Display	**Phoenix Display**
1	PCR	Power Critical Alarm severity indicator	
2	PMJ	Power Major Alarm severity indicator	
3	PMN	Power Minor Alarm severity indicator	
4	R1	Battery on Discharge alarm (BD)	AC/Multiple AC Fail (ACF, MACF)
5	R2	Very Low Voltage alarm (VLV)	Battery on Discharge, Battery Test Active (BD, BTA)
6	R3	Fuse Alarm (FAJ1/2/FAN1/2)	Distribution Fuse/CB Alarm, Open String (FAJ1/2, FAN1/2, CDFA, AMJ, OSA)
7	R4	AC Fail alarm (ACF)	High Voltage (HVA, HFV)
8	R5	Rectifier/Converter Fail alarm (RFA/ CFA)	Rectifier Fail, Incompatible Rectifier (RFA, RFN, ICR)
9	R6	Multiple Fail alarm Rectifier/Converter/AC (MACF/MRFA/ MCFA/MMAN)	Multiple Rectifier Fail (MRFA/MFA)
10	R7	High Voltage alarm - Rectifier and Converter (HVA/HFV/CHVA/CHFV	Converter Fail/Multiple Converter Fail, Converter Redundancy Loss, Converter Low Voltage, Converter High Voltage, Converter ID Conflict (CFA, MCFA, CFN, CRL, CVLA, CHVA, CHFV, CDID)

If your system using the **optional ES771 Mid-String Voltage Modules** continue with Step 4. Otherwise go to step 5.

Install and Configure Slot/Door-Mount Controllers	
Step	**Action**
4	**Configure the 1-Wire serial bus reference:** The ES771 modules must be referenced to the most negative potential of the DC bus. This reference is achieved by the proper setting of Jumper 11 (board reference J35) that is located next to the alarm relay configuration jumpers. The jumper is set in the factory for Positive Grounded systems (-48V) unless the controller is shipped with an assembled system that has a pre-determined primary output bus. An insulated tool must be used to set the jumpers. For systems with Positive Grounded batteries **(-48V/-24V)**, move 1-Wire Reference jumper 11 (J35) to the Positive Grounded position. For systems with Negative Grounded batteries **(+24V)**, move jumper 11 (J35) to the Negative Grounded position as shown: Again, the appearance of the jumpers may seem different when the controller is a slot-controller or a door-mount controller because of the orientation of the circuit board.  **Slot Controllers - NE843A/CP843A/ED843D**  **Door Mount Controllers - NE843C/NE843E/NE843P** Make sure the jumper cover is returned in slot-mount controllers.
	Securing the Slot-Mounted Controller For NE843C/NE843E based systems go to next section on connecting the controller. The following is for the NE843A/CP843A/EP843D slot-controllers.
5	Place the NE843A/CP843A slot-mounted controllers into a left-most power. The EP843D goes into the right-most power slot. Open the latch on right-hand side of the front panel by pushing down on the edge of the “blue” latch tab. 

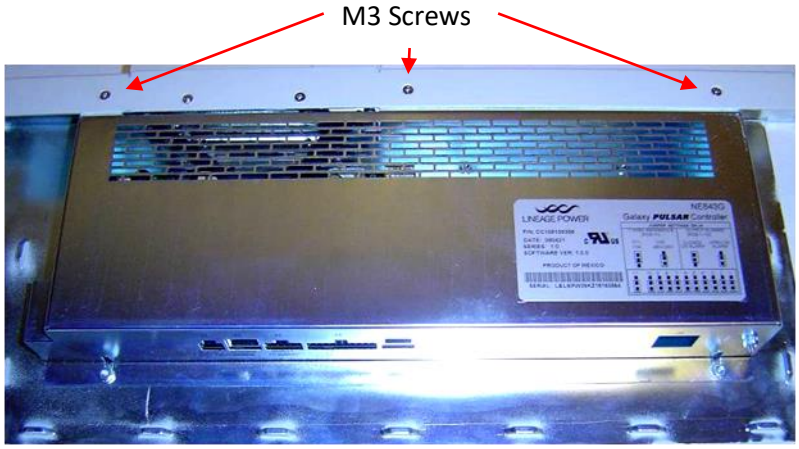
Install and Configure Slot/Door-Mount Controllers		
Step	**Action**	
6	Push the controller firmly into the shelf until seated. Attach or reattach all cable connections to the appropriate connections located on the side of the controller.	
7	Close the latch. The controller is now installed.	

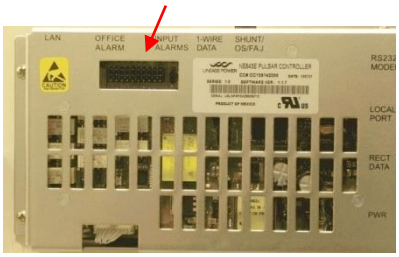
Install and Configure Pulsar Plus NE843G Controller

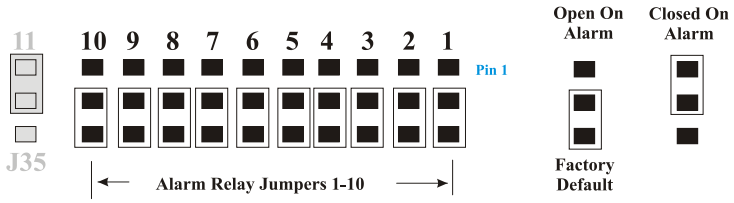
Although the NE843G frame-mount controller is very similar to the NE843A, CP843A, and EP843D Slot controllers and the NE843C and NE843E door/panel-mount controllers a separate section is provided since its packaging is the most different. However, the basic steps are very similar.

The controller is available factory installed into a door/panel of a power system, supplied as a removable slot controller, or provided as 1U frame mount controller. All these controllers utilize the same main microprocessor board. All functions, inputs, and outputs described are applicable to all controller configurations. The differences in the controllers are due the nuances of the physical packaging. Before power is applied, some basic configuration may be required that is applicable to all configurations.

Install and Configure Pulsar Plus NE843G Controller	
Step	**Action**
1	**Connect for ESD Prevention** The NE843G is typically mounted into a customer premise frame. If the output alarm contacts need to be changed from “Open On Alarm” to “Close On Alarm” or the 1-Wire bus needs to be referenced for a +24V power system then the cover will need to be removed to change jumper settings. Jumper configuration can be performed with the unit installed in the frame or not. Depending on the available space in a frame it may be easier to change the jumper settings when the unit is not mounted into the frame. Use appropriate ESD techniques when removing the cover and changing the jumpers. Remove the three M3 Phillips head screws and #4-40 hex nuts with lock washers shown in the following figure. Do not remove other screws. Gently pull up on the rear side of the cover as you slide the cover towards the back to remove the cover. (Note: reverse these steps to put the cover back on the unit).

Install and Configure Pulsar Plus NE843G Controller	
Step	**Action**
	
2	**Frame Mounting** The NE843G is designed to flush-fit into standard 19" frame rails. Extension brackets are available to mount the unit into standard 23" frame rails. Use the #12 paint piercing ground washers (12NWGRO/T2) along with the six 12-24 self-tapping screws (CC408577571) to mount the NE843G to the frame. Use at least two screws per side. The controller is typically mounted over the top of a J85480S1 L1 or L4 rectifier shelf but can also be mounted below.  Note: Return to this section if changing the jumper settings with the unit not installed in the frame.
3	**Configure Individual Alarm Output Contact Type– "Close" on or "Open" on alarm** The factory default configuration for all alarm outputs is "Open" on alarm. If this acceptable go to Step 8. Otherwise continue.
4	If the controller is slot mounted remove it to gain access to the jumpers. Otherwise continue.

Install and Configure Pulsar Plus NE843G Controller	
Step	**Action**
5	If an NE-872 Contactor Control Module is mounted on back of Door Mounted Controller remove it to gain access to the jumpers. After removing the mounting screws carefully position the NE-872 so that it is not in contact with electrically live components and is supported by the cables connected to it. Otherwise continue.  NE-872 Contactor Control Module
6	Locate configuration jumpers for alarm relays as shown below.  **Alarm Jumpers - Slot Controllers - Top of Controller** **Alarm Jumpers - Door Mounted Controllers** 

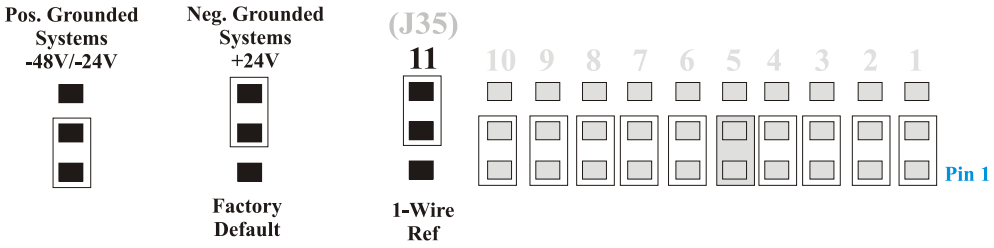
Install and Configure Pulsar Plus NE843G Controller	
Step	**Action**
7	**Configure alarm relays to "Open" or "Close" on alarm as required**: Jumpers 1-10 select the contact type to provide at alarm connector J4 of each respective Form-C output for each alarm. Carefully move each of respective configuration jumpers to the desired contact type: "Open On Alarm" or "Closed On Alarm" position as required per site instructions. Use of an insulated tool is suggested. Return the cover on the controller if finished configuring alarm relays and 1-Wire reference adjustment is not required. Note: the same control board is utilized in all controller applications. However, the appearance of the jumpers may seem different because of its orientation in the different packages. Use the following along with labeling on the controller to assist in setting the jumpers. **Frame-Mount Controller - NE843G**  Each jumper corresponds to one output alarm relay contact that can be independently configured. The alarm table shown in Step 3 previously is also applicable for this controller but repeated below for convenience. Utilize the web or EasyView interface to change any of the alarm user relay alarm assignments.

Install and Configure Pulsar Plus NE843G Controller

Step	Action

Jumper Number	Signal Name	Table 3 Table 2 Controller Standard Defaults NE843G
1	PCR	Power Critical Alarm severity indicator
2	PMJ	Power Major Alarm severity indicator
3	PMN	Power Minor Alarm severity indicator
4	R1	Battery on Discharge alarm (BD)
5	R2	AC and Multiple AC Fail alarm (ACF/MACF)
6	R3	Rectifier/Converter Fail alarm (RFA/MRFA/CFA/MCFA)
7	R4	Very Low Voltage alarm (VLV)
8	R5	Fuse Alarm - 48V (External FAJ2/FAN2)
9	R6	High Voltage alarm (HV)
10	R7	Fuse Alarm - 24V (External FAJ1/FAN1)

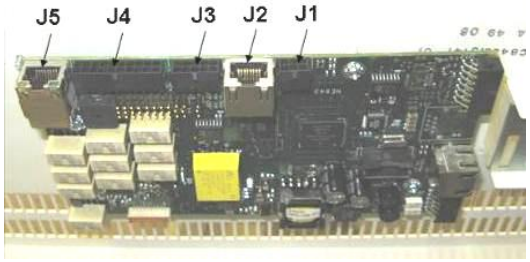
8	If your system **using optional ES771 Mid-String Voltage Modules** continue. Otherwise go to step 10.

Install and Configure Pulsar Plus NE843G Controller	
Step	**Action**
9	**Configure The 1-Wire Serial Bus Reference:** The ES771 modules must be referenced to the most negative potential of the DC bus. This reference is achieved by the proper setting of Jumper 11 (board reference J35) that is located next to the alarm relay configuration jumpers. The jumper is set in the factory for Positive Grounded systems (-48V) unless the controller is shipped with an assembled system that has a pre-determined primary output bus. An insulated tool must be used to set the jumpers. For systems with Positive Grounded batteries **(-48V/-24V)**, move 1-Wire Reference jumper 11 (J35) to the Positive Grounded position. For systems with Negative Grounded batteries **(+24V)**, move jumper 11 (J35) to the Negative Grounded position as shown: Again, the appearance of the jumpers may seem different when the controller is a frame-mount controller because of the orientation of the circuit board. **Frame-Mount Controller - NE843G**  Return the cover to the unit.
10	**Securing The NE-872 Contactor Control Module** If the NE-872 Contactor Control Module unit was removed from the back of the door mounted controller replace it and tighten its mounting screws. Otherwise continue to step 7.
11	**Securing The Slot Mounted Controller** If the sloe mounted controller was removed replace it. Otherwise continue to step 8.
12	**Securing The Frame-Mounted Controller** If the unit was not mounted into the frame see Step 2. Otherwise this portion is complete.

Connect To the Controller

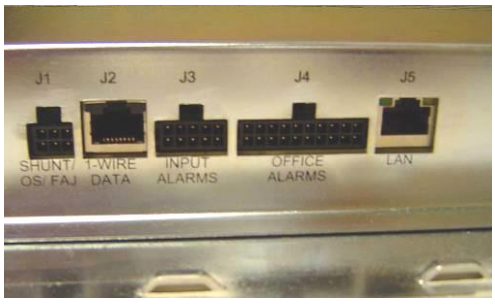
Connections to the controller are made through appropriate cable assemblies either directly to the main board or automatically for direct backplane interconnects. The controller is designed with individual connectors for outputs, inputs, communication, and other specific system related items. Primary system interconnects are oriented at the top and right side edges of the NE843C/NE843E/NE843P door-mounted units, on the left side of the unit's NE843A/CP843A slot-mounted controllers, at the rear of the NE843G, and at the front of the EP843D. The following information is valid for all configurations since the same main microprocessor board is utilized in the different controller packages. Slight differences due to packaging will be noted.

NE843C/NE843E/NE843P



NE843A/CP843A

NE843G



Many systems are shipped with the controller pre-wired in the factory. The following steps provides a brief description of how and what to connect to the controller if these connections are to be made in the field. Use only those that apply to the system configuration.

Connect to the Controller	
Step	**Action**
1	**Plant Interface Connector** **J1** is a 6-pin connector provided for interfacing inputs required for basic plant operation in specific system configurations. These inputs include a single plant shunt, (2) distribution alarms, and open battery string alarm. J1 connections are typically made in the factory with a specific wire harness for a given system. Following is a brief description of the inputs.

Pin	Signal Name	Description
1	Shunt+	Shunt + is the more positive lead from a system battery or load shunt. For battery shunts, this is the most positive lead of shunt during a discharge. The shunt may reside in the grounded or non-grounded side of the DC bus (±24V/-48V) as long as the Shunt Reference lead is connected correctly. This lead must comply with Class II wiring standards.
2	Shunt Reference	This signal is used to reference the shunt analog measurement circuits to either the battery or ground side of a system. The reference must be attached to the same potential or side that the monitored shunt resides. This lead must comply with Class II wiring standards.
3	Shunt-	Shunt - is the more negative lead from a system battery or load shunt. For battery shunts, this is the most negative lead of shunt during a discharge. The shunt may reside in the grounded or non-grounded side of the DC bus (±24V/-48V). This lead must comply with class II wiring.
4	Fuse Alarm Major - 24V	FAJ1 is the input monitor for distribution that accepts a contact to Battery for ±24V DC systems as an alarm. Factory default for FAJ1 is to alarm on application of DC bus voltage. Can be reconfigured as needed through the web interface.
5	Open String	OS1 is the input monitor that accepts a contact to Battery for ±24V/-48V DC systems to identify an open battery string. Factory default for OS1 is to alarm on application of DC bus voltage. Can be reconfigured as needed through the web interface.
6	Fuse Alarm Major -48V	FAJ2 is the input monitor for that accepts a contact to Battery for -48V DC systems as an alarm. Factory default for FAJ2 is to alarm on application of DC bus voltage. Can be reconfigured as needed through the web interface.

Connect to the Controller

Step	Action
2	**One-Wire Battery Peripheral Connector** **J2** is a standard shielded RJ-45 receptacle provided for making connections to "1-Wire" devices such as QS873 VT-Probes (up to 16) and ES771A Remote Mid-string Voltage Monitors (up to six). Standard cable assemblies have been designed and must be used for applications involving the QS873 VT-Probes or ES771 Remote Mid-string Voltage monitors. These cables provide simple plug-n-play from the controller to a QS873A probe, from the controller to an ES771A, and between QS873A probes and ES771 modules. Consult the section on "1-Wire" peripherals for further information. Following are the present pin assignments for J2.

Pin #	Signal Name	Description
1	reserved	
2	reserved	
3	SIG_RTN	Protected signal return for 1-wire
4	reserved	
5	1-Wire	1-wire communication signal
6	+5V	Protected +5V Power utilized by ES771 modules
7	reserved	
8	reserved	

Note: J2 does not contain the RS485 rectifier control bus

3	**Auxiliary Input Connector** **J3** is 10-pin right angle header that provides a separate connection for auxiliary inputs. Standard color coded cable assemblies are available. Part numbers for the 50' and 150' 24AWG input cables are CC848817651 and CC848817668, respectively. Contact technical field support for additional cable options or needs. Utilize the appropriate cable to obtain the desired connections to the inputs shown below.

Connect to the Controller	
Step	**Action**

Table 4 Auxiliary Input Connector

Pin # Wire Color	Signal Name	Description
1 (BK)	Aux Input 1 (Aux1)	Auxiliary input to monitor a contact closure or open to its respective return on pin 8, Auxiliary Input Return. See Appendix E for alarm assignments
2 (BR)	Aux Input 2 (Aux2)	Auxiliary input to monitor a contact closure or open to its respective return on pin 8, Auxiliary Input Return. See Appendix E for alarm assignments
3 (R)	Aux Power Major Input (AMJ)	Auxiliary input to monitor a contact closure to the non-grounded side of a dc bus (±24V/-48V) to create the standard Auxiliary Power Major alarm. See Appendix E for alarm assignments
4 (O)	Plant Battery Test/ Group Standby/TR (GSTR)	Dedicated input to be monitored for a contact closure to its respective return on pin 9. Used for Plant Battery Test and Group Standby Feature. Factory default as the Group Standby feature upon a contact closure.
5 (Y)	Emergency Power Off (EPO)	Dedicated EPO input to be monitored for a contact closure to its respective return on pin 10, Emergency Power Off Return.
6 (G)	Aux Input 3 (Aux3)	Auxiliary input to monitor a contact closure or open to its respective return on pin 8. See Appendix E for alarm assignments.
7 (BL)	Aux Input 4 (Aux4)	Auxiliary input to monitor a contact closure or open to its respective return on pin 8. See Appendix E for alarm assignments.
8 (V)	Aux Input Return (Aux_R)	Return for Auxiliary Inputs 1-4.
9 (S)	Plant Battery Test/ Group Standby (TR) Ret.(GSTR_R)	Return for Plant Battery Test and Group Standby.
10 (W)	Emergency Power Off Ret. (EPO_R)	Return for EPO input.

Connect to the Controller	
Step	**Action**
4	**Output Alarm Connector** All controller customer output alarm contacts are available at the **J4** output connector interface. J4 is a 20-pin right angle header with latching capability. Standard color coded alarm cable assemblies are available. Part numbers for the 50’ and 150’ 24AWG solid twisted pair output cables are CC848817635 and CC848817643, respectively. Contact technical field support for additional cable options. Utilize the appropriate cable to obtain the desired connections to the outputs shown below.

Connect to the Controller	
Step	**Action**

Table 5 Output Alarm Connector

Pin # Wire Color	Signal Name	Pin # Wire Color	Signal Name	Pulsar Plus Display Defaults	Phoenix Display Defaults
1 (BL)	PCR	11 (BL-BK)	PCR_C	Power Critical Alarm (PCR)	
2 (O)	PMJ	12 (O-BK)	PMJ_C	Power Major Alarm (PMJ)	
3 (G)	PMN	13 (G-BK)	PMN_C	Power Minor Alarm (PMN)	
4 (W)	R1	14 (W-BK)	R1_C	Battery on Discharge (BD)	AC/Multiple AC Fail (ACF, MACF)
5 (BK)	R2	15 (BK-W)	R2_C	AC/Multiple AC Fail (ACF/MACF)	Battery on Discharge, Battery Test Active (BD, BTA)
6 (BL-W)	R3	16 (BL-R)	R3_C	Rectifier/Converter Fail (RFA/MRFA, CFA/MCFA)	Distribution Fuse/CB Alarm, Open String (FAJ1/2, FAN1/2, CDFA, AMJ, OSA)
7 (O-R)	R4	17 (R)	R4_C	Very Low Voltage (VLV)	High Voltage (HVA, HFV)
8 (G-W)	R5	18 (R-G)	R5_C	Fuse Alarm - 48V [2] (External FAJ2/FAN2)	Rectifier Fail, Incompatible Rectifier (RFA, RFN, ICR)
9 (W-R)	R6	19 (R-W)	R6_C	High Voltage (HV)	Multiple Rectifier Fail (MRFA)
10 (BK-R)	R7	20 (R-BK)	R7_C	Fuse Alarm - 24V [2] (External FAJ1/FAN1)	Converter Fail/Multiple Converter Fail, Converter Redundancy Loss, Converter Low Voltage, Converter High Voltage, Converter ID Conflict (CFA, MCFA, CFN, CRL, CVLA, CHVA, CHFV, CDID)

1 Configuration jumpers for the alarm outputs have been set to provide an “Open” on alarm from the factory. See previous sections for changing the alarm contact type at J4.

2 Depending on the system rectifier voltage one of these will be defaulted as a general purpose output User Relay. Ex: if the system is -48V, then User relay R7 is unassigned and vice versa.

<table>
<tr><th colspan="2">Connect to the Controller</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>5</td><td>

Network (LAN) Connection (Optional)

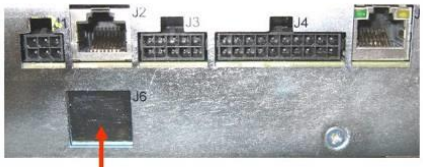
The controller provides a standard 10/100Base-T Ethernet connection for a LAN or direct Craft port connection. Connector **J5** is a standard RJ45 shielded receptacle connection for standard Cat-5 cable connection between the controller and the LAN. This port has two main modes of operation: Server mode and LAN mode (Static and DCHP Client). The factory default configuration for the port is operation as a DHCP Client.
In DHCP Server mode the port can be used as a local Craft interface. In this mode, a laptop can be directly connected to J5 with standard straight-through Cat-5 cable. A standard web browser can then be used to access the controller by typing in network address http://192.168.2.1. All controller's in DHCP Server mode use this same address. A connection must never be made between the controller and LAN while the controller is in Server mode.

In Static or DHCP Client modes of operation the controller is to be configured with an IP address as well as other network parameters. In these modes of operation the power system can be remotely monitored and accessed over the network. Permanent connections between the controller and LAN must use a Shielded Cat-5 cable and be routed according to appropriate building code. Following is the pin assignment for the connection:

<table>
<tr><th>Pin #</th><th>Signal Name</th></tr>
<tr><td>1</td><td>TX+</td></tr>
<tr><td>2</td><td>TX-</td></tr>
<tr><td>3</td><td>RX+</td></tr>
<tr><td>4</td><td></td></tr>
<tr><td>5</td><td></td></tr>
<tr><td>6</td><td>RX-</td></tr>
<tr><td>7</td><td></td></tr>
<tr><td>8</td><td></td></tr>
</table>

Note: A position for an additional RJ45 port is provided on the front panel for a future controller upgrade that will provide access to a second independent Ethernet connection. This connector has been designated J8.

</td></tr>
</table>

Connect to the Controller		
Step	**Action**	
6	**Telephone Line Connection (Optional)** Skip this section if the controller is not equipped with the Modem option. **Slot-Controllers** A standard RJ11, **J6**, provides a direct connect to a POTS line. **Door-Mount controllers** Modem provides an RJ11 connection for the POTS connection. Modem should be mounted according to respective system drawing. Use routing techniques per code to connect from the controller to the POTS line. Note: Use of the modem does require a dedicated connection to the controller's local RS-232 Craft port.	 J6 Connector
7	**Local RS-232 Serial Port Connector** Standard RS-232 serial connection (DB-9 or RJ45) provided at the front panel for local Craft port or Modem. A PC using EasyView or a standard terminal emulator can be connected for local access. The port can also be configured to support an external/Internal modem. The local port pin assignments take the assignment as a Data Circuit-terminating Equipment (DCE). When the RS-232 port is configured for a Modem, Craft port connectivity is temporarily lost. The Modem will have to be disconnected to use the port as a Craft port. This port is factory defaulted to operate as local Craft port.	RS-232  Ethernet  **RS-232 (RJ-45)**

Connect to the Controller	
Step	**Action**

Table 6 Local RS-232 Serial Port Signals

Pin #	Signal Name
1	232DCD (RS-232 Data Carrier Detect)
2	232RXD (RS-232 Receive)
3	232TXD (RS-232 Transmit)
4	232DTR (RS-232 Data Terminal Ready)
5	Ground (Current Limited Ground)
6	232DSR (RS-232 Data Set Ready)
7	232RTS (RS-232 Request To Send)
8	232CTS (RS-232 Clear To Send)
9	NC (No Connect)

Note: an RS-232 to USB adapter (dongle) may be used to connect the RS-232 port to the USB port of a PC. Adapters may require a specific manually set baud rate to operate properly. See **Figure 11: Configuration Menu (part 2)** and **Table 32 Communication Ports Configuration**.

Note: before connecting the USB or RS-232 port to your PC, be sure that the power system and its output are properly grounded. Discharge Ground (DG) bus must be bonded (connected) to earth ground.

CAUTION: damage to the controller may occur if the USB or RS-232 port is connected to a PC when Discharge Ground (DG) bus is not bonded (connected) to earth ground.

NE843C/NE843E And NE843G Controllers Only

The connections described in Steps 8 and 9 are automatically performed internally through the backplane connection for NE843A/CP843A/EP843D Slot-Controllers**.** Although the Infinity NE-M, NE-D, NE-S and P2 systems have the NE843C, NE843E, and NE843P pre-wired in the factory, the connections are valid.

8

Power And Sense Connector

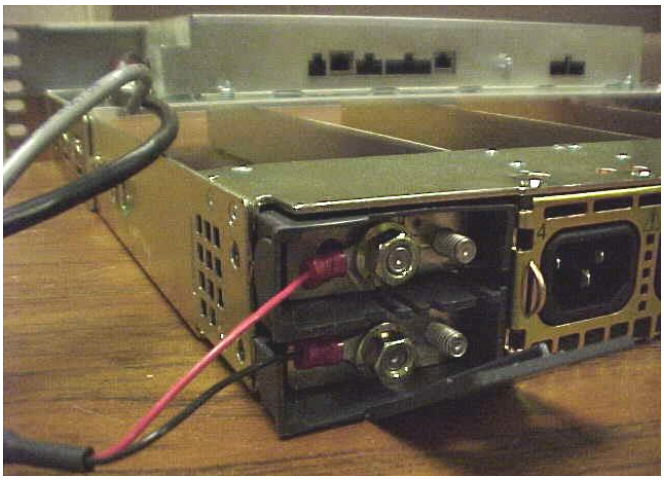
(Skip if NE843C/NE843E/NE843G/NE843P pre-wired in factory)

Basic power and sense to connector **J9** must be made in order for the controllers to function. The pin assignments for **J9** are listed below.

Connect to the Controller	
Step	**Action**

Table 7 Power And Sense Connector

Pin #	Signal Name	Description
1	RS485+	"B" side of the RS485 differential pair.
2	GP_REF	Reference lead for the RS485 rectifier GP bus. Must be connected to the reference side of internal communication circuitry in the rectifier. • DC Return bus (DG/Ground) in **Infinity NE** • Negative 48V DC bus (BAT) in **CP/EPS**
3	V2SNS_BAT	Second Sense Voltage connected to appropriate non-grounded sided of the second DC bus (BAT) to provide voltage sense. In **NE** Power Systems this connection is connected to negative DC bus of a -48V system.
4	V2SNS_DG	Second Sense Voltage connected to appropriate return/grounded side of the second DC bus (DG) to provide voltage sense. In **NE** Power Systems this connection is connected to positive DC bus of a -48V system which is also return/DG.
5	V1SNS_DG	Primary Sense Voltage connected to appropriate return/grounded side of the primary DC bus (DG) to provide voltage sense. In **NE** Power Systems this connection is connected to negative DC bus of a +24V system which is also return/DG.
6	V1SNS_BAT	Primary Sense Voltage connected to appropriate non-grounded sided of the primary DC bus (BAT) to provide voltage sense. In **NE** Power Systems this connection is connected to positive DC bus of a +24V system (BAT).
7	RS485-	"A" side of the RS485 differential pair.
8	DG	Reference connection to the Grounded/return side of the DC bus for alarms.
9	V2-	Connection to the negative potential of the secondary DC bus for secondary input power.
10	V2+	Connection to the positive potential of the secondary DC bus for secondary input power.
11	V1-	Connection to the negative potential of the primary DC bus for the main input power.
12	V1+	Connection to the positive potential of the primary DC bus for main input power.

Connect to the Controller	
Step	**Action**
	Note: V1 and V2 sense and power inputs can be used for 48V or 24V, vice versa. Systems from the factory will be wired such that V1 is for +24V connections and V2 is for -48V connections when possible for product consistency. If connecting the system up for single voltage plant application, regardless of the system DC potential, it is recommended that signals associated with V1 sense and power inputs be utilized. Thus, connections must be made to GP_REF, V1SNS_DG, V1SNS_BAT, DG, V1-, and V1+ in order to get the appropriate voltage at the front panel test jacks. If it is desired only to hook up the V2 sense and power inputs then the V1SNS_DG (pin 5) and the V2SNS_DG (pin 4) signals must be tied together at J9. **Power For The NE843G** The NE843G is primarily applied with the CP (Compact Power) family of rectifiers. Kit CC109144820 provides all the components necessary to connect to a J85480S1 L1 or L4 CP shelf. CC848845058 is the power cable provided with the kit. Attach one end of the cable assembly to the power connector **J9** located on the side of the controller and the other end with the ring terminals to the DC output of the shelf. The red wire is the Positive (+) DC bus connection and the black wire is the Negative (DC) bus connection. Use the lances designed into the controller shelf to secure the cable in place.  Note: the NE843G is a versatile controller that can be used with a variety of rectifier families. Consult technical field support or sales for the availability of other kits or application needs.

Connect to the Controller

Step	Action
9	**RS-485 Serial Connection (Skip if factory installed in the system)** In addition to being available at connector J9, the RS-485 rectifier communication bus is also accessible at connector **J10.** J10 is a standard shielded RJ45 connector on the controller that provides quick connections between the controller and serial system rectifiers and components. J10 is not available on slot-controllers since these units obtain their RS485 connections internally through a backplane connection through J9. J10 is used to directly connect to power shelves and distribution control boards such as the QS871, NE82, and ES772. Following is the pin assignments for connector J10:

Pin #	Signal Name	Description
1	RS485+	"B" side of the RS485 differential pair.
2	RS485-	"A" side of the RS485 differential pair.
3	GP_REF	Reference lead for the RS485 rectifier GP bus. Must be connected to the reference side of internal communication circuitry in the rectifier. • DC Return bus (DG/Ground) in **Infinity NE** • Negative 48V DC bus (BAT) in **CP/EPS**
4 -8	No Connection	

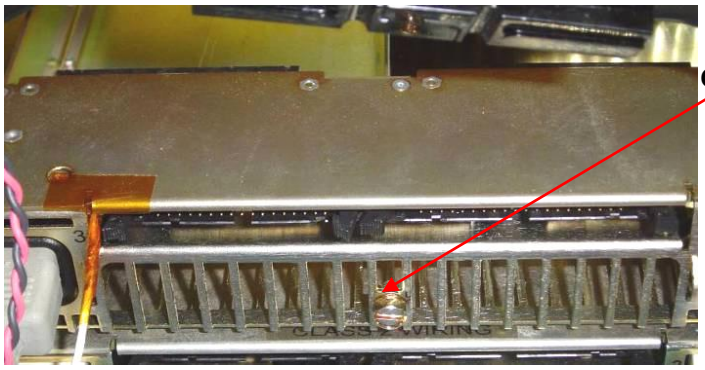
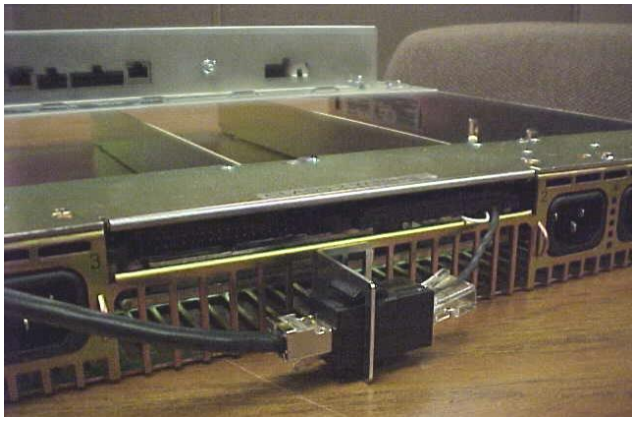
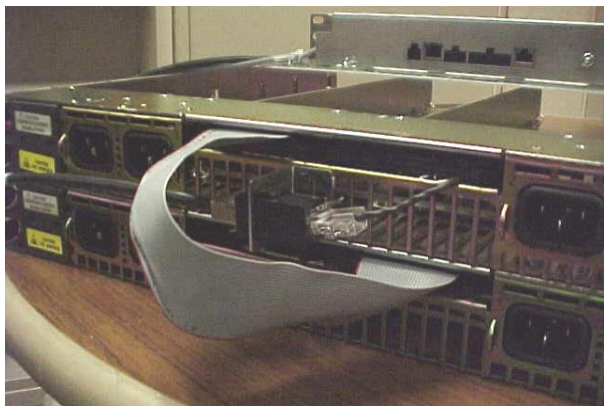
Note: when using J10, the GP_Ref signal must still be referenced properly in the system.

Communication For The NE843G And CP843A
with the Compact Power (CP) Line of systems

NE843G

Kit CC109144820 provides all the components necessary to connect the serial communication of the NE843G to a J85480S1 L1 or L4 CP shelf. These components include a CC848833475 communication cable (ribbon cable to RJ45 adapter on rear of CP shelf), a CC848833384 RJ45 bracket (for adapter cable), CC408574131 M5 screw (to secure bracket to CP shelf), a 555052-1 RJ45 Coupler, and a CC848791500 a 4' RJ45 Serial Cable (Controller to 1st CP Shelf).

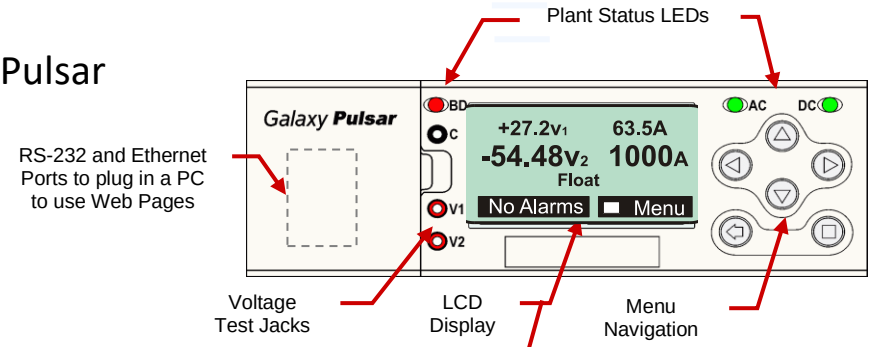
- Use the M5 screw to secure the RJ45 bracket to the **first** CP shelf at the ground screw location located at the rear of the shelf.
- Attach the RJ45 coupler to the adapter bracket.
- Connect IDC end of the communication cable to J1 on the rear of the CP power shelf and the other end to the coupler.
- Attach the RJ45 serial cable between the shelf adapter and J10 of the controller. Note a standard RJ45 Cat-5 cable can be used to make the connection between the CP shelf and the NE843G.
- Strain relief the communication cable to the shelf and controller as necessary.

Connect to the Controller	
Step	**Action**
	
	Once connected the CP communication will resembled that depicted below.
	
	The RJ45 communication bracket must not interfere or be interfered with by the multi-shelf cable interconnections. Ribbon cable assembly 848738253 must be used to connect from J2 of the first CP shelf to J1 on the second CP shelf as shown.
	

Connect to the Controller	
Step	**Action**
	CP843A The CP843A controller is slot controller and automatically connects up to the RS485 rectifier control bus once inserted into a power slot. However, the CP shelf must still be configured to operate in RS485 mode. This is done by using cable assembly CC848838284 which enables the RS485 mode of the shelf. The addition of other CP shelves utilizes the same inter-shelf cable 848738253 previously described. • Plug CC848838284 cable assembly into J1 of the first CP shelf. Note: the NE843G can be used to communicate with a variety of other Protocol based serial rectifier families. Consult technical field support or sales for the availability of other kits or application needs.
10	**RS-232 Serial Connection For Local Port And MODEM** Connector **J12** is a 14-pin right angle Molex connector used to make connection to an optional MODEM or is brought to the front panel DB9 or RJ45 for serial Craft port access. J12 access is not available on the NE843A/CP843A/EP843D slot-controllers or the NE843G. Use the provided cable assembly to connect to the BSM modem. Note: the connection to the front panel serial port will have to be removed and secured appropriately. Once the MODEM is installed the front panel serial port will not be active.

Initial Startup of the Controller

Once all relevant installation procedures are performed as defined in respective system product manuals and documentation, the system is ready to be powered up.

Initial Startup of the Controller	
Step	**Action**
1	Verify all connections are as described previously before applying power.
2	If equipped, place all external battery disconnect switches into their ON positions prior to applying power.
3	Apply power to the power system.
4	After approximately one minute, all LEDs on all components including rectifiers and converters, the controller, LVD control boards, aux displays, and remote voltage monitor modules should be green. If this is not the case, initiate the "Clear Events" and "Uninstall Equipment" operations found under **Menu➔Control/Operations** menu. Alarm conditions should clear. If all LEDs still aren't green, review the installation procedure and refer to the troubleshooting section. The controller display will indicate "NO ALARMS", system float voltage, total load current, and system operating mode. LEDs and back-light will be green for no alarms. Pulsar  Phoenix III  Contrast can be adjusted for the site's ambient condition by using the up and down arrow keys at the default menu shown. Contrast adjust is also available at : **Menu➔Configuration➔System Settings➔ Display Contrast**

Initial Startup of the Controller	
Step	**Action**
	***The display may have a protective transparent covering over the LCD portion. Make sure this covering has been removed for optimum viewing before adjusting the contrast.
5	Check the voltage reading on the controller display to verify that it complies with the system float voltage setting. The controller is factory configured with a rectifier Float voltage set-point of -54.48V for -48V rectifier systems and ±27.24V for ±24V rectifier systems. If converters are present, the display shows their voltage and current in smaller font. The Controller is factory configured with a converter output voltage set-point of -52.0V for -48V converters and +26.0V for +24V converters. Note: If Slope Thermal Compensation (STC) is active or if the connected batteries are not fully charged, the bus voltage may be different than the set-point. If possible, open the external battery disconnect prior to making measurements to eliminate these effects. If QS873 VT probes are installed in the system. STC may be active. This will be indicated by the Plant Mode "FLOAT – TEMP COMP". STC can be manually turned off at: **Menu➔Configuration➔Batteries➔Batt Temp Management➔Temp Comp.** If this is done, **be sure** to **Enable** the feature before leaving.
6	**Verifying a simple alarm** Remove a rectifier from its slot. The controller will illuminate its back-light or status LED amber indicating a missing rectifier condition. When the controller prompts to remove equipment press enter ■. This is a short cut that initiates the "Uninstall Equipment" operation found under the **Menu➔Control/Operations** menu. The alarm condition will clear and correct rectifier status will be displayed in **Menu➔Status➔Rectifiers.** Return the rectifier to its slot. The controller will update the rectifier status. If the above conditions did not yield the proper results, refer to the troubleshooting section.

Basic Controller Configuration

The Pulsar Plus family of controllers are a multiple micro-processor based unit with volatile and non-volatile memory. These units have been factory preconfigured with standard or customer specific configuration default settings for all features and thresholds. Many systems shipped from the factory all ready have the controller installed, configured, and tested for the system it resides. Installation and much of the configuration of the system controller may not be required. The date and time is generally set at factory test to Central Standard Time zone.

Controllers with customer specific configuration defaults are also available. These units will be assigned a unique apparatus code for ordering and management. A configuration template is available to facilitate this process. Lineage Power Systems predefined industry standard factory defaults are utilized for the Pulsar Plus family standard controllers. Although the configuration default files are permanently stored until they are replaced, all configurable parameters and thresholds can also be reconfigured or modified as needed in the

field. These items are then stored in non-volatile memory. However, a user can always return to factory programmed configuration by initiating the “Loading Defaults” operation for a specific battery type.

The **Basic** items to configure for basic system operation are:

- Float Set-Point (And associated alarms described in next section)
- Battery Type and number of strings
- Date
- Time

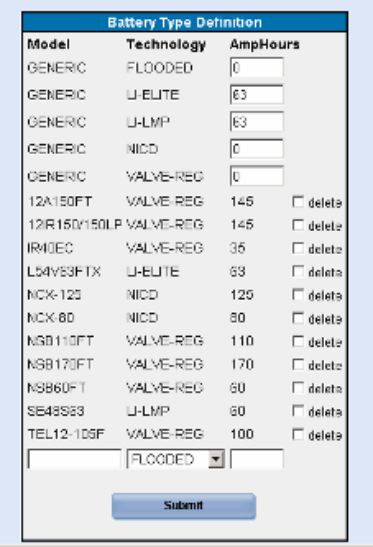
The controller is designed to support multiple battery technologies. These **Generic** technologies include:

- Valve-Regulated Lead Acid (Valve-Reg)
- Flooded Lead Acid (Flooded)
- Lithium Metal Polymer (Li-LMP)
- Lithium ELiTE (Li-ELiTE)
- Nickel-Cadmium (Ni-Cd)

Standard float values, alarm thresholds, and other functions are set as defaults for each of these battery types that can be modified in the field as desired. The controller also provides a list of industry standard batteries that are linked to these technologies and share the standard defaults. Batteries can be added or deleted from this list as required through the use of the controller’s remote interfaces.

The controller has been factory pre-configured with the generic Valve-Regulated Lead Acid (Valve-Reg) battery as the standard configured battery model. All associated configuration items for the “Valve-Reg” battery type are utilized. Thus, the default system float voltage setting and alarm thresholds are configured assuming the power system contains VRLA batteries that require an uncompensated float voltage of -54.50V (48V) or +27.25V (24V) as observed during the power-up procedure.

Basic configuration items such as the battery type, float set-point, date, and time, and site ID can be reconfigured in the field from the front panel or through remote means. To change these items do the following:

Basic Controller Configuration	
Step	**Action**
1	**Change the battery type to another battery type or specific model.** From the front panel go to **Menu➔Configuration➔Batteries➔Type** and select a battery model from the list. If the battery model is unique, select a generic technology class for the installed battery or use the Craft port to enter a specific battery model. A new model can be entered into the controller through the use of the web pages at **Settings➔Battery Types**. Note: the present controller can store 20 specific batteries. One may have to be deleted before adding. **Specific battery models stored in the standard controller:** • 12A100FT • 12A150FT • 12IR150/150LP • 3A125-33L • 3A95-21L • 3A95-27L • 3A95-33L • 6A95-13L • 6A95-15L • IR30EC • IR40EC • L54V63FTX • NCX-125 • NCX-80 • NSB110FT • NSB170FT • NSB60FT • SE48S63 • SE48S80 • TEL12-105F **Generic Battery technologies:** • Valve-Regulated Lead Acid (Valve-Reg) • Flooded Lead Acid (Flooded) • Lithium Metal Polymer (Li-LMP) • Lithium ELiTE (Li-ELiTE) • Nickel-Cadmium (Ni-Cd) 

Basic Controller Configuration	
Step	**Action**
	Press “save” once the correct battery is selected. If a generic battery type is selected select “Yes” to load the standard defaults. Note the controller will ask if the standard defaults are desired selecting yes will select the standard defaults for the selected battery. Selecting no, will leave settings at the default settings for the generic VRLAs. The float set-point value is one of these items. Note: Slope Thermal Compensation has been factory defaulted to be enabled with all VRLA batteries. If a VRLA battery is selected and there is no QS873A battery temperature probe attached to the controller a “Thermal Probe Fail” alarm will be generated. The alarm can be removed by connecting a probe to the system or by disabling the feature. The feature can be disabled at **Menu➔Configuration➔Batteries➔Batt Temp Management➔Temp Comp.** Select the Temp Comp and change the feature to be “Disabled”. Save.
2	To change the system rectifier Float-set-point go to **Menu➔Configuration➔Float Settings➔Set-Point** Set the desired system bus voltage. Save.
3	Set system date by going to: **Menu➔Configuration➔System Settings➔Date** Set to current date. Set system time by going to: **Menu➔Configuration➔System Settings➔Time** Set to present time.

Web Interface

The controller has an integrated 10/100Base-T port that supports standard protocols over TCP/IP like SNMP, TCP/IP, FTP and Telnet. It also has an integrated HTTP web server that serves up web pages to remote PCs using standard web browsers. Once properly connected to the network, simply typing the IP address assigned to the controller in the browser will serve up the log-in screen. The web pages support the majority of the functionality supported by EasyView and the T1.317 interface. The best way to learn the operation and content of these interfaces is through use. The basic operations performed at the front panel previously described are available through the web interface as well as all front panel configuration items. Following are few sample screens. Note: web pages are updated for functionally and aesthetics. Thus, some of the screens shown may be slightly different than those served up by your controller.

Craft Port

The web interface can be accessed remotely over the LAN or with a direct connection from a local PC. Once logged in the interface is the same. The following describes configuring the port as a local Craft port. This mode of operation allows a user to connect an external craft PC directly to the port and use the PC’s standard Web browser to locally access the system. This Craft port is supported by the controller operating in DHCP (Dynamic Host Configuration Protocol) server mode. While the Craft port is operating as a DHCP server, it must **never** be plugged into the building or surrounding LAN.

To access the system using the Craft Port follow the following basic procedure:

Web Interface Configuration	
Step	**Action**
1	Find and take note of the controller's Working IP (WIP) on the front panel display by going to **Menu➔Status➔Network Settings➔ Port 1** ***Note: If the Port is not configured as a Server it will not have the correct IP address.*** To use the Ethernet port locally as a Craft port it needs to be configured as a DHCP Server. DHCP Server operation can be validated at **Menu➔Status➔Network Settings**. Scroll down to view the port's present configuration. If it is not in DHCP Server mode, make sure the Craft port is not plugged into a LAN connection and re-configure the DHCP setting from the front panel to be Server. This is parameter is found in **Menu➔Configuration➔Communication Ports➔Network Settings➔DHCP**. Note: when performing this operation from the front panel, the controller must be rebooted by removing and reapplying power to the unit so that it can accept the new Ethernet port configuration. This can be done by removing and re-inserting the slot controller or by removing and reattaching the power connection at J9 on the door-mounted controller. The rebooting process takes approximately two minutes. Validate the change to server mode at **Menu➔Status➔Network Settings.**
2	Attach the LAN cable between the RJ45 (P2) on the main board to the appropriate Ethernet port on the Craft PC.
3	Open the PC's browser and enter the controller's WIP as the destination address. This address is http://192.168.2.1 by default. The controller has HTTP capabilities and will begin to return appropriate system representative web pages.
4	Using a standard browser, a login page similar to that depicted below will be served up by the controller. There are three levels of access through the port; Read-Only, Read/Write, and Read/Write with password management privileges. Passwords defaults for the Craft port as well as other remote access means default as follows: **Access** — **Default Password** User (Read-Only) — lineage Super-User (Read/Write) — super-user Administrator (Read/Write/Password Administration) — administrator **Enter Password** Password: [ ] Submit Reset

Security Levels/Passwords

The controller supports three levels of access: (User, Super-User, and Administrator). Password defaults can be changed only by a user of administrator privileges.

User security level:

- Can view almost every parameter in the system
- Can change only a few parameters considered to be of standard maintenance practices
- Default password: ***lineage***

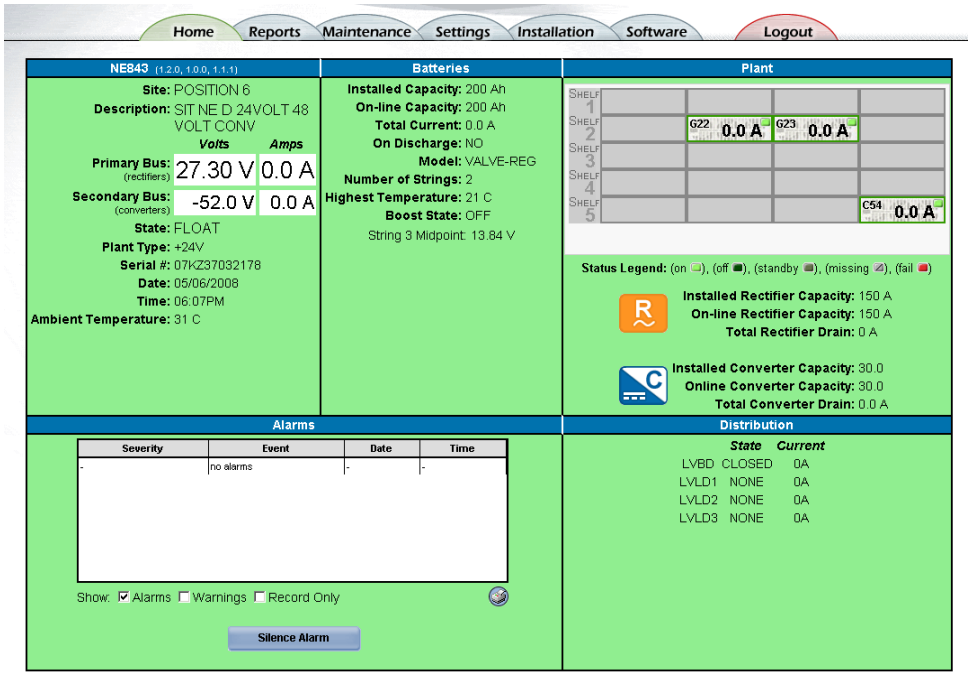
Super-User security level:

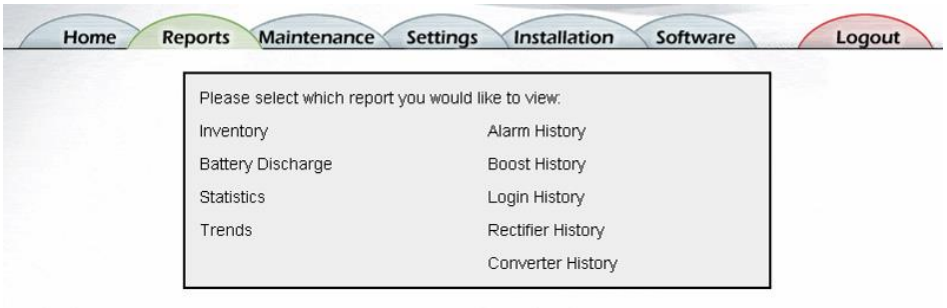
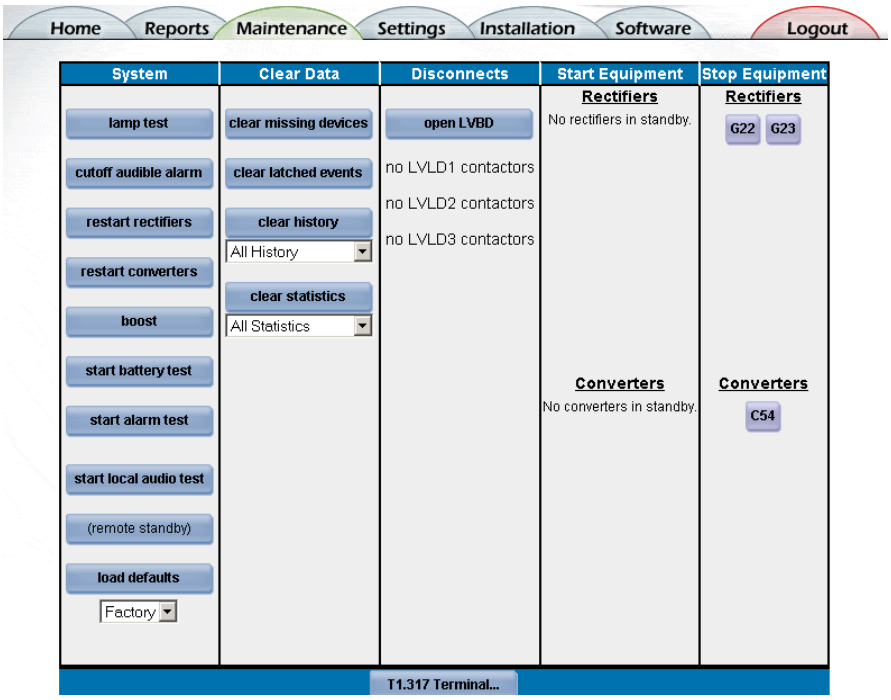
- Can do everything the user can do
- Can change any configuration parameter in the system (except passwords)
- Default password: ***super-user***

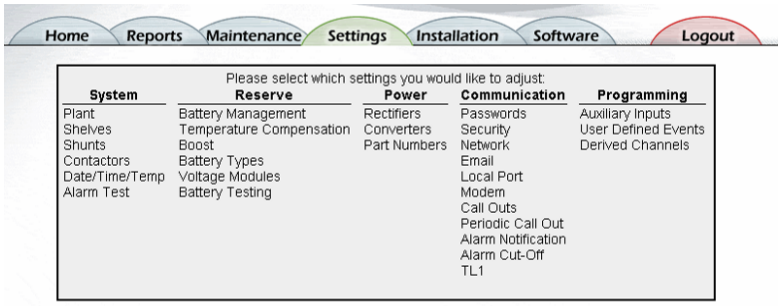
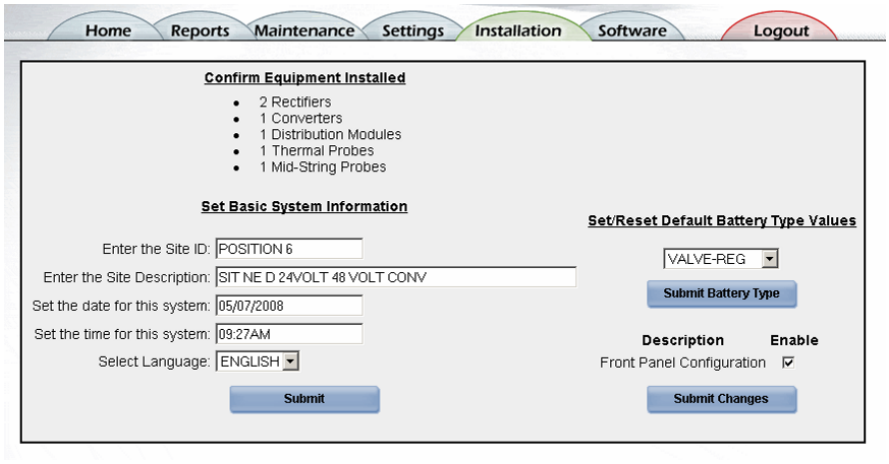
Administrator security level:

- Can do everything the super-user can do
- Can change passwords
- Can upgrade controller software
- Default password: ***administrator***

After the controller has granted access through the port, the controller serves up a Home page similar to that shown below. Front panel access and capabilities are a super-set of the functions and features available through the Craft port. Configuration of individual parameters and features can be performed by using the items located in the Settings tab or a general quick configuration of the system can be performed through the Installation tab. The Home Page has tabs that are partitioned as the following:

Web Interface Tabs	
Home	Main login page with representative graphic of the power components depicted: the number of shelves, rectifiers in place with their appropriate outputs, converters and outputs, empty slots, and indicate which rectifiers/converters are in alarm. High-level summary for the Batteries, Distribution, Alarms present, and controller summary are shown. There are also quick link tabs that take you to specific features. These tabs are the Home, Reports, Maintenance, Settings, and Installation. 

Web Interface Tabs	
Reports	The reports tab displays reports that the system controller can display through web pages. These reports include Event History, Inventory, Statistics, Trends, and Battery on Discharge. Individual history groups like Alarm History, Boost History, Login History, and Rectifier history are also available. 
Maintenance	Allows remote access to Control/Operation commands that are available through the front panel. These include restarting rectifiers/converters, starting alarm or battery tests, asserting boost, clearing history and statistics, clearing latched events and missing equipment, placing rectifiers/converters in and out of Standby, cutting of the audible alarm. The T1.317 Terminal button provides a quick link to a Telnet session to the controller that allows the T1.317 command interface to be utilized.  Note: The “Load Defaults” button under system loads the factory default settings assigned to a specific battery type as defined in the defaults configuration file. In the Standard controller this function will Standard configuration file. Custom configured controllers will utilize the specific custom configuration file defined for that particular configuration.

Web Interface Tabs	
Settings	Items in this menu are used to configure all the individual system parameters, features, and thresholds. These fields are arranged by System, Reserve, Communication and Programming. 
Installation	This tab provides access to quickly configure the primary items typically needed for a site. These configurations are the minimum for basic system operation. These items include selecting the battery type, date, time, and the site ID mentioned during the front panel configuration start-up section. 

Web Interface Tabs	
Software	This tab provides access to the Backup, Restore, and Upgrade features. Backup allows a user to store the controller's entire configuration to a "config.gal" file. This file can be used to configure other controllers with the same exact configuration or to "restore" the configuration of a controller that was modified in the field. The "Restore" tab provides this configuration upload ability. The "Upgrade Software" tab allows a user to upgrade specific portions of the controller's code: web pages, application code, configuration factory defaults, and language file. The controller supports two front panel languages. English, Spanish, French, and German are a few languages supported by the controller. Language support for web pages will be available in the future. Consult appropriate sales or technical support for Language file availability. 

Web pages will continuously be improved. A good method to use to understand the functions and features of the controller is by accessing the controller through the network or Craft port and click on the individual items to become more familiar with the items. More details on the front panel capabilities and Craft port web pages are found in the controller section.

Controller Operation

Overview

The Pulsar Plus family of controllers provides system monitoring and control features for Infinity NE/P2, CP, and other Lineage Power rectifier based power systems. These controllers monitor and control system components including rectifiers, converters, and distribution modules via a multi-drop RS485 digital communications bus. System status, parameters, settings, and alarm thresholds can be viewed and configured from the controller's front panel display. Assignment and configuration of alarm inputs and output relays can be performed from a laptop computer connected to a local RS-232 or Ethernet port, or by remote access is through a network connection to the World Wide Web (internet) or your enterprise network (intranet). An optional modem is also available.

This section describes the controller features, functions and alarms from perspective of a user utilizing the front panel display. All these features are available through the remote interfaces including EasyView™ and Web pages served by the controller. EasyView™ is the graphic user interface (GUI) Lineage Power provides for local serial port or remote MODEM access available on the web site. It supports all Lineage Power controllers and has been around for many years and will not be discussed in detail. The web interface and front panel will be the interfaces of choice. This section focuses on describing the controller from the front panel perspective since it is the most available interface and requires no PC or computer hardware. The items contained in the front panel are applicable to respective feature implementations in the web pages.

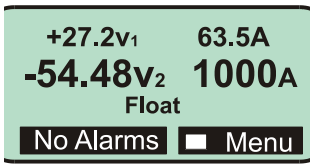


Figure 5: Front Panel Display

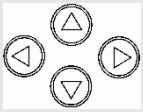
The Pulsar Front Panel display in Figure 5 shows the front panel display for a system with both rectifiers and converters. The display (V1 versus V2) correlates with test jacks. The large font indicates the "Primary" or rectifier dc bus; the smaller font shows the "Secondary" or converter dc bus. The controller will automatically determine the appropriate fonts and test jack designations.

For systems with no converters only a single voltage/current pair will be displayed on the front panel along with the correct test jack association. The other test jack will be unused and will have near zero voltage.

Front Panel Controls and Status Display - Pulsar

Controls - Pulsar

Pulsar controllers have six tactile buttons for navigation through a structured menu system. The buttons serve multiple purposes depending on the active screen. These functions are summarized below.

Navigation Controls - Pulsar		
Buttons	**Description**	
	**Display Contrast**	In the Main Display, the ▲▼ buttons increase or decrease the display contrast. Contrast adjustment is also available through the menus at **Menu➔Configuration➔System Settings**.
	Parameter Change	When changing a system parameter, the ▲▼ buttons increase or decrease the value of the parameter.
	**Direction Buttons**	In the Menus, the ◄▲▼► direction buttons navigate to make a selection. A black box highlighting a menu item indicates that the item has sub-menus.
	**Enter Button**	Enters a sub-menu or confirms a parameter change. From the Home Page only, goes to the top level Main menu.
	**ESC Button**	Goes up one menu level or exits a parameter change without saving.

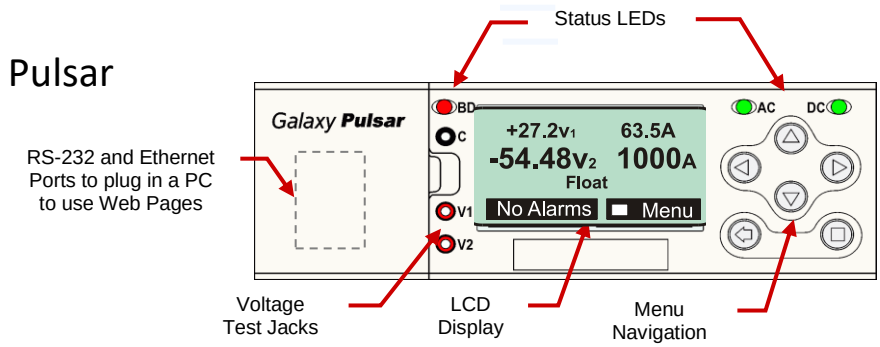
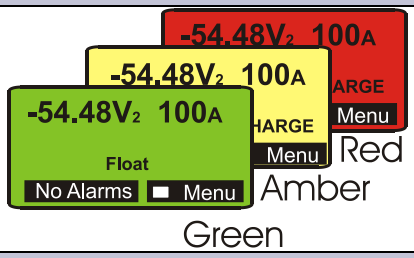


Figure 6: front Panel - Pulsar

LCD Back-light - Pulsar

Pulsar controllers incorporate an alarm severity back-light indicator. Severities of alarms can be configured through the remote interfaces. Following is a basic description of the back-light functionality.

<table>
<tr><th colspan="3">System Status Display – Pulsar</th></tr>
<tr><td colspan="2"> 
</td><td>The incorporated display technology can support a wide range of back-light colors. Present implementation supports three basic colors to indicate the alarm severity present in the system: Green, Amber, and Red

The highest severity in the system will take precedence.</td></tr>
<tr><th>Status</th><th>Function</th><th>Condition</th></tr>
<tr><td>green</td><td>Normal</td><td>Normal operation, no alarms, inputs and outputs are in their normal range.</td></tr>
<tr><td>red</td><td>Critical Alarm</td><td>Highest severity. Generally assigned to alarm to indicate a Power affecting condition. Immediate attention required.</td></tr>
<tr><td>red</td><td>Major Alarm</td><td>High severity. Generally assigned to alarm to indicate a Power affecting condition. Immediate attention required.</td></tr>
<tr><td>amber</td><td>Minor Alarm</td><td>Medium severity. Generally assigned to alarm to indicate a non-power affecting condition. Attention eventually required.</td></tr>
</table>

Status LEDs - Pulsar

Pulsar controller displays provides three LED indicators to provide more specific indications of the system status. These LEDs provide specific indication concerning the AC and DC system status and Battery on Discharge state. These LEDs have factory assigned defaults as indicated in the table below. However, the assignments to alarms can be customized in the field using the remote interfaces.

Table 8 Status LEDs - Pulsar

LED	Status	Condition
AC	 green	AC input to all rectifiers is in range.
	 amber	AC input to one rectifier is missing or out of range.
	 red	AC input to two or more rectifiers is missing or out of range.
DC	 green	DC output to all loads is normal.
	 amber	One or more of the following alarms are present: Fuse Minor 48, Fuse Minor 24
	 red	One or more of the following alarms are present: Open String, LVBD Open, Fuse Major 48, Fuse Major 24
BD	 green	System above configured Battery on Discharge (BD) threshold.
	 amber	State not presently assigned.
	 red	System equal to or below configured Battery on Discharge (BD) threshold.

Front Panel Controls and Status Display - Phoenix

Controls - Phoenix

Phoenix controllers have a rotary control knob and a button for navigation through a structured menu system. The rotary control knob serves multiple purposes depending on the active screen. These functions are summarized below.

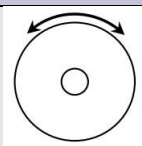
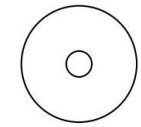
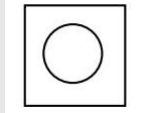
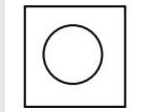
Navigation Controls - Phoenix			
Control	**Description**		
	**Rotary Control**	Menus	navigate to make a selection. A black box highlighting a menu item indicates that the item has sub-menus
		Parameter	increase or decrease the value of the parameter
	**Rotary Control Knob – Press to Enter Button**	Enters a sub-menu or confirms a parameter change. From the Home Page only, goes to the top level Main menu.	
	**Back / Home /ESC Button**	Goes up one menu level or exits a parameter change without saving. Shift between digits of multiple digit configuration settings values.	
	**Alarm Cut Off (ACO) Button**	Silences active audible alarm.	

Figure 7: Front Panel - Phoenix III

Status LEDs - Phoenix

Phoenix controller displays provide 24 LED indicators to indicate system status. Six LEDs are dedicated to specific stares. The other eighteen have factory assigned defaults as indicated in the table below and their assignments to alarms may be customized in the field using the remote interfaces.

Table 9 Status LEDs - Dedicated - Phoenix			
LED[2]	**Color**	**Alarm Name**	**Condition**
SYSOK3 **(NORM)**	Green	System OK	System OK - Normal operation, no alarms, inputs and outputs are in their normal range.
PMN[3]	Amber	Minor Alarm	Medium severity - Generally assigned to alarms which indicate a non-power affecting condition. Attention eventually required.
PMJ3	Red	Major Alarm	High severity - Generally assigned to alarms which indicate a power affecting condition. Immediate attention required.
PCR3	Red	Critical Alarm	Highest severity - Generally assigned to alarms which indicate a power affecting condition. Immediate attention required.
FLOAT	Green	Float Mode	One or more of the following alarms are present: Fuse Minor 48, Fuse Minor 24
EQL	Amber	Equalize / Boost Mode	One or more of the following alarms are present: Open String, LVBD Open, Fuse Major 48, Fuse Major 24

Table 10 Status LEDs - Custom Assignable - Phoenix[4]			
LED[5]	**Color**	**Alarm Name**	**Condition**
TCA	Amber	Total Current Alarm	Plant load current exceeds configured distribution current rating.
TCOMP (TEMP COMP)	Amber	Temperature Compensation Active	System voltage has been increased or decreased by the configured Temperature Compensation feature.
BAT	Amber	Battery Temperature Alarm	Battery temperature is above the configured threshold.
DCA	Amber	Distribution Current Alarm	Distribution branch current exceeds the configured threshold.
CFA	Red	Converter Fail Alarm	A DC/DC converter has failed.
DFA (FAJ)	Red	Distribution Fuse Alarm	A distribution or battery fuses or circuit breakers is open.
LVD	Red	Low Voltage Disconnect Alarm	A battery contactor is open due to plant voltage lower than the configured threshold.
(USR1)	Amber		User configurable LED.
TEMP	Amber	Temperature Alarm	Ambient temperature is not within configured thresholds.
LMR	Amber	Limited Recharge Alarm	Load current exceeds the configured % of rectifier capacity during normal operation. Alternatively, when load exceeds that of a configured number of redundant rectifiers.

[2] LED labels in parentheses indicate alternate designations not printed on the display label.

[3] The highest severity in the system will take precedence.

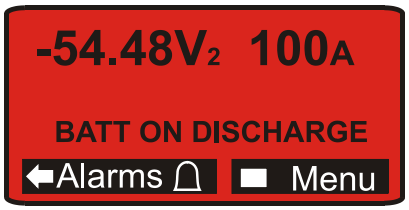
[4] LED labels are printed on the Front Panel. When custom assigned, place an appropriate label over the printed LED designation.

[5] LED labels in parentheses indicate alternate designations not printed on the Front Panel.

Table 10 Status LEDs - Custom Assignable - Phoenix[4]			
LED[5]	**Color**	**Alarm Name**	**Condition**
ACF	Amber	AC Fail Alarm	A rectifier is reporting AC failure.
RFA	Amber	Rectifier Fail Alarm	A rectifier has failed.
RFAM (MRFA)	Red	Rectifier Fail Multiple Alarm	Multiple rectifiers have failed.
HVSD	Red	High Voltage Shutdown Alarm	One or more rectifiers is shutdown due to plant voltage exceeding the configured threshold.
HVA	Red	High Voltage Alarm	System voltage exceeds the configured threshold.
BOD (BD)	Red	Battery on Discharge Alarm	System voltage below configured threshold.
VLV (LLVA)	Red	Very Low Voltage Alarm	System voltage below configured threshold.
(USR2)	Amber		User configurable LED.

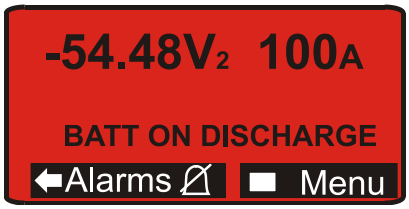
Audible Alarm

The controller has an integrated audible alarm located in its display assembly. This alarm will sound when any Critical, Major, or Minor alarm is detected by the controller. Upon assertion of the audible alarm the default front panel will provide and indicator of the alarm as well as a quick link to temporary cut-off the alarm.



Pressing the arrow key on a Pulsar controller or the ACO pushbutton on a Phoenix controller provides a quickly temporarily sliences the audible alarm.

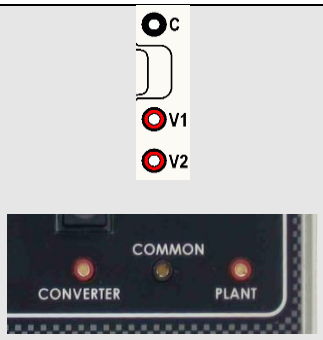
Once the audible cut-off is selected the alarms present in the system are listed. An indicator on the default front panel screen is provided to inform that the audible alarm cutoff is active. The audible alarm can also be turned-back on following similar procedures.



The audible alarm may be disabled altogether through proper configuration at the front panel or through remote means.

Voltage Test Jacks

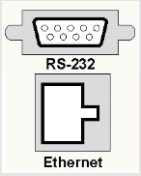
The controller front panel display has three test jacks that allow you to measure the system output voltage with a hand-held meter. The jacks are referenced with C (Common), V1 (Voltage One), and V2 (Voltage Two) or Common, Plant, and Converter. The voltage references correspond to the voltage referenced on the default front panel screen. For product consistency, factory built systems connect the controller in a manner such that V1 provides access to the +24V DC bus and V2 provides access to the -48V DC bus.



Thus, one system voltage can be measured between C and V1 and a second output voltage can be measured between C and V2. A voltage will not be present on one of the voltage test jacks if the controller resides in only a single voltage system without converters.

Local and Remote Access Ports

The controller provides communication ports for both local and remote access. Access to these ports depends on the specific controller configuration. Standard configurations of the NE843A, NE843C, NE843E, NE843G, and EP843D all have a front panel hatch located to the left of the test jacks that provide access to a local DB-9 RS-232 asynchronous serial port. There is also space allocated for an RJ45 receptacle that can be used as an option for the RS-232 serial port. It will also be used to access a second 10/100Base-T Ethernet port in the future. All Pulsar Plus family controllers also have integrated 10/100Base-T Ethernet. A standard shielded RJ-45 is provided for this connectivity. Slot-controllers, NE843A and CP843A, provide an option for a standard RJ11 telephone line interface.

Local and Remote Access Ports	
Port	**Description**
Front Panel **J7**  **J8**	A laptop PC can be connected to standard DB9 connector J7 to provide a ground-referenced RS-232 serial connection using EasyView ™ for local access. The port can also be configured to be used with an external modem. A position (as shown below) is reserved for a second RJ45 Ethernet connection in the future. It is covered for now.  
Side **J5**   **J6**	An RJ-45 Ethernet connector, Connector J5, on side (slot-mounted) or top (door-mounted) of unit, is provided for the integrated 10/100 Base-T network. Connection. This connection can be used for remote monitoring or as a local Craft port. In the remote monitoring mode, this port is compatible with Lineage Power Manager or other SNMP based programs used for web-based remote access and network management. Controllers equipped with an optional modem provide a standard RJ11 (J6) for a telephone line connection.

Front Panel Menu Structure

Feature content at the front panel is functionally divided at the Main Menu into the following categories:

Alarms

Warnings

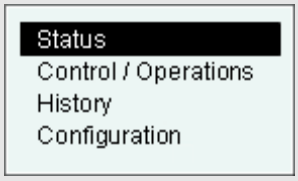
Status

Control/Operations

History

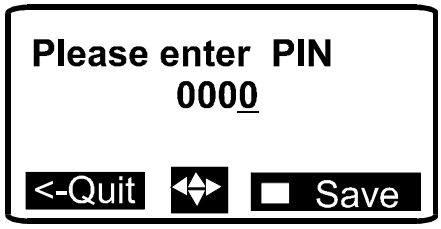
Configuration

Access to the main menu starts at the default front panel screen shown below.

Front Panel Default Screen	The front panel default screen displays the primary (Rectifier) and secondary (Converter when present) system bus voltages along with their respective total load in two different fonts. The larger font represents the rectifier output. Converter output voltages are also shown with one decimal extension and rectifier outputs have two decimal points. V1 represents +24V and V2 represents -48V systems. Test Jacks V1 and V2 provide access to these output voltages, respectively. The operating mode of the system is also displayed. Possible operating modes are: Float, Battery On Discharge, Boost, etc. An alarm soft-key as well as the back-light or status LED will indicate when alarms are present. Pressing the ⇦ will access the alarm cut-off as well as the alarms and warnings present in the system. Pressing the ☐ button accesses the main menu and the feature categories previously listed.
Main Menu 	Access to alarms, warnings, equipment status detail, basic control and operations for maintenance purposes, and system configuration can be obtained. Note: the controller has the ability to have a front Panel Password that limits configuration as well as some operations. A person with administrator level access can enable this feature through the remote interfaces. Standard controllers are shipped from the factory with this feature disabled.

Front Panel PIN

Controllers have the ability to restrict certain types of access from the front panel of the unit. It has the ability to enforce a four-digit Power Identification Number (PIN) requirement for users of the front panel for certain control/operations and configurable items. These control/operations and configurations are generally considered the items that will only be done during initial install or by specific personnel. This feature is shipped disabled from the factory in the standard controller offering and must be enabled by a remote user with administrator level privileges. When the front panel PIN feature is enabled, the factory default for the PIN is **0000**. Each position of the password is configurable between 0-9. A sample screen like that following is required for PIN access.



The up, down, left and right arrows are used to enter the appropriate password. Upon entering a correct PIN the following momentary screen shows up and then disappears leaving the user at the menu location prior to entering the PIN.

A user must enter the PIN for items that generally are not deemed as functions of a typical maintenance routine. It is assumed that the majority of the configured thresholds and system operational features will not be changed through a maintenance routine. Thus, entering the correct PIN will be required in order for these specific types of parameters or features to be modified in the field. These same rules are implemented when accessing through the Craft port. In addition to Configuration items, there are some Control/Operations that also require the PIN. These are shown below.

Control/Operations that require PIN

1. Clear History
2. Clear Statistics
3. Disconnects – Manual disconnect/reconnect of any LVLD/LVBD
4. Enter Boost

Control/Operations that do not require PIN

1. Lamp Test
2. Restart Rectifiers
3. Uninstall Equipment
4. Start Battery Test
5. Start Alarm Test
6. Load Factory Defaults
7. Cut-off Audible Alarm

Configuration - Most configuration items from the front panel require PIN access.

Configuration not requiring PIN

1. Battery Type
2. String Battery Capacity (AH)
3. Number Of Battery Strings
4. Manual Discharge Test Type
5. Manual Test Duration
6. Manual Test Check Battery Alarm Voltage Threshold
7. Battery Test Rectifier Voltage
8. System Date Format
9. System Date
10. System Time Format
11. System Time
12. Automatic Daylight Savings Feature
13. Display Contrast
14. Temperature Display Units
15. Alarm Test Feature
16. Alarm Test Relay Duration and Relay

Once a user enters the PIN, total front panel access is allowed for:

- As long as the user remains in menus other than the default menu and/or
- The default display has remained on the front panel for more than user configurable time-out value. Controllers have a factory configured default of 120 minutes. This time is adjustable between 1-120 minutes in 1 minute increments. 120 minutes is the factory default.
- An internal counter is kept and reset if the user leaves the default menu and returns to others menus before the time-out period is reached.

Front Panel Menu Flow

The following figures provide a menu flow map for each primary category. This information is followed up with brief descriptions of each of the menu items. **Alarms** and **Warnings** are not hierarchal mapped and are presented in chronological order of occurrence when they are present. No Active Alarms or No Active Warnings will be displayed when they are no alarms or warnings detected by the controller.

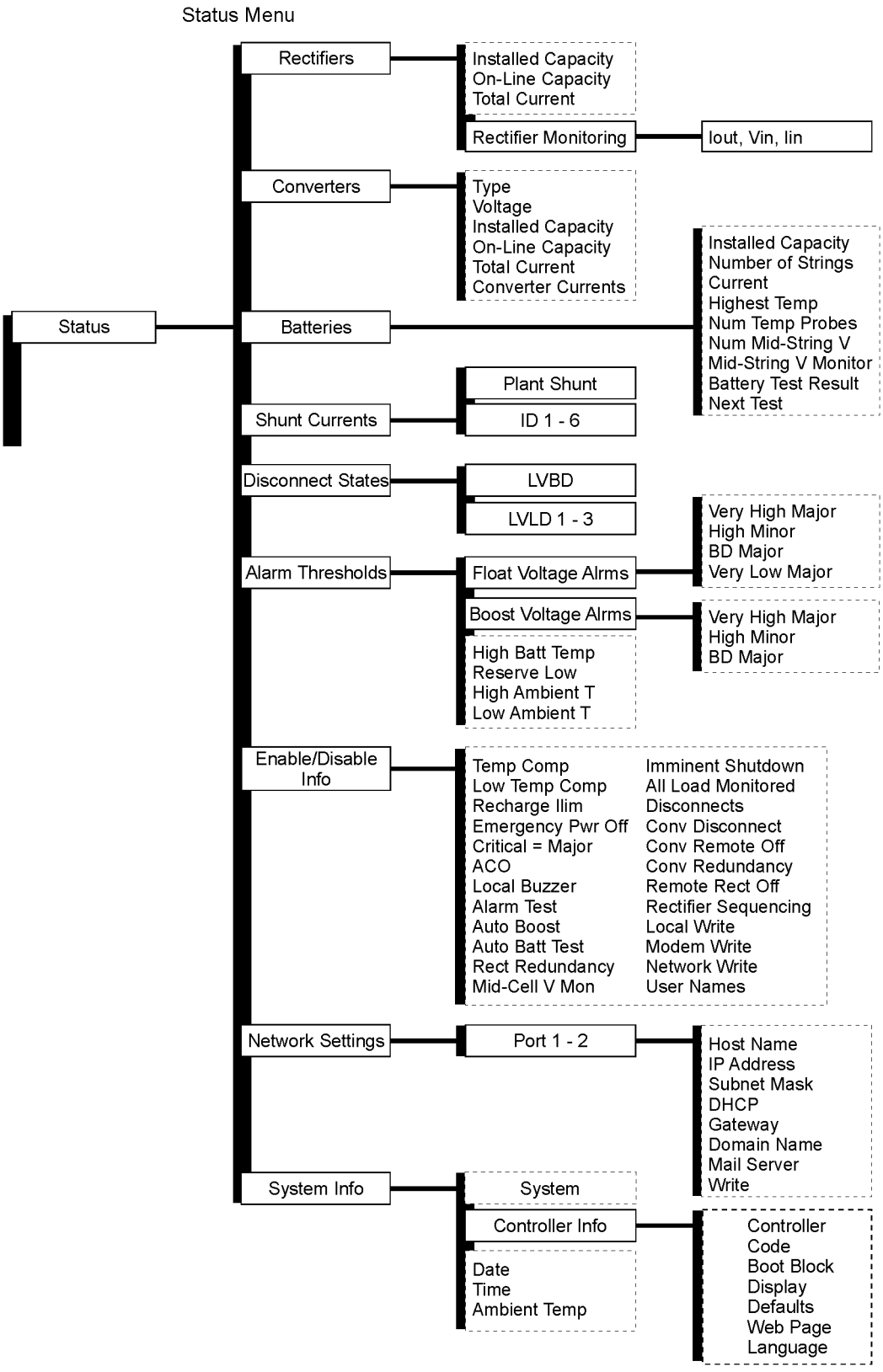


Figure 8: Status Menu

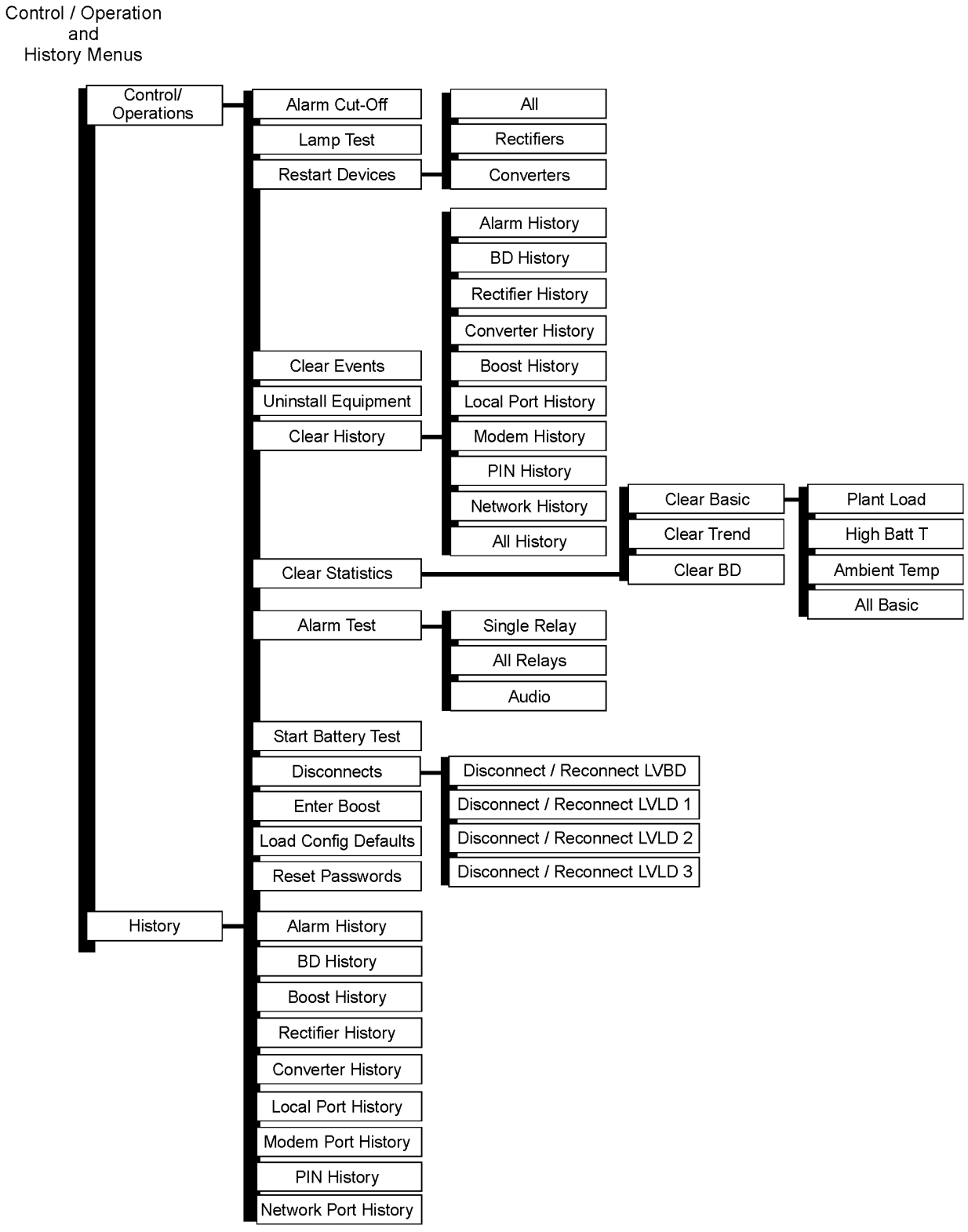


Figure 9: Control / Operations and History Menus

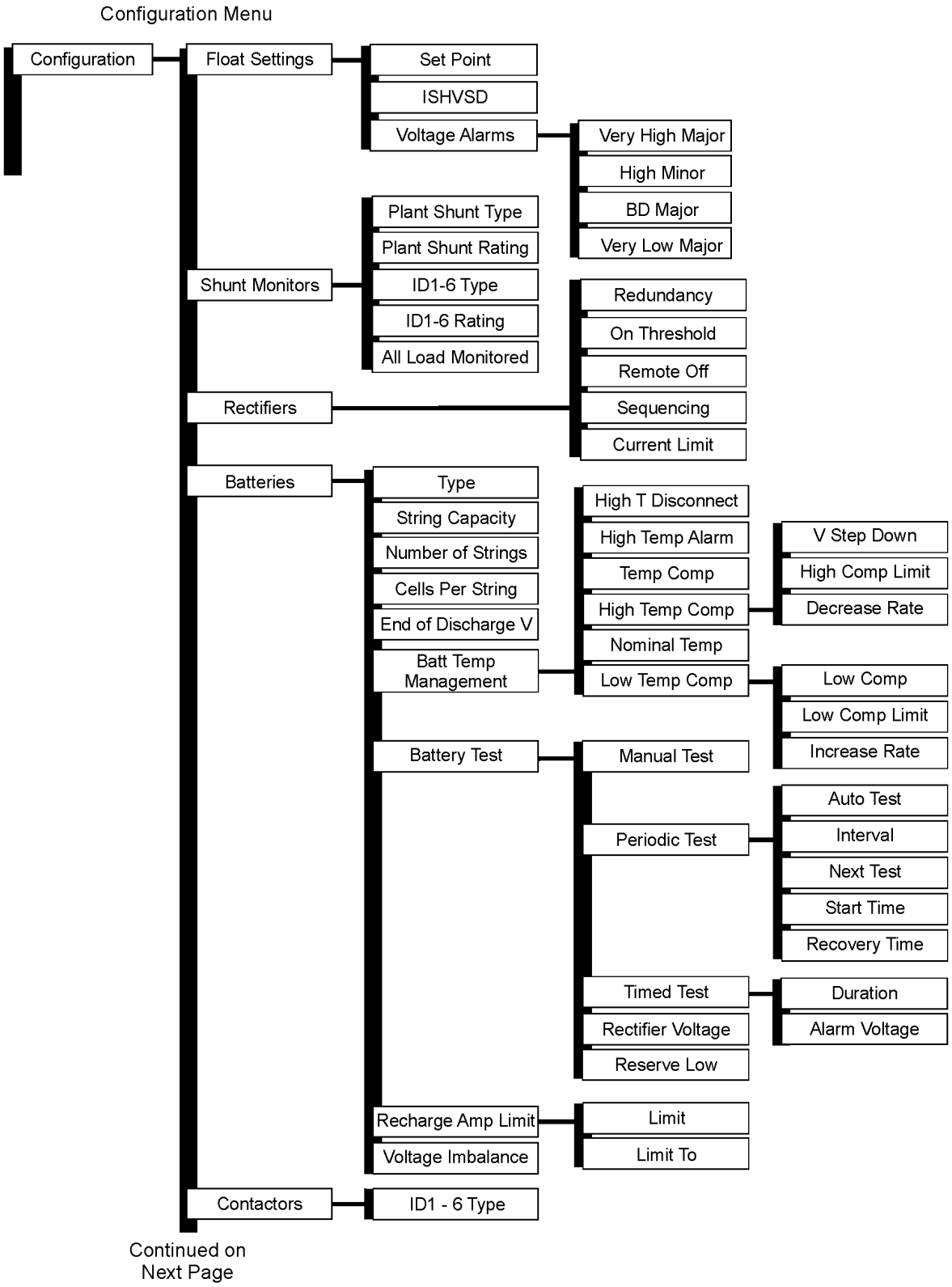


Figure 10: Configuration Menu (part 1)

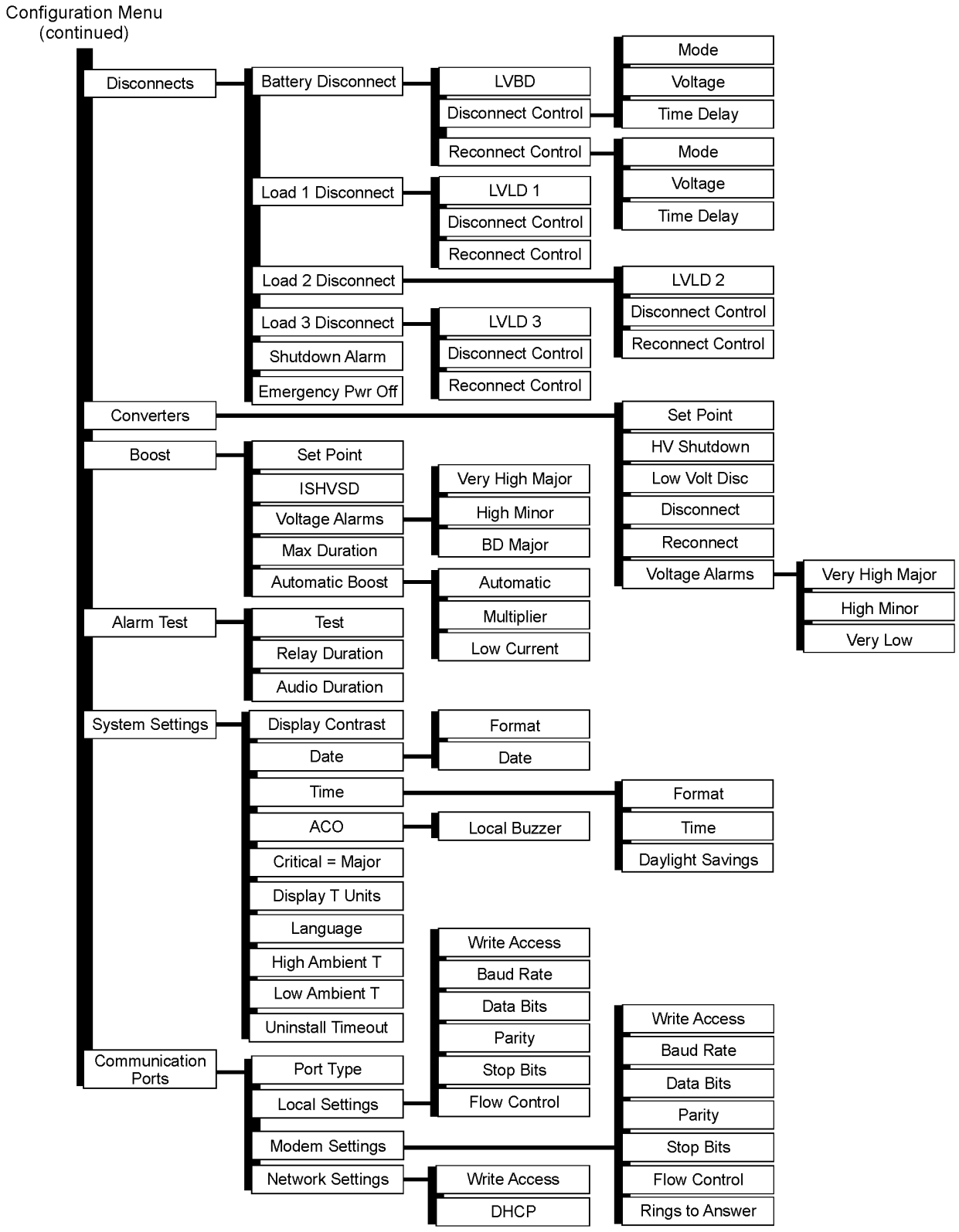


Figure 11: Configuration Menu (part 2)

Status

Status menus provide an overview of system components, threshold settings, and feature configuration. Configuration is not possible from here. Status items are also available through the remote port connections such as the web interface or local craft port using EasyView.

Rectifiers

Table 11 Rectifier Status	
Installed Capacity	The total installed rectifier capacity in the system. These rectifiers may or may not have AC applied or be outputting power.
On-line Capacity	The total rectifier capacity of rectifiers On-line in the system and able to produce power. Rectifiers that are running or in Standby are considered to be On-line. Rectifiers that are in RFA, ACF, etc. are not counted in the On-line capacity.
Total Output Current	The total output current of all rectifiers. This value is also displayed on the default front panel screen.
Rectifier Monitoring	Each individual rectifier's DC output current, AC input current, and AC input voltage by rectifier number Gmn () is available. "m" represents the shelf number and "n" represents the rectifier position number in that shelf. The state of the rectifier is also identified in the () when current is not shown. These states could be • **OFF:** Rectifier has been shutdown due to hardware failure (ex RFA, Temp, HV). • **STANDBY:** User has inhibited the rectifier's output voltage. • **MISSING:** An acknowledged rectifier has been removed. • **VACANT:** Rectifier has not been installed in that position.

Converters

Table 12 Converter Status	
Type	Provides generic description of the type of converter installed in the system. The information is of the format "24 to 48"or "48 to 24".
Voltage	Displays the measured value of the secondary (converter) DC output bus. This value is also displayed on the default front panel screen.
Installed Capacity	Provides the total installed converter capacity in the system.
On-line Capacity	The total converter capacity of rectifiers On-line in the system and able to produce power. Converters that have failed are not counted.
Total Output Current	The total output current of all converters. This value is also displayed on the default front panel screen.
Converter Currents	The individual converter output currents by converter number (Cmn) are available. "m" represents the shelf number and "n" represents the rectifier position number in that shelf.

Batteries

Table 13 Batteries Status	
Installed Capacity	Total installed battery capacity based upon the number of strings in the system and the Amp-Hour (AH) rating of the strings installed. This data is automatically entered for specific battery models included in the standard controller configuration. These values can be modified in the field. AH rates are 8-hour rates.
Number Of Strings	The total number of battery strings installed in the system.
Current	Measured value of the current flowing into or out of the batteries.
Highest Temp	Highest battery temperature being measured by the QS871 thermal probes attached in the system.
Num Temp Probes	Total number of installed QS873A thermal probes. Up to sixteen QS873A probes can be monitored by the controller.
Num Mid-String V	Total number of installed ES771 Mid-String voltage measurement modules. Up to six ES771 modules can be monitored
Mid-String V Monitor	Measured values of ES771 Mid-string voltages attached in the system. Up to three mid-string voltage readings per module.
Battery Test Result	Shows whether the most recent battery test was completed, and the last calculated reserve time.
Next Test	The date of the next automatic battery discharge test. The automatic discharge test feature must be enabled for this to work.

Shunt Currents

Table 14 Shunt Currents Status	
Plant Shunt	Displays the value of current measured by the shunt monitor on-board the controller. The plant shunt type must be set to Load or Battery and its current rating must be configured. Shunts are assumed to have a 50mV rating. Note: The Plant Shunt is generally used for a centralized architecture where there is one shunt for load or battery in which all the current passes.
ID1-8	Displays the individual shunt monitor currents measured by attached and properly configured Distribution Control and Monitoring modules. Values may be specific load or battery currents. Distribution Control and Monitoring modules include the NE872 and QS871. Up to eight values can be displayed.

Disconnect States

Table 15 Disconnect States Status	
LVBD(1)	Provides LVBD (Low Voltage Battery Disconnect) status. “None” is displayed for each non-configured contactor. “Closed” is shown for normal contactor state. “Open” shown for contactors that have opened and disconnected the battery.
LVLD(1-3)	Provides status of the three LVLDs (Low Voltage Load Disconnects 1-3). “None” is displayed for each non- configured contactor. “Closed” is shown for normal contactor state. “Open” will be shown for contactors that have opened or disconnected each respective load.

Alarm Thresholds

Table 16 Alarm Thresholds Status	
Float Voltage Alarms	Shows the configured settings for the Float Settings: Very High Major (HVSD), High Minor, Battery on Discharge (BD) and Very Low Voltage (VLV) alarms. Values are shown in (xx.xxV) format.
Boost Voltage Alarms	Shows the configured settings for the Boost Settings: Very High Major (HVSD), High Minor, and Battery on Discharge (BD) alarms. Values are shown in (xx.xxV) format.
High Batt Temp	Shows measured value of the highest battery temperature of all attached QS873 battery thermal probes.
Reserve Low	Shows configured value for the Low battery reserve time alarm.
High Ambient Temp	Shows configured value for the High Ambient Temperature alarm. This temperature is from the temperature sensor located on the controller itself.
Low Ambient Temp	Shows configured value for the Low Ambient Temperature alarm. This temperature is from the temperature sensor located on the controller itself.

Enabled/Disabled Info

This section of the menu provides a location to determine the Enable/Disable status of most controller features.

Table 17 Enabled/Disabled Info Status	
Temp Comp	Shows whether Battery Temperature Compensation is Enabled or Disabled.
Low Temp Comp	Shows if the Low Temperature compensation features is Enabled or Disabled. Note: General temperature compensation must be Enabled to use Low Temperature compensation.
Recharge Ilim	Shows if the Recharge Current Limit feature is Enabled or Disabled.
Emrgncy Pwr Off	Displays whether or not the Emergency Power Off (Remote Emergency Battery Disconnect) feature is Enabled or Disabled. If Enabled, EPO is asserted when contact closure is applied to the EPO input. The controller will keep battery contactors open until this contact closure has been removed. The feature assumes that AC has been removed to the system.
Critical=Major	Shows if the assertion of the Critical alarm severity with all Major alarms feature is Enabled or Disabled.
ACO	Shows if Audible Alarm Cut-off feature is Enabled or Disabled.
Local Buzzer	Shows if the on-board local audible buzzer is Enabled or Disabled.
Alarm Test	Shows if the Form-C Alarm Test Feature is Enabled or Disabled.
Auto Boost	Shows if the automatic boost charge mode of operation is Enabled or Disabled.
Auto Batt Test	Shows if the automatic battery test feature is Enabled or Disabled.
Rect Redundancy	Shows if the Rectifier redundancy feature is Enabled or Disabled.
Mid-Cell V Mon	Shows if the Mid-String Voltage imbalance detection feature is Enabled or Disabled.
Imminent Shutdn	Shows if the Imminent system shutdown alarm (LVBD) feature is Enabled or Disabled.

Table 17 Enabled/Disabled Info Status	
All Load Monitored	Shows if the All Loads Monitored feature is Enabled or Disabled. This assumes that every load distribution is being monitored so the sum of the load currents can be used to equal the total load of the system.
Disconnects	Shows if the LVBD (Low Voltage Battery Disconnect) and LVLD1-3 (Low Voltage Load Disconnects) features are Enabled or Disabled.
Conv Disconnect	Shows if the low voltage Converter Disconnect feature is Enabled or Disabled.
Conv Remote Off	Shows if the Remote Converter Off – Individual Remote Converter Standby feature is Enabled or Disabled.
Conv Redundancy	Shows if the Converter redundancy feature is Enabled or Disabled.
Remote Rect Off	Shows if the Remote Rectifier Off – Individual Remote Rectifier Standby is Enabled or Disabled.
Rectifier Sequencing	Shows if the Rectifier Sequencing is Enabled or Disabled.
Local Write	Whether or not the system can be configured through the local port.
Modem Write	Whether or not the system can be configured through the modem port.
Network Write	Whether or not the system can be configured through the network.
Usernames	Whether or not usernames and password identification have been enabled

Network Settings

This section of the menu displays the settings of the Network parameters for the two Ports. Controllers presently only utilizes Port 1. Port 2 is reserved for a second Ethernet port in the future.

Table 18 Network Settings Status	
Host Name	Network name assigned and configured for the controller since it acts as a repository for data and services such as e-mail, FTP, HTTP, etc that are accessed remotely by other equipment or users on the network.
IP Address *	Internet Protocol address assigned to the controller that identifies the unit on the network. The format for the IP address field is a 32-bit numeric address written as four numbers separated by periods (ddd.ddd.ddd.ddd). Each number, ddd, can be 0 to 255. In the server mode, 192.168.2.1 is used to access the controller.
Subnet Mask *	Internal network address assigned for identifying an internal network mask that the controller has been assigned to by a network administrator. The mask selectively includes or excludes certain equipment on a Host. The format for the Subnet Mask field is a 32-bit numeric address written as four numbers separated by periods (ddd.ddd.ddd.ddd). Each number, ddd, can be 0 to 255.
DHCP	This field indicates the operational mode of the integrated Ethernet port. The port can be operating as a DHCP Client, Static Client, or a DHCP Server. DHCP Server is the default mode of operation for Infinity NE Craft port and Static is the default for the LAN port.
Gateway *	This address is for the address of the Gateway or node on the network that will serve as the entrance to another network for the controller. This address is the address of the equipment or computer that routes the traffic from and to the controller to the outside network. It is generally the proxy server. The format for the Gateway address field is a 32-bit numeric address written as four

	numbers separated by periods (ddd.ddd.ddd.ddd). Each number, ddd, can be 0 to 255.
DNS *	Address of the Domain Name Server that translates domain names into IP addresses. This field is of the format ddd.ddd.ddd.ddd.
Mail Server	The address for the computer or equipment within the network that will manage the controller e-mails. The format for the Gateway address field is a 32-bit numeric address written as four numbers separated by periods (ddd.ddd.ddd.ddd). Each number, ddd, can be 0 to 255. If configured as 0.0.0.0, the controller will use the hostname mail host.
Write Access	This field shows whether the port has bee configured to allow Read/Write access or Read Only access. Read/Write access is available when the feature has been enabled.

* These fields are automatically assigned when using the DHCP server or Client mode of operation.

System Info

Table 19 System Info Status	
System	Up to 55 characters used to describe the system in which the controller resides. For example: Infinity NE. Note: The front panel will display only the first 22 characters.
Controller Info	Provides software versions running on the controller. These versions include the versions for the application code, the boot block, the display, the defaults file, and the web pages.
Date	Present Date of the controller on-board real-time clock using the configured Date format.
Time	Present time of the controller on-board real-time clock using the configured time format.
Ambient Temperature	Present temperature of the controller on-board temperature sensor displayed in the configured temperature format.

Control/Operations

The following are the system control and operation functions that can be performed from the front panel. These operations are generally used in post installation and maintenance modes.

Table 20 Control/Operations	
Alarm Cut-Off	Temporarily cuts-off (Turns off) the on-bard audible alarm.
Start Lamp Test	Temporarily illuminates all status indicators of attached rectifiers, distribution monitoring and control modules and the system controller.
Restart Devices	Provides the ability to restart All system serial controlled rectifiers and/or converters at once. Provides the ability to individually reset only rectifiers or converters at a time. This operation does not affect rectifiers, converters, and other system devices that are already functioning.
Clear Events	Used to clear momentary events or alarms. It clears the following system alarms: Check Battery, Reserve Time Low, Battery Voltage Imbalance

Table 20 Control/Operations	
Uninstall Equipment	Clears alarms related to the removal of a system component such as a rectifier, converter, thermal probe, or voltage monitoring module. Running this command allows the system controller to retake inventory of using equipment.
Clear History	This area of the menus system can be used to clear the various items that the controller maintains history records. Once cleared the controller begins to keep history of new events. **Alarm History** Clears only alarm event history. **BD History** Clear only BD network access history. **Rectifier History** Clears only rectifier event history. **Converter History** Clears only converter event history. **Boost History** Clears only Boost event history. **Local Port History** Clears only local port access event history. **Modem History** Clears only Modem port access event history. **Network History** Clears only network access history. **All History** Single command to clear all history.
Clear Statistics	This area of the menus system can be used to clear the various items that the controller maintains statistical records. Once cleared the controller begins to keep new statistical data. **Clear Basic** Clears individually or as a group the Basic statistical data kept on Plant Load, the highest battery temperature, and ambient. **Clear Trend** Clears the trend data kept on the plant load. **Clear BD** Clears the Battery on Discharge (BD) statistics kept on the plant load and voltage during discharge.
Alarm Test	Provides ability to initiate an alarm test on a specific user selected output relay or all output relays. Alarm relays are asserted at the configured alarm interval.
Start Battery Test	Initiates the manual battery test feature. A stop battery test operation is displayed to interrupt the testing and return the unit to normal operation. The manual battery test utilizes the configured test duration and a system bus voltage threshold to represent the end of reserve.
Disconnects	Provides individual manual control of up to four Low Voltage Disconnects (LVBD, LVLD1-3) for maintenance purposes.
Enter Boost	Initiates the manual battery Boost feature. A stop battery Boost operation is displayed to interrupt the Boost operation mode and return the unit to normal operation.
Load Config Defaults	This operation allows a user to bring back all factory defaults with a single operation. Factory defaults are also custom configuration defaults that are available. Custom configurations may support multiple factory defaults. Use caution when applying this command. Previous configuration changes will be overwritten.
Reset Passwords	Resets user, super-user and administrator passwords back to standard defaults.

History

This area of the menu system contains event history information. The controller works on a first record in first record out once the record size of a specific field is reached. The following system history logs are available:

Table 21 History	
Alarm History	Chronological view of the last 256 alarms and events that have occurred since the last time the history log was cleared.
BD History	Chronological view of the last 16 battery on discharge (BD) events since the last time the history log was cleared.
Boost History	Chronological view of the last 16 times the system entered boost mode since the last time the history log was cleared.
Rectifier History	Chronological view of the last 256 rectifier alarms and events that have occurred since the last time the history log was cleared.
Local Port History	Chronological view of the last local terminal logins that have occurred since the last time the history log was cleared. The number of these events counts towards the total number of Modem, Network, PIN, and Local port events which can be up to 48 events.
Modem Port History	Chronological view of the last Modem port logins that have occurred since the last time the history log was cleared. The number of these events counts towards the total number of Modem, Network, PIN, and Local port events which can be up to 48 events.
PIN History	Chronological view of the last Front Panel access that required password entry. The number of these events counts towards the total number of Modem, Network, PIN, and Local port events which can be up to 48 events.
Network Port History	Chronological view of the last Network access events that have occurred since the last time the history log was cleared. The number of these events counts towards the total number of Modem, Network, PIN, and Local port events which can be up to 48 events.

Configuration

The Configuration section of the menu system is where system operational parameters, system device information, and alarm thresholds are set-up and modified. Factory defaults are provided for the standard controller. Some defaults are dependent on the battery type. Consult Appendix E for default settings of different battery. Valve-Regulated Lead Acid (VRLA) batteries and default settings defined for the Standard configuration are assumed in this section. Customer specific configurations may be different. When there is doubt, contact Lineage Power technical support.

All items are field configurable. Modified settings are stored in non-volatile memory. Controllers require time to update sectors in flash memory for changes. Allow approximately a minute for the controller to accept and store modifications in non-volatile memory before removing power to the unit.

Float Settings

Table 22 Float Settings Configuration	
Set Point	Parameter sets the value that primary (rectifier) DC bus will be set and regulated. System Float Voltage set-point adjustable from -42.00V to -56.50V and +22.00V to +28.00V with a factory default of -54.48V and +27.24V for 48V and 24V VRLA power systems, respectively.
ISHVSD	This is an Independent High Voltage Shutdown threshold during the Float mode of operation that is sent to and stored in the rectifiers that is used by each rectifier for independent high voltage monitoring. The threshold can be set from -50.00V to -60.00V or +25.00 to +30.00V with a factory default setting of -58.50 and +29.25V for 48V and 24V systems, respectively.
Very High Voltage Major	This is the High Voltage Shutdown Alarm (HVSD) threshold for the primary DC bus that when it is reached the controller will send out the HV shutdown command to the serial rectifiers so that the offending rectifier will shut itself down. The threshold can be set from -50.00V to -60.00V or +25.74 to +31.75V with a factory default setting of -57.00 and +28.24V for 48V and 24V systems, respectively.
High Voltage Minor	This alarm indicates an abnormally high float output voltage (HFV) on the primary DC bus but the controller does not attempt to shut the offending unit down. The threshold can be set from -50.00V to -60.00V or +24.75 to +29.75V with a factory default setting of -56.00 and +27.74V for 48V and 24V systems, respectively.
BD (Battery on Discharge) Major	Primary DC bus threshold setting that determines when the system is determined to be operating either completely or partially on battery reserve. The threshold is set from -46.00V to - 55.00V or +23.00 to +28.00V. Has a factory default of -51.00V and +25.54V for 48V and 24V systems.

Table 22 Float Settings Configuration	
Very Low Voltage Major	Primary DC bus alarm threshold used to indicate an imminent system shutdown due to discharging batteries or a very low output voltage (VLV). Threshold is set from -40.00V to- 51.00V or +20.00 to +25.50V. Has a factory default of -46.00V and +23.00V for 48V and 24V systems.

Shunt Monitors

The Pulsar Plus family of controllers utilize an RS485 serial communication link to external distribution monitoring and control boards for shunt measurements and contactor control. Up to eight external boards can be managed by the controller for shunt monitoring and contactor control. Thus, eight contactors can be assigned to one of four independent controls: LVBD, LVLD1, LVLD2, and LVLD3. These distribution monitoring and control boards are identified by setting an address ID at the board and then assigning appropriate operation Type at the controller. The available Types are: Battery, Load, and None. Shunt sizes for each assigned battery or load type must also be configured. All shunts are assumed to have a voltage rating of 50mV. The current rating of each shunt is programmable between 0 to 9999A. Systems shipped with the controllers are appropriately pre-configured in the factory for the right shunt values and assignments.

Table 23 Shunt Monitors Configuration	
Plant Shunt Type	Definition type for the on-board shunt used for centralized plant architectures that are designed with a single shunt to monitor load or battery current. The on-board shunt monitor may be configured as “NONE”, “BATTERY”, or “LOAD”. The factory default is None.
Plant Shunt Rating	Current rating of the shunt being measured by the on-board shunt circuitry used for centralized plant architectures. Shunts are assumed to have a 50mV rating. The rating can be set from 0A to 9999A with a factory default setting of 600A.
ID1-8	The operation Type of each shunt monitoring circuit on system distribution boards 1-8 must be assigned based upon actual system implementation. The operational Type may be: None (For no shunt), Battery (Monitoring battery currents), and Load (for load currents).
ID1-8 Rating	The current rating of each shunt being monitored by the system distribution boards 1-8 must be configured based upon actual system implementation. All shunts are assumed to be 50mV. The current rating may be from 0-9999 Amps. The factory default is 600A for load shunts and 800A for the battery.

Table 23 Shunt Monitors Configuration

Defaults

The controller is factory configured with:

ID1	Type: Battery	Shunt: 300A
ID2	Type: None	Shunt: 300A
ID3	Type: None	Shunt: 600A
ID4	Type: None	Shunt: 600A
ID5	Type: None	Shunt: 600A
ID6	Type: None	Shunt: 600A
ID7	Type: None	Shunt: 600A
ID8	Type: None	Shunt: 600A

IDs defined as **None** will have no currents displayed and shunt configuration has no affect.

Note: Depending on the system and controller configuration for that system the values of the total load current (I_{load}) are calculated differently. The following table describes the different calculations for total load current.

All Loads Monitored	When Enabled, the All Load Monitor feature automatically links all Shunt Monitors configured as "Load" monitors to the system total load. This feature is operational only when the Plant Shunt Type is configured as NONE. The factory default is Disabled.

Table 24 Shunt Type Configuration

Shunt Type	System Configuration	Controller Operation
Battery	Shunt input is connected to a centralized battery shunt located in the system. All battery current flows through this shunt to and from the system batteries. System may or may not have Shunt Monitors configured.	Controller reports the following: $\mathbf{I_{Load} = \Sigma I_{Rect} + I_{plantshunt}}$ $\mathbf{I_{battery} = I_{plantshunt}}$ Where $I_{plantshunt}$ is negative for current into the battery and positive for current out of the battery. If there are shunt monitor cards also installed: 1. Cards configured as monitoring a "Load" shunt do not affect the total I_{Load} but have their values individually displayed. 2. Cards configured as monitoring a "Battery" shunt do not contribute to total battery current ($I_{battery}$) but have their values individually displayed. All battery management functions remain available.

Table 24 Shunt Type Configuration		
Shunt Type	**System Configuration**	**Controller Operation**
LOAD	Shunt input is connected to a centralized load shunt located in the system. The total system Load current flows through this shunt to the load equipment. System may or may not have Shunt Monitors configured.	Controller reports the following: $I_{Load} = I_{plantshunt}$ $I_{battery}$ = **Unavailable** If there are shunt monitor cards also installed: 1. Cards configured as monitoring a "Load" shunt do not affect the total I_{Load} but have their value individually displayed. 2. If there are cards configured as monitoring a "Battery" shunt it is assumed that all battery current flows through these shunts to and from the system batteries. These values are summed to the total battery current ($I_{battery}$) and override the previous equation for $I_{battery}$. Thus, the new $I_{battery}$ is $I_{battery} = \Sigma I_{battery\ shunt\ monitors}$ All battery management features are be available.
NONE	Shunt input may or may not be connected to a shunt located in the system. System has Shunt Monitors configured in the system.	Controller reports the following: $I_{Load} = \Sigma I_{Rect}$ $I_{battery}$ = **Unavailable** 1. If cards are configured to monitor "Battery" shunts, it is assumed that all battery current flows through these shunts to and from the system batteries and is summed to be the total battery current ($I_{battery}$). 2. Cards configured as monitoring a "Load" shunt do not affect the total I_{Load} but have their values individually displayed. Thus, the controller reports the following: $I_{battery} = \Sigma I_{battery\ shunt\ monitors}$ $I_{Load} = \Sigma I_{Rect} + \Sigma I_{battery\ shunt\ monitors}$ Where $I_{battery\ shunt\ monitors}$ is negative for current into the battery and positive for current out of the battery. **Note:** If there are no Shunt Monitors configured as battery then: $I_{battery}$ = **Unavailable** $I_{Load} = \Sigma I_{Rect}$

Table 24 Shunt Type Configuration		
Shunt Type	**System Configuration**	**Controller Operation**
	Shunt input may or may not be connected to a shunt located in the system. System has Shunt Monitors configured in the system and all system loads are monitored. And The new "All Load Monitored" feature has been "Enabled".	1. Cards configured to monitor "Battery" shunts are assumed to monitor all battery current to and from the system batteries and are summed to the total battery current ($I_{battery}$). In addition, all individual battery monitor values are displayed 2. Cards configured as monitoring a "Load" shunt are summed to calculate the total I_{Load} and also have their individual values displayed. Thus, the controller reports the following: $\mathbf{I_{battery} = \Sigma\ I_{battery\ shunt\ monitors}}$ $\mathbf{I_{Load} = \Sigma\ I_{Load\ shunt\ monitors}}$ Note: If there are no Battery Shunt Monitors configured but the total load monitored is enabled, then the total battery current is calculated as follows: $\mathbf{I_{battery} = Unavailable}$ $\mathbf{I_{Load} = \Sigma\ I_{Load\ shunt\ monitors}}$ Recharge current feature is unavailable.

Rectifiers

Table 25 Rectifiers Configuration	
Redundancy	An alarm is automatically generated when the rectifier capacity On-line in the system falls below N+X based on the present system load. X is the desired number of rectifiers to check for redundancy. The factory default for this feature is Enabled and X=1.
Rectifier On Threshold	The system DC bus threshold that rectifiers placed into Standby will automatically be turned on. This value can be set between -40.00V and -51.00V and +20.00V to +25.00V with factory defaults set to -44.0V and +22.00V for 48V and 24V rectifiers, respectively.
Remote Off	Provides the ability to disable or enable the capability of placing a rectifier into Standby operation through remote means such as the network, modem, or local terminal. The factory default for this feature is Disabled.
Sequencing	When enabled, provides the ability to hold off a user configured group of rectifiers when appropriate contact closure is received, The feature is also called Group Standby. The factory default for this feature is Disabled.
Current Limit	Adjustable from 30-100%. At 100% the rectifier will output its nameplate rating

Table 25 Rectifiers Configuration	
	and truly act as constant power rectifiers. Settings below 100% will be current limited to that percentage of the rectifier's name plate current rating.

Batteries

Table 26 Batteries Configuration	
Battery Type	The type of batteries used in the system can be selected from the following battery types loaded in the Standard controller: • 12A100FT • 12IR150/150LP • 3A95-21L • 3A95-33L • 6A95-15L • IR40EC • NCX-125 • NSB110FT • NSB60FT • SE48S80 • Generic VRLA (Valve Regulated Lead Acid) • Generic NiCd (Nickel Cadmium) • Generic Li-LMP (Lithium Metal Polymer) • 12A150FT • 3A125-33L • 3A95-27L • 6A95-13L • IR30EC • L54V63FTX • NCX-80 • NSB170FT • SE48S63 • TEL12-105F • Generic FLOODED (flooded lead acid) • Generic Li-ELiTE (Lithium ELiTE) Once selected the user has the opportunity to automatically accept the standard defaults for all battery Type related features. Parameters such as float voltage, float alarms, thermal compensation parameters, etc. are automatically adjusted if defaults are accepted. The system factory default is Valve-Reg.
String Capacity	Capacity of an individual battery string in the system which is used to derive the total installed system battery capacity. This value has to be entered for Generic battery types but is automatically configured for specific battery models. The value configured should be the rating to 1.75V at an 8-hr discharge rate. The available range is 0-9999 AH. The system factory default is 0 AH corresponding to the Generic Valve-Reg.
Battery Strings	The total number of battery string installed in the system entered by the user for inventory purposes and initial reserve time calculations. This value is automatically configured when using smart lithium batteries. Available range is 0-16. The Infinity NE system factory default is four strings of CSL-12100 batteries.
Cells Per String	The number of basic battery cells that make up a battery string. The available range is 1-75 cells with a factory default of 24 and 12 cells for -48V and +24V systems, respectively.

Table 26 Batteries Configuration	
End of Dchrg	The user defined system bus voltage at which the batteries are considered to be at the end of their reserve capability for manual battery testing (End of Discharge). This end-of-discharge voltage is used for automatic and opportunistic reserve time calculations. This setting has a range of -40.25V to -48.75V and 19.25V to +25.35V +21.00 with factory default of -42.00V and +21.00V for 48V and 24V systems, respectively.
Battery Temp Management*	This section includes all the parameters required for thermal management of the batteries. Parameters include the ability to enable/disable thermal compensation for high and low temperatures and set the slope decrease and increase rates, respectively. There is also a High Temperature alarm threshold, High Temperature Disconnect feature. Thermal compensation features are factory defaulted Enabled for Valve-Reg batteries.
Batt Test*	This section includes all the parameters required for battery testing through manual or automatic means. Configuration for manual test duration and the system test end-voltage for manual battery test are here along with the interval, start date, start time, time from last battery on discharge BD, and enable/disable for periodic battery test. The rectifier voltage during battery discharge testing and system reserve time low alarm threshold are also available. Automatic battery testing is factory disabled.
Recharge Amp Limit	Enable or disable battery recharge limiting and set recharge current limit. When enabled, the controller will regulate the current into the batteries to be below the setting. Recharge current limit is factory Disabled. The current limit range is 5 to 1000A and has a factory default of 50A for Valve-Reg batteries.
Voltage Imbal	User defined voltage threshold for a mid-string voltage imbalance alarm. Range 1.4 - 3.0 Volts. The factory default is 1.7V for Valve-Reg batteries. This alarm is only generated after batteries have been sitting on float for a minimum of 12 hours and the total battery current is less than 3A.

*See Appendix C for detailed descriptions of the Thermal Compensation and Battery Test features and parameters.

Contactors

The Pulsar Plus family of controllers utilize distribution monitoring and control boards to control contactors. These boards include the ES772, QS871, and the NE872 modules. Each of the boards in the system must be assigned to LVD contactor control by appropriately configuring a unique board ID on the board and associating it to a specific contactor function at the controller.

Table 27 Contactors Configuration	
ID1-6	Associates the ID numbers set on the distribution monitoring boards (NE872/QS871) to one of four independent set of contactor controls. These contactor controls are: LVBD (Low Voltage Battery Disconnect), LVLD1 (Low Voltage Load Disconnect 1), LVLD2 (Low Voltage Load Disconnect 2), and LVLD3 (Low Voltage Load Disconnect 3).

The controller has assigned each unique board ID number as follows: ID1 to LVBD, ID2 to LVLD1, ID3 to LVLD2, and ID4 to LVLD3. Note: the text description used for the disconnect such as "LVLD1" can be renamed using the remote interfaces. Each of these assignments has its own unique programmable parameters described next. ID5-ID8 have been assigned to NONE. Selecting NONE removes the ability of that particular distribution control board to control and external LVD.

Disconnects

This section of the configuration menu contains the parameters associated with the individual function assignments made in the previous section. Each LVD type (LVBD and LVLD1-3) can individually be enabled or disabled. Only the LVBD and LVLD1 are Enabled from the factory. The LVD's disconnect and reconnect method of operation used by the controller can be configured for each assignment. The method of disconnect or reconnect can be based on the traditional means of reaching a system bus voltage threshold (***Voltage***) or based on both reaching the system bus voltage threshold and an elapsed time from once the system has been placed on discharge (BD) and at least two or more rectifiers are reporting AC failures (***Voltage/Time***). The same Voltage and Voltage/Time mode of operation can also be selected for reconnecting LVDs. In this case the elapsed time configured is the time from once the reconnect voltage threshold has been reached. Note: selecting None for a reconnect mode will require manual intervention to shut the contactor. Selecting None for the disconnect mode will not allow a LVD to open. The controller has factory defaults of the following:

Table 28 Disconnects Configuration	
LVBD (Enabled)	Disconnect Mode (**Voltage**); Range: Voltage, Voltage/Time, None Disconnect Voltage (**-42.0V/+21.0V**); Range:-39.0 to -50.0V/+19.5 to +25.0V Time Delay (**0 min**); Range: 0-300min Reconnect Mode (**Voltage**); Range: Voltage, Voltage/Time, None Reconnect Voltage (**-48.0V/+22.2V**); Range:-39.0 to -55.0V/+19.5 to +27.0V Time Delay (**0 sec**); Range: 0-300sec
LVLD1 (Enabled)	Disconnect Mode (**Voltage**); Range: Voltage, Voltage/Time, None Disconnect Voltage (**-42.0V/+21.0V**); Range:-39.0 to -50.0V/+19.5 to +25.0V Time Delay (**0 min**); Range: 0-300min Reconnect Mode (**Voltage**); Range: Voltage, Voltage/Time, None Reconnect Voltage (**-44.0V/+22.0V**); Range: 39.0 to -55.0V/+19.5 to +27.0V Time Delay (**0 sec**); Range: 0-300sec
LVLD2 (Disabled)	Disconnect Mode (**Voltage**); Range: Voltage, Voltage/Time, None Disconnect Voltage (**-42.0V/+21.0V**); Range:-39.0 to -50.0V/+19.5 to +25.0V Time Delay (**0 min**); Range: 0-300min Reconnect Mode (**Voltage/Time**); Range: Voltage, Voltage/Time, None Reconnect Voltage (**-44.0V/+22.0V**); Range: 39.0 to -55.0V/+19.5 to +27.0V Time Delay (**30 sec**); Range: 0-300sec

Table 28 Disconnects Configuration	
LVLD3 (Disabled)	Disconnect Mode (**Voltage**); Range: Voltage, Voltage/Time, None Disconnect Voltage (**-42.0V/+21.0V**); Range:-39.0 to -50.0V/+19.5 to +25.0V Time Delay (**0 min**); Range: 0-300min Reconnect Mode (**Voltage**); Range: Voltage, Voltage/Time, None Reconnect Voltage (**-44.0V/+22.0V**); Range: 39.0 to -55.0V/+19.5 to +27.0V Time Delay (**0 sec**); Range: 0-300sec
— Imminent Shutdown Alarm	When enabled, the Imminent Shutdown Alarm is generated prior to opening the LVBD. Once the LVBD threshold has been reached, the alarm is generated. The alarm is issued 15 seconds prior to opening the contactor to provide an indication that system shutdown is imminent due to a system battery disconnect. The alarm is based on the configured LVBD battery disconnect threshold. The factory default for this feature is Disabled.
— Remote Emergency Power Off (EPO)	If enabled, the remote Emergency Power Off (EPO) feature allows the controller to detect the occurrence of a contact closure between J3.5 and J.10 and force open all battery contactors in the system. The battery contactor will open five seconds after the contact has been asserted. Once the contact is removed, the battery contactor will be re-asserted to its previous operational state. The factory default for this feature is Enabled.

Converters

Table 29 Converters Configuration	
Set-Point	Parameter sets the value that secondary (converter) DC bus voltage will be set and regulated. The converter output voltage set-point is adjustable from -46.00V to -54.5V and +23.0V to +27.2V with a factory default of -52.0V and +26.0V for 48V and 24V converter outputs, respectively.
HV Shutdown	This is an Independent High Voltage Shutdown threshold that is sent to and stored in the converters that is used by each converter for independent high voltage monitoring. The threshold can be set from -50.0V to -60.0V or +25.0 to +30.0V with a factory default setting of -58.0V and +29.0V for 48V and 24V converter outputs, respectively.
Low Voltage Disconnect	Enable or Disable for a feature that allows attached converters to be placed into Standby once an input voltage threshold is reached. The factory default for this feature is Disabled.

Table 29 Converters Configuration	
Disconnect	Converter input voltage threshold to be used to place all converters into Standby. The converter disconnect threshold is adjustable from -40.0V to -50.0V and +20.0V to +25.0V with a factory default of -46.0V and +23.0V for 24V and 48V output converters, respectively.
Reconnect	Converter input voltage threshold to be used to return all converters from Standby to On. The converter reconnect threshold is adjustable from -44.0V to -54.0V and +22.0V to +27.0V with a factory default of -52.0V and +26.0V for 24V and 48V output converters, respectively.
Voltage Alarms	Has the ability to set similar secondary DC bus level alarms as found with the rectifiers and the primary DC bus. This includes Very High Major, High Minor, and Very Low voltage. **Very High Major** This is the High Voltage Shutdown Alarm (HVSD) threshold for the secondary DC bus that when it is reached the controller will send out the HV shutdown command to the serial converters so that the offending converter will shut itself down. The threshold can be set from -50.0V to -60.0V or +25.0 to +30.0V with a factory default setting of -56.00 and +28.5V for 48V and 24V converter outputs, respectively. **High Major** This alarm indicates an abnormally high output voltage on the secondary DC bus. The controller does not attempt to shut the offending unit down. The threshold can be set from -48.0V to -60.0V or +24.0 to +30.0V with a factory default setting of -54.00 and +27.0V for 48V and 24V for converter outputs, respectively. **Very Low** Secondary DC bus alarm threshold used to indicate something dragging the bus to an undesired voltage level or an incorrect setting. The threshold can be set from -40.0V to -54.0V or +20.0 to +27.0V with a factory default setting of -46.0V and +23.0V for 48V and 24V for converter outputs, respectively.

Boost

The Boost function allows battery charging to be expedited by raising the system voltage to Boost level for a set time. The following boost mode parameters are set in this area of the menu system:

Table 30 Boost Configuration	
Set Point	Primary DC bus voltage set-point during the Boost mode of operation. Boost (set point) is adjustable from -48.00V to -58.00V and 22.00 to 30.00V in 0.1V increments. The factory default setting is -55.20V and 27.24V.

Table 30 Boost Configuration	
ISHVSD	This is an Independent High Voltage Shutdown threshold during the Boost mode of operation that is sent to and stored in the rectifiers that is used by each rectifier for independent high voltage monitoring. The threshold can be set from -52.00V to -60.00V or +26.00 to +30.00V with a factory default setting of -58.50 and +29.25V for 48V and 24V systems, respectively.
Voltage Alarms	Has the ability to set similar DC bus level alarms during Boost as found with the Float mode of operation. This includes Very High Major, High Minor, and BD. **Very High Major** This is the High Voltage Shutdown Alarm (HVSD) threshold for the primary DC bus during Boost that when it is reached the controller will send out the HV shutdown command to the serial rectifiers so that the offending rectifier will shut itself down. The threshold can be set from -50.00V to -60.00V or +25.75 to +31.75V with a factory default setting of -57.00 and +28.24V for 48V and 24V systems, respectively. **High Minor** This alarm indicates an abnormally high output voltage on the secondary DC bus during Boost. The controller does not attempt to shut the offending unit down. The threshold can be set from -50.00V to -60.00V or +25.75 to +31.75V with a factory default setting of -56.00 and +27.74V for 48V and 24V for systems, respectively. **BD** Primary DC bus threshold setting used during the Boost mode of operation that determines when the system is determined to be operating either completely or partially on battery reserve. The threshold can be set from -46.00V to- 55.00V or +23.00 to +28.00V with a factory default setting of -51.00V and +25.54V for 48V and 24V systems, respectively.
Max Duration	Defines the maximum time duration the system can remain in the Boost mode of operation. Value set from 1 to 80 hours. The factory default setting is 5 hours.
Automatic	Enables or Disables the automatic boost feature. Boost may be configured to use a “Timed” or “Current” based algorithm. When set to Time, Boost will utilize a multiplication factor of the actual time of the last BD. When set to Current, Boost will end once the monitored battery current reaches the programmed threshold. These values can be modified through the remote interfaces. The factory default setting for Automatic Boost is Disabled.

System Settings

Table 31 System Settings Configuration	
Display Contrast	Allows display back-light intensity to be adjusted for contrast in local ambient light. Factory default is 50%.
Date	Sets system date and format. The format for date can be selected from: mm/dd/yyyy, dd/mm/yyyy, yyyy/mm/dd, mm-dd-yyyy, yyyy-mm-dd, dd-mm-yyyy, mm/dd/yy, yy/mm/dd, dd/mm/yy, mm-dd-yy, yy-mm-dd, or dd-mm-yy and the format for time can be 12HR/24HR format. The factory default is Date: mm/dd/yyyy and Time: 24HR.
Time	Sets system date and format. The format for date can be selected from: mm/dd/yyyy, dd/mm/yyyy, yyyy/mm/dd, mm-dd-yyyy, yyyy-mm-dd, dd-mm-yyyy, mm/dd/yy, yy/mm/dd, dd/mm/yy, mm-dd-yy, yy-mm-dd, or dd-mm-yy and the format for time can be 12HR/24HR format. The factory default is Date: mm/dd/yyyy and Time: 24HR.
Daylight Savings	Enable or disable. The factory default is Enabled.
Display T Units	°C or °F. The factory default is °C.
Languages	Allows the language support to be set between English and Other. Other is a secondary language such as Spanish or French.
High Ambient T	High ambient temperature alarm threshold that can be set from 30°C to 75°C. This temperature is measured on-board the controller. The factory default setting is 75°C.
Low Ambient T	Low ambient temperature alarm threshold that can be set from -40°C to 10°C. This temperature is measured on-board the controller. The factory default setting is -40°C.

Communication Ports

Menus for configuring the following communication parameters:

Table 32 Communication Ports Configuration	
Port Type	Sets the RS-232 asynchronous serial communication port for either Local terminal or Modem application. Factory default is Local.
Local Port Settings	Provides the ability to Enable or Disable Write access to the controller, the ability to change system settings through the SNMP management or local port. The factory default setting is enabled. The baud rate, number of data bits, parity, number of stop bits, and flow control parameters for the port is also configurable. These parameters have been factory set to 9600, 8, none, 1, none, respectively.

Table 32 Communication Ports Configuration	
Modem Port Settings	Provides the ability to Enable or disable Write access, the ability to change system settings through the Modem. The factory default setting is Enabled. The baud rate, number of data bits, parity, number of stop bits, and flow control parameters for the port is also configurable. Note: the initialization string of the external MODEM must be set in the controller. Factory default for the string is AT&FEV&C1S0=0H. This string can be modified by utilizing EasyView or T1.317 commands through a local terminal connection. Consult technical field support if further assistance is required. Thee number of rings to be detected by the modem before it answers (Rings to Answer) can be set from 1 to 9. The factory default setting is 1.
Network Settings	The access type and the Dynamic IP addressing mode are set in this section. The Dynamic IP address mode sets the IP address operation mode of the Ethernet port on the controller. This port has been set to act in DHCP (Dynamic Host Configuration Protocol) Client mode. This mode of operation assumes that the network will automatically provide an IP address to the controller. The port may also be configured to use a "Static" IP address which is configured by the user. The Static and Client modes of operation allow the controller's port to be configured to operate plugged into the network. It can also be used in a "Server" mode to provide Craft port functionality. In this Server mode the controller default IP address is ***192.168.2.1*** *(*destination address in a browser). Note: once this parameter is changed, the controller must be re-booted by removing power from the unit by removing and re-inserting the unit into the shelf. In addition, there is the ability to Enable or disable Write access for someone who is attached to the Craft port. The factory default setting is Enabled.

10/100 Base-T Port

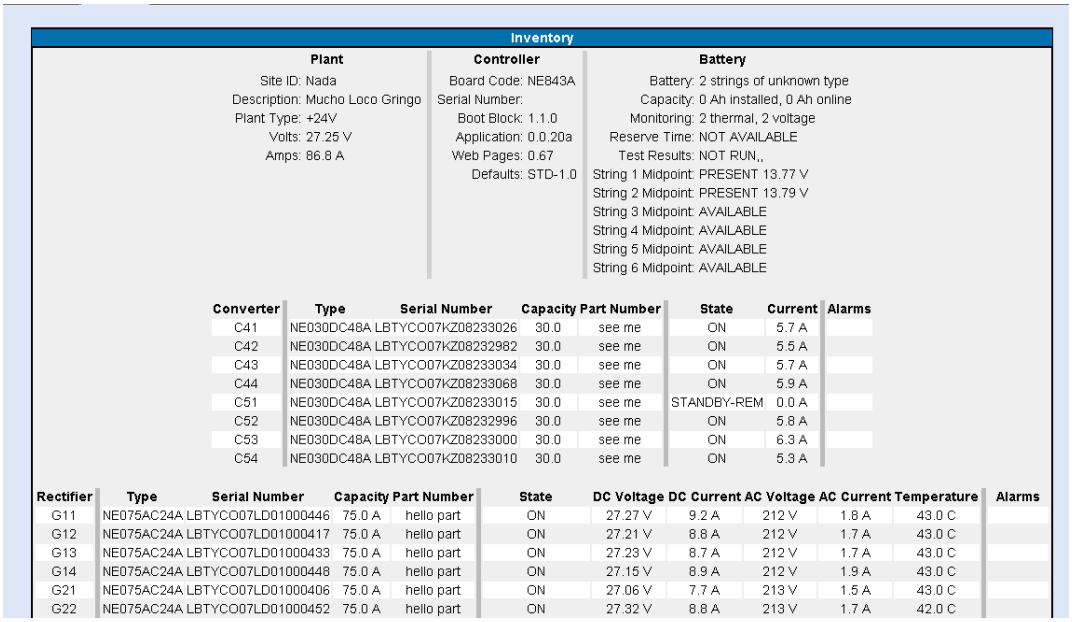
An introduction to the main screens of the web interface is provided in Section 4. The Pulsar Plus family of controllers support network access to almost all controller functions including all voltage and temperature readings, current alarms, and alarm history. It supports a web-based user interface using standard browsers such as Microsoft Internet Explorer®. It can provide plant alarm and control information to a distributed or centralized Network Operation Center (NOC) using the Simple Network Management Protocol (SNMP) or the Transaction Machine Language (TL1), which allow the controller to provide alarm information to the NOC for integrated network management. The controller provides network access and control capability for users under the HTTP, Telnet, FTP, SMTP, SNMP, and TL1 protocols. The typical protocol functions are as follows:

HTTP

HTTP (hypertext transfer protocol) is the foundation protocol of the World Wide Web (www) and can be used in any client-server application involving hypertext. HTTP makes use of TCP (transmission control protocol) for client to server connection and IP (internet protocol) for internetworking. The controller's standard HTTP protocol web pages provide integrated site information with an enhanced graphical user interface. The on-board HTTP web pages server is password protected for read/write privilege as mention in Section 4. Further access restrictions can be implemented using the software read/write disable capabilities configured through the front panel. The controller has a configurable timeout for connections that remain idle more than a user-programmed time period.

The best way to learn the web pages is to go through each tab and look at the features. The high level tabs were described in Section 4. There is much user friendly information and configuration available within these tabs.

Selecting **Inventory** in the **Reports** tab produces a screen similar to the following:



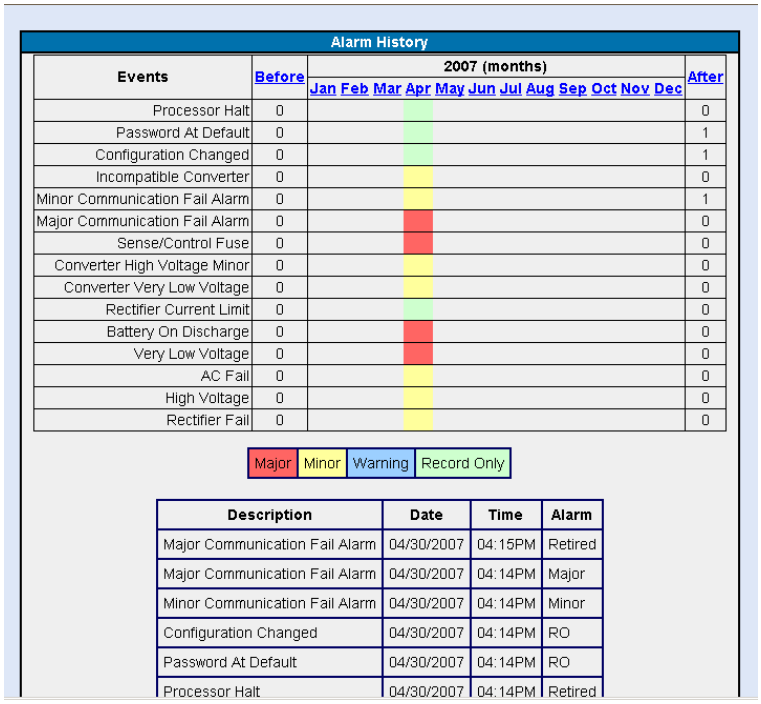
Inventory

Plant		Controller		Battery	
Site ID:	Nada	Board Code:	NE843A	Battery:	2 strings of unknown type
Description:	Mucho Loco Gringo	Serial Number:		Capacity:	0 Ah installed, 0 Ah online
Plant Type:	+24V	Boot Block:	1.1.0	Monitoring:	2 thermal, 2 voltage
Volts:	27.25 V	Application:	0.0.20a	Reserve Time:	NOT AVAILABLE
Amps:	86.8 A	Web Pages:	0.67	Test Results:	NOT RUN,,
		Defaults:	STD-1.0	String 1 Midpoint:	PRESENT 13.77 V
				String 2 Midpoint:	PRESENT 13.79 V
				String 3 Midpoint:	AVAILABLE
				String 4 Midpoint:	AVAILABLE
				String 5 Midpoint:	AVAILABLE
				String 6 Midpoint:	AVAILABLE

Converter	Type	Serial Number	Capacity	Part Number	State	Current	Alarms
C41	NE030DC48A	LBTYCO07KZ08233026	30.0	see me	ON	5.7 A	
C42	NE030DC48A	LBTYCO07KZ08232982	30.0	see me	ON	5.5 A	
C43	NE030DC48A	LBTYCO07KZ08233034	30.0	see me	ON	5.7 A	
C44	NE030DC48A	LBTYCO07KZ08233068	30.0	see me	ON	5.9 A	
C51	NE030DC48A	LBTYCO07KZ08233015	30.0	see me	STANDBY-REM	0.0 A	
C52	NE030DC48A	LBTYCO07KZ08232996	30.0	see me	ON	5.8 A	
C53	NE030DC48A	LBTYCO07KZ08233000	30.0	see me	ON	6.3 A	
C54	NE030DC48A	LBTYCO07KZ08233010	30.0	see me	ON	5.3 A	

Rectifier	Type	Serial Number	Capacity	Part Number	State	DC Voltage	DC Current	AC Voltage	AC Current	Temperature	Alarms
G11	NE075AC24A	LBTYCO07LD01000446	75.0 A	hello part	ON	27.27 V	9.2 A	212 V	1.8 A	43.0 C	
G12	NE075AC24A	LBTYCO07LD01000417	75.0 A	hello part	ON	27.21 V	8.8 A	212 V	1.7 A	43.0 C	
G13	NE075AC24A	LBTYCO07LD01000433	75.0 A	hello part	ON	27.23 V	8.7 A	212 V	1.7 A	43.0 C	
G14	NE075AC24A	LBTYCO07LD01000448	75.0 A	hello part	ON	27.15 V	8.9 A	212 V	1.9 A	43.0 C	
G21	NE075AC24A	LBTYCO07LD01000406	75.0 A	hello part	ON	27.06 V	7.7 A	213 V	1.5 A	43.0 C	
G22	NE075AC24A	LBTYCO07LD01000452	75.0 A	hello part	ON	27.32 V	8.8 A	213 V	1.7 A	42.0 C	

Obtaining a chronological view of the alarm events is also available by selecting **Alarm History** from the reports screen produces the following page.



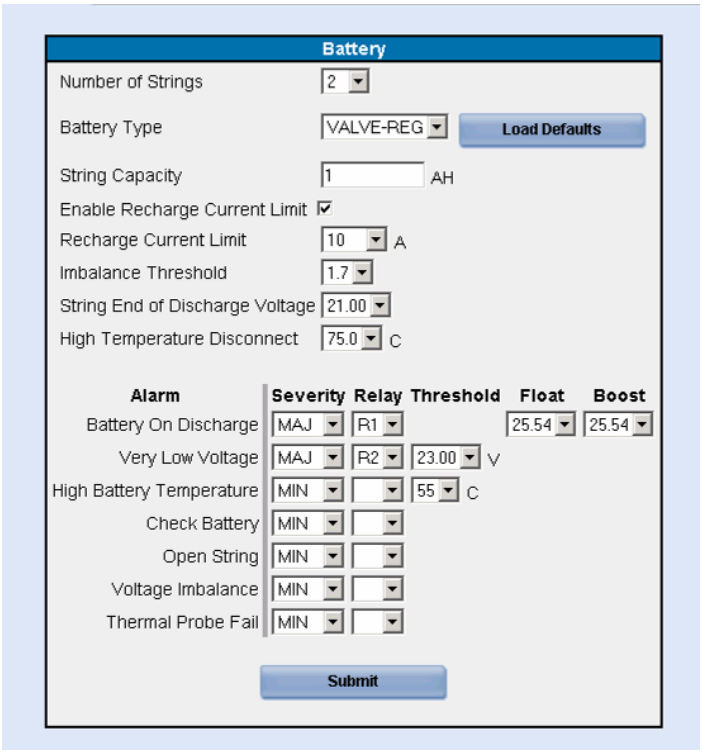
Alarm History

Events	Before	2007 (months) Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec	After
Processor Halt	0		0
Password At Default	0		1
Configuration Changed	0		1
Incompatible Converter	0		0
Minor Communication Fail Alarm	0		1
Major Communication Fail Alarm	0		0
Sense/Control Fuse	0		0
Converter High Voltage Minor	0		0
Converter Very Low Voltage	0		0
Rectifier Current Limit	0		0
Battery On Discharge	0		0
Very Low Voltage	0		0
AC Fail	0		0
High Voltage	0		0
Rectifier Fail	0		0

Major | Minor | Warning | Record Only

Description	Date	Time	Alarm
Major Communication Fail Alarm	04/30/2007	04:15PM	Retired
Major Communication Fail Alarm	04/30/2007	04:14PM	Major
Minor Communication Fail Alarm	04/30/2007	04:14PM	Minor
Configuration Changed	04/30/2007	04:14PM	RO
Password At Default	04/30/2007	04:14PM	RO
Processor Halt	04/30/2007	04:14PM	Retired

Selecting the Settings tab produces the web page from which configuration for all individual items can be performed as mentioned in Section 4. Selecting **Battery** in the **Settings** screen produces the following web page:



Battery

Number of Strings: 2

Battery Type: VALVE-REG — Load Defaults

String Capacity: 1 AH

Enable Recharge Current Limit: ☑

Recharge Current Limit: 10 A

Imbalance Threshold: 1.7

String End of Discharge Voltage: 21.00

High Temperature Disconnect: 75.0 C

Alarm	Severity	Relay	Threshold	Float	Boost
Battery On Discharge	MAJ	R1		25.54	25.54
Very Low Voltage	MAJ	R2	23.00 V		
High Battery Temperature	MIN		55 C		
Check Battery	MIN				
Open String	MIN				
Voltage Imbalance	MIN				
Thermal Probe Fail	MIN				

Submit

TELNET

Telnet provides remote log-on capability to a computer or server. The terminal to terminal connection with Telnet is based on a TCP connection for traffic between user and server. Once login is established; the controller will support this session until the “exit” command is received or the idle timeout limit is reached. A command line interface is used to view and configure the controller’s features and thresholds. Backup, restore, and upgrade procedures may also be performed.

SNMP

SNMP (simple network management protocol) is the most dominant network management standard. It allows communication and control via open standards host systems for centralized management of multiple plants. A number of vendors such as HP OpenView, IBM NetView, Lucent OneVision, and Sun Micro’s NetManager have adopted the standard for telecommunication and computer equipment network management. A standard MIB for the controller is available to be down loaded on the web at www.lineagepower.com . Up to four SNMP alarm trap destinations can be programmed using the Network Settings link found in Settings Tab of the web pages. Alarms then can be assigned under Alarm Notification also found in the Settings tab of the web pages. SNMP is more fully described in the Appendix.

SMTP

SMTP (simple mail transfer protocol) provides a basic electronic email facility. It provides a mechanism for transferring messages among separate hosts and browser applications. The protocol is used in Gateway for sending alarm messages and alerts through email.

FTP

FTP (file transfer protocol) is used to send files from one system to another under user commands. The protocol is used with the controller for downloading files and upgrades through a TCP connection. Application software, default configuration file, and web pages are uploaded to the controller using FTP.

TL1

TL1 is the transaction language command interface that allows direct communication with a central monitoring system and is defined by Telcordia for various equipment. It allows communication and control via open standards host systems for centralized management of multiple plants. The protocol is typically used over a X.25 network for alarm reporting.

Optional Devices and Modules

One-Wire Peripheral Devices

QS873A Voltage/Thermal Probes

The QS873A Voltage/Thermal Probes (VT-Probes) are used to measure battery temperatures for slope thermal compensation, and to provide mid-string voltages to the ES771 for battery voltage imbalance detection. Each of these weatherized assemblies monitor their respective contact temperature and converts the measurements into serial data which is then read by the system controller using Maxim's industry standard 1-Wire® bus. Several QS873A probes can be connected in a serial fashion since the data is received through digital means. The Pulsar Plus family of controllers can handle up to 16 QS873A VT-probes. This allows multiple strings and or multiple batteries within a string to be monitored for temperature. As mentioned, these probes are required for the battery string voltage imbalance feature since they route the mid-string voltage to the system controller via the ES771A remote mid-string voltage monitoring modules. All probes are provided with a PTC device to protect against accidental short circuit during voltage measurements.

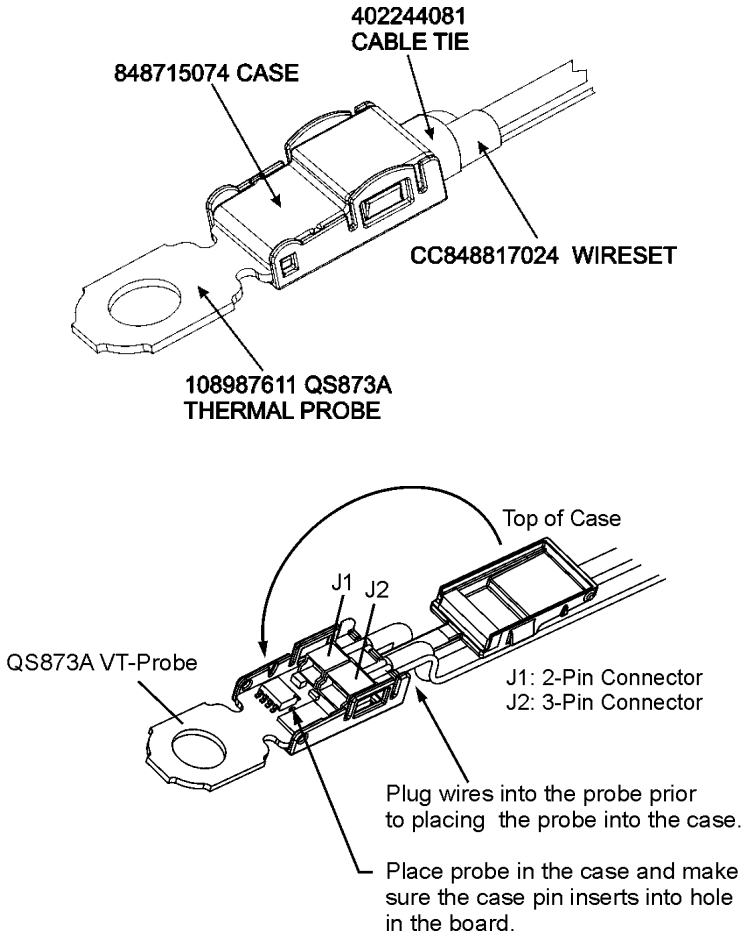


Figure 12: QS873A Voltage/Thermal Probe (VT-Probe)

Following is a brief description of the interfaces on the QS873A VT-Probe depicted above.

J2

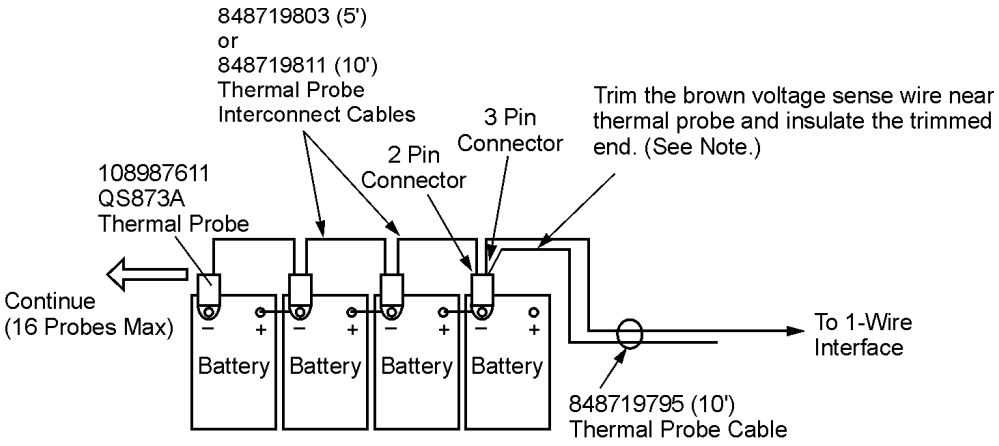
3-position connector connects the VT-Probe to the 1-Wire interface through cable 848719795. It may also connect directly to the ES771A with (CC848791517, 2.5') or (848719829, 10') or other VT-Probes in daisy chain fashion using either the (848719803, 5') or the (848719811, 10') cable.

J1

2-position connector serves to connect the VT-Probe to J2 on other VT-Probes in a daisy-chain fashion described above.

Application of QS873 VT Probes

QS873 VT Probes can be used with or without mid-string voltage monitoring. Only one probe is required to allow the battery slope thermal compensation function to be utilized. Additional probes for individual battery or multiple string monitoring can be added as desired. The highest temperature measured from all the probes is utilized by the controller. Although many systems come with the probes factory installed, probes can be added or replaced in the field. The following figure depicts monitoring all batteries in a single string without the use mid-string voltage monitors. Actual cables and connectivity may depend on true system connect

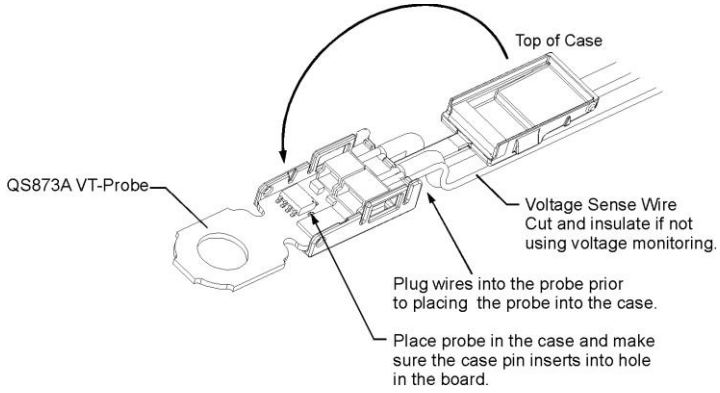
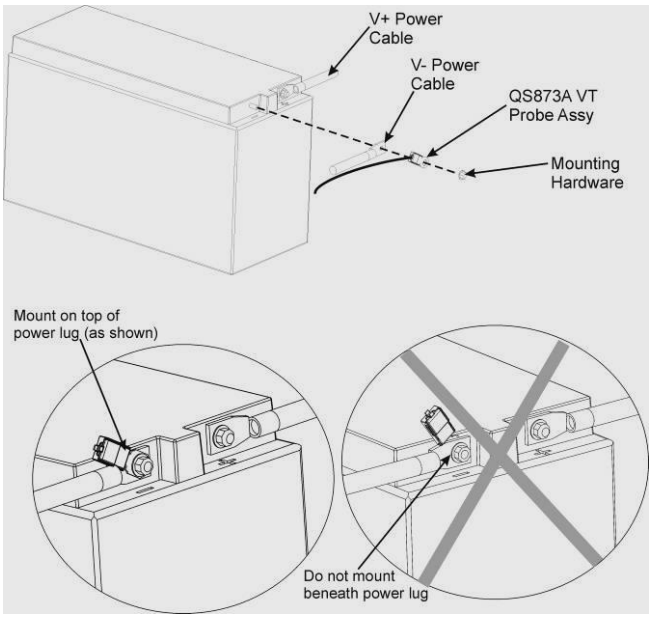


Note: 848719795, 848719803 and 848719811 come with a discrete brown wire for Battery Voltage Sense. When ES771A Modules are NOT used, trim and insulate this wire.

Figure 13: VT-Probe Connections To Infinity NE

Following are basic steps when installing the temperature probes for Thermal Compensation without Voltage Monitoring.

VT-Probe Connect to Controller	
Step	**Action**
1	The QS873A weatherized VT-Probe is provided with 2-pin and 3-pin receptacles and a 1/4-inch ring terminal. Insert the RJ-45 end of the 848719795 wire set into the P5- SYS AUX PORT on the controller
2	Using voltage monitoring now or in the future? **No** - Cut the brown voltage sense wire on the 848719795 at the 3-pin connector. **Yes** - Insulate the end of the wire and secure it in the system for future use.

VT-Probe Connect to Controller	
Step	**Action**
3	Insert the 3-pin connector end of the cable into the receptacle on the VT-Probe closest to the controller. 
4	Snap the cover closed on the VT-probe.
5	Place the first probe to the negative battery post as shown in figure. 
6	The controller automatically recognizes the VT-probes. The number of registered temperature probes and the highest battery temperature monitored may be checked from the front panel by scrolling down the menu at **Menu➔Status➔Batteries**. The fields are “Num Temp Probes ()” and Highest Temp () where () contains the number of devices communicating in the system as well as the highest battery temperature.
7	Connect either the 848719803 (5-ft) or the 848719811 (10-ft) cable to the 2-position receptacle of the first probe and to the 3-position receptacle of another probe. Verify the number of probes (2) registered with the controller with command: **Menu➔Status➔Batteries➔NUM TEMP PROBES (2)**

VT-Probe Connect to Controller	
Step	**Action**
8	Repeat Step 7 until all probes are installed.
9	The controller is now able to make thermal measurements in performing Slope Thermal Compensation (STC). To enable or verify that STC is active go to **Menu➔Configuration➔Batteries➔Battery Temp Management** and select **TEMP COMP** and verify that the feature Temperature Comp is Enabled. If not, configure and save it appropriately. Additional parameters associated with slope thermal compensation may be set on the controller to customize this feature.

ES771A Remote Mid-String Voltage Monitor Module

The ES771A remote mid-string voltage monitoring module is used to measure the mid-string voltages of up to three strings of batteries. This unit utilizes an appropriate QS873A VT-Probe connection to obtain the voltage for measurement. It then serially transmits the appropriate information to the system controller which performs the voltage imbalance detection feature. It also serves as interface that transmits the thermal data from the VT-Probes for slope-thermal compensation and other battery management features. As with the QS873A VT probes, ES771A units also utilize Maxim's industry standard 1-Wire® bus. Thus, multiple ES771A devices can be used and placed in a daisy chain fashion along with the QS873A VT probes. The number of Mid-string voltage modules actively hooked to batteries and being monitored by the system controller to batteries is displayed under Batteries in the Status menu. Note: VT-Probes must be connected to the batteries in order for the ES771 to be recognized.

The Pulsar Plus family of controllers can monitor up to six ES771A modules. Each ES771A module is individually addressed so that specific mid-string voltages can be displayed and identified. A seven-position rotary ID switch located on the unit must be set to a unique address number otherwise an ID conflict alarm will be generated. Units are shipped out of the factory with a default ID setting of "one". If additional units are to be in the system the ID must be reconfigured. Note: there are systems that are shipped with ES771A units installed and with proper configuration.

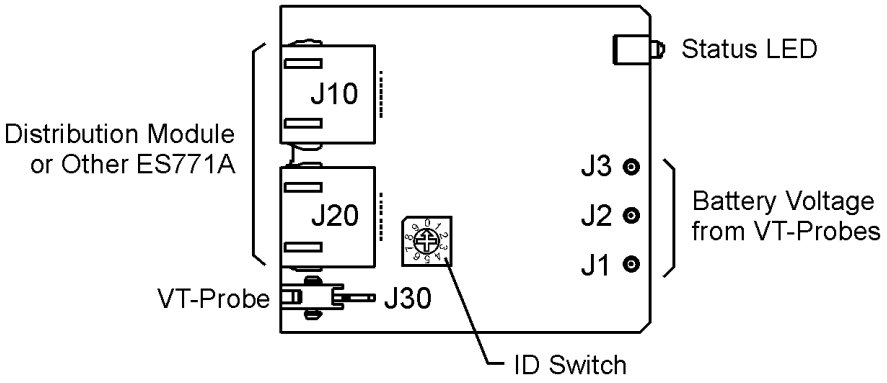


Figure 14: ES771A Remote Voltage Monitor Module

Following is a brief description of the interfaces on the QS873A VT-Probe depicted above.

J10, J20

RJ-45 receptacles that connect the ES771A to other ES771As or the 1-Wire interface port of the controller or system provided 1-wire interface. Typical cables utilized are the (CC848791500, 4") or (848652947, 10') cable.

J30
Connects the ES771A to the first QS873A VT-Probes using either the (CC848791517, 2.5') or the (848719829', 10') cables.

J1, J2, J3
Snap-fit connectors for the mid-string voltage signal wire (Brown) from the VT-Probes.

ID Switch
A seven-position rotary ID switch used by the controller to uniquely identify each ES771A in the system. A setting of "0" produces and invalid ID alarm. Valid ID settings are from 1 through 6. Units shipped from the factory have a factory default ID setting of "one".

Status LED
The module illuminates its green LED when plugged into the 1-wire network and with the VT-probe attached to negative battery terminal of the mid-string voltage. The LED will illuminate red when the controller determines that one or more of the strings from the unit has exceeded the Mid-String Voltage threshold and time considerations.

Application of ES771A Modules with QS873 VT Probes

ES771A modules require the use of QS873 VT Probes in order to activate the mid-string voltage monitoring feature in the controller. One VT probe is required for each mid-string voltage being monitored. Additional VT probes can be added for individual battery temperature measurement. It is up to the end-user to determine the number of battery temperature probes or voltage modules other applications may require. The highest temperature measured from all installed VT probes is utilized by the controller for slope thermal compensation. Many factory built systems come with the ES771A modules and QS873A VT probes factory installed, ES771A modules can be added or replaced in the field as necessary. The following depicts a typical configuration where four battery strings are being monitored with the required minimum VT probes. The middle battery in each string must be used when both the voltage imbalance and thermal compensation features are desired. This is one configuration using the ES771A. Systems may be configured differently. Consult technical field support if questions or concern arise.

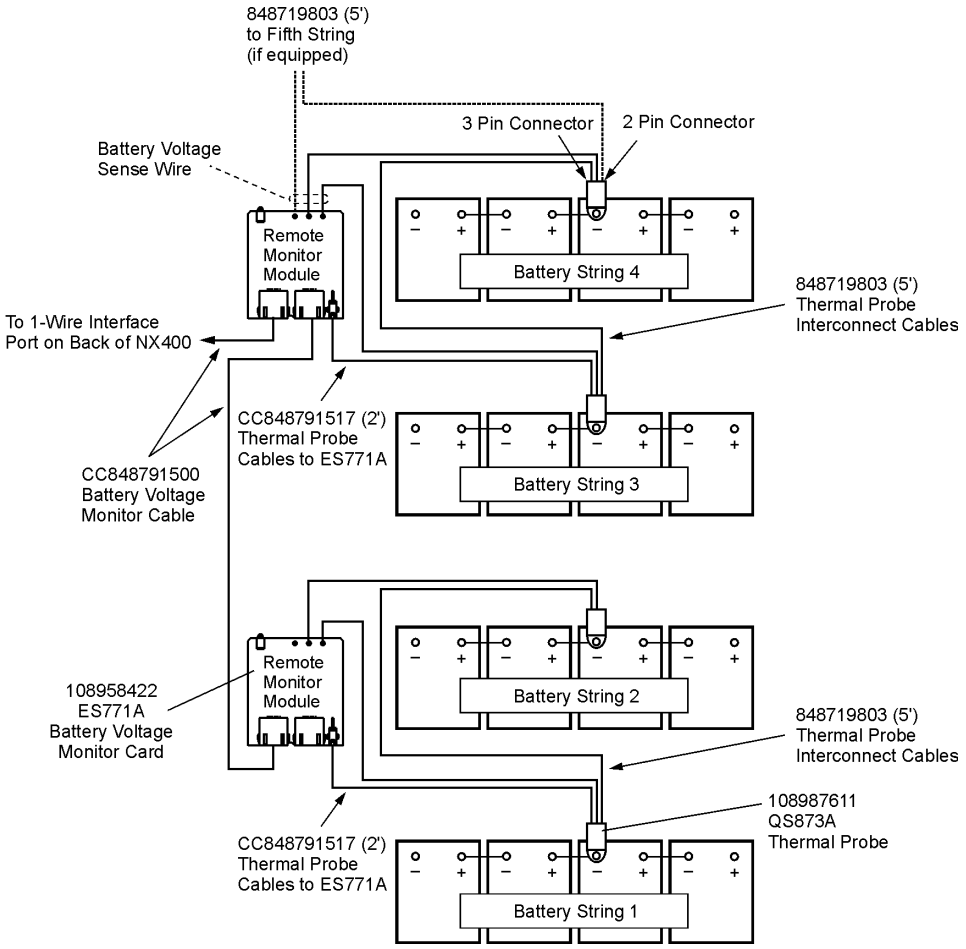


Figure 15: Four-String System Monitored For Imbalance With One VT Probe Per String

Voltage Imbalance Mid-String Monitoring

Step	Action for Voltage Imbalance Mid-String Monitoring
1	Insert one RJ-45 end of the 848652947 wire set into the P5-SYS AUX PORT on the controller and the other end to the first ES771A Remote Voltage Monitor module.
2	Follow the steps for installing a probe described in the previous section to attach a VT probe to the negative post located at the center of the string as depicted in Figure 15. Do not cut the brown wire.
3	Dress and attach the snap fit connector on the brown wire to the appropriate snap fit pin on the ES771A (J1-J3). Note: exercise care when attaching the battery voltage sense wire onto the J1, J2, and J3 pins of the ES771A pins. These push-on clips can be deformed if excessive force at an incorrect angle of insertion resulting in a non-optimum connection. The contact must not be bent more than 10 degrees.
4	Verify that the controller automatically registers the number of ES771A modules (1) at the front panel location: **Menu➔Status➔Batteries➔Num Mid-String V** Note: Modules will only be recognized when there is actual potential applied through the VT

Step	Action for Voltage Imbalance Mid-String Monitoring
	probe to the ES771 module.
5	Connect another ES771A to the controller by connecting an additional 848652947 wire set from the first module to the RJ45 receptacle on the second module. Verify the number of modules (2) registered with the controller with command: Menu➔Status➔Batteries➔Num Mid-String V
6	Repeat Step 5 until all modules are installed. Verify that all probes are also automatically detected by the controller at the front panel at: **Menu➔Status➔Batteries➔Num Temp Probes**
7	If the LEDs on the module(s) are not illuminated green on or are red or if the number of registered modules does not agree with the number used: Check integrity of all cable connections
8	Issue the Clear Events command: **Menu➔Control/Operations➔Clear Events**. If the LEDs are still not lit green or if the number of registered modules still does not agree, call your local field representative.

The system is now set to monitor both voltage and temperatures to support the batter string voltage imbalance and slope thermal compensation features. Figure 16 depicts a reserve system where every battery in the string being monitored for temperature. Again, the highest temperature measured will be used for battery thermal management. Only one temperature probe is required for thermal compensation features.

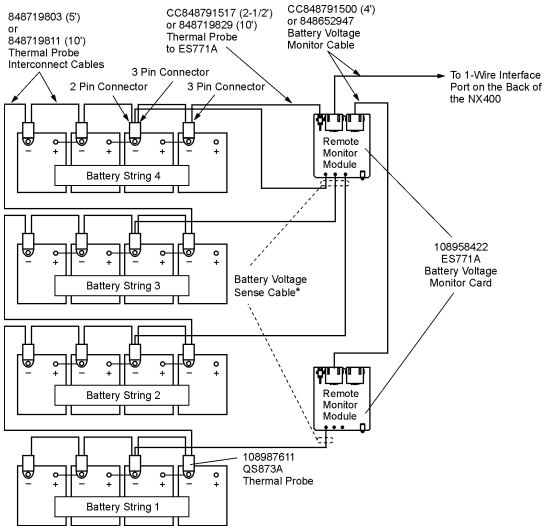


Figure 16: Same System Monitored For Imbalance With VT Probe On Every Battery

Following is a summary of the parts utilized in the 1-Wire management system

Probe And Cable Descriptions	Comcode
QS873A battery thermal probe	108987611
10-ft Probe to Infinity NE interconnect	848719795
5-ft Probe to probe interconnect	848719803
10-ft Probe to probe interconnect	848719811
ES771A Voltage Monitoring Module	108958422
2.5-ft Probe to ES771A interconnect	CC848791517
10-ft Probe to ES771A interconnect	848719829
4-ft ES771A to ES771A/Infinity NE interconnect	CC848791500
10-ft ES771A to ES771A/Infinity NE interconnect	848652947

NE872A Distribution Monitor and Control Module

Overview

The NE872A (CC109124780) allows the Pulsar Plus family of controllers to manage various distributions through serial communications in rectifier and converter based systems. The system controller will communicate over the GP RS485 bus to the NE872A and monitor associated alarms for open load or battery protectors, measure a single shunt configured as a load or battery shunt, monitor the DC bus voltage for back-up LVD functionality, and control and monitor a single load or battery latching LVD contactor. The board allows addressing for up to eight NE872As being installed in a system. Figure 17 shows the connections and interfaces for the NE872A.

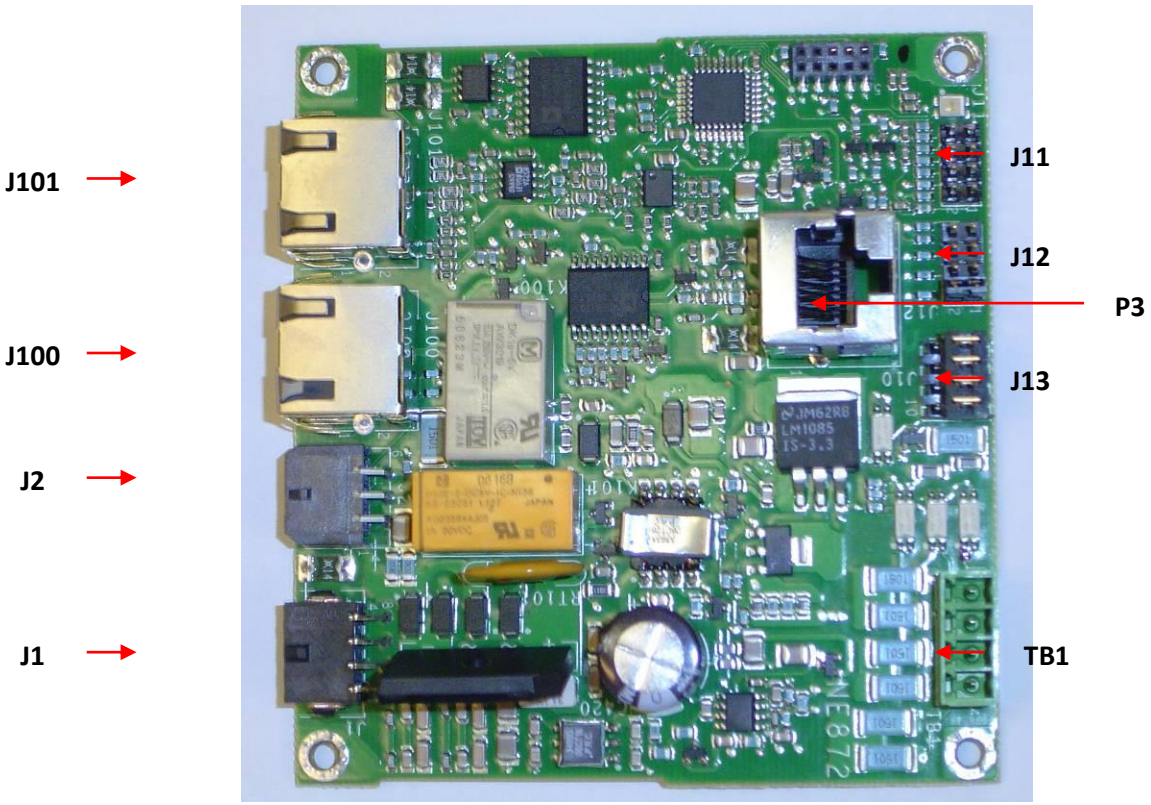


Figure 17: NE872A Remote Distribution Module

Module Features

The NE872A module has the following features:

- **Status LED**: Tri-colored LED that illuminates according to following conditions:

LEDs (✸= On)			
Green	**Amber**	**Red**	**Condition**
✸			Normal
	✸		Minor Alarm
		✸	Major Alarm
		Flashing	Communication Loss with Controller
Flash (5s)		✸	Manual Reconnect Command Accepting

In addition, the following conditions will illuminate the LEDs as described below. This assumes the external disconnect switch is used to open and close the battery charging path to the batteries.

Tri-Color LVD Status			
Condition	**Red**	**Green**	**Amber**
Contactor Closed (Normal)		X	
Contactor Open (Normal) (Flash between –Each~1/2 sec on)	X	X	
Contactor Open Due To Remote LVD (Flash between –Each~1/2 sec on)	X		X

Tri-Color LVD Status			
Condition	**Red**	**Green**	**Amber**
ID not configured			Flashing
Alarm Inputs — Open String — FAJ alarms			 X
Fault Alarms — Board Fault — Contactor FAIL	X		
Lamp Test operation activated (10 second operation)	Red 3 seconds On, Green 3 seconds On, Amber 3 seconds On, All off for 1 second		

Alarm Inputs: The NE872A has been designed to allow it to be referenced to either VBus(-) or Vbus(+) so it can be used in both positive and negative grounded systems. All alarm or control inputs are either alarmed on an open or a closure to VBus(-) or provide its own signal return as described below:

- **Remote LVD Open**: The NE872 has the ability to accept a dry contact closure that will allow an external controller to force open the LVD independently from the system controller. The contactor will remain disconnected as long as the input is asserted. Upon de-asserting the input contactor closure, the NE872 will return the LVD to the a state dictated by the controller.
- **Fuse Alarm Major:** A contact closure to the non-grounded "Battery" side of the DC bus (-48V/±24V) applied to this respective input, by default, produces an "Fuse Alarm Major" alarm by the controller.
- **Open String:** A contact closure to the non-grounded "Battery" side of the DC bus (-48V/±24V) applied to this respective input, by default, produces an "Open String" alarm by the controller.

External Shunt Monitoring Input: The NE872 has the ability to monitor a single shunt mounted in the grounded or non-grounded side of the DC bus in a ±24V or -48V power system. The shunt must have a 50mV rating. Its current rating as well as its assignment to load or battery is configured at the controller. Three leads are used to monitor the shunt: Shunt+, Shunt-, and Shuntref. Shunt+ is the most positive side of the shunt input voltage as defined during a battery discharge. Shunt- is the most negative side of the shunt input voltage as defined during a battery discharge. Shuntref is the reference lead which must be attached to the DC side of the bus in which the shunt resides to properly reference the circuitry.

Contactor Management: Controls and monitors one load or battery contactor. The contactor is of the magnetic latching type equipped with an auxiliary switch for status. The board is designed to drive both 24V and 48V rated contactors.

Reverse Battery Protection: The NE872A will prevent the closure of the battery contactor when it senses batteries have been connected in reverse polarity. A Major alarm "Reversed Battery" is generated by the system controller.
Note: when a battery disconnect breaker is used to take battery strings off-line for servicing, care must be taken to ensure battery connections are correct at the disconnect switch.

Autonomous Backup LVD Function: The NE872 monitors the system bus voltage to provide a backup for the Low Voltage Disconnect (LVD) function. In the event of a loss of communication between the NE872A due to a failed or removed controller, communication cable disconnect, etc. the configured disconnect and reconnect values assigned to a particular LVD function at the controller are used along with the boards

internal measurement capability to control the LVD. These disconnect and reconnect threshold values are sent from the controller to each respective QS871A upon establishing initial communication.

8-Position Jumper: 8-position jumper arrangement that uniquely identifies up to eight NE872 remote distribution monitor and control modules. Placing no jumper, ID position 0, is an invalid configuration. The Pulsar Plus family of controllers can address up to eight unique NE872s. Note: factory ordered systems are generally pre-configured and will have the jumpers appropriately set. Jumpers are arranged as shown.

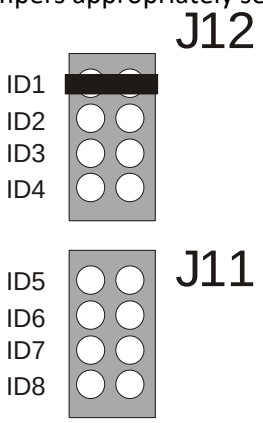


Figure 18: NE872A ID Jumper Settings

- **12-Position Jumper:** 12-position jumper arrangement that configures the NES872 operate in a positive of negative battery plant. The jumper is selected so that all polarity sensitive items are selected at once by configuring one header. Note: factory ordered systems are generally pre-configured and will have the jumpers appropriately set. The block jumper is arranged as shown.

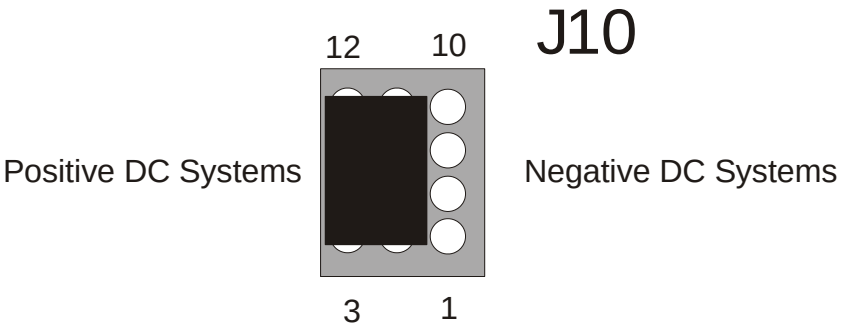


Figure 19: NE872A ID Jumper Settings

Module Connector Definitions

The NE872 module has six connectors used for board power, measurement, alarm inputs and various serial communications.

J1

Provides the connections to external distribution module's bus voltage and power, shunt inputs and reference, Fuse Alarm Major And Open String Inputs.

Table 33 NE872 J1 Signal Description		
Pin #	**Signal Name**	**Signal Description**
1	FAJ	General purpose Fuse Alarm Major (FAJ) alarm input; Major alarm on closure to the non-grounded "Battery" side of the DC bus (-48V/±24V). Optional connection at terminal block TB1.
2		
3	SHREF	Shunt Reference signal to be placed in the DC potential of which the shunt

Table 33 NE872 J1 Signal Description		
Pin #	**Signal Name**	**Signal Description**
		resides to reference the shunt measurement
4	SHUNT+	Positive Battery Shunt input signal whose signal polarity is defined by the voltage on the shunt during battery discharge.
5	OS	Open String (OS) alarm input for external battery disconnect switch; Alarms on closure to the non-grounded "Battery" side of the DC bus (-48V/±24V). Optional connection at terminal block TB1.
6	NE_CM	Infinity NE Common or Discharge Ground (DG) connection used for power and voltage monitoring. Connection made to NEcommon in the Infinity system.
7	DB	Discharge Battery (BAT) power input connected to the Non-Grounded side of the DC bus. Also used as sense voltage for backup monitoring.
8	SHUNT-	Negative Battery Shunt input signal whose signal polarity is defined by the voltage on the shunt during battery discharge

J2

Provides the contactor management interface for control and LVD status.

Table 34 NE872 J2 Signal Description		
Pin #	**Signal Name**	**Signal Description**
1	LVD_COILA	Low Voltage Disconnect Coil Voltage A. "A" positive with respect to "B" to close contactor. Signal connected to one side of contactor coil.
2	LVD_C	Common of contactor status indicator. Connect signal to Common of the micro-switch of contactor. Return reference for LVD auxiliary alarm status detection.
3	LVD_NO	Normally Open contactor status monitor indicator. Closed to LVD_C when contactor is closed. Connect signal to NO pin of micro-switch of contactor.
4	LVD_COILB	Low Voltage Disconnect Coil Voltage B. "B" positive with respect to "A" to open contactor. Signal connected to other side of contactor coil.
5	BATT_SNS	Reserve Battery Sense Voltage input signal. Battery bus voltage used for reverse battery detection. Connection made to battery side of the battery contactor. Signal connection must not be used for Load contactors.
6	LVD _NC	Normally Closed contactor status monitor. Closed to LVD_C when contactor is open. Connect signal to NC pin of micro- switch of Contactor.

TB1

Terminal Block connection that provides field access to Fuse Alarm Major, Open String, and the Remote LVD input.

Table 35 NE872 TB1 Signal Description		
Pin #	**Signal Name**	**Signal Description**
1	Remote LVD Return	Protective (PTC or resistive) return to NE common for External Remote LVD contact closure input signal.
2	Remote LVD	External contact closure for remote disconnecting attached LVD; Disconnects LVD on a dry contact closure to Remote LVD Return when feature is enabled.
3	FAJ	General purpose Fuse Alarm Major (FAJ) alarm input; Major alarm on closure to the non-grounded "Battery" side of the DC bus (-48V/±24V). Optional connection at connector J1.
4	OS	Open String (OS) alarm input for external battery disconnect switch; Alarms on closure to the non-grounded "Battery" side of the DC bus (-48V/±24V). Optional connection at connector J1.

J100 and J101

Provides connectivity to the RS485 GP rectifier/converter bus as well as a pass through to the next RS485 connected device.

Table 36 NE872 J100 and J101 Signal Description		
Pin #	**Signal**	**Signal Description**
1	RS485+	**B** Inverting Driver Output / Inverting Receiver Input
2	RS485-	**A** Non-inverting Receiver Input/ Non-inverting Driver Output
3	RS485REF	RS485 Reference/return. Pass-through on this board.
4-8		No Connection

QS871A Distribution Monitor and Control Module

Overview

The QS871A (CC109103371) allows the Pulsar Plus family of controllers to obtain distribution data through serial communications. The system controller monitor alarms for open load or battery protectors, measures load or battery shunts, monitors the bus voltage, and controls and monitors a single load or battery LVD contactor. Figure 20 shows the connections and interfaces for the QS871A.

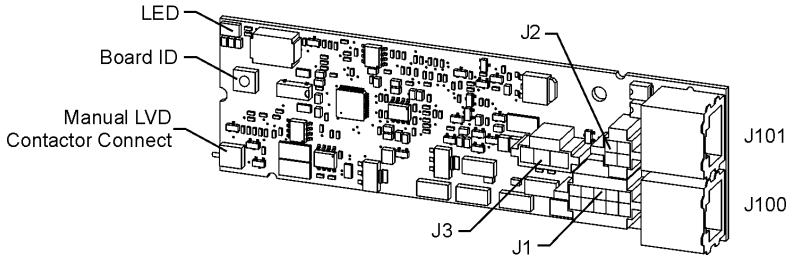


Figure 20: QS871A Remote Distribution Module

Module Features

The QS871A module has the following features:

- **Status LED**: This is a tri-colored LED and will illuminate accordingly for the conditions shown below.

LEDs (✹= On)			
Green	**Amber**	**Red**	**Condition**
✹			Normal
	✹		Minor Alarm
		✹	Major Alarm
		Flashing	Communication Loss with Controller
Flash (5s)		✹	Manual Reconnect Command Accepting

In addition, the following alarms will be issued for the conditions noted. This assumes the external disconnect switch is used to open and close the battery charging path to the batteries.

Condition	Contactor Fail Alarm	Contactor Open Alarm	Open String Alarm	Controller LED	QS871 LED
Open Integral QS871A Disconnect Switch			X	RED	Blinking

					AMBER
Battery reconnected in reverse polarity	X	X		RED	RED
System started w/ reverse battery polarity	X	X		RED	RED

Alarm Inputs: The QS871A is referenced to VBus(-), therefore, all alarm inputs are either alarmed on an open or a closure to VBus(-) as described below.

- One input closure to VBus(-) for **Remote LVD Open** (RO) from external source (J3 pins 1 and 2)
- One input to **Fuse Input Major** alarm upon closure to VBus(-), for distribution protector open alarms (J1 pin 7)
- One input to **Open String** alarm upon closure to VBus(-) for battery circuit breaker open alarms (J1 pin8)

Reverse Battery Protection: The QS871A will prevent the closure of the battery contactor when it senses batteries have been connected in reverse polarity. The QS871A will keep the contactor disconnected and generate an appropriate alarm. When a battery disconnect breaker is used to take battery strings off-line for servicing, care must be taken to ensure battery connections are correct at the disconnect switch.

Manual LVD Contactor Connect: This feature allows the Infinity NE or any other power system to resume powering the load after low voltage disconnect of batteries. Fully depleted battery strings can be replaced with fully charged strings. Once the strings have been installed, depressing the Manual LVD Contactor switch on the front of the QS871A module will result in the LVBD contactor closing. Continue to depress the switch until the Green LED stops flashing and displays a continuous green color. This indicates acceptance of the command and permanent closure of the contactor. Releasing the switch prior to the continuous green LED will result in the contactor opening and removing power to the load.

External Shunt Monitoring Input (J1 pins 4 and 5): The shunt must be in the VBus(-) leg to maintain proper reference with the QS871A module. These inputs are for the system controller to read battery or load currents. The polarity of the connections must be positive during battery discharge.

Contactor Management: Controls and monitors one load or battery non-latching contactor.

Autonomous Backup LVD Function: Monitor system bus voltage for backup LVD function (in case of loss of communication to the QS871As or failed or removed controller). The configured disconnect and reconnect values assigned to a particular LVD function are sent from the controller to each respective QS871A. In the advent of a controller failure the QS871As will utilize their individual voltage monitoring and these thresholds to disconnect and reconnect the contactor.

7-Position ID Switch: Rotary 8-position switch that uniquely identifies up to seven remote distribution monitor and control modules. ID position 0 is invalid. The controller can address up to eight unique distribution monitor and control modules.

Note: The majority of applications that utilize the QS871 utilize the QS871A. There are versions of the QS871 that are used in special applications where components have been removed because the feature was not required. These versions and the feature set are high-lighted below.

Feature	QS871A	QS871B	QS871C
Inputs			
Open String input	X	X	X
Fuse Alarm Major input	X		X
Remote LVD Input	X		
Auxiliary Alarm Input	X		
Shelf ID Input		X	X
Misc			
Status LED	X	X	X
Rotary ID Switch (7-position)	X		
Contactor Drive And Monitor	X		X
Momentary Forced Closed LVD switch	X		X
Reverse Battery Detection feature	X		X
Backup Contactor Disconnect/Reconnect Feature	X		X
Analog Monitoring			
Shunt Monitoring Circuitry	X	X	X
DC Bus Monitoring Circuitry	X	X	X
Connectors			
Power/Shunt/OS/FAJ connector	X	X	X
Shielded RJ-45 connectors	X		
Remote LVD and Aux alarm connector	X		
Contactor Control Connector	X		X

Module Connector Definitions

The QS871A module has five connectors: two RJ-45 connectors used for serial communication to ES773A VT-Probes, ES771A Remote Voltage Monitoring Modules, and a Pulsar Plus family controller and three connectors for monitoring circuit breakers, contactors and shunts. The connectors are defined as follows.

J1

Provides the connections to external distribution module's bus voltage and power, shunt inputs and reference, Fuse Alarm Major And Open String Inputs, and shunt.

Table 37 QS871 J1 Signal Description

Pin #	Signal Name	Signal Description
1	VPWR-	VBUS(-) or BATT- Power. Power and board reference for QS871, connect to Non-Grounded side of the DC bus (-48V).
2	VPWR+	VBUS (+) Power and Positive Sense voltage for backup monitoring.
3	BATT-	Discharge Battery (BAT) input connected to the Non-Grounded side of the DC bus (-48V). Used as sense voltage for backup monitoring, reverse voltage detection, and force contactor closed.
4	SHUNT+	Positive Battery Shunt input signal whose signal polarity is defined by the voltage on the shunt during battery discharge.
5	SHUNT-	Negative Battery Shunt input signal whose signal polarity is defined by the voltage on the shunt during battery discharge

Table 37 QS871 J1 Signal Description		
6	OS	Open String (OS) alarm input for external battery disconnect switch; Alarms on closure to the non-grounded "Battery" side of the DC bus (-48V).
7	FAJ	General purpose Fuse Alarm Major (FAJ) alarm input; Major alarm on closure to the non-grounded "Battery" side of the DC bus (-48V).
8	SHLF_ID3	Signal used for identifying the board. Pulled up or down on board accordingly in the factory.
9	RS485+	**B** Inverting Driver Output / Inverting Receiver Input
10	RS485-	**A** Non-inverting Receiver Input/ Non-inverting Driver Output

J2

Provides the contactor management interface for control and LVD status.

Table 38 QS871 J2 Signal Description		
Pin #	**Signal Name**	**Signal Description**
1	LVD_COIL	Positive voltage applied to Low Voltage Disconnect Coil. Connect to positive side of contactor coil.
2	LVD_COILRTN	Contactor coil return to VBUS- potential through circuitry. Connect to most negative side of Contactor coil, other side of coil connected to VBus(+).
3	LVD _NC	Normally Closed contactor status monitor. Closed to LVD_C when contactor is open. Connect signal to NC pin of micro- switch of Contactor.
4	LVD_NO	Normally Open contactor status monitor indicator. Closed to LVD_C when contactor is closed. Connect signal to NO pin of micro-switch of contactor.

Note: The common or return of the micro switch for these signals must be attached to Vbus- in the system outside of this board.

J3

Connection that provides field access to External Auxiliary Fuse Alarm Major and the Remote LVD input.

Table 39 QS871 J3 Signal Description		
Pin #	**Signal Name**	**Signal Description**
1	Remote LVD	External contact closure for remote disconnecting attached LVD; Disconnects LVD on a dry contact closure to Remote LVD Return when feature is enabled.
2	Remote LVD Return	Protective (PTC or resistive) return to NE common for External Remote LVD contact closure input signal.
3	Aux_Alarm	General purpose Fuse Alarm Major (FAJ) alarm input; Major alarm on closure to the non-grounded "Battery" side of the DC bus Battery (-48V).

J100 and J101

Provides connectivity to the RS485 GP rectifier/converter bus as well as a pass through to the next RS485 connected device.

Table 40 QS871 J100 and J101 Signal Description		
Pin #	**Signal Name**	**Signal Description**
1	RS485+	**B** Inverting Driver Output / Inverting Receiver Input
2	RS485-	**A** Non-inverting Receiver Input/ Non-inverting Driver Output
3	RS485REF	RS485 Reference/return. Pass-through on this board.
4		No Connection
5	-	Connects between J101.5 and J100.5. Connection reserved for1-Wire communication signal in the system.
6	-	Connects between J101.6 and J100.6. Connection reserved for1-Wire +5V signal in the system.

Table 40 QS871 J100 and J101 Signal Description		
7		No Connection
8		No Connection

ES772A Remote Distribution Module

Overview

The ES772A allows the controller to communicate with devices in TEPS or OEM distribution panels. It will allow the controller to alarm for open load and battery protectors, read battery current from an external shunt, and control a non-latching contactor. The contacts can be assigned as a load-disconnect or as a battery disconnect.

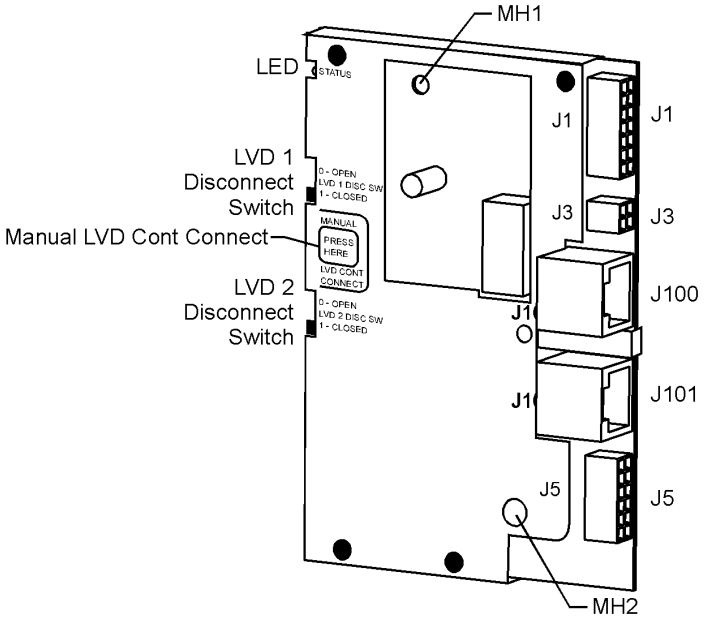


Figure 21: ES772A Remote Distribution Module

Controls, LED and Connectors

Receptacle J1: User connections to external distribution module.

Receptacle J3: User connections to external distribution module.

J100/J101: User connections to the controller J10, other devices such as the QS873A VT-Probe and the ES771A Remote Voltage Monitor Module, and other RJ45 connections carrying the RS485 rectifier communication bus.

Receptacle J5: User connections to external distribution module.

Mounting Hole MH1: Mounting hole to mount module in user application.

Mounting Hole MH2: Mounting hole to mount module in user application.

LVD2 Disc SW: Disconnect switch for external contactor 2

Manual LVD Cont Connect: Switches for forced reconnect function.

LVD1 Disc SW: Disconnect switch for external contactor 1, when wired as described in installation section.

LED: This is a tri-colored LED and will illuminate accordingly for the conditions shown below.

LEDs: *= On			
Green	**Amber**	**Red**	**Condition**
*			Normal
	*		Minor Alarm
		*	Major Alarm
	Flashing		External Contactor(s) Manually Opened with either LVD1 or LVD2 DISC SW
		Flashing	Communication Loss with System Controller
Flash (5 sec)		*	Manual Reconnect Command Accepting

The ES772A is referenced to VBus(-), therefore, all alarm inputs are either alarmed on an open or a closure to VBus(-) as described in the following.

Module Features

The ES772A module has the following features:

- **16 Alarm inputs.** These inputs may be used to monitor for distribution circuit breakers with micro-switch closures for protector opening, GMT style fuses with or DIN style circuit breakers. Furthermore, the two Auxiliary Major alarms may be used to monitor micro-switch closures from other devices such as a fan or a door, etc.

  The alarming states for the different inputs are as stated below:

  ° 10 inputs to alarm or an open to VBus(-) for DIN style circuit breakers (J5 pins 1-10)

  ° 2 inputs to alarm on closure to VBus(-) for Auxiliary Major alarming from external source (J5 pins 11 and 12)

  ° 2 inputs to alarm upon closure to VBus(-), for distribution protector open alarms (J1 pins 6 and 13)

  ° 2 inputs to alarm upon closure to VBus(-) for battery circuit breaker open alarms (J1 pins 7 and 14)

- **(2) LVBD or LVLD Contactor Manual Disconnect Switches** are provided. These switches allows users to manually open up to two external contactors to disconnect a battery string from the V(-) bus and allow the user to perform maintenance on the battery. The switches can also disconnect a load from the V(-) bus if the contactor is configured for load disconnect. The contactors are treated as one type of contactor. That is both contactors are either LVBD or LVLD type.

- **Reverse Battery Protection.** If wired as instructed in Fig. 9-2 or 9-3, the ES772A will prevent the closure of contactors with batteries that are wired in reverse polarity. It will be active during initial start-up and also during servicing if the integral battery disconnect switches are used to connect and disconnect the battery strings from the V(-) bus. If the battery strings are wired in reverse polarity and an attempt was made to close the contactor, the ES772A will disconnect all contactors and appropriate alarms will be transmitted.

  If an external disconnect switch is used to take battery strings off-line for servicing, care must be taken to ensure battery connections are correct at the disconnect switch. This is because the contactors remain closed when an external disconnect switch is used to disconnect the batteries from the bus. If the batteries are reconnected in reverse polarity, closing the switch will result in the batteries being connected to the bus in reverse polarity. If the external disconnect switch is connected as shown in Fig

3, then the reverse battery protection feature will be provided. Read all warning statements prior to making any connections.

- **Manual LVD Cont Connect** - Manual LVD Contactor Connect. This feature allows the CPS6000 system to resume powering the load after low voltage disconnect of batteries following a battery on discharge event. The fully depleted battery strings are to be replaced with fully charged strings. Once the strings have been replaced, depressing the Manual LVD Cont switches on the front of the ES772A module will result in the LVD contactors closing and the LED blinking in green color. Continue to depress the switches until the LED stops flashing and displays a continuous green color. This indicates acceptance of command and continued closure of contactors. Note that releasing the switches prior to the LED displaying a continuous green color will result in the contactor opening and removing power to the load.
- **External battery shunt input**, (J1, pins 4 and 11). The battery shunt must be in the VBatt(-) leg to maintain proper reference with the ES772A module. These inputs are for the system controller to read battery current. The polarity of the connections must be positive during battery discharge.
- Monitor plant voltage for **backup LVD function** (in case of failure of controller during battery discharge)

Module Connector Definitions

The ES772A module has five connectors. Two are RJ-45 connectors used for RS485 serial communication to ES773A VT-Probes, the ES771A Remote Voltage Monitoring Module, and to the controller. The remaining connectors are used for monitoring circuit breakers, contactors and shunts and are defined in the following tables.

Connector J1 Pin-out Definitions

Table 41 ES772 Connector J1 Pinout Definitions			
Pin	**Name**	**Definition**	**Comments/Connections**
1	VPWR +	V(+) Power	Power for ES772A, connect to VBus(+)
2	N/A	Reserved	
3	N/A	Reserved	
4	SHUNT-	Neg Batt Shunt Input	Polarity is during battery discharge
5	BATT1_SENSE	Polarity Sense for String 1	Connect to battery negative, V(-) of String 1
6	DIST_ALM_1	Trip-Indicator Input-1 for US Style CB or GMT Fuse. Alarm on closure to VBus(-).	Connect to NC terminal of breaker micro switch or to indicator lead of GMT fuse, other end (C) referenced to VBus(-).
7	EXT BAT SW1	Alarm input for external battery disconnect switch; alarm on closure to VBus(-).	Connect to NC micro switch of US Style CB, other end (C) referenced to VBus(-), micro switch must close upon manual opening of CB.
8	VPWR -	V(-) Power	Power for ES772A, connect to VBus(-)
9	STATUS1_RTN	Reference for STATUS1	Connect to C pin of micro switch of Contactor 1.
10	STATUS1	Contactor 1 Status Monitor	Connect to NO pin of micro switch of Contactor 1.
11	SHUNT+	Positive Battery Shunt Input	Polarity is during battery discharge
12	LVD1_COIL	Contactor 1 coil input	Connect to one side of Contactor 1 coil, other side of coil connected to VBus(+).
13	DIST_ALM_2	Trip-Indicator Input-2 for US Style CB or GMT Fuse. Alarm on closure to VBus(-).	Connect to NC terminal of breaker micro switch or to indicator lead of GMT fuse, other end (C) referenced to VBus(-).
14	EXT BAT SW2	Alarm input for external battery disconnect switch; alarms on closure to VBus(-).	Connect to NC micro switch of US Style CB, other end (C) referenced to VBus(-), micro switch must close upon manual opening of CB.

Table 42 ES772 Connector J3 Pin Definitions			
Pin	**Name**	**Definition**	**Comments**
1	BATT2_SENSE	Polarity Sense for String 2.	Connect to battery negative VBus(-) of string 2.
2	STATUS2_RTN	Reference for STATUS2.	Connect to C pin of micro switch of Contactor 2.
3	STATUS2	Contactor 2 Status Monitor.	Connect to NO pin of micro switch of Contactor 2.
4	LVD2_COIL	Contactor 2 coil input.	Connect to one side of Contactor 2 coil, other side of coil connected to VBus(+).

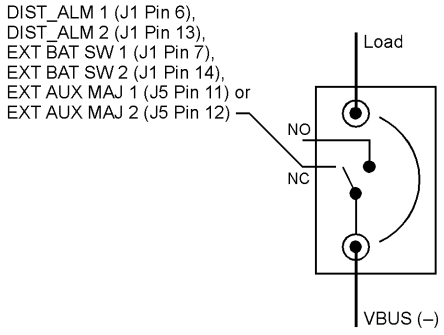


Figure 22: Typical Alarm Connections

The DIST_ALM(1, 2) EXT BAT SW(1, 2), and the EXT AUX MAJ(1, 2) alarm inputs are to be connected as shown in Figure 22. All of these inputs alarm on a closure to VBus(-). The DIST_ALM(1, 2) alarm inputs are to be used for monitoring US Style CBs and GMT style fuses. The EXT BAT SW(1, 2), alarm inputs are to be used for monitoring battery disconnect switches or circuit breakers with a micro switch that closes on manual opening of switch. The EXT AUX MAJ(1, 2) alarms may be connected to external devices with a micro switch that closes on an alarmed state. Examples of this might be a Door Open alarm, or a Fan Fail alarm.

Since these devices all alarm on a contact closure, the protectors of the same type may have the indicating NC terminal connected together and the C terminals connected together and connected as shown above. This is not the case for DIN style circuit breakers, which must be individually monitored via different alarm inputs as shown in Figure 25.

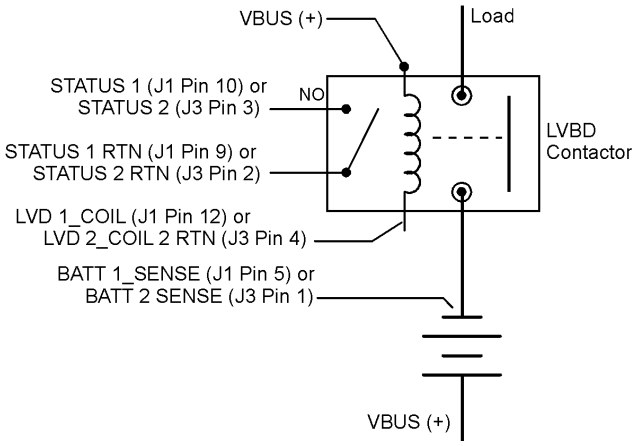


Figure 23: Alarm Connections with Reverse Polarity Protection

Figure 23 shows the connection required if Reverse Polarity Protection is to be used with the integral battery disconnect switches LVD1_DISC or LVD2_DISC. Note that the sense lead BATT1 or BATT2 must be connected as shown in order for the reverse polarity protection feature to work. If two strings are being used, connect one string to STATUS1, LVD1, LVD1_COILRTN, STATUS1_RTN, BATCB1, and BATT1_SENSE connections and the other to the "-2" connections. When more than two strings are being used, divide the strings among the two inputs.

WARNING

When two battery strings are connected to the same battery terminal, care must be taken to ensure the polarity of the two strings is correct to each other. Improper connection will result in one string being shorted to the other string and the system can not protect against this.

With the above connections, the following alarms will be issued for the conditions noted.

	Contactor Fail Alarm	Contactor Open Alarm	Open String Alarm	Controller LED	ES772 LED
Open Integral ES772A Disconnect Switch		X		RED	Blinking AMBER
Battery reconnected in reverse polarity	X	X		RED	RED
System started w/ reverse battery polarity	X	X		RED	RED

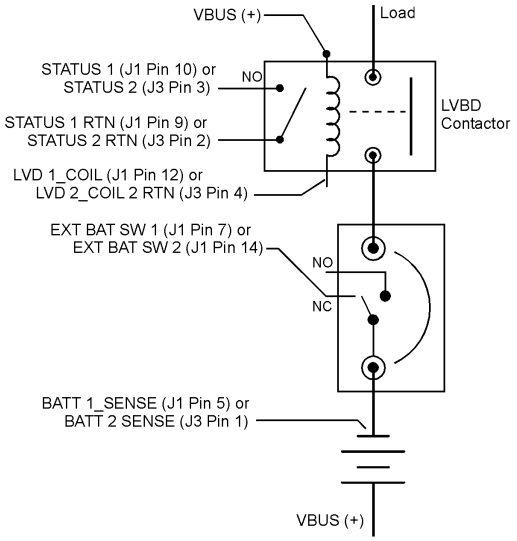


Figure 24: Reverse Polarity Protected Alarm Connections with an External Battery Disconnect Switch

Figure 24 shows the connections required if Reverse Polarity Protection is to be used with an external disconnect switch. Note that the sense lead BATT1_SENSE or BATT2_SENSE must be connected as shown in order for the reverse polarity protection feature to work. If two strings are being used, connect one string to STATUS1, LVD1_COIL, STATUS1_RTN, BATCB1, and BATT1_SENSE connections and the other to the "-2" connections. When more than two strings are being used, divide the strings among the two inputs.

WARNING

When two battery strings are connected to the same battery terminal, care must be taken to ensure the polarity of the two strings is correct to each other. Improper connection will result in one string being shorted to the other string and the system can not protect against this.

With the above connections, the following alarms will be issued for the conditions noted. This assumes the external disconnect switch is used to open and close the battery charging path to the batteries.

	Contactor Fail Alarm	Contactor Open Alarm	Open String Alarm	Controller LED	ES772 LED
Open Integral ES772A Disconnect Switch			X	RED	Blinking AMBER
Battery reconnected in reverse polarity	X	X		RED	RED
System started w/ reverse battery polarity	X	X		RED	RED

Auxiliary Port Connector

Table 43 Auxiliary Port Connector Signals			
Pin	**Function**	**Pin**	**Function**
1	DIN CB-1	2	DIN CB-2
3	DIN CB-3	4	DIN CB-4
5	DIN CB-5	6	DIN CB-6
7	DIN CB-7	8	DIN CB-8
9	DIN CB-9	10	DIN CB-10
11	EXT AUX MAJ-1	12	EXT AUX MAJ-2

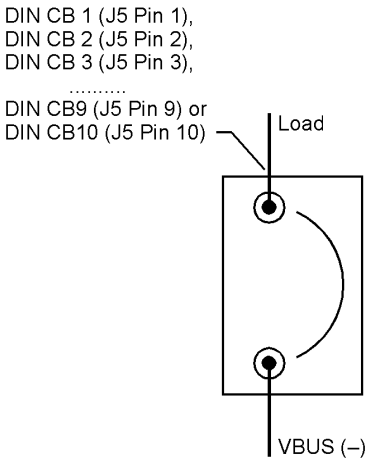


Figure 25: Alarm Connections for DIN Style Load Protectors

Figure 25 shows the connections required if load protectors are the DIN style circuit breakers. Note that 10 alarm inputs are provided for monitoring up to 10 DIN breakers because these breakers must be monitored individually. The DIN CB(1-10) inputs are alarmed on an open to VBus(-).

J100 and J101 Serial Ports

J100 and J101 are used to connect the ES772A to the controller. Note that if QS873A VT-Probes are to be used in conjunction with the ES772A, connect J100 or J101 on the ES772A to the controller via the Auxiliary Port connector on the controller, and then connect the QS873A to the unused RJ-45 jack on the ES772A.

If the ES772A is being used with both the QS873A and the ES771A Remote Voltage Monitoring Module, connect either the ES771A or the QS873A to the controller as both have two RJ-45 jacks for serial communication purposes. Then connect the two-jack device not connected to the controller to the unused serial port of the two-jack device connected to the controller, and connect the QS873A to its second serial port.

ES772A Module Mounting

Use the template in Figure 26 as a guide to mount the ES772A in your application. The location of the mounting holes MH1 and MH2 are outlined.

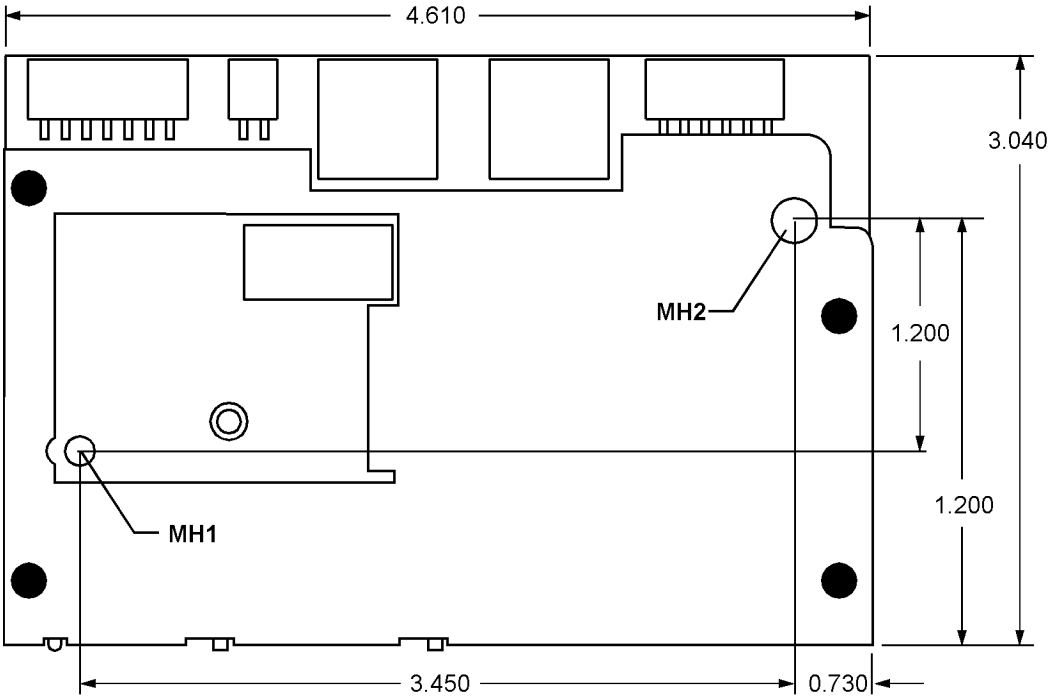


Figure 26: ES772A Mounting Hole Locations

22-position external distribution panel

Overview

The J5694722 external distribution accepts up to 22 bullet-breakers for DC loads and occupies 3U of vertical rack space in a 23" rack. The panel has a total output capacity of 400A and is front accessible. The following configurations are available in 3 distinct distribution modules:

- Without contactor
- With 400A LVLD and 500A shunt
- With 400A LVBD and 500A shunt

Features

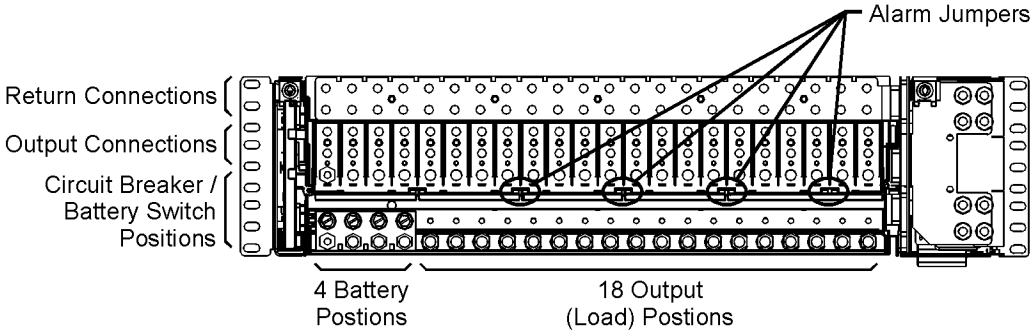


Figure 27: J5694722 External Distribution

- Up to 22 flexible battery positions that can be configured either with the battery bus or the load bus using an adapter plate
- All lug connections accept double-holed lugs.
- Staggered vertical arrangement of up to three distributions directly stacked with wiring access.
- Contactor control, measurements and alarms with the Pulsar Plus family compatible ES772 module
- CO ground connection
- Contactor options None, LVBD, LVLD
- 500A shunt
- Accommodates single, double and triple pole breakers with lug adapter for multi-pole breakers
- English hardware (1/4-20) for all customer connections
- TPS fuses in place of bullet-breakers

This page is intentionally blank.

Troubleshooting

Table 44 Infinity NE System Troubleshooting					
Alarm Severity Indicator[6]	**User Interface Display**	**Rectifier LED**	**Distribution Module Board LED**	**Possible Problem(s)**	**Possible Solution(s)**
PMN AMBER	MIN, AC Fail	None	GREEN	Single Rectifier not receiving ac power. • AC input circuit breaker has opened. • AC input voltage is out of range.	1. Verify ac power to rectifier is available. 2. Verify rectifier input circuit breaker is closed. 3. If problem not corrected, replace rectifier.
PMJ RED	MIN, AC Fail MAJ, Multiple AC Fail MAJ, Battery on Discharge	None	GREEN	Multiple rectifiers not receiving ac power, batteries are powering load. • AC input circuit breakers have opened. • AC input voltage is out of range. • Internal rectifier fault.	4. Verify ac power to rectifiers is available. 5. Verify rectifier input circuit breakers are closed. 6. If problem not corrected, replace rectifier.
PMJ or PMN AMBER or RED	MIN, AC Fail MAJ, Multiple AC Fail	None	GREEN	A rectifier, multiple rectifiers, or the entire system has lost AC and one or more rectifiers have been removed from the system while under this condition.	1. Verify that ac power to all rectifiers is available. 2. Verify that rectifiers all report good AC 3. Issue the uninstall equipment under the operations menu for any rectifier that may have been removed during the AC fail.
PMJ RED	MAJ, Battery on Discharge	AC OK DC OK	GREEN	Rectifier output voltage has fallen below the battery on discharge threshold set by the user.	1. If commercial ac power is present but the system voltage remains low, call your local field representative. 2. Investigate other alarms that may be present such as rectifier related problems.
PMN AMBER	MIN, Rectifier Fail (Note 1)	AC OK ALARM (Note 1)	GREEN	Rectifier output has dropped below 36V, rectifier has entered hiccup mode.	Replace rectifier.
PMJ RED	MAJ, Rectifier Fail	AC OK ALARM (Note 1)	GREEN	All rectifier outputs have dropped below 36V, all rectifiers have entered hiccup mode. Defective controller.	Remove controller; if output voltage does not go to set-point previously set by user, call your local field representative.

[6] **Pulsar Displays** – Alarm Severity indicated by back-light color of the display: Red = Critical or Major, Amber = Minor, Green = Normal.
Phoenix Displays – Alarm Severity indicated by separate LEDs: PCR (Red) = Critical, PMJ (Red) = Major, PMN (Amber) = Minor, SYSOK (Green) = Normal

Table 44 Infinity NE System Troubleshooting					
Alarm Severity Indicator[6]	**User Interface Display**	**Rectifier LED**	**Distribution Module Board LED**	**Possible Problem(s)**	**Possible Solution(s)**
PMJ RED	MAJ, Rectifier Fail (Note 1)	AC OK DC OK	AMBER (Blinking)	One or both of the LVD contactors is open; someone may have manually opened LVD contactor.	Place disconnect switch in ON position.
PMN AMBER	MAJ, Contactor 1 Open	AC OK DC OK	GREEN	Batteries have exceeded temperature threshold set by user.	Call your local field representative.
None	No response.	RED (Blinking)	RED (Blinking)	Controller failure, all devices on the communication bus reporting loss of communication with controller.	Check controller to ensure it is properly inserted into its slot. If so, perform the following steps: 1. Remove the controller board for 1 minute and then reset. 2. If problem persists, replace controller with new controller board. 3. If problem still persists, call your local field representative.
PMN AMBER	MIN, Thermal Probe Fail	AC OK DC OK	GREEN	Battery thermal probe failed.	1. Ensure thermal probe is properly connected to thermal probe cable and controller 2. Ensure cable is properly connected to the rear of the Distribution Module. 3. If problem persists, replace thermal probe per ensuing instructions. 4. If no thermal probe is desired make sure the Slope Thermal Compensation feature is disabled. 5. If problem still persists, call your local field representative.
PMJ RED	MAJ, Fuse Major	AC OK DC OK	RED	One or more of the output circuit breakers or fuses have opened.	Reset circuit breakers or replace fuse.
PMN AMBER	MIN, Rectifier Fail	AC OK ALARM	Normal	Single rectifier thermal alarm: Excessive ambient temperature Multiple rectifier failure	1. Verify that there is no obstruction of the vertical airflow path. 2. Reset the rectifier by removing the rectifier, waiting approximately 30 seconds, and replacing the rectifier. 3. If problem persists, replace the rectifier. 4. If problem still persists, call your local field representative.

Table 44 Infinity NE System Troubleshooting					
Alarm Severity Indicator[6]	**User Interface Display**	**Rectifier LED**	**Distribution Module Board LED**	**Possible Problem(s)**	**Possible Solution(s)**
PMJ RED	MIN, Rectifier Fail MAJ, Multiple Rectifier Fail MAJ, Battery on Discharge	AC OK ALARM	Normal	Multiple rectifier thermal alarm: Excessive ambient temperature Multiple rectifier failure	1. Verify that there is no obstruction of the vertical airflow path. 2. Reset rectifies by removing them, waiting approximately 30s and replacing them. 3. If problem persists, replace the rectifiers. 4. If problem still persists, call your local field representative.
PMJ RED	MAJ, High Voltage	AC OK ALARM	Normal	High output voltage from rectifier(s) Rectifier(s) high voltage shutdown Internal rectifier(s) failure	1. Reset the rectifier(s) by removing the rectifier(s), waiting approximately 30s and replacing the rectifier(s). 2. If problem persists, replace the rectifier. 3. If problem still persists, call your local field representative.
PMN Amber	MIN, Clock Battery Low	AC OK DC OK	Normal	Internal Lithium Battery Is Low	1. The battery is not designed to be easily field replaced. The controller unit needs to be replaced. 2. Obtain all desired information such as alarm history, statistics, and any field configuration that is different than the standard.
PMN Amber	MIN, Minor Communication Fail	RED Blinking Single rectifier	GREEN	Rectifier lost communication with controller.	1. If a rectifier has been removed from an installed/operational system, go to the Control/Operations menu and execute Uninstall Equipment. 2. Reset the rectifier by removing the rectifier, waiting approximately 30 seconds, and replacing. 3. If problem persists, replace the rectifier. 4. If problem still persists, call your local field representative.
PMJ RED	MAJ, Major Communication Fail	GREEN	RED (Blinking)	LVD Board lost communication with the controller.	1.Replace Distribution Module Board. (Note 2) 2.If problem persists, call your local field representative.

Table 44 Infinity NE System Troubleshooting					
Alarm Severity Indicator[6]	**User Interface Display**	**Rectifier LED**	**Distribution Module Board LED**	**Possible Problem(s)**	**Possible Solution(s)**
SYSOK GREEN	No Alarm, Individual Shunt Currents displayed at or above their maximum display values (≥600A for loads, ≥800A for battery)	AC OK DC OK	Normal	One or both of the QS871A shunt inputs is open-circuit.	1. Verify that the respective shunt has its green and yellow wire connections attached used for the current measurements. 2. Verify the shunt connection to the QS871A is good by verifying the green and yellow wire connections from the shunt follows through to the 10-pin connector at the respective QS871A.

Note 1: While in hiccup mode, the rectifier will attempt to restart every 10 seconds for a maximum of 3 times.

Note 2: Refer to Section 5, LVD board Removal for removal details. Note that the power system will continue to power the load while the LVD board is out of the system; however, there will be no possibility of battery backup until the LVD board is replaced.

Checking for Defective VT-Probes

1. Disconnect the first probe from its RJ-45 terminal block.
2. Run the CLE function. If the system controller illuminates its LED in green color, the probe is defective. Alternatively, the number of registered probes may be known from the terminal interface (TI) by running the Number of Temperatures present command, see Appendix B. If the registered number of probes is equal to the total number of probes connected, remember you've removed a probe, so the total number will be one less than that during installation, and then the first probe is defective. Replace the probe with a different probe and follow the above procedure to ensure it is operational.
3. If the system controller LED remains green or the number of registered probes is still incorrect, replace the first probe and remove the second probe and repeat Step 2. Continue this procedure until the defective probe has been found.

Specifications

Table 45 Specifications

General Specifications	
Item	**Specification**
Input Voltage Ranges (power)	+/-24 volts: from +/-18 volts to +/-30 volts; -48 volts: from -36.5 volts to -60 volts SELV
Input Power	6.0 watts maximum
Input Power Connections	NE843A/CP843A/EP843D, No external connection required; NE843C/NE843E/NE843G/NE843P, (**J9**)12-pin connector
Bonding Network	Suitable for installation as part of either • Common Bonding Network (CBN) • an Isolated Bonding Network (IBN)
Facilities	Suitable for installation in • Network Telecommunication Facilities • Locations where the NEC applies
DC Return	• Isolated DC Return (DC-I) or • Common DC Return (DC-C)
Front Panel User Interface	• 4 or 8-line by 40-character LCD • Severity sensitive backlit LCD (LEDs on NE 843P); • Three status LEDs (20 on NE843P) • Voltage test jacks; • Six Push Buttons (Rotary Control + 2 Push Buttons on NE843P)
System Configuration Methods	• Front panel LCD display and menu keys (**J5**) and (**J8**) 10/100 Base-T port/s (**J7**) DB9 for RS-232 port: T1.317 or EasyView **(J6**) RJ11 for phone line connection –MODEM option
Maximum Power Units	• 60 NE Power Units • 32 CP Power Units
Low-Voltage Disconnects	Manage up to eight LVD contactors using up to 3 independent configurable Load disconnect thresholds (LVLDs) and 1 configurable Battery disconnect threshold (LVBD).
Temperature Monitoring	Up to 16 One-Wire Battery Temperatures; One on-board internal ambient temperature

System Inputs/Outputs Specifications	
Item	**Specification**
SELV	All input and output connections comply with SELV requirements.
Connections - Ports	**CAUTION** Intra-building ports of the equipment or subassembly • are suitable for connection only to shielded intra-building or unexposed wiring or cabling grounded at both ends. • MUST NOT be metallically connected to interfaces which connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 5) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection. All controller ports are intra-building except the phone port of the BSM6 Modem.
Alarm and Control Inputs	(**J3**) 10-pin connector 2 control and 5 alarm inputs and returns; (**J1**) 6-pin connector for 4 basic plant inputs
Alarm Contact Outputs	10 User configurable Form-C Outputs; (**J4**) 20-pin connector for 10 individual alarm output contacts; Wire size: 28-16 AWG stranded or solid
Alarm Contact Ratings	60 VDC, 0.5A
Plant Voltage Measurement Accuracy 0 to 50°C -40 to 85°C Resolution	 ±0.05% of full scale + 1 count 48V Systems: ±40 mV; 24V Systems ±25 mV ±0.1% of full scale + 1 count) 48V Systems: ±70 mV; 24V Systems ±40 mV 0.01V
Plant Current Measurement Accuracy 0 to 50°C -40 to 85°C Resolution	 ±0.5% of full scale ±1.25% of full scale 1A
Temperature Measurement One-Wire Probe Accuracy -5 to +55°C -40 to +85°C Resolution	 ±1°C ±3°C 0.1°C

Environmental Specifications	
Item	**Specification**
Operating Temperature	-40 to 75°C (-40 to 167°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Altitude	-200 to 13,000 feet (-61 to 3962 meters)[7]
Humidity	10% to 95% non-condensing
Audible Noise	< 60 dBA
Earthquake Rating	Zone 4, upper floors
Controlled Environment	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).

Installation Area Specifications	
Item	**Specification**
Installation Area Limitations	Store and operate 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.

Operation Without Batteries	
Item	**Specification**
Suitability without Batteries	Suitable for use in power plants with or without batteries.
Loss of AC Power without Batteries	Loss of ac power causes • Controller DC power is lost • Controller alarm relays are activated (unpowered)
Recovery from Loss of AC Power without Batteries	Restoration of AC power causes • Rectifiers return to their configured voltage set point • Controller DC power is restored • Controller automatically return to its last configuration Alarm relays reflect actual alarm states

[7] For altitudes above 5000 feet (1524 meters), derate the temperature by 3.6 °F per 1000 feet (0.656 °C per 100 meters).

Safety / Standards Compliance Specifications	
Item	**Specification**
Safety Agency Approvals	UL Recognized to UL Subject 1801, Power Distribution Center for Communications Equipment and CAN/CSA C22.2 No. 60950-1-03, UL 60950-1, Standard for Safety of Information Technology Equipment.
European Economic Community (EEC) Directives	EMC Directive 89/336/EEC, Low Voltage Directive 73/23/EEC as amended by Marking Directive 93/68/EEC
Radiated and Conducted Emissions	FCC Part 15, Class A EN55022 (CISPR22) Class A
Electromagnetic Immunity	Telcordia GR-1089-CORE EN55022 (CISPR22) Class A
Electrostatic Discharge	EN61000-4-2 Level 1-4
RF Immunity	IEC61000-4-3 Level 3, 10 V/m
Conducted Immunity	IEC 61000-4-6 Level 3 Input Power Ports IEC 61000-4-6 Level 2 Telecom Ports
Voltage Dips, Interruptions, and Variations	IEC 61000-4-11, EN55024 (CISPR24)

Safety

Safety Statements

Please read and follow all safety instructions and warnings before installing, maintaining, or repairing the equipment. Refer to individual equipment product manuals for additional safety statements specific to other equipment being installed, removed, or replaced.

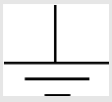
See the **Specifications** section for equipment specific

- Safety Compliance information
- Installation Area Limitations
- Environmental Limitations

- Do not install this equipment over combustible surfaces.
- 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 requirements 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.
- DC output 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.
- Insulation on field-wired conductors must be rated no less than 90° Celsius. Size conductors based on listed recommendations. Wiring internal to enclosed equipment cabinets must be rated at 105° Celsius (minimum).
- 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.
- Alarm contacts are not fused within the equipment. Current limiting protection for these contacts must be provided by external circuits. Exceeding these maximum ratings could result in fire or damage to the unit. See Specifications section for alarm contacts ratings.
- In enclosed equipment cabinets, the equipment chassis must be connected directly to the cabinet ac service ground bus. For applications in huts, vaults, and central offices, the equipment chassis must be connected to the system bonding network.

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.” Signal words as described below may also be used to indicate the level of hazard.

DANGER	Indicates the presence of a hazard that will cause death or severe personal injury if the hazard is not avoided.
WARNING	Indicates the presence of a hazard that can cause death or severe personal injury if the hazard is not avoided.
CAUTION	Indicates the presence of a hazard that will or can cause minor personal injury or property damage if the hazard is not avoided.
	This symbol identifies the need to refer to the equipment instructions for important information.
	These symbols (or equivalent) are used to identify the presence of hazardous ac mains voltage.
	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.
	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 non-insulated metal objects. Follow safety precautions.”
	One of these two symbols may be 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.
	This symbol is used to identify the protective safety earth ground for the equipment.
	This symbol is used to identify other bonding points within the equipment.
	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.”

Precautions

- Install, service, and operate this equipment only by professional, 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 equipment may be powered by multiple ac inputs. Ensure that the appropriate circuit protection device for each ac input being serviced is disconnected before servicing the equipment.
- Do not disconnect permanent bonding provisions unless all AC inputs are disconnected.
- 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.
- High leakage currents may be possible on this type of equipment. Make sure the equipment is properly safety earth grounded before connecting power.
- Exercise care and follow all safety warnings and practices when servicing this equipment. Hazardous energy and voltages are present in the unit and on the interface cables that can shock or cause serious injury. When equipped with ringer modules, hazardous voltages will be present on the ringer output connectors.
- Use the following precautions in addition to proper job training and safety procedures:
  - Use only properly insulated tools.
  - Remove all metallic objects (key chains, glasses, rings, watches, or other jewelry).
  - Wear safety glasses. Fuses can produce sparks. High energy levels on buses and distribution components can produce severe arcing.
  - Test circuits before touching.
  - Lock out and tag 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 wiring).
  - Use care when removing or replacing covers; avoid contacting circuits.
- 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 batteries, which 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.

This page is intentionally blank.

Contacts and Warranty

Customer Service Contacts

Customer Service, Customer Training, Technical Support, Product Repair and Return, and Warranty Service

Customer Service, Customer Training, Technical Support, Product Repair and Return, and Warranty Service

For customers in the United States, Canada, Puerto Rico, and the US Virgin Islands, please dial +1 877 546 3243 (877 LINEAGE) or for all other countries, please call +1 972 244 9288. This number is staffed from 7:00 am to 5:00 pm USA Central Time Zone (GMT -6), Monday through Friday, on normal business days. At other times, this number is still available, but for emergencies only. Services provided include initiating the spare parts procurement process, ordering documents, product warranty administration, and providing other product and service information.

For other customers worldwide the 800 number may be accessed after first dialing the AT&T Direct country code for the country where the call is originating, or you may contact your local field support center or your sales representative to discuss your specific needs.

On-Line Power Systems Product Manuals and Software

Power Systems on-line product manuals and software are available on-line. Software includes Easy View and SNMP MIB.

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 During the warranty period stated in Sub-Article B below, Seller's Manufactured Products (products manufactured by Seller), which have been paid for by Customer, will conform to industry standards and Seller's specifications and shall be free from material defects;

3 With respect to Vendor items (items not manufactured by Seller), Seller warrants that such Vendor items, which have been paid for by Customer, will be free from material defects for a period of sixty (60) days commencing from the date of shipment from Seller's facility.

B. The Warranty Period listed below is applicable to Seller's Manufactured Products furnished pursuant to this Agreement, commencing from date of shipment from Seller's facility, unless otherwise agreed to in writing:

Warranty Period		
Product Type	**New Product**	**Repaired Product***
Central Office Power Equipment**	24 Months	6 Months

* *The Warranty Period for a repaired Product or part thereof is six (6) months or, the remainder of the unexpired term of the new Product Warranty Period, whichever is longer.*

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 repaired or replacing Product to the destination designated by Customer.

E. Except for batteries, the defective or nonconforming Products or parts which are replaced shall become Seller's property. Customer shall be solely responsible for the disposition of any batteries.

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 experimental products or prototypes or with respect to expendable items, including, without limitation, fuses, light bulbs, motor brushes, and the like. Seller's warranty does not extend to any system into which the Product is incorporated. This warranty applies to Customer only and may not be assigned or extended by Customer to any of its customers or other users of the Product.

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.

Appendix A: Software Upgrades through Craft Port

Software can be upgraded through the 10/100Base-T connection either over the network or when configured as the Ethernet Craft Port. There are four program files that can be upgraded on the Pulsar Plus family of controllers: The boot block, the factory defaults, application, and web pages. The present application does not have a factory defaults file. Hard coded defaults are utilized. In any case, each of these items has a specific file name. FTP is used for upgrading controller software. Each file goes in a certain directory on the controller:

Item	File	Directory
Boot Block	NE843-boot.bin	/
Defaults	NE843-dflts.bin	dflts
Application	NE843-app.bin	code
Web pages	NE843-pages.web	web
Backup Configuration	config.gal	config
Language file	alt.lang	custom

These files must be uploaded to the controller using FTP either through the web page interface or through a direct Telnet session. To use FTP, the user must first initiate a Telnet session through the Craft port or network connection. To use the Ethernet port locally as a Craft port it needs to be configured as a DHCP Server. DHCP Server operation can be validated at **Menu➔Status➔Network Settings**. Scroll down to view the port's present configuration.

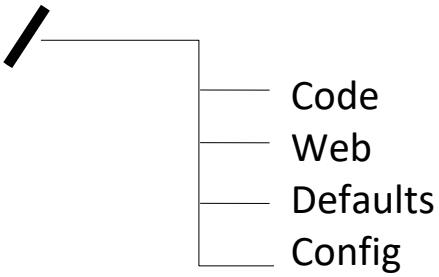
If it is not in DHCP Server mode, make sure the Craft port is not plugged into a LAN connection and re-configure the DHCP setting from the front panel to be Server. This is parameter is found in **Menu➔Configuration➔Communication Ports➔Network Settings➔DHCP**. Note: the controller will need to be rebooted in order to accept the new Ethernet port configuration. This is done by temporarily removing power to the unit. This process takes approximately two minutes.

Common FTP commands used when performing file operations are:

- **ftp** – Initiate the ftp session.
- **cd** – Change directories in the controller.
- **put** – Copy files from the PC running FTP to the controller (The present working directory of the PC will be the source directory for the file being copied.)
- **get** – Copy files from the controller to the PC running FTP (The present working directory of the PC will be the destination directory for the file being copied.)
- **bye** – Exit the FTP session
- **pwd** – Display the path of the current directory
- **rm** – Remove a file from a directory
- **ls** – List all files in a directory

Note: The controller has a file/directory structure as shown below: Where "/" is the root directory. Each subdirectory contains files that are necessary for the Application Software and web pages. Thus, using an FTP client, shown previously, files may be transferred to/from these controller directories. The exact path to the upgrade file may be used in the "put" command to update the software. Note: software upgrades

require administrator level privilege. Thus, the password required is **administrator**. Similar responses are seen when opening a Telnet session remotely over the LAN connection. Note: you have to give the path of to the file in conjunction with the put commands.



Boot Block Software

Using any FTP client, perform the following steps to load Application Software:

1. Change your directory to the PC directory where the Application code is stored.

2. Type: *FTP x.x.x.x (The controller Working IP Address is 192.168.2.1).*
   ftp 192.168.2.1
   Connected to 192.168.2.1
   220 NE843 FTP Ready

3. Login as guest using the network administrator password (administrator).
   User (192.168.2.1:(none)): ***guest***
   331 User name okay, need password
   Password: ***administrator***
   230 Logged in

4. Change directory (cd) to the main **boot block** directory by typing: *cd /.*
   ftp> ***cd /***
   250 CWD command successful

5. Use the put command to copy the application software to the controller.
   ftp> put ***NE843-boot.bin***
   200 Port command okay
   150 Opening data connection for STOR (192.168.2.1,1576)

6. Wait until the message indicating a successful file transfer is displayed.
   226 File sent OK
   ftp: 917504 bytes sent in 2.31Seconds 396.50Kbytes/sec.

7. Type bye to exit/logout of the FTP session.
   ftp> ***bye***
   221 Goodbye!

Factory Defaults

Using any FTP client, perform the following steps to load default web pages:

1. Type: *FTP x.x.x.x (The controller Working IP Address is 192.168.2.1).*
   ftp 192.168.2.1
   Connected to 192.168.2.1
   220 NE843 FTP Ready

2. Login as guest using the using the network administrator password (administrator).
   User (192.168.2.1:(none)): ***guest***
   331 User name okay, need password
   Password: ***administrator***
   230 Logged in

3. Change directory (cd) to the **dflts** directory by typing: *cd dflts.*
   ftp> ***cd dflts***
   250 CWD command successful

4. Use the put command to copy the web pages to the controller.
   ftp> put ***NE843-dflts.bin***
   200 Port command okay
   150 Opening data connection for STOR (192.168.2.1,1576)

5. Verify the transfer by a message displayed indicating a successful file transfer.
   226 File sent OK
   ftp: 917504 bytes sent in 2.31Seconds 396.50Kbytes/sec.

6. Type bye to exit the FTP session.
   ftp> ***bye***
   221 Goodbye!

Application Software

Using any FTP client, perform the following steps to load Application Software:

1. Change your directory to the PC directory where the Application code is stored.

2. Type: *FTP x.x.x.x (The controller Working IP Address is 192.168.2.1).*
   ftp 192.168.2.1
   Connected to 192.168.2.1
   220 NE843 FTP Ready

3. Login as guest using the network administrator password (administrator).
   User (192.168.2.1:(none)): ***guest***
   331 User name okay, need password
   Password: ***administrator***
   230 Logged in

4. Change directory (cd) to the **code** directory by typing: *cd code.*
   ftp> ***cd code***
   250 CWD command successful

5. Use the put command to copy the application software to the controller.
   ftp> put ***NE843-app.bin***
   200 Port command okay
   150 Opening data connection for STOR (192.168.2.1,1576)

6. Wait until the message indicating a successful file transfer is displayed.
   226 File sent OK
   ftp: 917504 bytes sent in 2.31Seconds 396.50Kbytes/sec.

7. Type bye to exit/logout of the FTP session.
   ftp> ***bye***
   221 Goodbye!

Web Pages

Using any FTP client, perform the following steps to load default web pages:

1. Type: *FTP x.x.x.x (The controller Working IP Address is 192.168.2.1).*
   ftp 192.168.2.1
   Connected to 192.168.2.1
   220 NE843 FTP Ready

2. Login as guest using the using the network administrator password (administrator).
   User (192.168.2.1:(none)): ***guest***
   331 User name okay, need password
   Password: ***administrator***
   230 Logged in

3. Change directory (cd) to the **web** directory by typing: *cd web.*
   ftp> ***cd web***
   250 CWD command successful

4. Use the put command to copy the web pages to the controller.
   ftp> put ***NE843-pages.web***
   200 Port command okay
   150 Opening data connection for STOR (192.168.2.1,1576)

5. Verify the transfer by a message displayed indicating a successful file transfer.
   226 File sent OK
   ftp: 917504 bytes sent in 2.31Seconds 396.50Kbytes/sec.

6. Type bye to exit the FTP session.
   ftp> ***bye***
   221 Goodbye!

Backup/Restore Configuration File

Using any FTP client, perform the following steps to load default web pages:

1. Type: *FTP x.x.x.x (The controller Working IP Address is 192.168.2.1).*
   ftp 192.168.2.1
   Connected to 192.168.2.1
   220 NE843 FTP Ready

2. Login as guest using the using the network administrator password (administrator).

User (192.168.2.1:(none)): ***guest***
331 User name okay, need password
Password: ***administrator***
230 Logged in

3. Change directory (cd) to the **config** directory by typing: *cd config.*
ftp> ***cd config***
250 CWD command successful

Backing Up/Retrieving

4. To retrieve a backup of a site's configuration use the get command to get a copy of the configuration file (config.gal).
ftp> get ***config.gal***
200 Port command okay
150 Opening data connection for STOR (192.168.2.1,1576)
226 File sent OK

Restoring

4. To restore a backup of a site's configuration use the put command to load a copy of the configuration file (config.gal) to the site.

ftp> put *filename* ***config.gal***
Note: The full path of to the file with the filename must be provided. It is OK just to use the same name with a command like the following:

ftp> put ***config.gal***

200 Port command okay
150 Opening data connection for STOR (192.168.2.1,1576)

5. Verify the transfer by a message displayed indicating a successful file transfer.
226 File sent OK
ftp: 917504 bytes sent in 2.31Seconds 396.50Kbytes/sec.

6. Type bye to exit the FTP session.
ftp> ***bye***
221 Goodbye!

Language Files
Using any FTP client, perform the following steps to load default web pages:
1. Type: *FTP x.x.x.x (The controller Working IP Address is 192.168.2.1).*
ftp 192.168.2.1
Connected to 192.168.2.1
220 NE843 FTP Ready

2. Login as guest using the using the network administrator password (administrator).
User (192.168.2.1:(none)): ***guest***
331 User name okay, need password

Password: ***administrator***
230 Logged in

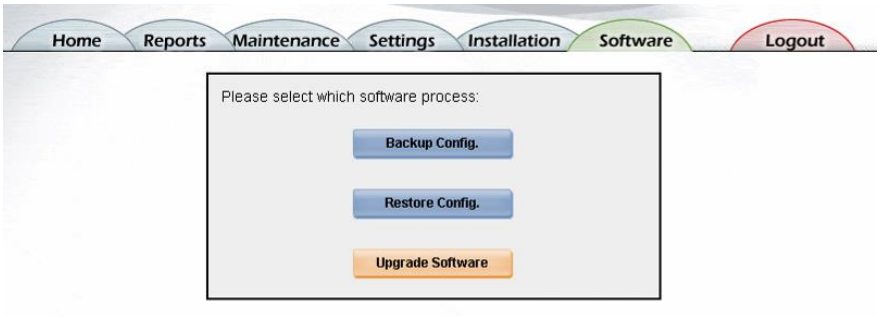
3. Change directory (cd) to the **web** directory by typing: *cd web.*
ftp> ***cd custom***
250 CWD command successful

4. Use the put command to copy the web pages to the controller.
ftp> put ***alt.lang***
200 Port command okay
150 Opening data connection for STOR (192.168.2.1,1576)

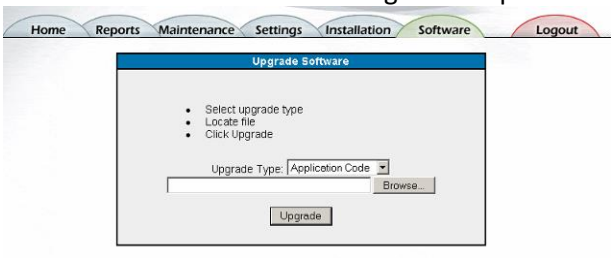
5. Verify the transfer by a message displayed indicating a successful file transfer.
226 File sent OK
ftp: 917504 bytes sent in 2.31Seconds 396.50Kbytes/sec.

6. Type bye to exit the FTP session.
ftp> ***bye***
221 Goodbye!

The software can also be uploaded through the web pages. Login into through the web pages as "administrator" and go to the "Software" tab and use the "**Upgrade Software**" tab feature button located at the bottom of the page. The sample screen is shown below.



Clicking the "**Upgrade Software**" button provides an interface to select which file is to be upgraded as well as a tool to help select the location of the file to FTP. Following is a sample screen.



.

Appendix B: T1.317 Command Language

Initializing Controllers

The Pulsar Plus family of controllers are highly flexible with many features. This section outlines programming the controller using the Hyper Terminal program that is shipped with most IBM compatible PC's. Connect the cable between the computer RS-232 port, and the controller RS-232 port, J3. After Hyper Terminal has started and the programming cable is connected to the controller and the PC, you will see the login screen that allows access to the controller programming features.

RS-232 Terminal/Modem Port

This interface provides a T1.317 interface for local or dial-out access. The local port DTR signal switches the port personality from modem to terminal. This interface provides access to all status, configuration, and operations. It also provides call-out on alarm capability.

The controller communicates with the modem using the following settings:

Baud Rate:	9600
Data Bits:	8
Stop Bits:	1
Parity:	None

Three levels of security protect incoming access: user, super-user, and administrator. A user has read ability and can only get status information from the controller. A super-user can change configurations and perform control operations. An administrator has all the abilities of a super-user but can also change passwords. All access to the controller is via the T1.317 command set, to be discussed later.

This section describes how to log into the system via an RS-232 local port. The first step to logging in is to get to an “ENTER PASSWORD:” prompt. From a terminal connected to the RS-232 port, simply press ENTER until you see the log-in prompt. The number of ENTER keys required will depend on the baud rate you are trying to connect at. The controller will adjust its baud rate automatically until it recognizes the carriage return character (ASCII 13) sent by pressing ENTER.

At the “ENTER PASSWORD:” prompt, type the user or super-user password. The default password for each level of security is listed below.

Default User password	**lineage**
Default Super-user password	**super-user**
Default Administrator password	**administrator**

After receiving the correct password, the controller will respond with one of the following command line prompts:

User command-line prompt:	*
Super-user command-line prompt:	**

When these prompts appear the controller is ready to accept commands. Note that the session will be terminated if the port is idle for 15 minutes.

T1.317 Command Language

The Pulsar Plus controller command language is based on the T1.317 standard. This section describes the commands, objects and attributes used to access measurements, configuration, and control parameters in the controller.

Objects and Attributes

The T1.317 standard organizes system parameters called attributes into groups called objects. All commands, objects, attributes and ranges for their respective parameters for the controllers are given in the following tables.

An object-attribute pair uniquely identifies a measurement, configuration, or control parameter. For example, the object-attribute pair “dc1,vdc” identifies the plant voltage while the object-attribute pair “dc1,adc” identifies the plant load current. In each of these examples “dc1” identifies the plant object and “vdc” and “adc” identify DC voltage and DC current, respectively.

There are three main commands involved with plant operations in the system controller command set. The command “**sta**” is used to get the status of the plant, the command “**cha**” is used to change a plant parameter, and the command “**ope**” is used to initiate a plant function. A person at the “user” level can only perform the sta operations. A person at the “super-user” and “administrator” level can also perform the "cha" and "ope" operations.

Instructions in the T1.317 command set take the following form:

command object,attribute[=parameter].

Certain commands do not require a value for parameter, while others do. Note that text parameters are to be enclosed in quotation marks while numeric parameters are not to be enclosed in quotation marks.

For example, to obtain the plant voltage, type in the following command:

sta dc1,vdc

To enable low-temperature slope thermal compensation, type in the following command:

cha sc1,rve=1

To change the voltage at which the LVD contactor disconnects the batteries from the load to 40V, type the following:

cha cn1,dth=40

To initiate a manual boost charging, i.e., place the plant into boost charging mode, type in the following command:

ope dc1,stt=“boost”

The tables below summarize the object-attribute pairs in the system along with the commands that can be used with the pair and the valid range that the attribute may have. The values in bold text are the default settings for the attributes.

Table 46 T1.317 Power System Related Commands

obj,attr	description	sta	cha	ope	type	Range of Values
ps1,ide	Identifier	✓			text	PS1
ps1,des	Power system description	✓			text	“NE843”
ps1,sid	Site ID	✓	✓		text	Up to 20 characters
ps1,sde	Site Description	✓			*text*	Up to 55 characters

Table 46 T1.317 Power System Related Commands						
obj,attr	**description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
ps1,sys	System Description	✓	✓		text	Up to 55 characters
ps1,swv	Software version	✓			text	d.d
ps1,verw	Web pages version	✓			text	d.d
ps1,verb	Boot block version	✓			text	d.d
ps1,verd	Display version	✓			text	d.d
ps1,dflt	Defaults version	✓			text	d.d
ps1,brc	Board code	✓			*text*	“”
ps1,sn	Serial number	✓			*text*	YYLLddddddddd
ps1,dow	Day of week	✓			*Text*	Sunday…Saturday
ps1,dat	Date	✓	✓		date	format matching ps1,dtf
ps1,dtf	Date format	✓	✓		*text*	mm-dd-yyyy, dd-mm-yyyy, yyyy-mm-dd
ps1,tim	Time	✓	✓		time	hh:mm
ps1,tmf	Time format	✓	✓		*number*	12, 24
ps1,dls	Daylight savings enable	✓	✓		number	0=disabled 1=enabled
ps1,lng	Language	✓	✓	✓	*text*	ENGLISH, OTHER OPE changes the descriptions
ps1,tun	Temperature units	✓	✓		*text*	C, F
Ps1,cem	Critical equals major	✓	✓		*number*	0=disable, 1=enable
ps1,fpc	Front panel configuration	✓	✓		*number*	0=disable, 1=enable
ps1,rrf	Remote rectifier off	✓	✓		*number*	0=disable, 1=enable
ps1,poe	Power off enable	✓	✓		*number*	0=disable, 1=enable
ps1,usl	Uninstall missing equipment	✓		✓	number	1
ps1,usr	Username enable	✓	✓		*number*	0=disable, 1=enable
ps1,dct	Display contrast	✓	✓		*number*	0 – 100 %
ps1,ptt	Communication port type	✓	✓		text	“LOCAL”,”MODEM”
ps1,amt	System ambient temperature	✓			number	dd °C
ps1,fst	Factory defaults	✓		✓	*text*	See ps1,fstl
ps1,fstl	Factory defaults list	✓			*text*	Comma deliminated list of defaults
ps1,rap	Reset Passwords	✓		✓	*number*	1 = reset passwords (OPE only valid from local display) will restore passwords.gal
ps1,fpe *	Front Panel Pin enable	✓	✓		*number*	0=disable, 1=enable
ps1,fpt *	Front Panel Pin Time-out	✓	✓		*Number*	1-120 minutes
Ps1,fpp *	Front Panel Pin	✓	✓		*Number*	4 digit Pin (only viewable as admin)
ps1,rss	Restart all	✓		✓	*number*	1=restart rectifiers and ringers
ps1,ltt	Lamp test	✓		✓	*number*	1 = do lamptest
ps1,ast	System alarm state	✓			*Text*	“NORM, "RO", "WRN", "MIN", "MAJ", "CRIT"
ps1,slv	Port security level	✓			*text*	
ps1,dss	Daylight saving start	✓	✓		*d:d:d:d*	mon:wk:dow:min mon:-1:dom:min
ps1,dse	Daylight saving end	✓	✓		*d:d:d:d*	mon:wk:dow:min mon:-1:dom:min
Ps1,uet	Uninstall Timeout	✓	✓		*Number*	0-60

* Must have administrator privileges to change.

Table 47 T1.317 User Login Related commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
x,ide	Identifier	✓			text	USR01-USR14, ADM1
x,des	Description	✓	✓		text	User Account 1-14 Administrator Account
x,pwd	Password	✓	✓		text	15 characters
x,usr	User name	✓	✓		text	15 characters
x,lvl	Security level	✓	✓		text	“USER”, “SUPER-USER”, “ADMINISTRATOR”

Table 48 T1.317 DC Plant Related Commands						
obj,attr	**description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
dc1,ide	Description	✓			text	DC1
dc1,des	Description	✓	✓		text	DC Plant 1
dc1,typ	Plant Type	✓	✓	✓	number	48V, 24V
dc1,vdc	Plant voltage	✓		✓	number	dd.dd V
dc1,adc	Plant load current	✓		✓	number	ddd.d A
dc1,cap	Total installed rectifier capacity	✓			number	ddd.d A
dc1,olcap	Total on-line rectifier capacity	✓			number	ddd.d A
dc1,trd	Plant total rectifier drain	✓			number	ddd.d A
dc1,sht	Centralized plant shunt type	✓	✓		Text	“NONE”, ”BATTERY”, ”LOAD”
dc1,sha	Centralized plant shunt size	✓	✓		Number	0=disabled 1-9999
dc1,stt	Plant state	✓		✓	text	“FLOAT”, “BOOST”
dc1,bod	Battery on discharge	✓			number	0=on discharge 1=not on discharge
dc1,rss	Rectifier restart	✓		✓	number	0=no action 1=restart
dc1,rsq	Rectifier sequencing	✓	✓		number	0=disable 1=enable
dc1,ron	User Group TR request	✓		✓	Number	0-3 LSB = User, MSB=PBT
dc1,rot	All Rectifier On Threshold	✓	✓		number	20-25or 40-50 volts
dc1,nst	Number of battery strings	✓	✓		number	1-70
dc1,cps	Number of Cells per String	✓	✓		number	1-75 (24V plant) or 24 (48V plant)
dc1,bty	Battery type	✓	✓	✓	Text	See battery type definitions default (OPE causes battery defaults to be loaded)
dc1,isd	Imminent shutdown enable	✓	✓		number	0=disable 1=enable
dc1,rtm	Actual reserve time	✓			text	Low Current-Batt current too low High Current-Batt current too high dd.d (in hours)
dc1,scap	String capacity	✓	✓		number	
dc1,mls	All load shunts monitored	✓	✓		number	0=disable 1=enable

Table 49 T1.317 Alarms With Two Thresholds Related Command						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
objid,ide	Identifier	✓			text	see below
objid,des	Description	✓	✓		text	see below
objid,fds	Front Panel Description	✓	✓		text	see below
objid,ast	Alarm state	✓			number	0=not active 1=active
objid,led	LED	✓	✓		text	BD,AC,DC,””
objid,sev	Alarm severity	✓	✓		text	CRIT, MAJ, MIN, WRN, RO
objid,fth	Alarm boost threshold	✓	✓		number	see below
objid,bth	Alarm float threshold	✓	✓		number	see below

objid,acc	Contact Closure	✓	✓		text	R1,R2,R3,R4,R5,R6,R7,””
objid,dly	Notify Delay	✓	✓		number	0-540 seconds
objid,noo	Notify On Occur	✓	✓		number	0=no 1=yes
objid,nor	Notify On Retire	✓	✓		number	0=no 1=yes
objid,nag	NAG On Occur	✓	✓		number	0=no 1=yes
objid,dst	Notify Destination	✓	✓		text	“”, P1, P2, P3, P4, E1, E2, E3, E4, S1, S2, S3, S4

objid	Description	Float Threshold	Boost Threshold
bda1	Battery On Discharge	23-28 V or 46-55 V	23-28 V or 46-55 V
hfv1	High voltage	24.75-29.75 V or 50-60 V	25.75-31.75 V or 52-60 V
hva1	Very high voltage	24.75-29.75 V or 50-60 V	25.75-31.75 V or 52-60 V

Table 50 T1.317 Alarms With One Threshold Related Command

obj,attr	Description	sta	cha	ope	type	Range of Values
objid,ide	Identifier	✓			text	see below
objid,des	Description	✓	✓		text	see below
objid,fds	Front Panel Description	✓	✓		text	see below
objid,ast	Alarm state	✓			number	0=not active 1=active
objid,sev	Alarm severity	✓	✓		text	CRIT, MAJ, MIN, WRN, RO
objid,thr	Alarm threshold	✓	✓		number	number
objid,led	LED	✓	✓		text	BD,AC,DC,””
objid,acc	Contact Closure	✓	✓		text	R1,R2,R3,R4,R5,R6,R7,””
objid,dly	Notify Delay	✓	✓		number	**0**-540 seconds
objid,noo	Notify On Occur	✓	✓		number	**0=no** 1=yes
objid,nor	Notify On Retire	✓	✓		number	**0=no** 1=yes
objid,nag	NAG On Occur	✓	✓		number	**0=no** 1=yes
objid,dst	Notify Destination	✓	✓		text	“”, P1, P2, P3, P4, E1, E2, E3, E4, S1, S2, S3, S4

objid	Description	Threshold
amth1	High ambient temp	30-75C
amtl1	Low ambient temp	-40-10C
btha1	High battery temperature	30-85C
mrfa1	Multiple Rectifier Fail	2-88
mman1	Multiple Manual Off	2-88
rrtl1	Real-time reserve low	0-100hrs
rtl1	Reserve time low	0-100hrs
macf1	Multiple AC Fail	2-88
rls1	Redundancy Loss	1-87
cmfa1	Multiple Converter Fail	2-16
chva1	Converter Very High Output Voltage	25-30V 50-60V
chfv1	Converter High Output Voltage	24-30V 48-60V
cvla1	Converter Very Low Output Voltage	20 - 27V 40 - 54V
crl1	Converter redundancy loss	1-16
vla1	Very low voltage	20-25.5 V or 40-51 V

Table 51 T1.317 Alarms With No Threshold Related Command						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
objid,ide	Identifier	✓			text	see below
objid,des	Description	✓	✓		text	see below
objid,fds	Front Panel Description	✓	✓		text	see below
objid,ast	Alarm state	✓			number	0=not active 1=active
objid,sev	Alarm severity	✓	✓		text	CRIT, MAJ, MIN, WRN, RO
objid,led	LED	✓	✓		text	BD,AC,DC,””
objid,acc	Contact Closure	✓	✓		text	R1,R2,R3,R4,R5,R6,R7,””
objid,dly	Notify Delay	✓	✓		number	0-540 seconds
objid,noo	Notify On Occur	✓	✓		number	0=no 1=yes
objid,nor	Notify On Retire	✓	✓		number	0=no 1=yes
objid,nag	NAG On Occur	✓	✓		number	0=no 1=yes
objid,dst	Notify Destination	✓	✓		text	“”, P1, P2, P3, P4, E1, E2, E3, E4, S1, S2, S3, S4

obj	Description
aac1	ACO Active
acf1	AC fail
amj1	Auxiliary Fuse Major
ata1	Alarm Test Active
atb1	Alarm Test Aborted
aux1	Auxiliary alarm 1
aux2	Auxiliary alarm 2
aux3	Auxiliary alarm 3
aux4	Auxiliary alarm 4
aux5	Auxiliary alarm 5
aux6	Auxiliary alarm 6
bbl1	Memory Backup Battery Low
bfa1	Battery Test Failed
bta1	Battery test active
cch1	Configuration Changed
cdid1	Converter ID Conflict
cfa1	Converter Fail
clc1	Clock Changed
clm1	Rectifier Current Limit
cma1	Minor Communication Fail Alarm
cnf1	LVBD 1 Failed
cnf2	LVLD 1 Failed
cnf3	LVLD 2 Failed
cnf4	LVLD 3 Failed
cno1	LVBD 1 Open
cno2	LVLD 1 Open
cno3	LVLD 2 Open
cno4	LVLD 3 Open
cof1	Queue Overflow
cor1	Number Did Not Respond
did1	ID Conflict
epo1	Emergency power (battery) off
epr1	External Password Reset
exl1	Excessive Login Attempts
faj1	External 24V Fuse Major

obj	Description
faj2	External 48V Fuse Major
fan1	External 24V Fuse Minor
fan2	External 48V Fuse Minor
hcl1	History Cleared
icc1	Incompatible Converter
icr1	Incompatible Rectifier
isd1	Imminent shutdown
man1	Manual Off
mcm1	Major Communications Fail
mdp1	Voltage Duplicate Id
mzd1	Voltage Id Not Configured
nnc1	Number Not Configured
osa1	Open String
pfd1	Password At Default
pgi1	Program Line Invalid
pht1	Processor Halt
por1	Number Did Not Respond
rcdp1	Ringer ID Conflict
rf1	Ringer fail
rfa1	Rectifier Fail
rfn1	Rectifier fan fail
rpff1	Ringer fan fail
rpfj1	Ringer fail major
rprl1	Ringer redundancy loss
rpxj1	Ringer 1 major external fault
rpxn1	Ringer 1 minor external fault
scd1	Battery voltage imbalance
stf1	Self Test Failed
tpa1	Thermal probe fail
vmf1	Voltage module fail
vsf1	Sense/Control Fuse
zid1	ID Not Configured

Table 52 T1.317 Rectifier Management Related Commands

obj,attr	Description	sta	cha	ope	type	Range of Values
gm1,ide	Identifier	✓			Text	GM1
gm1,des	Description	✓	✓		Text	Rectifier Manager 1
gm1,lse	Load Share Enable	✓	✓		number	0=disable 1=enable
gm1,rme	Redundancy monitor enable	✓	✓		number	0=disable,1=enable
gm1,fsd	Float High Voltage Shutdown	✓	✓		number	25-30 or 50-60 V
gm1,bsd	Boost High Voltage Shutdown	✓	✓		number	26-30 or 52-60 V
gm1,fsp	Float Set-Point	✓	✓		number	22-28 or 44-56.5 V
gm1,bsp	Boost Set-Point	✓	✓		number	22-30 or 48-60 V
gm1,fcl	Float Current Limit	✓	✓		number	30-110%
gm1,bcl	Boost Current Limit	✓	✓		number	30-110%

Table 53 T1.317 Rectifiers Related Commands

obj,attr	Description	sta	cha	ope	type	Range of Values
gsr,des	Description	✓	✓		text	Rectifier sr
gsr,typ	Rectifier Type	✓	✓		text	12 char
gsr,sn	Serial number	✓			text	Up to 18 characters

Table 53 T1.317 Rectifiers Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
gsr,adc	DC Current (VI, VIR)	✓			number	number A
gsr,vdc	DC Voltage	✓			number	number V
gsr,stt	Individual rectifier state	✓		✓	text	ON*, OFF, STANDBY*, VACANT*, MISSING
gsr,cap	Capacity	✓			number	number A
gsr,tmp	Temperature	✓			number	number F or C
gsr,seq	Use In Sequence Enable	✓	✓		number	0=no 1=yes
gsr,rfa	Rectifier Fail	✓			number	0=inactive 1=active
gsr,acf	AC Fail	✓			number	0=inactive 1=active
gsr,man	Standby or Manual Off	✓			number	0=inactive 1=active
gsr,did	ID Conflict	✓			number	0=inactive 1=active
gsr,clm	Current Limit	✓			number	0=inactive 1=active
gsr,rcf	Communication Fail	✓			number	0=inactive 1=active
gsr,rfn	Fan fail	✓			number	0=inactive 1=active

s stands for shelf number (1 to 6)

r stands for rectifier number (1 to 7)

* The user may only set the state to ON, STANDBY, or VACANT

Table 54 T1.317 Converter Plant Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
cp1,des	Description	✓	✓		Text	Converter Plant 1
cp1,typ	Converter output type	✓			Text	24V or 48V
cp1,vdc	DC Voltage	✓		✓	Number	Number in volts
cp1,adc	DC Current	✓			Number	Number in amps
cp1,cap	Installed capacity	✓			Number	Number in amps
cp1,olcap	Online capacity	✓			Number	Number in amps
cp1,vsp	Voltage Set-Point	✓	✓		Number	23-28V or 46-57V
cp1,vsd	Internal high voltage shutdown	✓	✓		Number	25-30V or 50-60V
cp1,dth	Low Voltage Discon Threshold	✓	✓		Number	20-25V or 40-50V
cp1,rth	Low Voltage Recon Threshold	✓	✓		Number	22-27V or 44-54V
cp1,lvd	Low Voltage Disconnect Enable	✓	✓		Number	0=disabled 1=enabled
cp1,rss	Converter restart	✓		✓	number	1=restart
cp1,rme	Redundancy monitor enable	✓	✓		number	0=disable,1=enable
Cp1,rof	Remote standby enable	✓	✓		number	0=disable,1=enable

Table 55 T1.317 DC Converter Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
c*sr*,des	Description	✓	✓		Text	DC Converter sr
c*sr*,typ	Type	✓			Text	10 chars
c*sr*,sn	Serial number	✓			Text	Serial number
c*sr*,adc	DC Current	✓			Number	Number in amps
c*sr*,cap	Capacity	✓			Number	Number in amps
c*sr*,stt	State	✓		✓	Text	ON*, OFF, STANDBY*, MISSING, VACANT* ON qualifiers –LIM OFF qualifiers –LVD, -INF, -TA, -HVSD, -FAN
c*sr*,cfa	Converter Fail	✓			Number	0=inactive 1=active
c*sr*,did	ID Conflict	✓			Number	0=inactive 1=active
c*sr*,ccf	Communication Fail	✓			Number	0=inactive 1=active

s stands for shelf number (0 or 1)

r stands for converter number (1 thru 6)

* The user may only set the state to ON, STANDBY, or VACANT

Table 56 T1.317 Battery Reserve Management Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
br1,des	Description	✓	✓		*Text*	*Battery Reserve 1*
br1,adc	Total battery current	✓			number	*d* A (+ for discharge, - for charge)
br1,hbt	Highest battery temperature	✓			number	*dd* °C
br1,cap	Installed battery capacity	✓			number	ddddd AH
br1,olcap	On-line battery capacity	✓			number	ddddd AH
br1,btr	Discharge test results	✓			text	*result,reserve,load* *result* is one of the following: COMPLETED CHECK BATTERY INTERRUPTED ACTIVE NOT RUN *reserve* is hours calculate by last complete test *load* is load at beginning of test
br1,tth	High Temperature Threshold	✓	✓		*Number*	*30-90℃ or 86-194℃*
br1,cle	Current Limit Enable	✓	✓		number	0=disable 1=enable
br1,clt	Current Limit Threshold	✓	✓		number	5-1000A
br1,cev	Battery string end of discharge V	✓	✓		*Number*	19.25-22.75V or 40.25-43.75V
br1,bts	Battery Test State	✓		✓	number	0=inactive 1=active
br1,mtt	Manual test type	✓	✓		*text*	DISABLED, 20%, TIMED
br1,tev	Manual test alarm voltage	✓	✓		number	21-27V or 36-48 V
br1,tmd	Manual test duration	✓	✓		number	0.1-99.9 hours
br1,bte	Auto test type	✓	✓		text	DISABLED, 20%, TIMED
br1,btv	Battery test rectifier voltage	✓	✓		number	21-26 V or 42-52 V
br1,ath	Auto test start hour	✓	✓		number	0-23
br1,tin	Auto test interval	✓	✓		number	1-18 months
br1,atw	Auto test min hours after BD	✓	✓		number	0-240 hours
br1,atd	Auto test date	✓	✓		date	dd-mmm-yy

Table 56 T1.317 Battery Reserve Management Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
br1,nvm	Number of mid-cell V present	✓				*d*
br1,ntm	Number of temperatures present	✓				*d*
br1,scd	Battery voltage imbalance detection enable	✓			number	0=disable,1=enable (Automatically enabled when mid cell V monitor present)
br1,scv	Battery imbalance threshold	✓	✓		number	1.5-3.0V

Table 57 T1.317 Battery Type Definition Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
bt*nn*,des	Description	✓	✓		Text	Battery Configuration 1
bt*nn*,bty	Battery Type	✓	✓		Text	Up to 14 characters
bt*nn*,btc	Battery Class	✓	✓		Text	FLOODED, SEALED, NICD, LI_LMP, LI_ELITE
bt*nn*,cap	Capacity	✓	✓		Number	**number**

Where n stands for battery type number (1 thru 25)

Table 58 T1.317 Boost Management Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
bs1,ide	Identifier	✓			*Text*	BS1
bs1,des	Description	✓	✓		*Text*	Boost Control 1
bs1,stt	State	✓	✓		*Text*	QRCT, MANUAL, BTP, TIMED AU-TO, OFF
bs1,atm	Auto Mode	✓	✓		*Text*	OFF, QRCT, TIMED
bs1,tmd	Timed Manual Duration	✓	✓		Number	1-80 hours
bs1,amf	Auto Multiplication Factor	✓	✓		*Number*	0.1-9
bs1,cta	Current Term Current Thresh	✓	✓		*Number*	1-999A

Table 59 T1.317 Disconnect Contactor Control Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
cn*x*,ide	Identifier	✓			number	CN1, CN2, CN3, CN4
cn*x*,des	Description	✓	✓		number	Contactor 1
cn*x*,stt	Status	✓		✓	text	NONE, DISCON, CONNECT, FAILED
cn*x*,ena	Control enable	✓	✓			0=disable,1=enable
cn*x*,dth	Disconnect threshold	✓	✓		number	19-25V or 39-50V
cn*x*,ddy	Disconnect delay	✓	✓		number	0-300 minutes
cn*x*,dam	Disconnect automode	✓	✓		text	0=“NONE” 1=“VOLTAGE” 2= “VOLTAGE+TIME”
cn*x*,dtm	Disconnect remaining time	✓			number	>0 means going to disconnect
cn*x*,rth	Reconnect threshold	✓	✓		number	19.5-27V or 39-55V
cn*x*,rdy	Reconnect delay	✓	✓		number	0-300 seconds
cn*x*,ram	Reconnect automode	✓	✓		text	0=“NONE” 1=“VOLTAGE” 2=“VOLTAGE+TIME”
cn*x* 4,rtm	Reconnect remaining time	✓			number	>0 means going to reconnect

The contactors are identified as follows:

CN1 = Battery Disconnect (LVBD1)
CN2 = Load 1 Disconnect (LVLD1)
CN3 = Load 2 Disconnect (LVLD2)
CN4 = Load 3 Disconnect (LVLD3)

Table 60 T1.317 Distribution Current Monitor Related Commands

obj,attr	Description	sta	cha	ope	type	Range of Values
dcm*xx*,ide	Identifier	✓			number	DCMC1 is the plant shunt DCM01-DCM08
dcm*xx*,des	Description	✓	✓		number	Contactor 1
dcm*xx*,stt	State	✓			text	NONE MISSING PRESENT
dcm*xx*,typ	Shunt Type	✓	✓		text	NONE LOAD BATTERY
dcm*xx*,val	Reading	✓			number	*ddd.d* Amps
dcm*xx*,sha	Shunt amp rating	✓	✓		number	0-9999 Amps

The shunt type defaults are as follows:
DCMC1 = Battery
DCM01 = Battery
DCM02-DCM08 = Load

Table 61 T1.317 Distribution Contactor Interface Related Commands

obj,attr	Description	sta	cha	ope	type	Range of Values
dcn*xx*,ide	Identifier	✓			number	DCN01-DCN06
dcn*xx*,des	Description	✓	✓		number	Contactor 1
dcn*xx*,stt	State	✓			text	NONE MISSING OPEN CLOSED
dcn*xx*,typ	Contactor interface type	✓	✓		text	NONE, CN1, CN2, CN3, or CN4

The contactor interface type defaults are as follows:
DCN01 = CN1
DCN02 = CN2
DCN03 = CN3
DCN04-DCN08 = CN4

Table 62 T1.317 Slope Thermal Compensation Related Commands

obj,attr	Description	sta	cha	ope	type	Range of Values
sc1,ide	Identifier	✓			Text	SC1
sc1,des	Description	✓	✓		Text	Slope Thermal Comp
sc1,stt	State	✓	✓		number	0=disable 1=enable
sc1,rve	Raise Voltage Enable	✓	✓		number	0=disable 1=enable
sc1,ltt	Lower Temperature Threshold	✓	✓		number	-5-20°C or 23-68°F
sc1,ntt	Nominal Temperature Threshold	✓	✓		number	15-30°C or 59-86°F
sc1,utt	Upper Temperature Threshold	✓	✓		number	30-55°C or 86-131°F
sc1,spt	Step Temperature	✓	✓		number	45-85°C or 113-185°F
sc1,lsp	Low temperature slope	✓	✓		number	1-10mV/°C per cell
sc1,usp	Upper temperature slope	✓	✓		number	1-10mV/°C per cell

Table 63 T1.317 Input Management Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
in*mnn*,stt	Input state	✓			text	0=not alarming 1=alarming
in*mnn*,typ	Input alarm type	✓	✓		text	"" – no alarm, for in006, this value allows the input to be used for either group standby or PBT. Polarity is ignored. "FAN1" - drives FAN1 alarm "FAN2" – drives FAN2 alarm "FAJ1" – drives FAJ1 alarm "FAJ2" – drives FAJ2 alarm "OSA1" – drives OSA1 alarm "AMJ1" – drives AMJ1 alarm, not valid for NE872 or other LVD card inputs. "AUX1" – drives AUX1 alarm "AUX2" – drives AUX2 alarm “AUX3" – drives AUX3 alarm “AUX4" – drives AUX4 alarm “AUX5" – drives AUX5 alarm “AUX6" – drives AUX6 alarm "REMLVD" – Active signal opens battery contactors for built-in plant input, or for LVD inputs, it opens the contactor on the card where the signal is active.
in*mnn*,pol	Input alarming state	✓	✓		text	CLOSED, OPEN

where: *m* is the distribution interface module ID from 1 to 4
nn is the input number from 01 to the number of inputs supported by the distribution interface module

Built-in plant inputs

Object	Signal Name	Default Description
In001	FAJ1	Fuse Alarm Major 24V
In002	FAJ2	Fuse Alarm Major 48V
In003	AUX_PMJ	Auxiliary Major Alarm
In004	OS_BATT	Open String
In005	EPO_IN	Emergency Power Off
In006	PBT_IN	Group Standby/PBT
In007	AUX1_IN	Air Conditioner Fail
In008	AUX2_IN	Door Open
In009	AUX3_IN	High External Ambient
In010	AUX4_IN	Low External Ambient

Table 64 T1.317 Call-Out Manager Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
cm1,des	Description	✓	✓		text	30 char (Call-Out Manager)
cm1,ngi	NAG Interval	✓	✓		Number	15 to 60 minutes

Table 65 T1.317 Call-Out Phone Number Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
x,des	Description	✓	✓		text	(Alternate) Call-Out Number
x,typ	Type	✓	✓		text	DATA, PAGER
x,phn	Phone Number	✓	✓		text	Digit ( ) * # - , up to 25 characters
x,bdr	Connect Baudrate	✓	✓		Number	300, 1200, 2400, 4800, 9600, 14400
x,dbt	Data Bits	✓	✓		Number	7, 8
x,pry	Parity	✓	✓		Text	O,E,N
x,sbt	Stop Bits	✓	✓		Number	1, 2
x,dly	Pager ID Delay	✓	✓		Number	0-9 seconds
x,pgr	Pager ID (Pin #)	✓	✓		Text	Digit ( ) * # - , up to 25 characters
x,msg	Pager Message	✓	✓		Text	up to 25 characters

Where x is p1, p2, p3, p4, a1

Table 66 T1.317 Call-Out Email Address Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
x,ide	Identifier	✓			text	E1, E2, E3, E4
x,des	Description	✓	✓		text	Email Address
x,adr	Address	✓	✓		text	40 characters
x,typ	Type	✓	✓		text	**NORMAL**, PAGER

Where x is E1 – E4

Table 67 T1.317 SNMP Destination Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
x,ide	Identifier	✓			text	S1, S2, S3, S4
x,des	Description	✓	✓		text	SNMP Trap Destination
x,ip	IP Address	✓	✓		text	d.d.d.d

Where x is S1 – S4

Table 68 T1.317 Periodic Call-Out Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
po1,des	Description	✓	✓		text	Periodic Call-Out 1
po1,phn	Phone Number	✓	✓		text	Digit ( ) * # - , up to 25 characters
po1,bdr	Connect Baudrate	✓	✓		Number	300, 1200, 2400, 4800, 9600, 14400
po1,dbt	Data Bits	✓	✓		Number	7, 8
po1,pry	Parity	✓	✓		Text	O,E,N
po1,sbt	Stop Bits	✓	✓		Number	1, 2
po1,int	Interval	✓	✓		Text	Sunday…Saturday, Daily, Monthly, Quarterly, Never
po1,tim	Time	✓	✓		Time	Hh:mm
po1,cl01-10	Command Line 1-10	✓			TextX	X Up to 40 characters each

Table 69 T1.317 Modem Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
mp1,des	Description	✓	✓		Text	Modem Port 1
mp1,stt	State	✓			Text	USER, SUPER-USER,

						ADMINISTRATOR, TL1, LOGOUT
mp1,bdr	Modem baud rate	✓	✓		text	2400,4800,9600
mp1,dbt	Data Bits	✓	✓		Number	7, 8
mp1,pry	Parity	✓	✓		text	O, E, N
mp1,sbt	Stop Bits	✓	✓		Number	1, 2
mp1,tmo	Time-Out	✓	✓		Number	0(disabled) – 45 minutes
mp1,hsh	Handshaking	✓	✓		text	NO, SW
mp1,nrg	Number of Rings Before Answer	✓	✓		number	2-15
mp1,wre	Write Enable	✓	✓		Number	0=disable 1=enable (HW,SW)
mp1,ins	Modem Initialization String	✓	✓		text	Up to 40 characters “” assigns the default string

Table 70 T1.317 Local RS-232 Port Related Commands

obj,attr	Description	sta	cha	ope	type	Range of Values
lp1,des	Description	✓	✓		text	Local Port 1
lp1,stt	State	✓			text	USER, SUPER-USER, ADMINISTRATOR, TL1, LOGOUT
lp1,bdr	Baud Rate	✓	✓		text	AUTO, 300, 1200, 2400, 4800, 9600, 19200
lp1,dbt	Data Bits	✓	✓		Number	7, 8
lp1,pry	Parity	✓	✓		text	O, E, N
lp1,sbt	Stop Bits	✓	✓		Number	1, 2
lp1,tmo	Time-Out	✓	✓		Number	0(disabled) – 45 minutes
lp1,hsh	Handshaking	✓	✓		text	NO, HW, SW
lp1,app	Application	✓	✓		Text	TERMINAL, EVENT LOG (HW,SW)
lp1,wre	Write Enable	✓	✓		Number	0=disable 1=enable (HW,SW)

Table 71 T1.317 Alarm Test Related Commands

obj,attr	Description	sta	cha	ope	type	Range of Values
at1,des	Description	✓	✓		Text	Alarm Test 1
at1,stt	Alarm Test State	✓		✓	Number	0=inactive 1=active
at1,stg	Alarm Test Stage	✓			text	PCR,PMJ,PMN,R1,R2,R3,R4,R5,R6,R7
at1,lte	Alarm Test Enable	✓	✓		Number	0=disable 1=enable (HW,SW)
at1,dur	Duration	✓	✓		Number	5-300 seconds
at1,pcr	Test Power Critical	✓	✓		Number	0=no 1=yes
at1,pmj	Test Power Major	✓	✓		Number	0=no 1=yes
at1,pmn	Test Power Minor	✓	✓		Number	0=no 1=yes
at1,r1	Test Relay 1	✓	✓		Number	0=no 1=yes
at1,r2	Test Relay 2	✓	✓		Number	0=no 1=yes
at1,r3	Test Relay 3	✓	✓		Number	0=no 1=yes
at1,r4	Test Relay 4	✓	✓		Number	0=no 1=yes
at1,r5	Test Relay 5	✓	✓		Number	0=no 1=yes
at1,r6	Test Relay 6	✓	✓		Number	0=no 1=yes
at1,r7	Test Relay 7	✓	✓		Number	0=no 1=yes
at1,ets	Email Test	✓		✓	number	1=do test (sets and clears ATA1)
at1,ems	Email Results	✓			text	
at1,bzi	Audio Test Duration	✓	✓		Number	5-300 seconds
at1,bzt	Audio Test State	✓		✓	Number	“”=Stop Test, Local=local

Table 71 T1.317 Alarm Test Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
						buzzer
at1,irt	Individual Relay Test State	✓		✓	Number	“”=Stop Test, PCR,PMJ,PMN,R1,R2,R3,R4,R5,R6,R7

Table 72 T1.317 Alarm Cut-off Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
aco1,des	Description	✓	✓		Text	Alarm Cut-off 1
aco1,stt	Alarm Cut-off State	✓		✓	Number	0=inactive 1=active
aco1,cst	Critical Alarm Cut-off State	✓			Number	0=inactive 1=active
aco1,cae	Critical Alarm Cut-off Enable	✓	✓		Number	0=disable 1=enable
aco1,cto	Critical Alarm Cut-off Time-Out	✓	✓		Number	1 to 8 hours
aco1,jst	Major Alarm Cut-off State	✓			Number	0=inactive 1=active
aco1,jae	Major Alarm Cut-off Enable	✓	✓		Number	0=disable 1=enable
aco1,jto	Major Alarm Cut-off Time-Out	✓	✓		Number	1 to 8 hours
aco1,nst	Minor Alarm Cut-off State	✓			Number	0=inactive 1=active
aco1,nae	Minor Alarm Cut-off Enable	✓	✓		Number	0=disable 1=enable
aco1,nto	Minor Alarm Cut-off Time-Out	✓	✓		Number	1 to 72 hours
aco1,lbe	Local Buzzer Enable	✓	✓		Number	0=disable 1=enable

Table 73 T1.317 User Defined Events Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
u*nnnn*,des	Description	✓	✓		Text	30 char
u*nnnn*,fds	Front Panel Description	✓	✓		text	see below
u*nnnn*,ast	Alarm State	✓			Number	0=inactive 1=active
u*nnnn*,sev	Severity	✓	✓		Text	CRIT, MAJ, MIN, WRN, RO
u*nnnn*,prg	Program Line	✓	✓		Text	60 char
u*nnnn*,dur	Minimum Duration	✓	✓		Number	> 0 seconds
u*nnnn*,lat	Latched	✓	✓		Number	0=no 1=yes
u*nnnn*,led	LED	✓	✓		text	BD,AC,DC,””
u*nnnn*,acc	Contact Closure	✓	✓		text	R1,R2,R3,R4,R5,R6,R7,””
u*nnnn*,dly	Notify Delay	✓	✓		Number	0-540 seconds
u*nnnn*,noo	Notify On Occur	✓	✓		Number	0=no 1=yes
u*nnnn*,nor	Notify On Retire	✓	✓		Number	0=no 1=yes
u*nnnn*,nag	NAG On Occur	✓	✓		Number	0=no 1=yes
u*nnnn*,dst	Notify Destination	✓	✓		text	“”, P1, P2, P3, P4, E1, E2, E3, E4, S1, S2, S3, S4

where nnnn = 1 thru 128

Table 74 T1.317 Derived Channels Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
DRnn,des	Description	✓	✓		Text	30 char (Derived Chan nn)
DRnn,val	Value	✓			Number	Number units
DRnn,prg	Program line	✓	✓		Text	60 char
DRnn,uni	Unit	✓	✓		Text	5 chars

Where nn is from 01 thru 8

Table 75 T1.317 Trend Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
Obj,ide	Identifier	✓				DCT1 for DC plant load CPT1 for DC converter load
dct1,des	Description	✓	✓		Text	DC1 Trend Statistics CP1 Trend Statistics
dct1,src	Source	✓	✓		Text	DC1 ADC CP1 ADC

Table 76 T1.317 TL1 Manager Related commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**range**
tlm1,des	Description	✓	✓		text	30 char (TL1 Manager)
tlm1,aue	Activate-User Enable	✓	✓		number	0=disable 1=enable
tlm1,cts	CTS Connect Detection	✓	✓		number	0=disable 1=enable
tlm1,dsr	DSR Connect Detection	✓	✓		number	0=disable 1=enable
Tlm1,prt	Port	✓	✓		number	2020
Tlm1,tmo	Timeout	✓	✓		number	0-60 minutes

Table 77 T1.317 TL1 Object Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
tl*n*,des	Description	✓	✓		text	30 char (TL1 Object n)
tl*n*,cds	Condition Description	✓	✓		text	60 char
tl*n*,aid	Aid	✓	✓		text	20 char
tl*n*,cnd	Condition Type	✓	✓		text	20 char
tl*n*,saf	Service Affecting	✓	✓		Number	0=no 1=yes
tl*n*,rpt	Reporting	✓	✓		text	EQUIPMENT, ENVIRONMENT, PRESENCE

Where n is the TL object number from 001 thru ~~256~~ 128

Table 78 T1.317 Call-Back Security Related Commands						
obj,attr	**Description**	**sta**	**cha**	**Ope**	**type**	**Range of Values**
cb1,des	Description	✓	✓		text	Call-Back Security 1
cb1,stt	State	✓	✓		number	0=off 1=on
cb1,ph1-5	Call-Back Phone Number	✓	✓		Text	Digit () * # - , space
cb1,br1-5	Connect Baudrate	✓	✓		number	300, 1200, 2400, 4800, 9600, 14400

Table 79 T1.317 Mid-String Voltage Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
ms*nc*,des	Description	✓	✓		text	30 char (Mid-String Voltage Module n Channel c)
ms*nc*,stt	State	✓		✓	text	None, Present, Missing
ms*nc*,val	Value	✓			Number	Mid-String voltage
ms*nc*,did	Duplicate Id	✓			Number	0=no 1=yes

Where n is the Mid-String module number from 1 to 7, and
c is the Mid-String channel number form 1 to 3

Table 80 T1.317 Network Settings Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
net1,des	Description	✓	✓		text	30 char (Mid-String Voltage Module n Channel c)
net1,ead	Ethernet (MAC) Address	✓			text	hh:hh:hh:hh:hh:hh
net1,dhcp	DHCP	✓	✓	✓	number	0=static IP, 1=DHCP Client, 2=DHCP Server (OPE causes system reboot)
net1,ip	Static IP address	✓	✓		IP address	xxx.xxx.xxx.xxx (not used if DHCP enabled)
net1,sub	Static Subnet Mask	✓	✓		IP address	xxx.xxx.xxx.xxx (not used if DHCP enabled)
net1,gtwy	Static Gateway (Router) IP	✓	✓		IP address	xxx.xxx.xxx.xxx (not used if DHCP enabled)
net1,host	Hostname	✓	✓		text	
net1,wip	Working IP address	✓				xxx.xxx.xxx.xxx (shows DHCP assigned or static IP address)
net1,dom	Static Domain Name	✓	✓		text	(not used if DHCP enabled)
net1,dns	Static DNS IP	✓	✓		IP address	xxx.xxx.xxx.xxx (not used if DHCP enabled)
net1,wre	Write Enable	✓	✓			0=disabled, 1=enabled
net1,tmo	Session Timeout	✓	✓			Minutes
net1,msrv	Mail host IP	✓	✓		IP address	xxx.xxx.xxx.xxx (0.0.0.0 will force a DNS lookup of “mailhost”)

Table 81 T1.317 Auxiliary Network Settings Related Commands						
obj,attr	**Description**	**sta**	**cha**	**ope**	**type**	**Range of Values**
net2,des	Description	✓	✓		text	30 char (Mid-String Voltage Module n Channel c)
net2,ena	Enable	✓	✓		number	0=disable 1=enable
net2,ip	Static IP address	✓	✓		IP address	xxx.xxx.xxx.xxx (not used if DHCP enabled)
net2,sub	Static Subnet Mask	✓	✓		IP address	xxx.xxx.xxx.xxx (not used if DHCP enabled)
net2,gtwy	Static Gateway (Router) IP	✓	✓		IP address	xxx.xxx.xxx.xxx (not used if DHCP enabled)
net2,host	Hostname	✓	✓		text	
net2,dom	Static Domain Name	✓	✓		text	(not used if DHCP enabled)
net2,msrv	Mail host IP	✓	✓		IP address	xxx.xxx.xxx.xxx (0.0.0.0 will force a DNS lookup of “mailhost”)

net2 is currently only used by an attached Gateway Card in the NX400 system.

Additional T1.317 Commands And Samples

ala	Report Active Alarms

Syntax: ala

Description

This command reports all the active alarm conditions in the plant. One alarm message is listed per line in the report. The table below lists the default alarm messages. Note that if user changes the severity of the alarm, the corresponding change will show up in the alarm message. However, alarm conditions with the RO severity will not be displayed, the rec command, discussed later, must be used.

Alarm Message

MAJ, Multiple Rectifier Fail
MAJ, Multiple AC Fail
MAJ, Battery On Discharge
MAJ, High Voltage
MAJ, Sense Fuse
MAJ, Fuse Major
MAJ, Auxiliary Major
MAJ, Contactor 1 Open
MAJ, Contactor 1 Fail
MAJ, Major Communication Fail
MAJ, High Battery Current Shutdown
MAJ, Shorted Cell Detected
MAJ, Imminent Low V Shutdown
MAJ, Open String

MIN, Rectifier Fail
MIN, AC Fail
MIN, Thermal Probe Fail
MIN, Battery High Temp
MIN, Rect Redundancy Loss
MIN, High Battery Current
MIN, Minor Communication Fail
MIN, Circuit Pack Failure
MIN, Mid-cell V Monitor Fail

If no alarms are active “NO ACTIVE ALARMS” is reported.

bye	Log-off

Syntax: bye

Description

This command is used to terminate the session.

cha	**Change Value**

Syntax: cha *obj,attr=value*
where: *obj,attr* is an object-attribute pair. For example, ps1,sid.

Description

This command is used to change system configuration parameters. Examples are listed below to illustrate how this command works.

cha ps1,sid="My Plant"Change the site id to My Plant
cha p1,phn="123456789"Change the primary phone number to 123456789

You must be logged in as a super-user to use this command.

cle	**Clear All Latched Events**

Syntax: cle

Description

This command is used to clear latched events. These events include communication failures, missing rectifiers, missing thermal probes, missing voltage monitoring module, distribution fuses, and loss of redundancy alarm.

You must be logged in as a super-user to use this command.

his	**Report Alarm History**

Syntax: his

Description

Syntaxhis
where: obj,attr is an object-attribute pair as defined in the following:
sum dc1,adc- report plant load current statistics
sum br1,hbt- report highest battery temperature statistics

his	**Report Boost History**

Syntax: his bs1,stt

Description

This command reports the boost history in the following format:
sum bs1,stt
30-MAY-03,15:11:12,RESUMED,COMPLETED,78
30-MAY-03,12:03:34,AUTO,DISCHARGE,14

**

This report gives the start date, start time, start reason, stop reason, and boost duration in minutes. The start reasons are:
MANUALBoost initiated by user
AUTOBoost started automatically after a battery discharge
RESUMEDBoost resumed after being suspended by a discharge

The stop reasons are:
COMPLETEDBoost completed normally
TIMEOUTBoost timed out before completing
DISCHARGEBoost suspended because of a battery discharge
CANCELEDBoost canceled by user
ALARMBoost cancelled by an alarm condition

DISABLEDAuto boost cancelled by being disabled

his	**Report BD History**

Syntax: dc1,bod

Description

This command reports the battery discharge history in the following format:

his dc1,bod
30-MAY-03,15:11:12,MANUAL,COMPLETED,118.3,23,
01-APR-03,03:11:12,BD,COMPLETED,118.3,26,130
12-FEB-03,12:00:02,PERIODIC,COMPLETED,120.9,27,135
.
**

This report gives the start date, start time, start reason, current at start of discharge, duration in minutes, and, if calculated, a reserve time prediction. The start reasons are:

MANUALDischarge test initiated by user
PERIODICPeriodic discharge test
BDNatural battery discharge

The stop reasons are:

COMPLETEDDischarge completed normally
TIMEOUTAuto discharge test timed out
DISABLEDAuto discharge test disabled
ENDVDischarge test hit end voltage
CANCELEDDischarge test canceled by user

lis	**List Rectifiers**

Syntax: lis rec

Description

This command is used to list all the rectifiers in the system. The command will list all present and missing rectifiers. Missing rectifiers are rectifiers that have been removed from a shelf. The cle will clear missing rectifiers from the controller's memory and they will no longer be listed by this command. Return value for a system with 3 rectifiers on shelf 1 would look like the following:

* lis rec
G11
G12
G13
.
* _

login	**Log-in**

Syntax: login “*password*”
where *password* is either the user, super-user or administrator password

Description

This command is used to log-in as a user, super-user or administrator. For example, if you are currently logged into the controller as a user but would like to change the site id you must first use this command to log-in as a super-user. You must be logged in as an administrator in order to upgrade the software and change passwords.

ope	**Operate a Control**

Syntax: ope *obj,attr=value*
where: *obj,attr* is an object-attribute pair. For example, dc1,pbt.

Description

This command is used to operate a system control parameter. Examples are listed below to illustrate how this command works.

ope ps1,usl=1Update serial link
ope dc1,stt="boost"Place plant into boost mode

You must be logged in as a super-user to use this command.

pas	**Change Passwords**

Syntax: pas *t,"password","password"*
where "*t*" is to change the user password, "s" to change the super-user password, and "a" to change the administrator password. *password* is the new password

Description

This command changes either the user or super-user password. You must be logged in as a super-user to use this command. The password is sent twice in order to avoid mistakes. The password must have at least 6 characters but no more than 15 characters.

You must be logged in as a super-user to use this command.

sta	**Report Status**

Syntax: sta *obj,attr*
where: *obj,attr* is an object-attribute pair. For example, ps1,sid.

Description

This command reports the value of the measurement, configuration, or control parameters in the system. A couple examples are listed below to illustrate how this command works.

sta dc1,vdcReport plant voltage
sta dc1,adcReport plant load current

The command line would respond as follows for first command listed above.

* sta dc1,vdc
:DC1
VDC=-52.48
.
* _

The "* " in the example above is the user command line prompt. The line ":DC1" indicates that the information that follows is for the plant object. The line starting with "VDC" identifies the DC voltage. The "." line is the end-of-command identifier.

sum	Report Statistics

Syntax: sum *obj,attr*
where: *obj,attr* is an object-attribute pair defined by the following:
sum dc1,adcReport plant load current statistics
sum br1,hbtReport highest battery temperature statistics
sum br1,amtReport ambient temperature statistics

Description

This command reports the highest hourly a averages, highest hourly maximum, and the highest hourly minimum statistics for plant load and highest battery temperature. The following is an example of a command response:

```
* sum dc1,adc
:DC1 ADC
HHI=
30-MAY-03,12:03:00,127.3
14-FEB-03,11:15:37,126.9
24-DEC-03,02:30:13,126.2
LHI=
29-MAR-03,10:43:00,120.0
04-APR-03,11:15:53,121.1
21-SEP-03,07:13:10,124.3
HHA=
03-JAN-03,12:00:00,127.0
18-APR-03,11:00:00,126.5
21-OCT-03,02:00:00,126.1
.
*
```

The line ":DC1 ADC" indicates that the information that follows is for the plant load current. The "HHI=" indicates highest hourly instantaneous reading. The "LHI=" indicates highest hourly instantaneous reading. The "HHA=" indicates highest hourly average reading. The "." line is the end-of-command identifier. The "* " in the example above is the user command line prompt.

sum	Report Plant Load Trend Statistics

Syntax: sum dct1

Description

This command reports the plant trend statistics, which includes up to 16 daily highest hourly and lowest hourly instantaneous readings, up to 32 daily maximum hourly averages, and up to 13 monthly averages of the daily maximum hourly averages. The following is an example of a command response:

```
* sum dct1
:DCT1
SRC=DC1 ADC
CLR=01-JAN-2001,12:00:00
DHI=
29-JAN-2002,02:00;00,123.2
```

30-JAN-2003,05:00:00,120.1
31-JAN-2003,14:00:00,122.8
DLI=
29-JAN-2002,12:00;00,120.9
30-JAN-2003,08:00:00,118.7
31-JAN-2003,01:00:00,119.2
DHH=
29-JAN-2002,02:00;00,122.1
30-JAN-2003,05:00:00,119.7
31-JAN-2003,14:00:00,121.6
MAV=
31-JAN-2003,23:00:00,121.3
.
*

The “DHI=” indicates daily highest hourly instantaneous reading. The “DLI=” indicates daily highest hourly instantaneous reading. The “DHH=” indicates daily highest hourly average reading. The “MAV=” indicates monthly average of daily highest hourly average reading. The “.” line is the end-of-command identifier. The “* ” in the example above is the user command line prompt.

sum	**Report Battery Discharge Statistics (Profile)**

Syntax: sum dc1,bod

Description

This command reports the last battery discharge profile report. The report includes cleared date and time, start date and time, end date and time, duration in seconds, and up to 50 sample points. Each sample is time stamped in seconds. We compress the samples to derive a minimum set of data required to reconstruct the curve while retaining important coup de fouet minimum and maximum voltages and lowest voltage at end of discharge. The following is an example of a command response:

* sum dc1,bod
:DC1 BOD
CLR=29-JUN-04,10:27:11
BEG=30-JUN-04,10:38:36
END=30-JUN-04,10:42:53
DUR=256
VAL=
0,51.08
8,50.18
18,49.24
20,48.87
248,48.36
252,49.76
254,50.84
256,51.13
.
*

The “.” line is the end-of-command identifier. The “* ” in the example above is the user command line prompt.

GUI	Report GUI Compatibility

Syntax: GUI

Description

This command is for internal use only. It reports an EasyView compatibility number. The command response is: NE843GUI=1.0

ali	Special Internet Command

Syntax: ali

Description

This command is for internal use only. It exists for EasyView compatibility purposes only and does nothing.

Error Messages

While logging into the controller or while entering commands, you may encounter one or more of the following error messages:

Error Message	Description
!-112, SYNTAX ERROR	Unrecognizable command was entered.
!-220, SECURITY	Super-user command was entered by someone with user status.
!-221, EXCESSIVE LOGIN ATTEMPTS	Too many attempts were made to login with an unrecognized password.
!-223, INVALID PASSWORD	New password contains an illegal character.
!-224, NEW PASSWORD MISMATCH	First and second copy of new passwords don't match
!-304, INVALID PARAMETER	An attempt was made to change a parameter to an illegal value.
!-319, INVALID ATTRIBUTE	An invalid object id was specified in the command or, a command referred to an attribute that doesn't support it.
!-320, INVALID OBJECT	An invalid object id was specified in the command
!328, FEATURE DISABLED	An attempt was made to initiate a feature that is disabled.
!335, COULD NOT EXECUTE	Command could not execute because of active alarms or a conflicting operation.

Appendix C: Battery Functions

Float Mode

Float mode is the default operation mode of the power system. The system voltage, while in float mode, is determined by the configuration parameter Rectifier Float Set point (fsp) and may be adjusted by the Battery Thermal Compensation circuit, if active. No individual adjustment of plant rectifiers is necessary and load sharing among plant rectifiers is automatic in all plant modes and will take effect within several seconds of a new rectifier being added to the system.

The Rectifier Float Set point should be set per the battery manufacturer's recommendations. Note that the actual Rectifier Float Set point measured on the plant may differ from the value set by the user if battery thermal compensation (STC) is enabled.

Slope Thermal Compensation

The following is a list of slope thermal compensation parameters that can be configured in the controller.

High Temperature Alarm

Alarm threshold can be set from 30°C to 85°C. The alarm retires when the temperature drops to 10°C below the set threshold. The factory default setting is 55°C.

High Temperature Compensation

The system controller automatically enables high temperature compensation if a VT thermal probe is detected. The feature can be disabled by disconnecting all thermal probes and updating the serial links using the Lamp Test function. Settings for this feature are as follows.

V Step Down: Battery step temperature can be set from 45°C to 85°C. The factory default setting is 75°C.

High Comp Limit: The upper temperature thermal limit can be set from 30°C to 55°C. The factory default setting is 45°C.

Decrease: The upper temperature slope setting (rate of decrease) can be set from -1mV to -10mV in -.1mV steps. The factory default is -3mV.

Nominal Temperature: Temperature above or below which Slope Thermal Compensation is enabled. The stable range is 15 to 30°C. The factory default setting is 25°C.

Low Temperature Compensation

This feature is disabled by default, and can be enabled only if Temperature Slope Thermal Compensation is enabled. The following are the associated parameters.

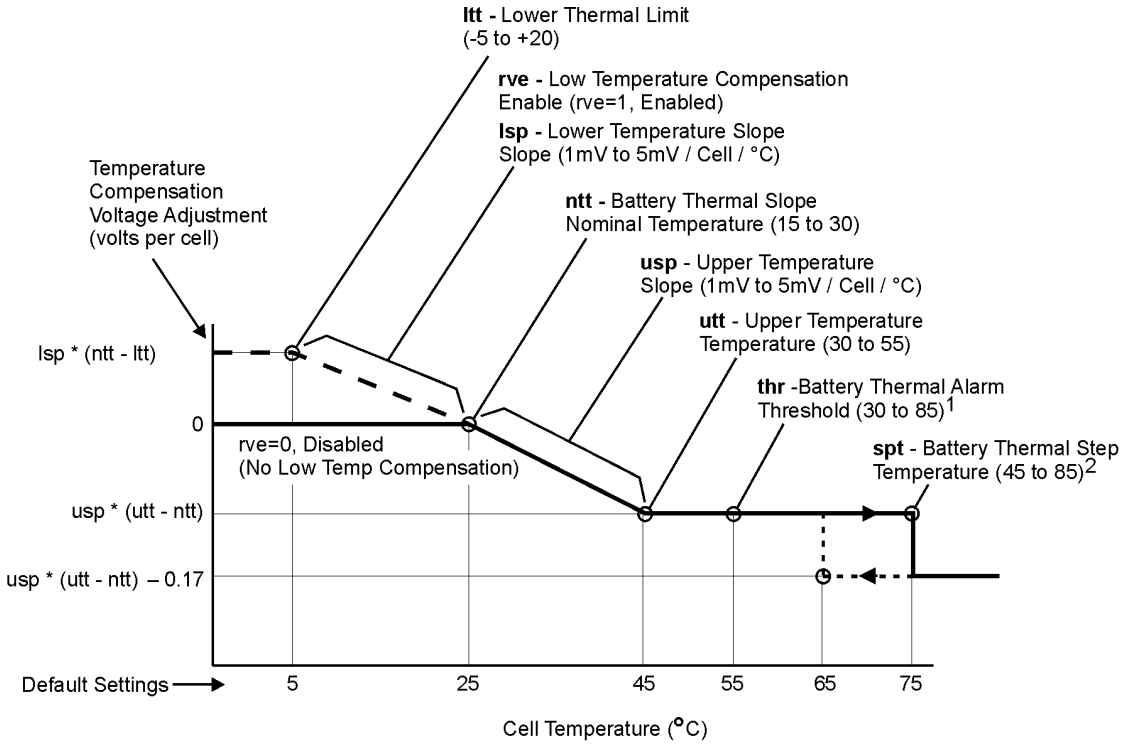
Low Comp Limit: Low temperature thermal compensation can be set from -5°C to 20°C. The factory default setting is 0°C.

Increase: The low temperature slope (rate of increase) can be set from 1mV to 10mV in .1mV increments. The factory default setting is 3mV.

The controller has a flexible Thermal Compensation feature which provides voltage compensation from that level established by the Plant Float Set-Point (fsp) or Boost Set-Point (bsp), dependent on the highest temperature monitored by the QS873A VT-Probes attached to the system batteries. Thermal Compensation should be used in a plant containing sealed or valve regulated maintenance free batteries. Note that Thermal Compensation is automatically enabled from the factory when Valve-Regulated Lead Acid batteries are the system battery type. The feature is not automatically enabled upon detection of a VT-Probe. Refer to the Installation Instructions for more details on wiring and configuring this feature.

Thermal Compensation lowers plant voltage from the fsp for monitored battery temperatures which are above the ideal temperature established during configuration as the Battery Thermal Slope Nominal Temperature (ntt). (The items in parenthesis are the user configurable points referred to in the graph shown below.) Lowering the plant voltage helps to keep the batteries at their optimum state of charge while protecting them from thermal runaway. Thermal runaway is a complex sealed battery phenomenon where, for one or more of a number of reasons, one or more cells in a string are unable to dissipate the internal heat generated by their charging current and experience an increase in internal temperature. By lowering the float voltage as cell temperature increases, the float current is lowered to a point where this destructive behavior can be avoided. If a cell failure is imminent and the cell temperature continues to rise above the threshold configured for Battery Thermal Step Temperature (stp), plant voltage drops in a single step to a level which keeps the remaining cells in the string from overcharging and being damaged. Refer to Figure C-1 for a graphical view of Battery Thermal Compensation and the relationship of its various set points.

The controller can also increase plant voltage above that set by the fsp or bsp for colder environments, again seeking to keep batteries at their optimum charge state. Batteries will lose capacity as the battery temperature drops below their optimal operating temperature. Increasing the plant voltage with decreases in battery temperature will cause more current to flow into the batteries. This results in electrolysis of the water in the batteries. Since this reaction is exothermic, it also serves to keep batteries warm. This feature results in an increase in plant voltage, and is required to be enabled during controller configuration.



1. The Battery Thermal Alarm occurs when the temperature rises above the thr set point. It retires when the temperature decreases to 10°C below the thr set point (45°C default).

2. Plant voltage decreases an additional 0.17 volts per cell when the temperature increases above the spt set point. It is increased 0.17 volts per cell when the temperature decreases to 10°C below the spt set point, as indicated by the dashed line (65°C default).

Figure C-1: Slope Thermal Compensation

The following describes the configuration parameters which may be activated or altered by the user. Refer to Appendix D for the ranges of values the parameters may take and their factory default settings.

Lower Thermal Limit (ltt): The lower temperature where, if Low Temperature Compensation is enabled, the controller will increase plant voltage to a level corresponding to (lsp * (ntt - ltt)* 24)V above the fsp. Plant voltage will be increased proportionally at any temperature between this point and the Battery Thermal Slope Nominal Temperature (ntt).

Low Temperature Compensation Enable (rve): A 0 disables and 1 enables the Low Temperature Thermal Compensation feature. Since rve increases plant voltage rather than decreasing it based on temperature, the option is provided to disable it separately from the entire feature so that equipment loads sensitive to high voltages can be protected.

Lower Temperature Slope (lsp): The slope rate for the voltage increase per cell when the battery temperature is below the ntt (Battery Thermal Slope Nominal Temperature).

Battery Thermal Slope Nominal Temperature (ntt): The zero compensation temperature point. Temperatures monitored between this point and the Upper Temperature Limit (utt) will result in a proportional decrease of plant voltage to a level corresponding to (usp*(utt-ntt)*24)V below the fsp at the utt. If Low Temperature Compensation is enabled, temperatures monitored between this point and the Lower Thermal Limit (ltt) will result in a proportional increase of plant voltage to a level corresponding to (lsp*(ntt-ltt)*24)V above the fsp at the ltt.

Upper Temperature Slope (usp): The slope rate for the voltage decrease per cell when the battery temperature is above the ntt (Battery Thermal Slope Nominal Temperature).

Upper Temperature Limit (utt): The upper temperature where Battery Thermal Compensation will have reduced plant voltage to a level corresponding to (usp*(utt-ntt)*24)V below the fsp. Plant voltage will be reduced proportionally at any temperature between this point and the Battery Thermal Slope Nominal Temperature (ntt).

Battery Thermal Alarm Threshold (thr): A monitored battery temperature above this threshold results in a Battery Thermal alarm with a PMN severity.

Battery Thermal Step Temperature (spt): A monitored battery temperature above this threshold results in an additional 4.08V step decrease in plant voltage.

Plant Battery Test

The following is a list of plant battery test parameters that can be configured in the controller. The result of the Plant Battery Test is available in the Batteries sub-menu of the Status menu.

Manual Test: Permits manually starting a battery discharge test. The test can be set to end on either of the following two parameters.

Duration: The duration of the test can be set from 0.1 hours to 99.9 hours.

Cutoff Cell V: The test can be set to end when battery cell voltage reaches this cutoff voltage. Cutoff voltage can be set from 1.5V to 2.0V.

Automatic Test: This utility offers the flexibility of running pre-programmed battery tests at specific times and days, and for specific durations.

Automatic Test: Enable or disable automatic periodic running of the battery test. The factory default setting is disabled.

Interval: The test interval (time between tests) can be set from 1 to 18 months in 1 month increments. The factory default setting is 12 months.

Next Test: Enter a particular day in dd-mm-yy format to automatically run the battery test on that day.

Start Time: Enter a particular time in hh-mm format to automatically run the battery test at that time. The setting can be configured from 0 to 23 hours. 00:00 is midnight.

Hours from BD: Time interval needed to elapse since the last Battery on Discharge alarm before a battery test can be performed. This can be set from 0 to 240 hours in 1 hour increments. The factory default setting is 72 hours.

Recharge Amp Limit: This section contains the settings for battery recharge current limit.

Limit: Enable or disable battery discharge current limiting.

Limit To: Current limit setting, from 5A to 1000A. The factory default setting is 50A.

During this test, the controller lowers the rectifier voltage to 44V. (This value was chosen to be higher than 1.2V plus the highest possible LVD contactor disconnect threshold so as not to accidentally open the LVD contactor.) Lowering the rectifier output voltage to 44V creates a battery on discharge condition. If the batteries are present and healthy, the plant voltage will remain above 48V and the batteries will support the load. If the batteries are not present or are not able to support the load, the plant voltage will immediately drop to approximately 44V without any consequence to the load. The Battery on Discharge alarm is masked during this test.

The test is terminated by the occurrence of any of the following conditions:

- Initiating another Plant Battery Test. That is, once the test has been initiated, the test may be stopped by initiating another test either through the controller or by shorting pins 19 and 20 of the host interface connector.
- An alarm condition occurring. Any alarm condition that occurs during this test will result in the test being aborted regardless of whether the contact-closure exists between pins 19 and 20 of the host interface connector.
- The test has continued for over 100 minutes.
- The plant voltage has dropped below 44V. In this case, the system will abort the test and resume rectifier operation.

After the test has stopped, the plant will revert to the float mode. It may go to boost mode if the auto-boost feature has been enabled.

Boost Mode

Boost charging is a feature of the controller, which allows the user to temporarily raise the plant voltage to a higher, predetermined level, thus, reducing the time needed to charge batteries. The system may manually be placed in the boost-mode through the front panel.

Note that the measured boost voltage may not exactly match the value chosen by the user if the thermal compensation feature is enabled. This is because the controller performs thermal compensated boost charging and will adjust the boost value based on the battery temperature per the slope chosen by the user.

The plant will exit the boost mode and enter the float mode if any of the following occurs:

- The current flowing into the battery string(s) is less than 5A
- The duration of boost mode charging has reached the configured duration time (1-80) hours
- The controller receives either a High-Voltage, Rectifier Fail alarm, or High-Battery Temperature alarms
- User sets the plant state to Float via the TI.

Once initiated, the boost mode may be exited by placing the Plant State to Float.

Auto-Boost Charge

This feature may be enabled from the TI. See Appendix B for details. When enabled, the plant enters the boost-charging mode of operation following a battery discharge once the BD alarm has been retired, provided the duration of the discharge was greater than 4 minutes. The controller will not enter the auto-boost-charging mode if the discharge duration was less than 4 minutes.

When in auto-boost mode, the controller raises the plant voltage to the value selected by the user. The controller keeps the plant in this mode of operation for a minimum of 5 minutes.

The exit conditions for the Auto-Boost Charge are the same as those for Boost Charge.

Redundancy Loss Function

This feature must be enabled from the front panel. The controller determines the number of rectifiers present and compares the actual currents being drawn by the load to that produced by the total number of rectifiers less one. If the measured load current exceeds the N rectifier's capacity for over 1 min, the alarm condition is activated. The alarm condition is latched on until the Clear Events command is activated from the front panel.

This feature may be used by customers to determine if the load being served is greater than N rectifiers worth, in an N+1 system. That is, the load requirements have changed such that the power system is no

longer operating as a redundant power system. An additional rectifier may be required to ensure continuous redundant operation.

If enabled, this feature will be disabled during battery discharge and recharge conditions. It will be enabled when the battery charging current falls below 5A.

Battery Voltage Imbalance Detection

This feature requires the use of the ES771A Remote Voltage Monitoring Module. Note that this feature is automatically enabled if the controller detects the presence of the ES771A module. This module is to be placed in the electronics cabinet and utilizes the QS873A VT-Probes to measure the voltage of the battery string being monitored. The VT-Probe is to be placed on the negative battery terminal located in the middle of the battery string. The controller has data on the plant voltage; the half-string voltage measured from each monitored battery string is compared to the plant voltage minus the measured half-string voltage. If the comparison results in a difference of greater than 1.7V (or the configured value) for longer than 12 hours, the alarm is asserted. The alarm may be retired by initiating the Clear Events command from the front panel.

After this feature has been enabled, the system waits for 12 hours to ensure the battery strings are stable. A battery string is considered to be stable if the charging current is less than 3A. If a stable battery string yields a difference measurement greater than 1.7V (or the configured value) for over 12 continuous hours, a Battery Voltage Imbalance alarm is generated.

When the alarm is issued, the Float Set-Point (fsp) and the Battery On Discharge (BD) threshold values are reduced by fsp/Number of Cells per string. Once the alarm has been cleared by the Clear Events (CLE) command, the plant reverts to its normal Float Set-Point (fsp); however, the BD threshold is maintained at the new threshold for up to four minutes before reverting back to the old threshold. This is done to ensure the batteries have had enough time to charge up to the nominal fsp and to prevent any spurious BD alarm conditions.

This feature may be used by customers as part of their overall battery maintenance program in determining the health of battery strings. A voltage imbalance of 1.7V between half-string voltages may mean a shorted-cell, loose connection, or some other abnormality somewhere in the string. A service person should be sent out to the site and determine if the string should be replaced.

Battery Recharge Current Limit

The battery recharge current limit feature enables the controller to limit the recharge current flowing into a battery section during the charge cycle. The recharge current flowing into the battery section can be limited to any value between 5A and 1000A.

Note that this feature will not have any impact on the current being delivered to the load. Further, there will be no effect on the discharge current flowing from the battery strings to the load during an ac fail condition. The controller will maintain the recharge current within 10% of the set level.

Battery Parameter Defaults

The controller has been configured with battery specific defaults. These battery types are shown in the top portion of Table C-1 Supported Battery Types. The generic Valve –Regulated Lead Acid battery is the default battery type for this controller configuration. Battery models and their parameters can be added or adjusted in the field.

Table C-1 Supported Battery Types			
Vendor	**Battery Type**		**String Or Battery Capacity 8hr rate(AH)**
Generic	**Valve-Reg**	**(VRLA)**	**0**
Generic	**Flooded**	**Flooded**	**0**
Generic	**Ni-Cd**		**0**
Generic	**Li-LMP**		**0**
Generic	**Li-ELiTE**		**63**
Lineage Power	**12A100FT**	**(VRLA)**	**96**
Lineage Power	**12A150FT**	**(VRLA)**	**145**
Lineage Power	**12IR150/150LP**	**(VRLA)**	**145**
Unigy	**3A125-33L**	**(VRLA)**	**2000**
Unigy	**3A95-21L**	**(VRLA)**	**950**
Unigy	**3A95-27L**	**(VRLA)**	**1235**
Unigy	**3A95-33L**	**(VRLA)**	**1520**
Unigy	**6A95-13L**	**(VRLA)**	**570**
Unigy	**6A95-15L**	**(VRLA)**	**665**
Lineage Power	**IR30EC**	**(VRLA)**	**27**
Lineage Power	**IR40EC**	**(VRLA)**	**35**
Lineage Power	**L54V63FTX**	**(Li-ELiTE)**	**63**
Saft	**NCX-125**	**(NiCad)**	**125**
Saft	**NCX-80**	**(NiCad)**	**80**
North Star	**NSB110FT**	**(VRLA)**	**110**
North Star	**NSB170FT**	**(VRLA)**	**170**
North Star	**NSB60FT**	**(VRLA)**	**60**
Avestor	**SE48S63**	**(Li-LMP)**	**63**
Avestor	**SE48S80**	**(Li-LMP)**	**80**
C&D	**TEL12-105F**	**(VRLA)**	**100**
NA	**None**		**NA**

This page is intentionally blank.

Appendix D: Default Configurations

Table D-1 Standard Configuration Item Defaults provides the default settings for the configurable parameters and features that are associated in the controller. Also listed are the battery technologies and specific battery models included in the configuration file. Specific battery models assume the configuration defaults for their generic technology class except for a specific capacity and model name. The generic Valve Regulated Lead Acid battery type will be the factory default Battery Type selected and configured for the controller configuration. Changes to individual features, parameters, and thresholds for each battery type will be allowed in the field. These changes will be stored in non-volatile memory. However, if the Load Factory Defaults control/operation command is initiated, all assigned values shown in **Table D-1 Standard Configuration Item Defaults** and **Table C-1 Supported Battery Types** will be restored. The configurations made in the field will be lost.

There are four sections for determining the defaults for the standard configuration program file. These sections are **Standard**, **24V Battery**, **48V Battery**, and **Alarms**. This document will show four separate tables for these categories. In addition, the Excel spreadsheet is also attached.

The **Standard** section includes settings and thresholds independent of the primary output voltage of the system. Generally, these items are set using information that does not depend on the battery reserve system.

The **24V Battery** section includes settings and thresholds that are generally dependent of the primary 24V output voltage of the system. Generally, these items are set using information that depends on the battery reserve system configured.

The **48V Battery** section includes settings and thresholds that are generally dependent of the primary 48V output voltage of the system. Generally, these items are set using information that depends on the battery reserve system configured.

The **Alarms** section provides the assigned severities, alarm output relays, and LED assignments for the standard configuration.

This document will continue to be revised and updated as feedback and additional requirements come in from the field or as new configurable features and thresholds are added to the standard controller. Features, thresholds, and other configurable items not addressed in the list will remain at the factory default set for each respective item as defined in the standard product offering. Note: Custom configurations can be made available through configuration of application or customer preferred defaults for the information in the following tables for certain application.

Table D-1 Standard Configuration Item Defaults

			Factory Default	Factory 24V Rectifier Default	Factory 48V Rectifier Default	
Category	**Description**	**Range**	**Factory**	**Factory 24V**	**Factory 48V**	**obj,attr**
Controller	Site ID	≤ 20 characters	""			PS1,SID
	Site Description	≤ 55 characters	""			PS1,SDE
	Controller Description	Plant Description	"NE843A"			PS1,DES
	System Description	≤ 55 characters	"Infinity NE"			PS1,SYS
	Plant Description	Plant Description	"H569-2448"			DC1,DES
	Plant Voltage Type	24V or 48V		"24V"	"48V"	DC1,TYP
	Automatic Daylight Savings Feature	1=Enabled 0=Disabled	1			PS1,DLS
	Display Contrast	0 to 100%	50			PS1,DCT
	Temperature Display Units	C or F	"C"			PS1,TUN
	Date Format		"MM/DD/YYYY"			PS1,DTF
	Time Format	12 or 24	12			PS1,TMF
	Front Panel Configuration	1=Enabled 0=Disabled	1			PS1,FPC
	Remote rectifier Off	1=Enabled 0=Disabled	0			PS1,RRF
	Emergency Power-off Enable	1=Enabled 0=Disabled	1			PS1,POE
	User Name Login Enable	1=Enabled 0=Disabled	0			PS1,USR
	Front Panel PIN enable	1=Enabled 0=Disabled	0			PS1,FPE
	Front Panel Pin Default	Four digits 0-9	"0000"			PS1,FPP
	Front Panel PIN timeout	1 to 120 minutes	30			PS1,FPT
	Daylight Saving Start	mon:wk:dow:min mon:-1:dom:min	"3:2:0:120"			PS1,DSS
	Daylight Saving End	mon:wk:dow:min mon:-1:dom:min	"11:1:0:120"			PS1,DSE
	Uninstall Equipment Timeout	0 to 60s	15			PS1,UET
	Controller Ambient Temperature High	35 to 75 °C	75			AMTH1,THR
	Controller Ambient Temperature Low	-40 to 10 C	-40			AMTL1,THR
	Critical Equals Major	1=Enabled 0=Disabled	1			PS1,CEM
	User Password		"lineage"			PAS U,
	Super-user Password		"super-user"			PAS S,
	Administrator Password		"administrator"			PAS A,
Low Voltage Disconnects **Battery Disconnect 1**	Battery Disconnect Control Mode	0=none, 1=voltage 2=voltage/time	1			CN1,DAM
	Battery Disconnect Time Delay	0 to 300 minutes	0			CN1,DDY
	Battery Reconnect Control Mode	0=none, 1=voltage 2=voltage/time	1			CN1,RAM
	Battery Reconnect Time Delay	0 to 300 sec	0			CN1,RDY
	Battery Disconnect Description	<=32 Chars	"LVBD1"			CN1,DES
	Battery Disconnect Open Description	<=32 Chars	"LVBD1 Open"			CNO1,DES
	Battery Disconnect Open Front Panel Description	<=32 Chars	"LVBD1 Open"			CNO1,FDS
	Battery Disconnect Failed Description	<=32 Chars	"LVBD1 Failed"			CNF1,DES
	Battery Disconnect Failed Front Panel Description	<=32 Chars	"LVBD1 Failed"			CNF1,FDS
Load Disconnect 1	Load 1 Disconnect	1=Enabled 0=Disabled	1			CN2,ENA

Table D-1 Standard Configuration Item Defaults

			Factory Default	Factory 24V Rectifier Default	Factory 48V Rectifier Default	
Category	**Description**	**Range**	**Factory**	**Factory 24V**	**Factory 48V**	**obj,attr**
	Load 1 Disconnect Control Mode	0=none, 1=voltage 2=voltage/time	1			CN2,DAM
	Load 1 Disconnect Voltage	19.5 to 25V -39.0 to -50V		21.00	42.00	CN2,DTH
	Load 1 Disconnect Time Delay	0 to 300 minutes	0			CN2,DDY
	Load 1 Reconnect Control Mode	0=none, 1=voltage 2=voltage/time	1			CN2,RAM
	Load 1 Reconnect Voltage	19.5 to 27 -39.0 to -55.0V		22.00	44.00	CN2,RTH
	Load 1 Reconnect Time Delay	0 to 300 sec	0			CN2,RDY
	Load 1 Disconnect Description	<=32 Chars	"LVLD1"			CN2,DES
	Load 1 Disconnect Open Description	<=32 Chars	"LVLD1 Open"			CNO2,DES
	Load 1 Disconnect Open Front Panel Description	<=32 Chars	"LVLD1 Open"			CNO2,FDS
	Load 1 Disconnect Failed Description	<=32 Chars	"LVLD1 Failed"			CNF2,DES
	Load 1 Disconnect Failed Front Panel Description	<=32 Chars	"LVLD1 Failed"			CNF2,FDS
Load Disconnect 2	LV Load 2 Disconnect	1=Enabled 0=Disabled	0			CN3,ENA
	LV Load 2 Disconnect Control Mode	0=none, 1=voltage 2=voltage/time	1			CN3,DAM
	LV Load 2 Disconnect Voltage	19.5 to 25V -39.0 to -50V		21.00	42.00	CN3,DTH
	LV Load 2 Disconnect Time Delay	0 to 300 minutes	0			CN3,DDY
	LV Load 2 Reconnect Control Mode	0=none, 1=voltage 2=voltage/time	1			CN3,RAM
	LV Load 2 Reconnect Voltage	19.5 to 27 -39.0 to -55.0V		22.00	44.00	CN3,RTH
	LV Load 2 Reconnect Time Delay	0 to 300 sec	0			CN3,RDY
	Load 2 Disconnect Description	<=32 Chars	"LVLD2"			CN3,DES
	Load 2 Disconnect Open Description	<=32 Chars	"LVLD2 Open"			CNO3,DES
	Load 2 Disconnect Open Front Panel Description	<=32 Chars	"LVLD2 Open"			CNO3,FDS
	Load 2 Disconnect Failed Description	<=32 Chars	"LVLD2 Failed"			CNF3,DES
	Load 2 Disconnect Failed Front Panel Description	<=32 Chars	"LVLD2 Failed"			CNF3,FDS
Load Disconnect 3	Load 3 Disconnect	1=Enabled 0=Disabled	0			CN4,ENA
	Load 3 Disconnect Control Mode	0=none, 1=voltage 2=voltage/time	1			CN4,DAM
	Load 3 Disconnect Voltage	19.5 to 25V -39.0 to -50V		21.00	42.00	CN4,DTH
	Load 3 Disconnect Time Delay	0 to 300 minutes	0			CN4,DDY
	Load 3 Reconnect Control Mode	0=none, 1=voltage 2=voltage/time	1			CN4,RAM
	Load 3 Reconnect Voltage	19.5 to 27 -39.0 to -55.0V		22.00	44.00	CN4,RTH
	Load 3 Reconnect Time Delay	0 to 300 sec	0			CN4,RDY
	Load 3 Disconnect Description	<=32 Chars	"LVLD3"			CN4,DES
	Load 3 Disconnect Open Description	<=32 Chars	"LVLD3 Open"			CNO4,DES
	Load 3 Disconnect Open Front Panel Description	<=32 Chars	"LVLD3 Open"			CNO4,FDS
	Load 3 Disconnect Failed Description	<=32 Chars	"LVLD3 Failed"			CNF4,DES
	Load 3 Disconnect Failed Front Panel Description	<=32 Chars	"LVLD3 Failed"			CNF4,FDS

Table D-1 Standard Configuration Item Defaults

			Factory Default	Factory 24V Rectifier Default	Factory 48V Rectifier Default	
Category	**Description**	**Range**	**Factory**	**Factory 24V**	**Factory 48V**	**obj,attr**
Contactor Interfaces	ID1 Type	None/CN1/ CN2/CN3/CN4	"CN1"			DCN01,TYP
	ID2 Type	None/CN1/ CN2/CN3/CN4	"CN2"			DCN02,TYP
	ID3 Type	None/CN1/ CN2/CN3/CN4	"CN3"			DCN03,TYP
	ID4 Type	None/CN1/ CN2/CN3/CN4	"CN4"			DCN04,TYP
	ID5 Type	None/CN1/ CN2/CN3/CN4	"None"			DCN05,TYP
	ID6 Type	None/CN1/ CN2/CN3/CN4	"None"			DCN06,TYP
	ID7 Type	None/CN1/ CN2/CN3/CN4	"None"			DCN07,TYP
	ID8 Type	None/CN1/ CN2/CN3/CN4	"None"			DCN08,TYP
	Imminent LVBD Shutdown	1=Enabled 0=Disabled	0			DC1,ISD
Rectifiers	Rectifier Redundancy Loss Enable	1=Enabled 0=Disabled	0			GM1,RME
	Rectifier Loadshare Enable	1=Enabled 0=Disabled	1			GM1,LSE
	Rectifier Float Current Limit	30 to 100%	100			GM1,FCL
	Rectifier Boost Current Limit	30 to 100%	100			GM1,BCL
	Group Standby/Sequencing Enable	1=Enabled 0=Disabled	0			DC1,RSQ
	Remote rectifier Off Enable	1=Enabled 0=Disabled	0			PS1,RRF
	Rectifier Redundancy Threshold	1 to 80	1			RLS1,THR
	Multiple Rectifier Fail	2 to 88	2			MFA1,THR
	Oring FET test enable	1=Enabled 0=Disabled	1			GM1.OFT
	Efficiency Enable	1=Enabled 0=Disabled	1			DC!,EME
	Efficiency Target	20% to 95%	70			DC1,EMT
	Efficiency Rectifier Turn On Threshold	25% to 100%	76			DC1,EMO
Converters	Converter Internal Selective High Output Voltage Shutdown	25.0 to 30.0V50.0 to 60.0V		58.0	29.0	CP1,VSD
	High Output Voltage Major Alarm	25.0 to 30.0V 50.0 to 60.0V		56.0	28.5	CHVA1, THR
	High Output Voltage Minor Alarm	24.0 to 30.0V 48.0 to 60.0V		54.0	27.0	CHFV1,THR
	Output Voltage Set-Point	23.0 to 27.2V 46.0 to 54.5V		52.0	26.0	CP1,VSP
	Low Voltage Alarm	20.0 to 27.0V 40.0 to 54.0V		46.0	23.0	CVLA1,THR
	Converter Current Limit	30 to 100%	100			CP1,CLM
	Converter Redundancy Loss Enable	1=Enabled 0=Disabled	0			CP1,RME
	Remote converter Off Enable	1=Enabled 0=Disabled	0			CP1,ROF
	Low Voltage Disconnect Input Threshold	20.0 to 25.0V 40.0 to 50.0V		23.0	46.0	CP1,DTH
	Low Voltage Reconnect Input Threshold	22.0 to 27.0V 44.0 to 54.0V		25.0	50.0	CP1,RTH
	Low Voltage Disconnect Enable	1=Enabled 0=Disabled	0			CP1,LVD
	Converter Redundancy Threshold	1 to 32	1			CRL1,THR
	Multiple Converter Fail	2 to 30	2			CMFA1,THR
Battery Type Definitions	Battery 1 Type Description	<=32 chars	"Generic Valve-Reg Battery"			BT01,DES
	Battery 1 Type		"Valve-Reg"			BT01,BTY
	Battery 1 Class		"VALVE-REG"			BT01,BTC
	Battery 1 Capacity		0			BT01,CAP
	Battery 2 Type Description	<=32 chars	"Generic Flooded Battery"			BT02,DES

Table D-1 Standard Configuration Item Defaults

			Factory Default	Factory 24V Rectifier Default	Factory 48V Rectifier Default	
Category	**Description**	**Range**	**Factory**	**Factory 24V**	**Factory 48V**	**obj,attr**
	Battery 2 Type		"Flooded"			BT02,BTY
	Battery 2 Class		"FLOODED"			BT02,BTC
	Battery 2 Capacity		0			BT02,CAP
	Battery 3 Type Description	<=32 chars	"Generic NiCd Battery"			BT03,DES
	Battery 3 Type		"NiCd"			BT03,BTY
	Battery3 Class		"NICD"			BT03,BTC
	Battery 3 Capacity		0			BT03,CAP
	Battery 4 Type Description	<=32 chars	"Generic Li-LMP Battery"			BT04,DES
	Battery 4 Type		"Li-LMP"			BT04,BTY
	Battery 4 Class		"LI-LMP"			BT04,BTC
	Battery 4 Capacity		63			BT04,CAP
	Battery 5 Type Description	<=32 chars	"Generic Li-ELiTE Battery"			BT05,DES
	Battery 5 Type		"Li-ELiTE"			BT05,BTY
	Battery 5 Class		"LI-ELITE"			BT05,BTC
	Battery 5 Capacity		63			BT05,CAP
	Battery 6 Type Description	<=32 chars	"Lineage Power (408014140)"			BT06,DES
	Battery 6 Type		"12A100FT"			BT06,BTY
	Battery 6 Class		"VALVE-REG"			BT06,BTC
	Battery 6 Capacity		96			BT06,CAP
	Battery 7 Type Description	<=32 chars	" Lineage Power (408520655)"			BT07,DES
	Battery 7 Type		"12A150FT"			BT07,BTY
	Battery 7 Class		"VALVE-REG"			BT07,BTC
	Battery 7 Capacity		145			BT07,CAP
	Battery 8 Type Description	<=32 chars	"Lineage Power (408520663)"			BT08,DES
	Battery 8 Type		"12IR150/150LP"			BT08,BTY
	Battery 8 Class		"VALVE-REG"			BT08,BTC
	Battery 8 Capacity		145			BT08,CAP
	Battery 9 Type Description	<=32 chars	"Unigy (408567044)"			BT09,DES
	Battery 9 Type		"3A125-33L"			BT09,BTY
	Battery 9 Class		"VALVE-REG"			BT09,BTC
	Battery 9 Capacity		2000			BT09,CAP
	Battery 10 Type Description	<=32 chars	"Unigy (408545495)"			BT10,DES
	Battery 10 Type		"3A95-21L"			BT10,BTY
	Battery 10 Class		"VALVE-REG"			BT10,BTC
	Battery 10 Capacity		950			BT10,CAP
	Battery 11 Type Description	<=32 chars	"Unigy (408545553)"			BT11,DES
	Battery 11 Type		"3A95-27L"			BT11,BTY
	Battery 11 Class		"VALVE-REG"			BT11,BTC
	Battery 11 Capacity		1235			BT11,CAP
	Battery 12 Type Description	<=32 chars	"Unigy (408545611)"			BT12,DES
	Battery 12 Type		"3A95-33L"			BT12,BTY
	Battery 12 Class		"VALVE-REG"			BT12,BTC
	Battery 12 Capacity		1520			BT12,CAP
	Battery 13 Type Description	<=32 chars	"Unigy (408545693)"			BT13,DES
	Battery 13 Type		"6A95-13L"			BT13,BTY
	Battery 13 Class		"VALVE-REG"			BT13,BTC

Table D-1 Standard Configuration Item Defaults

			Factory Default	Factory 24V Rectifier Default	Factory 48V Rectifier Default	
Category	**Description**	**Range**	**Factory**	**Factory 24V**	**Factory 48V**	**obj,attr**
	Battery 13 Capacity		570			BT13,CAP
	Battery 14 Type Description	<=32 chars	"Unigy (408545710)"			BT14,DES
	Battery 14 Type		"6A95-15L"			BT14,BTY
	Battery 14 Class		"VALVE-REG"			BT14,BTC
	Battery 14 Capacity		665			BT14,CAP
	Battery 15 Type Description	<=32 chars	"Lineage Power (407928761)"			BT15,DES
	Battery 15 Type		"IR30EC"			BT15,BTY
	Battery 15 Class		"VALVE-REG"			BT15,BTC
	Battery 15 Capacity		27			BT15,CAP
	Battery 16 Type Description	<=32 chars	"Lineage Power (407928753)"			BT16,DES
	Battery 16 Type		"IR40EC"			BT16,BTY
	Battery 16 Class		"VALVE-REG"			BT16,BTC
	Battery 16 Capacity		35			BT16,CAP
	Battery 17 Type Description	<=32 chars	"Lineage Power (CC408612792)"			BT17,DES
	Battery 17 Type		"L54V63FTX"			BT17,BTY
	Battery 17 Class		"LI-ELITE"			BT17,BTC
	Battery 17 Capacity		63			BT17,CAP
	Battery 18 Type Description	<=32 chars	"Saft ()"			BT18,DES
	Battery 18 Type		"NCX-125"			BT18,BTY
	Battery 18 Class		"NICD"			BT18,BTC
	Battery 18 Capacity		125			BT18,CAP
	Battery 19 Type Description	<=32 chars	"Saft (408539365)"			BT19,DES
	Battery 19 Type		"NCX-80"			BT19,BTY
	Battery 19 Class		"NICD"			BT19,BTC
	Battery 19 Capacity		80			BT19,CAP
	Battery 20 Type Description	<=32 chars	"North Star (408508752)"			BT20,DES
	Battery 20 Type		"NSB110FT"			BT20,BTY
	Battery 20 Class		"VALVE-REG"			BT20,BTC
	Battery 20 Capacity		110			BT20,CAP
	Battery 21 Type Description	<=32 chars	"North Star (408508760)"			BT21,DES
	Battery 21 Type		"NSB170FT"			BT21,BTY
	Battery 21 Class		"VALVE-REG"			BT21,BTC
	Battery 21 Capacity		170			BT21,CAP
	Battery 22 Type Description	<=32 chars	"North Star (408503910)"			BT22,DES
	Battery 22 Type		"NSB60FT"			BT22,BTY
	Battery 22 Class		"VALVE-REG"			BT22,BTC
	Battery 22 Capacity		60			BT22,CAP
	Battery 23 Type Description	<=32 chars	"Avestor (408531611)"			BT23,DES
	Battery 23 Type		"SE48S63"			BT23,BTY
	Battery 23 Class		"LI-LMP"			BT23,BTC
	Battery 23 Capacity		60			BT23,CAP
	Battery 24 Type Description	<=32 chars	"Avestor (CC408574065)"			BT24,DES
	Battery 24 Type		"SE48S80"			BT24,BTY
	Battery 24 Class		"LI-LMP"			BT24,BTC
	Battery 24 Capacity		80			BT24,CAP
	Battery 25 Type Description	<=32 chars	"C&D (408530167)"			BT25,DES

Table D-1 Standard Configuration Item Defaults

			Factory Default	Factory 24V Rectifier Default	Factory 48V Rectifier Default	
Category	**Description**	**Range**	**Factory**	**Factory 24V**	**Factory 48V**	**obj,attr**
	Battery 25 Type		"TEL12-105F"			BT25,BTY
	Battery 25 Class		"VALVE-REG"			BT25,BTC
	Battery 25 Capacity		100			BT25,CAP
Batteries	Number Of Battery Strings	0 to 16 Strings	0			DC1,NST
	Battery Model	≤ 14 Characters	"Valve-Reg"			DC1,BTY
Battery Discharge Test	Timed Test Duration	0:0:0 to 23:59:59	4:00:00			BR1,TMD
	Automatic Battery Test Feature	disabled, 20%, timed	"disabled"			BR1,BTE
	Automatic Test (AT) Interval	1 to 18 Months	12			BR1,TIN
	Date For Next Automatic Test	yyyy-mm-dd	1/1/2099			BR1,ATD
	Start Time For Automatic Test	0 to 23	0			BR1,ATH
	Hours To Wait From Last BD Before AT	0 to 240 hours	72			BR1,ATW
	Manual Test Type	disabled, 20%, timed	"disabled"			BR1,MTT
	Reserve Time Low (Full Capacity)	0.0 to 99.9 hours	0			RTL1,THR
	Real-time Reserve Low (During BD)	0.0 to 99.9 hours	0			RRTL1,THR
Battery Sections	String 1 contactor	CN1 to CN4	"DCN01"			B01,CON
	String 1 Number of strings	1 to 70	0			B01,NST
	String 1 Battery type		"VALVE-REG"			B01,BTY
	String 2 contactor	CN1 to CN4	"DCN01"			B02,CON
	String 2 Number of strings	1 to 70	0			B02,NST
	String 2 Battery type		"VALVE-REG"			B02,BTY
	String 3 contactor	CN1 to CN4	"DCN01"			B03,CON
	String 3 Number of strings	1 to 70	0			B03,NST
	String 3 Battery type		"VALVE-REG"			B03,BTY
Battery Boost	Boost Maximum Duration	1 to 80 Hours	1			BS1,TMD
	Automatic Boost Feature	disabled, timed, or current	"disabled"			BS1,ATM
	Auto Boost BD Multiplication Factor	0.1 to 9.0	0.5			BS1,AMF
	Auto Boost Termination Current Threshold	1 to 999A	5			BS1,CTA
Shunt Monitors	Plant Shunt Type	Battery/None /Load	"BATTERY"			DCMC1,TYP
	Plant Shunt Current Rating	0 to 9999 Amps	600			DCMC1,SHA
	ID1 Type	Battery/None /Load	"BATTERY"			DCM01,TYP
	ID1 Shunt Current Rating	0 to 9999 Amps	300			DCM01,SHA
	ID2 Type	Battery/None /Load	"NONE"			DCM02,TYP
	ID2 Shunt Current Rating	0 to 9999 Amps	300			DCM02,SHA
	ID3 Type	Battery/None /Load	"NONE"			DCM03,TYP
	ID3 Shunt Current Rating	0 to 9999 Amps	600			DCM03,SHA
	ID4 Type	Battery/None /Load	"NONE"			DCM04,TYP
	ID4 Shunt Current Rating	0 to 9999 Amps	600			DCM04,SHA
	ID5 Type	Battery/None /Load	"NONE"			DCM05,TYP
	ID5 Shunt Current Rating	0 to 9999 Amps	600			DCM05,SHA
	ID6 Type	Battery/None /Load	"NONE"			DCM06,TYP
	ID6 Shunt Current Rating	0 to 9999 Amps	600			DCM06,SHA

Table D-1 Standard Configuration Item Defaults

			Factory Default	Factory 24V Rectifier Default	Factory 48V Rectifier Default	
Category	**Description**	**Range**	**Factory**	**Factory 24V**	**Factory 48V**	**obj,attr**
	ID7 Type	Battery/None /Load	"NONE"			DCM07,TYP
	ID7 Shunt Current Rating	0 to 9999 Amps	600			DCM07,SHA
	ID8 Type	Battery/None /Load	"NONE"			DCM08,TYP
	ID8 Shunt Current Rating	0 to 9999 Amps	600			DCM08,SHA
	All Load Shunts Monitored	1=Enabled 0=Disabled	0			DC1,MLS
Built-in Inputs	Input 1 Description	<=32 chars	"Fuse Alarm Major 24V"			IN001,DES
	Input 1 Type		"FAJ1"			IN001,TYP
	Input 1 Active State	CLOSED=Battery OPEN=No BAT	"CLOSED"			IN001,POL
	Input 2 Description	<=32 chars	"Fuse Alarm Major 48V"			IN002,DES
	Input 2 Type		"FAJ2"			IN002,TYP
	Input 2 Active State	CLOSED=Battery OPEN=No BAT	"CLOSED"			IN002,POL
	Input 3 Description	<=32 chars	"Auxiliary Major Alarm"			IN003,DES
	Input 3 Type		"AMJ1"			IN003,TYP
	Input 3 Active State	CLOSED=Battery OPEN=No BAT	"CLOSED"			IN003,POL
	Input 4 Description	<=32 chars	"Open String"			IN004,DES
	Input 4 Type		"OSA1"			IN004,TYP
	Input 4 Active State	CLOSED=Battery OPEN=No BAT	"CLOSED"			IN004,POL
	Input 5 Description	<=32 chars	"Emergency Power Off"			IN005,DES
	Input 5 Type		"REMLVD"			IN005,TYP
	Input 5 Active State	CLOSED=Closed to RTN, OPEN=Open to RTN	"CLOSED"			IN005,POL
	Input 6 Description	<=32 chars	"Group Standby/PBT"			IN006,DES
	Input 6 Type		""			IN006,TYP
	Input 6 Active State	CLOSED=Closed to RTN, OPEN=Open to RTN	"CLOSED"			IN006,POL
	Input 7 Description	<=32 chars	"Air Conditioner Fail"			IN007,DES
	Input 7 Type		"AUX1"			IN007,TYP
	Input 7 Active State	CLOSED=Closed to RTN, OPEN=Open to RTN	"CLOSED"			IN007,POL
	Input 8 Description	<=32 chars	"Door Open"			IN008,DES
	Input 8 Type		"AUX2"			IN008,TYP
	Input 8 Active State	CLOSED=Closed to RTN, OPEN=Open to RTN	"CLOSED"			IN008,POL
	Input 9 Description	<=32 chars	"High External Ambient"			IN009,DES
	Input 9 Type		"AUX3"			IN009,TYP
	Input 9 Active State	CLOSED=Closed to RTN, OPEN=Open to RTN	"CLOSED"			IN009,POL
	Input 10 Description	<=32 chars	"Low External Ambient"			IN010,DES
	Input 10 Type		"AUX4"			IN010,TYP
	Input 10 Active State	CLOSED=Closed to RTN, OPEN=Open to RTN	"CLOSED"			IN010,POL

Table D-1 Standard Configuration Item Defaults

			Factory Default	Factory 24V Rectifier Default	Factory 48V Rectifier Default	
Category	**Description**	**Range**	**Factory**	**Factory 24V**	**Factory 48V**	**obj,attr**
Auxiliary Alarms	Auxiliary Alarm 1 Description	<=32 chars	"Air Conditioner Fail"			AUX1,DES
	Auxiliary Alarm 1 Front Panel Desc	<=24 chars	"Air Conditioner Fail"			AUX1,FDS
	Auxiliary Alarm 2 Description	<=32 chars	"Door Open"			AUX2,DES
	Auxiliary Alarm 2 Front Panel Desc	<=24 chars	"Door Open"			AUX2,FDS
	Auxiliary Alarm 3 Description	<=32 chars	"High External Ambient"			AUX3,DES
	Auxiliary Alarm 3 Front Panel Desc	<=24 chars	"High External Ambient"			AUX3,FDS
	Auxiliary Alarm 4 Description	<=32 chars	"Low External Ambient"			AUX4,DES
	Auxiliary Alarm 4 Front Panel Desc	<=24 chars	"Low External Ambient"			AUX4,FDS
	Auxiliary Alarm 5 Description	<=32 chars	"Fan Fail"			AUX5,DES
	Auxiliary Alarm 5 Front Panel Desc	<=24 chars	"Fan Fail"			AUX5,FDS
	Auxiliary Alarm 6 Description	<=32 chars	"Hydrogen Present"			AUX6,DES
	Auxiliary Alarm 6 Front Panel Desc	<=24 chars	"Hydrogen Present"			AUX6,FDS
Ringers	Ringer Output Voltage Set-Point	65-100 VAC	100			RP1,VSP
	Ringer Output Frequency	15-50Hz	20			RP1,FRQ
	Ringer DC Output Offset Feature	1=Enabled/ 0=Disabled	1			RP1,OFE
	Ringer Redundancy Loss Feature	1=Enabled/ 0=Disabled	1			RP1,RME
Alarm Test	Alarm Test Enable	1=Enabled 0=Disabled	1			AT1,LTE
	Duration of Each Relay Closure	5 to 300 sec	30			AT1,DUR
	PCR Relay Test Enable	1=Enabled 0=Disabled	1			AT1,PCR
	PMJ Relay Test Enable	1=Enabled 0=Disabled	1			AT1,PMJ
	PMN Relay Test Enable	1=Enabled 0=Disabled	1			AT1,PMN
	R1 Relay Test Enable	1=Enabled 0=Disabled	1			AT1,R1
	R2 Relay Test Enable	1=Enabled0=Disabled	1			AT1,R2
	R3 Relay Test Enable	1=Enabled 0=Disabled	1			AT1,R3
	R4 Relay Test Enable	1=Enabled 0=Disabled	1			AT1,R4
	R5 Relay Test Enable	1=Enabled 0=Disabled	1			AT1,R5
	R6 Relay Test Enable	1=Enabled 0=Disabled	1			AT1,R6
	R7 Relay Test Enable	1=Enabled 0=Disabled	1			AT1,R7
	Buzzer Test Interval	5-300sec	10			AT1,BZI
Alarm Cut-Off	Critical Alarm Cut-off Enable	1=Enabled 0=Disabled	1			ACO1,CAE
	Critical Alarm Cut-off Timeout	1 to 4 hours	1			ACO1,CTO
	Major Alarm Cut-off Enable	1=Enabled 0=Disabled	1			ACO1,JAE
	Major Alarm Cut-off Timeout	1 to 4 hours	1			ACO1,JTO
	Minor Alarm Cut-off Enable	1=Enabled 0=Disabled	1			ACO1,NAE
	Minor Alarm Cut-off Timeout	1 to 72 hours	8			ACO1,NTO
	Local Buzzer Enable	1=Enabled 0=Disabled	1			ACO1,LBE
Communication Ports	Communication Port Type	LOCAL or MODEM	"LOCAL"			PS1,PTT
	Local Port Write Access	1=Enabled 0=Disabled	1			LP1,WRE
	Local RS-232 baud rate	2400/4800/ 9600/ Auto	"AUTO"			LP1,BDR

Table D-1 Standard Configuration Item Defaults

			Factory Default	Factory 24V Rectifier Default	Factory 48V Rectifier Default	
Category	**Description**	**Range**	**Factory**	**Factory 24V**	**Factory 48V**	**obj,attr**
	Local RS-232 handshaking (Flow Control)	No/SW/HW	"NO"			LP1,HSH
	Number of Local RS-232 data bits	7,8	8			LP1,DBT
	Local RS-232 parity	n,e,o	N			LP1,PRY
	Number of Local RS-232 stop bits	1,2	1			LP1,SBT
	Local RS-232 Time-out	0-45 minutes	5			LP1,TMO
	Local RS-232 Application	TERMINAL, EVENT LOG	"TERMINAL"			LP1,APP
	Modem Port Write Access	1=Enabled 0=Disabled	1			MP1,WRE
	Modem baud rate	2400/4800/ 9600	"2400"			MP1,BDR
	Number Of Modem data bits	7,8	8			MP1,DBT
	Modem parity	n,e,o	N			MP1,PRY
	Number Of Modem stop bits	1,2	1			MP1,SBT
	Modem Time-out	0-45 minutes	5			MP1,TMO
	Modem initialization string	≤ 20 Characters	"AT&FEV&C1S0=0H"			MP1,INS
	Modem number of rings before answering	1 to 9	1			MP1,NRG
	Modem handshaking (Flow Control)	No/SW/HW	"NO"			MP1,HSH
Network Port	DHCP	0=static 1=client 2=server	1			NET1,DHCP
	Timeout	0 to 45 minutes	10			NET1,TMO
	Network Port Write Access	1=Enabled 0=Disabled	1			NET1,WRE
Standard Alarms	Alarm Delay	0 to 9 minutes	0			SDA,DLY
	Notify On Occur	1=Enabled 0=Disabled	0			SDA,NOO
	Notify On Retire	1=Enabled 0=Disabled	0			SDA,NOR
	Nag On Occur	1=Enabled 0=Disabled	0			SDA,NAG
	Notify Destination		""			SDA,DST
Single Threshold Alarms	Alarm Delay	0 to 9 minutes	0			THA,DLY
	Notify On Occur	1=Enabled 0=Disabled	0			THA,NOO
	Notify On Retire	1=Enabled 0=Disabled	0			THA,NOR
	Nag On Occur	1=Enabled 0=Disabled	0			THA,NAG
	Notify Destination		""			THA,DST
Dual Threshold Alarms	Alarm Delay	0 to 9 minutes	0			DTA,DLY
	Notify On Occur	1=Enabled 0=Disabled	0			DTA,NOO
	Notify On Retire	1=Enabled 0=Disabled	0			DTA,NOR
	Nag On Occur	1=Enabled 0=Disabled	0			DTA,NAG
	Notify Destination		""			DTA,DST
Alarm Call-Out	Nag Interval	15 to 60 minutes	15			CM1,NGI
	Call-Out Destination Type	data or pager	"DATA"			COP,TYP
	Call-Out Phone Number	up to 25 Characters	""			COP,PHN
	Call-Out Baudrate	300, 1200, 2400, 4800, 9600, 19200	2400			COP,BDR
	Call-out Data Bits	7 or 8	8			COP,DBT

Table D-1 Standard Configuration Item Defaults

			Factory Default	Factory 24V Rectifier Default	Factory 48V Rectifier Default	
Category	**Description**	**Range**	**Factory**	**Factory 24V**	**Factory 48V**	**obj,attr**
	Call-Out Parity	n,e,o	N			COP,PRY
	Call-Out Stop Bits	1 or 2	1			COP,SBT
	Pager ID Delay	0 to 9 seconds	0			COP,DLY
	Pager ID	up to 25 Characters	""			COP,PGR
	Pager Message	up to 25 Characters	""			COP,MSG
Periodic Dial-Out	Phone Number	up to 25 Characters	""			PSO,PHN
	Baudrate	300, 1200, 2400, 4800, 9600, 19200	2400			PSO,BDR
	Data Bits	7 or 8	8			PSO,DBT
	Parity	n,e,o	N			PSO,PRY
	Stop Bits	1 or 2	1			PSO,SBT
	Interval	Sunday-Saturday, Daily, Monthly, Quarterly, Never	"Never"			PO1,INT
	Time	hh:mm	6:00			PSO,TIM
	Command Line 1	<=40 characters	""			PSO,CL01
	Command Line 2	<=40 characters	""			PSO,CL02
	Command Line 3	<=40 characters	""			PSO,CL03
	Command Line 4	<=40 characters	""			PSO,CL04
	Command Line 5	<=40 characters	""			PSO,CL05
	Command Line 6	<=40 characters	""			PSO,CL06
	Command Line 7	<=40 characters	""			PSO,CL07
	Command Line 8	<=40 characters	""			PSO,CL08
	Command Line 9	<=40 characters	""			PSO,CL09
	Command Line 10	<=40 characters	""			PSO,CL10
Alarm Email Notification	IP Address		""			COE,ADR
	Email Type	normal or pager	"NORMAL"			COE,TYP
Call-Back Security	Call-Back Security Enable	1=Enabled 0=Disabled	0			CBS,STT
	Phone Number 1	up to 25 Characters	""			CBS,PH1
	Baudrate 1	300, 1200, 2400, 4800, 9600, 19200	2400			CBS,BR1
	Phone Number 2	up to 25 Characters	""			CBS,PH2
	Baudrate 2	300, 1200, 2400, 4800, 9600, 19200	2400			CBS,BR2
	Phone Number 3	up to 25 Characters	""			CBS,PH3
	Baudrate 3	300, 1200, 2400, 4800, 9600, 19200	2400			CBS,BR3
	Phone Number 4	up to 25 Characters	""			CBS,PH4
	Baudrate 4	300, 1200, 2400, 4800, 9600, 19200	2400			CBS,BR4
	Phone Number 5	up to 25 Characters	""			CBS,PH5
	Baudrate 5	300, 1200, 2400, 4800, 9600, 19200	2400			CBS,BR5
SNMP Destination	IP Address		"0.0.0.0"			SND,IP

Table D-1 Standard Configuration Item Defaults						
			Factory Default	Factory 24V Rectifier Default	Factory 48V Rectifier Default	
Category	**Description**	**Range**	**Factory**	**Factory 24V**	**Factory 48V**	**obj,attr**
TL1 Manager	Activate User Enable	1=Enabled 0=Disabled	0			TLM,AUE
	CTS Detection Enable	1=Enabled 0=Disabled	0			TLM,CTS
	DSR Detection Enable	1=Enabled 0=Disabled	0			TLM,DSR
	Timeout	0 to 60 minutes	0			TLM,TMO
	Port	0 to 65535	2020			TLM,PRT

Table D-2 24V Battery Related Items Defaults

Category	Description	Range	Valve-Reg	Flooded	Li_ELiTE	NiCd	Li-LMP	obj,attr
Voltage Settings	Float Rectifier High Voltage Shutdown	25 to 30V	29.25	29.25	29.25	29.25	29.25	GM1,FSD
	Float High Voltage Major Alarm	25.74 to 31.75V	28.24	28.24	28.24	28.24	28.24	HVA1,FTH
	Float High Voltage Minor Alarm	24.75 to 29.75V	27.74	27.74	27.74	27.74	27.74	HFV1,FTH
	Float Voltage	21 to 28V	27.24	26.04	27.24	27.20	27.24	GM1,FSP
	Float Battery on Discharge Alarm	23 to 28V	25.54	25.00	26.50	25.54	25.54	BDA1,FTH
	Very Low Voltage Alarm	20 to 25.5V	23.00	23.00	23.00	23.00	23.00	VLA1,THR
	Rectifier On Threshold	20 to 25V	22.00	22.00	22.00	22.00	22.00	DC1,ROT
Battery Disconnect	LV Battery Disconnect	1=Enabled 0=Disabled	1	1	0	1	0	CN1,ENA
	LV Battery Disconnect Voltage	19.5 to 25V	21.00	21.00	21.00	21.00	21.00	CN1,DTH
	LV Battery Reconnect Voltage	19.5 to 25V	22.20	22.20	22.20	22.20	22.20	CN1,RTH
Batteries	Cells Per String	0-75	12	12	12	12	12	DC1,CPS
	String End Of Discharge Voltage	19.25 to 25.35	21.00	21.00	21.00	21.00	21.00	BR1,CEV
	Recharge Current Limit Feature	1=Enabled 0=Disabled	0	0	0	0	0	BR1,CLE
	Recharge Current Limit Value	5 to 1000A	50	50	25	25	25	BR1,CLT
	Boost Maximum Duration	1 to 80 Hours	1	1	1	1	1	BS1,TMD
	Voltage Imbalance Detect	1.5V to 3.0V	1.7	1.7	1.7	2.0	1.7	BR1,SCV
	High Temperature Disconnect	30 to 90°C	75	75	75	75	75	BR1,TTH
	High Battery Temperature	30 to 85°C	55	55	55	55	85	BTHA1,THR
Battery Slope Compensation	Slope Thermal Compensation (STC)	1=Enabled 0=Disabled	1	0	0	0	0	SC1,STT
	High Temperature Voltage Step Down	45 to 85°C	75	75	75	75	75	SC1,SPT
	High Temperature Compensation Stop	30 to 55°C	55	55	55	55	55	SC1,UTT
	High Temperature Decrease Rate	1-10mV/°C per cell	3	3	3	3	3	SC1,USP
	Nominal Temperature (No Temp Comp)	15 to 30 °C	25	25	25	25	25	SC1,NTT
	Low Temperature Compensation Feature	1=Enabled 0=Disabled	0	0	0	0	0	SC1,RVE
	Low Temperature Compensation Stop	-5 to 20°C	0	0	0	0	0	SC1,LTT
	Low Temperature Decrease Rate	1-10mV/°C per cell	3	3	3	3	3	SC1,LSP
Battery Discharge Test	Timed Test Alarm Voltage Threshold	21 to 27V	22.00	22.00	23.00	22.00	22.00	BR1,TEV
	Rectifier Voltage During Battery Test	21 to 26V	21.00	21.00	21.00	21.00	21.00	BR1,BTV
Battery Boost	Boost Rectifier High Voltage Shutdown	26 to 30V	29.25	29.25	29.25	29.25	29.25	GM1,BSD
	Boost High Voltage Major Alarm	25.75 to 31.75V	28.24	29.00	28.24	28.24	28.24	HVA1,BTH
	Boost High Voltage Minor Alarm	25.75 to 31.75V	27.74	28.00	27.74	27.74	27.74	HFV1,BTH
	Boost Voltage	22 to 30V	27.24	26.04	27.24	27.20	27.24	GM1,BSP
	Boost Battery on Discharge Alarm	23 to 28V	25.54	25.00	26.50	25.54	25.54	BDA1,BTH

Table D-3 48V Battery Related Items Defaults								
Category	**Description**	**Range**	**Valve-Reg**	**Flooded**	**Li_ELiTE**	**NiCd**	**Li-LMP**	**obj,attr**
Voltage Settings	Rectifier Float Selective High Voltage Shutdown	-50 to -60V	58.50	58.50	58.50	58.50	58.50	GM1,FSD
	High Float Voltage Major Alarm	-50 to -60V	57.00	57.00	57.00	57.00	57.00	HVA1,FTH
	High Float Voltage Minor Alarm	-50 to -60V	56.00	56.00	56.00	56.00	56.00	HFV1,FTH
	Rectifier/System Float Voltage	-42 to -56.5V	54.48	52.08	54.48	54.40	54.48	GM1,FSP
	Battery on Discharge Float Alarm	-46 to -55V	51.00	50.00	53.00	51.00	51.00	BDA1,FTH
	Very Low Float Voltage Alarm	-40 to -51V	46.00	46.00	46.00	46.00	46.00	VLA1,THR
	Rectifier On Threshold	-40 to -51V	44.00	44.00	44.00	44.00	44.00	DC1,ROT
Battery Disconnect	LV Battery Disconnect	1=Enabled 0=Disabled	1	1	0	1	0	CN1,ENA
	LV Battery Disconnect Voltage	-39.0 to -50V	42.00	42.00	42.00	42.00	42.00	CN1,DTH
	LV Battery Reconnect Voltage	-39.0 to -55V	48.00	48.00	48.00	48.00	48.00	CN1,RTH
Batteries	Cells Per String	0 to 75	24	24	24	24	24	DC1,CPS
	String End Of Discharge Voltage	-40.25 to -48.75V	42.00	42.00	42.00	42.00	42.00	BR1,CEV
	Recharge Current Limit Feature	1=Enabled 0=Disabled	0	0	0	0	0	BR1,CLE
	Recharge Current Limit Value	5 to 1000A	50	50	25	25	25	BR1,CLT
	Boost Maximum Duration	1 to 80 Hours	1	1	1	1	1	BS1,TMD
	Voltage Imbalance Detect	1.5V to 3.0V	1.7	1.7	1.7	2.0	1.7	BR1,SCV
	High Temperature Battery Disconnect	30 to 90°C	75	75	75	75	75	BR1,TTH
	High Battery Temperature	30 to 85°C	55	55	55	55	85	BTHA1,THR
Battery Slope Compensation	Slope Thermal Compensation (STC)	1=Enabled 0=Disabled	1	0	0	0	0	SC1,STT
	High Temperature Voltage Step Down	45 to 85°C	75	75	75	75	75	SC1,SPT
	High Temperature Compensation Stop	30 to 55°C	55	55	55	55	55	SC1,UTT
	High Temperature Decrease Rate	1-10mV/°C per cell	3	3	3	3	3	SC1,USP
	Nominal Temperature (No Temp Comp)	15 to 30 °C	25	25	25	25	25	SC1,NTT
	Low Temperature Compensation Feature	1=Enabled 0=Disabled	0	0	0	0	0	SC1,RVE
	Low Temperature Compensation Stop	-5 to 20°C	0	0	0	0	0	SC1,LTT
	Low Temperature Decrease Rate	1-10mV/°C per cell	3	3	3	3	3	SC1,LSP
Battery Discharge Test	Timed Test Alarm Voltage Threshold	-36 to -48V	44.00	44.00	46.00	44.00	44.00	BR1,TEV
	Rectifier Voltage During Battery Test	-42.00 to -52V	42.00	42.00	42.00	42.00	42.00	BR1,BTV
Battery Boost	Boost Rectifier High Voltage Shutdown	-52 to -60V	58.50	58.50	58.50	58.50	58.50	GM1,BSD
	Boost High Voltage Major Alarm	-50 to -60V	57.0	58.5	57.0	57.0	57.0	HVA1,BTH
	Boost High Voltage Minor Alarm	-50 to -60V	56.0	58.0	56.0	56.0	56.0	HFV1,BTH
	Boost Voltage	-48 to -58V	55.2	57.0	54.5	54.4	54.5	GM1,BSP
	Boost Battery on Discharge Alarm	-46 to -55V	51.0	50.0	53.0	51.0	51.0	BDA1,BTH

Appendix E: Alarms and Relays

Alarm Relays

The control unit is provided with ten alarm relays; seven to provide the actual alarm condition, and three to provide the severity associated with the alarm. The severity relays transmit Power Critical (PCR), Power Major (PMJ), or Power Minor (PMN). Each alarm is factory assigned a severity based on industry practices. However, they may be reassigned to PCR, MAJ, MIN, or RO (Record Only). An alarm condition with the RO severity results in the system controller transmitting the alarm without the severity but is stored in the history log. PCR, PMJ nor PMN are transmitted with the alarm.

The seven selectable alarm relays are called User Alarm Relay 1 (R1) through User Alarm Relay 7 (R7). Relays are user definable in that the user may assign any combination of alarms from a given set of alarms. The following table shows which alarms may be assigned along with their factory default settings.

Alarms

Table E-1 shows a list of all alarms along with their descriptions, default settings, ranges and/or severity, and affected alarm relays and LEDs.

Table E-1 Alarms, Alarm Relays and LEDs Assignments – Pulsar Display

	Severity - Relay and Display					Additional Relay							LED			
Description	CRIT	PMJ	PMN	WRN	RO	R1	R2	R3	R4	R5	R6	R7	AC	DC	BD	Object ID
AC Fail			MIN						R4				AC			ACF1
Alarm Cut-off Active					RO											AAC1
Alarm Test Aborted					RO											ATB1
Alarm Test Active					RO											ATA1
Auxiliary 1		MAJ														AUX1
Auxiliary 2		MAJ														AUX2
Auxiliary 3		MAJ														AUX3
Auxiliary 4		MAJ														AUX4
Auxiliary 5		MAJ														AUX5
Auxiliary 6		MAJ														AUX6
Auxiliary 7		MAJ														AUX7
Auxiliary 8		MAJ														AUX8
Auxiliary 9		MAJ														AUX9
Auxiliary 10		MAJ														AUX10
Auxiliary 11		MAJ														AUX11
Auxiliary 12		MAJ														AUX12
Auxiliary Major Alarm		MAJ														AMJ1
Battery Test Active					RO										BD	BTA1
Battery on Discharge (Float and Boost)		MAJ				R1									BD	BDA1
Battery Thermal alarm			MIN													BTHA1
Check Battery			MIN													BFA1
Clock Battery Low			MIN													BBL1
Clock Changed					RO											CLC1
Communication Loss Major		MAJ														MCM1
Communication Loss Minor			MIN													CMA1
Configuration Changed					RO											CCH1

Table E-1 Alarms, Alarm Relays and LEDs Assignments – Pulsar Display

	Severity - Relay and Display					Additional Relay							LED			
Description	CRIT	PMJ	PMN	WRN	RO	R1	R2	R3	R4	R5	R6	R7	AC	DC	BD	Object ID
Controller Ambient Temperature High			MIN													AMTH1
Controller Ambient Temperature Low			MIN													AMTL1
Controller Fail (Not user mappable)		x	x		x											
Converter Distribution Fuse		MAJ												DC		CDFA1
Converter Fail			MIN							R5						CFA1
Converter Fan Major		MAJ								R5						CFJ1
Converter Fan Minor			MIN							R5						CFN1
Converter Low Voltage	CRIT						R2									CVLA1
Converter High Voltage Major		MAJ										R7				CHVA1
Converter High Voltage Minor			MIN									R7				CHFV1
Converter ID Conflict		MAJ														CDID1
Converter Redundancy Loss			MIN							R5						CRL1
Defective Temp Probe			MIN													TPA1
Emergency Power Off (EPO)		MAJ														EPO1
Energy Management Disabled				WRN												EMD1
Excessive Login Attempts				WRN												EXL1
External Password Reset				WRN												EPR1
Fuse Major 24		MAJ						R3						DC		FAJ1
Fuse Major 48		MAJ						R3						DC		FAJ2
Fuse Minor 24			MIN					R3						DC		FAN1
Fuse Minor 48			MIN					R3						DC		FAN2
Generator Requires Maintenance		MAJ														GNM1
Generator Running			MIN													GNR1
High Voltage Major		MAJ										R7				HVA1
High Voltage Minor			MIN									R7				HFV1
History Cleared					RO											HCL1
ID Conflict		MAJ														DID1
ID Not Configured		MAJ														ZID1
Imminent LVBD Shutdown		MAJ												DC		ISD1
Incompatible Converter			MIN													ICC1
Incompatible Rectifier			MIN													ICR1
Low Battery Temperature					RO											BTLA1
LV Disconnect Contactor 1 Fail		MAJ														CNF1
LV Disconnect Contactor 1 Open		MAJ												DC		CNO1
LV Disconnect Contactor 2 Fail		MAJ														CNF2
LV Disconnect Contactor 2 Open		MAJ														CNO2
LV Disconnect Contactor 3 Fail		MAJ														CNF3
LV Disconnect Contactor 3 Open		MAJ														CNO3
LV Disconnect Contactor 4 Fail		MAJ														CNF4
LV Disconnect Contactor 4 Open		MAJ														CNO4
Manual Off			MIN							R5						MAN1
Multiple AC Fail		MAJ									R6		AC			MACF1
Multiple Converter Fail		MAJ									R6					CMFA1
Multiple Manual Off		MAJ									R6					MMAN1
Multiple Rectifier Fail		MAJ									R6					MFA1
No Call-Out Response				WRN												COR1

Table E-1 Alarms, Alarm Relays and LEDs Assignments – Pulsar Display

	Severity - Relay and Display					Additional Relay							LED			
Description	**CRIT**	**PMJ**	**PMN**	**WRN**	**RO**	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**AC**	**DC**	**BD**	**Object ID**
No Dial-Out Response				**WRN**												POR1
Open String		**MAJ**												**DC**		OSA1
Password At Default					**RO**											PFD1
Processor Halt					**RO**											PHT1
Program Line Invalid		**MAJ**														PGI1
Queue Overflow				**WRN**												COF1
Real-Time Reserve Time Low					**RO**											RRTL1
Rectifier Current Limit					**RO**											CLM1
Rectifier Fail			**MIN**							**R5**						RFA1
Rectifier Fan Fail			**MIN**							**R5**						RFN1
Rectifier Redundancy Loss			**MIN**							**R5**						RLS1
Reserve Time Low					**RO**											RTL1
Ringer External Failure Major		**MAJ**														RPXJ1
Ringer External Failure Minor			**MIN**													RPXN1
Ringer Fail Major		**MAJ**														RPFJ1
Ringer Fail Minor			**MIN**													RF1
Ringer Fan Fail			**MIN**													RPFF1
Ringer ID Conflict		**MAJ**														RCDP1
Ringer Redundancy Loss			**MIN**													RPRL1
Self Test Failed			**MIN**													STF1
Sense Fuse			**MIN**													VSF1
Thermal Probe Failure			**MIN**													TPA1
Unconfigured Alarm Destination				**WRN**												NNC1
Un-powered Controller (Not configurable)		**x**	**x**		**x**	**x**	**x**	**x**				**x**				
Very High Battery Temperature					**RO**											BTVH1
Very Low Battery Temperature					**RO**											BTVL1
Very Low Voltage	**CRIT**						**R2**									VLA1
Voltage Duplicate ID		**MAJ**														MDP1
Voltage ID Not Configured		**MAJ**														MZD1
Voltage Imbalance Detect			**MIN**													SCD1
Voltage Monitoring Module Failure			**MIN**													VMF1

Table E-2 Alarms, Alarm Relays and LEDs Assignments – Phoenix Display

	Severity - Relay and Display					Additional Relay							LED	
Description	CRIT	PMJ	PMN	WRN	RO	R1	R2	R3	R4	R5	R6	R7		Object ID
AC Fail			PMN			R1							ACF	ACF1
Alarm Cut-off Active					RO								ACO	AAC1
Alarm Test Aborted					RO									ATB1
Alarm Test Active					RO									ATA1
Auxiliary 1		MAJ												AUX1
Auxiliary 2		MAJ												AUX2
Auxiliary 3		MAJ												AUX3
Auxiliary 4		MAJ												AUX4
Auxiliary 5		MAJ												AUX5

Table E-2 Alarms, Alarm Relays and LEDs Assignments – Phoenix Display

	Severity - Relay and Display					Additional Relay							LED	
Description	CRIT	PMJ	PMN	WRN	RO	R1	R2	R3	R4	R5	R6	R7		Object ID
Auxiliary 6		MAJ												AUX6
Auxiliary 7		MAJ												AUX7
Auxiliary 8		MAJ												AUX8
Auxiliary 9		MAJ												AUX9
Auxiliary 10		MAJ												AUX10
Auxiliary 11		MAJ												AUX11
Auxiliary 12		MAJ												AUX12
Auxiliary Major Alarm		MAJ						R3					DFA	AMJ1
Battery Test Active					RO		R2						BOD	BTA1
Battery on Discharge (Float and Boost)		MAJ					R2						BOD	BDA1
Check Battery			MIN											BFA1
Real Time Clock Battery Low			MIN											BBL1
Clock Changed					RO									CLC1
Communication Loss Major		MAJ												MCM1
Communication Loss Minor			MIN											CMA1
Configuration Changed					RO									CCH1
Controller Ambient Temperature High			MIN										TEMP	AMTH1
Controller Ambient Temperature Low			MIN										TEMP	AMTL1
Controller Fail (Not user mappable)		x	x		x									
Converter Distribution Fuse		MAJ						R3					DFA	CDFA1
Converter Fail		MAJ										R7	CFA	CFA1
Converter Fan Minor			MIN									R7	CFA	CFN1
Converter Low Voltage	CRIT											R7	CFA	CVLA1
Converter High Voltage Major		MAJ										R7	CFA	CHVA1
Converter High Voltage Minor			MIN									R7	CFA	CHFV1
Converter ID Conflict		MAJ										R7		CDID1
Converter Redundancy Loss		MAJ										R7	CFA	CRL1
Defective Temp Probe			MIN											TPA1
Emergency Power Off (EPO)		MAJ												EPO1
Energy Management Disabled				WRN										EMD1
Excessive Login Attempts				WRN										EXL1
External Password Reset				WRN										EPR1
Fuse Major 24		MAJ						R3					DFA	FAJ1
Fuse Major 48		MAJ						R3					DFA	FAJ2
Fuse Minor 24			MIN					R3					DFA	FAN1
Fuse Minor 48			MIN					R3					DFA	FAN2
Generator Requires Maintenance		MAJ												GNM1
Generator Running			MIN											GNR1
High Battery Thermal alarm			MIN										BAT	BTHA1
High Voltage Major		MAJ							R4				HVSD	HVA1
High Voltage Minor			MIN						R4				HVA	HFV1
History Cleared					RO									HCL1
ID Conflict		MAJ												DID1
ID Not Configured		MAJ												ZID1
Imminent LVBD Shutdown		MAJ												ISD1

Table E-2 Alarms, Alarm Relays and LEDs Assignments – Phoenix Display

	Severity - Relay and Display					Additional Relay							LED	
Description	CRIT	PMJ	PMN	WRN	RO	R1	R2	R3	R4	R5	R6	R7		Object ID
Incompatible Converter			MIN										CFA	ICC1
Incompatible Rectifier			MIN							R5			RFA	ICR1
Low Battery Temperature					RO									BTLA1
LV Disconnect Contactor 1 Fail	CRIT	MAJ											LVD	CNF1
LV Disconnect Contactor 1 Open	CRIT	MAJ											LVD	CNO1
LV Disconnect Contactor 2 Fail	CRIT												LVD	CNF2
LV Disconnect Contactor 2 Open	CRIT												LVD	CNO2
LV Disconnect Contactor 3 Fail		MAJ											LVD	CNF3
LV Disconnect Contactor 3 Open		MAJ											LVD	CNO3
LV Disconnect Contactor 4 Fail		MAJ											LVD	CNF4
LV Disconnect Contactor 4 Open		MAJ											LVD	CNO4
Manual Off			MIN											MAN1
Multiple AC Fail		MAJ				R1							ACF	MACF1
Multiple Converter Fail		MAJ										R7	CFA	CMFA1
Multiple Manual Off		MAJ												MMAN1
Multiple Rectifier Fail		MAJ									R6		RFAM	MFA1
No Call-Out Response				WRN										COR1
No Dial-Out Response				WRN										POR1
Open String		MAJ						R3					DFA	OSA1
Password At Default					RO									PFD1
Processor Halt					RO									PHT1
Program Line Invalid		MAJ												PGI1
Queue Overflow				WRN										COF1
Real-Time Reserve Time Low					RO									RRTL1
Rectifier Current Limit					RO									CLM1
Rectifier Fail		MAJ								R5			RFA	RFA1
Rectifier Fan Fail			MIN							R5			RFA	RFN1
Rectifier Redundancy Loss			MIN										LMR	RLS1
Reserve Time Low					RO									RTL1
Ringer External Failure Major		MAJ												RPXJ1
Ringer External Failure Minor			MIN											RPXN1
Ringer Fail Major		MAJ												RPFJ1
Ringer Fail Minor			MIN											RF1
Ringer Fan Fail			MIN											RPFF1
Ringer ID Conflict		MAJ												RCDP1
Ringer Redundancy Loss			MIN											RPRL1
Self Test Failed			MIN											STF1
Sense Fuse			MIN											VSF1
Unconfigured Alarm Destination				WRN										NNC1
Un-powered Controller (Not configurable)	x	x	x		x	x	x	x	x	x	x	x		
Very High Battery Temperature		MAJ											BAT	BTVH1
Very Low Battery Temperature					RO									BTVL1
Very Low Voltage		MAJ											BOD, VLV	VLA1
Voltage Duplicate ID		MAJ												MDP1

Table E-2 Alarms, Alarm Relays and LEDs Assignments – Phoenix Display

	Severity - Relay and Display					Additional Relay							LED	
Description	CRIT	PMJ	PMN	WRN	RO	R1	R2	R3	R4	R5	R6	R7		Object ID
Voltage ID Not Configured		MAJ												MZD1
Voltage Imbalance Detect			MIN											SCD1
Voltage Monitoring Module Failure			MIN											VMF1

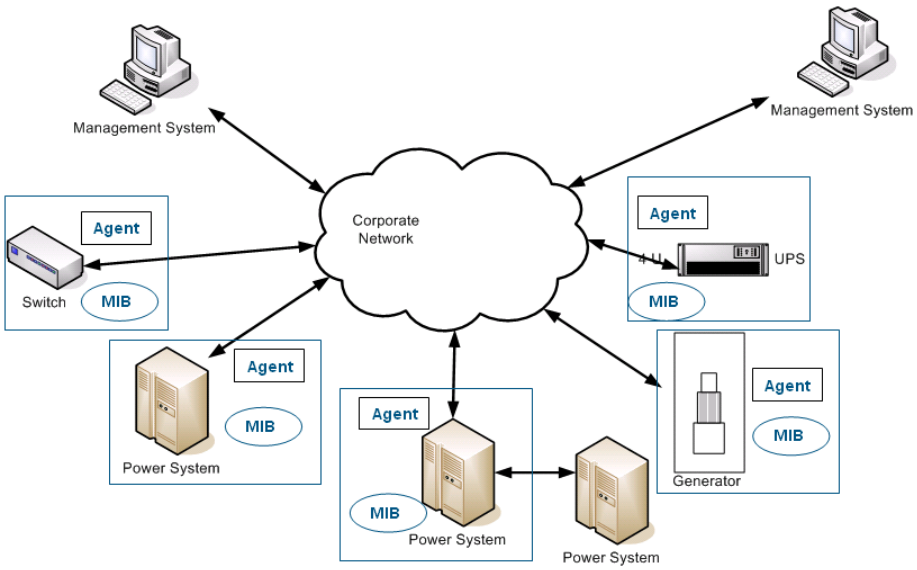
Table E-3 Alarms, Alarm Relays and LEDs Assignments – Phoenix Display – Default UDEs

	Severity - Relay and Display					**Additional Relay**							**LED**	
Description	**CRIT**	**PMJ**	**PMN**	**WRN**	**RO**	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**		**Object ID**
Total Current Alarm Plant			**MIN**										TCA	
Total Current Alarm Converter			**MIN**										TCA	
Distribution Current Side A			**MIN**										DCA	
Distribution Current Side B			**MIN**										DCA	

Appendix F: SNMP

SNMP Overview

In addition to supporting the basic protocols (Telnet, HTTP, FTP, and SMTP) on TCP/IP, the Pulsar Plus family of controllers support conveying system alarm and control information to a Network Operation Center (NOC) using the Simple Network Management Protocol (SNMP). SNMP is the most popular protocol for managing diverse networks. Using SNMP to access management information data and retrieve alarm information can allow company personnel to more easily manage system performance and remotely find and solve system problems. A controller serves as an SNMP Agent. A SNMP Host system is used to communicate to a multitude of SNMP Agents. A number of SNMP Host packages are available such as HP OpenView, Castle Rock Computing SNMPc, IBM NetView, Lucent OneVision, and Sun Micro's NetManager. Lineage Power Systems also provides a SNMP Host focused on the needs of the power engineer with its Manager product.



Simple Network Management Protocol is an application-layer protocol designed to facilitate the exchange of management information between network devices. There have been several releases of SNMP in its history and the controller implements an **SNMPv2C Agent**. SNMPv2C is backwards compatible with SNMPv1.

A key part of the SNMP protocol is the detailed Management Information
Base (MIB) that describes all Agent variables that can be accessed. For the controller, this includes all the objects controlled or monitored in the system such as: rectifiers, converters, distribution monitoring cards, alarms, etc. Essentially, all elements described in the T1.317 protocol (see Appendix B) are available in SNMP. The MIB will be needed by any SNMP Host that wishes to communicate with the controller and can be retrieved at the "Design Tools and Download" link located at http://www.lineagepower.com .

SNMP Operations

Interactions between the SNMP Host and the SNMP Agent can be any of four different types of commands: Reads, Writes, Traversal operations, and Traps. SNMP utilizes six operations to respond to the various SNMP Hosts: Get, GetNext, GetBulk, Set, Trap, and Inform. The controller implements the Get, GetNext, Set, and Trap operations.

Get - Allows the SNMP Host to retrieve a value from the SNMP Agent.

GetNext - Allows the SNMP Host to retrieve the next value in sequence from a table or list of variables in the SNMP Agent.

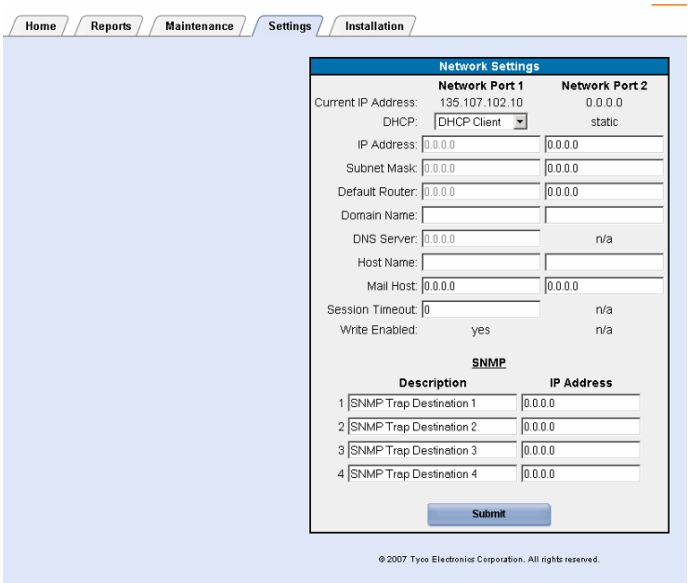
Set - Allows the SNMP Host to set a value within the SNMP Agent.

Trap - Used by the SNMP Agent (the power system controller) to asynchronously inform the SNMP Host of an event such as an alarm notification. Unlike the other operations, the trap does not require a response from the host. The SNMP Agent must be configured with appropriate addresses of the SNMP Host.

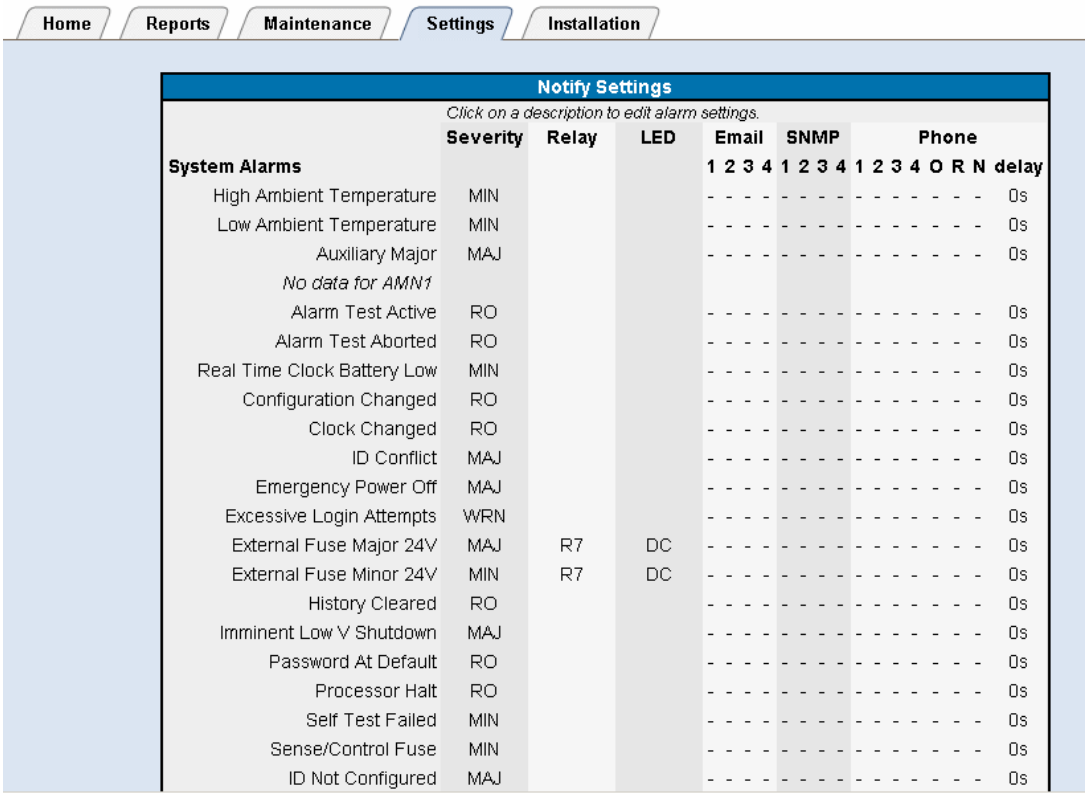
SNMP Configuration

SNMP functionality is always available. No enabling or disabling of the feature is required. Appropriate trap destinations and assignments of specific alarms must be configured for SNMP to properly send out Traps. Users can configure these SNMP parameters from the browser interface. They may also be configured from a Telnet command line interface.

Configuration of the IP addresses for Trap destinations is performed under the “Network” link under the main configuration “Settings” tab. The controller supports up to four different destinations for SNMP messages. Each destination (1 through 4) is configured with an IP address. The sample screen for this configuration follows.



Individual alarms or events are assigned as Traps to one of the four specific SNMP destinations. Assignment of the alarm and events is performed under the “Alarm Notification” link under the main configuration “Settings” tab. The sample screen for this configuration follows.



Notify Settings

Click on a description to edit alarm settings.

	Severity	Relay	LED	Email	SNMP	Phone	
System Alarms				1 2 3 4	1 2 3 4	1 2 3 4 O R N	delay
High Ambient Temperature	MIN			- - - -	- - - -	- - - - - - -	0s
Low Ambient Temperature	MIN			- - - -	- - - -	- - - - - - -	0s
Auxiliary Major	MAJ			- - - -	- - - -	- - - - - - -	0s
No data for AMN1							
Alarm Test Active	RO			- - - -	- - - -	- - - - - - -	0s
Alarm Test Aborted	RO			- - - -	- - - -	- - - - - - -	0s
Real Time Clock Battery Low	MIN			- - - -	- - - -	- - - - - - -	0s
Configuration Changed	RO			- - - -	- - - -	- - - - - - -	0s
Clock Changed	RO			- - - -	- - - -	- - - - - - -	0s
ID Conflict	MAJ			- - - -	- - - -	- - - - - - -	0s
Emergency Power Off	MAJ			- - - -	- - - -	- - - - - - -	0s
Excessive Login Attempts	WRN			- - - -	- - - -	- - - - - - -	0s
External Fuse Major 24V	MAJ	R7	DC	- - - -	- - - -	- - - - - - -	0s
External Fuse Minor 24V	MIN	R7	DC	- - - -	- - - -	- - - - - - -	0s
History Cleared	RO			- - - -	- - - -	- - - - - - -	0s
Imminent Low V Shutdown	MAJ			- - - -	- - - -	- - - - - - -	0s
Password At Default	RO			- - - -	- - - -	- - - - - - -	0s
Processor Halt	RO			- - - -	- - - -	- - - - - - -	0s
Self Test Failed	MIN			- - - -	- - - -	- - - - - - -	0s
Sense/Control Fuse	MIN			- - - -	- - - -	- - - - - - -	0s
ID Not Configured	MAJ			- - - -	- - - -	- - - - - - -	0s

Community Strings

SNMP Community Strings can serve as passwords or user IDs for network elements. The community name assigns an access environment for a set of SNMP Hosts or Agents using that community name. An SNMP Host or Agent within the community can be said to exist within the same administrative domain. Because devices that do not know the proper community name are precluded from SNMP operations, network management personnel can use the community name as a weak form of authentication. Community strings can be either read only or read/write. Having this capability provides further security by restricting the ability to alter the configuration of the managed device.

Presently the controller defaults the value of the community string to “public” with read/write access. These SNMP parameters are not configurable at this time.

This page is intentionally blank.

Issue History

Issue 0.1

Released for review and comment.

Issue 1.0

Initial Product Release.

Issue 2.0

Corrected page header on pages 143-162; corrected items to Pulsar Plus; added 24V accuracy; corrected various spelling; change Table D: float range of 24V to (21 to 28), removed DC1,SCAP, BR1,TMD format changed from number to hh:mm:ss, 2nd (BT07,DES) changed to (BT08,DES), RL1 changed to RLS1 (rectifier redundancy loss alarm), corrected J4 output alarm default descriptions in Connection Pulsar section, added note to step 8 of the connecting to pulsar section.

Issue 3.0

Enhanced power cable connection J9 descriptions in Step 8 of Connecting to Pulsar Plus.

Issue 4.0

Rebranding

Issue 5.0

Added NE843G, Added ES772 section

Issue 6.0

Not issued

Issue 7.0

Integrated NE843P Phoenix III controller

Issue 8.0

Fixed Table 5 Wire Colors

This page is intentionally blank.